European Commission

Preparatory study on ecodesign for furniture

Phase I
Tasks 1 to 4

Draft Report
Version 1

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Unit B4 — Sustainable Products

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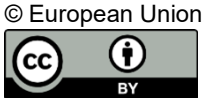

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1 Abbreviations

ABS	Acrylonitrile Butadiene Styrene
AASS	Acetic Acid Salt Spray
AGEC	Anti-Waste and Circular Economy Law (France)
AI	Artificial Intelligence
BAT	Best Available Technology
BNAT	Best Near Available Technology
BoM	Bill of Materials
BoS	Bill of Substances
BREF	Best Available Techniques Reference Document
BPR	Biocidal Products Regulation
B2B	Business-to-Business
B2C	Business-to-Consumer
CAM	Criteri Ambientali Minimi (Italian Green Public Procurement criteria)
CARB	California Air Resources Board
CAS	Civic Amenity Site
CASS	Copper-Accelerated Acetic Acid Salt Spray
CBM	Trade Association for Interior Design and the Furniture Industry (Netherlands)
CEPS	Centre for European Policy Studies
CEN	European Committee for Standardization
CLP	Classification, Labelling and Packaging Regulation
CMD	Chair Measurement Device
CN	Combined Nomenclature
CO_2	Carbon Dioxide
CPR	Construction Products Regulation
Cr(VI)	Hexavalent Chromium
D2C	Direct-to-Consumer
DEA	Déchets d'Éléments d'Ameublement (Furniture Waste Stream, France)
DG ENV	Directorate-General for Environment
DIN	Deutsches Institut für Normung (German Standards Institute)
DoP	Declaration of Performance
DPP	Digital Product Passport
EAP	Enquête Annuelle de Production
EEA	European Environment Agency
EEE	Electrical and Electronic Equipment
EFTA	European Free Trade Association
EFIC	European Furniture Industries Confederation
EoL	End of Life
EPD	Environmental Product Declaration
EPI	Emulsion Polymer Isocyanate
EPR	Extended Producer Responsibility
ESPR	Ecodesign for Sustainable Products Regulation
ETSI	European Telecommunications Standards Institute
EVA	Ethylene Vinyl Acetate
FSC	Forest Stewardship Council
GHG	Greenhouse Gas

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GOLS	Global Organic Latex Standard
GOTS	Global Organic Textile Standard
GPP	Green Public Procurement
GPSR	General Product Safety Regulation
GRS	Global Recycled Standard
HBCDD	Hexabromocyclododecane
HDF	High Density Fibreboard
HDPE	High Density Polyethylene
HPL	High Pressure Laminate
HS	Harmonized System (customs nomenclature)
HTC	Hydrothermal Carbonization
IKEA	Ingvar Kamprad Elmtaryd Agunnaryd
ISO	International Organization for Standardization
ISCC+	International Sustainability and Carbon Certification
JRC	Joint Research Centre
LCA	Life Cycle Assessment
LCC	Life Cycle Cost
LCI	Life Cycle Inventory
LEED	Leadership in Energy and Environmental Design
LLCC	Least Life Cycle Cost
MDF	Medium Density Fibreboard
MEErP	Methodology for Ecodesign of Energy-related Products
MS	Member State
NGO	Non-Governmental Organisation
NSS	Neutral Salt Spray
OEFSR	Organisation Environmental Footprint Sector Rules
OSA	Open Strategic Autonomy
OSB	Oriented Strand Board
PA	Polyamide
PAH	Polycyclic Aromatic Hydrocarbon
PBDE	Polybrominated Diphenyl Ether
PCP	Pentachlorophenol
PE	Polyethylene
PEF	Product Environmental Footprint
PEFCR	Product Environmental Footprint Category Rules
PEFC	Programme for the Endorsement of Forest Certification
PFAS	Per- and Polyfluoroalkyl Substances
PFHxS	Perfluorohexane Sulfonic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PMMA	Polymethyl Methacrylate
POPs	Persistent Organic Pollutants
PP	Polypropylene
PRO	Producer Responsibility Organisation
PST	Production in Physical Units
PU	Polyurethane
PVC	Polyvinyl Chloride
QA	Quality Assurance

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RCS	Recycled Claim Standard
RDF	Refuse-Derived Fuel
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RTA	Ready-to-Assemble
SCIP	Substances of Concern In Products database
SCCPs	Short-Chain Chlorinated Paraffins
SDG	Sustainable Development Goals
SDS	Safety Data Sheet
SHM	Stakeholder Meeting
SME	Small and Medium-sized Enterprise
SoC	Substance of Concern
SRF	Solid Recovered Fuel
STM	Surface Treatment of Metals and Plastics
STS	Surface Treatment using Organic Solvents
SVHC	Substance of Very High Concern
TFL	Thermally Fused Laminate
TIG	Tungsten Inert Gas Welding
TLR	Textile Labelling Regulation
TPE	Thermoplastic Elastomer
TPU	Thermoplastic Polyurethane
TRL	Technology Readiness Level
UF	Urea Formaldehyde
UNI	Ente Italiano di Normazione (Italian Standards Body)
UV	Ultraviolet
VOC	Volatile Organic Compound
WBP	Wood-Based Panels
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WtE	Waste-to-Energy

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Draft for SHM1

1. Executive summary

Task 1: Scope

Task 1 examines existing furniture definitions, relevant legislation, voluntary schemes and standards for furniture. It also assesses which circularity aspects are relevant to furniture.

Furniture represents a highly heterogeneous product group, encompassing a wide range of product types, functions, materials, lifetimes and use contexts, and is characterised by a broad diversity in design, construction, size and material composition. A functional definition of furniture is therefore essential.

The most relevant definition identified is that developed by the European Commission's Joint Research Centre (JRC) i.e. "free-standing or built-in units whose primary function is to be used for the storage, placement or hanging of items and/or to provide surfaces where users can rest, sit, eat, study or work, whether for indoor or outdoor use. Bed frames, legs, bases and headboards are included in the scope. Not included are: bed mattresses, streetlights, railings and fences, ladders, clocks, playground equipment, stand-alone or wall-hung mirrors, electrical conduits, road bollards and building products such as steps, doors, windows, floor coverings and cladding" (Faraca et al., 2024)

At this preliminary draft stage of the Preparatory Study, questions remaining regarding the scope include whether built-in units should be included within the scope or not, and what specific exclusions should be made from the scope of any eventual regulation.

Task 1 also conducts the assessment of the relevance of circularity aspects to furniture as a 'complex, durable' product i.e. "a product which is composed of multiple components which can be replaced permitting disassembly and re-assembly of the product" and which is expected to last a considerable length of time. Filtering, validation and clustering of circularity aspects were conducted according to the JRC's methodology B2 (Rodriguez et al., 2025). The resulting clusters of circularity aspects emerged of relevance: durability and reliability; repairability and possibility of maintenance; recyclability, recovery of materials and recycled content; and upgradeability and modularity/design-for-disassembly.

Based on these clusters, existing bases for defining and measuring circularity requirements were identified from standards and voluntary labels. It is noted that a range of circularity standards are currently being prepared by CEN Technical Committee for furniture's Working Group 10 for all relevant circularity clusters, but so far, only one is available: EN 17902:2023 (Furniture – Circularity – Evaluation method for dis/re-assembly capability). The rest remains in development. Nevertheless, a range of product specific standards for 'durability and reliability' exist, while criteria for assessing 'repairability and possibility of maintenance', and 'recyclability, possibility of recovery of materials and recycled content' have been defined within several voluntary labels.

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Task 2: Markets

Task 2 analyses the EU furniture market and provides the economic and market data required to support the definition of representative base cases and the subsequent environmental and economic assessment. It covers generic economic data such as production, sales, trade, consumption, market structure, market failures and secondary market, as well as stock data, market trends, consumer costs and attitudes, and information on the furniture value chain and sourcing of raw materials.

The analysis confirms that furniture is an economically significant but highly heterogeneous market, made of a highly diverse product group, characterised by a fragmented manufacturing structure and an extensive intra-EU trade. Production on own account in the EU-27 amounted to approximately **EUR 76.6 billion in 2024**, following a peak of EUR 82.9 billion in 2022, while sold production was slightly higher at **EUR 76.9 billion**. Kitchen furniture was the largest individual category by value, at around EUR 14.1 billion.

The EU furniture industry comprises around 125,000 manufacturing enterprises, of which approximately 92% are micro-enterprises, highlighting the highly fragmented nature of the sector. Small and medium enterprises (SMEs) account for a further 7% of companies, while large enterprises represent only a very small share of the total number of firms. Despite this fragmentation, production value, employment and trade are concentrated in a limited number of Member States, notably Germany, Italy, Poland, France and Spain. The sector remains an important manufacturing activity and employer across the Union, while a growing share of production is integrated into international value chains.

Nominal sold production value increased by 1.7 % per year between 2015 and 2024, whereas real sold production value declined by around 1.1 % per year after adjusting for producer price changes. Kitchen furniture was the only category assessed to record positive real growth over the period.

Trade plays a major role in the furniture market. Intra-EU trade is particularly significant, reflecting the integrated nature of European furniture value chains, while imports from outside the EU (in particular, China, Türkiye, Vietnam, Ukraine, Taiwan, Indonesia, Serbia, Bosnia and Herzegovina) contribute to the supply of several furniture categories and components. Extra-EU exports and imports were each around EUR 20 billion in 2024.

The analysis identifies differences in import dependency across furniture products and raw materials. The EU has a particularly strong position in kitchen furniture, for which extra-EU imports are comparatively limited, whereas reliance on imports is considerably higher for products such as metal furniture, seating and furniture components. Furthermore, although the EU remains largely self-sufficient in key wood-based materials such as sawnwood and particle board, dependency on non-EU suppliers is more pronounced for veneer sheets and plywood. The sourcing of these materials is concentrated among a relatively small number of exporting countries (mainly Ukraine, China, Brazil and the United States), creating potential supply-chain vulnerabilities, particularly in relation to geopolitical developments and the availability of sustainable raw materials.

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Wood remains the dominant material used in furniture manufacturing, both in raw form and as intermediate products, accounting for the majority of production value, followed by textiles, leather, rubber and other materials used in upholstered products. The furniture industry faces increasing difficulties in securing reliable access to high-quality raw materials, particularly wood. Competition for wood resources from construction, packaging and bioenergy applications is increasing, while disruptions linked to global supply chains and geopolitical events have contributed to higher procurement costs and material shortages in recent years.

Furniture is characterised by relatively long but highly variable product lifetimes, depending on product type, quality and market segment. Working average lifetimes was found to range from around 10 years for upholstered seating to 15 years for several wooden and metal furniture categories. Based on these lifetimes and Eurostat sold production quantities, the stock of the seven furniture categories reported in units is estimated at approximately 6.7 billion units in 2024, with other wooden furniture, kitchen furniture and dining and living-room furniture accounting for the largest shares. Other metal furniture, which is reported by Eurostat by weight rather than units, represents an additional estimated stock of around 18.5 million tonnes. These figures are first-order estimates based on EU sold production and therefore exclude imported furniture and do not deduct products subsequently exported.

The analysis finds that repair, reuse and refurbishment activities are becoming increasingly important elements of the furniture market, though their development varies significantly across Member States. Some countries have established dedicated furniture EPR systems (France) or are in the process of establishing one (e.g. Italy, Spain) or offer repair incentives and reuse infrastructures (e.g. France, the Netherlands). Nevertheless, most of the EU MSs continue to rely primarily on municipal bulky-waste management systems. France provides the most developed example of a system supporting collection, reuse, repair and recycling. Refurbishment also appears more established in professional and office furniture markets than in the domestic market.

Meanwhile, the second-hand furniture market, encompasses reuse, resale, refurbishment and repair through social enterprises, is expanding, driven by digital marketplaces, specialised resale platforms and refurbishment activities. However, data remain fragmented and reuse is likely to be significantly underreported. EU reporting indicates average furniture reuse of around 6 kg per capita, but with considerable variation between Member States and reporting methodologies. Demand for refurbished furniture is increasing in some market segments, particularly in public procurement, where organisations with carbon reduction targets are taking the lead in purchasing refurbished furniture. Buy-back and resale schemes illustrate how circular business models can extend product lifetimes while creating commercial value. Furniture-as-a-Service models are emerging, particularly in the office furniture segment, but stakeholder feedback suggests that ownership-based business models remain strongly preferred by household consumers.

Important market failures remain at end of life. Furniture waste is poorly captured in official statistics, with no dedicated EU furniture-waste category; therefore, bulky waste is used as the closest available proxy. Available evidence indicates that recycling, reuse and remanufacturing remain limited and that substantial quantities of furniture continue to be incinerated or landfilled. Stakeholders highlighted the gap in collection

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systems, the absence of dedicated requirements for separate collection and sorting of furniture waste, limited information on material composition, a lack of harmonised approaches and incentives for reuse and refurbishment, as well as uneven application of EPR schemes across the EU. These shortcomings are particularly relevant for increasingly complex and multi-material furniture products.

Consumer preferences continue to be influenced primarily by price, quality, aesthetics and durability. Stakeholder consultation indicates that durability is regarded as the most important circular design feature across all furniture categories, while modularity, repairability and design for disassembly are generally considered of medium importance. Consumers are perceived to value extended warranties, repair information and the availability of spare parts, suggesting a willingness to keep furniture in use for longer periods where repair and maintenance remain feasible. At the same time, repair decisions are strongly influenced by the value of the furniture item and by the cost of repair relative to replacement, with consumers reported to be less willing to repair low-cost furniture and high repair costs identified as a major barrier to repair.

The market is also undergoing significant technological and business innovation. Digitalisation is transforming both manufacturing and retail activities through the adoption of digital twins, artificial intelligence, 3D modelling, virtual reality and augmented reality applications. These technologies support product customisation, improve resource efficiency and enhance the online purchasing experience. Innovation is also evident in materials, with increasing interest in recycled inputs, bio-based materials, algae-derived products, fungal composites and other alternatives aimed at reducing environmental impacts and supporting circular economy objectives.

Task 3: Users

Task 3 addresses the use phase of furniture and the user- and demand-side aspects relevant to it. It analyses how furniture is purchased, used, maintained, repaired, passed on and discarded, and identifies the social, cultural, economic and infrastructural conditions that can support or restrict potential ESPR measures. Under the revised MEErP methodology, its purpose extends beyond traditional use-phase energy consumption to user-specific parameters, circular practices and barriers. It provides the behavioural evidence needed to complement Task 4's technical assessment, define representative lifetimes and end-of-life assumptions for the Task 5 base-case LCA/LCC modelling, assess realistic improvement options in Task 6, and inform the scenario and policy assessments in Tasks 7 and 8. On average, the direct use-phase impacts of furniture, e.g., arising from cleaning, care and maintenance are low and were estimated at less than 1% of total life-cycle impacts because furniture mostly do not consume high amount of energy or water during use. The main relevance of the use phase is therefore the actual use-time for which furniture provides its function: Longer actual service life can postpone replacement and distribute production impacts over more years of use. Consequently, not only the technical lifetime is relevant but consumer behaviour and the actual use-time a piece of furniture stays in use are as important when assessing the environmental impacts and savings potential of durable furniture.

Consumer behaviour matters first at purchase, as it determines which products enter households and what consumers expect from them. Across the available evidence,

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functionality, fit for purpose, perceived quality and durability, design and price are the strongest purchasing criteria. Sustainability is relevant but generally remains secondary to attributes that provide an immediate personal benefit, particularly under affordability constraints. This creates an attitude–behaviour gap: Consumers may support sustainable furniture in principle while paying a premium or choosing sustainable over cheaper alternatives might be less common. ESPR-related information is therefore more likely to influence decisions when environmental performance is translated into tangible benefits such as longer lifetime, easier maintenance, resistance to wear and repairability. Health and product safety may also provide a relevant entry point because they are concrete and personally salient to consumers. However, detailed information on hazardous substances may be difficult for consumers to interpret, particularly as potential health impacts depend not only on the presence of a hazardous substance but also on actual exposure and resulting risk. Consumer-facing information may therefore be more effective where complex substance-related information is translated into clear and meaningful indicators or product-safety information rather than presented as extensive lists of substances. At the same time, the market trend towards low-cost furniture and more frequent purchasing risks shortening actual lifetimes even where products remain technically usable.

Lifetime is the most important Task 3 parameter for the upcoming base-case definition and LCA/LCC modelling , and it further plays a significant role in the definition of ambitious ESPR requirements and effective measures. However, reliable and comparable data on the actual lifetime of furniture are scarce - also due to the variety of materials and dimension of the product group - and available sources most often do not differentiate between technical lifetime and actual use-time although these might differ materially. The strongest comparable consumer evidence found reports actual use-times of 8.6 years for couches, 8.8 years for desks and 10.5 years for wardrobes, compared with desired lifetimes of 13.2, 17.9 and 19.0 years respectively, while reliable data on other furniture products or EU-average lifetimes are absent. Other sources generally provide much wider and partly incompatible estimates that might not cover real-world conditions. Task 5 should therefore distinguish technical lifetime from actual first-user lifetime, apply product-specific assumptions and ranges, and test uncertain parameters through sensitivity analysis rather than relying on a single universal value.

The difference between technical lifetime and actual use-time is explained by the reasons consumers replace or discard furniture. Physical failure, instability and wear remain relevant, but disposal frequently occurs while products are still functional. Moves, changes in household composition or room use, loss of fit, redecoration, changing aesthetic preferences, perceived obsolescence, low attachment, repair costs and the convenience of disposal can all end to premature end-of-life. Limited awareness of reuse channels and the effort required to find another user can further redirect usable furniture towards bulky-waste systems or informal throwing. Lifetime modelling must therefore recognise that improved technical durability enables, but does not guarantee, longer use.

Several lifetime-extension strategies can be evaluated for furniture. Maintenance and appropriate care can preserve functional and aesthetic condition, while misuse, unsuitable detergents, moisture, incorrect assembly or other inappropriate treatment can cause premature damage. Relevant practices differ considerably between materials (e.g., wood, metal, plastics, leather, textiles and upholstered products) or assembly types of furniture. Yet actual consumer maintenance routines and the

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resulting lifetime extension are poorly quantified. Product-specific, concise care information may support correct behaviour, but the evidence does not currently justify one harmonised maintenance frequency or a quantified EU-wide lifetime benefit.

Repair already occurs to a meaningful extent and is predominantly informal. A comprehensive Danish regional survey (Dorland & Jørgensen, 2025) reports an average furniture repair rate of 42%, with rates above 50% for cabinets/dressers, shelves and dining tables/chairs, compared with 34% for sofas/recliners and 26% for office furniture. Around 78% of recorded repairs were undertaken by users themselves, friends or family indicating at a low rate of professional furniture repair. Repair decisions depend on product value, emotional attachment, age, failure type, expected repair quality, cost and convenience. Among unrepaired furniture, perceived or actual unrepairability, repair cost, and replacement preference play an important role while lack of repair locations was less important and regionally different.

Reuse and resale can extend service life by transferring furniture to another user and often occur through informal channels, including friends and family, online marketplaces and free-giveaway networks. Their environmental benefit, however, cannot be inferred from transaction volumes alone. It depends on whether the reused item replaces a new purchase, how long the secondary use lasts, transport requirements and rebound effects. Marketplace-based modelling suggests a secondary-life extension factor of about 1.5, or approximately 4.6 additional years for furniture on average, but this is not a universal observed value between furniture types and studies. Evidence reviewed in Task 3 indicates a displacement rate of around 29% in one regional study, illustrating that many second-hand acquisitions may be additional rather than substitutes for new furniture. Additionally, high rebound effects arising from additional consumption through freed income could even reverse the environmental impact savings. Task 5–6 assessments should therefore take the displacement rate, secondary lifetime and rebound effects into account for modelling.

Refurbishment, leasing and furniture-as-a-service can also retain furniture in productive use, particularly in B2B, office and public-procurement markets where take-back, asset management and organised service cycles are more developed. Refurbishment barriers include labour and logistics costs, difficult disassembly, weak base materials, cleaning and hygienisation requirements, component availability, fragmented service capacity and uncertain demand. These models can therefore benefit from durable structures, replaceable wear parts, repeated non-destructive disassembly and reliable product histories.

Finally, furniture collection and end-of-life routing are highly heterogeneous. There is no harmonised EU furniture-waste stream or dedicated waste code: Products may enter municipal bulky waste, separately collected wood, scrap metal, residual waste, retailer take-back, reuse networks or, where electronics are integrated, WEEE systems. Plastic and other material fractions may subsequently be separated for recycling during dismantling, sorting and treatment. Collection systems and treatment routes differ substantially between Member States, and EU-level quantities cannot be robustly derived from the available national and regional evidence. Estimates of reusable shares also vary widely according to definitions, product mix, handling and market conditions. Collection itself can destroy value through throwing, compaction, weather exposure, transport damage or mixed storage while separate collection, early

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sorting, logistics, local demand and preparation-for-reuse infrastructure ultimately determine how much remaining value is retained.

Task 4: Technologies

In addition to being an incredibly heterogeneous product group, furniture is a composite of independently-sourced material streams including solid and engineered wood, metals, plastics, textiles/leather, foams, and various adhesives and surface treatments. Each of these streams has its own upstream production chain, with existing BAT on production covered in BREF documents, and end-of-life considerations. The furniture manufacturer typically designs a product based on these component parts – they order, cut, shape and assembles these inputs into the final product. This means most material-level environmental requirements (resin chemistry, alloy composition, foam formulation) lie with upstream suppliers, and the manufacturer's practical influence over ESPR outcomes is based on material selection, joining/fastening method, and business model e.g. flat-pack/self-assembly vs. fully-assembled/bespoke.

Due to the difficulties of defining “average” furniture products, Task 4 gives an overview of relevant material-level characteristics to bring an understanding to the different production processes and materials used in furniture. A Bill of Materials (BoM) for 20 furniture types from seating, storage and surfaces has been developed based on Environmental Performance Declaration (EPD) analysis of 224 products. This provides the starting point for defining “average furniture products”, so-called base cases for Task 5 LCA analysis. Each base case must further take into account consideration of production scale (SME vs. automated); transport/assembly model (flat-pack vs. fully-assembled); and the lightweighting–durability trade-off.

End-of-life performance, is where the data is weakest and most fragmented. There is no EU waste code or harmonised statistical category for furniture (it is collected as "bulky waste"), and treatment outcomes diverge between Member States. For instance, France has EPR-driven separate collection (better data, less mechanical/weather damage, higher reuse and recycling potential), Germany uses a four-tier wood-contamination classification (which sends more treated/composite wood to energy recovery rather than mechanical recycling) and some Member States lack recycling or waste-to-energy capacity causing furniture waste to be landfilled. This means an EU-wide recyclability or recycled-content requirement cannot assume a uniform EoL treatment pathway; its real-world effect will vary by Member State infrastructure.

At the material level, the main EoL problem is composite construction that resists separation: metals and mono-material plastics recycle well because established sorting infrastructure exists, whereas foam and textile/leather layers are almost always bonded rather than separable and lack both the mechanical means of separation and a market for the resulting recyclate. Wood has a functioning cascading-use pathway (solid wood → particleboard) but no harmonised EU framework, so its treatment depends on national contamination-classification rules as much as on the material itself. These aspects need to be taken into account in the EoL modelling of Task 5, where recycling is not determined by furniture type per se, but whether a given material stream has established local recycling infrastructure (mono-material plastics, class AI/AII wood and metals do; composites and treated wood do not), and where in the cascading-use hierarchy a material sits at end of life.

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In terms of Best Available Technologies, initial stakeholder feedback converged around the point of circular-by-design mechanical assembly. Reversible fasteners, mono-material components and standardised interchangeable parts were identified by nearly every stakeholder group as the BAT design logic that would support disassembly, modularity, repairability and recyclability at the same time, making this a design parameter that could lead to improvements across several ESPR aspects at once, rather than trading them off against each other. This can, however, have drawbacks on durability and potentially lead to different material needs and may not be suitable for every product or business model.

Durability is a cross-cutting limitation. For instance, a reversible-fastener design only delivers repair/reuse/recycling improvements if the underlying material survives repeated disassembly cycles. For example, a thin engineered panel does not behave like solid wood or a metal frame under repeated dismantling. Any recyclability, recycled-content or disassembly requirement must therefore be tested against whether the base material can actually support the number of disassembly/reassemblies cycles the requirement implies (EN 17902 and CEN/TC 207 standards are the relevant test references).

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2. Introduction

This draft document represents the first phase of the preparatory study to assess the product group furniture as part of the regulatory process under the Ecodesign for Sustainable Products Regulation (ESPR). It covers the first four tasks of Scope, Markets, Users and Technologies under the Methodology for Ecodesign of Energy-related Products (MEErP) from 2011. Since furniture is not an energy-related product, the Joint Research Centre of the European Commission brought out twelve additional methodologies for how the MEErP may be extended to work in the context of ESPR. These methodologies are applied as far as possible in the development of the study on top of the initial MEErP process.

This preparatory study on furniture is carried out by the consortium VITO, Trinomics, Öko-Institut, Fraunhofer IZM and Ecoinnovazione. The study started in March 2026 and is initially planned to end in Spring 2027. Dependent on the outcomes of the study, the European Commission will decide to conduct an Impact Assessment in the year following the preparatory study, ending in May 2028. In parallel to the ESPR study, the study to update the EU Ecolabel for furniture is also being conducted in parallel by the study team to enable the use of synergies. The planning dates stated above are tentative and may evolve during the implementation of the study; the latest project planning is available on the project website: https://espr-euecolabel-furniture.eu/project-plan

The current interim draft represents a work in progress, which will be revised and added to following the stakeholder meeting on October 6th. Throughout the document, questions are directed to stakeholders for specific further information. We also welcome stakeholders to provide their viewpoints on the information provided to improve its accuracy and completeness where necessary. A stakeholder feedback form is provided on the project website for structured feedback. During the stakeholder meeting a presentation will also be shared with stakeholders.

The aims and objectives of the project and a general methodological overview are detailed below.

2.1. Political context

The Ecodesign for Sustainable Products Regulation (ESPR) (EU) 2024/1781 entered into force on 18th of July 2024. The ESPR Regulation builds on the previously existing Ecodesign Directive 2009/125/EC, expanding the Ecodesign requirements for specific product groups as it enables the setting of performance and information requirements for almost all categories of physical goods placed on the EU market. The framework allows setting a wide range of requirements, including on:

- product durability, reusability, upgradability and reparability
- presence of substances that inhibit circularity
- energy and resource efficiency
- recycled content
- remanufacturing and recycling

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- carbon and environmental footprints
- information requirements, including a DPP

Furniture was identified early in the ESPR implementation process as a candidate priority product group. In the run-up to the first ESPR working plan, the Joint Research Centre (JRC) assessed a wide range of product groups and horizontal requirements as suitable candidates for prioritisation, focusing on "new" priorities: products and horizontal requirements that were not in the scope of the previous Ecodesign Directive 2009/125/EC but that fall within the broader scope of the ESPR (Faraca & Palma, 2024). From an initial long list of product groups referenced in recent policy documents, furniture was among the products shortlisted based on environmental, market and policy considerations, and was then assessed against ten impact categories addressing the EU's main climate, environmental and energy objectives: water effects; air effects; soil effects; biodiversity effects; waste generation and management; climate change; life-cycle energy consumption; human toxicity; material efficiency; and lifetime extension (Faraca et al., 2024).

Furniture was ranked among the priority products for further action, alongside textiles and apparel, steel and aluminium, tyres, and mattresses. The JRC study identified high improvement potential on material efficiency, waste generation, recycled content and end-of-life management, based on the sector's substantial EU market size and its largely un-addressed circularity gaps relative to sectors already covered by prior Ecodesign or product-specific legislation (Faraca et al., 2024).

On the 16th of April 2025 the ESPR Working Plan for 2025–2030 was published (COM(2025) 187) and confirmed furniture (and separately mattresses) as the second highest priority product to be addressed after textiles, with delegated act adoption indicatively targeted for 2028. The Working Plan identifies furniture's improvement potential as "*High potential to improve aspects of resource use, with impacts of production and supply of materials often being the main contributor across different environmental impact categories (e.g. climate change, acidification, eutrophication), and waste generation. Positive impact on other categories such as air, soil and biodiversity*" [EU ESPR, 2025].

2.2. Objectives of this preparatory study

Overall, the objectives of the preparatory study can be summarised as follows:

- analysing the technical, economic, environmental, market and societal aspects of furniture.
- establish the problems and problem drivers to be addressed by the intervention, and
- develop possible design options that have the potential to improve the environmental performance of furniture in view of possible ESPR requirements, including a DPP,
- consider the use of existing voluntary labelling schemes (e.g. EU Ecolabel, Blue Angel, Nordic Swan and Green Public Procurement criteria for furniture)

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The current report covers MEErP Tasks 1 to 4 (Scope, Market, Users, Technologies) and shall serve as input for the first stakeholder meeting and following stakeholder consultation, before starting on the second phase of the preparatory study with MEErP Tasks 5–7.

Based on the findings of the preparatory study, the European Commission will decide whether to develop a draft proposal for an ESPR Delegated Act for furniture, in which case an Impact Assessment support study shall be carried out at a later stage.

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3. Methodology

3.1. Methodology background

The preparatory study includes the following seven tasks (Eynard et al., 2024; Kemna, 2011):

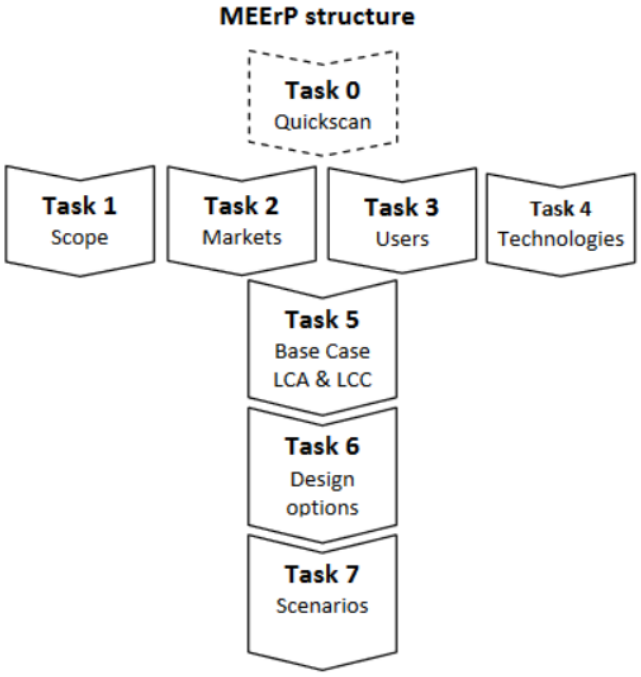

Figure 3-1: MEErP Structure

Source: Eynard et al., 2024; Kemna, 2011

Task 1 (Scope): Define the product category and system boundaries to ground realistic design options, testing and calculation methods, and potential measures; review existing EU/national measures and global benchmarks, and assess whether accurate, reproducible test methods exist or need improvement.

Task 2 (Markets): Position the product group within EU industry and trade, provide market and cost inputs, capture trends relevant to Ecodesign measures, and assemble price/rate data for life cycle cost (LCC) calculations.

Task 3 (Users): Characterise real-world user behaviour to quantify parameters that drive environmental impact and LCC, identifying social, cultural, and infrastructural barriers and adjust from standard test conditions to actual use patterns.

Task 4 (Technologies): Analyse current EU-market products and technologies from state-of-the-art to best available technology (BAT) and best not-yet-available technology (BNAT) to inform Base Case definition (Task 5) and identify improvement potential (Task 6).

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Task 5 (Base Case, LCA & LCC): Define a representative EU Base Case (using real-life performance via multipliers from standard values) as the foundation for environmental and LCC analyses, while checking through impact/sensitivity analysis that the abstraction remains valid across segments. Data from previous tasks and literature is used to model the product's environmental footprint throughout its life cycle and identify hotspots for improvement, using key impact categories (e.g. energy use, greenhouse gas emissions, resource use, waste generation). In addition, a review of relevant substances of concern is now included in this task as a result of the revision of the MEErP Methodology.

Task 6 (Design options): Identify design options, based on the hotspots identified in Task 5, quantify their environmental impacts and consumer LCC, determine least life cycle costs (LLCC) and BAT (with BNAT as long-term potential), and interpret the LLCC–BAT gap as room for competitive differentiation and policy targeting. Assess technical, economic, and market feasibility of improvement measures (e.g. design changes, material substitutions) and estimate the potential benefits (environmental, economic, social) of these improvements. Looking into a design option of introducing a DPP to cover information requirements was included in this task following the revision of the MEErP Methodology, and a design option related to substances of concern is also to be included.

Task 7 (Scenarios): Integrate results to propose suitable policy instruments, build scenarios (e.g. to 2030/2050) versus business-as-usual (BAU), model the effects of different policy scenarios (e.g. BAU, Ecodesign requirements, voluntary agreements), quantify the expected environmental, economic, and social impacts of each scenario at the EU level and compare with EU targets and societal costs, assess impacts on consumers and industry, and test robustness via a sensitivity analysis aligned with sectoral design cycles. Choose the most effective and practical regulatory approach.

To support the revised ESPR framework the JRC has developed a set of new methodologies that translate ESPR product aspects listed in Article 5(1) of Regulation (EU) 2024/1781 into concrete, usable assessment tools. Rather than a single unified method to replace the MEErP, the JRC has produced multiple methodologies to be applied on top of the existing MEErP structure:

- **Method for the assessment of product aspects in view of ecodesign requirements under ESPR** (JRC143215): Provides the general framework for translating the broad product aspects listed in Article 5(1) ESPR (durability, reparability, recyclability, etc.) into measurable, verifiable parameters.
- **Methods for the definition of classes of performance and labels** (JRC143463): Sets out how products can be grouped into performance classes (e.g. A–G style scales) and how such classes should be translated into consumer-facing labels or scores.
- Method for the identification and tracking of substances of concern in products and for the preparation of restriction measures on the use of substances in products (JRC143683): Provides a systematic approach for identifying which substances in a product group should be flagged as substances of concern and for deciding what tracking or disclosure information is needed.
- **Method for the ranking of potential requirements based expected impacts and costs** (JRC143331): Offers a structured way to compare and prioritise

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candidate ecodesign requirements by weighing their expected environmental, economic and social impacts against their implementation costs.

- **Methodology for defining data requirements for the Digital Product Passport under the ESPR framework** (JRC145830): Defines how to determine which data fields, granularity (model, batch, item or component) and access rights should be built into a product group's Digital Product Passport.
- Method for the integration of the support to ESPR impact assessments within the evaluation process of products, including international trade aspects and impact of measures on third countries (JRC142690)
- **Method for the definition of mandatory Green Public Procurement requirements** (JRC145122): approach to determine the advisability of GPP requirements, analyse their feasibility, assess their expected market impacts, and define the specific types of requirements.
- **Method for the assessment of EU Open Strategic Autonomy aspects** in the context of the Ecodesign for Sustainable Products Regulation (JRC143215): provides a framework for evaluating how proposed ecodesign requirements affect the EU's supply-chain resilience, critical raw material dependency and industrial self-sufficiency.
- **Method for the assessment of circularity aspects** and integration in or relation with the Methodology for the Ecodesign of Energy-related Products (MEErP) (JRC143211): explains how to prioritise aspects based on relevance criteria.

These methodologies are intended to provide guidance how to rank different requirements and enable consideration of elements that may trade off with each other, now that the simple metric of energy consumption is no longer in focus. They do not replace the MEErP, which still provides the overall study architecture (scope, market analysis, base cases, design options, policy scenarios), but support turning a product aspect into measurable parameters, evidence requirements and potential thresholds.

Several of the methodologies are cross-cutting across different tasks, while others require an additional assessment. In parallel to the Task 1 to 7 reports, the following assessments are included as separate annexes:

1) Digital Product Passport Assessment: separate annex published with Tasks 1-4, to be updated as Tasks 1-7 progress.
2) Open Strategic Autonomy Assessment: annex at the end of this Task 1-4 report.
3) Substances of Concern Report: separate annex to accompany Task 5.

Throughout the preparatory study, the study team will attempt to apply these methodologies in each task of the MEErP methodology as far as possible. However, due to the volume and depth of additional methodologies, flexibility is also needed to reach relevant conclusions within the study timeframe and budget.

3.2. Stakeholder consultation

Stakeholder consultation activities took place as well across the different tasks. A **survey on the ESPR options for furniture was conducted from the 11th of May**

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until the 13th of July. The stakeholder consultation aimed to collect data and information to inform further analysis in the preparatory study following the MEErP methodology. This survey specifically supported MEErP Tasks 1 on scope, Task 2 on markets, Task 3 on users and task 4 on technologies related to furniture. The survey targeted a broad spectrum of stakeholders along the furniture value chain.

The questionnaire was sent to stakeholders in the form of an excel template, as it covered a diverse range of topics. Not each part/question was relevant to all stakeholders, so many partial responses were received. The full questionnaire is included in Annex X. The following topics were covered in the questionnaire:

- **General information and stakeholder profile:** background information on respondents and their organisations, including stakeholder type, organisational role, furniture categories and materials covered, voluntary certification schemes, views on the scope of furniture products under ESPR, key circularity priorities, Digital Product Passport (DPP) requirements, and availability of technical and environmental data.
- **Technical features, circularity and best available technologies:** information on environmentally sustainable furniture design and production practices, including design for durability, repairability, modularity, recyclability and disassembly; best available and emerging technologies; use of recycled and cascaded materials; barriers to increasing recycled content; repair, refurbishment and maintenance practices; and factors influencing product lifetime extension.
- **End-of-life management and recycling:** current furniture collection and treatment practices, including preparation for reuse, recycling, incineration and disposal pathways; barriers to recycling and material recovery; collection systems and recycling technologies; and opportunities to improve circularity at the end of a product's life.
- **Market and economic aspects:** information on (i) market structure, (ii) secondary markets for used furniture, (iii) end-user behaviour and preferences, (iv) product lifetime and replacement patterns, (v) value chain characteristics and Digital Product Passport (DPP) implementation, and (vi) trade, sales, pricing, and market trends across different furniture categories.

In total, 53 responses were received by a diverse range of stakeholders.

In terms of organisation size, small organisations represented the largest share of respondents (43%), followed by large organisations (28%) and medium-sized organisations (25%). Micro-organisations accounted for a smaller share of the sample (4%). This is presented in **Figure 3-2** below.

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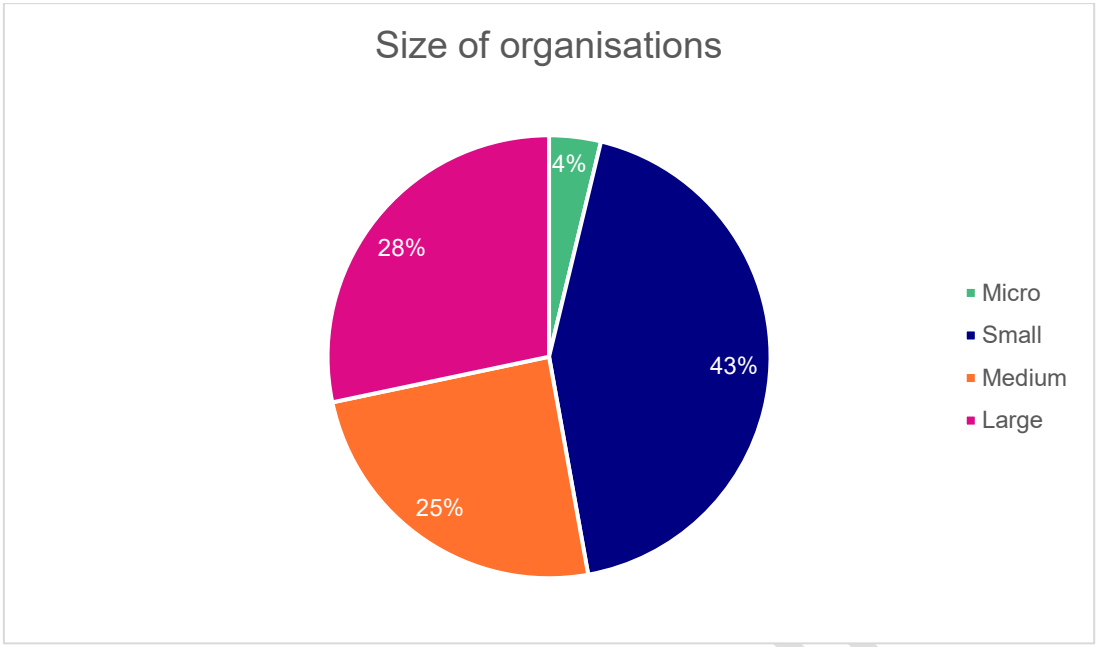

Figure 3-2: Size of organisation for respondents (n=53).

As shown in **Figure 3-3**, industry associations formed the largest stakeholder group, representing 32% of responses. Manufacturer or importer organisations accounted for 15%, while certification, verification, labelling or standards bodies and public authorities each represented 11% of responses. NGOs and suppliers to furniture manufacturers each accounted for 8%, followed by research organisations (6%), consultancies and consumer organisations (each 4%), and end-of-life service providers for furniture (2%).

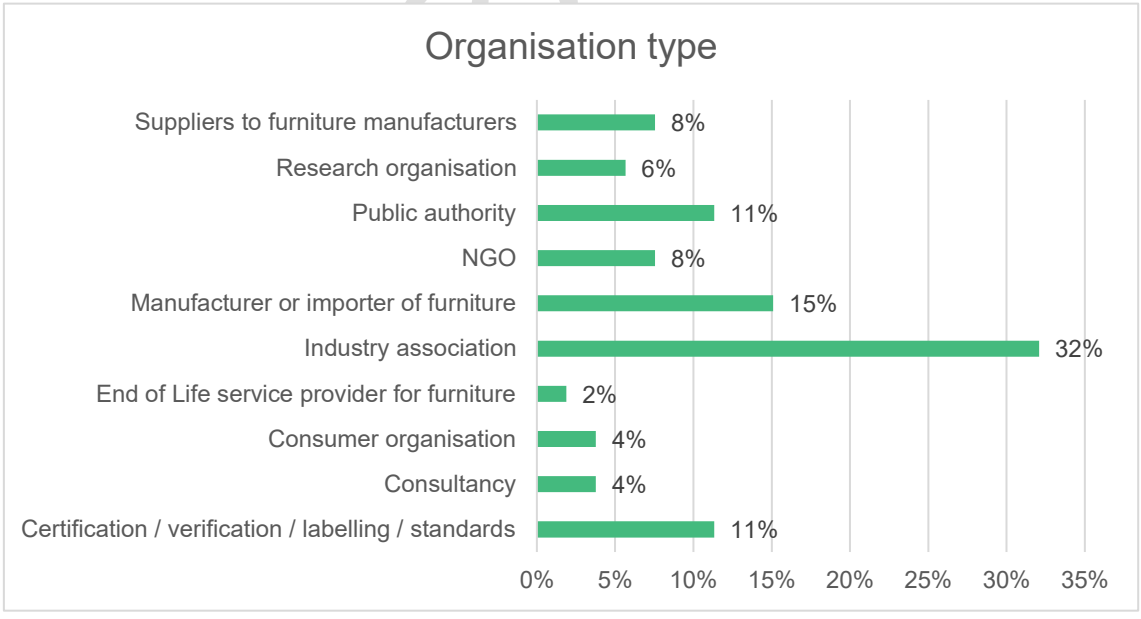

Figure 3-3: Organisation type for respondents (n=53).

Although the questionnaire did not include an explicit question on the country of origin, this information was deduced from each organisation's website. Respondents were headquartered across 12 countries, as can be seen in **Figure 3-4.** Belgium accounted for the largest share of responses (34%), reflecting the presence of EU-level

associations and organisations. Germany followed with 15%, while France and the Netherlands each accounted for 9%. Denmark and Italy each represented 8%, Spain 6%, Norway 4%, and Bulgaria, Finland, Portugal and Sweden each accounted for 2% of responses.

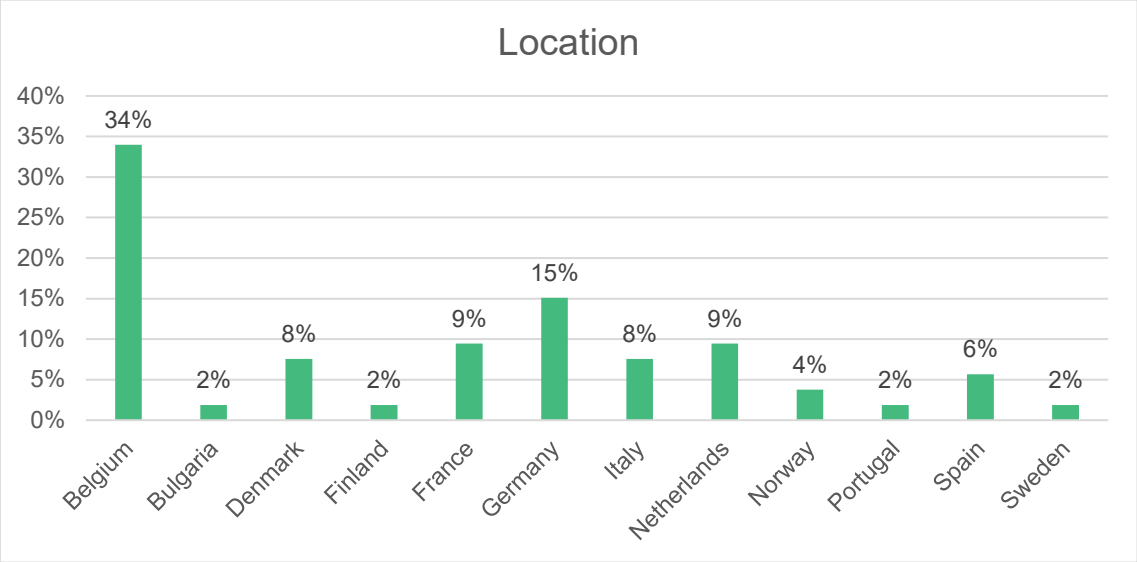

Figure 3-4: Location of organisation for respondents (n=53).

Figure 3-5 below presents the sectors in which respondents are active, or the stakeholder groups they represent. This question was answered by 21 stakeholders. Manufacturers or importers of furniture made up the largest share of respondents (38%), followed by industry associations representing manufacturers of furniture (33%). Customers or users of furniture accounted for 14%, while companies providing maintenance, repair or refurbishing services represented 10%. End-of-life service providers for furniture accounted for the remaining 5%. No respondents represented industry associations for customers using furniture.

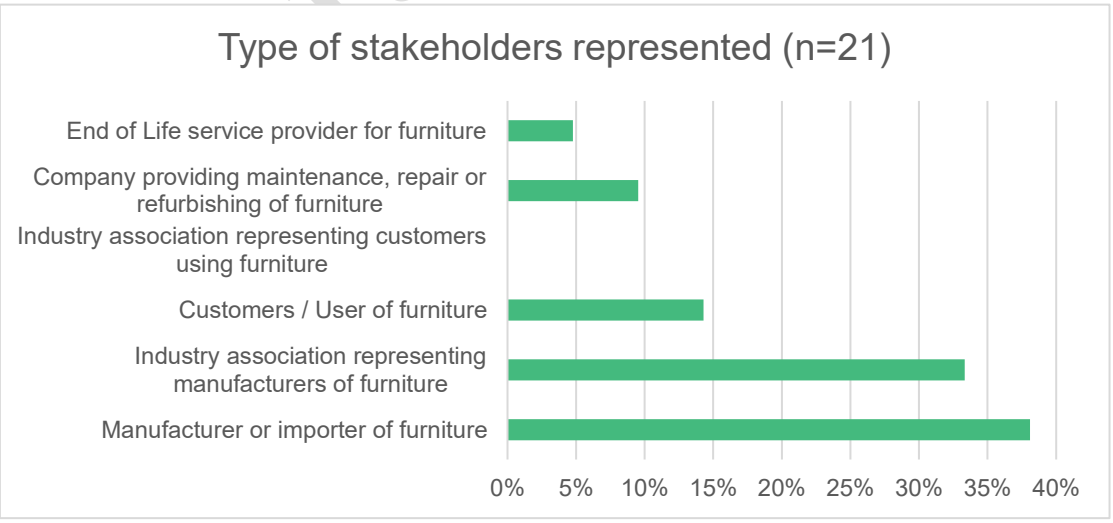

Figure 3-5: Type of stakeholders represented by respondents (n=21).

4. Preliminary Mapping of Available LCA Data

4.1. Objectives of MEErP Task 0

The preliminary mapping of available Life Cycle Assessment (LCA) data represents Sub-task 2.1 of Phase I of the Preparatory Study on furniture and corresponds to the optional Task 0 – Quick Scan of the JRC methodology (Torres et al., 2025). Its purpose is to provide an early evidence base for the environmental assessment of furniture and, in particular, to support the definition and modelling of representative base cases in MEErP Task 5.

The analysis has a three-fold purpose: to identify the main environmental hotspots associated with furniture products, components and processes; to assess the availability and potential usability of quantitative inventory data for the modelling of representative furniture base cases; and to identify the main knowledge gaps and additional data collection needs to be addressed in the following stages of the Preparatory Study.

4.2. Main results from the analysis

The mapping started out by the Technical Report that supports the current EU Ecolabel criteria for furniture (Donatello et al., 2017), expanded with different sources of LCA studies and data. The scientific literature review focused mainly on studies published after the review by Cordella and Hidalgo (2016), while considering earlier publications where they provide inventories or evidence that is still relevant. Overall, 28 publications were identified, whose relevance was assessed using the screening approach developed by Cordella and Hidalgo (2016), considering the scope of the study, data quality and representativeness, impact assessment methods, relevance of the findings, robustness and independent review. The approach has been applied with a certain degree of flexibility: where findings from articles that were scored below the threshold were also confirmed in publications with higher scores, these have been considered for the analysis. Twenty-two publications reached the screening threshold and were taken forward for the main analysis.

The scientific evidence was complemented by an analysis of Environmental Product Declarations (EPDs), Life Cycle Inventory (LCI) databases and selected public research initiatives. In particular, EPDs provide complementary information to the scientific LCA literature by broadening the evidence on the material composition of furniture products currently placed on the market and supporting the development and validation of preliminary bill of materials, although the available declarations cannot be considered statistically representative of the EU market. No furniture-specific PEFCR or PEF-compliant studies were identified for the preliminary mapping. Overall, 203 EPDs were analysed, including 55 declarations for storage products, 71 for tables and 77 for seating. Beds and miscellaneous furniture were not sufficiently represented to support the same level of quantitative analysis. The available EPD information was

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harmonised into a common material taxonomy and used to develop preliminary product clusters and average Bills of Materials (BoMs).

The literature (including both scientific literature and EPDs) covers mainly indoor furniture, including seating, desks and tables, storage furniture and wood-based panels, while no sufficiently robust evidence was identified for outdoor furniture, children's furniture and multifunctional furniture. Wood and wood-based panels are the most frequently represented structural materials, together with steel and aluminium. Upholstered furniture additionally includes polyurethane foam, textiles, leather or synthetic leather, while adhesives, resins, coatings, plastics, fittings and other ancillary materials are represented with different levels of detail. The more recent product information also indicates a broader material diversity that is not reflected in literature. In particular, plastics can account for a substantial share of the mass of office and contract seating, while also composites, glass, mineral materials and electrical and electronic components occur in products, together with bamboo, rattan, cork and other materials.

The analysis of environmental hotspots confirms the conclusions of Cordella and Hidalgo (2016). The production and supply of materials is the most important life cycle stage, although its contribution varies according to the product configuration and materials used. For wood-based panels, the results indicate that the environmental profile is affected not only by wood supply but also by resins and by energy-intensive production processes. Fibre or chip preparation, drying, pressing and lamination are identified as relevant processes, together with electricity and thermal energy consumption.

Manufacturing generally contributes less than material production, but its relevance depends on the manufacturing processes. Electrical and thermal energy, machining, drying, pressing, coating and finishing can become significant contributors. Coating, finishing and adhesive-related processes can also be relevant because of associated emissions of VOCs and formaldehyde, depending on the formulations and processes used. Distribution can also be relevant and is sensitive to the geographical origin of materials and components, final market distances, transport mode and the mass and volume of the product.

While cleaning and general maintenance during the use phase have a limited contribution, product lifetime plays an important role in the overall environmental performance of furniture. However, additional evidence is needed on actual use duration and on the environmental effects driven by repair, component replacement, refurbishment and remanufacturing.

The relevance of end-of-life treatment varies across the studies and the products, depending on material composition, impact category and treatment route considered. Recycling, incineration with or without energy recovery, reuse and landfill can lead to substantially different environmental results, which are also influenced by methodological assumptions on substitution and biogenic carbon. Representative end-of-life scenarios therefore need to be defined for the base cases, with alternative scenarios considered where relevant to reflect this variability.

As far as the availability of inventory data is concerned, the analysis of the EPDs allowed to develop preliminary product clusters and average BoMs. Product function

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was used as the main level of classification, in alignment with ongoing work within CEN/TC 270, according to which the following groups are identified: storage, seating, beds, tables and diverse. Material composition was also considered as complementary classification where relevant. For storage furniture and tables, wood-based, metal-based and mixed-material configurations can be differentiated. For seating, the complexity of material composition supports a function-based classification, including distinction between upholstered and non-upholstered products, and between different seating functions. For beds, no significant data points have been identified in literature. In total, 20 preliminary average BoMs were developed for storage, seating and table configurations, describing the following reference products: i) group “seats”: non-upholstered chairs; upholstered sofas; upholstered multipurpose office chairs; upholstered task chairs; upholstered visitor and lounge chairs; ii) group “storages”: wood-based small/drawers; metal-based small/drawers; wood-based low closed; metal-based low closed; wood-based tall closed; metal-based tall closed; metal-based open; ii) group “tables”: wood-based desk; metal-based desk; mixed materials desk; wood-based dining table; metal-based dining table; wood-based coffee table; wood-based meeting table.

Beyond the development of BoM, a number of cross-cutting data needs remain for the modelling of the base cases. These include validation of representative product masses and BoMs; data on electricity and thermal energy consumption for manufacturing processes; production scraps and waste treatment; packaging; chemical inputs and emissions; assumptions on supply-chain and distribution; and end-of-life scenarios. The modelling of the base cases will also be supported by secondary LCI datasets. Sources identified at this stage include the EF 3.1 database for core processes, relevant datasets being developed in the framework of the PEFCR on Hotel Accommodation, and the Italian National LCA Database.

The existing information provides a useful starting point, but further evidence is needed to define representative EU values and scenarios. In this regard, stakeholder input will be important to contribute to assessing whether the preliminary product types and material configurations reflect current EU market practice, identifying configurations that may be missing or overrepresented, and providing additional evidence on manufacturing processes, logistics and end-of-life scenarios.

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5. MEErP Task 1 – Scope

5.1. Objectives of MEErP Task 1

The aim of MEErP Task 1 is to define the product category and the system boundaries of the 'playing field' for ecodesign. In this section, a detailed overview of existing legislation, voluntary schemes and standards for furniture is provided, with the aim of defining the functional unit of the product group, the possible scope of a potential regulation, and possible exemptions from the scope.

The methodological approach follows the updated MEErP structure but additionally integrates circularity and material efficiency aspects more systematically. Specifically, Task 1 also incorporates the initial filtering and validation steps proposed in the B2 methodology for assessing the relevance of circularity aspects, and the multi-criteria assessment framework from B3 for identifying appropriate product scopes for horizontal measures.

5.2. Product Scope

Furniture represents a highly heterogeneous product group, encompassing a wide range of product types, functions, materials, lifetimes and use contexts. Unlike energy-related products previously regulated under the Ecodesign Directive, furniture products are characterised by a broad diversity in design, construction, size and material composition. This poses specific challenges for the definition of proportionate, enforceable and effective ecodesign requirements under the Ecodesign for Sustainable Products Regulation (ESPR). According to the Joint Research Centre (JRC) scoping work supporting the ESPR Working Plan, furniture can be broadly defined as free-standing or built-in units whose primary function is to provide surfaces for sitting, resting, eating or working, or to enable the storage or placement of items, for indoor or outdoor use. This definition covers a wide spectrum of products used in domestic, commercial and public settings, manufactured using a combination of wood-based panels, solid wood, metals, plastics, textiles, foams, glass and surface coatings (Faraca et al., 2024). From a regulatory perspective, furniture differs fundamentally from more standardised product groups (such as mattresses or tyres) in that it does not constitute a homogeneous commodity. Products vary significantly in terms of: function (e.g. seating, storage, surfaces), application (domestic versus professional use), location (indoor versus outdoor)(*Governo Italiano*, n.d.), material composition (mono-material versus complex multi-material assemblies), expected lifetime and intensity of use. This heterogeneity directly affects the feasibility of defining uniform performance thresholds, test methods and verification procedures, and necessitates a careful approach to granularity, sub-grouping and differentiation of requirements.

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5.2.1. Product definition and boundaries

The purpose of this section is to provide a preliminary product definition, based as far as possible on the functional unit of a product. Further, it seeks to establish boundaries relative to other product groups.

Furniture covers a wide range of products used in private households and commercial settings. The JRC defines furniture as “free-standing or built-in units whose primary function is to be used for the storage, placement or hanging of items and/or to provide surfaces where users can rest, sit, eat, study or work, whether for indoor or outdoor use. Bed frames, legs, bases and headboards are included in the scope. Not included are: bed mattresses, streetlights, railings and fences, ladders, clocks, playground equipment, stand-alone or wall-hung mirrors, electrical conduits, road bollards and building products such as steps, doors, windows, floor coverings and cladding” (Faraca et al., 2024).

This is mirrored by the EU Ecolabel definition (Article 1 (1)), which defines furniture in the same terms. In addition to the exclusions named in the JRC definition, it is also specified that the product group does not include “furniture fitted in vehicles used for public or private transit” and more generally, products whose primary function is not to be used as per Article 1(1).

In the Stakeholder Survey (June-July 2026), stakeholders were asked whether they agree whether the scope as used by the JRC/EU Ecolabel is also suitable for regulation at the EU level under ESPR. A large majority accepted this as a reasonable staring point, although many argue that adjustments are also needed. Some argued that the scope is overly broad, and reliant on a long exclusion list rather than a positive, precise definition, creating legal uncertainty.

In a parallel survey on the EU Ecolabel (June-July 2026), stakeholders were also asked if the EU Ecolabel scope should be amended in its next iteration. One specific proposal made by several stakeholders is that acoustic and space-organising products (screens, sound absorbers, acoustic panels/baffles and room dividers) should be included within the ecolabel scope. For the purpose of ESPR, however, such products would not fit within the existing functional definitions. At this point, the environmental case for including such products in the scope is not clear. Introduction of a new function to the definition would have to carefully consider whether other products could unintendedly be pulled into scope.

The EU Ecolabel also includes a material-based exclusion for products which consist of more than 5% (weight by weight) of materials not included in the following list: solid wood, wood-based panels, cork, bamboo, rattan, plastics, metals, leather, coated fabrics, textiles, glass and padding/filling materials. Several stakeholders raised however that regulation should include in scope all furniture products regardless of material, in order to avoid the creation of loopholes.

The EU Ecolabel also excludes from scope “second-hand, refinished, refurbished or remanufactured furniture products”. Regulation (EU) 2024/1781 (ESPR) Recital 17 states that:

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"Second-hand products, in particular products that undergo refurbishment or repair, originating from within the Union are not new products and they can circulate within the internal market without needing to comply with delegated acts setting ecodesign requirements that have entered into force after their placing on the market. However, remanufactured products are considered new products and they will be subject to ecodesign requirements if they fall within the scope of a delegated act."

Article 2(16) further specifies:

"'remanufacturing' means actions through which a new product is produced from objects that are waste, products or components and through which at least one change is made that substantially affects the safety, performance, purpose or type of the product;"

However, specific uncertainties were raised for the furniture sector. For example, it was questioned if a sofa is reupholstered with new filling/fabric, is it considered a new product? In general, however, refurbishment and repair activities can be considered as not substantially affecting the safety, performance, purpose or type of the product, and therefore do not constitute remanufacturing and do not require any product-specific deviation from the requirements set out in Regulation (EU) 2024/1781.

A favoured alternative to the JRC/EU Ecolabel definition is to base the scope on an EU-wide harmonised vocabulary developed by CEN/TC 207 'Furniture'. It is understood that CEN/TC 207 has drawn up a proposal for a new standardisation project, with the goal to develop a CEN/TS (Technical Specification). This, however, is still in development and has not been seen by the study team. This option can therefore not be assessed further.

Another proposal which has been made by European Furniture Industries Confederation (EFIC) is that the Delegated Act should apply to furniture products classified under (EU) 2025/1926 on the tariff and statistical nomenclature and on the Common Customs Tariff (EFIC, 2025). Recommended specifically is alignment with Chapter 94, specifically headings 9401 and 9403 (**Table 5-1)**.

Table 5-1: CN Codes for furniture products according to (EU) 2025/1926.

H.S. Code	Description
9401: Seats (other than those of heading 94.02), whether or not convertible into beds, and parts thereof	
9401.10	- Seats of a kind used for aircraft
9401.20	- Seats of a kind used for motor vehicles - Swivel seats with variable height adjustment
9401.31	-- Of wood
9401.39	-- Other - Seats other than garden seats or camping equipment, convertible into beds:
9401.41	-- Of wood

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H.S. Code	Description
9401.49	-- Other - Seats of cane, osier, bamboo or similar materials
9401.52	-- Of bamboo
9401.53	-- Of rattan
9401.59	-- Other - Other seats, with wooden frames
9401.61	-- Upholstered
9401.69	-- Other - Other seats, with metal frames:
9401.71	- Upholstered
9401.79	-- Other
9401.80	- Other seats - Parts:
9401.91	- Of wood
9401.99	-- Other
9403: Other furniture and parts thereof.	
9403.10	- Metal furniture of a kind used in offices
9403.20	- Other metal furniture
9403.30	- Wooden furniture of a kind used in offices
9403.40	- Wooden furniture of a kind used in the kitchen
9403.50	- Wooden furniture of a kind used in the bedroom
9403.60	- Other wooden furniture
9403.70	- Furniture of plastics - Furniture of other materials, including cane, osier, bamboo or similar materials:
9403.82	-- Of bamboo
9403.83	-- Of rattan
9403.89	-- Other - Parts:
9403.91	-- Of wood
9403.99	- Other

827 The CN codes further specify that the articles (other than parts) referred to in headings
828 94.01 to 94.03 are to be classified in those headings only if they are designed for
829 placing on the flood or ground. An exception is made for the following articles designed
830 to be “hung, fixed to the wall or stand one on the other”:

831 • cupboards, bookcases, other shelved furniture (including single shelves
832 presented with supports for fixing them to the wall) and unit furniture;

- seats and beds.

Not included in the CN codes for furniture are:

- Pneumatic or water mattresses, pillows or cushions
- Mirrors designed for placing on the floor or ground
- Furniture specially designed as parts of refrigerating or freezing equipment; furniture specially designed for sewing machines;
- Lamps or light sources
- Furniture specially designed as parts of apparatus for various electrical equipment including microphones, sound recording, transmission apparatus, radar apparatus or monitors and projectors.
- Parts and accessories of vehicles
- Dentist chairs
- Clocks and clock cases etc.
- Toy furniture or toy luminaires and lighting fittings, billiard tables or other furniture specially constructed for games, furniture for conjuring tricks or decorations
- Monopods, bipods, tripods and similar.

Furniture groups for which CN codes exist but were not recommended to be included in the ESPR scope include:

- Medical, surgical, dental or veterinary furniture; barbers chairs and similar, having rotating as well as both reclining and elevating movements
- Mattress supports; articles of bedding and similar furnishing fitted with springs or stuffed or internally fitted with any material or of cellular rubber or plastics, whether or not covered.
- Luminaires and lighting fittings including searchlights and spotlights; illuminated signs, illuminated nameplates etc.
- Prefabricated buildings.
- Furniture fitted in vehicles used for public or private transit

National legislation (in particular EPR schemes) and other voluntary labels also provide definitions for furniture. These are summarised in **Sections 5.3.4** and **5.5.6** .

Regarding what falls outside of scope, from the outset, it is clear that mattresses are not included within the product group furniture, on account of being included separately in 2025-2030 Working Plan for ESPR (Ecodesign for Sustainable Products and Energy Labelling Working Plan 2025-20250, 2025). It is acknowledged that some multi-functional furniture products (i.e. sofa beds) contain mattresses. Here, it is recommended that a subsequent Preparatory Study on mattresses considers requirements for this specific mattress type, and any future regulation on the furniture and mattress product group align on this topic. The sofa bed frame itself would still be in scope.

The interaction with the Construction Products Regulation (EU) 2024/3110 is also considered. Construction products are defined (Article 3 (1)) as “any formed or formless physical item, including 3D-printed products, or a kit that is placed on the market, including by means of supply to the construction site, for incorporation in a permanent manner into construction works or parts thereof with the exception of

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items that need first to be integrated into a kit or another construction product prior to being incorporated in a permanent manner into construction works". This could include 'built-in units" which are also currently included in the scope of furniture (Faraca et al., 2024). However, it is not currently planned under the CPR to establish obligations for such products, therefore risk of inconsistent/competing requirements between CPR and ESPR is assessed as limited.

Regarding vehicle-integrated/transport furniture, one stakeholder argues that an exemption of these products creates inconsistency because identical materials/components are used across applications. The study team considers that an exclusion makes sense, as automotive and aircraft seats are safety articles which have specific functions and different requirements. Automotive seats are governed by EU Type-Approval Framework and the End of Life Vehicle Directive which already sets strict obligations relating to safety, re-use, recycling and recycled content. Aircraft seats are structural articles which must comply with airworthiness codes (EASA CS-25) e.g. dynamic crash behaviour and smoke toxicity.

In general, it is not yet clear to what extent built-in/fitted furniture is regulated under Construction Products Regulation. For example, can fitted kitchens, fitted shelves/wardrobes or integrated seating be considered as "incorporated into a building in a permanent manner" i.e. intended to remain in the construction work. It was also argued by several stakeholders representing custom-made/bespoke furniture as well as modular/built-in kitchens and fitted furniture that an exemption should be made for individually manufactured products. The Construction Products Regulation (Article 14) was cited as providing precedence for this (see **Section 0**). i.e.

"a manufacturer may decide not to undergo the applicable assessment and verification of the product's compliance with applicable product requirements and not to draw up a declaration of performance and conformity when any of the following applies:

(a) the product is individually manufactured or custom-made and fulfils all of the following conditions:

(i) it is manufactured using a non-series process;

(ii) it is produced in response to a specific order;

(iii) it is installed in a single identified construction work by a manufacturer who is also responsible for the safe incorporation of the product into the construction work; and

(iv) it is in compliance with the applicable national rules, and under the supervision of those responsible for the safe execution of the construction works designated under the applicable national rules;

(b) the product is manufactured in a manner exclusively appropriate to heritage conservation and in a non-series process for adequately renovating construction works officially protected as part of a designated environment or because of their special architectural or historic merit, in compliance with the applicable national rules."

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Regarding specific products excluded from the EU Ecolabel, two stakeholders state that stand-alone mirrors should be included because the usually have frames/joints which are relevant to eco-design considerations. Another argues for consideration of lighting and umbrellas. It is noted by the study team that these products all fall outside of conventional functional definitions of furniture used both by standardisation and by the European Commission.

It is noted that several voluntary schemes for furniture explicitly exclude outdoor furniture from scope, perhaps because of differing durability requirements and/or different needs regarding surface treatments or other finishes which are incompatible with the product-specific focus which many voluntary schemes take. The study team is not aware, however, of any reasons why a similar exemption for outdoor furniture should be made for ecodesign considerations.

A specific, more niche subcategory is camping equipment, for example, fold-out tables and chairs. These fall within the current functional based definition of furniture, and the study team is not aware of any grounds for exclusion.

5.2.2. Subgrouping and classification

For furniture, the JRC made a preliminary assessment of a further granularity concept to assess the most suitable aspects for dividing this large product group (Faraca et al., 2024). They summarise that the most relevant aspects to consider when subdividing the product category are:

- Location of the furniture (indoor <=> outdoor);
- Application (domestic <=> professional);
- Material (mainly wood / wooden based; plastic; textile; metal; or glass);
- Function (seating, surfaces, and storage).

Depending on the information purpose, market studies, production and trade statistics or standards use different categories in their reporting system with partly even overlapping categories. For example Statistica divides the furniture market into seven segments, which mainly represent the different settings: Living Room Furniture, Bedroom Furniture, Kitchen & Dining Furniture, Outdoor Furniture, Home Office Furniture, Lamps and Lighting, and Home Decor (Statista, 2024). Other industry distinguish among the following subcategories:

- By product type: Beds, Tables, Sofas, Chairs and Stools, Others (Wardrobes, Shelves, and Cabinets)
- By application / end-users: Residential (home furniture), commercial (business/office furniture, educational, healthcare, hospitality, others)
- By distribution channel (home centres, speciality stores, online stores) / by geography
- By material: Metal (e.g. steel, aluminium), wood, plastic, glass, foams, textiles (Mordor Intelligence, n.d.).

In standardisation (see also **Section 5.4)**, furniture is categorised based on

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- Application/usage areas: Domestic furniture, non-domestic furniture, children and nursery furniture, office furniture, outdoor furniture, educational furniture, furniture surfaces, and hardware furniture
- Functionality: Storage, tables/desks, seating, beds & mattresses, learning (e.g., writing boards)

Specifically, CEN/TC 207 'Furniture' uses the following subcategories:

- Storage furniture (e.g. cabinets, wardrobes, bookshelves)
- Seating furniture (e.g. chairs, sofas)
- Bed frames (excluding mattresses)
- Tables and work surfaces (e.g. dining tables, desks)

It is therefore concluded that most existing approaches to the subcategorization of furniture used a mixed approach, combining function with location, application and material. Such approaches are considered necessary to account for the vast heterogeneity of the product group, in order to enable important distinctions between different applications and locations within the same functional families. It is concluded that a similar approach is required when defining base cases in Task 5.

5.2.3. System boundaries

Ecodesign was originally introduced by Directive 2005/32/EC on Ecodesign of Energy-using products, and was recast by Directive 2009/125/EC on Ecodesign of Energy-related products. The focus was therefore on the 'use-phase' of products, and measures focused on minimising energy consumption.

The ESPR framework newly allows setting a wide range of requirements, including on:

- Product durability, reusability, upgradeability and repairability;
- Presence of substances that inhibit circularity
- Energy and resource efficiency
- Recycled content
- Remanufacturing and recycling
- Carbon and environmental footprints
- Information requirements, including a DPP.

This leads to a major expansion of system boundaries from use-phase only to all life cycle stages of product groups, including raw materials, manufacturing, distribution, use and end-of-life.

The geographical scope is the EU single market. However, it is noted that a significant share of products is imported from third countries; similarly, the production value chains often span beyond EU (see Task 2).

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5.2.4. Relevant definitions

Article 2 of Regulation (EU) 2024/1781 (ESPR) provides the basis of definitions for this study. This includes:

(1) 'product' means any physical goods that are placed on the market or put into service;

(2) 'component' means a product intended to be incorporated into another product;

(3) 'intermediate product' means a product that requires further manufacturing or transformation such as mixing, coating or assembling to make it suitable for end-users;

(4) 'product group' means a set of products that serve similar purposes and are similar in terms of use, or have similar functional properties, and are similar in terms of consumer perception;

(5) 'ecodesign' means the integration of environmental sustainability considerations into the characteristics of a product and the processes taking place throughout the product's value chain;

(6) 'ecodesign requirement' means a performance requirement or an information requirement aimed at making a product, including processes taking place throughout the product's value chain, more environmentally sustainable;

(7) 'performance requirement' means a quantitative or non-quantitative requirement for or in relation to a product to achieve a certain performance level in relation to a product parameter referred to in Annex I;

(8) 'information requirement' means an obligation for a product to be accompanied by information as specified in Article 7(2);

(9) 'supply chain' means all upstream activities and processes of the product's value chain, up to the point where the product reaches the customer;

(10) 'value chain' means all activities and processes that are part of the life cycle of a product, as well as its possible remanufacturing;

(11) 'life cycle' means the consecutive and interlinked stages of a product's life, consisting of raw material acquisition or generation from natural resources, pre-processing, manufacturing, storage, distribution, installation, use, maintenance, repair, upgrading, refurbishment and reuse, and end-of-life;

(12) 'end-of-life' means the life cycle stage that begins when a product is discarded and ends when the waste material of the product is returned to nature or enters another product's life cycle;

(13) 'environmental impact' means any change to the environment, whether adverse or beneficial, wholly or partially resulting from a product during its life cycle;

(14) 'class of performance' means a range of performance levels in relation to one or more product parameters referred to in Annex I, which is established based on a common methodology for the product or product group, ordered in such a way as to allow for product differentiation;

(15) 'remanufacturing' means actions through which a new product is produced from objects that are waste, products or components and through which at least

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one change is made that substantially affects the safety, performance, purpose or type of the product;

(16) 'upgrading' means actions carried out to enhance the functionality, performance, capacity, safety or aesthetics of a product;

(17) 'refurbishment' means actions carried out to prepare, clean, test, service and, where necessary, repair a product or a discarded product in order to restore its performance or functionality within the intended use and range of performance originally conceived at the design stage at the time of the placing of the product on the market;

(18) 'maintenance' means one or more actions carried out to keep a product in a condition where it is able to fulfil its intended purpose;

(19) 'repair' means one or more actions carried out to return a defective product or waste to a condition where it fulfils its intended purpose;

(20) 'premature obsolescence' means a product design feature or subsequent action or omission resulting in the product becoming non-functional or performing less well without such changes of functionality or performance being the result of normal wear and tear;

(21) 'durability' means the ability of a product to maintain over time its function and performance under specified conditions of use, maintenance and repair;

(22) 'reliability' means the probability that a product functions as required under given conditions for a given duration without an occurrence which results in a primary or secondary function of the product no longer being performed;

(23) 'environmental footprint' means a quantification of the environmental impacts resulting from a product throughout its life cycle, whether in relation to a single environmental impact category or an aggregated set of impact categories based on the Product Environmental Footprint method established by Recommendation (EU) 2021/2279 or other scientific methods developed by international organisations, widely tested in collaboration with different industry sectors and adopted or implemented by the Commission in other Union law;

(24) 'carbon footprint' means the sum of greenhouse gas emissions and greenhouse gas removals in a product system, expressed as CO2 equivalents and based on a life cycle assessment using the single impact category of climate change;

(25) 'material footprint' refers to the total amount of raw materials extracted to meet final consumption demands;

(26) 'substance of concern' means a substance that:

(a) meets the criteria laid down in Article 57 of Regulation (EC) No 1907/2006 and is identified in accordance with Article 59(1) of that Regulation;

(b) is classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 in one of the following hazard classes or hazard categories:

(i) carcinogenicity categories 1 and 2;

(ii) germ cell mutagenicity categories 1 and 2;

(iii) reproductive toxicity categories 1 and 2;

(iv) endocrine disruption for human health categories 1 and 2;

(v) endocrine disruption for the environment categories 1 and 2;

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(vi) persistent, mobile and toxic or very persistent, very mobile properties;

(vii) persistent, bioaccumulative and toxic or very persistent, very bioaccumulative properties;

(viii) respiratory sensitisation category 1;

(ix) skin sensitisation category 1;

(x) hazardous to the aquatic environment — categories chronic 1 to 4;

(xi) hazardous to the ozone layer;

(xii) specific target organ toxicity — repeated exposure categories 1 and 2;

(xiii) specific target organ toxicity — single exposure categories 1 and 2;

(c) is regulated under Regulation (EU) 2019/1021; or

(d) negatively affects the reuse and recycling of materials in the product in which it is present;

(27) 'digital product passport' means a set of data specific to a product that includes the information specified in the applicable delegated act adopted pursuant to Article 4 and that is accessible via electronic means through a data carrier in accordance with Chapter III;

It is noted that CEN/TC 207 'Furniture' has drawn up a proposal for a new standardisation project with the working title 'Furniture — Vocabulary'. The plan is to develop a CEN/TS (Technical Specification). This vocabulary is not yet available.

5.3. Legislation

5.3.1. International legislation

CITIES – Convention on International Trade in Endangered Species of Wild Fauna and Flora

The CITES Convention (Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement that is regulating the global trade in endangered animal and plant species. Its primary aim is to ensure that international trade does not contribute to the extinction or endangerment of species. All EU Member States are parties to the convention. CITES operates through three appendices (I–III), which classify species according to their level of threat. Each appendix entails different levels of control.

For the furniture sector, CITES can be relevant for example, when furniture or veneers are made from protected timber species (for example, various types of rosewood (Dalbergia), ebony, mahogany, or ramin). Companies must be able to prove that the timber they use was legally harvested and that all required CITES documentation is available. As a result, CITES has become a key consideration for the globally active furniture industry, influencing material choices, supply-chain management, and increasing demand for sustainably managed and legally certified timber species.

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Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants (POPs)[1] is a global treaty adopted in 2001 to protect human health and the environment from persistent organic pollutants – chemicals that remain in the environment for long periods, accumulate in living organisms, and pose serious risks to ecosystems and people. It entered into force in 2004. More than 180 countries, including all EU Member States, have joined the convention. POPs include substances such as certain pesticides, industrial chemicals, and by-products like dioxins and furans. The convention requires participating countries to eliminate or restrict the production, use, and trade of listed POPs, manage existing stockpiles, and reduce or eliminate unintentional releases.

For the furniture industry, the Stockholm Convention can be indirectly but significantly relevant, as several POPs have historically been used in materials and components that may appear in furniture. A key example is certain flame retardants, such as PBDEs (polybrominated diphenyl ethers), which were once widely used in foams, textiles, and plastic components of upholstered or office furniture. Many PBDEs and related flame retardants are now listed under the convention (see Annexes of the Convention), meaning their use is restricted or banned, and recycled materials containing them may also face strict controls.

5.3.2. EU Legislation

There is currently no specific EU legislation governing the mandatory sustainability of furniture. However, there are a number of overarching EU legal acts that also apply to furniture products. The following provides an overview of the most relevant existing legal acts relating to furniture products. In addition, there is a voluntary EU Ecolabel scheme for the product category ‘Furniture ’ which allows companies to demonstrate excellent environmental performance of their products. The EU Ecolabel is discussed in more detail in **Section 5.5.1** as it is a voluntary and not a mandatory scheme.

REACH Regulation 1907/2006/EC

The Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (EC No 1907/2006) is the European Union’s key chemicals legislation and aims to protect people and the environment from the risks posed by chemical substances. It lays down provisions with regard to the manufacture, placing on the market or use of substances on their own, in mixtures or in articles. REACH therefore also directly affects furniture and its components, such as, among others, wood-based materials, paints and textiles. Key elements of the regulation include the registration of substances by manufacturers and importers, the evaluation of substances, an authorisation procedure for substances of very high concern, and restrictions on hazardous chemicals.

[1] Available at this link.

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Annex XVII sets out restrictions on certain hazardous substances, mixtures and articles. Furniture is explicitly mentioned in a number of entries of the current version of the Regulation, including entry No. 23 on cadmium, No. 31 on creosote wash oil (among others), and No. 77 on formaldehyde. Furthermore, there are several entries regulating the treatment of wood (e.g. regarding the use of mercury compounds, arsenic compounds or other substances). Several entries also mention textiles; these may be relevant to furniture items insofar as they contain textile components. Some of the restrictions apply to all articles placed on the market and thus also to furniture products.

Other restrictions in REACH Annex XVII rather concern the production of materials such as e.g. polyurethane in entry 76 on N,N-dimethylformamide stipulates workers protection provisions.

Additionally, article 33 imposes information requirements for articles containing substances of very high concern, provided that they exceed the concentration of 0.1%.

CLP Regulation 1272/2008/EC

The Regulation on Classification, Labelling and Packaging of substances and mixtures (CLP) (EC No 1272/2008) is the European Union's core legislation for identifying and communicating the hazardous properties of chemicals. Its purpose is to ensure a high level of protection of human health and the environment, while also supporting the free movement of substances and mixtures on the internal market. To this end, CLP lays down rules for the classification of chemicals according to their hazards as well as for the labelling and packaging of hazardous substances and mixtures before they are placed on the market. The Regulation implements the United Nations' Globally Harmonised System of Classification and Labelling of Chemicals (GHS) within the EU.

For furniture and its components, CLP is particularly relevant in relation to chemical products used in manufacture, treatment or maintenance, such as paints, varnishes, adhesives, coatings, preservatives and cleaning agents. Where such products are supplied as substances or mixtures, they may need to be classified and labelled in accordance with CLP. The Regulation therefore primarily affects the chemical products associated with furniture production and use, rather than finished furniture articles as such. However, classification under CLP may still be relevant indirectly, for example when hazardous constituents in mixtures used for furniture production trigger labelling, packaging or supply chain communication obligations.

General Product Safety Regulation (GPSR) 2023/988/EU

The General Product Safety Regulation (GPSR) – Regulation (EU) 2023/988 – is the EU's key legislation on general product safety. The objective of this Regulation is to improve the functioning of the internal market while providing for a high level of consumer protection. It therefore contains essential rules on the safety of consumer products placed or made available on the market. It replaces the previous Product Safety Directive from 2001.

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The Regulation applies to all products insofar as there are no specific provisions with the same objective under Union law which regulate the safety of the products concerned. In addition, there are defined exemptions, but furniture products are not listed among them. It should be noted that the Regulation applies to new products, but also to used, repaired or reconditioned ones (an exception is made for products that are to be repaired or reconditioned prior to being used, provided that those products are placed or made available on the market and are clearly marked as such). The Regulation sets out extensive obligations for manufacturers, importers and distributors. These include carrying out risk assessments, documenting safety-related information, ensuring traceability throughout the supply chain, and the obligation to communicate safety warnings clearly and promptly. The Regulation also concerns and explicitly addresses distance sales and providers of online marketplaces. Various requirements are set, for example, providers of marketplaces must actively cooperate with authorities, remove unsafe products and provide a central risk reporting system.

A check in the Safety Gate (European Commission, n.d.), where furniture is managed as a separate product category, shows that safety of furniture is relevant: The most common risk type for furniture alerts is injuries due to, for example, insufficient stability.

The GPSR contains general safety requirements and refers to European standards covering certain products and risks.

Further information on relevant standards is provided in **Section 5.4**.

Packaging Directive 94/62/EC and Packaging and Packaging Waste Regulation (PPWR)

The aim of the European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste is to harmonise the rules on packaging and packaging waste management in order to prevent or reduce the environmental impact of such waste, thereby ensuring a high level of environmental protection and the functioning of the internal market. The current version of the directive (which includes amendments up to 2018) sets out measures aimed at the prevention, reuse, recycling and other forms of recovery of packaging waste and, as a result, a reduction in the final disposal of waste. All packaging waste placed on the European market is covered, whether it is used or released at industrial, commercial, office, shop, service, household or any other level, regardless of the material used. On this basis it is concluded that packaging of furniture products would be in scope of this legislation as well.

In November 2022, the Commission proposed to revise the Packaging and Packaging Waste Directive and has published a proposal for a Regulation on packaging and packaging waste. The shift from a Directive to a Regulation means among others that manufacturers are directly obligated by the legislation, as opposed to a Directive which first needs to be transferred to National Legislation. The “Regulation (EU) 2025/40 of the European Parliament and of the Council of 19 December 2024 on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC” (PPWR) was adopted in December 2024. As the

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Regulation “applies to all packaging, regardless of the material used, and to all packaging waste, whether such packaging is used in or such packaging waste originates from industry, other manufacturing, retail or distribution, offices, services or households”, it is understood that the packing of furniture products would as well be in scope of the new Regulation. It establishes requirements for the entire life-cycle of packaging as regards environmental sustainability and labelling as well as requirements for extended producer responsibility, packaging waste prevention, such as the reduction of unnecessary packaging and the re-use or refill of packaging, as well as the collection and treatment, including recycling, of packaging waste: For example, Article 4 requires all packaging to be recyclable, Article 7 sets recycled content targets for plastic packaging and Articles 10 and 11 require the amount of packaging to be reduced as well as a shift to reusable packaging. The Regulation recently came into effect in August 2026, (except for Article 67(5), which shall apply from 12 February 2029), and will therefore gradually replace the existing Directive.

Waste Framework Directive 2008/98/EC

The Waste Framework Directive (WFD) establishes the fundamental concepts and definitions related to waste management, including the definitions of waste, recycling, and recovery. It sets out key principles of waste management aimed at reducing the negative impacts on human health and the environment, with a particular focus on waste prevention. The directive includes provisions on waste prevention and promotes the reuse of products, as well as the development of systems that support repair and reuse activities.

The directive also introduces the principle of extended producer responsibility (EPR), providing Member States with the legal basis for establishing EPR schemes. These make producers financially or organisationally responsible for managing the waste phase of their products. On this basis, several EU countries have introduced furniture EPR schemes, which are described in more detail in **Section 5.3.3**.

Additionally, it sets quantitative targets for preparing for re-use and the recycling of municipal waste and strengthens provisions on separate collection – especially for paper, metal, plastic, glass, and textiles. No furniture specific targets are set.

Deforestation Regulation 2023/1115/EU

The EU Deforestation Regulation (EUDR) 2023/1115/EU aims to ensure that products placed on the EU market do not contribute to deforestation or forest degradation anywhere in the world. It also aims at reducing the Union’s contribution to greenhouse gas emissions and global biodiversity loss. It applies to key commodities with high deforestation risk – such as cattle, cocoa, coffee, palm oil, soya, rubber, and wood – as well as many derived products, including wooden furniture.

Article 3 of the regulation requires that all such products are deforestation free, produced in accordance with the relevant country’s laws, and covered by a comprehensive due diligence statement. To meet these rules, operators must assess and mitigate risks, gather certain data (for example the geolocation data for every plot

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of land where commodities were produced), and ensure traceability throughout supply chains. The EUDR also introduces a risk classification system for countries (low, standard, high risk), influencing, among others, inspection levels.

As many items of furniture are made of wood or contain wooden components or leather, they are directly affected by the Regulation.

Textile Labelling Regulation 1007//2011/EU

The Textile Labelling Regulation (TLR) 1007//2011/EU aims at improving the functioning of the internal market and at providing accurate information to consumers. It lays down rules concerning

- the use of textile fibre names and related labelling and marking of fibre composition of textile products,
- rules concerning the labelling or marking of textile products containing non-textile parts of animal origin and
- rules concerning the determination of the fibre composition of textile products.

The Regulation applies to textile products and to products with textile components that contain at least 80% textile fibres by weight. Items of furniture containing at least 80 % by weight of textile components are explicitly in the scope of the Regulation.

The Textile Labelling Regulation is currently under revision. In the new version, it is intended to introduce specifications for physical and digital labelling of textiles, including sustainability and circularity parameters based on requirements under the proposed Regulation on eco-design for sustainable products. The proposed revision of the regulation is planned by the second quarter of 2026.

Right to Repair Directive 2024/1799/EU

The Right to Repair Directive (EU) 2024/1799 lays down rules strengthening the provisions related to the repair of goods. It applies to the repair of goods purchased by consumers in the event of a defect of the goods that occurs or becomes apparent outside the liability of the seller pursuant to Article 10 of Directive (EU) 2019/771.

Articles 5 (concerning the obligation to repair) and 6 (concerning information on obligation to repair) only apply to goods for which and to the extent that repairability requirements are provided for by Union legal acts listed in Annex II. Furniture is currently not listed there. However, the sector may become relevant in the future: if furniture products receive repairability or durability requirements under the Ecodesign for Sustainable Products Regulation (ESPR), the Right to Repair Directive would automatically extend its repair obligations to those items.

Construction Products Regulation (CPR) 2024/3110/EU

The Construction Products Regulation (EU) No. 2024/3110 provides the European legal framework for the placement of construction products on the EU Single market

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and aims to establish uniform criteria for the performance and safety of such products. For the purpose of the Regulation, a 'construction product' is defined as "any formed or formless physical item, including 3D-printed products, or a kit that is placed on the market, including by means of supply to the construction site, for incorporation in a permanent manner into construction works or parts thereof with the exception of items that need first to be integrated into a kit or another construction product prior to being incorporated in a permanent manner into construction works".

The CPR applies to construction products and to the following items: (a) key parts of products; and (b) parts or materials intended to be used for products covered by this Regulation, if the manufacturer of those parts or materials so requests. However, the Regulation does not apply to (a) lifts subject to Directive 2014/33/EU of the European Parliament and of the Council, escalators or their components and to (b) requirements or performance assessment subject to Directive (EU) 2020/2184 of the European Parliament and of the Council [on the quality of water intended for human consumption] and covered by the delegated acts of the Commission referred to in Article 11(8) of that Directive. Exceptions for products placed on the market in the outermost regions of the Union within the meaning of Article 349 TFEU are possible, in this case specific provisions apply. The CPR requires manufacturers to issue a Declaration of Performance (DoP), provided a harmonised European standard exists for the product.

For furniture, the CPR is not generally applicable, as furniture is typically not considered a construction product. However, it may become relevant in specific cases where furniture is designed to be permanently integrated into a building and thus considered part of the constructed works. This could apply for example to built-in furniture, such as fitted kitchens, integrated wardrobes, fixed seating in public buildings, or specialised functional furniture in commercial or public environments, provided that such furniture is permanently attached to the building structure and fulfils particular construction-related functions (for example, in relation to fire safety, structural requirements, or indoor emissions).

Article 3 of the CPR defines 'permanent' as "intended to remain in the construction work, or in parts thereof, after the completion of the construction or renovation process".

Article 14 of the CPR states that "a manufacturer may decide not to undergo the applicable assessment and verification of the product's compliance with applicable product requirements and not to draw up a declaration of performance and conformity when any of the following applies:

(a) the product is individually manufactured or custom-made and fulfils all of the following conditions:
    (i) it is manufactured using a non-series process;
    (ii) it is produced in response to a specific order;
    (iii) it is installed in a single identified construction work by a manufacturer who is also responsible for the safe execution of the construction works designated under the applicable national rules;
    (iv) it is in compliance with the applicable national rules, and under the supervision of those responsible for the safe execution of the construction works designated under the applicable national rules;

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(b) the product is manufactured in a manner exclusively appropriate to heritage conservation and in a non-series process for adequately renovation construction works officially protected as part of a designated environment or because of their special architectural or historic merit, in compliance with the applicable national rules."

Biocidal Product Regulation (EU) No 528/2012

The Biocidal Products Regulation (BPR) – Regulation (EU) No 528/2012 – governs the making available on the market and use of biocidal products, which are used to protect humans, animals, materials or articles against harmful organisms such as pests or bacteria, by the action of the active substances contained in the biocidal product. Its objective is to improve the functioning of the internal market for biocidal products while ensuring a high level of protection for both human and animal health and the environment. The Regulation establishes a two-tier authorisation system: active substances must first be approved at Union level before biocidal products containing them can be authorised for placing on the market, either through national authorisation, mutual recognition between Member States, or the Union authorisation procedure. It also introduces rules on the authorisation of biocidal product families and on treated articles.

For furniture, the BPR is primarily relevant through Article 58, which governs treated articles, i.e. articles that have been treated with, or incorporate, one or more biocidal products, such as items of furniture that have been treated with wood preservatives, antimicrobial coatings or anti-mould finishes. Wooden furniture and outdoor furniture are frequently treated with preservatives falling under Product Type 8 (wood preservatives), while upholstery, mattresses and other textile-containing furniture components may be treated with antimicrobial or anti-mite agents falling under Product Type 9 (fibre, leather, rubber and polymerised materials preservatives). Under Article 58(2), a treated article may only be placed on the market if all active substances contained in the biocidal products used to treat it are approved for the relevant product type or are included in the list of approved active substances under examination. Article 58(3) further requires that, where a treated article makes a biocidal claim (e.g. explicit marketing of furniture as "antibacterial" or "insect-repellent"), the supplier must ensure that the article is labelled with specified information, including the names of all active substances, the biocidal property attributed to the article, and, where relevant, instructions for use and information on associated risks. Suppliers must also provide this labelling information to consumers upon request, free of charge, within 45 days.

Further EU Legislation

There are other EU laws that do not directly apply to the furniture product group as a whole but may apply to individual products with specific characteristics. For example, this could be the case for furniture containing electrical or electronical components (here e.g. the Machinery Regulation, the Electromagnetic Compatibility Directive, or the Restriction of Hazardous Substances Directive could apply).

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5.3.3. Member State Legislation

French Code de l'Environnement (Articles L541-10 and R543-240)

Article L541-10 (Code de l'environnement; Sous-Section 1: Dispositions Générales, n.d.) of the French Code de l'Environnement sets out the core legal principles of Extended Producer Responsibility (EPR) in France. It establishes that producers, importers and distributors of products that generate waste may be required to ensure or contribute to (among others) the prevention and management of this waste, to the adoption of an eco-design approach to products, to the promotion of the extension of the lifespan, to the support of reuse and repair networks as well as to development aid projects relating to the collection and treatment of their waste, and to development of recycling of. The article also sets out provisions regarding the Producer Responsibility Organisations (PROs) to be established.

The following articles set out various details regarding the implementation of the EPR scheme: For example, Article L541-10-1 defines the product categories covered, including '10° Furniture items, as well as upholstered seating and bedding products and, from 1 January 2022, textile decorative items'. Article L541-10-2 concerns the use of contributions paid to the PROS, Article L541-10-3 concerns eco-modulation, and Article L541-10-5 a fund for financing reuse.

Currently the following products are covered by the scheme:

- Furniture and its components whose primary function is to contribute to the furnishing of a residential, commercial or public-access area by providing seating, sleeping accommodation, storage, or a surface for placing or working on;
- Textile decorative items used to decorate walls, floors and windows with removable finished products made from natural or synthetic textiles, as well as their accessories, regardless of the materials from which they are made.

More concretely, furniture falling within the following 12 categories is concerned:

- Living room, lounge and dining room furniture
- Occasional furniture
- Bedroom furniture
- Bedding (including mattresses)
- Office furniture
- Kitchen furniture
- Bathroom furniture
- Garden furniture
- Seating
- Technical, commercial and institutional furniture
- Upholstered seating and sleeping products
- Textile decorative items and their accessories

However, the following elements are excluded from the scope:

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- Furniture and its components falling within the scope of Section 10 of Chapter III of Title IV of Book V of the regulatory part of the Environment Code [*These provisions relate to electrical and electronic equipment*]
- Specific fittings for business premises constituting fixed installations which are both:
  - Custom-designed;
  - Assembled and installed by a professional fitter;
  - Intended for permanent use as an integral part of the building or structure, in a predefined dedicated location;
  - And can only be replaced by a similar element specifically designed for that purpose;
- Street furniture installed on public land and in public spaces;
- Floor, wall and ceiling coverings falling within Section 19 of the same chapter, in particular carpets intended for permanent installation in buildings.

Non-exhaustive lists of specific products covered are available on the websites of the three aggregated producer responsibility organisations (PROs)v ("La filière DEA," n.d.).

Spanish Waste and Contaminated Soils Law (2022)

Spain's Law 7/2022 of 8 April, on Waste and Contaminated Soil for a Circular Economy, is a comprehensive national framework that aligns Spanish waste policy with EU directives and the goals of a circular economy. The law strengthens measures for waste prevention, reuse, and recycling while introducing new obligations for producers and distributors. Key elements include expanded extended producer responsibility (EPR) schemes, restrictions on certain single-use products, and fiscal instruments such as a tax on non-reusable plastic packaging. The legislation also establishes stricter rules for waste management, tracking, and reporting, as well as requirements to improve separate collection systems.

Although broad in scope, the law affects many sectors, including furniture. Furniture is explicitly mentioned in some contexts:

- "1. To prevent the generation of waste, the competent authorities shall adopt measures aimed, at a minimum, at the following: […] (d) Encourage the reuse of products and product components, including through donation, and the introduction of systems that promote repair, reuse and refurbishment, in particular for electrical and electronic equipment, batteries and accumulators, textiles and furniture, packaging, and construction materials and products."
- "2. To facilitate preparation for reuse and high-quality recycling, in accordance with Articles 24(2) and 24(3), local authorities shall establish separate collection for at least the following categories of waste falling within their jurisdiction: [...] f) bulky waste (furniture and household goods) by 31 December 2024 […]"

In relation to targets for preparation for reuse, recycling and recovery:

- "In order to meet the objectives of this Act and to contribute to a European circular economy with a high level of resource efficiency, the competent authorities shall take the necessary measures, through waste management

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plans and programmes, to ensure that the following targets are met: […] c) By 2025, the preparation for reuse and recycling of municipal waste shall be increased to a minimum of 55% by weight; at least 5% by weight of the total shall correspond to preparation for reuse, primarily of textile waste, waste electrical and electronic equipment, furniture and other waste suitable for preparation for reuse." The targets increase to 60%/10% in 2030 and to 65%/15% in 2035.

- "Final Provision Seven. Textile waste, furniture and household goods, plastics for agricultural use, and healthcare waste. Within a maximum period of three years from the entry into force of this law, systems of extended producer responsibility shall be developed by regulation for textiles, furniture and household goods, and plastics for agricultural use that are not packaging, in accordance with Title IV of this law […]. It is understood that the Spanish EPR system for furniture is currently still under development."

Hungarian EPR scheme including wooden furniture

In Hungary, an EPR scheme for wooden furniture has been in place since 2023. Detailed rules for the operation of the extended producer responsibility system are set out in the Government Decree 80/2023 (III. 14.) ('EPR Decree'), which was published in 2023. Producers must register on the partner portal of the designated concession company, MOHU MOL Hulladékgazdálkodási Zrt. (hereinafter MOHU) (Extended Producer Responsibility Legislation, n.d.). There is a practical guidance document available for producers published by MOHU (Information Notice on the Relationship between the Producer and MOHU in the Context of the EPR (Extended Producer Responsibility) Scheme, 2025). However, no concrete product groups are defined there. Unfortunately, the Hungarian law is also not available in English, so it is not possible to assess precisely how the product category is defined. However, it appears that the product category 'furniture' is not explicitly mentioned but instead falls under the more general category 'wood'.

Portuguese EPR scheme for furniture

Portugal's Decree-Law No. 24/2024 of 26 March 2024 (amending the "Regime Unificado" of Extended Producer Responsibility, Decree-Law No. 152-D/2017) legally established a new EPR scheme for furniture and mattresses, with the requirement that it be "operationalised" (*a operacionalizar*) by 31 December 2025(Decreto-Lei n.º 24/2024, 2024).

As of mid-2026, the system does not yet appear to be operational.

Italian EPR scheme for furniture

In Italy, the work towards an EPR scheme was initiated by the furniture industry, led by the industry association FederlegnoArredo (Ecomondo, 2026). At the moment,

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however, the EPR schemes in Italy are voluntary (e.g. Riqualta[2]), and apart from a few cases where materials are sorted, furniture ends up with bulky waste and therefore typically in landfill (Consortium, 2026).

In August 2026, the Ministry of Environment and Energy Security (MASE) opened consultation on a draft dedicated decree on EPR (Regolamento recante istituzione del regime di responsabilità estesa del produttore per mobili e prodotti da arredo) pursuant to Articles 178-bis and 178-ter of Legislative Decree No. 152/2006 (the Italian Environmental Code / Testo Unico Ambientale) (MASE, 2026).

The scope of the draft is determined by furniture function, defining clear categories (wooden domestic furniture, seating, office and kitchen furniture, garden items, and mattresses) mapped to national economic activity/customs codes.

The draft has staggered reuse and recycling targets starting from December 31, 2028:

- Preparation for reuse: 5% by weight (2028), scaling to 10% (2030) and 15% (2032).
- Recycling targets (of collected waste): 50% by weight (2028), scaling to 55% (2030) and 60% (2032).

Dutch EPR scheme for furniture

The Dutch National Programme for a Circular Economy (NPCE) 2023–2030 commits to having an EPR scheme in place for furniture by 2030 at the latest, aimed at improving collection, reuse, refurbishment, repair and recycling of furniture (Betreft Versterking voor een circulaire economie, 2026).

A phased approach has been recommended. First, that a statutory EPR is implemented that initially only obliges producers to report data (i.e. number of furniture items sold, collected after disposal, resold after repair/refurbishment, recycled or incinerated). From 2030, binding targets for collection, preparation for reuse, and recycling would then be set (Betreft Versterking voor een circulaire economie, 2026).

The proposed scheme for furniture is intended to be comprehensive, eventually covering both built-in furniture (like kitchen and bathroom cabinets) and freestanding furniture (like tables, chairs, and sofas). Certain items are explicitly excluded from the scope, most notably mattresses (which already have a separate EPR) and small accessories that fit within a 30x30x30 cm box. Furniture with electrical components, such as adjustable desks, legally falls under the existing EPR for electronic equipment, but the report recommends further coordination to handle them within the furniture collection systems for practical reasons (Kort et al., 2025). An overview of proposed sub-categories is provided in **Table 5-2**.

[2] https://riqualta.it

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1543 **Table 5-2: Overview of furniture categories proposed for Dutch EPR system (Kort**
1544 **et al., 2025).**

Main category	Category	Subcategory
Built-in furniture	Interior construction	Built-in custom furniture
	Kitchen	Kitchen cabinet
		Kitchen countertop
	Bathroom	Bathroom furniture
Freestanding furniture	Storage furniture	Wardrobe/Closet
		Chest of drawers
		Nightstand
		Bookcase
		TV stand
		Drawer unit
		Other
	Seating furniture	Sofas
		Armchairs
		Dining chairs
		Office chairs
		Other
	Beds	Complete bed
		Bed base
	Tables & desks	Dining table
		Coffee table
		Side table
		Desk

Main category	Category	Subcategory
		Other

In addition to the proposed EPR for furniture, an EPR system for mattresses has already been established in the Netherlands. Initially launched as a voluntary initiative by five manufacturers, it was made mandatory by the Dutch Government in January 2022, and is coordinated by the CBM (Trade Association for Interior Design and the Furniture Industry) (Moch et al., 2023).

5.3.4. Comparative analysis of legislation

The Member State legislation reviewed in section 6.1.3 shows that none of the five countries examined (France, Spain, Hungary, Portugal, the Netherlands) currently regulate furniture through a single, harmonised national definition.

Only France and the Netherlands provide an explicit, functional definition of furniture comparable in structure to the JRC/EU Ecolabel definition discussed in section 5.2 (i.e. free-standing or built-in items whose primary function is seating, storage, sleeping, or providing a working/placement surface). In Hungary, a material-based definition (specifically “wood”) is used instead of a functional definition. In Spain and Portugal, a definition of furniture has not been identified by this study.

Regarding exclusions, some differences appear between France’s approach and the proposed Dutch approach: France explicitly excludes custom-fitted, permanently installed furniture from its EPR scope (treating it as akin to a construction product), whereas the Netherlands' proposed scheme **explicitly includes** built-in furniture (e.g. fitted kitchens, bathroom cabinets) as a main category.

France also includes "bedding" (including mattresses) as one of its 12 furniture categories, while the Netherlands excludes mattresses from furniture scope. This is because an EPR system for mattresses has already been established in the Netherlands.

Both France and the Netherlands treat the electrical/electronic overlap similarly in principle (deferring to WEEE-type EPR obligations for electrical components), but the Dutch report additionally recommends practical coordination so that electrically-adjustable furniture (e.g. height-adjustable desks) can still be handled through furniture collection streams — an implementation nuance not present in the French framework.

Regarding subcategories, the French system classifies primarily by room/setting, resulting in subcategories that mix product types. The proposed Dutch system classifies first by construction mode (built-in vs. free-standing) before subdividing by product function.

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5.4. Test standards

The European Committee for Standardisation CEN has a dedicated Technical Committee for furniture (CEN/TC 207) (CEN) with various working groups:

- CEN/TC 207/SC 3 Office furniture
- CEN/TC 207/WG 1 Domestic furniture
- CEN/TC 207/WG 2 Kitchen and bathroom furniture
- CEN/TC 207/WG 3 Thermal insulation of building equipment and industrial installations
- CEN/TC 207/WG 4 Requirements for Outdoor furniture
- CEN/TC 207/WG 5 Contract and educational furniture
- CEN/TC 207/WG 6 Test methods for fire behaviour
- CEN/TC 207/WG 7 Surfaces and surface finishes of furniture
- CEN/TC 207/WG 8 Hardware for furniture
- CEN/TC 207/WG 9 Test methods
- CEN/TC 207/WG 10 Requirements and tools for furniture circularity

WG 10 is the Working Group for furniture circularity that started in 2022. According to the JRC the standardisation activities of WG 10 cover a complete furniture circularity package, considering the most relevant aspects of the products listed in Article 5 of the ESPR (Faraca et al., 2024). WG 10 is the Working Group for furniture circularity that started in 2022.

To date, CEN/TC 207 WG 10 has published one standard - EN 17902:2023 (Furniture – Circularity – Evaluation method for dis/re-assembly capability). This provides guidelines for one aspect of the circular economy framework: the disassembly and reassembly capability: “This document provides guidelines for one aspect of circular economy framework; disassembly and reassembly capability. This document establishes a set of criteria on which to base an assessment of the ability to access and remove/replace/reassemble priority parts of products. The criteria provided are intended to be used when designing a product and apply to different designs, materials, or construction methods. This document does not include requirements. The document does not apply to disassembly operations for the sole purpose of separating the individual materials. This document does not provide a method to evaluate the overall degree of circularity of furniture products. For this, additional complementary evaluation methods for other aspects are necessary.”

Three further standards are under development in WG 10:

- Furniture – Circularity – Evaluation method for maintenance, repair and refurbishing capability, providing a framework to assess and improve the maintenance, repair and refurbishment potential of furniture products.
- Furniture – Circularity – Guidance on reliability, supporting the development of product-specific standards for assessing product reliability as a key contributor to durability and product lifetime.
- Furniture – Circularity – Evaluation method for upgrade capability, supporting product adaptability and lifetime extension through upgrading.

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In addition to the circularity standards, many standards are already available for a variety of product types which prescribe minimum requirements and test methods for strength, durability and safety. Examples of durability standards are EN 12520 (Furniture - Safety, strength and durability - Requirements for domestic seating), EN 15828 (Hardware for furniture - Strength and durability of hinges and their components - Stays and hinges pivoting on a horizontal axis) or EN 12720 (Furniture - Assessment of surface resistance to cold liquids). An overview of potentially relevant EN, ISO/IEC, and national standards have been identified and detailed in:

- Table 5-3: Overview of relevant EN or ISO/IEC test standards on furniture;
- Table 5-4: Overview of German DIN standards which do not exist at European level;
- Table 5-5: Overview of Italian UNI standards which do not exist at European level

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1633 **Table 5-3: Overview of relevant EN or ISO/IEC test standards on furniture**

Standard / Date / Source of information / Topic	Title	Description	Out of Scope
Domestic Furniture			
EN 12520:2024 (Nov 2024) Seating	Furniture - Strength, durability and safety - Requirements for domestic seating	Minimum requirements for the safety, strength and durability of all types of domestic seating for adults. It also specifies additional test methods for seat side-to-side durability as well as finger entrapment and shear and compression. The requirements are based on use by persons weighing up to 110 kg. Also include definitions of different components e.g. for back rest / foot rest / accessible part etc.	Does not apply to ranked seating, seating for non-domestic use, office work chairs, chairs for educational institutions, outdoor seating and to links for linked seating for which European Standards exist. Requirements for the durability of upholstery materials, castors, reclining and tilting mechanisms and seat height adjustment mechanisms are not included as well as requirements for electrical safety and requirements for the resistance to ageing, degradation, flammability and ergonomics.
EN 12521:2023 (Nov 2023) Tables	Furniture - Safety, strength and durability - Requirements for domestic tables	Specifies the minimum requirements for the safety, strength and durability of all types of domestic tables intended for use by adults, including those with glass in their construction. It also contains additional test methods.	Does not apply to office tables and office desks, tables for non-domestic use, tables for educational institutions or outdoor tables for which European Standards exist. It does not apply to trestle tables. With the exception of stability tests, it does not provide assessment of the suitability of any storage features included in domestic tables. It does not include requirements for electrical safety. It does not include requirements for the resistance to ageing and degradation.
Storage	For a standard for domestic storage units see EN 14749:2016+A1:2022, listed under “Domestic Furniture & Non-Domestic Furniture” as it also concerns non-domestic kitchen storage.		

Non-Domestic Furniture			
EN 16139:2025 (Jul 2025) Seating	Furniture - Safety, strength and durability - Requirements and test methods for non-domestic seating	Specifies requirements for the safety, strength and durability of all types of non-domestic seating intended to be used by adults with a weight of not more than 110 kg, including office visitor chairs.	Does not apply to ranked seating, office work chairs, chairs for educational institutions, outdoor seating and to links for linked seating for which other European Standards exist. Does not apply to work chairs for industrial use. Requirements for the durability of upholstery materials, castors, reclining and tilting mechanisms and seat height adjustment mechanisms are not included as well as requirements for the resistance to ageing, degradation and flammability and electrical safety.
EN 15372:2023 (Dec 2023) Tables	Furniture - Strength, durability and safety - Requirements for non-domestic tables	Specifies requirements for the safety, strength and durability of all types of non-domestic tables including those with glass in their construction.	Does not apply to office work tables or desks, tables for educational institutions, laboratory workbenches for educational institutions and outdoor tables for which EN standards exist. Does not apply to laboratory workbenches for professional use and industrial workbenches. Does not apply to tables where the tabletop is not fixed to the understructure, i.e. when applying test 6, Table 2, the top becomes detached from the understructure. With exception of the stability tests, this document does not provide assessment of the suitability of any storage features included in non-domestic tables. Does not include requirements for electrical safety. Does not include requirements for the resistance to ageing, degradation.

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EN 16121:2023/ AC:2025 (Dec 2023/Apr 2025) Storage	Non-domestic storage furniture - Requirements for safety, strength, durability and stability	This document specifies requirements for the safety, strength, and durability for all types of non-domestic storage furniture including office storage furniture.	Does not apply to domestic storage, industrial storage, kitchen, catering equipment, retail storage, and industrial storage lockers. Requirements for strength and durability do not apply to the structure of the building for example the strength of wall hanging cabinets includes only the cabinets and the parts used for attachment. The wall and the wall attachments are not included. Does not include requirements for the resistance to ageing, degradation and flammability.
Domestic Furniture & Non-Domestic Furniture			
EN 1022:2023 (Nov 2023) Seating	Furniture - Seating - Determination of stability	Specifies test methods and requirements for the determination of the stability of all types of seating for adults weighing up to 110 kg, without regard to use, materials, design/ construction or manufacturing process. The test methods described can be used for seating for children and heavier adults by modifying test loads and loading points.	Does not apply to seating for sitting, perching or leaning that requires an action from the user in order to keep the body posture in a stable position. Does not apply to children's highchairs, table mounted chairs and bath seats which are covered by other European Standards.
EN 1728:2012/ AC:2013 (Jul 2013) Seating	Furniture - Seating - Test methods for the determination of strength and durability	Specifies test methods for the determination of strength and durability of the structure of all types of seating without regard to use, materials, design/construction or manufacturing process.	Does not apply to children's highchairs, table mounted chairs and bath seats which are covered by other European Standards. Test methods for the assessment of ageing, degradation, ergonomics and electrical functions are not included. The test methods are not intended to assess the durability of upholstery materials, such as upholstery filling materials and upholstery covers. The Standard does not include any requirements. Requirements for different end uses can be found in other Standards.

EN 1730:2012 (Oct 2012) Tables	Furniture - Tables - Test methods for the determination of stability, strength and durability	Specifies test methods for the determination of stability, strength and durability of the structure of all types of tables and desks without regard to use, materials, design/ construction or manufacturing process.	Does not apply to changing units which are covered by other European Standards. Test methods for the assessment of ageing, degradation, and electrical functions are not included. Does not apply to the strength and durability of any storage features that are covered by other European Standards. Does not include any requirements. Requirements for different end uses can be found in other Standards.
EN 16122:2012/ AC:2015 (Jul 2012) Storage	Domestic and non-domestic storage furniture - Test methods for the determination of strength, durability and stability	Specifies tests methods for the determination of strength, durability and stability for all types of domestic and non-domestic storage furniture including domestic kitchen furniture.	Does not apply to office, industrial, catering equipment and retail storage, nor to industrial storage lockers. Strength and durability tests do not assess the structure of the building (for example the strength of wall hanging cabinets); rather, they include only the cabinets and the parts used for attachment. The wall and the wall attachments are not included. Requirements for safety, strength and durability can be found in other European Standards. Assessment of the effects of ageing, degradation and flammability is not included.

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EN 14749:2016 +A1:2022 (May 2022) Storage and kitchen-worktops	Furniture - Domestic and kitchen storage units and kitchen-worktops - Safety requirements and test methods	Specifies safety requirements and test methods for all types of kitchen and bathroom storage units and domestic storage furniture, including TV-furniture, and their components.	Does not apply to non-domestic storage, office storage, industrial storage, catering equipment, retail storage and industrial storage lockers. Does not apply to furniture covered by EN 71 1, Safety of toys – Part 1: Mechanical and physical properties. The stability requirements do not apply to TV-furniture with a built in TV attachment. Such products are covered by EN 62368 1:2014+A11:2017, Audio/video – Information and communication technology equipment – Part 1: Safety requirements, Clause 8.6. It does not include requirements for the resistance to ageing, degradation, flammability and electrical safety. Safety that is dependent upon the structure of the building is not included, e.g. the strength of wall hanging units includes only the cabinet and its components including wall attachment devices. The wall and the wall attachments are not included.

Office furniture			
EN 1335-1:2020 +A1:2022 (Nov 2022) Seating	Office furniture - Office work chair - Part 1: Dimensions - Determination of dimensions	Specifies the dimensions of four types of office work chairs as well as test methods for their determination. **Definition "office work chair":** "chair for one person, which has an adjustable seat height, can rotate horizontally and is commonly used in conjunction with a work surface". Note: An office work chair may or may not have features such as armrests and/or a headrest. The following five chair types are defined in the definition part of the standard. 1) Type Ax work chair – office work chair with the largest range of adjustments (Note: Type Ax chair has the largest range of adjustment for the seat height, a smaller seat depth dimension and a smaller distance from the backrest to the front of the armrests.) 2) Type A work chair – office work chair with a large range of adjustments 3) Type B work chair – office work chair with a range of adjustments 4) Type C work chair – office work chair with limited adjustments Tall office work chair – office work chair with a higher seat height, measured from the floor, than the maximum seat height specified in Table 2, also with a foot support. Note: A chair used for high work surfaces and desks.	Does not apply to seating for children for which a European Standard exists.

EN 1335-2:2018 (Nov 2018) Seating	Office furniture - Office work chair - Part 2: Safety requirements	Specifies safety, strength and durability requirements for office work chairs. The requirements are based upon use for 8 h a day by persons weighing up to 110 kg.	Does not apply to other seating in the office area for which other European Standards exist.
EN 527-1:2011 (May 2011) Tables	Office furniture - Work tables and desks - Part 1: Dimensions	Specifies dimensions of work tables and desks for office tasks to be undertaken in a seated, a sit stand or standing position.	Includes neither dimensions for storage unit nor those for other tables in the office area or reception desks.
EN 527-2:2016 +A1:2019 (May 2019) Tables	Office furniture - Work tables - Part 2: Safety, strength and durability requirements	Specifies safety, strength and durability requirements for work tables and desks for office tasks to be undertaken in a seated, a sit-stand or standing position.	Does not apply to other tables in the office area, which are covered by EN 15372.
Storage	Covered by EN 16121:2023/ AC:2025, listed under “Non-Domestic Furniture”.		
Beds and mattresses			
EN 1725:2023 (Nov 2023) Beds & mattresses	Furniture - Beds - Requirements for safety, strength and durability	Specifies requirements on safety, strength and durability for all types of fully assembled beds used by adults in domestic and non-domestic environments including their components, such as bed frames, bed bases, mattresses and mattress pads (when they form a unit with the mattress) and, when supplied with the bed base, mattresses and mattress pads. The tests are based on use by persons weighing up to 110 kg.	With the exception of sleeping functions, it does not apply to foldaway beds. It does not apply to bunk beds, high beds and medical beds where separate standards exist, as well as waterbeds and air beds. Additional requirements can be applicable to items that have additional functions, e.g. storage features, day beds and convertible sofa-beds. The durability test, 6.6.1, test 11, applies only to electrically operated beds. The standard does not include requirements for the resistance to ageing, degradation, flammability and electrical safety.

EN 1957:2012 (Oct 2012) Beds & mattresses	Furniture - Beds and mattresses - Test methods for the determination of functional characteristics and assessment criteria	Specifies test methods for the determination of the durability and hardness of mattresses and all types of fully erected beds with mattresses (and mattress pads when they form a unit with the mattress	Does not apply to water beds, air beds and children cots. Includes a method for the determination of the firmness rating of a mattress or a bed correlating to the subjective assessment made by people (see Annex A). It needs to be emphasised that the firmness rating cannot be used to demonstrate comfort and/or quality of a mattress or a complete bed. Ageing and degradation caused by air, light, humidity and temperature is not included. The test results are only valid for the article tested. When test results are intended to be applied to other similar articles, the test specimen shall be representative of them.
EN 747-1:2024 (Mar 2024) Bunk beds and high beds	Furniture - Bunk beds and high beds - Part 1: Safety, strength and durability requirements	Specifies requirements for the safety, strength and durability of bunk beds and high beds for domestic and non-domestic use. It is applicable to bunk beds and high beds with an internal length greater than 1 400 mm and a maximum bed base width of 1 200 mm, and with the upper surface of a bed base of 600 mm or more above the floor.	Does not apply to bunk beds and high beds used for special purposes, including but not limited to prisons, the military and fire brigades. If other products are included in a bunk bed/high bed, for example a table or storage furniture, the relevant European Standards could, in addition, apply.
EN 747-2:2024 (Mar 2024) Bunk beds and high beds	Furniture - Bunk beds and high beds - Part 2: Test methods	Specifies test methods for the safety, strength and durability of bunk beds and high beds for domestic and non-domestic use. The tests are applicable to beds with an internal length greater than 1 400 mm and a maximum bed base width of 1 200 mm and with the upper surface of a bed base 600 mm or more above the floor. The tests are designed to be applied to a bed that is fully assembled and ready for use.	-

Schools & Educational Sector			
EN 1729-1:2015/ AC:2016 (Dec 2015/Aug 2016) Chairs & tables	Furniture - Chairs and tables for educational institutions - Part 1: Functional dimensions	Specifies functional dimensions and markings for all chairs, stools and tables, for educational institutions, including fixed and adjustable chairs and tables. It applies to both un-upholstered and upholstered chairs and stools as well as to both non-swivel and swivel chairs. It applies to furniture for use with laptop computers or portable devices.	Does not apply to ranked seating or special purpose workstations. Does not apply to furniture used by teaching personnel.
EN 1729-2:2023 (May 2023) Chairs & tables	Furniture - Chairs and tables for educational institutions - Part 2: Safety requirements and test methods	Specifies safety requirements and test methods for chairs and tables for general educational purposes in educational institutions including kindergarten, childcare institutions and early years education settings. It applies to furniture for use with laptop computers or portable devices, but not to special purpose workstations, e.g. laboratories, ranked seating and workshops. The chairs fulfilling the applicable requirements of this document are suitable for users weighing up to 110 kg.	
EN 13150:2020 (Feb 2020)	Workbenches for laboratories in educational institutions - Dimensions, safety and durability requirements and test methods	Applies to workbenches, movable science tables and workbench shelves designed for use in educational institutions and similar laboratories. It does not apply to workbenches and working tables for industrial laboratories, institutes and universities or similar research institutions. It does not apply to fume cupboards. Specifies safety and durability requirements and test methods and gives dimensions.	Requirements and test methods related to the fire safety of workbenches and to the resistance of the work surface are not included in this document. Requirements concerning electrical safety and media services (e.g. water, gas, wastewater, compressed air) are not included in this document.

Children's & baby furniture			
EN 17191:2021 (Jul 2021) Seating	Children's furniture - Seating for children - Safety requirements and test methods	This document specifies safety requirements and test methods for seating specifically intended for children who are able to walk and sit by themselves. It applies to seating intended to be placed on the floor for domestic and non-domestic use including in day care centres and for indoor and outdoor use. Note: Seating includes but is not limited to chairs, benches, stools, bean bags, deckchairs, rocking chairs, reclining chairs, armchairs, foldable chairs and swivel chairs.	It applies to the seating function only. If the seating has additional functions or can be converted into other products, the relevant European Standards could, in addition, apply. It does not apply to children's highchairs, childcare articles such as reclined cradles and seating in educational institutions for which other European Standards exist (Seating in educational institutions are covered by the Standards EN 1729-1 and EN 1729-2). It does not apply to swing chairs, wheelchairs, electrical safety or seating for children with special needs.
EN 14988:2017 +A2:2024 (April 2024) High chairs	Children's high chairs - Requirements and test methods	Specifies safety requirements for free standing children's high chairs that elevate children to dining table height usually for the purposes of feeding or eating. Children's high chairs are for children up to 3 years of age who are capable of sitting unaided. With the exception of special high chairs for medical purposes, this document applies to children's high chairs for domestic and non-domestic use. Note: If a children's high chair has to or can be converted into other functions, additional European Standards may apply.	Special high chairs for medical purposes are excluded from the scope.

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EN 716-1:2017 +AC:2019 (Mar 2019) Children's cots and folding cots	Furniture - Children's cots and folding cots for domestic use - Part 1: Safety requirements	Specifies safety requirements for children's cots for domestic use with an internal length greater than 900 mm but not more than 1 400 mm. The requirements apply to a cot that is fully assembled and ready for use. For cots that can be converted into other items e.g. changing units, playpens additional requirements can apply.	This European Standard does not apply to carry cots, cribs and cradles for which a separate European standard exists.
EN 716-2:2017 (Jun 2017) Children's cots and folding cots	Furniture - Children's cots and folding cots - Part 2: Test methods	Specifies test methods for assessing the safety of children's cots and folding cots for domestic use. It applies to children's cots and folding cots with an internal length greater than 900 mm but not more than 1 400 mm.	-
EN 1130:2019/ AC:2020 (Nov 2019/Dec 2020) Cribs	Children's furniture - Cribs - Safety requirements and test methods	Specifies safety requirements and test methods for cribs (including cradles, suspended cribs and bedside sleepers) for domestic and non-domestic use. The requirements apply to cribs with a maximum internal length of crib base of 900 mm which are intended to provide sleeping accommodation for infants, until they are able to sit unaided or pull or push themselves up on their hands and knees.	This document does not apply to electrical safety. It does not apply to cribs used for medical purposes or used in hospitals. Products that can be converted into other items may be covered by other relevant European Standards.

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EN 12221:2026 (Mar 2026) Changing units / changing pads	Childcare articles - Changing units and changing pads for domestic use - Safety requirements and test methods	Specifies safety requirements and test methods for changing units, changing pads and changing unit accessories for domestic use. This document only covers the function of the item as a changing unit. If the item can be converted or used for another function (e.g. cots, storage furniture, bathtubs and stands, etc.), other relevant European Standards apply. The changing unit can be foldable and can be fitted with a child bathtub or other additional items.	-
Outdoor & Garden Furniture			
EN 581-1:2017 (Mar 2017) Seating & tables	Outdoor furniture - Seating and tables for camping, domestic and contract use - Part 1: General safety requirements	Specifies the general safety requirements for outdoor seating and tables for camping, domestic and contract for use by adults, without regard to materials, design/construction or manufacturing processes.	Does not apply to seating for spectator facilities. Does not include requirements for the durability of upholstery materials, castors, reclining and tilting mechanisms and seat height adjustment mechanisms.

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EN 581-2:2015 (Nov 2015) Seating	Outdoor furniture - Seating and tables for camping, domestic and contract use - Part 2: Mechanical safety requirements and test methods for seating	Specifies the minimum requirements for the safety, strength and durability of all types of outdoor seating for adults, without regard to materials, design/construction or manufacturing processes. The test requirements contained within this standard are based on use by persons weighing up to 110 kg.	Does not apply to street furniture. Does not apply to removable upholstery and covering. Does not include requirements for the durability of castors/wheels and height adjustment mechanisms. Does not include requirements for electrical safety. Does not include requirements for the resistance to ageing and degradation caused by light, temperature and moisture.
EN 581-3:2017 (Jan 2017) Tables	Outdoor furniture - Seating and tables for camping, domestic and contract use - Part 3: Mechanical safety requirements for tables	Specifies the minimum requirements for the safety, strength and durability of all types of outdoor tables for adults, without regard to materials, design/construction or manufacturing processes.	Does not apply to street furniture. With the exception of stability tests the standard does not provide assessment of the suitability of any storage features included in tables. Does not include requirements for the durability of castors/wheels and height adjustment mechanisms. Does not include requirements for electrical safety. Does not include requirements for the resistance to ageing and degradation caused by light, temperature and moisture.

Bathroom furniture			
EN 14688:2015 +A1:2018 (Oct 2018) Wash basins	Sanitary appliances - Wash basins - Functional requirements and test methods	Specifies the functional characteristics and test methods for wash basins for domestic purposes. For the purposes of this standard the term “domestic purposes” includes use in hotels, accommodation for students, hospitals and similar buildings, except when special medical provisions are required.	-
Kitchen furniture			
EN 1116:2018 (Jan 2018) Source Kitchen furniture	Furniture - Kitchen furniture - Coordinating sizes for kitchen furniture and kitchen appliances	Specifies co-ordinating sizes for kitchen units, worktops, recess panelling, furniture fronts and decorative panels as well as for kitchen appliances (white goods and ovens) and further installation elements, e.g. sinks (abbreviated as "appliances"). It specifies dimensions for the height, the width, the depth and the space to integrate appliances in kitchen units.	Does not apply to kitchens used commercially (e.g. in hotels, restaurants).

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EN 13759:2012 (Apr 2012) Seating and sofa-beds	Furniture - Operating mechanisms for seating and sofa-beds - Test methods	Specifies test methods for the determination of the durability of hand and power operated reclining mechanisms for adult seating. Also specifies test methods for the determination of the durability of mechanisms for converting sofas and chairs into beds. The test methods are based on use by a person weighing up to 110 kg. Includes definitions of (among others): **'Work chair'**: chair, with or without arm rests, for use by one adult in the office or home office (for example for working with a computer), whose upper part, which includes the seat and back, is supported on a single column and can rotate in the horizontal plane and is at least adjustable in height **'Convertible sofa-bed'**: item of seating that utilises a mechanism to convert it into a bed	Requirements for the durability of reclining mechanisms are not included within this standard. Test methods for strength and durability of the structure are not included. It does not apply to the safety of electrically driven seating which is covered by the machinery, low voltage and EMC directives. It does not apply to tilting and reclining mechanisms fitted to work chairs.
EN 12727:2016 (Nov 2016) Ranked seating	Furniture - Ranked seating - Requirements for safety, strength and durability	Specifies requirements determining the safety, structural strength and durability of all types of seating that are permanently fastened to the floor and/or wall, whether in bench or individual seat form.	Does not apply to linked seating not fastened to the floor and/or walls and street furniture. It does not include requirements for resistance to ageing, degradation, flammability, the effect of ambient temperature and the durability of upholstery materials.

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EN 14703:2007 (Apr 2007) Ranked seating	Furniture - Links for non-domestic seating linked together in a row - Strength requirements and test methods	Specifies strength requirements and test methods for the links used for non-domestic seating, which can be linked together in a row. Definition 'linked seating': single chairs fitted with means whereby they can be linked together in a row or separated and used singly or stored	Does not specify strength or durability requirements for individual chairs as these are contained within EN 15373. Assessment of ageing and degradation is not included. Tests carried out according to this European Standard are intended to demonstrate the ability of the links to function correctly in their intended environment. It should be understood that fulfilling the requirements does not ensure that the links will operate as expected in circumstances or emergencies that cannot be foreseen.
EN 1021-1:2014 (Aug 2014)	Furniture – Assessment of the ignitability of upholstered furniture – Part 1: Cigarette ignition source	Specifies a test method to assess the ignitability of material combinations, such as covers and fillings used in upholstered seating, when subjected to a smouldering cigarette as an ignition source.	The test measures only the ignitability of a combination of materials used in upholstered seating and not the ignitability of a particular finished item of furniture incorporating these materials.
EN 16516:2017 +A1 (Jul 2020)	Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air	Specifies a horizontal reference method for the determination of emissions of regulated dangerous substances from construction products into indoor air. This method is applicable to volatile organic compounds, semi-volatile organic compounds, very volatile aldehydes and ammonia.	-

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EN 717-1:2004 (Oct 2004) Wood-based panels	Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method	Specifies a chamber method with three options of test chambers for the determination of the formaldehyde emission from wood-based panels in terms of the steady-state concentration in a climate chamber under defined conditions, which relate to typical conditions in real-life. This chamber method can also be applied to the estimation of formaldehyde concentrations under various conditions in practice, by the use of mathematical models. This standard can also be used for the testing of formaldehyde emissions of products other than wood-based panels	-
Hardware for furniture			
EN 15570:2008 (May 2008) Hardware for furniture	Hardware for furniture - Strength and durability of hinges and their components - Hinges pivoting on a vertical axis	Specifies test methods and requirements for the strength and durability of all types of hinges pivoting on a vertical axis and their components for all fields of application. The tests consist of the application of loads, forces and velocities simulating normal functional use, as well as misuse, that might reasonably be expected to occur.	With the exception of the corrosion test in Clause 6.4, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes. The strength and durability tests only relate to the hinges and the parts used for the attachment, e.g. mounting plates and screws. With the exception of corrosion, ageing and the influence of heat and humidity are not included.
EN 15828:2010 (Oct 2010) Hardware for furniture	Hardware for furniture - Strength and durability of hinges and their components - Stays and hinges pivoting on a horizontal axis	Specifies test methods and requirements for the strength and durability of all hinges, stays and systems which include hinges and stays pivoting on a horizontal axis and their components for all fields of application. The strength and durability tests only relate to the hinges and the parts used for the attachment, e.g. mounting plates and screws.	It does not apply to systems intended for storage functions. This standard does not apply to electrically actuated systems. With the exception of the corrosion test in 6.4, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes. With the exception of corrosion, ageing and the influence of heat and humidity are not included.

EN 15338:2024 (Sept 2024) Hardware for furniture	Hardware for furniture - Strength and durability of extension elements and their components	Specifies test methods and requirements for the strength and durability of all types of extension elements and their components for all fields of application, except table extensions. The strength and durability tests only relate to the extension elements and the parts used for the attachment, e.g. screws.	With the exception of the corrosion test in 6.4, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes. Ageing and influences of heat and humidity are not included.
EN ISO 9227:2022/ A1:2024 (Nov 2022/Jun 2024)	Corrosion tests in artificial atmospheres - Salt spray tests [- Amendment 1: Footnote of warning]	Specifies the apparatus, the reagents and the procedure to be used in conducting the neutral salt spray (NSS), acetic acid salt spray (AASS) and copper-accelerated acetic acid salt spray (CASS) tests for assessment of the corrosion resistance of metallic materials, with or without permanent or temporary corrosion protection. Also describes the method employed to evaluate the corrosivity of the test cabinet environment.	It does not specify the dimensions or types of test specimens, the exposure period to be used for a particular product, or the interpretation of results. Such details are provided in the appropriate product specifications.
EN 16014:2011 (Aug 2011) Hardware for furniture	Hardware for furniture - Strength and durability of locking mechanisms	Specifies test methods and requirements for the strength and durability of all types of locking mechanisms for furniture and their components for all fields of application. The strength and durability tests only relate to the locking mechanisms and their components and the parts used for the attachment, e.g. screws.	This European Standard does not apply to latching mechanisms. With the exception of the corrosion test in 6.5, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes. With the exception of corrosion, ageing and influences of heat and humidity is not included.

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EN 15939:2019 (Jun 2019) Wall attachment devices	Hardware for furniture - Strength and loading capacity of wall attachment devices	Specifies test methods for the verification of the loading capacity of all types of wall attachment devices for storage furniture and their components. The tests consist of the application of loads and forces simulating normal functional use, as well as misuse that might reasonably be expected to occur. With the exception of the corrosion test in 6.3, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.	It does not apply to devices intended to prevent the overturning of storage furniture. The tests can be applied to the part attached to the furniture alone or to the combination of the part attached to the furniture and the part attached to the wall. The attachment into the wall is not included. With the exception of the corrosion test, ageing and influences of temperature and humidity are not included.
EN 15706:2009 (Apr 2009) Hardware for furniture	Hardware for furniture - Strength and durability of slide fittings for sliding doors and roll fronts	Specifies test methods and requirements for the strength and durability of all types of slide fittings for all types of sliding doors and roll fronts sliding horizontally and vertically and their components for all fields of application. The strength and durability tests only relate to the fittings and the parts used for the attachment.	With the exception of the corrosion test in Clause 8, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes. With the exception of the corrosion test in Clause 8, ageing and influences of heat and humidity are not included.
EN 17850:2023 (Dec 2023) Hardware for furniture	Hardware for furniture - Star bases for seating - Requirements and test methods	Specifies requirements and test methods for the determination of the strength, durability and stiffness of star bases for use for seating with three or more legs. It is applicable without regard to materials, design/construction or manufacturing processes. It is a component standard helping to regulate star-base properties between component manufacturer and manufacturer of final seating. The requirements are based upon star bases fitted with glides and with castors whose wheels are up to 65 mm diameter and for use by persons weighing up to 150 kg.	It is not applicable for star bases intended to be used in child seating products. It is not relevant for the final consumer where standards for complete articles exist.

EN 17869:2023 (Mar 2023) Hardware for furniture	Hardware for furniture - Test methods for strength and overload tests of connectors for furniture constructed from panel material	Specifies test methods for the strength and overload tests of connectors for furniture constructed from panel material and procedures for evaluating test results. It is specifically intended for assessing cabinet connectors for carcases made of wood-based panel materials. The methods described can, however, be used to assess the relative performance of other types of connectors, e.g. some types of connectors for beds.	The strength and overload tests only apply to the connectors and their components, as well as the mounting to and in the cabinet carcase. They do not apply to additional functions that the connector can have, e.g. covering of the connector. Aging and the influences of temperature and humidity are not included.
EN 17737:2022 (Nov 2022) Hardware for furniture	Hardware for furniture - Test and evaluation methods for the corrosion resistance of furniture fittings	Specifies test methods for the determination of corrosion resistance of furniture fittings as ready-to-use assemblies or their individual parts. It applies to the optical assessment of surface changes for the following materials: - metals and their alloys; - metal coatings with anodic or cathodic properties; - conversion coatings; - anodic oxide layers; - organic coatings on metallic materials.	This document does not include any requirements regarding the corrosion resistance of furniture fittings. These can be given in the product specifications.

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EN 16955:2017 (Apr 2017) Hardware for furniture	Hardware for furniture - Tapered pressure tubes for self-supporting gas springs for the height adjustment of seating - Test methods and requirements for strength and durability	Specifies test methods and requirements for the strength and durability of tapered pressure tubes for self-supporting gas springs for the height adjustment of seating	-
EN 16337:2013 (Jun 2013) Hardware for furniture	Hardware for furniture - Strength and loading capacity of shelf supports	Specifies test methods for the verification of the loading capacity of shelf supports. With the exception of the corrosion test in 6.4, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes. The strength tests include only the shelf supports and their components as well as the attachment to the cabinet and/or to the wall.	This standard does not apply to ceiling attached shelf support systems. If the shelf support has additional functions, e.g. as a connector or as an extension element, these are not covered by this standard. With the exception of the corrosion test, ageing and influences of temperature and humidity are not included.

Furniture surfaces		
Surfaces and surface finishes of furniture	There exist various standards on surfaces and surface finishes of furniture	EN 15187:2024 Furniture - Assessment of the effect of light exposure EN 17214:2019 Visual assessment of furniture surfaces EN 15186:2024 Furniture - Assessment of the surface resistance to scratching EN 12721:2009+A1:2013 Furniture - Assessment of surface resistance to wet heat EN 15185:2023 Furniture - Assessment of the surface resistance to abrasion EN 13721:2023 Furniture - Assessment of the surface reflectance EN 12720:2009+A1:2013 Furniture - Assessment of surface resistance to cold liquids EN 12722:2009+A1:2013 Furniture - Assessment of surface resistance to dry heat EN 16611:2023 Furniture - Assessment of the surface resistance to microscratching EN 13722:2004 Furniture - Assessment of the surface gloss
Cover fabrics		

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Cover fabrics	There exist various standards on cover fabrics	ISO 6330: Textiles — Domestic washing and drying procedures for textile testing ISO 5077: Textiles — Determination of dimensional change in washing and drying ISO 15797: Textiles — Industrial washing and finishing procedures for testing of workwear EN ISO 5077: Textiles - Determination of dimensional change in washing and drying ISO 1421 Rubber or plastics coated fabrics - Determination of tensile strength and elongation at break ISO 13937-2 Textiles - Tear properties of fabrics - Part 2: Determination of tear force using the trouser-shaped test specimen ISO 5470-2 Rubber or plastics coated fabrics - Determination of abrasion resistance - Part 2: Martindale abrader ISO 12945-1 (Knitted / non-woven) ISO 12945-2 (Woven) Textiles - Determination of fabric propensity to surface fuzzing and to pilling ISO 105-C06 (Household) ISO 15797 / ISO 105-C06 (Commercial) Textiles - Tests for colour fastness - Part C06: Colour fastness to domestic and commercial laundering ISO 105-X12 Textiles - Tests for colour fastness - Part X12: Colour fastness to rubbing ISO 105-B02 Textiles - Tests for colour fastness - Part B02: Colour fastness to artificial light: Xenon arc fading lamp test EN ISO 2411 Aerospace series - Textile fabrics coated or laminated with elastomeric or plastics materials - Determination of coating or laminate adhesion
Leather		
Leather	There exist various standards on leather	EN ISO 4045 Leather - Chemical tests - Determination of pH and difference figure EN ISO 3377-1 Leather - Physical and mechanical tests - Determination of tear load - Part 1: Single edge tear EN ISO 11640 Leather - Tests for colour fastness - Colour fastness to cycles of to-and-fro rubbing EN ISO 105-B02 Textiles - Tests for colour fastness - Part B02: Colour fastness to artificial light: Xenon arc fading lamp test EN ISO 11644 Leather - Test for adhesion of finish EN ISO 5402-1 Leather - Determination of flex resistance - Part 1: Flexometer method EN ISO 15700 Leather - Tests for colour fastness - Colour fastness to water spotting EN ISO 17233 Leather - Physical and mechanical tests - Determination of cold crack resistance of surface coating

Draft standards			
FprEN 17684 (Planned for Aug 2026) Electrically operated furniture	Furniture - Electrically operated furniture - Stability, strength, durability and mechanical safety requirements	Specifies stability and mechanical safety requirements and test methods for electrically operated furniture for domestic and non-domestic use, including requirements on shear, compression, entrapment, strength and durability. Applies to electrically operated furniture for use in areas accessible by adults and children of all abilities, and domestic pets. Includes requirements related to all persons, including children from the age of 4 years in and around the products and the associated hazards.	Excludes considerations and requirements related to children less than 4 years old operating the product. Does not include requirements related to the electrical safety of the item of furniture. In general, it does not take into account: damage to property or the environment. Does not apply to: seating incorporated in other machines and seats in vehicles. If the electrically operated furniture has additional functions or can be converted into other products, other relevant European Standards can apply. Is not applicable to electrically operated furniture which is manufactured before the date of publication of this document.

In addition, formal requests under Regulation (EU) No 1025/2012 have been made by the European Commission asking CEN/CENELEC to develop or revise European standards in support of specific EU legislation. These include:

- M/396 – Mandate to CEN and CENELEC for standardisation in the field of machinery. This mandate underpins standardisation work in support of the Machinery Regulation (EU) 2023/1230 (which repealed and replaced the earlier Machinery Directive 2006/42/EC). It is the legal basis for the development of FprEN 17684 "Furniture – Electrically operated furniture – Stability, strength, durability and mechanical safety requirements" (planned publication, August 2026; drafted by CEN/TC 207 "Furniture"), which is already listed as a draft standard in section 6.2.1. FprEN 17684 specifies stability and mechanical safety requirements and test methods for electrically operated furniture (e.g. height-adjustable desks, motorised reclining or lifting furniture) used domestically and non-domestically, covering hazards such as shearing, compression and entrapment. It excludes electrical safety requirements (covered elsewhere) and hazards to children under 4 years old. This is currently the only identified Commission mandate resulting in a furniture-specific mechanical/stability standard.
- M/497 – Standardisation mandate to CEN, CENELEC and ETSI on the safety of child-care articles. Issued in support of the General Product Safety Directive 2001/95/EC (now succeeded by the General Product Safety Regulation (EU) 2023/988), this mandate has led to a family of standards covering nursery and children's furniture-adjacent products, including:
  - EN 1130:2019 – Children's furniture – Cribs and cradles for domestic use – Safety requirements and test methods;
  - EN 16890:2017+A1:2021 – Children's furniture – Mattresses for cots and cribs – Safety requirements and test methods;
  - EN 12790-1:2023 / EN 12790-2:2023 – Child-care articles – Reclined cradles (Parts 1 and 2).

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Further to European standards, some additional standards have been identified in Germany and Italy which may be relevant to the purpose of this study. These are detailed in **Table 5-4** and **Table 5-5**.

Table 5-4: Overview of German DIN standards which do not exist at European level.

Standard / Date / Source of information / Topic	Title	Description	Out of Scope
DIN 68878:2011 (Nov 2011) Seating	Chairs for domestic use - Performance characteristics - Requirements and test methods	This standard applies to chairs not fixed to the floor in domestic settings; it does not apply to high chairs, folding chairs or outdoor chairs. This standard specifies functional dimensions, performance requirements and test methods.	-
DIN 68888:2009 (Jun 2009)	Domestic furniture - Seating - Determination of durability of upholstery	No accessible information found.	-
DIN EN 12132-2 Cover fabrics	Curtains and drapery textiles - Part 2: Determination of down and feather proofness by rubbing method	Specifies the method for determining the feather and down proofing of cover fabrics used in upholstered furniture (e.g. cushions and padded seating).	-
DIN EN ISO 9237 Cover fabrics	Textiles - Determination of the permeability of fabrics to air	Specifies the method for determining the air permeability of cover fabrics used in upholstered furniture.	-
DIN EN ISO 13936-2 Cover fabrics	Textiles - Determination of the slippage resistance of yarns at a seam in woven fabrics - Part 2: Fixed seam opening method	Specifies the fixed seam opening method for determining the seam slippage resistance of cover fabrics used in upholstered furniture.	-
DIN EN 20105-A02 Cover fabrics	Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour	Specifies the grey scale reference method used to assess colour fastness of cover fabrics to heat exposure.	-

1654 **Table 5-5: Overview of Italian UNI standards which do not exist at European level.**

Standard/ Date/Source of information	Title	Summary[3]
UNI 11839:2021 December 2021	Furniture - Office workplace - Criteria for the arrangement of furniture to ensure the physical distance of the operators	This document integrates the requirements of the UNI 11534: 2014 standard, on the arrangement of office furniture, with considerations and suggestions that take into account the needs of social distancing imposed by the diffusion of epidemics and pandemics.
UNI 11938:2024 February 2024	Furniture - Wall-hanging bathroom furniture - Installation guidelines	This document defines the minimum requirements for the installation of wall-hanging bathroom furniture. These guidelines apply to all wall-hanging bathroom furniture installations, both public and private, such as residential buildings, hotels, hospitals, accommodation facilities, school facilities, sports and tourist facilities.
UNI 11675:2017 March 2017	Furniture - Furniture design and their approaches to meet the needs of all persons - Requirements	This standard specifies requirements for the design of furniture to meet the needs of all persons.
UNI 11780:2020 March 2020	Furniture - Furniture for hospital and medical offices - Requirements and test methods	This standard defines requirements and test methods for the design of furniture for hospital and medical offices.
UNI 11674:2017 March 2017	Furniture - Requirements for the determination of the Italian origin of furniture	This standard defines the requirements that are necessary to confer the Italian origin of furniture production.

[3] As the Italian standards themselves are not available in English, a short summary is included instead of concrete indications concerning the scope as English summaries are available on the Italian Standardisation Organisation's Websites.

UNI 9240:2016 May 2016	Furniture - Pull off test for surface adhesion	The standard defines a test method to verify, with a traction test, the strength of the furniture surface materials to support adhesion.
EC 1-2024 UNI 9240:2016 February 2024	Furniture - Pull off test for surface adhesion	Errata corrige 1 of 22/02/2024 to UNI 9240:2016
UNI 9242:1987 December 1987	Furniture - Determination of edges resistance to heat	This standard describes a method for evaluating the effect of prolonged exposure to heat on edgebanded furniture panels. The test is aimed at evaluating the quality of the bonding of the edge-panel system and not of the individual components or materials that compose it.
UNI 11840:2021 December 2021	Furniture - Criteria for defining a product family and for sampling	This document provides information to correctly identify a family of office furniture products and to choose the most unfavourable case(s) to be tested within it, in order to determine performances that can be considered as significant not only for the product in the specific configuration under test, but also for the entire range of products included in the family. This document does not apply to dimensional requirements.
UNI CEN/TS 16209:2022 June 2022	Furniture - Classification for properties for furniture surfaces	This document specifies a system for the classification of the resistance to: - Dry heat; - Wet heat; - Cold liquids; - Abrasion; - Scratching; - Microscratching. The classification applies to foils, laminates, melamine faced boards, pigmented and transparent lacquers. The classification for the resistance to cold liquids also applies to oils and waxes. The following classification does not apply to leather surfaces.
UNI 11994:2025 October 2025	Furniture - Acoustic pods - Definitions and requirements	This standard defines and classifies acoustic pods (also known as acoustic rooms, room-in-rooms, offices, office phone booths, collaborative rooms) and defines their requirements in relation to their dimensions, functions, mechanical, acoustic, indoor air quality and ventilation. Electrical risks are not included.
UNI 9084:2002 November 2002	Furniture - Chairs and stools - Seat height adjustment durability test	The standard specifies a test method for assessing the fatigue strength of semi-automatic and manual seat height adjustment mechanisms.

UNI/TR 11796:2020 September 2020	Furniture - Technical specification for the purchase of non-domestic equipped seatings	This technical report is a guide for the draft of technical specifications for the supply of non domestic equipped seating.
UNI 10477:1995 July 1995	Furniture - Determination of dimensional variations of doors due to humidity variations	This standard describes a method for determining the dimensional changes in furniture doors when subjected to successive uniform atmospheric conditions resulting from variations in relative humidity. It applies to all furniture doors made of materials sensitive to changes in humidity, with the exception of roller shutters and similar products.
UNI CEN/TS 18231:2026 March 2026	Furniture - Guide to measuring EN 1335-1 dimensions with ISO 24496 CMD	This document explains how to act and avoid interpretations on how to measure the dimensions of EN 1335-1:2020+A1:2022 using the test methods and chair measurement device (CMD) of ISO 24496:2021. This document provides additional information not provided in ISO 24496:2021, further clarifications and examples to make measurement of the dimensions more precise and less interpretable.
UNI 11663:2017 January 2017	Domestic storage furniture - Requirements for strength and durability	The standard defines the requirements for strength and durability of domestic storage furniture, including those in kitchens and bathrooms.
UNI 4856:2019 February 2019	Non domestic furniture - Furniture for educational institutions - Teacher's desk and chair - Stability, strength and durability	The standard specifies the stability, strength and durability requirements and relevant test methods for teacher's desk and chair for educational institutions.
UNI 11191:2006 May 2006	Office furniture - Tables and desks for Video Display Terminals (VDT) - Specular gloss requirement	The standard defines the specular gloss requirement of work tops of tables and desks for Video Display Terminals (VDT).
UNI/TR 11654:2020 January 2020	Office furniture - Technical specification for the purchase of office tables and desks, storage units and screens	This technical report is a guide for the draft of technical specifications for the supply of office furniture. It is applied to the supply of office desks and tables, storage furniture and screens.

UNI 10916:2001 January 2001	Office furniture - Footrests - Dimensions and characteristics	The standard specifies the dimensions of footrests for office use.
UNI/TR 11653:2020 March 2020	Office furniture - Technical specification for the purchase of office seating	This technical report is a guide for the drafting of technical specifications for the provision of office chairs.
UNI 10846:2000 March 2000	Upholstered furniture - Polymeric materials coated fabrics for covering - Requirements and test methods	The standard specifies the requirements and associated test methods for upholstery materials used in upholstered furniture consisting of substrates coated with polymeric materials.
UNI 10714:1999 April 1999	Upholstered furniture - Microfibre nonwoven fabrics for covering - Requirements and test methods.	The standard sets out the requirements for microfibre-based non-woven upholstery fabrics for upholstered furniture, based on a series of characteristics identified using the specified test methods.
UNI 11072:2003 September 2003	Upholstered furniture - Structure, upholstery and finish - Requirements and test methods	The standard defines performance requirements and test methods of structure, upholstery and finish for all types of upholstered seatings without taking into account their construction and constituent materials.
UNI 10988:2020 July 2020	Shop furniture - Storage units - Terminology, safety requirements and test methods	The standard establishes terminology, requirements and test methods of storage units used in shops.
UNI 11306:2020 July 2020	Benches - Safety requirements and test methods	The standard specifies safety requirements for benches for street furniture, regardless of theirs shape and materials.
UNI 11125:2004 August 2004	Labelling of furniture covered with leather - Requirements	This standard specifies requirements for labelling furniture covered with leather, furthermore, specifies rules for identification and designation of leathers for the suppliers.

UNI 10171:1993 September 1993	Wadding for furniture. Determination of compressibility and delayed elastic recovery.	It describes the test procedures for determining, under controlled conditions, the compressibility and delayed elastic recovery of wadding used in furniture (including sofas and beds).
UNI 10172:1993 September 1993	Wadding for furniture. Determination of compressibility and delayed elastic recovery after dynamic fatigue.	It describes a method for determining compressibility and delayed elastic recovery following dynamic fatigue, so as to estimate the in-service performance of upholstery wadding (for furniture and bedding) subjected to repeated loads.
UNI 9429:2022 May 2022	Surface finishings for wood and furniture - Determination of surface resistance to temperature changes	The standard describes two methods for evaluating the effect of rapid temperature changes on finished panels forming furniture elements. The scope is to assess any alteration of the surface under test and the possible interactions among the combination of two or more materials. The methods are suitable for both a comparison of panels with different coating systems and as a test to ensure that a given level of performance is maintained or achieved. The standard applies to furniture surfaces. The standard does not apply to surfaces made of leather, leather imitations, natural and synthetic fabrics.
UNI 11216:2016 June 2016	Surface finishings for wood - Surface finishings for domestic furniture - Performance requirements for of coated wood-based surfaces	The standard defines the minimum requirements for wood coated surfaces of domestic furniture for indoor use. The features considered are the following: scratch resistance, resistance to temperature variations, resistance to dry heat, resistance to wet heat, resistance to cold liquids, light resistance, tendency to retain dirt, adhesion by pull-off and crosscut.
EC 1-2016 UNI 11216:2016 July 2016	Surface finishings for wood - Surface finishings for domestic furniture - Performance requirements for of coated wood-based surfaces	Errata corrige 1 of 19/07/2016 to UNI 11216:2016
EC 2-2017 UNI 11216:2016 April 2017	Surface finishings for wood - Surface finishings for domestic furniture - Performance requirements for of coated wood-based surfaces	Errata corrige 2 of 28/04/2017 to UNI 11216:2016

UNI 11771-1:2020 January 2020	Decorative continuous laminates based on thermosetting resins (generally called continuous laminates - CPL) - Part 1: General	This standard classifies continuous decorative laminates (CPL) based on their performance and application fields. CPLs are coating materials for internal use, intended to be glued onto supports. Depending on the type, they can be used in the furniture sector for the realization of various parts of furniture (such as panelling, backsplashes, doors and worktops), interior design (such as edges, profile coatings, doors and window sills) as well as in the field of construction and transport as surfaces for covering rigid vertical elements (walls and partitions), composite materials (sandwich panels) or floors.
UNI 11771-3:2020 23 January 2020	Decorative continuous laminates based on thermosetting resins (generally called continuous laminates - CPL) - Part 3: Specifications	This standard establishes a classification system for CPLs as well as performance levels. This Part 3 of the standard also specifies the requirements for the properties of the various types of CPL. CPLs are primarily intended for use as a decorative coating surface in the field of furniture, interior design and flooring.
UNI 11896:2023 January 2023	Classification of the materials with which furniture is made in relation to its emission of volatile organic substances	The purpose of the standard is to classify the materials with which furniture is made according to its emissions of volatile organic compounds in a test chamber. Based on the use of materials already classified according to this standard, it is also possible to classify a finished product.
UNI/TR 11359:2010 May 2010	Safety management of textiles, clothing, furniture, footwear, leather and accessories	This technical report considers the main aspects for safety and human health- to keep in mind planning of the products - in relation to textiles, clothing, furniture, footwear, leather and their accessories. It describes the critical chemicals potentially present and the consequent risks; it considers the physical- mechanical risk and fire risk. This technical report applies to all kind of products mentioned above.
UNI CEN/TS 16526:2014 January 2014	Sandwich boards for furniture (SWB-F) - Factory made products - Definition, classification and test methods for determination of performance characteristics	This technical specification is the official English-language version of the European technical specification CEN/TS 16526 (November 2013 edition). The technical specification defines terms, establishes a classification and specifies test methods for factory-made, non-structural, coated and uncoated flat composite panels used for the manufacture of furniture components (SWB-F) under dry (service class 1) and damp (service class 2) conditions. The technical specification does not set out requirements. Guidance is provided for the selection of composite panel properties relevant to specific applications. The technical specification does not apply to products already covered by existing standards.

UNI 9713:1990 May 1990	Wood. Technical suitability of wood species for indoor furniture.	It provides the information needed to assess the technical suitability of the timber species most commonly used in the manufacture of solid wood components for interior furniture.
UNI CEN/TS 16822:2015 November 2015	Textiles and textile products - Self-declared environmental claims - Use of the terms	This Technical Specification establishes guidelines for the development and use of self-declared environmental claims for textiles (e.g. fibres, yarns, fabrics), textile products (e.g. clothing) and textile components of products (e.g. upholstery fabric in furniture), which includes principles, methodology and rules for some terms commonly used in environmental claims.
UNI/PdR 77:2024 August 2024	Guidelines for computerised calculation for the determination of LENI according to the complete calculation method of UNI EN 15193-1:2021	This UNI/PdR supports the use of the program LENICALC for the calculation of LENI according to the complete calculation method of the UNI EN 15193-1:2021 standard. This UNI/PdR and the software applies to residential and non-residential buildings, as specified by UNI EN 15193-1:2021. Neither the standard UNI EN 15193-1:2021, nor this UNI/PdR and the software are concerned with lighting requirements, which are in scope of UNI EN 12464-1, UNI EN 12193 and UNI EN 1838. Furthermore, the UNI/PdR and the software do not cover lighting requirements, the design of lighting systems, the planning of lighting installations, the characteristics of lighting equipment (lamps, control gear and luminaires) and systems used for display lighting, desk lighting or luminaires built into furniture.

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No third country test standards beyond those listed in tables **Table 5-3, Table 5-4** or **Table 5-5** relevant to the purpose of this study have been identified.

5.4.1. Comparative analysis of test standards

The EN/ISO/IEC standards identified provide a harmonised European baseline for assessing the safety, strength, durability and stability of furniture, organised primarily around a matrix of:

- product function (seating, tables, storage) and,
- intended use context (domestic vs. non-domestic).

Representative examples include EN 12520 (domestic seating) and EN 16139 (non-domestic seating); EN 12521 (domestic tables) and EN 15372 (non-domestic tables); and EN 14749 and EN 16121 (storage furniture, domestic/non-domestic). A second tier of standards (EN 1022, EN 1728, EN 1730, EN 16122) specifies the underlying test methods (e.g. stability, strength and durability testing) that are referenced by, and common across, the requirement-setting standards above, without themselves setting pass/fail requirements.

A clear domestic/non-domestic split exists, reflecting different expected use intensities and user populations (e.g. non-domestic seating is tested for use by the general public rather than a single household). In addition, several specialised furniture categories emerge, sometimes based on setting (i.e. educational furniture, children's furniture, outdoor furniture) or sometimes based on product type (i.e. office work chairs/desks), indicating that beyond generic functions, specialised considerations are also needed in specific contexts.

Standards for specific components are also addressed, for example, hardware. These cover the strength and durability of individual hardware elements — hinges pivoting on vertical and horizontal axes (EN 15570, EN 15828), locking mechanisms (EN 15939), extension elements (EN 15338), slide fittings for sliding doors and roll fronts (EN 15706), wall attachment devices (EN 16014), shelf supports (referenced in 6.2.1), star bases and gas springs for seat height adjustment (EN 17850, EN 16955), panel-material connectors (EN 17737), and corrosion resistance of furniture fittings generally (EN 16955/related corrosion test methods, informed by the generic salt spray test EN ISO 9227). These hardware standards are consistently function-specific (e.g. testing only the hinge and its attachment points, not the surrounding furniture item) and generally exclude ageing/degradation effects beyond corrosion.

Furniture surfaces are addressed by a further dedicated cluster of standards assessing resistance to scratching (EN 15186), microscratching (EN 16611), abrasion (EN 15185), dry heat (EN 12722), wet heat (EN 12721), cold liquids (EN 12720), light exposure (EN 15187), as well as surface gloss (EN 13722), reflectance (EN 13721) and general visual assessment (EN 17214) — together providing a comprehensive, standardised toolkit for evaluating the durability and quality of furniture surface finishes independent of the underlying furniture type.

Upholstery and filling materials are covered by a smaller number of standards focused mainly on fire safety (EN 1021-1, cigarette ignition source for upholstered furniture);

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notably, upholstery/filling durability is explicitly excluded from the scope of the seating, storage and table standards discussed above, indicating a gap relative to the more extensive national (particularly Italian) coverage of upholstery materials, wadding and coated fabrics described earlier.

It appears no differentiation is made between different settings in which furniture is used (i.e. domestic vs. non-domestic or indoor vs. outdoor) at the component level.

Finally, indoor emissions are addressed through EN 16516 (determination of emissions of dangerous substances, including VOCs, SVOCs, very volatile aldehydes and ammonia, into indoor air from construction products, also applied to furniture) and the EN 717 series on formaldehyde release from wood-based panels (EN 717-1, chamber method), the latter also being applicable, per its own scope, to the testing of formaldehyde emissions from products other than wood-based panels.

5.5. Voluntary Schemes

A large number of voluntary schemes have been identified for the certification of final furniture products, materials used in furniture manufacturing, as well as certifications that final products/materials are free from chemicals or meet certain emission standards.

As part of the stakeholder survey (Jun-July 2026), stakeholders were also asked for feedback on which certifications were considered most relevant and useful.

The EU Ecolabel emerged as the most frequently referenced scheme, particularly among consumer and environmental NGOs, and some argued its criteria should be considered a benchmark when developing ESPR requirements for furniture. However, several manufacturer respondents noted the EU Ecolabel has limited market uptake in practice.

National Type I ecolabels were widely cited as useful in certain Member States specifically because of their strong local market recognition and role in procurement, in particular, Nordic Swan (Norway), the Blue Angel and Goldens M (Germany), Svensk Möbelfakta (Sweden), and NF Marque (France).

For wood, FSC and PEFC were cited across multiple respondent types (manufacturers, sector associations, and NGOs) as useful for guaranteeing responsible timber sourcing. Several respondents pointed to schemes addressing specific health and chemical safety hotspots as particularly valuable in particular OEKO-TEX for textiles and CertiPUR for polyurethane foam.

It was however also commented by some stakeholders, particularly larger manufacturers, that label proliferation and fragmentation exist, and that outside of public procurement, labels remain secondary in purchasing decisions.

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5.5.1. EU/National voluntary schemes

EU Ecolabel – Furniture and mattresses

There are EU Ecolabel criteria for furniture and EU Ecolabel criteria for bed mattresses. The product group 'furniture' shall comprise "free-standing or built-in units whose primary function is to be used for the storage, placement or hanging of items and/or to provide surfaces where users can rest, sit, eat, study or work, whether for indoor or outdoor use. The scope extends to domestic furniture and contract furniture items for use in domestic or non-domestic environments. Bed frames, legs, bases and headboards are included in the scope."

However, the product group does not include the following products:

(a) Bed mattresses, which are covered by the criteria set out in Commission Decision 2014/391/EU,
(b) Products whose primary function is not to be used as per paragraph 1, including streetlights, railings and fences, ladders, clocks, playground equipment, stand-alone or wall-hung mirrors, electrical conduits, road bollards and building products such as steps, doors, windows, floor coverings and cladding.
(c) Second-hand, refinished, refurbished or remanufactured furniture products.
(d) Furniture fitted in vehicles used for public or private transit.
(e) Furniture products which consist of more than 5 % (weight by weight) of materials not included in the following list: solid wood, wood-based panels, cork, bamboo, rattan, plastics, metals, leather, coated fabrics, textiles, glass and padding/filling materials.

Criteria for awarding the EU Ecolabel to furniture products are related to product description; general requirements for hazardous substances and mixtures; wood, cork, bamboo and rattan; plastics; metals; upholstery covering materials; upholstery padding materials; glass: use of heavy metals; final product requirements; consumer information; information appearing on the EU Ecolabel (Commission Decision (EU) 2016/1332 of 28 July 2016 Establishing the Ecological Criteria for the Award of the EU Ecolabel for Furniture (Notified under Document C(2016) 4778) (Text with EEA Relevance), 2016).

The following list shows specific requirements defined by the EU Ecolabel, however, is intended only as a preliminary assessment and is not exhaustive. The detailed criteria set out in Commission Decision 2016/1332/EU are authoritative:

- For each product, technical drawings, information on components and materials, and a breakdown of the respective material shares must be provided.
- Specific requirements apply to the origin, traceability and sustainable management of wood, cork, bamboo and rattan.
- The use of substances of very high concern and other hazardous substances and mixtures in the product and during manufacturing is largely restricted.
- Requirements apply to paints, coatings, varnishes and similar products to limit volatile organic compounds (VOCs) and certain hazardous substances.

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- Plastics must be free from PVC and certain heavy metals. Larger plastic parts must be labelled, and products with a high proportion of plastic must contain a minimum share of recycled material.
- Restrictions apply to the coating and electroplating of metal components, as well as to the use of heavy metals and VOC-containing coatings.
- Upholstery and covering materials must meet requirements relating to harmful residues, material quality and the chemicals used. Additional requirements apply to certain textiles, leather, coated fabrics, latex foams and polyurethane foams.
- For glass, lead-containing materials are excluded or restricted, and maximum limits apply to lead, mercury and cadmium impurities.
- Furniture made from multiple components or materials must be designed so that it can be dismantled, repaired, reused and recycled using basic tools. Appropriate instructions for dismantling and repairing the product must also be provided.
- Certain furniture products and material combinations are subject to VOC emission testing and maximum emission limits.
- Manufacturers must provide a free guarantee of at least five years and make spare parts available for at least five years.
- Clear consumer information must be provided with the product in the language of the country where it is placed on the market.

Regarding fitness-of-use, the EU ecolabel defines a number of relevant standards, differentiated according to product type in **Table 5-6.**

Table 5-6: relevant standards according to product type.

Furniture type	Standard
Upholstered furniture	EN 1021 Part 1 & 2 Furniture – Assessment of the ignitability of upholstered furniture
Office furniture	EN 527 Part 1 & 2 Office furniture – Worktables and desks, EN 1023-2 Office furniture – Screens, EN 1335 Part 1 & 2 Office furniture – Office work chair, EN 14073-2 Office furniture – Storage furniture, EN 14074 Office furniture – Tables and desks and storage furniture
Outdoor furniture	EN 581 Part 1-3 Outdoor furniture – Seating and tables for camping, domestic and contract use
Seating furniture	EN 1022 Domestic furniture – Seating, EN 12520 Furniture, Strength, durability and safety, EN 12727 Furniture – Ranked seating, EN 13759 Furniture – Operating mechanisms for seating and sofa-beds, EN 14703 Furniture – Links for non-domestic seating linked together in a row, EN 16139 Furniture – Strength, durability and safety
Tables	EN 12521 Furniture - Strength, durability and safety – Requirements for domestic tables, EN 15372 Furniture - Strength, durability and safety – Requirements for non-domestic tables

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Furniture type	Standard
Kitchen furniture	EN 1116 Kitchen furniture – Coordinating sizes for kitchen furniture and kitchen appliances, EN 14749 – Domestic and kitchen storage units and worktops
Beds	EN 597 Part 1 & 2 Furniture - Assessment of the ignitability of mattresses and upholstered bed bases, EN 716-1 Furniture - Children's cots and folding cots for domestic use, EN 747-1 Furniture – Bunk beds and high beds, EN 1725 Domestic furniture – Beds and mattresses, EN 1957 Furniture – Bed and mattresses, EN 12227 Playpens for domestic use
Storage furniture	EN 16121 Non-domestic storage furniture
Other types of furniture	EN 1729 Part 1 & 2 Furniture – Chairs and tables for educational institutions, EN 13150 Workbenches for laboratories, EN 14434 Writing boards for educational institutions

Source: Based on Official Journal of the European Unition, 2016/1332/EU, EU Ecolabel for furniture, Appendix IV

Voluntary EU GPP Criteria for Furniture

The European Commission has developed a set of voluntary Green Public Procurement (GPP) criteria (guidelines) for furniture to help public authorities purchase products with reduced environmental impacts. These criteria, updated in 2017, cover the procurement of new and refurbished furniture, as well as end-of-life services. They address key environmental impacts across the furniture lifecycle, including the sourcing of legal and sustainable timber, limits on certain hazardous substances like formaldehyde, and requirements for durability and design for disassembly. The criteria are divided into "core" and "comprehensive" levels to accommodate varying levels of ambition (EU Green Public Procurement Criteria for Furniture, 2017).

It is important to note that these EU-level criteria are voluntary. Member states may have their own mandatory or voluntary GPP criteria for furniture. Several stakeholders responding to the Stakeholder Survey (June-July 2026) referenced Italy's Criteri Ambientali Minimi (CAM) for furniture, which has been mandatory for public tenders since 2017 (with updated criteria published in 2022), covering the large majority of Italian public office and institutional furniture procurement (Governo Italiano, n.d.).

Nordic Swan Ecolabel Furniture and fitments (Version 6.0)[4]

The Nordic Swan eco-label has a scheme for ‘furniture and fittings’. It includes “domestic furniture and contract furniture items for use in domestic or non-domestic environments”. Furniture must fall into one of the following categories below:

[4] Nordic Ecolabelling for Furniture and fitments, Version 6.0 • 29 October 2025 – 31 December 2029, available at this link.

- Furniture and fitments regulated and complying with requirement O4 such as table/desk furniture, seating furniture, sleeping furniture, storage furniture, Kitchen- and bathroom furniture, lounge furniture/mattresses, screen and partition walls, writing boards and mobile furniture ensembles and enclosures units/office pods.
- Doors and door frames for indoor use
- Sound absorption screens designed to be freestanding or mounted on tabletops
- Bathroom furniture with integrated countertop/sink

The following individual fitting are included as well:

- Countertops
- Fronts (doors and drawer fronts) for kitchens, bath and wardrobes
- Kitchen cabinets

It has to be noted that a maximum of 5% by weight of the furniture/product may consist of materials that do not have requirements in the criteria. Applications may also be made for product systems, e.g. kitchen and wardrobe solutions of which there are numerous variations. To market the product as a Nordic Swan Ecolabelled kitchen, the license must include all necessary parts to assemble a finished kitchen such as cabinets, mouldings, at least one front (for cabinets or drawers) and at least one worktop. Additional relevant products may be included in the product group upon request, if they fulfil specific criteria.

Products that are not primarily intended for use as furniture/fitments are excluded from the Nordic Swan Ecolabel for furniture and fitments. The following examples are given:

- Building products (e.g. walls, stairs, mouldings, windows, floors, construction panels). So-called demountable walls and/or fixed walls that can, for example, divide a room in two, where the function is equivalent to a wall, cannot be Nordic Swan Ecolabelled.
- Acoustic ceiling- and wall panels, either part of the ceiling or wall construction or which is mounted directly on ceiling or walls. This type of acoustic panels can be labelled according to criteria for 010 Panels and mouldings for interior use*.
- Sanitary ware, such as toilets, shower cabins, bathtubs and washbasins
- Lamps
- Bathroom accessories, such as soap dispensers, paper towel holders, towel racks, toilet paper holders and similar
- Office supplies
- Furniture intended for outdoor use
- Carpets, cushions/pillows** and textiles
- Toys (products that fall within the scope of the Directive 2009/48/EC on the
- safety of toys)
- Mirror glass that is not part of another piece of furniture/fitment
- Aids, such as raised toilet seats, armrests, backrests and similar
- Interior items, such as picture frames, candlesticks and hooks

*Separate criteria also exist for: Carpets, floors, office supply, outdoor furniture panels and mouldings for interior use, windows, textiles and toys. ** Decorative

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cushions/pillows and pillows for sleeping must be labelled in accordance with the criteria for Nordic Ecolabelling of textiles. Other types of pillows/cushions that are a part of an overall furniture license, for example part of a sofa, can be ecolabelled under the criteria for furniture and fitments"

Criteria for awarding the Nordic Swan Ecolabel Furniture and fitments relate to the description of the product (and production process); product requirements; chemicals; solid wood, cork, bamboo; panels made of wood and/or bamboo; paper; laminate; surface treatment of wood, wood-based panels and laminate; metal – steel and aluminium; plastic, rubber and silicone; textiles; quality requirements textiles – seating furniture and headboards; padding materials; hide and leather; materials for sound absorption; glass; linoleum; natural stone and agglomerated stone and licence maintenance.

The Nordic Swan Ecolabel criteria document also includes definitions of relevant terms:

- **Domestic furniture**: Furniture made for household or personal use.
- **Non-domestic furniture**: Non-domestic furniture or commercial furniture is furniture intended for use in office buildings, public institutions, hospitals, restaurants, hotels and similar establishments.
- **Furniture ensembles and enclosures**: Self-contained, mobile and soundproof. Example of enclosures are mobile working booth/-phone booth or -office pod.

A non-exclusive overview of requirements is presented below:

- Requirement for prohibited substances: This list includes the substances on the candidate list and, among others, per- and polyfluorinated compounds, halogenated organic compounds, alkylphenols and alkylphenol ethoxylates and other alkylphenol derivatives, phthalates and pigments and additives based on lead, tin, cadmium, CrVI and mercury and their compounds. However, substances such as isothiazolinones ("may be present in the chemical product at a level of not more than 0.05% by weight"), butylhydroxytoluene (BHT, CAS No. 128-37-0), aziridine and polyaziridines and bisphenol A, S and F are also listed.
- Tree species listed in CITES (Appendices I, II and III) are not permitted. Species listed in the IUCN Red List as CR, EN and VU or in the Rainforest Foundation Norway's tree list are not permitted - nor is the Siberian Larch (if it comes from forests outside the EU), unless certain requirements are met. As proof, a declaration from the manufacturer is required, or, if species from restricted lists are used, a valid FSC/PEFC CoC certificate or other documents that prove full traceability to the forest. Traceability and certification requirements are also defined for furniture containing 10% wood, bamboo or cork (by weight). In this case, at least 70% by weight of all wood raw materials, bamboo and cork used in the product awarded the Nordic Swan Ecolabel must come from forests that are managed according to the principles of sustainable forestry and that meet the requirements of the FSC or PEFC control systems. The requirements therefore go beyond those of the Blue Angel.
- Material based requirements defined for cotton, flax and other bast fibres, wool and synthetic fibres.
- Number of general material requirements are placed on all liquid coating systems, for example, exclude SVHC or certain GHS hazard classes. In

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addition, endocrine disruptors, formaldehyde and a number of other substances are also regulated which may not be used as starting material in any coating. Also prohibits the use of copper, tin, lead and cadmium for surface coatings of metals because they cause difficulties in the further use of steel scrap.

- Durability requirements for leather.
- A minimum guarantee of five years as well as the availability of spare parts.
- Requirements for a circular design of upholstered furniture. Here, a choice can be made between two different options for meeting the requirements. One of the options includes, among other things, requirements regarding the use of recycled material, according to which the product must consist of at least 70% recycled or renewable materials. The other option relates to the separability of the main materials.
- A requirement for complete separability of the individual main components, or a more specific requirement relating to the removability and replaceability of cover fabrics.

Regarding fitness-of-use, the Nordic Swan defines a number of relevant standards, differentiated according to area of use **Table 5-7**.

Table 5-7: Nordic Swan – quality-related standards for relevant furniture groups.

Furniture type	Standard
Seating furniture – residential area	EN 12520 Furniture – Strength, durability and safety – Requirements for domestic seating / EN 1022 Furniture – Seating – Determination of stability
Seating furniture – contract area	EN 16139:2013 Level 1 – Furniture – Strength, durability and safety – Requirements for non-domestic seating; EN 1022 Furniture – Seating – Determination of stability
Children's seating furniture – residential and contract areas	EN 17191 – Children's seating furniture – Safety requirements and test methods
Furniture ensembles and cabin systems / "office pods"	ISO 23351-1 Acoustics – Measurement of speech level reduction of furniture ensembles and cabin systems – Part 1: Laboratory method. Full documentation of the measurements and calculations carried out in accordance with this standard must be available if a reduction in structure-borne sound is reported.
Office work chairs	EN 1335-1 Office furniture – Office work chair – Part 1: Dimensions – Determination of dimensions; EN 1335-2 Office furniture – Office work chair – Part 2: Safety requirements
Sound absorption	EN ISO 354 Acoustics – Measurement of sound absorption in a reverberation room / ISO 20189 Acoustics – Screens, furniture and single objects for indoor use – Rating of sound absorption and sound reduction based on laboratory values; EN ISO 11654 Acoustics – Sound absorbers for use in buildings – Rating of sound absorption

Source: (Manhart et al., draft) based on Nordic Ecolabelling for Furniture and fitments, Version 6.0 • 29 October 2025 – 31 December 2029

Blue Angel – The German Ecolabel

The Blue Angel eco-label comprises two schemes for furniture:

Upholstered Furniture (DE-UZ 117)[5]

This scheme applies to „ready-to-use upholstered furniture for use indoors according to DIN 68880 that are not primarily – more than 50% by volume – made from wood and/or wood-based materials (chipboards, core boards, fibreboards, veneer-faced panels, whether uncoated or coated) and would thus come under the scope of the environmental label DE-UZ 38 “Low-emission products made of wood and wood-based materials”. These Basic Award Criteria also apply to upholstered furniture that can sometimes be used for sleeping. Upholstered furniture (bed mattresses) that are primarily designed for sleeping come under the scope of the environmental label DE-UZ 119”.

Criteria include general substance requirements; requirements for wood; requirements for metals; leather; textiles and coated textiles; moth proofing; upholstery materials; coating systems; use; packaging; fitness for use; wearing parts; recycling and disposal; consumer information; advertising claims and social criteria.

Low-emission furniture and slatted frames made of wood and wood-based material (DE-UZ 38)[6]

This scheme applies to “ready-to-use indoor furniture and slatted frames made predominantly – i.e. more than 50% by volume – of wood and/or wood-based materials. Window elements and semi-finished products are not covered by the scope of these Basic Award Criteria. The Environmental Label Jury can approve other ready-to-use products made of wood and wood-based materials on the recommendation of the German Environmental Agency (Umweltbundesamt). The term furniture in this context also includes Saunas[7], infrared and office booths, provided that they meet the first sentence of this scope”.

Criteria relate to requirements for the wood and coatings; indoor air quality; special requirements; use of materials (wearing parts, design, plastic parts); consumer information; advertising claims and social criteria. The aim is to additionally introduce obligatory odour tests for UZ 38 in the future.

[5] BLUE ANGEL – The German Ecolabel – Low-Emission Upholstered Furniture (DE-UZ 117), Basic Award Criteria Edition January 2018, Version 5, available at this link.

[6] BLUE ANGEL – The German Ecolabel – Low-Emission Furniture and Slatted Frames made of Wood and Wood-Based Materials (DE-UZ 38), Basic Award Criteria Edition January 2022, Version 6, available at this link.

[7] Saunas in the sense of the scope are exclusively the cabins. Sauna ovens are not within the scope of the award.

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In terms of specific requirements, the Blue Angel, a non-exclusive list of examples include:

- The materials used must not contain any substances as constitutional components that exhibit certain properties: This includes, in particular, substances that are classified as substances of very high concern (SVHC) under the REACH Regulation and have been included in the REACH Candidate List. Also excluded are substances that are classified in the following hazard categories according to the CLP Regulation or meet the corresponding criteria: carcinogenic (Carc. 1A or 1B), germ cell mutagenic (Muta. 1A or 1B), toxic to reproduction (Repr. 1A or 1B), acutely toxic (Acute Tox. 1 or 2), and toxic to specific target organs, repeated and single exposure (STOT SE. 1, STOT SE. 2, STOT RE. 1, or STOT RE. 2). Furthermore, no substances may be used that are classified as carcinogenic (K1, K2), mutagenic (M1, M2), or toxic to reproduction (RF1, RF2, RE1, RE2) according to TRGS[8] 905.
- With regard to recovery and disposal, upholstered furniture - including the materials used for its manufacture (leather, textiles, foams, wood-based materials, adhesives, etc.) - may not have any material preservatives (fungicides, insecticides, flame retardants) or halogenated organic compounds (e.g. chloro-organic carriers in textiles, chloroparaffins in leather grease, halogenated organic plastics) added to them. Excluded from this are biocides that are used solely for in-can preservation in aqueous coatings and glues, preservatives for the transport preservation of hides and semi-finished tanned products, mothproofing for textiles made of animal fibres, adhesives based on aqueous dispersions and the flame retardants permitted.
- No flame retardants may be used. Excluded from this are halogen-free reactive flame retardants that are completely incorporated into the polymer (covalent bond).
- No halogenated organic compounds may be used in the manufacture, including the manufacture of materials used. This includes blowing agents or auxiliary blowing agents in the manufacture of the upholstery material and chloroparaffins/chloroalkanes such as chloro-organic carriers in textiles or chloroparaffins in leather grease. Halogenated organic plastics are also excluded.
- No per- and polyfluorinated chemicals (PFCs), for example fluorocarbon resins and dispersions, perfluorinated sulfonic and carboxylic acids and substances that can possibly be degraded to these, may be used.
- The use of synthetic nanomaterials in the manufacture of leather and textiles and coated textiles in the process or in the finishing is not permitted.
- It must be ensured that all processed wood comes from legal sources. In addition, at least 50% of the wood or 50% of the primary raw materials for wood-based materials must come from sustainably managed forests that are demonstrably managed in an economically viable, environmentally sound and socially responsible manner. To prove the legality of the wood origin, the applicant had to declare the legality of the wood source: FSC or PEFC certificate for closed chain of custody (CoC) or certificates from raw material suppliers.

[8] Technische Regeln für Gefahrstoffe (TRGS) – Technical Rules for Hazardous Substances

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- Wood-based materials in their raw state (i.e. before processing or coating) may not exceed an equilibrium concentration for formaldehyde of a certain limit value (previously 0.1 ppm) in a test chamber.
- prohibit the use of chromium (VI) and cadmium in galvanizing processes for surface coatings. The use of nickel is only permitted in each case if the nickel release from the nickel-plated components is less than 0.5 µg/cm² per week in accordance with EN 1811.
- Liquid coating systems: The coating materials may not exceed a total VOC content of max. 420 g/l for the entire coating system. This only affects parts with a proportion of at least 5% by volume. Furthermore, coating plants that have an exhaust gas purification system in accordance with the 31st BImSchV (BGBl. I 2001) and TA Luft (GMBl. 2002) are excluded. The coating systems must meet the requirements of Section 3 of the VdL Guideline 02 for the declaration of wood coating systems (Verband der deutschen Lack- und Druckfarbenindustrie e.V 2001).
- Fitness-for-use requirements including safety, abrasion resistance, tear resistance, lightfastness, rub fastness and compression set, each in accordance with existing ISO, EN or DIN standards.
- Requirements for cover fabrics in accordance with existing ISO/EN/DIN standards.
- Requirement that products be packaged in a way that allows volatile components to off-gas after production.
- For wear parts contained in upholstered furniture — for example, hinges or [excerpts] — a functional and compatible replacement must be ensured for at least five years.

Austrian Ecolabel

Furniture (UZ 06) (Version 10.1)[9]

The Austrian Ecolabel scheme UZ 06 is covering ‘furniture, doors, stairs and slatted bed bases made of wood and wood-based materials (Part A) and solid wood coffins (Part B)’ and is extended from January 2025 to include non-load-bearing partition walls.

The following indoor furniture falls within the scope of the guideline:

- Furniture for residential use: for bedrooms and living rooms, teenagers’ and children’s bedrooms, hallways and cloakrooms, kitchens and bathrooms
- Office furniture
- Contract furniture: for schools, crèches and nurseries, hospitals and sanatoriums, laboratories, workshops, commercial premises (shopfitting), restaurants, hotels and guesthouses, boarding schools and residential homes,

[9] Österreichisches Umweltzeichen – Richtlinie UZ 06 – Möbel, Türen, Treppen und Lattenroste aus Holz und Holzwerkstoffen (Teil A) und Vollholzsärge (Teil B), Version 10.1 vom 1. Juli 2024, 1. Detailänderung, gültig ab 1. Jänner 2025: Erweiterung der Produktgruppe um nichttragende Trennwände; available (in German) at this link.

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2042 barracks, event halls, theatres, cultural and religious buildings, libraries,
2043 swimming and sports facilities, and meeting rooms

2044 Doors, stairs, non-load-bearing partition walls and slatted bed bases for indoor use are
2045 also covered by the guideline and are included in the term 'furniture', unless explicitly
2046 stated otherwise. Solid wood coffins have also been included in this product group; the
2047 criteria can be found in the second part of the guideline.

2048 The following products are not covered by the scheme:

2049 • Outdoor furniture (covered by UZ 28 'Weather-resistant wood products').
2050 • Upholstered furniture (covered by UZ 54 "Low-emission upholstered furniture"),
2051 and office chairs (covered by UZ 34"Office chairs and office seating").
2052 • Furniture for saunas is also excluded from the scope.

2053 Criteria of the scheme relate to materials; health and environmental criteria; fitness for
2054 use; and declaration.

2055 Low emission upholstered furniture (UZ 54) (Version 5/2023)[10]

2056 The Austrian Ecolabel scheme UZ 54 relates to low-emission upholstered furniture.

2057 Specifications apply to ready-to-use upholstered furniture intended for indoor use in
2058 accordance with DIN 68880 [1] or ÖNORM A 1681-2 [2], which are not predominantly,
2059 i.e. to more than 50% by volume, made of wood and/or wood-based materials
2060 (chipboard, blockboard, fibreboard, veneered panels, whether uncoated or coated) and
2061 are therefore classified under the UZ 06 'Furniture' eco-label. The scope also includes
2062 upholstered furniture that may occasionally be used for sleeping. Upholstered furniture
2063 (bed mattresses) that is predominantly used for sleeping is without scope and is
2064 covered by UZ 55 for bed mattresses. Criteria relate to different health and
2065 environmental criteria.

2066 Office chairs UZ 34 (Version 7)[11]

2067 The Austrian Ecolabel scheme UZ 34 relates to office chairs.

2068 The following chairs are in scope of the scheme:

2069 • Office work chair ('Büroarbeitsstuhl' in German): Office chair, definition in
2070 accordance with ÖNORM EN 1335-1 [1]: Seating furniture for one person, with a
2071 backrest, with or without armrests (excerpt)

[10] Österreichisches Umweltzeichen – Richtlinie UZ 54 – Emissionsarme Polstermöbel, Version 5 Vom 1. Januar 2023; available (in German) at this link.

[11] Österreichisches Umweltzeichen – Richtlinie UZ 34 – Büroarbeitsstühle und Bürostühle, Version 7 vom 1. Januar 2020; available (in German) at this link.

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- Office chair (‘Bürostuhl’ in German): Office chair, definition based on ÖNORM A 1600 Part 1 [2]: Office armchair (chair) with a backrest, optional upholstery, with or without armrests

Criteria of the scheme relate to health and environmental criteria; design requirements; disposal of chairs; safety and performance requirements; ergonomic requirements and declaration.

European Federation of Office Furniture (FEMB) Level Certification[12]

The European Federation of Office Furniture (FEMB) Level Certification offers a certification scheme for furniture (‘office and non-domestic furniture for indoor use’) concerning sustainability. It provides measurable performance criteria that address environmental and social aspects throughout the supply chain. It also includes requirements that aim at guaranteeing that products which have a reduced effect on the environment, have at the same time an equivalent performance to other products on the market.

It has been conceived to be applied to office furniture, but its principles can be used to assess the sustainability of any kind of indoor furniture. However, it not applicable to furniture designed to be used outdoor. Furthermore, certification of furniture components is not possible.

The scheme includes also definition of central terms, among them:

- **Furniture product:** A furniture product in the scope of this standard is commonly labelled as seating, table, storage, partition or room system (see extra definition). Product type selection can be extended upon decision of standard owner.
- **Room system:** A "room system" is defined as a product that stands unsupported in a room and creates a fully enclosed space designed to be occupied by people that is part of the surrounding room consists of walls fixed to each other and typically including a door is with or without ceiling and floor panels can include technical installation or functional elements like lighting, air conditioning, etc.

Requirements relate to materials (wood and wood-based materials / plastic parts / surface coatings / adhesives and glues / textiles, leather and upholstery materials / flame retardants and phthalates / packaging materials / life cycle assessment / efficient use of materials / recycled content / extended producer responsibility and circular economy / water and solid waste management) as well as to energy & atmosphere, management of chemicals and social responsibility.

In terms of specific requirements, a non-exclusive list of examples from the FEMB standard include:

[12] European Federation of Office Furniture (FEMB), Sustainability requirements for office and non-domestic furniture for indoor use (Edition 2023), available at this link.

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- prohibits substances with certain classifications, including PBT substances and carcinogenic and reprotoxic (but not mutagenic) substances.
- requirement on surface coatings of wood, plastic or metal parts. The coating products are classified according to their GHS hazard class and certain exceptional regulations are defined. Furthermore, a number of heavy metals are excluded as additives in coating materials. With regard to the VOC content, the amount of organic solvents is limited to 35 g/m² of surface.
- VOC emission limit values for PUR foams.
- Voluntary criterion on use of recycled materials: One point is earned if at least 30% of the total weight consists of recycled materials, and two points if at least 50% consists of recycled materials. Recycled materials are defined as materials that have been reclaimed either during the manufacturing process or after use by the consumer, or otherwise diverted from the solid waste stream.
- Disassembly: it must be demonstrated that: Instructions for disassembling the product are accessible; Disassembly is possible with standard tools and does not require special training: Components can be replaced without loss of quality; Product parts are marked to facilitate separation by material for recycling, and; Users are given information about wear parts and their repair/replacement, and functionally compatible spare parts are available for at least 5 years.
- all plastic parts ≥ 100 g be marked for recycling in accordance with ISO 11469. Recycling information should be applied directly to the parts, unless this is disadvantageous for aesthetic reasons or not possible for technical reasons. In these cases, the information can be provided in the product's instructions for use.

Deutsche Gütegemeinschaft Möbel (DGM)

The German Furniture Quality Association 'Deutsche Gütegemeinschaft Möbel e. V.' (DGM) offers several certifications.

The **'Golden M' quality mark** (Das "Goldene M" - Das Gütezeichen Für Geprüfte Möbel, n.d.) is an award for certified furniture that meets strict criteria in terms of quality, safety, and health and environmental protection. Furniture manufacturers must meet high standards to be awarded the certificate. Relevant categories of furniture include:

- Storage furniture
- Kitchen and bathroom furniture
- Tables, seats and benches
- Upholstered furniture
- Beds
- Mattresses
- Waterbeds
- Office furniture
- Children's furniture
- School Furniture
- Outdoor furniture

Draft for SFWT

There is also a certificate for circular sustainable furniture. The '**Circular, Sustainable Furniture' quality mark** has incorporated, consolidated and supplemented the many existing criteria. The resulting RAL-GZ 436 quality and testing specifications for circular sustainable furniture are demanding, but have been deliberately and transparently designed to best meet current and future market requirements placed on the furniture industry and the circular economy by consumers and policymakers (Deutsche Gütegemeinschaft Möbel, 2023a).

The 'Möbel Schadstoffgeprüft' quality mark (Deutsche Gütegemeinschaft Möbel, 2023b) is based on the DGM emissions label, which has been in use since 2016, as well as the environmental and health standards of the renowned 'Goldenes M' quality mark. It provides proof of compliance and guidance on healthy living.

The prerequisite for furniture and its manufacturers to be awarded the quality mark is emission class A. Proof of classification is provided by relevant pollutant tests, and the mark is awarded exclusively by the Deutsche Gütegemeinschaft Möbel e.V.

The following furniture categories are eligible for the quality mark:

- Seating furniture
- Storage furniture
- Tables
- Office furniture
- Slatted bases
- Mattresses
- Beds

Full criteria are publicly available.

As a non-exclusive overview of criteria, Golden M:

- Prohibits substances with certain classifications in preparations (paints, adhesives, stains, coating systems, …).
- Prohibits azo dyes, halogenated organic flame retardants and plasticizers and requires, for example, residue tests for biocides and pesticides on a material-specific basis.
- Restricts flame retardants and phthalates in general and certain substances and substance groups on a material-specific basis.
- Stipulates in "General Quality Principles" that safety, function and fitness for use are assessed according to the state of the art at the time of placing on the market and on the basis of a high-quality level.
- Requirements for dimensional changes for foams, including requirements for loss of hardness, which is determined by measuring fatigue resulting from constant impact loading in accordance with DIN EN ISO 3385 (DIN EN ISO 2439, Method A).
- Abrasion resistance of covers: a general requirement that after 3,000 test cycles any colour change must reach at least level 3 of the grey scale, additional requirements are set for specific cover fabrics at two performance levels
- Durability requirements for leather.

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(Manhart et al., draft) identify Golden M as the only voluntary scheme which defines requirements for dimensional changes of foams. It is also assessed as having the most comprehensive specifications regarding abrasion resistance.

Möbelfakta (Sweden, also used in Norway)

Möbelfakta is an independent Swedish sustainability labelling and reference system for furniture and currently owned by IVL Swedish Environmental Research Institute together with the Swedish Federation of Wood and Furniture Industry (TMF). It is a Type I ecolabel according to ISO 14024. The label addresses three areas: (i) *quality* – durability, function and safety, verified through testing at accredited laboratories (e.g. RISE) against relevant European product standards; (ii) *environment* – material and chemical requirements, product information, spare parts and packaging; and (iii) *responsible supply chains* – policies and systematic risk-based due diligence of suppliers, based on the UN Global Compact's ten principles on human rights, labour, environment and anti-corruption. Möbelfakta covers a broad range of furniture, with particular relevance for furniture used in public and institutional environments (offices, schools, healthcare) and is widely referenced in Swedish and Nordic public procurement (e.g. by Sweden's National Agency for Public Procurement and ADDA). Criteria are reviewed periodically by a multi-stakeholder Criteria Council. The Möbelfakta READY label also exists as a support tool for suppliers of components and materials who want to demonstrate that their products meet Möbelfakta's requirements (About Möbelfakta, n.d.).

Cradle to Cradle Certified®

Cradle to Cradle Certified® is a multi-attribute product certification administered by the Cradle to Cradle Products Innovation Institute, applicable to furniture among many other product categories. Products are assessed against five categories of sustainability performance – material health, product circularity, clean air and climate protection, water and soil stewardship, and social fairness – and awarded an overall achievement level (Bronze to Platinum) corresponding to the lowest-scoring category. For furniture, this typically involves assessment of individual material inputs (e.g. foams, textiles, coatings, wood-based panels) against chemical hazard criteria, in addition to design for disassembly/recyclability and manufacturing-level social and environmental criteria (Product Circularity, Verified, n.d.). The scheme is used internationally, including by several European furniture manufacturers, and is recognised as a contributor to green building certification schemes (LEED, BREEAM, DGNB).

Marque NF and NF Ameublement family (France)

Marque NF (Norme Française) is the general French certification mark administered by AFNOR Certification, denoting that a product complies with defined French and/or European standards. Within the furniture sector, AFNOR Certification operates several dedicated NF sub-certifications, each targeting a specific furniture segment and referencing the relevant EN product standards for safety, mechanical performance, durability and, in most cases, additional environmental and/or health criteria:

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- **NF Ameublement – Mobilier domestique**: covers domestic (household) furniture, certifying conformity with relevant safety, dimensional and durability standards (e.g. EN 12520, EN 1725 and related series) as well as low-emission/formaldehyde criteria.
- **NF Mobilier professionnel**: covers furniture intended for professional/office use, referencing relevant EN 527, EN 1023, EN 14073/14074 series standards on office furniture (desks, storage, seating).
- **NF Mobilier de crèche**: a dedicated scheme for furniture used in crèches and early-years childcare settings, with reinforced safety requirements appropriate to very young children (e.g. entrapment, tip-over, toxicity of surface materials).
- **NF Mobilier éducation**: covers furniture for educational settings (schools), referencing relevant EN 1729 series standards on chairs and tables for educational institutions.
- **NF Mobilier collectivités**: covers furniture intended for communal/public-sector settings more broadly (e.g. libraries, administrative buildings, healthcare waiting areas), combining durability and safety requirements suited to intensive public use.
- **NF Office Excellence certifié**: a certification addressing the broader performance and service quality of office furniture offerings (including ergonomic and functional performance), going beyond baseline safety compliance.
- **NF Environnement**: France's official (Type I, NF ECOLOGIE) ecolabel, which for furniture, when applied, adds environmental criteria (material sourcing, hazardous substance restrictions, recyclability, end-of-life) on top of the relevant NF product-specific requirements.

These NF schemes are widely used in the French market, particularly for public procurement and institutional furniture markets (education, childcare, healthcare, local government), and are administered by AFNOR Certification / FCBA (Institut technologique Forêt Cellulose Bois-construction Ameublement) as the technical certification body for furniture.

STIP (Stichting Inkoop Platform/ Netherlands)

STIP is a Dutch label/register for companies that exclusively use certified wood (FSC and/or PEFC) in their products, developed for the Dutch market to support compliance with Dutch government sustainable timber procurement policy (TPAC – Timber Procurement Assessment Committee criteria). Rather than certifying individual furniture products against multi-attribute criteria, STIP certifies that a company's entire wood/timber sourcing is from certified, legal and sustainable sources, providing assurance to public and private buyers, particularly relevant to Dutch government furniture tenders (Inkoop Duurzaam Hout & Papier, n.d.).

5.5.2. Third country voluntary schemes

BIFMA LEVEL® (ANSI/BIFMA e3 Furniture Sustainability Standard)

LEVEL® is a voluntary, third-party, multi-attribute certification programme developed by the Business and Institutional Furniture Manufacturers Association (BIFMA), based on

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the American National Standards Institute - ANSI/BIFMA e3 Furniture Sustainability Standard. It applies to business and institutional furniture (moveable walls; systems furniture; case goods; tables; seating; and accessories) and is assessed based on environmental, material health and social impact categories (LEVEL® BY BIFMA, n.d.). The programme is understood to be predominantly used in North America.

5.5.3. Material-related certifications

These certifications for specific materials were cited by stakeholders in response to the stakeholder survey (June-July 2026) as relevant in the furniture sector.

Wood – sustainable forest management

- FSC (Forest Stewardship Council): international certification of responsible forest management and Chain of Custody, verifying that wood and wood-based materials originate from responsibly managed forests and are tracked through the supply chain (Forest Stewardship Council, n.d.).
- PEFC (Programme for the Endorsement of Forest Certification): international umbrella certification scheme endorsing national forest-certification systems, functionally equivalent to FSC in providing assurance of sustainable forest management and chain of custody, and widely used for wood-based furniture components in Europe (PEFC, n.d.).
- Bois de France: a French label certifying that wood used in a product originates from French forests, supporting traceability and a lower-carbon-footprint sourcing claim linked to shorter supply chains; used as a criterion in some French furniture eco-modulation/bonus schemes (Bois de France, n.d.).
- STIP (Stichting Inkoop Platform / Netherlands): STIP is a Dutch label/register for companies that exclusively use certified wood (FSC and/or PEFC) in their products, developed for the Dutch market to support compliance with Dutch government sustainable timber procurement policy (TPAC – Timber Procurement Assessment Committee criteria). Rather than certifying individual furniture products against multi-attribute criteria, STIP certifies that a company's entire wood/timber sourcing is from certified, legal and sustainable sources, providing assurance to public and private buyers, particularly relevant to Dutch government furniture tenders (Inkoop Duurzaam Hout & Papier, n.d.).

Textiles

- OEKO-TEX: an international association providing independent testing and certification systems for textile and leather products. Its core purpose is to guarantee that certified items are free from harmful chemical levels and safe for human health.
- GOTS (Global Organic Textile Standard): international standard certifying the organic status of textile fibres and covering environmental and social criteria across the full textile supply chain (processing, manufacturing, packaging, labelling), applicable to upholstery textiles (Global Organic Textile Standard, n.d.).

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- ERTS (Ecological and Recycled Textile Standard): A standard from Ecocert that certifies textile products containing recycled, renewable, or natural fibres. It ensures the traceability of these materials and sets environmental and social criteria for the production process, making it relevant for upholstery and other textile components containing recycled content (Group Ecocert, n.d.).
- GRS (Global Recycled Standard) and RCS (Recycled Claim Standard): international voluntary standards (administered by Textile Exchange) verifying recycled content in products and tracking it through the supply chain; GRS additionally includes environmental and social processing criteria, while RCS verifies recycled content only. Both are used to substantiate recycled-content claims for textile and, in some cases, plastic components of furniture (Textile Exchange, n.d.).

Latex foam

- GOLS (Global Organic Latex Standard): certifies that latex foam used in upholstery/mattress-type products is produced from certified organic raw latex and processed according to defined environmental and social criteria along the supply chain (Control Union, n.d.).

PU foam (bio-based/chemically recycled)

- ISCC+ (International Sustainability and Carbon Certification): a certification system verifying the sustainability and traceability of biomass-based and chemically recycled feedstocks through mass-balance chain-of-custody accounting; used to substantiate bio-based or chemically-recycled content claims in polyurethane (PU) foam used in upholstered furniture (ISCC - International Sustainability & Carbon Certification, n.d.).

Plastics – recycled content

- RecyClass: EU-based voluntary certification scheme (an initiative of Plastics Recyclers Europe) offering separate certifications for recyclability/design-for-recycling and for verified recycled plastic content, relevant to plastic furniture components (RecyClass, n.d.).
- LNE – Incorporation de Matières Plastiques Recyclées (MPR): a French certification scheme operated by LNE (Laboratoire national de métrologie et d'essais) verifying the declared percentage of recycled plastic material incorporated into a product (LNE, n.d.). According to stakeholder feedback, it is used to substantiate recycled-content claims for plastic components of furniture, notably for eligibility under French EPR eco-modulation bonuses.

5.5.4. Chemical- and emissions-related certifications

These certifications for chemicals and emissions were cited by stakeholders in response to the stakeholder survey (June-July 2026) as relevant in the furniture sector.

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- **CARB – California Air Resources Board (ATCM)**: The California Air Resources Board's Airborne Toxic Control Measure (ATCM) is a regulation designed to reduce formaldehyde emissions from composite wood products sold, supplied, used, or manufactured for sale in California. The regulation sets stringent emission standards for hardwood plywood (HWPW), particleboard (PB), and medium-density fibreboard (MDF), as well as finished goods containing these materials, such as cabinets, flooring, and furniture. Products that comply are required to be labelled as such (California Air Resources Board, n.d.). It is understood to be used voluntarily by a limited number of supply chain actors.
- CertiPUR®: A voluntary certification program in Europe administered by EUROPUR, specifically for the flexible polyurethane foam used in mattresses and upholstered furniture. It verifies that the foam is produced without certain harmful substances (such as specific flame retardants, heavy metals, and phthalates) and meets strict limits for VOC emissions. It is widely used by manufacturers as an input-material declaration (EUROPUR, n.d.).
- Greenguard / Greenguard Gold: An internationally recognised indoor air quality certification administered by UL Solutions, Greenguard verifies that a product has been tested for low chemical emissions, including volatile organic compounds (VOCs) and formaldehyde. The more stringent Greenguard Gold standard applies stricter limits suitable for sensitive environments like schools and healthcare facilities. The certification is referenced internationally and can contribute credits toward green building certifications such as BREEAM, LEED, and WELL (UL Solutions, n.d.).
- Solar Impulse Efficient Solutions Label: The Solar Impulse Foundation's "Efficient Solutions" label recognises technologies and products (including sustainable materials and manufacturing processes relevant to furniture) that are both environmentally friendly and profitable. Unlike sector-specific furniture ecolabels, it certifies individual solutions and technologies rather than finished products, based on an independent technical review (Solar Impulse Foundation, n.d.).

5.5.5. Environmental footprint tools, declarations and reporting frameworks

These environmental footprint tools, declarations and reporting frameworks were cited by stakeholders in response to the stakeholder survey (June-July 2026) as relevant in the furniture sector.

- EPD (Environmental Product Declaration) / EPD International: An EPD is a standardised, independently verified document (ISO 14025, EN 15804 for construction/furniture-related products) reporting the life-cycle environmental impacts of a product based on LCA. They are based on a Life Cycle Assessment (LCA) and provide transparent, third-party verified environmental information about a product (EPD, n.d.). Their usefulness for furniture is understood to be limited by the sector's high product variability, meaning a single EPD often applies only to a specific product/product family rather than being representative of a whole furniture category.

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- PEF (Product Environmental Footprint) Method: this is the European Commission's harmonised LCA-based methodology (Commission Recommendation (EU) 2021/2279) for measuring and communicating the environmental performance of products across their life cycle, using 16 impact categories. No Product Environmental Footprint Category Rules (PEFCRs) or Organisation Environmental Footprint Sector Rules (OEFSRs), i.e., a harmonised methodology for the calculation of the environmental footprint of products and organisations has been developed so far for furniture or the furniture sector. (European Commission, n.d.).
- Eco Impact Score: this voluntary environmental-impact scoring/labelling initiative driven by the French AGEC-law provides consumers with a summary score of a product's environmental footprint (Eco Impact, n.d.).
- EcoVadis: business sustainability ratings platform (not a product label) that assesses companies on corporate environmental, labour and human rights, ethics, and sustainable procurement performance, producing a scorecard and medal rating (Bronze to Platinum) (Ecovadis, n.d.). It is understood to be sometimes required by furniture buyers (particularly B2B/contract and public-sector buyers) as part of supplier qualification and responsible sourcing due diligence.

5.5.6. Comparative analysis of voluntary labels

This section compares how the voluntary schemes identified in this study define furniture, structure it into sub-categories, and exclude specific products.

Different approaches to defining furniture can be identified. For example:

- The EU Ecolabel and Nordic Swan both use functional definitions of furniture, although the Nordic Swan further defines its scope with an explicit list of eligible product categories.
- The German and Austrian ecolabels use a product specific approach. For example, Blue Angel (Germany) has differentiated criteria sets for specific product categories, namely ‘upholstered furniture’ and ‘indoor furniture made of wood and wood-based materials’.
- Some voluntary schemes, like the FEMB Level Certification, target specific settings, namely office and non-domestic settings.

Voluntary schemes also differ in how or whether they subdivide furniture into sub-categories, for example:

- The EU Ecolabel does not sub-divide "furniture" into named categories; it applies a single, unified set of criteria across the whole product group, differentiated only by material stream within the criteria themselves (wood/cork/bamboo/rattan; plastics; metals; upholstery covering materials; upholstery padding materials; glass).
- The Nordic Swan scheme instead defines scope through a list of named furniture *types* that must be met for eligibility (table/desk furniture, seating furniture, sleeping furniture, storage furniture, kitchen and bathroom furniture,

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lounge furniture/mattresses, screen and partition walls, writing boards, mobile furniture ensembles/enclosures/office pods), plus separately listed "individual fittings" (countertops, fronts, kitchen cabinets) and adjacent product types with their own criteria documents (doors, sound absorption screens, bathroom furniture with integrated countertop/sink).

Several schemes explicitly exclude outdoor furniture, including the Nordic Swan, Blue Angel and the Austrian Ecolabel. The EU Ecolabel therefore appears as an exception in including outdoor furniture within its scope.

In addition to product level schemes, a range of schemes addressing materials, chemical/emissions and environmental footprints exist and are used by the furniture sector. These could help define requirements for specific components or properties of furniture under a ESPR regulatory framework.

5.6. Assessment of Circularity Relevance

The most significant addition to Task 1 under the new methodology (B2) is the qualitative assessment of the relevance of circularity aspects (as defined in ESPR Article 5) (Rodriguez et al., 2025). This includes: durability, reliability, reusability, upgradability, repairability, possibility of maintenance, possibility of refurbishment, water use and water efficiency, resource use and resource efficiency, recycled content, possibility of remanufacturing, recyclability, possibility of recovery of materials, and expected generation of waste.

Methodology B2 requires two steps to be carried out within Task 1: initial filtering; and validation of the results of the filtering. A third step – level of relevance assessment – is to be carried out under MEErP Task 4.

5.6.1. Initial Filtering

As part of the initial filtering, it is possible to define furniture as a ‘complex, durable’ product i.e. “a product which is composed of multiple components which can be replaced permitting disassembly and re-assembly of the product” and which is expected to last a considerable length of time.

Table 5-8: Classification of furniture under ESPR product types.

Filter	Question	Result for Furniture
Filter 1 – Complex vs. non-complex products vs. components	Is the product composed of multiple replaceable components permitting disassembly/re-assembly?	Complex product
Filter 2 – Durable vs. consumable products	Is the product expected to last a considerable length of time, or is it consumed/depleted through use?	Durable product

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Filter	Question	Result for Furniture
Filter 3 – Disposable vs. dissipatively consumed products	Applies only to consumable products: is the product discarded largely intact, or dissipated (almost) fully during use?	Not applicable (furniture is a durable, not a consumable, product)

Based on Table 5 of the JRC B2 Methodology, the relevant circularity aspects for complex, durable products were then filtered. **Table 5-9** summarises the outcome of the filtering exercise for each of the circularity aspects in scope

Table 5-9: Filtering relevant circularity aspects to product group furniture.

Circularity aspect	Relevance* to complex products	Relevance* to durable products	Outcome of filtering
Durability	Relevant	Relevant	Taken forward to validation
Reliability	Relevant	Relevant	Taken forward to validation
Reusability	Relevant	Not Relevant	On basis of expert assessment and stakeholder feedback, this was later reincorporated as relevant aspect
Upgradeability	Relevant	Not Relevant	On basis of expert assessment and stakeholder feedback, this was later reincorporated as relevant aspect
Repairability	Relevant	Relevant	Taken forward to validation
Possibility of maintenance	Relevant	Relevant	Taken forward to validation
Possibility of refurbishment	Relevant	Not relevant	On basis of expert assessment, was taken forward due to known existence of refurbishment activity in furniture sector
Resource use and efficiency	Relevant	Relevant	Limited in-use consumption of resources, but relevant footprint.
Water use and efficiency	Relevant	Relevant	No in-use consumption of water relevance upstream to be assessed.
Recycled content	Relevant	Relevant	Taken forward to validation

Circularity aspect	Relevance* to complex products	Relevance* to durable products	Outcome of filtering
Possibility of remanufacturing	Relevant	Not Relevant	Filtered out of further consideration
Recyclability	Relevant	Relevant	Taken forward to validation
Possibility of recovery of materials	Relevant	Relevant	Taken forward to validation
Expected generation of waste	Relevant	Relevant	Taken forward to validation

* relevance according to JRC method for the assessment of circularity aspects (Rodriguez et al., 2025)*

As a result of the filtering exercise, reusability, upgradability, possibility of refurbishment and possibility of remanufacturing should be filtered out of consideration for the product group Furniture.

5.6.2. Validation of the Initial Filtering

In line with the guiding questions set out in Section 3.2.4.2 of the JRC B2 Methodology, the technical feasibility of each circularity aspect categorised as 'Relevant' in Step 1 was tested by considering, for example: whether the product or its components can technically accommodate the circularity aspect given its function, materials and construction; whether existing infrastructure, business models or supply chains support the practical implementation of the aspect; and whether credible evidence exists (e.g. from industry practice or comparable product groups) that the aspect can be improved without compromising safety or core performance.

This initial filtering was thus validated via the stakeholder survey conducted between 19 May and 13 July. Stakeholders were asked to indicate and explain which circularity aspects should be given higher priority due to a significant influence on aspects of ecodesign (e.g., resource consumption, emissions reduction, product lifespan, recyclability, and environmental impact during manufacturing and disposal). An overview of responses is given in **Figure 5-1.**

Draft for SHM

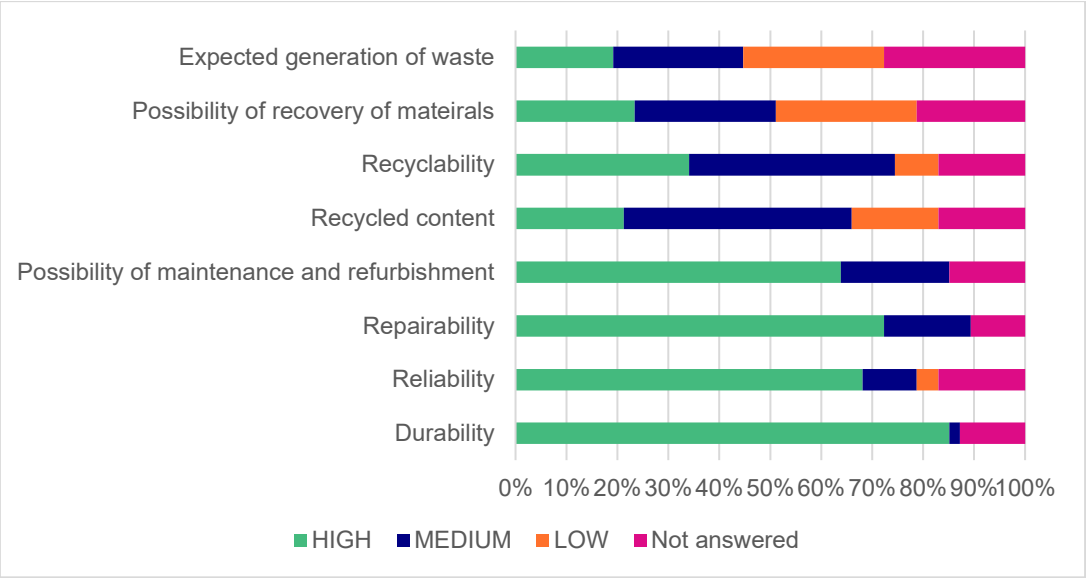

Figure 5-1: Priority of circularity aspects to aspects of ecodesign according to stakeholder survey (n=44)

Source: study's own

A number of stakeholders, in particular industry associations representing furniture manufacturers and public administrations, emphasised that any prioritisation of circularity aspects should be underpinned by harmonised, measurable, verifiable and standards-aligned definitions of terms such as durability, reliability, maintenance, repair, refurbishment, reuse, upgrading and remanufacturing, which are currently interpreted inconsistently across the industry and inconsistently grouped within the ESPR framework. These stakeholders further argued that prioritisation should focus on the areas where the ESPR can deliver the greatest environmental impact at proportionate cost, noting that the Commission's working plan and JRC analysis point to waste reduction and material efficiency as offering the greatest gains for furniture. They state that a uniform, one-size-fits-all approach across all furniture types is not appropriate, given that the relevance of individual circularity aspects, and the trade-offs between them (e.g. between recyclability and durability), vary significantly by product type and function. These stakeholders recommended a step-wise approach, whereby a thorough impact assessment covering environmental outcomes, consumer benefits, administrative burden, compliance costs and effects on competitiveness, including for SMEs precedes the setting of any information or performance requirements, supported by reliable data, harmonised evaluation methods and relevant standards.

Durability is identified across stakeholder groups as a highly relevant circularity aspect by 40 respondents (85%), most commonly due to the low in-use phase impact of furniture. Differences, however, appear in how circularity is defined. Manufacturers and industry associations are more likely to define durability at component or subsystem level, for example the structural/load-bearing frame, upholstery padding, or foam resilience, and frequently propose that requirements be targeted at these specific elements rather than applied uniformly across the whole product. Consumers and public-sector buyers appear to define durability more broadly to include resistance to wear, scratches, light exposure and mechanical stress. The importance of information — expected lifetime, warranty conditions and maintenance instructions — needed to make durability meaningful and verifiable at the point of purchase were also stressed.

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Here, some referenced the need for an operational, measurable definition centred on (average) product lifetime as a quantifiable indicator. Smaller-scale manufacturers, particularly in craft and joinery segments, raise concerns however that durability testing and verification obligations could impose disproportionate administrative and cost burdens on SMEs.

Synergies and trade-offs between durability and other circularity aspects exist. Some consider durability a prerequisite for other circularity aspects including maintenance, repair and reuse. However, others also raised the trade-off between durability and recyclability and end-of-life material recovery, for example, the use of bonding technologies to join components securely at the expense of being able to disassemble and separate components. One also raised that aesthetic obsolescence also plays a role in limiting product lifetimes, and that technical durability requirements alone may be insufficient to secure environmental outcomes.

Reliability is similarly considered highly relevant across stakeholder groups (68 %)The predominant rationale for considering it high relevance is that reliable products are less likely to fail prematurely, thereby avoiding unnecessary replacement and the associated resource, energy and waste impacts. Some respondents note that reliability is of particular importance for furniture with functional or moving components (e.g., mechanisms, modular connections, lift tables), where failure directly curtails the product's usable life.

Manufacturers and industry associations generally define reliability functionally, as the capacity of a product to perform its function dependably and cause no trouble in everyday use, with one citing "initial service life prior to repair" as per CEN/TC 207 WG 10. A frequently raised concern shared by manufacturer associations, retailer associations, and public administration, is however that no standardised, validated method currently exists to define, measure or verify expected product lifespan or reliability across the highly heterogeneous furniture category. As such, several caution against requirements based on prescribing or declaring a fixed product lifespan, given the lack of standardised methodology, recommending instead the use of legal guarantee periods and voluntary guarantee periods beyond legal minimums as more robust and verifiable proxies.

Repairability is likewise considered a highly relevant circularity aspect by 34 respondents (72%) or as a medium priority by 8 respondents (17%). The dominant justification is that repairability prevents wear, breakage or minor damage from prematurely ending a product's useful life. A number of manufacturers highlight that furniture components age at different rates and argue that a worn part should be individually replaceable without discarding parts that remain functional. Craft/joinery associations caution that repairability should not be equated with a requirement for maximum disassembly, since long service life in craft furniture is often achieved through robust construction and high-quality joints; for this group, repairability should apply "where technically feasible" without compromising durability, stability or safety.

Spare parts availability is also raised as a relevant aspect of repairability. Some stakeholders argue however that rigid requirements to maintain a fixed, comprehensive range of spare parts would generate unnecessary costs and inefficiencies, particularly for rarely used parts. These respondents argue that spare-parts obligations should be limited to components critical to functionality and most prone to failure, with flexible

Draft for SHM1

provisions on availability and delivery timelines, rather than components intended primarily for aesthetic renewal.

Where medium relevance is indicated, this tends to indicate a specific reservation, for example: the risk of "greenwashing" around repairability claims, a view that repairability need is inversely related to component reliability (i.e., higher-reliability parts justify a lower repairability emphasis for those parts), and safety concerns for certain repairable parts (e.g., gas struts).

Multiple respondents note that a standardised evaluation method for maintenance, repair and refurbishment capability is still under development (CEN/TC 207), and that a reparability index and priority-parts methodology are the subject of ongoing research (e.g., the Circ4Fun project).

Possibility of maintenance and refurbishment is considered of lesser priority than durability, reliability and repairability, but is nevertheless considered a highly relevant aspect by 30 respondents (64%) and of medium relevance by 10 respondents (21%). It is largely considered relevant due to its direct impact on durability, by extending product lifetime and consequently reducing the environmental footprint of furniture.

Some argue that maintenance and refurbishment are distinct concepts that should not be assessed or scored as a single, combined criterion. Maintenance is defined as user-facing actions, cleaning, care and simple upkeep, that preserve a product's quality, functional performance and appearance over time. Refurbishment on the other hand is a professional process which involves inspection, cleaning, maintenance and repair of parts or the product as a whole. Several respondents note that refurbishment is often carried out by third parties (social and solidarity economy organisations, independent refurbishes) largely outside the original manufacturer's control, and that refurbished products may not be guaranteed to conform to current standards at the time of re-marketing, raising questions about where regulatory responsibility should sit. Similarly, maintenance outcomes are strongly influenced by user behaviour and care practices, which manufacturers cannot fully control or guarantee, complicating the design of prescriptive requirements. Some argue, that caution against prescriptive performance requirements (e.g., specifying maintenance frequency or approved care products), arguing that care and maintenance needs vary by product type and market. Finally, one stakeholder notes that maintenance and refurbishment are of greater relevance for more expensive furniture, suggesting that a uniform priority weighting may not reflect the criterion's varying economic relevance across furniture price segments and categories (e.g., office/contract furniture versus lower-cost domestic items).

Resource use and efficiency in the use phase is irrelevant, however, it is relevant to the design and subsequent production of products. This ESPR aspect was omitted in the questionnaire, but raised by several stakeholders when answering questions relating to best available technologies. As there were no specific questions on this aspect, stakeholder validation is limited but it is well supported generally by the JRC working plan study (Faraca et al., 2024).

Material choice of a product fundamentally determines a product’s environmental footprint (e.g. metal or metal finishings have an inherently higher footprint than wood). Regional/local sourcing to cut transport footprint can also play a role.

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Lightweighting can reduce product weight or material density while providing the same function can reduce the footprint, while foldable furniture can reduce weight and bulk, thereby reducing transport emissions. Reducing material density can however have trade-offs with durability, structural strength and recyclability and reinforcing needs.

Renewable or bio-based feedstocks can reduce the environmental footprint. For example, bio-based adhesives or resins, based on agricultural or co-forest materials. Chemical recycling may at some point be able to complement recycled content targets for bio-based materials. However, one materials supplier points out that biomass balance approach results are inconsistent across PEF, EPD and PCF methodologies making it hard to demonstrate or compare footprint benefits credibly, which could undermine customer/regulator trust in bio-based substitution claims specifically.

One public buyer prioritised the use of materials from renewable resources together with reduced water and energy consumption during manufacturing. An industry association representing manufacturers of furniture components additionally called for recognition of material efficiency in the use of wood resources, support for the cascading use of wood (prioritising material use over energy recovery), recognition of the contribution of wood-based panels to extending biogenic carbon storage, and the avoidance of requirements that would divert recyclable wood towards incineration or other lower-value uses.

Recycled content is rated of lower relevance to furniture by stakeholders, with 21 (45%) rating it of medium relevance, while 10 rated it high and 8 rated it low (21% and 17% respectively). Grounds for higher prioritisation centre on resource conservation and climate benefits: several respondents note that increasing recycled content reduces pressure on virgin resource extraction and may deliver associated CO2 emission reductions, particularly for metals. A producer responsibility organisation rates it "high" on the basis of its impact on waste management viability, and a Member State respondent notes that measurement methodologies are becoming available, making enforcement feasible, while avoiding primary material use directly affects environmental footprint.

Grounds for assessing recycled content as of lower relevance most frequently refer to the trade-offs involved with reliability and durability, since recycled feedstocks (e.g., rebounded PU foam, recycled textiles) typically cover a narrower range of technical properties than virgin materials and are often unsuitable for high-performance applications (e.g., comfort layers, load-bearing or high-mechanical-stress components).

Retailer associations and manufacturers also highlight limited availability of high-quality, cost-effective secondary materials, insufficient traceability and transparency, and the absence of harmonised methodologies for calculating, tracking and verifying recycled content as reasons for caution. For foam, some raise a technical and policy trade-off between closed-loop (material-to-material) recycling, currently limited by industrial capacity, and open-loop mass-balance approaches, which enable higher near-term recycled content figures via certified chain-of-custody allocation but are contested by some (e.g., environmental organisations, who reject "credit" mass-balance accounting for plastics) as lacking physical traceability. For wood, one stakeholder states that recycled content requirements for furniture should not divert recovered wood away from sectors where it is already used efficiently in line with the cascading-use principle, highlighting a cross-sectoral competition for constrained

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recycled feedstock. Consumers and manufacturers raise the risk that recovered materials may carry "legacy chemicals," posing risks to indoor air quality and consumer safety (e.g., formaldehyde and other volatile substances), an important qualifier to unconditional support for recycled content.

Recyclability is rated as of medium relevance by 19 respondents (40%), of high relevance by 16 respondents (34%) and low relevancy by 4 (9%). Grounds for higher prioritisation centre on end-of-life environmental performance and resource conservation. It is also noted by some as a prerequisite for recycled content. Grounds for lower or qualified prioritisation are similar in character to those raised for recycled content. A recurring position, expressed by manufacturer associations and an environmental organisation alike, is that recyclability should rank behind reuse, repair and refurbishment in priority terms, reflecting the waste hierarchy

The relevance of recyclability appears to depend on the material. Some note that certain materials (e.g., metals) are highly recyclable where they can be identified, separated and collected, provided design facilitates this separation. One stakeholder also commented that recyclability of wood-based panels can also be enhanced through the use of formaldehyde-free, bio-based binders. One manufacturer states that permanent joints, glue and staples are largely unproblematic within a single material class (e.g., wood-to-wood) but contaminate both material streams when they cross a boundary between distinct materials (e.g., wood-to-foam, wood-to-metal), arguing for reversible mechanical joints specifically at these interfaces rather than universally. An end-of-life service provider notes that the priority accorded to recyclability depends on which materials are involved and how much energy the recycling process costs, i.e. that a uniform priority level may not be appropriate across all material types. It is also noted that recycling routes exist for wood-based panels and metals, but are noted as barely existing for post-consumer foam and upholstery textiles, meaning design improvements alone cannot guarantee improved recycling outcomes without corresponding infrastructure investment.

Possibility of recovery of materials is rated by 13 (28%) as medium relevance and the same rated it as low relevance. 11 stakeholders rated it of high relevance. Grounds for higher prioritisation are broadly consistent with those advanced for recyclability, emphasising resource efficiency and waste reduction. Grounds for lower prioritisation either referred to the lower position of recovery in the waste hierarchy, or uncertainty about what this criterion refers to or how it differs from recyclability.

Expected generation of waste is rated by 13 (28%) stakeholders as low relevance, 12 (26%) as medium relevance, and 9 (19%) as high relevance. Higher relevance is assigned by public authorities, research organisations, raw-material suppliers, and environmental/civil society respondents. Reasons for lower relevance include that end-of-life outcomes depend on factors entirely outside manufacturers' visibility or control, principally the availability and effectiveness of local waste management infrastructure and consumer behaviour. However, one stakeholder notes that a substantial share of relevant waste is generated further back in the supply chain (i.e., during production/manufacturing) rather than at the post-consumer end-of-life stage.

Furthermore, stakeholders raised further priority aspects which are relevant to circularity and broader ecodesign:

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- **Modularity/design-for-disassembly:** A range of stakeholders from across industry, NGOs, consumer representatives, research organisations, social enterprises and the manufacturers of furniture and its components raised the importance of modularity/design-for-disassembly. Key reasons included the ability of products to adapt to changing user needs and preferences (e.g. through removable and washable covers, or the addition, removal or replacement of parts), which was seen as reducing premature discarding of furniture that remains in good technical condition, and the reduced risk of damage during disassembly and reassembly, which was noted as particularly relevant when furniture is moved between locations or users. Several stakeholders additionally highlighted the availability of spare parts and repair service providers as a related priority, given its influence on the practical realisation of modularity-driven repairability.
- **Upgradeability and adaptability:** Furniture manufacturer associations and individual manufacturers, together with research and technology organisations, identified upgradeability as an important lever for extending product lifespans and reducing the discarding of furniture that remains functional, citing examples such as modular systems, and the availability of add-on or renewal components.
- **Chemical safety, substances of concern and VOCs:** This aspect was raised by stakeholders across the value chain, including suppliers of adhesives, resins and other chemicals/materials, furniture and bedding manufacturers, consumers, research and technology organisations, and environmental organisations. Stakeholders noted that chemical choice and binder chemistry affect embodied carbon, indoor-air emissions and end-of-life options simultaneously, and that reducing hazardous substances and physical contaminants in raw materials (e.g. laminates) is important given that the highest life-cycle impacts of furniture typically occur during the raw-material production phase. Consumer representatives emphasised chemical safety, and in particular low formaldehyde and VOC emissions, as a high priority linked to indoor air quality. Environmental organisations called for particular attention to substances of concern such as PVC and flame retardants, recommending that PVC be prohibited in indoor applications and that transition timelines for information requirements on substances of concern be kept to a minimum, citing timelines of up to eight years observed in other product sectors as excessive. Industry stakeholders supporting stringent chemical requirements generally linked this to simplified compliance and improved recycling pathways, while environmental organisations linked it more directly to health protection and the prevention of hazardous substances entering recycling loops.
- **Material traceability and transparency (including in relation to the Digital Product Passport):** a range of stakeholders raised this as important for supporting recycling compatibility, claims substantiation and informed design and end-of-life decisions. Research bodies emphasised that information provided (e.g. on material composition, repair, maintenance and disassembly) should be reliable and, where feasible, independently verifiable rather than based solely on self-declaration. Raw material supplier associations expressed conditional support, stating that Digital Product Passport requirements must remain proportionate and must protect confidential business information.
- **Flammability requirements and flame retardants:** A furniture manufacturer association and an environmental organisation both called for a harmonised European approach to flammability requirements, noting that the current

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fragmentation of requirements across Member States is a root cause of continued reliance on flame retardants. Harmonisation can facilitate circular design and support the reduction of substances of concern, while the environmental organisation additionally noted that flame retardants reduce the quality of foam and textile components and increase recycling costs.

- **Mass balance concept and circular feedstock:** Industry associations representing chemical and adhesive suppliers, together with chemical/material producers for furniture, called for recognition of the mass balance concept for circular feedstock (including bio-based, chemically recycled and chain-of-custody content) alongside low-VOC requirements, reflecting a sector-specific priority not raised by other stakeholder groups.
- **Packaging, take-back and re-use/second-hand value:** Furniture manufacturers and importers identified packaging and take-back programmes, as well as re-use and second-hand value, as further relevant aspects, generally at medium priority relative to design-stage circularity aspects.
- **Aesthetic quality and cleanability:** One stakeholder noted that most furniture is discarded due to changes in trends rather than technical failure, and that the possibility of cleaning is especially relevant for upholstered furniture, which is often discarded once stained or soiled. This behavioural perspective was not raised by other stakeholder groups but is considered relevant to understanding furniture disposal drivers not captured by conventional technical circularity aspects.

Using expert judgement and the results of the stakeholder consultation, the technical feasibility of circularity aspects was then assessed, using the 'yes/no' questions provided in Table 6 of Methodology B2.

Table 5-10: Assessment of technical feasibility of circularity aspects relevant to furniture.

Circularity Aspect	Guiding Question	Assessment
Durability	Is the functionality of the product expected to be provided for a long lifetime and/or for a high amount of multiple uses?	Assessed as highly relevant and technically feasible
Reliability	Can the fatigue/aging of the product or a part/component cause a limiting event (i.e. when a primary or secondary function is no longer delivered) in the product? Do the characteristics of the product make it more vulnerable and exposed to environmental stresses, accidents or part aging under normal conditions of use?	Considered highly relevant, although some stakeholders state that technical feasibility may be limited by limited development of standards and testing methods

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Circularity Aspect	Guiding Question	Assessment
Repairability	Does the product contain parts or components that may be repaired and/or is there potential to redesign the product in a way that it can be repaired?	Considered highly relevant, although some stakeholders state that technical feasibility may be limited - standardised evaluation method for maintenance, repair and refurbishment capability is still under development (CEN/TC 207), and reparability index and priority-parts methodology are the subject of ongoing research
Possibility of maintenance	Will the use and/or storage of the product in specific conditions maintain/extend its expected lifetime (e.g. … use of specific cleaning products in furniture)? Would it be possible to postpone a limiting event by performing maintenance activities to any of the parts/components of a product or to the product?	Technically feasible, although possible maintenance actions may differ according to product type and market.
Recycled content	Is there a waste stream (i.e. product manufacturing waste – pre-consumer waste – and/or post-consumer waste) from which material can be recycled and reintroduced in the manufacturing process of the product (or another product)? Is the waste stream available (i.e. not used for other applications) for using it in the manufacturing of the specific product group under study? Is the waste stream generated within an acceptable distance from the recycling and manufacturing sites? Can the recycled material be used for the manufacturing of the product with the same or an acceptable minimum quality to keep the properties and function of the product?	Depends strongly on the material stream, with strong regional variations. A deeper analysis material by material is given in Task 4 (section 0). Challenges identified relating to limited availability of high-quality, cost-effective secondary materials, insufficient traceability and transparency, and the absence of harmonised methodologies for calculating, tracking and verifying recycled content. Also potential trade off with durability. Assessed as technically feasible but with limitations.

Circularity Aspect	Guiding Question	Assessment
Recyclability	Is the product made of at least one component/part or material that can be separated and recycled, and/or would it be possible to redesign the product in such a way that at least one component/part or material that can be separated and recycled? Is there available waste derived from the product from which materials can be recovered and recycled (i.e. is the product a consumable or will waste be generated after its end of life)? Is the technology to recycle the product part/material available and/or is there potential to redesign the product so that it can be recycled by existing recycling technologies? Is there an existing or potential demand for the recycled material?	Technically feasible - product specific options for improving recyclability exist.
Possibility of recovery of materials	Is there available waste derived from the product from which materials can be recovered (i.e. is the product a consumable or will waste be generated after its end of life)? Is it technically feasible even after redesign to separate and sort materials (or combinations of materials) for their recovery compatible with a recycling process, for backfilling and/or for preparation for reuse? Is it technically feasible even after redesign to recover material with the required quality for recycling, backfilling and/or preparation for reuse?	Technically feasible - aspect should be grouped with recyclability
Expected generation of waste	No guiding questions provided as aspect potentially relevant to all products	Technically feasible - differentiation between pre-consumer and post-consumer waste generation needed.

Finally, in line with Section 3.2.4.2.1 of the JRC B2 Methodology, circularity aspects that would be addressed through the same Annex I parameters, or that stakeholders themselves treat as interdependent, may be clustered so that validation and the subsequent level-of-relevance assessment are carried out on the cluster rather than on each individual aspect. Based on the survey evidence collected, the following groupings are proposed for furniture:

- **Durability and reliability**: several stakeholders described durability and reliability as mutually reinforcing (reliable products avoid premature failure and thereby support durability), and both are overwhelmingly rated highly relevant for similar reasons (low in-use impact, extended product lifetime). These are proposed to be considered as a linked pair in Step 3, while retaining separate scoring given the divergence in stakeholder views on measurability (4% rate reliability as low relevance, none do so for durability).

- **Repairability and possibility of maintenance**: while stakeholders distinguished maintenance (user-facing upkeep) from refurbishment (professional-scale intervention, already filtered out in Step 1), they linked repairability and maintenance closely as complementary levers for extending in-use lifetime through minor, component-level intervention. These two are proposed to be assessed together, while noting the boundary with the (filtered out) possibility of refurbishment should be kept distinct in any resulting requirements.
- **Recyclability, possibility of recovery of materials and recycled content**: stakeholders raised near-identical justifications and trade-offs for recyclability and possibility of recovery of materials (end-of-life resource conservation, material-dependent feasibility, waste hierarchy positioning), and several respondents were unable to distinguish the two conceptually. Recovery of materials also has implications for future viability of recycled content, although this is presently assessed by a number of stakeholders as technically challenging constrained principally by feedstock and infrastructure limitations, it is strongly dependent on the material type (e.g. metals, plastics, wood, textiles or foam). These aspects are proposed to be assessed jointly.
- **Upgradeability and modularity/design-for-disassembly:** although upgradability was categorised as 'Not relevant' for furniture in the Step 1 initial filtering, the validation exercise surfaced strong and broad-based stakeholder support (spanning industry, NGOs, consumer representatives, research organisations, social enterprises and manufacturers) for modularity/design-for-disassembly and upgradeability as closely related levers for extending furniture lifespans. Both are justified on materially the same grounds – enabling products to adapt to changing user needs (e.g. removable/washable covers, or the addition, removal or replacement of parts), reducing premature discarding of functional products, and supporting the addition of add-on or renewal components – and both point to the same practical enabler, namely the availability of spare parts and repair/service providers. These two are therefore proposed to be assessed as a single cluster, and reinstated in the assessment despite their exclusion in Step 1.
- **Resource efficiency:** while not quantified specifically in the stakeholder questionnaire, several pointed out rightly, that the choice of materials and reducing their weight can strongly impact environmental performance of furniture. This aspect is therefore also taken up.

In summary, "durability and reliability", "repairability and possibility of maintenance", "recyclability, recovery of materials and recycled content" and resource efficiency are assessed as being relevant circularity aspects for further considerations. In addition, the validation exercise leads to the reinstatement of upgradeability (clustered with modularity/design-for-disassembly), which had initially been filtered out in Step 1.

The level of relevance of these groups will next be determined in Task 4 on the basis of three dimensions: technical relevance, economic relevance and environmental relevance. The goal of this next step is to allow the study team to have an indication of the most relevant circularity aspects and will inform the definition of design options and ecodesign requirements in Task 6.

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5.7. Horizonal requirements

As required by Methodology B3, MEErP Task 1 must also assess whether any ESPR aspects relevant to furniture could more efficiently be addressed through horizontal ecodesign requirements rather than product-specific ones, following the two-parameter horizontality test (product-level and aspect/provision-level horizontality) set out in the B3 methodology.

It is concluded that horizontal requirements are largely not relevant for furniture as a product group. Most aspects with high horizontality potential — such as repairability, reusability, upgradability and disassembly-related provisions — are, per the B3 methodology, only meaningfully horizontal when products share common, identifiable components (e.g. batteries, screens, circuit boards) across product families.

The one notable exception concerns furniture incorporating electrical and electronic equipment (EEE) — for example, adjustable/electrically actuated desks and beds, lighting-integrated furniture, or furniture with embedded charging/smart functions. Where such components are present, provisions targeting those specific components (e.g. spare part availability, disassembly requirements, restrictions on substances of concern, or energy consumption in standby/off mode) could, in principle, be aligned with equivalent component-based requirements already established or under development for EEE and consumer electronics product groups. This exception applies only to the EEE-containing sub-set of furniture products and their electronic/electrical components, rather than to the furniture product group as a whole.

5.8. Preliminary conclusions Task 1

The following preliminary conclusions primarily concern the definition of the product category (as well as exemptions) and the study team's initial assessment of the extent to which standards and other voluntary specifications already exist addressing aspects of circularity.

First, it is proposed that furniture is based primarily on the JRC's existing functional definition, since the functional approach aligns with industry standards and the EU Ecolabel definition. This was supported as a starting point by a large number of responding stakeholders i.e.

"free-standing or built-in units whose primary function is to be used for the storage, placement or hanging of items and/or to provide surfaces where users can rest, sit, eat, study or work, whether for indoor or outdoor use. Bed frames, legs, bases and headboards are included in the scope" (Faraca et al., 2024).

Further consideration is needed in Task 2-Task 4, however, to as whether built-in and bespoke units should be within scope.

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Questions for Stakeholders:

Q1-1: Should “built-in” or “bespoke units” be included within the scope for furniture. Please justify your answer (i.e. with reference to specific environmental or economic arguments).

If “built-in units” should be excluded in your opinion, what would be the best approach for doing so? What potential loopholes could be created by the exclusion of “built-in units” and how could this be mitigated?

According to the JRC definition, other products not included within the scope of the furniture is: "bed mattresses, streetlights, railings and fences, ladders, clocks, playground equipment, stand-alone or wall-hung mirrors, electrical conduits, road bollards and building products such as steps, doors, windows, floor coverings and cladding” (Faraca et al., 2024)

This list of exemptions could be adjusted to align with CN codes falling outside of 94.01 to 94.03. In contrast to the existing definition, this includes:

- 'Pneumatic or water mattresses, pillows or cushions'. Considered niche products, but could provide additional clarification beyond the JRC's exclusion of 'bed mattresses'
- 'mirrors designed for placing on the floor or ground', but not wall-hung mirrors as in the JRC definition. While already excluded by the JRC's functional definition, it may cause confusion to explicitly exclude free standing mirrors but not wall-hung mirrors.
- 'furniture specially designed as parts of refrigerating or freezing equipment or furniture specially designed for sewing machines'. This is considered a niche topic, but could add certainty in addition to the JRC's list of exemptions.
- 'lamps or light sources'. These are already clearly excluded by the JRC functional definition) but could add certainty in addition to the JRC's list of exemptions.
- Furniture specially designed as parts of apparatus for various electrical equipment
- including microphones, sound recording, transmission apparatus, radar apparatus or monitors and projectors. Considered already excluded by the JRC's functional definition but could add certainty in addition to the JRC's list of exemptions.
- 'Parts and accessories of vehicles, including automotive and aircraft seating'. Could add certainty in addition to the JRC's list of exemptions.
- 'Dentists chairs': Could add certainty in addition to the JRC's list of exemptions.
- Clocks and clock cases etc: could provide additional clarification beyond the JRC's exclusion of 'clocks'.
- 'Toy furniture or toy luminaires and lighting fittings, billiard tables or other furniture specially constructed for games, furniture for conjuring tricks or decorations': Could add certainty in addition to the JRC's list of exemptions.
- 'Monopods, bipods, tripods and similar:' This is considered a niche topic, but could add certainty in addition to the JRC's list of exemptions.

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Questions for Stakeholders:

Q1-2: To what extent do you agree with additional exclusions beyond those made in the JRC definition?

Do you believe further exclusions are necessary? Please justify your answer.

It is not considered necessary to make specific exemptions for second-hand furniture, including furniture which has been refurbished or repaired, as such activities do not constitute remanufacturing - i.e. lead to changes which "substantially affects the safety, performance, purpose or type of the product" (ESPR, Article 2(16)) - and are therefore already exempted from ESPR's delegated acts.

Second, an analysis of the standardisation landscape (**Section 5.4**) as well as requirements of voluntary labels (**Section 5.5**) identifies that an existing basis for the definition of circularity requirements exists across all circularity aspect clusters (defined in **Section 5.6.2**). An overview of this is presented in **Table 5-11**.

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Table 5-11: Existing basis from standards and voluntary labels for the definition of circularity requirements.

Circularity aspect cluster	Existing basis for definition and measurement of circularity aspect
Durability and reliability	Circularity standards *under development* in WG 10: • Furniture – Circularity – Guidance on reliability, supporting the development of product-specific standards for assessing product reliability as a key contributor to durability and product lifetime. Product specific standards - requirements relating to safety, strength and durability: • domestic seating EN 12520:2024 • domestic tables EN 12521:2023 • non-domestic seating EN 16139:2025 • non-domestic tables EN 15372:2023 • Non-domestic storage furniture EN 16121:2023/ AC:2025 • (Dec 2023/Apr 2025) • Office furniture - Work tables EN 527-2:2016 • +A1:2019 • Beds & mattresses EN 1725:2023 • Bunk beds and high beds EN 747-1:2024 • Workbenches for laboratories in educational institutions EN 13150:2020 • Ranked seating EN 12727:2016 • Electrically operated furniture FprEN 17684 Test methods for the determination of strength and durability • Seating EN 1728:2012/ AC:2013 • (Jul 2013) • Tables EN 1730:2012 • Domestic and non-domestic storage furniture EN 16122:2012/ AC:2015 Component and finishes specific standards (see Table 5-3): • Hardware • Surfaces and surface finishes • Cover fabrics • Leather Voluntary schemes: • EU Ecolabel, Nordic Swan, Golden M: durability requirements for leather • Blue Angel: requirements for cover fabrics in line with existing ISO/EN/DIN standards • Golden M: Requirements for dimensional changes for foams, including requirements for loss of hardness, which is determined by measuring fatigue resulting from constant impact loading in accordance with DIN EN ISO 3385 (DIN EN ISO 2439, Method A). Also abrasion resistance of covers.

Circularity aspect cluster	Existing basis for definition and measurement of circularity aspect
Repairability and possibility of maintenance	Circularity standards *under development* in WG 10: • Furniture – Circularity – Evaluation method for maintenance, repair and refurbishing capability, providing a framework to assess and improve the maintenance, repair and refurbishment potential of furniture products. Voluntary schemes: • Blue Angel: for wear parts, requirement that functional and compatible replacement ensured for at least five years. • FEMB Levels: information requirements on wear parts and repair/replacement and functionally compatible spare parts are available for at least five years.
Recyclability, possibility of recovery of materials and recycled content	Voluntary schemes: • Nordic Swan: optional requirement for 70% recyclable *or* renewable products, or separability of main materials FEMB Levels: product parts market to facilitate separation by material for recycling, and all plastic parts (≥ 100 g) be marked for recycling in accordance with ISO 11469.
Upgradeability and modularity/design-for-disassembly	Circularity standards available: • EN 17902:2023 (Furniture – Circularity – Evaluation method for dis/re-assembly capability). Circularity standards *under development* in WG 10: • Furniture – Circularity – Evaluation method for upgrade capability, supporting product adaptability and lifetime extension through upgrading. Voluntary schemes: • Nordic Swan: requirement for complete separability of the individual main components, or a more specific requirement relating to the removability and replaceability of cover fabrics. • FEMB Levels: disassembly requirements including instructions, use of standard tools, replacement of components without loss of quality

It is noted that a range of circularity standards are currently being prepared by CEN Technical Committee for furniture's Working Group 10 for all relevant circularity clusters, but so far, only one is available: EN 17902:2023 (Furniture – Circularity – Evaluation method for dis/re-assembly capability). The rest remains in development. Nevertheless, a range of product specific standards for 'durability and reliability' exist, while criteria for assessing 'repairability and possibility of maintenance', and 'recyclability, possibility of recovery of materials and recycled content' have been defined within several voluntary labels.

Questions for Stakeholders:
Q1-3: of the standards and labels listed in **Table 5-11**, which standards or voluntary labels provide the most suitable basis for defining and measuring circularity? Please justify your answer.

Are there further means to define and measure the circularity aspect clusters which the study team should be aware of?

6. MEErP Task 2 – Markets

6.1. Objectives of MEErP Task 2

The purpose of this task is to provide the market analysis of the furniture product group, compiling the necessary data that help gauge the importance of the market (e.g. through its size, trade and production) and the most market-relevant product segments, including the apparent consumption level in the EU, the most important producers by MS, the market and cost inputs, the latest trends in the market in terms of consumer preferences and product design. Moreover, relevant aspects related to the circular economy such as the penetration of Extended Producer Responsibility (EPR) schemes, information about repairability ecosystems across the EU, reuse, resale and remanufacturing channels etc., which were often overlooked in preparatory studies under the previous Ecodesign Directive, are also collected under this task. All these serve as inputs for informing the construction of the base cases and the assessment of their environmental impacts, as conducted in Tasks 5 and 6.

6.2. Generic economic data

6.2.1. Production

This section presents data on the production of new furniture in the EU27, covering both physical output (in units) and monetary value (in EUR, current prices), at EU27 aggregate level and broken down by Member State. Production data is sourced from the Eurostat Prodcom database (Sold production, exports and imports, dataset ds-059358) and covers EU Member States for the reference year 2024 (Eurostat, 2026f). Where individual Member State data is not publicly available due to confidentiality, the EU27 aggregate figures reported by Eurostat are used, which include all Member State data including those not published at individual level.

The analysis covers 32 Prodcom product codes spanning seating of all types and materials, kitchen furniture, office furniture, bedroom furniture, dining and living room furniture, shop furniture, other wooden, metal, plastic and other material furniture, furniture parts and medical furniture. The tables present the eight most important product codes for each indicator, ranked by EU27 production in 2024, with all remaining codes grouped under Other. It should be noted that production on own account data is only available from 2021 onwards. For the longer trend analysis, sold production is therefore used, as it provides complete coverage across all Member States for the full period 2013 to 2024.

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Production in physical terms (units)

According to Eurostat data (see **Table 6-1**) the EU27 produced furniture across eight key product categories in 2024, with total volumes ranging from 16 million units for plastic furniture to 95 million units for other wooden furniture. Kitchen furniture, the largest category by economic value, accounted for 79 million units. Wooden dining and living room furniture and wooden bedroom furniture followed at 86 million and 69 million units respectively. Wooden office furniture accounted for 39 million units, while upholstered seats with wooden frames, metal office furniture and plastic furniture each represented smaller shares of total output.

It should be noted that code 31091100 (metal furniture, other) is reported in kilograms rather than pieces and is therefore not included in the figures above. At EU27 level, 630 million kilograms of this product were produced in 2024, making it by far the largest single product code by reported quantity, though not directly comparable to the piece counts for other categories.

At Member State level, Poland is the largest producer by volume with approximately 124 million pieces reported in 2024 across the eight product categories shown, followed by Italy with 62 million and Spain with 33 million. Portugal and Lithuania also report substantial volumes at 31 million and 28 million pieces respectively. Production figures for France and Germany are substantially incomplete at Member State level due to confidentiality rules applied at product code level. The EU27 total figures, which incorporate all Member State data including those not published at individual level, provide the most complete aggregate for policy purposes and are shown in the EU27 total row at the bottom of the table.

National production statistics provide additional context for the substantial confidentiality gaps in the Member State-level Eurostat data, particularly for Germany and France. The gaps are especially pronounced for kitchen furniture, for which publicly available Member State data account for only 32.2 million units compared with an EU-27 total of 78.8 million units. German national statistics (Statistisches Bundesamt (Destatis), 2026) report approximately 24.8 million units of wooden kitchen furniture intended for sale in 2024, including 24.7 million fitted kitchen elements, while French national statistics (Institut national de la statistique et des études économiques (INSEE), 2025) report approximately 7.5 million units of wooden kitchen furniture sold in 2024, including assembled and flat-pack kitchen elements. Together, these national figures account for approximately 32.3 million units, equivalent to around 69 % of the 46.6 million-unit gap between the publicly available Member State data and the EU-27 aggregate. German national statistics also report approximately 6.8 million units of wooden bedroom furniture in 2024, while the corresponding French data remain partly confidential. The national data are not incorporated directly into Table 6-1 because they use more detailed national product classifications and different production indicators. Germany reports under the GP2019 nine-digit classification, while France uses the PRODFRA classification, compared with the harmonised eight-digit PRODCOM categories used in the Eurostat analysis. The German figures also refer to production intended for sale and the French figures to invoiced quantities, rather than precisely the same production indicator used in Table 6-1. The national statistics are therefore used as complementary evidence rather than to fill individual Eurostat cells, but they confirm that a substantial part of the apparent gap reflects confidentiality in major producing Member States rather than an absence of production.

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3018 **Table 6-1: Production of new furniture in the EU-27 in 2024 - top 8 product codes by quantity, (million units, by Member State)**

Country	Other wooden furniture	Wooden dining & living room	Kitchen furniture	Wooden bedroom furniture	Wooden office furniture	Upholstered seats (wooden frames)	Metal office furniture	Plastic furniture	Other furniture products
Austria	0.18	0.03	0.45	0.03	0.47	0.16	0.26	:	0.18
Belgium	0.09	0.15	0.28	0.10	3.10	:	1.37	0.02	0.13
Bulgaria	0.73	0.66	0.46	0.79	0.27	0.63	0.59	0.23	1.35
Croatia	0.11	0.23	0.17	0.34	0.06	0.50	0.62	0.01	0.18
Czechia	1.84	0.44	:	0.00	0.86	0.10	0.76	0.00	3.42
Denmark	1.15	1.26	2.61	1.64	0.55	0.15	0.15	0.21	1.89
Estonia	0.41	0.14	0.19	0.61	0.03	0.23	0.06	0.00	0.31
Finland	0.16	0.15	:	0.14	0.18	:	0.10	0.00	0.59
France	5.05	:	:	:	:	:	:	:	1.33
Germany	:	3.07	0.00	:	:	:	:	0.69	0.05
Greece	0.32	0.24	0.19	0.32	0.19	0.10	0.29	0.29	0.45
Hungary	0.34	0.19	0.11	0.23	0.24	0.34	0.06	0.29	0.41
Ireland	:	:	:	:	:	0.05	0.01	:	:
Italy	3.29	8.48	12.76	17.95	4.64	2.47	5.53	0.00	7.24
Latvia	2.81	0.05	0.03	0.03	0.13	0.01	:	:	0.16
Lithuania	11.85	3.22	0.15	7.20	3.02	0.99	0.81	0.00	0.82
Netherlands	0.10	0.14	1.81	0.13	0.22	0.09	0.16	:	0.67
Poland	25.13	59.15	4.34	8.90	4.59	9.62	0.31	3.03	8.62

Country	Other wooden furniture	Wooden dining & living room	Kitchen furniture	Wooden bedroom furniture	Wooden office furniture	Upholstered seats (wooden frames)	Metal office furniture	Plastic furniture	Other furniture products
Portugal	4.68	1.70	:	2.37	13.28	0.93	4.32	2.00	2.09
Romania	2.73	3.40	1.22	1.12	0.30	1.06	0.06	0.12	3.37
Slovakia	0.86	0.43	0.10	0.41	0.19	0.44	0.03	:	0.04
Slovenia	0.25	0.27	0.07	0.16	0.09	0.04	0.02	:	0.34
Spain	2.66	1.52	7.25	4.63	1.47	2.40	1.91	1.91	9.33
Sweden	:	0.07	:	1.27	0.83	0.16	:	:	0.86
Sum of all MSs for which data is public	**64.73**	**84.97**	**32.18**	**48.37**	**34.72**	**20.47**	**17.43**	**8.80**	**43.81**
EU-27 Total	**95.00**	**86.00**	**78.76**	**68.74**	**39.45**	**21.95**	**19.98**	**15.48**	**58.94**

Source: (Eurostat, 2026f)

Note: Countries excluded: Cyprus, Luxembourg and Malta (no data).

Note: France and Germany have incomplete Member State-level data due to confidentiality. The EU-27 total includes all Member States.

Note: Product code 31091100 (other metal furniture) is reported in kilograms, while all other codes are reported in pieces. The total PST therefore excludes this code.

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Production in monetary terms (EUR millions)

The monetary value of EU27 furniture production in 2024 amounted to approximately EUR 76.6 billion in current prices data (see **Table 6-2**). Kitchen furniture is by far the most valuable product category at EUR 14.1 billion, representing close to one fifth of total production value. Wooden dining and living room furniture follows at EUR 7.7 billion, ahead of parts of furniture in wood at EUR 6.4 billion and upholstered seats with wooden frames at EUR 6.1 billion. Other wooden furniture and wooden bedroom furniture each account for approximately EUR 5.7 billion, while metal furniture other and wooden office furniture represent EUR 5.0 billion and EUR 4.3 billion respectively. (Eurostat, 2026f).

The contrast between the volume and value rankings is notable. Kitchen furniture ranks third by pieces but first by value, reflecting a high average unit value driven by fitted kitchen units. Other wooden furniture leads by volume but ranks fifth by value, indicating a high share of lower value products within this broad category. Parts of furniture in wood rank third by value despite not featuring in the volume table at all, highlighting the importance of the furniture components supply chain within the EU.

Italy is the highest value producer at EUR 15.4 billion in 2024, driven by strong positions across kitchen furniture, dining and living room furniture and seating. Poland ranks second at EUR 10.8 billion and Spain third at EUR 6.8 billion. Lithuania, Portugal, the Netherlands and Romania each report between EUR 1.7 billion and EUR 2.6 billion. (Eurostat, 2026f). Production value figures for France and Germany are incomplete at Member State level due to confidentiality rules. For comparison, the separate Eurostat sold-production indicator reports German kitchen furniture sales of around EUR 5.5 billion in 2024, confirming Germany's significant role in this product category despite the confidentiality of its production-on-own-account value. (Eurostat, 2026f)..

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3049 **Table 6-2: Value of production of new furniture in the EU27 in 2023 - top 8 product codes by value (EUR millions, Member State).**

Country	Kitchen furniture	Wooden dining & living room furniture	Parts of furniture (wood n.e.s.)	Upholstered seats (wooden frames)	Other wooden furniture	Wooden bedroom furniture	Metal furniture (other)	Wooden office furniture	Other furniture products	Total (EUR millions)
Austria	139	25	197	73	39	28	251	133	269	1 154
Belgium	245	58	80	:	67	22	60	30	135	698
Bulgaria	55	112	11	70	77	89	32	48	172	665
Croatia	25	50	18	22	17	38	28	14	113	326
Czechia	:	50	:	27	82	:	211	125	219	715
Denmark	434	123	31	85	161	89	75	41	346	1 385
Estonia	44	27	51	73	30	81	8	24	94	433
Finland	180	9	11	35	28	8	60	189	244	764
France	:	:	:	:	:	:	:	:	606	606
Germany	:	507	:	:	:	:	:	:	371	878
Greece	32	38	31	9	31	37	38	20	80	317
Hungary	38	42	77	137	75	55	41	32	207	704
Ireland	:	:	1	25	:	:	:	:	15	40
Italy	3 487	2 234	2 034	1 147	773	1 411	496	812	2 998	15 392
Latvia	15	12	72	1	94	11	4	17	47	275
Lithuania	45	133	376	294	515	409	55	239	511	2 576
Netherlands	267	62	274	77	137	44	96	169	575	1 702

Country	Kitchen furniture	Wooden dining & living room furniture	Parts of furniture (wood n.e.s.)	Upholstered seats (wooden frames)	Other wooden furniture	Wooden bedroom furniture	Metal furniture (other)	Wooden office furniture	Other furniture products	Total (EUR millions)
Poland	349	2 452	411	2 239	711	795	507	414	29,60	10 839
Portugal	:	375	143	182	224	269	54	239	284	1 771
Romania	117	735	178	39	175	151	20	34	213	1 664
Slovakia	27	58	59	110	42	63	59	20	488	926
Slovenia	21	19	98	14	44	31	61	32	70	390
Spain	1 173	345	722	632	430	645	707	169	1,955	6 777
Sweden	:	17	:	72	:	48	:	202	327	666
Sum of all MSs for which data is public	**6 692**	**7 484**	**4 876**	**5 363**	**3 754**	**4 324**	**2 865**	**3 004**	**13 300**	**51 661**
EU-27 total*	**14 067**	**7 700**	**6 412**	**6 139**	**5 736**	**5 715**	**5 014**	**4 258**	**21 543**	**76 583**

Source: (Eurostat, 2026f)

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Trends in production over time

Table 6-3 and **Table 6-4** present EU-27 production on own account for the period 2021 to 2024, the years for which this indicator is available at EU27 aggregate level. As apparent from **Table 6-3** and **Table 6-4**, total PST production declined steadily from 628 million units in 2021 to 484 million units in 2024, a fall of approximately 23%. This decline is visible across most product categories, most notably other wooden furniture which fell from 186 million units in 2021 to 95 million in 2024, and wooden bedroom furniture which dropped from 90 million to 69 million units over the same period. Kitchen furniture is the only category showing relative resilience, declining only modestly from 90 million to 79 million units. Wooden dining and living room furniture is the only category that increased over the period, rising from 71 million to 86 million units in 2024.

Table 6-3: EU-27 production of new furniture 2021–2024 - top 8 product codes by quantity (millions of units, PST).

Product	2021	2022	2023	2024
Other wooden furniture	186	163	141	95
Wooden dining & living room	71	76	76	86
Kitchen furniture	90	94	89	79
Wooden bedroom furniture	90	74	73	69
Wooden office furniture	45	42	39	39
Upholstered seats (wooden frames)	30	32	24	22
Metal office furniture	18	20	18	20
Plastic furniture	18	18	14	15
Other	81	78	63	59
Total	**628**	**597**	**538**	**484**

Source: (Eurostat, 2026f)

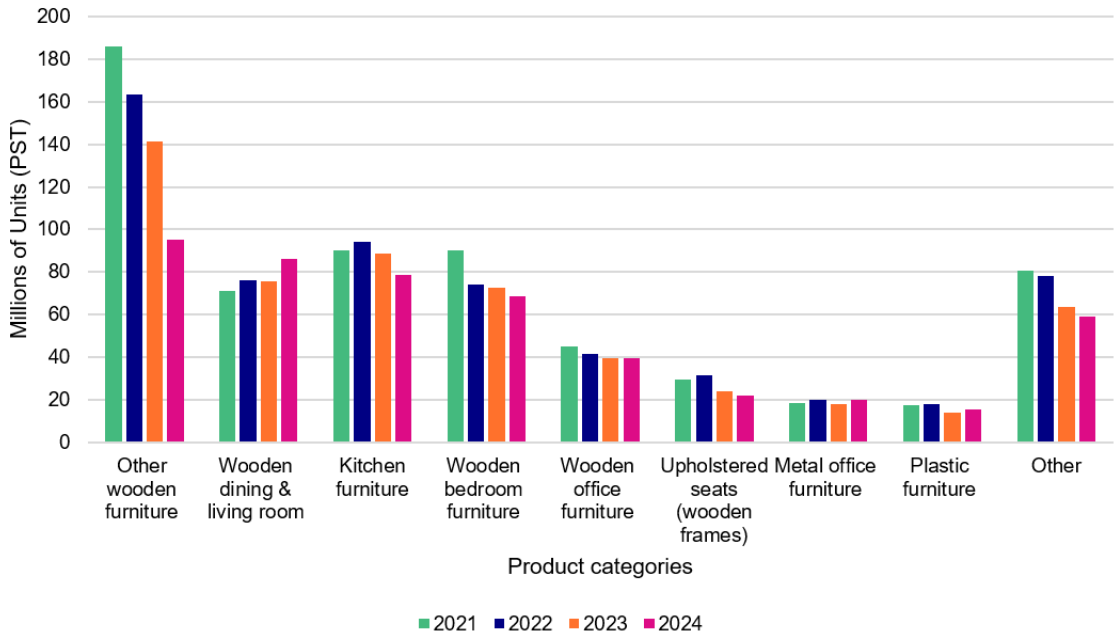

Figure 6-1: EU-27 production of new furniture 2021–2024 - top 8 product codes by quantity (millions of Units, PST)

Source: (Eurostat, 2026f)

In value terms (**Table 6-4** and Figure 6-2), total EU27 production peaked at EUR 82.9 billion in 2022 before declining to EUR 76.6 billion in 2024. Kitchen furniture is by far the largest category by value throughout the period, rising from EUR 12.0 billion in 2021 to a peak of EUR 14.6 billion in 2022 before settling at EUR 14.1 billion in 2024. Wooden dining and living room furniture is the second largest category at EUR 7.7 billion in 2024, followed by upholstered seats with wooden frames at EUR 6.1 billion and parts of furniture in wood at EUR 6.4 billion. The divergence between the volume decline and the relative stability of production value suggests that average unit values increased over the period, consistent with broader inflationary trends in input costs across the furniture sector.

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Table 6-4: EU-27 value of production of new furniture 2021–2024 - top 8 product codes by value (EUR millions).

Year	2021	2022	2023	2024
Kitchen furniture	12 000	14 588	14 436	14 067
Wooden furniture dining & living room	6 940	7 752	7 600	7 700
Upholstered seats (wooden frames)	6 727	7 354	6 593	6 139
Parts of furniture (wood, n.e.s.)	5 838	6 600	6 120	6 412
Other wooden furniture	6 300	7 395	6 400	5 736
Wooden bedroom furniture	6 300	6 450	6 357	5 715
Metal furniture	4 800	5 200	5 100	5 014
Wooden office furniture	4 200	4 500	4 687	4 258
Other	21 357	23 054	22 339	21 543
Total	**74 463**	**82 894**	**79 631**	**76 583**

Source: (Eurostat, 2026f)

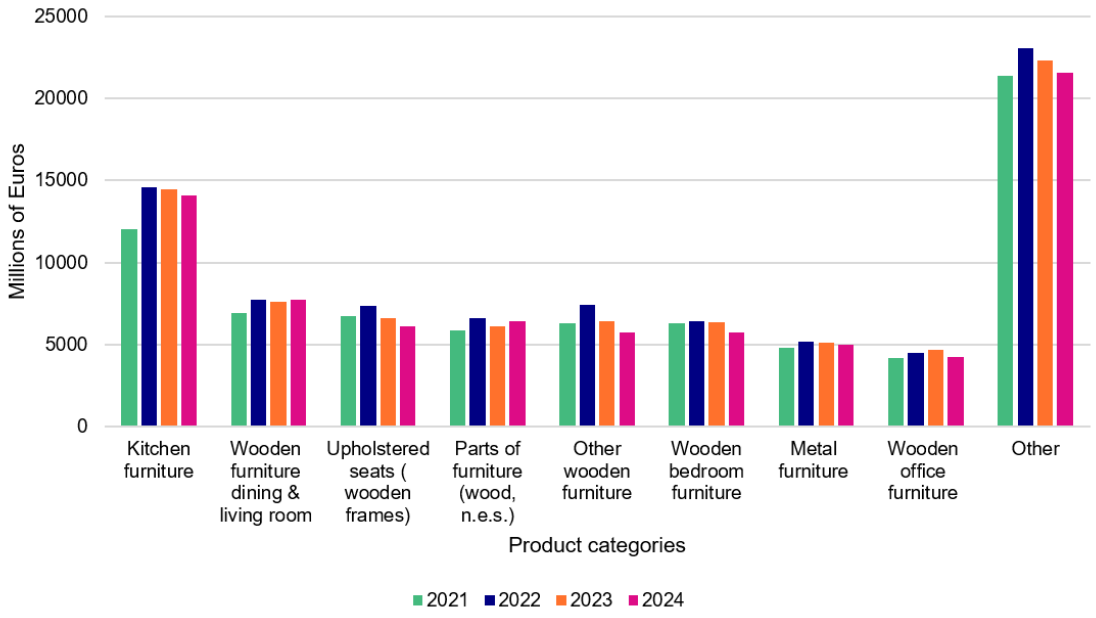

Figure 6-2: EU-27 production of new furniture 2021–2024 - top 8 product codes by value (millions of Euros)

Source: (Eurostat, 2026f)

Questions for stakeholders

Q2-1: Do the 2024 production volumes and values, and the relative importance of the main furniture product categories, appear representative of the EU market?

Q2-2: Do you have additional data that could help validate or complete Member State production figures where Eurostat data are confidential or unavailable, particularly for France and Germany?

Q2-3: Does the decline in reported physical production between 2021 and 2024, including the substantial decline for other wooden furniture, reflect developments observed in the market, or could changes in reporting or product classification partly explain this trend?

6.2.2. Sales

Sold production of new furniture in the EU27 reached EUR 76 933 million in 2024 across the eight core product codes, marginally above the EUR 76 583 million reported for production on own account in the same year. Kitchen furniture again leads by value at EUR 14 400 million, with Germany alone accounting for EUR 5 462 million, around 38% of the EU total. Wooden dining and living room furniture (EUR 7,200 million) and parts of furniture of wood, n.e.s. (EUR 6 518 million) are the second and third largest categories by value. Italy reports the highest total sold production value of any Member State at EUR 15 823 million, of which EUR 12 544 million is across the eight named codes and the remainder falls under other Prodcom furniture codes.

National statistics provide some additional context for the substantial confidentiality gap in sold production quantities for other wooden furniture. Publicly available Member State data account for 39.4 million units compared with an EU-27 total of 94.8 million units, leaving around 55.4 million units not visible at Member State level. Polish national statistics (Główny Urząd Statystyczny, 2025), which report sold production using the PRODCOM classification, record approximately 13.8 million units of other wooden furniture (PRODCOM 31.09.13.00) in 2024. This alone accounts for around 25 % of the difference between the publicly available Member State figures and the EU-27 aggregate. Swedish national statistics (Statistics Sweden (SCB), 2026) were also reviewed but sold production quantities remain confidential for several of the relevant national product subcategories, preventing a complete national total from being derived.

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Table 6-5: Sold production of new furniture by Member State in 2024 - top 8 product codes by quantity (millions of units) (Member State)

Country	Other wooden furniture	Kitchen furniture	Wooden bedroom furniture	Wooden dining & living room	Wooden office furniture	Upholstered seats (wooden frames)	Metal office furniture	Plastic furniture	Other products	Total
Austria	0.2	:	0.0	0.0	0.5	0.2	0.3	:	:	1.1
Belgium	0.1	0.3	0.1	0.2	3.1	0.3	1.4	0.0	0.3	5.7
Bulgaria	:	:	0.8	0.7	:	:	0.6	0.2	1.2	3.5
Croatia	0.1	0.2	0.4	0.2	0.1	0.5	0.6	0.0	0.2	2.2
Czechia	1.8	0.1	0.6	0.4	0.9	0.1	0.8	:	3.6	8.3
Denmark	1.1	2.6	1.6	1.3	0.6	0.2	0.2	0.2	1.9	9.7
Estonia	0.4	0.2	0.6	0.1	0.0	0.2	0.1	:	0.3	2.0
Finland	0.2	:	0.1	0.2	0.2	:	0.1	0.0	0.6	1.4
France	5.0	:	:	:	1.4	:	:	:	1.3	7.8
Germany	8.4	24.8	6.8	3.1	3.3	0.8	0.9	0.7	8.3	57.0
Greece	:	0.2	0.3	0.2	0.2	0.1	0.3	0.3	0.4	2.1
Hungary	0.3	0.1	0.2	0.2	0.3	:	0.1	0.3	0.3	1.8
Ireland	0.2	1.0	0.2	0.1	0.1	0.1	0.0	:	0.5	2.2
Italy	3.3	12.8	18.1	8.8	4.7	2.6	5.6	5.0	8.0	69.0
Latvia	:	:	0.0	0.0	0.1	0.0	:	:	0.1	0.3
Lithuania	11.9	0.2	7.2	3.3	3.0	1.1	0.8	0.0	0.8	28.2
Netherlands	:	1.8	0.1	0.1	0.2	:	0.2	:	0.4	2.8

Country	Other wooden furniture	Kitchen furniture	Wooden bedroom furniture	Wooden dining & living room	Wooden office furniture	Upholstered seats (wooden frames)	Metal office furniture	Plastic furniture	Other products	Total
Poland	:	4.3	:	:	4.6	:	0.3	3.0	3.5	15.8
Portugal	:	8.8	:	1.7	13.3	:	4.3	2.0	2.1	32.2
Romania	2.7	1.2	1.1	3.4	0.3	:	0.1	0.1	3.4	12.3
Slovakia	0.9	0.1	0.4	:	0.2	0.4	0.0	:	0.0	2.1
Slovenia	:	0.1	0.2	:	0.1	0.0	0.0	:	0.3	0.7
Spain	2.7	9.1	4.6	1.5	1.5	2.9	:	:	6.7	29.0
Sweden	:	:	1.3	0.1	0.8	0.2	:	:	0.9	3.2
Sum of all MSs for which data is public	**39.4**	**68.0**	**44.9**	**25.6**	**39.3**	**9.7**	**16.5**	**11.9**	**45.1**	**300.4**
EU-27 total*	**94.8**	**80.8**	**68.9**	**50.0**	**39.5**	**23.0**	**20.2**	**15.5**	**64.7**	**457.5**

Source: (Eurostat, 2026f)

Note: Product code 31091100 (other metal furniture) is reported in kilograms rather than pieces and is therefore excluded from Table 6-5 and the PST totals. However, it remains a significant product category, with approximately 900 million kg of sold production at EU-27 level in 2024, including approximately 414 million kg in Germany..

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3119 **Table 6-6: Value of sold production of new furniture in the EU27 in 2024 — top 8 product codes by value (EUR millions, Member State)**

Country	Kitchen furniture	Wooden dining & living room furniture	Parts of furniture (wood n.e.s.)	Upholstered seats (wooden frames)	Other wooden furniture	Wooden bedroom furniture	Metal furniture (other)	Wooden office furniture	Other products	Total
Austria	:	25	:	73	39	28	251	133	:	549
Belgium	245	58	80	96	67	22	60	30	232	891
Bulgaria	:	112	:	:	:	89	32	:	118	351
Croatia	26	50	18	22	17	41	28	14	113	330
Czechia	58	50	77	27	84	133	211	125	1 046	1 811
Denmark	436	125	34	89	161	89	75	41	348	1 397
Estonia	44	28	51	73	31	82	8	24	104	445
Finland	180	9	11	36	29	8	72	189	252	786
France	:	236	231	:	459	:	560	:	1 283	2 768
Germany	5 462	507	1 038	502	:	792	:	:	5 232	13 534
Greece	32	38	31	9	:	37	38	20	80	285
Hungary	38	42	77	:	75	55	41	33	111	472
Ireland	305	14	1	25	27	50	10	50	47	530
Italy	3 495	2 262	2 096	1 174	776	1 425	502	814	3 279	15 823
Latvia	:	12	:	1	:	11	4	17	12	58
Lithuania	46	134	380	310	516	409	55	239	514	2 603
Netherlands	267	62	274	:	:	:	96	169	508	1 376
Poland	349	:	:	:	:	:	507	414	1 672	2 943

Country	Kitchen furniture	Wooden dining & living room furniture	Parts of furniture (wood n.e.s.)	Upholstered seats (wooden frames)	Other wooden furniture	Wooden bedroom furniture	Metal furniture (other)	Wooden office furniture	Other products	Total
Portugal	245	375	:	:	:	:	54	239	250	1 163
Romania	117	743	178	:	175	151	20	34	213	1 632
Slovakia	27	:	:	110	:	:	59	:	12	208
Slovenia	21	:	:	14	:	31	61	32	58	218
Spain	1 174	345	737	643	430	645	713	169	1 592	6 448
Sweden	:	17	:	72	:	48	:	202	307	646
Sum of all MSs for which data is public	12 566	5 244	5 314	3 276	2 887	4 146	3 458	2 988	17 386	57 265
EU-27 total*	14 400	7 200	6 518	6 219	5 784	5 738	5 063	4 269	21 742	76 933

Source: (Eurostat, 2026f)

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In physical terms (**Table 6-5)**, EU-27 sold production across furniture product codes reported in pieces amounted to approximately 457.5 million units in 2024. The eight individually presented product categories accounted for 392.7 million units, with other wooden furniture (94.8 million units) and kitchen furniture (80.8 million units) the largest categories. The EU-27 aggregate exceeds the sum of publicly available Member State data (300.4 million units) by around 157.1 million units, reflecting confidential or unavailable product-level figures for several Member States. For Germany, Eurostat reports approximately 57.0 million pieces across all furniture codes reported in PST, of which 48.7 million pieces fall within the eight individually presented categories, indicating that the bulk of Germany's reported sold production volume sits in Prodcoms furniture codes outside the eight covered here. A cross-check against German national production statistics from Destatis, using the corresponding detailed GP2019 product codes, produces the same aggregate of approximately 48.7 million pieces for these eight categories in 2024. **Other metal furniture** (PRODCOM 31091100) is excluded from these PST totals because it is reported in kilograms rather than pieces. It nevertheless represents a **significant product category**, with approximately 900 million kg of sold production at EU-27 level in 2024, including around 414 million kg in Germany.

French national statistics provide additional evidence that the publicly available Eurostat figures are incomplete. INSEE’s 2024 Annual Production Survey (EAP) reports publicly disclosed furniture sales values of at least around EUR 4.5 billion across the relevant PRODFRA categories, compared with approximately EUR 2.8 billion visible in **Table 6-6**. Several additional French product-level values are confidential or unavailable French product-level values remain confidential, meaning that a complete national total cannot be derived from the published data. Stakeholder survey respondents from a furniture industry association reported annual turnover of around EUR 8 billion for furniture manufacturers in France (Consortium, 2026). As turnover, INSEE invoiced sales and Eurostat sold production are not directly equivalent indicators, the national and stakeholder data are used as complementary evidence of the incompleteness of the publicly available Eurostat Member State figures rather than to replace them directly.

Sold production value is used in preference to production on own account for the longer time series, since the latter is only available for the EU27 aggregate from 2021 onwards, while sold production value data are reported consistently back to 2014. **Figure 6-3** restates this longer series in constant 2024 prices.

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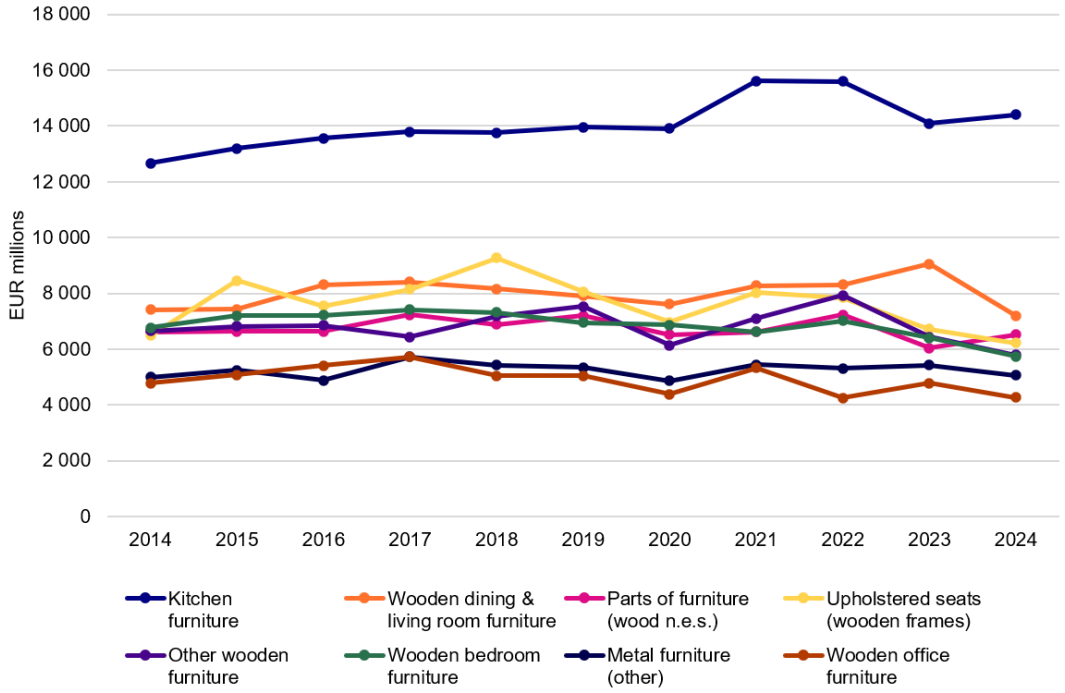

Figure 6-3: EU-27 value of sold production of top 8 furniture product codes, 2014–2024, deflated to 2024 prices (EUR millions, constant prices)

Source: (Eurostat, 2026f), (Eurostat, 2026e)

Note: Nominal sold production values were converted to constant 2024 prices using the Eurostat Producer Price Index for the manufacture of furniture (NACE Rev. 2 C31, dataset *sts_inpp_a*). Values for each year were adjusted using the ratio of the 2024 index (118.3) to the index for the respective year. The same sector-level price index was applied to all eight product categories.

Questions for stakeholders

Q2-4: Do the sold production volumes and values presented above broadly reflect the scale and composition of the EU furniture market?

Q2-5: Given the breadth of the kitchen furniture category and the limited availability of disaggregated market data, how should specific subcategories or components, such as fitted/built-in units and modular elements, be distinguished or represented in the subsequent assessments?

6.2.3. Trade

Exports to third countries from the EU

According to Eurostat PRODCOM data (dataset DS-059358), EU-27 furniture exports to third countries (**Figure 6-4**) amounted to approximately EUR 20.35 billion in 2024. The eight individually presented furniture categories accounted for EUR 13.55 billion, while the remaining furniture-related product codes accounted for a further EUR 6.80 billion. Upholstered seats with wooden frames were the largest individual export

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category, at EUR 2.18 billion, followed by other wooden furniture at EUR 1.98 billion and kitchen furniture at EUR 1.75 billion. Other metal furniture and parts of seats were also significant export categories, at around EUR 1.73 billion and EUR 1.70 billion, respectively.

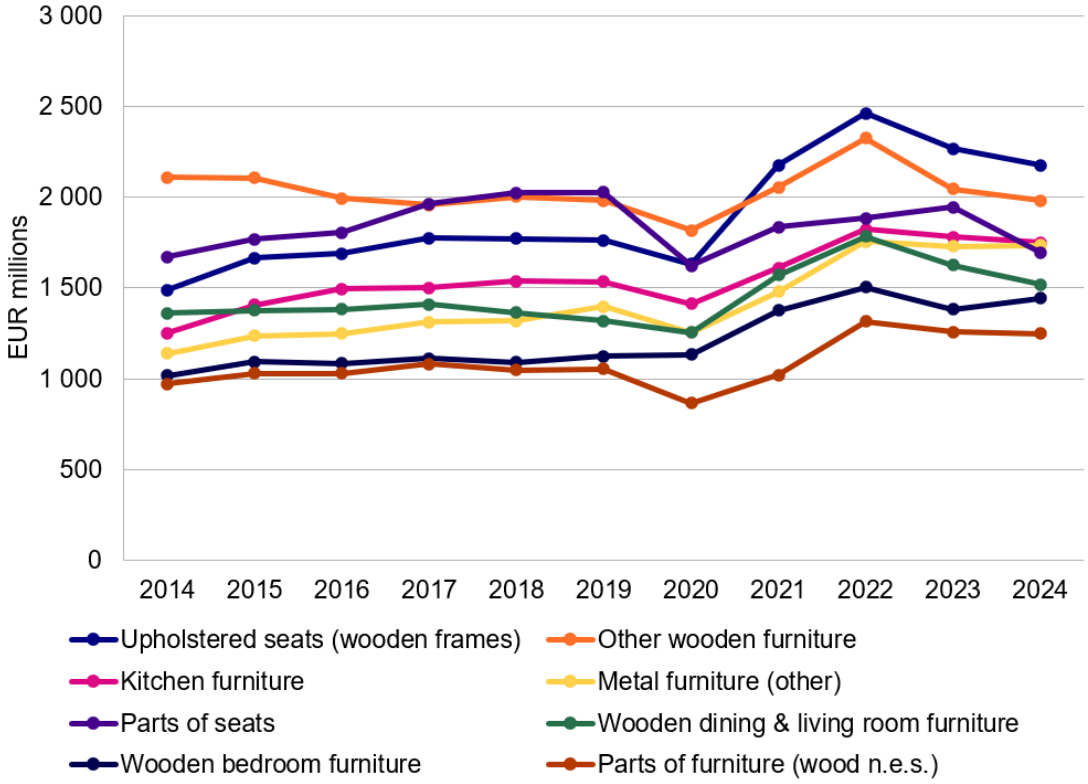

Figure 6-4: EU-27 exports to third countries by top-8 furniture product codes, 2014-2024 (EUR millions, EU-27 published values)

Source: (Eurostat, 2026f)

Figure 6-5 compares the combined export value of the eight selected furniture product codes with the remaining furniture-related product codes. The eight selected codes consistently accounted for the larger share of extra-EU exports over 2014–2024, reaching EUR 13.55 billion in 2024 compared with EUR 6.80 billion for the remaining codes. Both groups followed a broadly similar trend, with gradual growth up to 2019, a decline in 2020, a strong recovery in 2021–2022 and a subsequent easing in 2023–2024. Exports peaked in 2022 at EUR 14.85 billion for the eight selected codes and EUR 7.28 billion for the remaining codes.

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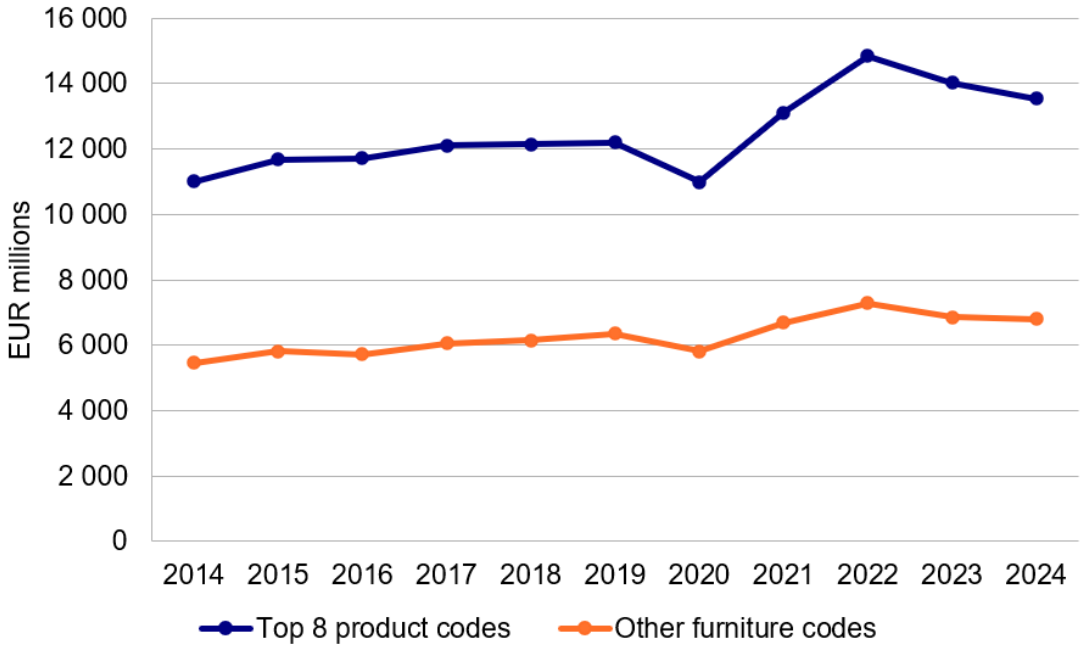

Figure 6-5: EU-27 exports to third countries by top-8 product code and remaining codes, 2014-2024 (EUR millions, EU-27 published values)

Source: (Eurostat, 2026f)

Export activity is concentrated among a small number of Member States. **Table 6-7** shows that Poland (EUR 13.0 billion), Germany (EUR 11.8 billion) and Italy (EUR 11.4 billion) were the three largest exporters of furniture (all codes) to third countries in 2024, together accounting for the majority of total EU-27 extra-EU furniture exports. Czechia (EUR 4.4 billion) and the Netherlands (EUR 3.7 billion) complete the top five, at considerably lower volumes than the top three.

Table 6-7: Top 5 exporting countries (EU-27 exports to third countries, all furniture codes, 2024)

Rank	Member State	2024 total value (EUR millions)
1	Poland	13 010
2	Germany	11 759
3	Italy	11 402
4	Czechia	4 399
5	Netherlands	3 716

Source: (Eurostat, 2026f)

It is important to note the sum of the 27 Member States' individually reported extra-EU export values is substantially higher than the EU-27 total published by Eurostat (by a factor of roughly 2.5–3 across 2014–2024). This is a known feature of COMEXT national trade statistics: shipments transiting through more than one Member State before crossing the EU's external border can be recorded as an "export" in each Member State's national statistics, while the EU-27 aggregate counts each shipment

once, at the point of actual exit. The EU-27 total (as published) is therefore used throughout this section as the appropriate figure for analysing the EU's furniture trade position with the rest of the world.

To compliment the analysis, stakeholder responses provided complementary evidence on the principal destinations for EU furniture exports. For an aggregate covering armchairs, sofas, sectionals, sofa-beds and poufs, one respondent identified the United Kingdom, the United States, Switzerland, Norway and China as the main extra-EU destinations in 2024. Together, these markets accounted for around two thirds of exports in the relevant categories, which were reported to be concentrated mainly in the mid- to high-end segment. A second, Eurostat-based survey submission for 2025 showed that the United Kingdom, the United States, Switzerland and Norway were among the five main destinations for each of the five leading export categories: upholstered seats with wooden frames, other wooden furniture, other metal furniture, wooden furniture for dining and living rooms, and fitted kitchen units. China was also an important destination for several categories, while Canada was relevant for other wooden furniture and the United Arab Emirates for other metal furniture. Overall, the responses confirm the importance of the United Kingdom, the United States, Switzerland, China and Norway as extra-EU markets for European furniture. (Consortium, 2026)

Imports from third countries to the EU

EU-27 imports from third countries show a markedly different composition to exports. According to Eurostat PRODCOM data (Eurostat, 2025a), metal furniture (other) (31091100) was the largest single import category in 2024, at EUR 3.54 billion, followed by parts of seats (31001400) at EUR 2.70 billion. Imports of other metal furniture increased substantially over the period, from EUR 1.35 billion in 2014 to a peak of EUR 4.20 billion in 2022, before falling in 2023 and partially recovering in 2024. By comparison, exports of other metal furniture amounted to EUR 1.73 billion in 2024, indicating that the EU was a substantial net importer of this product category.

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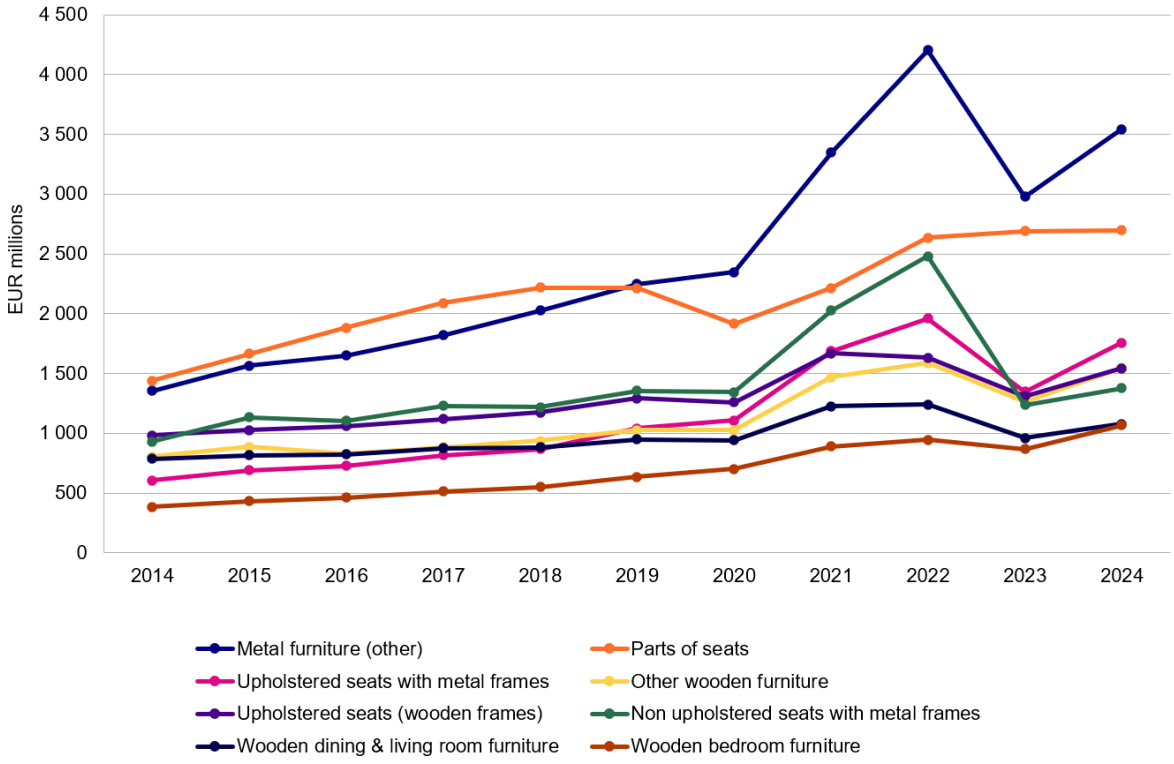

Figure 6-6: EU-27 imports from third countries by top-8 furniture product codes, 2014-2024 (EUR, EU-27 published values)

Source: (Eurostat, 2026f)

The next largest import categories in 2024 were upholstered seats with metal frames (EUR 1.76 billion), other wooden furniture (EUR 1.55 billion), upholstered seats with wooden frames (EUR 1.54 billion) and non-upholstered seats with metal frames (EUR 1.38 billion). Wooden dining and living room furniture and wooden bedroom furniture completed the top eight, at around EUR 1.08 billion and EUR 1.07 billion respectively. Kitchen furniture falls outside the top eight import categories for this indicator, with imports of around EUR 0.15 billion in 2024, despite being the third largest export category.

Total imports across the eight largest product codes amounted to approximately EUR 14.6 billion in 2024, while the remaining furniture related codes accounted for a further EUR 5.75 billion, bringing total extra EU furniture imports to around EUR 20.36 billion. The top eight categories therefore represented around 72 % of total extra EU furniture imports in 2024. As shown in (**Figure 6-7)** , the combined value of the top eight import categories exceeded that of the remaining furniture codes throughout the period. Nevertheless, the residual group remains substantial, indicating that a significant share of extra EU imports is distributed across a wider range of furniture products and components beyond the largest individual categories.

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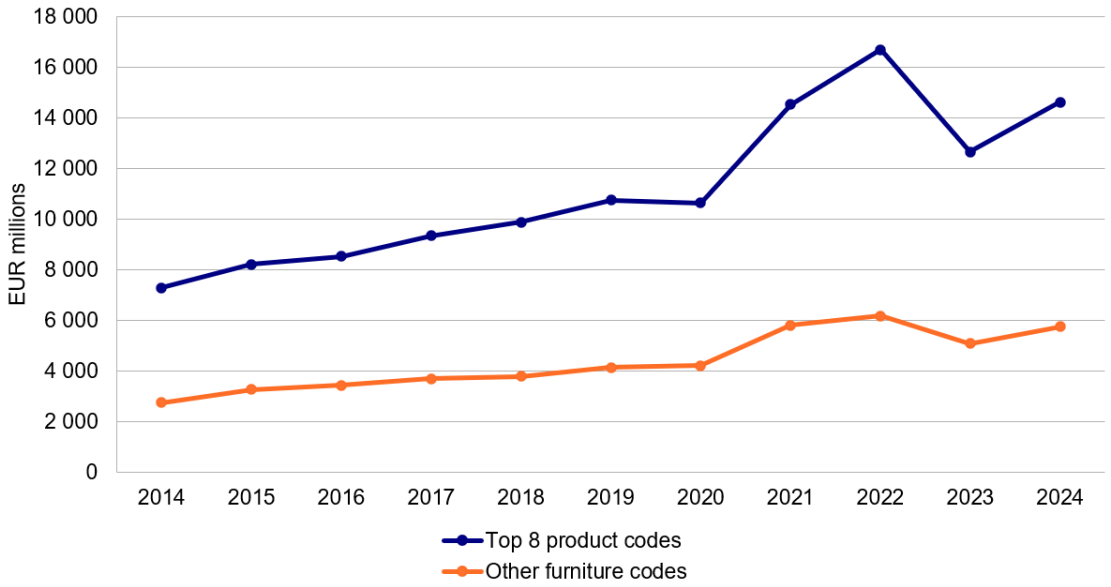

Figure 6-7: EU-27 imports from third countries by top-8 product code and remaining codes, 2014-2024 (EUR, EU-27 published values).

Source: (Eurostat, 2026f)

Stakeholder responses provided complementary evidence on the origin of extra-EU furniture imports. For an aggregate covering armchairs, sofas, sectionals, sofa-beds and poufs, one respondent estimated that China accounted for EUR 2.7 billion, or 72%, of import value in 2024, corresponding to approximately 20.0 million seats and an increase of around 70% since 2018. Türkiye, Vietnam, Ukraine and Bosnia and Herzegovina were the next-largest origins, but at substantially lower values. A second, Eurostat-based survey submission for 2025 also showed a high concentration of imports from China across several major categories, including 76% of other metal furniture, 86.7% of upholstered seats with metal frames, 58.4% of other wooden furniture, 60.7% of upholstered seats with wooden frames and 83.6% of non-upholstered seats with metal frames. Vietnam and Türkiye appeared repeatedly as secondary origins, alongside Ukraine, Indonesia, Serbia, Bosnia and Herzegovina and Taiwan for particular categories. Overall, the responses indicate that import concentration from China is particularly high for metal furniture and seating products. (Consortium, 2026).

Import activity is led by Germany, which imported furniture (all codes) worth EUR 14.6 billion in 2024, nearly twice the value of the second-largest importer, France (EUR 7.9 billion). The Netherlands (EUR 6.1 billion), Czechia (EUR 3.6 billion) and Spain (EUR 3.5 billion) complete the top five (**Table 6-8**). Germany's position as both the largest importer and a top-three exporter of furniture suggests a dual role as a major manufacturing base and the EU's largest furniture consumer market; it may also reflect Germany's function as a distribution hub for furniture entering or transiting the EU.

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Table 6-8: Top 5 importing countries (EU-27 imports from third countries, all furniture codes, 2024).

Rank	Member State	2024 total value (EUR millions)
1	Germany	14 556
2	France	7 867
3	Netherlands	6 072
4	Czechia	3 612
5	Spain	3 514

Source: (Eurostat, 2026f)

The relative importance of extra-EU imports also varies substantially by product category. As shown in Section 6.2.4, imports accounted for 58.2 % of apparent consumption for parts of seats and 51.6 % for other metal furniture in 2024, indicating particularly high exposure to international supply. Import shares were also relatively high for other wooden furniture (28.9 %) and upholstered seats with wooden frames (27.6 %), but much lower for wooden furniture parts (4.9 %) and kitchen furniture (1.2 %). This suggests that international supply chains are particularly relevant for seat components, metal furniture and some seating and wooden furniture categories, while kitchen furniture and wooden furniture parts are supplied predominantly from within the EU.

Intra-EU trade

Intra-EU exports

According to Eurostat-Comext data (DS-059341, partner = Intra-EU27), EU-27 Member States exported furniture of the eight largest product codes to other EU Member States in a value of EUR 36.97 billion in 2024, alongside a further EUR 9.42 billion in the remaining 18 furniture-related codes, bringing total intra-EU furniture exports to EUR 46.39 billion. Parts of seats, not of wood (940199) were the largest single category at EUR 8.57 billion, closely followed by other wooden furniture (940360) at EUR 8.19 billion and upholstered seats with wooden frames (940161) at EUR 4.79 billion. (Eurostat, 2026b).

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3305 **Table 6-9: Intra-EU exports among EU-27 Member States, by furniture product, 2024 (EUR millions).**

Member State	Parts of seats (not of wood)	Other wooden furniture	Upholstered seats (wooden frames)	Metal furniture (other)	Wooden kitchen furniture	Parts of furniture (of wood)	Wooden bedroom furniture	Parts of furniture (not of wood)	Other furniture codes (18 codes)
AT	81	138	41	131	47	76	59	117	178
BE	50	272	134	266	18	72	72	82	548
BG	83	73	28	39	2	5	26	12	103
CY	0	2	0	0	0	0	0	0	0
CZ	2 590	266	13	366	17	51	95	131	336
DE	1 017	775	193	1 150	1 709	701	346	592	1 261
DK	10	209	152	145	68	47	112	131	404
EE	3	34	52	10	8	39	43	5	36
ES	94	427	117	253	132	39	60	93	472
FI	4	10	6	25	0	9	0	14	84
FR	292	275	57	242	48	58	57	75	359
GR	0	27	9	24	2	5	5	4	72
HR	71	47	32	24	1	8	13	7	25
HU	325	57	142	74	4	54	41	51	102
IE	0	2	0	4	0	5	0	1	9
IT	381	880	713	358	400	624	229	386	1 199
LT	17	505	268	52	9	202	176	103	196
LU	0	1	0	0	1	0	0	0	11

Member State	Parts of seats (not of wood)	Other wooden furniture	Upholstered seats (wooden frames)	Metal furniture (other)	Wooden kitchen furniture	Parts of furniture (of wood)	Wooden bedroom furniture	Parts of furniture (not of wood)	Other furniture codes (18 codes)
LV	1	91	10	9	6	11	4	12	53
MT	0	0	0	0	0	0	0	0	0
NL	52	581	166	680	42	46	153	182	1 098
PL	1 886	2 418	2 064	542	133	337	851	338	1 907
PT	483	330	102	30	87	45	65	32	235
RO	658	376	316	29	16	60	79	28	275
SE	27	170	52	118	14	123	78	84	308
SL	131	83	16	51	5	39	31	38	75
SK	318	137	105	103	15	45	71	28	75
EU-27	**8 573**	**8 187**	**4 789**	**4 727**	**2 784**	**2 703**	**2 667**	**2 544**	**9 421**

Source: (Eurostat, 2026b).

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Poland was the largest intra-EU exporter of furniture in 2024 (EUR 10.48 billion across all product codes), followed by Germany (EUR 7.74 billion) and Italy (EUR 5.17 billion). The leading exporter varies by product: Poland leads in other wooden furniture, upholstered seats and wooden bedroom furniture, while Germany leads in metal furniture, wooden kitchen furniture and both parts-of-furniture categories. Czechia, while only the fourth-largest exporter overall, is the leading exporter of parts of seats specifically (EUR 2.59 billion), ahead of Poland and Germany indicating a degree of specialisation in seat-component manufacturing not reflected in its overall ranking.

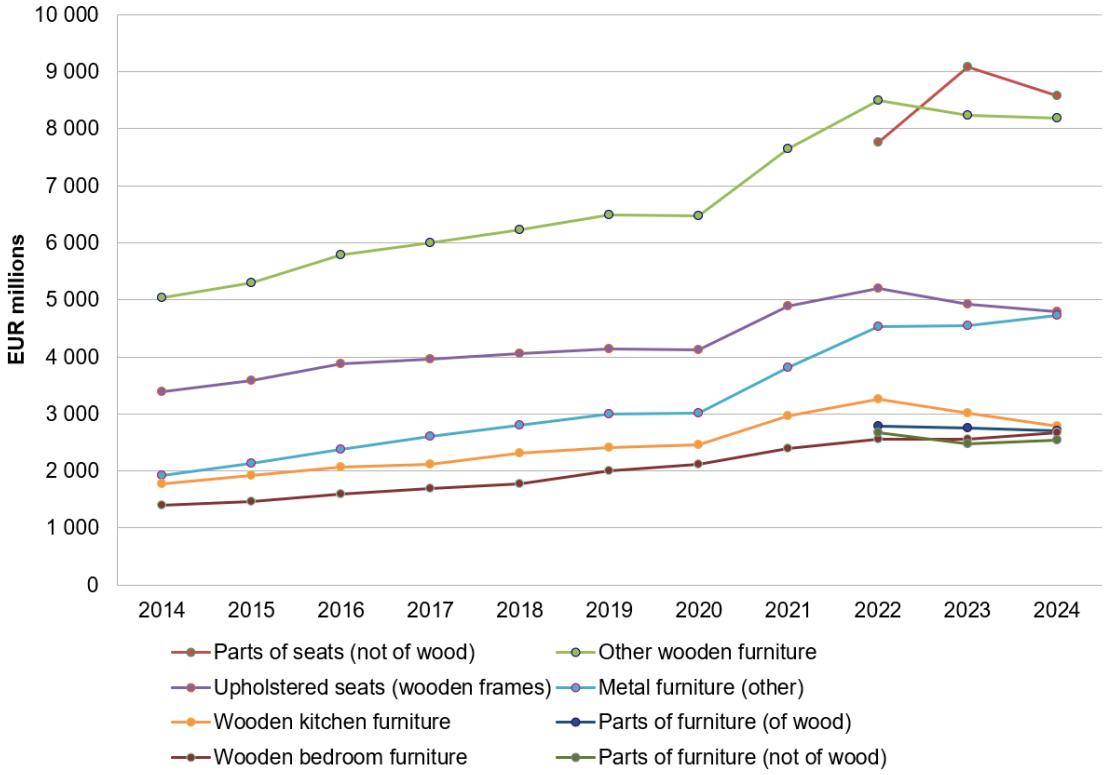

Figure 6-8: EU-27 intra-EU exports by furniture product, 2014-2024 (EUR).

Source: (Eurostat, 2026b)

Important to note that three product codes parts of seats, not of wood (940199), parts of furniture of wood (940391) and parts of furniture not of wood (940399) show no recorded trade before 2022. This reflects a Harmonised System (HS) nomenclature revision effective from 2022, under which these wood/non-wood distinctions were introduced for the first time; trade in these product types prior to 2022 was recorded under different, less granular code numbers outside the scope of this analysis. The trend chart above accordingly shows these three series starting only from 2022.

Additionally, stakeholder consultation provided further product-level evidence of specialisation within the intra-EU market. The largest country-product source flows reported were Polish exports of upholstered seats with wooden frames (EUR 1.94 billion), other wooden furniture (EUR 1.34 billion) and wooden bedroom furniture (EUR 0.89 billion), together with German exports of fitted kitchen units (EUR 1.34 billion) and other metal furniture (EUR 0.91 billion). These findings are consistent with the broader Eurostat results, particularly Poland's strong position in wooden and upholstered furniture and Germany's importance in kitchen and metal furniture (Consortium, 2026).

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Intra-EU imports

EU-27 Member States imported furniture of the same eight product codes from other EU Member States in a value of EUR 30.46 billion in 2024, alongside EUR 9.42 billion in the remaining 18 codes, for a total of EUR 39.88 billion. As with exports, parts of seats, not of wood was the largest category (EUR 9.24 billion), followed by other wooden furniture (EUR 6.65 billion) and upholstered seats with wooden frames (EUR 4.09 billion).

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Table 6-10: Intra-EU imports among EU-27 Member States, by furniture product, 2024 (EUR millions).

Member State	Parts of seats (not of wood)	Other wooden furniture	Upholstered seats (wooden frames)	Metal furniture (other)	Wooden kitchen furniture	Parts of furniture (of wood)	Wooden bedroom furniture	Parts of furniture (not of wood)	Other furniture codes (18 codes)
AT	100	385	207	239	199	94	167	122	445
BE	195	314	203	166	162	96	97	79	355
BG	8	60	13	28	5	4	17	12	36
CY	1	33	7	9	8	2	9	3	29
CZ	1 790	331	101	127	78	43	82	81	242
DE	3 166	1 616	1 322	742	121	671	636	452	1 599
DK	23	204	243	120	60	98	52	105	327
EE	2	34	10	15	7	10	7	10	37
ES	351	456	90	164	104	115	93	87	343
FI	17	95	65	55	35	27	19	41	138
FR	511	868	767	438	596	321	268	272	1 109
GR	5	74	22	37	21	7	19	18	95
HR	8	77	36	53	42	13	26	28	100
HU	381	106	27	65	12	25	27	43	129
IE	4	66	21	27	16	18	12	13	66
IT	118	335	101	218	50	143	69	113	344
LT	14	45	18	29	5	29	11	26	64
LU	1	42	19	16	45	5	17	7	70

Member State	Parts of seats (not of wood)	Other wooden furniture	Upholstered seats (wooden frames)	Metal furniture (other)	Wooden kitchen furniture	Parts of furniture (of wood)	Wooden bedroom furniture	Parts of furniture (not of wood)	Other furniture codes (18 codes)
LV	3	23	6	18	4	16	6	12	34
MT	1	12	8	6	16	1	13	2	13
NL	74	547	389	351	463	200	207	208	739
PL	904	198	42	239	32	107	64	141	296
PT	331	168	49	90	43	27	37	61	187
RO	162	160	36	87	29	36	46	36	153
SE	96	249	228	163	87	152	64	113	249
SL	19	45	18	33	58	15	18	19	64
SK	954	111	46	55	27	31	47	37	137
EU-27	**9 240**	**6 654**	**4 093**	**3 591**	**2 326**	**2 306**	**2 128**	**2 143**	**7 403**

3341 Source: (Eurostat, 2026b).

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Germany was by far the largest intra-EU importer of furniture in 2024 (EUR 10.32 billion), more than double the second-largest importer, France (EUR 5.15 billion). Germany leads intra-EU imports in every one of the eight featured product categories except wooden kitchen furniture, where France (EUR 596 million) narrowly leads the Netherlands (EUR 463 million). The Netherlands and Czechia round out the next two positions overall (EUR 3.18 billion and EUR 2.88 billion respectively).

A 2025 Eurostat-based stakeholder submission reinforced Germany's position as the principal intra-EU destination market. Germany accounted for four of the five largest country-product destination flows reported: upholstered seats with wooden frames (EUR 1.63 billion), other wooden furniture (EUR 1.27 billion), other metal furniture (EUR 1.06 billion) and wooden furniture for dining and living rooms (EUR 0.95 billion). France accounted for the fifth-largest flow, comprising EUR 0.86 billion of upholstered seats with wooden frames (Consortium, 2026).

A second stakeholder provided a complementary national-market perspective, identifying Italy (EUR 946 million), Germany (EUR 693 million), Poland (EUR 515 million), Spain (EUR 341 million) and Portugal (EUR 266 million) as the main intra-EU sources of finished furniture supplied to France in 2024. These countries accounted for 15%, 11%, 8%, 5% and 4% respectively of the measure reported by the respondent (Consortium, 2026).

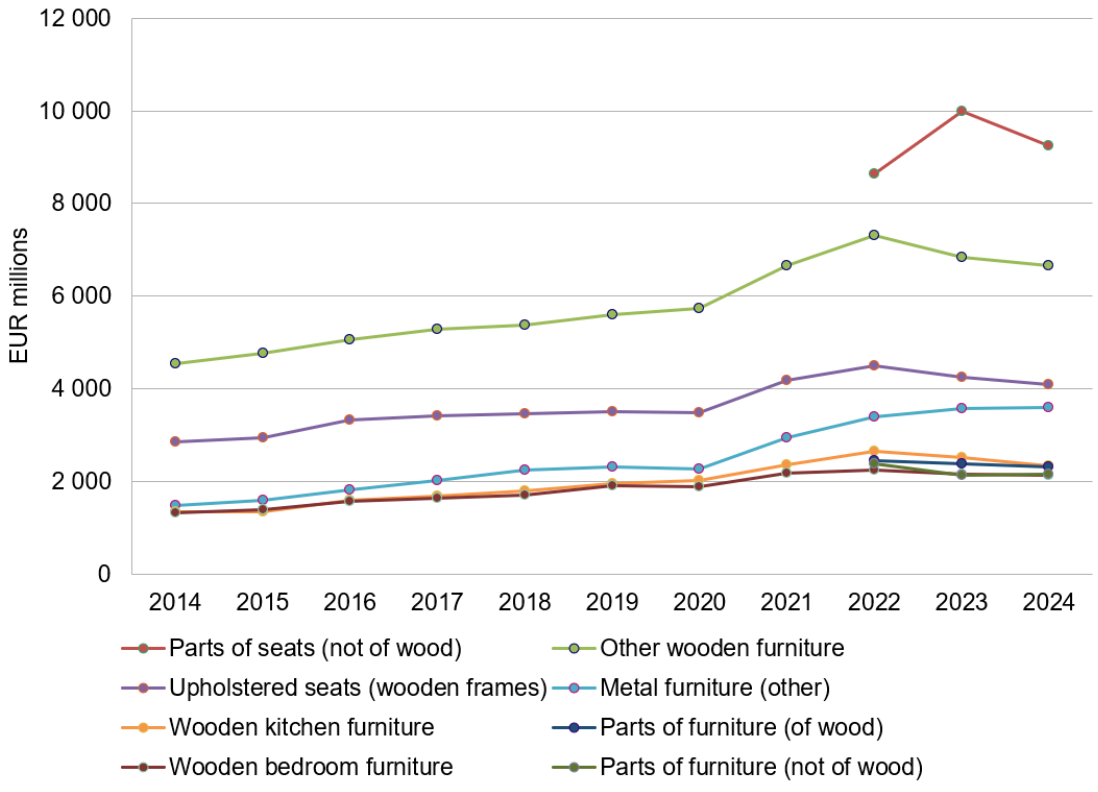

Figure 6-9: EU-27 intra-EU imports by furniture product, 2014-2024 (EUR, millions)

Source: (Eurostat, 2026b)

Total intra-EU exports (EUR 46.39 billion) are about 16% higher than total intra-EU imports (EUR 39.88 billion), even though one country's export should, in theory, match another's import of the same goods. Eurostat itself flags this as a known issue with intra-EU trade data, caused by factors like different valuation methods, reporting thresholds for smaller traders, and estimates for missing data. These figures should be read as Eurostat's best estimates of each flow, not as perfectly matched statistics.

Questions for stakeholders

Q2-6: Do the main trade patterns presented above, including the leading product categories, importing/exporting Member States and extra-EU trading partners, reflect your understanding of the EU furniture market?

Q2-7: Do you have data or insights that could help explain or validate the discrepancies between EU-27 and Member State trade figures, and between reported intra-EU exports and imports?

Q2-8: Does the product coverage used here adequately capture furniture trade relevant to the ESPR, particularly given the importance of furniture parts, components and other product codes outside the eight main categories?

6.2.4. Apparent consumption

Apparent consumption is estimated using Eurostat's International trade of EU and non-EU countries dataset (ds-059358) by adding international imports to sold production and subtracting exports: Apparent consumption = sold production − exports + imports (Eurostat, 2026f).

This provides an estimate of the value of furniture consumed within the EU-27 for each product category. As sold production includes products that are subsequently exported, exports must be deducted. At EU-27 level, import and export data cover only trade with non-EU countries, while trade between Member States is treated as internal EU trade.

Apparent consumption can only be calculated in value terms (EUR). For most of the furniture product codes considered, as Eurostat does not report import and export quantities in comparable units, as customs data generally record furniture trade by weight and value rather than by number of items. Apparent consumption in physical units can therefore **not** be estimated. As Eurostat also does not provide an aggregate total across all furniture product codes, the analysis focuses on the eight largest product categories by EU-27 sold production value in 2024.

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Table 6-11: EU-27 apparent consumption of furniture by product, 2014–2024 (EUR, millions).

Year	Kitchen furniture	Metal furniture (other)	Wooden dining & living room furniture	Upholstered seats (wooden frames)	Parts of furniture (wood n.e.s.)	Wooden bedroom furniture	Other wooden furniture	Parts of seats
2014	8 534	4 049	5 123	4 471	4 214	4 565	3 806	3 531
2015	8 877	4 396	5 196	5 912	4 237	4 908	4 068	3 404
2016	9 137	4 206	5 921	5 252	4 279	4 994	4 176	3 765
2017	9 385	4 995	6 058	5 734	4 747	5 219	3 971	4 049
2018	9 495	5 027	6 009	6 773	4 591	5 277	4 645	4 027
2019	9 830	5 165	6 015	6 034	4 942	5 131	5 119	3 866
2020	10 027	5 058	5 892	5 304	4 644	5 165	4 209	3 495
2021	11 727	6 469	6 655	6 281	4 824	5 113	5 415	3 954
2022	12 995	7 448	7 272	6 552	5 798	6 042	6 709	4 405
2023	12 365	6 650	8 336	5 716	5 013	5 857	5 621	4 317
2024	12 803	6 872	6 761	5 586	5 543	5 360	5 349	4 630

Source: (Eurostat, 2026f).

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Import dependence differs markedly across furniture product categories. In 2024, extra-EU imports accounted for more than half of apparent consumption of parts of seats (58.2%) and metal furniture (51.6%). Import shares were considerably lower for the other categories, ranging from 16.0% for wooden dining and living-room furniture to 28.9% for other wooden furniture. Kitchen furniture and wooden furniture parts had particularly low import shares, at 1.2% and 4.9%, respectively, indicating that EU demand for these products is met predominantly by EU production.

Import shares increased in almost all categories between 2014 and 2024. The largest increases were recorded for metal furniture and parts of seats, both rising by around 18 percentage points. The import share for wooden bedroom furniture also more than doubled, from 8.4% to 19.9%. Overall, the results indicate growing reliance on extra-EU suppliers for more standardised furniture products and components, while bulkier or more customised products, such as kitchen furniture, remain largely supplied from within the EU.

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Table 6-12: Share of imports in EU-27 apparent consumption of furniture, by product, 2014-2024 (%).

Year	Kitchen furniture	Metal furniture (other)	Wooden dining & living room furniture	Upholstered seats (wooden frames)	Parts of furniture (wood n.e.s.)	Wooden bedroom furniture	Other wooden furniture	Parts of seats
2014	0.7%	33.4%	15.4%	22.0%	2.5%	8.4%	21.1%	40.8%
2015	0.7%	35.6%	15.7%	17.3%	2.9%	8.8%	21.8%	48.9%
2016	0.7%	39.2%	13.9%	20.2%	3.2%	9.2%	19.8%	50.0%
2017	0.7%	36.4%	14.4%	19.5%	3.2%	9.8%	22.2%	51.6%
2018	0.9%	40.3%	14.7%	17.3%	3.5%	10.4%	20.2%	55.1%
2019	1.0%	43.5%	15.8%	21.4%	3.7%	12.4%	20.0%	57.2%
2020	1.1%	46.4%	16.0%	23.7%	4.2%	13.6%	24.4%	54.8%
2021	1.2%	51.7%	18.4%	26.6%	5.1%	17.4%	27.1%	56.0%
2022	1.2%	56.5%	17.1%	24.9%	5.4%	15.6%	23.7%	59.9%
2023	1.2%	44.8%	11.5%	22.9%	5.4%	14.8%	22.5%	62.4%
2024	1.2%	51.6%	16.0%	27.6%	4.9%	19.9%	28.9%	58.2%

Source: (Eurostat, 2026f)

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Questions for stakeholders

Q2-9: Do the apparent consumption estimates and import shares presented above broadly reflect the EU furniture market?

Q2-10: Are additional data available to validate these estimates or enable apparent consumption to be assessed in physical units?

6.2.5. Secondary market

The secondary market for furniture involves the re-sale of pre-owned furniture both in informal and official setting, for example through (multi-)national or local online platforms or through physical stores and peer-to-peer exchanges. The furniture can be resold as such or after undergoing repair and refurbishment operations. Thus, the second-hand furniture market includes the refurbishment, resale and redistribution of domestic and non-domestic furniture with the purpose of being reused by a new owner. Social enterprises are crucial actors in this ecosystem, creating employment opportunities and offering up- and re-skilling for vulnerable individuals.

This section provides information about the ecosystem connected with the secondary market in the EU, in terms of existing Producer Responsibility Organisations (PROs) and Extended Producer Responsibility (EPR) schemes, the rates of furniture reuse, the available infrastructure for repair, the channels to secondary market and statistics on furniture sales in the secondary market.

PROs and EPR schemes in the EU

Unlike the traditional EPR schemes, e.g. for packaging, which are focused on waste collection and recycling, the few existing EPR schemes for furniture have a more extended focus and also look at funding activities upstream of recycling, including sorting of furniture for repair and refurbishment, in preparation for resale on the secondary market, for reuse. Therefore, the PROs that implement the EPR scheme become important actors for the secondary market, not only because they fund the pre-secondary market activities but also because they participate actively in the secondary market by partnering with reuse operators, charities, social enterprises and second-hand retailers.

As stated in section 5.3.3, at the time of writing EPR national schemes for furniture are operational in only France and Hungary, with Belgium having an EPR scheme for mattresses. Portugal, Spain, Italy and the Netherlands have schemes under development.

As in other product groups, France is the pioneer, having an EPR scheme for furniture in place since 2012, enacted through Article R. 54 1-10-6 of the French Environmental Code. The scheme is currently fully established and comprehensive, covering both domestic and non-domestic/commercial furniture. There are currently three PROs that implement the EPR scheme in France: Ecomaison (formerly known as Eco-mobilier, Valdelia, and Valobat (RREUSE, 2025). Ecomaison is the leader, covering more than

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90% of the discarded furniture in France, 97% of which is recovered through reuse, recycling or energy recovery (Ecomaison, 2026a).

Since 2023, Hungary also has an operational EPR scheme that includes wooden furniture. However, the scheme is not dedicated to furniture and, instead, includes other products such as packaging, plastics, electrical and electronic equipment, batteries and accumulators, motor vehicles, tyres, paper (office and advertising), cooking oil and fat, and textile products (Schönherr, 2025). The system is managed by the state-coordinated management system through the waste management company of MOL Group,[13] one of Hungary's leading oil and gas companies. As no dedicated furniture PRO exists, the producers comply via the national waste authority.

While the development of EPR schemes and the establishment of national laws is still slow, the industry calls for an EU-level harmonised EPR scheme for furniture. This approach could provide a comprehensive framework, combining multiple instruments to support the scalability of solutions aimed at closing material loops and facilitating a genuine transition towards a more circular economy within the sector (EFIC, 2025).

Repairability ecosystem in the EU

While ten years ago the reuse of furniture was relatively small-scale and pursued primarily for social purposes rather than for broader environmental and economic goals (European Environment Bureau, 2017), developments such as the adoption of the EU Circular Economy Waste Package through Directive (EU) 2018/849–852, amending waste legislation, the implementation of the EU Circular Economy Action Plan since 2020, the EU Right to Repair Directive (EU) 2024/1799, and other relevant policies at the EU and national levels have progressively repositioned furniture reuse as an activity that also serves environmental and economic goals. However, it remains marginal as shown by a recent report published by RREUSE (RREUSE, 2026).

Reuse practices trigger the development of a repair ecosystem that valorises the used/pre-owned furniture. Four main groups can be distinguished as suppliers of repair services in this ecosystem (European Environment Agency, 2022):

- professional repairers working on warranty repairs for original equipment manufacturers
- independent repairers, including repair corners in shops
- voluntary repairers (repair cafés)
- consumers carrying out repairs themselves (do-it-yourself regime)

The first two groups perform repair services commercially. According to Eurostat data (Eurostat, 2024), in 2020, the most recent year with data available, there were over 17 500 enterprises engaged in repair of furniture and home furnishings in the EU. In the same year, these enterprises employed 11 500 employees, i.e. persons with a work contract. However, the number of people actually active in the EU furniture repair enterprises in 2020 was over 27 000 persons and this includes enterprise owners / self-

[13] The implementation entity is MOHU MOL Hulladékgazdálkodási Zrt. (MOHU), the concession company created by MOL Group.

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employed and unpaid family workers etc. The fact that the number of employees with contract is lower than the number of furniture repair enterprises, which in turn is lower than the total number of persons employed, indicates that the sector is dominated by very small businesses and self-employed repairers, with many enterprises operating without any employees and relying primarily on owner-operators or family labour. This employment structure suggests that furniture repair remains a highly fragmented activity characterised by sole proprietorships and micro-enterprises, where unpaid labour accounts for a substantial share of the workforce relative to salaried employees. **Figure 6-10** shows time series, back to the year 2011 of the number of enterprises (bars, left axes), number of persons employed with a contract and number of persons employed, including those that do not have a work contract (lines, right axis).

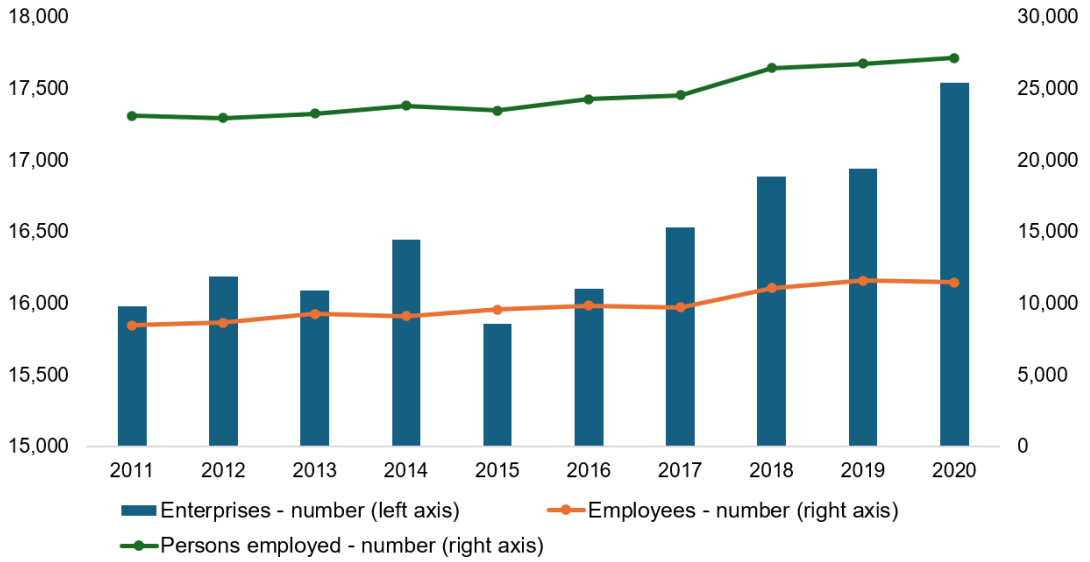

Figure 6-10: Enterprise and employment in the furniture repair sector.

As the figure shows, the number of enterprises active in the furniture repair sector has been steadily increasing since 2015. Similarly, the number of people employed or active in the sectors has increased during this period. Over the period from 2011 to 2020, the number of employees has increased by 35% while the number of persons employed has increased by 18%.[14] During the same period, the number of enterprises increased only by 10%. The stronger growth in employees relative to both enterprises and total persons employed suggests that existing businesses increasingly rely on hired workers rather than solely on self-employed owners, indicating a gradual professionalisation and strengthening of the sector's economic activity.

In the group of independent repairs, a significant category is represented by social enterprises. Indeed, RREUSE, which is the largest network of social enterprises active in the circular economy in Europe, has counted 1 404 sites of social enterprises[15] that repair furniture and prepare it for reuse - its second life (RREUSE, 2026). Out of these,

[14] "Persons employed" includes both employees and self-employed persons (including owner-managers and contributing family workers), whereas "employees" refers only to persons working under an employment contract.

[15] One enterprise may operate across multiples sites.

1 163 enterprises are active in EU countries, most of them in France (330 social enterprises) and Belgium (205 social enterprises). In 2024, the social enterprises in the RREUSE network separately collected 166 000 tonnes of furniture, of which 84 000 tonnes were reused locally. RREUSE maintains a map of the network of repair social enterprises.[16] Ecomaison also acknowledges that repair and refurbishing of furniture has been historically mostly performed by social enterprises but since the adoption of the Anti-Waste and Circular Economy (AGEC) law in 2020, some dedicated factories have been created. In addition, the organisation reports 71 certified refurbishment shops in France (Consortium, 2026).

The Duch programme Circular Craft Centre[17] stimulates furniture repair and refurbishment. Circular Craft Centres are collaborations of recycle points, thrift stores, repair facilities, education and the social domain. Repair is an important part of these collaborations. Currently, over 80 such centres exist across the Netherlands. Coordinate by Rijkswaterstaat on behalf of the Ministry of Economic Affairs and Climate, the programme also provided subsidy for circular craft centres from 2019-2024, but it has been discontinued.

In the group of voluntary repairs, repair cafés are prominent. A repair café is a community-based meeting place where people bring broken items, such as furniture, electrical appliances, textiles, bicycles, toys and household goods to be repaired with the help of volunteer repairers, with the aim of extending product lifetimes, reducing waste, sharing repair skills and strengthening local communities. Repair cafés have become an established component of the European repair ecosystem. Their organisation into national networks and international federations and coalition demonstrates their growing importance, enabling local initiatives to share expertise, coordinate activities, collect repair data and collectively advance circular economy objectives while extending product lifetimes and preventing waste. For instance, Repair Café International, is the main European repair cafés organisation in Europe. Founded in 2010 in the Netherlands, it coordinates the repair café movement globally. According to the latest annual report of the organisation Repair Café International (Repair Café International, 2026), in 2025 there were 400 000 repairs worldwide, including non-electric products, such as furniture. The same organisation reports that 75% of the furniture items the repairers in the cafés of the network have worked on could be successfully repaired (Repair Café International, 2021). These included mainly chairs, tables and benches.

Other repair café organisation, operating at global (including EU repair cafés), EU or national level include the Repair Initiative (Reparatur-Initiativen) Network in Germany, which reports over 18 000 repair initiatives participating in the network as of 2024 (anstiftung, n.d.), Open Repair Alliance and Right to Repair Europe. Furniture repair and refurbishment services are also available in Austria, although the market remains relatively small and fragmented. Activities are primarily carried out by local carpenters, small workshops and social enterprises operating reuse centres, with service availability generally higher in urban areas than in rural regions. Most providers focus

[16] https://www.rreuse.org/our-network/network-map?productstream=672387068bf74762d3a65cd5

[17] See details at the following links: https://circulairambachtscentrum.nl/ and https://epale.ec.europa.eu/en/blog/circular-craft-centre-theres-no-such-thing-waste

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on bespoke repair work rather than large-scale or standardised refurbishment activities. To support repair and extend product lifetimes, Austria also provides consumers and businesses with dedicated online platforms that help identify repair opportunities and service providers, including for furniture. These include "Reparatur-Netzwerk" for Vienna[18] and the "Reparaturführer" for the rest of Austria.[19] Repair and refurbishing shops are also occasionally or moderately available in countries such as Italy, France, the Netherlands and Belgium (Consortium, 2026). In general, the stakeholders consulted via the survey (Consortium, 2026) have reported that while some repair services are available, they vary considerably within and across MSs and remain limited in comparison to the overall furniture market.

Incentive for repair

Moreover, national financial incentives dedicated to developing a repairability and refurbishment ecosystem are seldom. If they exist, they are rather under the form of regional or local initiative supported by municipalities, social economy organisations and circular economy programmes.[20] One notable exception is France through the EPR system that dedicates part of the funds collected to partially reimburse the consumers who want to repair their furniture, as well as to fostering the social economy dedicated to furniture repair activities. In addition, France has a system of bonus for repair and reuse financed by the EPR scheme Ecomaison (Ecomaison, 2026b). Furthermore, as part of its Circular Economy Strategy 2026-2028, Ireland is also reported to be piloting a national repair voucher scheme to reduce the cost or repair and increase the perceived value of used products.[21] However, while the scope of the scheme is still to be defined, it is worth noting that furniture products are among the priority product groups for the future Digital Product Passport initiative under the country's Circular Economy Strategy.

In the Netherland there are also some general subsidies that support the circular economy, including projects that focus on furniture repair. Examples are the subsidy Circular Chain Projects and the Subsidy Circular Implementation and Scaling up. However, these subsidies are currently not open for applications (Consortium, 2026).

Reuse, resale, remanufacture

Directive 2008/98/EC requires Member States to take measures to encourage reuse as part of their waste prevention programmes, and to monitor and assess the implementation of these measures on reuse. At the same time, the Member States have the obligation to report data on reuse to the European Environment Agency every year in a format laid out in the Annex to the implementing decision (EU) 2021/19 (European Environment Agency, 2024). According to (EU) 2021/19, Member States

[18] https://www.reparaturnetzwerk.at

[19] https://www.reparaturfuehrer.at/ooe/kategorien

[20] One such examples is the city of Vienna (https://www.wien.gv.at/umwelt/wiener-reparaturbon) that provides subsidy for repair for several products including furniture.

[21] See details here: https://www.rte.ie/news/environment/2026/0224/1560230-circular-economy-strategy/

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shall report the qualitative data (Annex A) every following year, and quantitative data (Annex B) at least every three years. The reporting has started in 2023 for the first reference year which was set to 2021.

An analysis conducted by the European Environment Agency (European Environment Agency, 2025) reveals that there is a wide variation in the furniture reuse data reported by the MSs, which is attributed to significant differences in reuse habits and in the methodologies for data collection across the Member States. The EU average reuse of furniture is calculated at 6 kg/capita.

Figure 6-11 below shows the reuse of furniture in 2021 as reported in 2023 by the Member States. The data is reported in quantity (tonnes) of furniture. As the figure shows, Germany is a clear leader, with over 900 000 tonnes of reused furniture in 2021. The Netherlands follows second, with about one third of the amount of furniture reused in Germany. Italy and Belgium also have significant amounts of reused furniture, but they are still modest in relation those seen in the Netherlands and, especially, in Germany. Surprisingly, France, the only EU country with a mature EPR scheme for furniture reported only 35 000 tonnes of reused furniture in 2021, occupying the 9th place among the 25 reporting countries.[22]

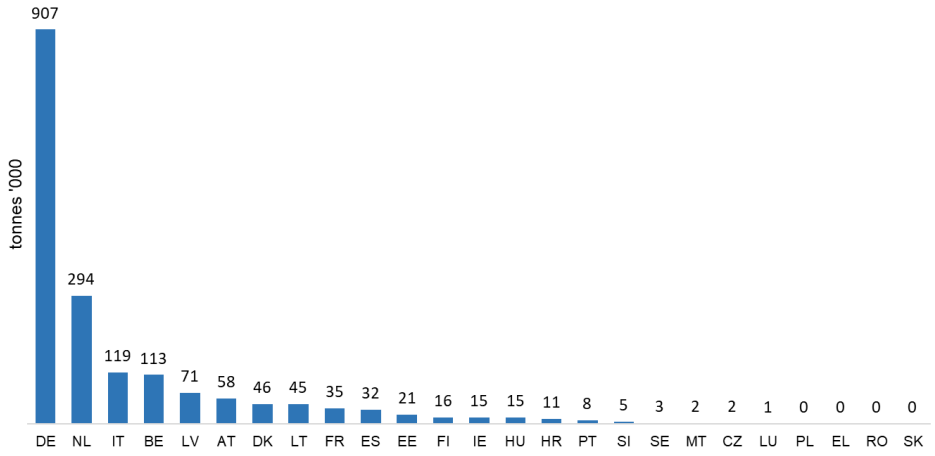

Figure 6-11: Furniture reuse across the EU MSs (tonnes, reference year 2021)

Source: own representation based on the data reported in accordance with implementing decision (EU) 2021/19 (European Environment Agency, 2024).

The above data need to be treated with caution as this is the first reporting and may be incomplete. In fact, capturing official statistics on reuse is inherently difficult because it largely occurs outside the formal waste management system on which statistical reporting is based. Eurostat and similar datasets primarily track materials once they enter regulated waste streams, yet many furniture items are reused through informal or semi-formal channels such as donations, second-hand markets, or peer-to-peer exchanges, meaning they never become “waste” in the first place and are therefore not recorded. In addition, capturing reuse would require dedicated tracking systems, coordination between actors (e.g. municipalities, social enterprises, private platforms), and specific reporting obligations, which are currently underdeveloped compared to the

[22] Bulgaria and Cyprus have not reported reuse data for 2021.

well-established systems for recycling. As a result, despite its importance in the waste hierarchy, reuse remains statistically underreported, inconsistent, and often invisible in official datasets. This is also reflected in the high variability and gaps observed in the first EU-level reuse reporting exercise presented in **Figure 6-11** above. Another caveat of the data presented in **Figure 6-11** is that they represent absolute levels and are not scaled at the size of the market in each country.

Data on secondary market sales is not available, as they are not systematically collected and are often confidential business information for the existing marketplaces. However, through our stakeholders' consultation activity (Consortium, 2026), the Dutch Ministry of Economic Affairs and Climate has provided secondary-market furniture sales for the Netherlands, by market channel. These are presented in **Table 6-13.**

Table 6-13: Secondary-market sales of furniture in the Netherlands (2024, in tonnes)

Sales in physical shops/markets	Sales in online platforms	Other channels	Total	Specify the unit
75 617	130 433	87 521	293 571	ton

Source: (Consortium, 2026)

France has set a yearly binding target for reuse of furniture to 120 000 tonnes by 2030. **Figure 6-12** below shows this target will be reached with an annual increase of 10 000 tonnes, starting from around 60 000 tonnes in 2023.

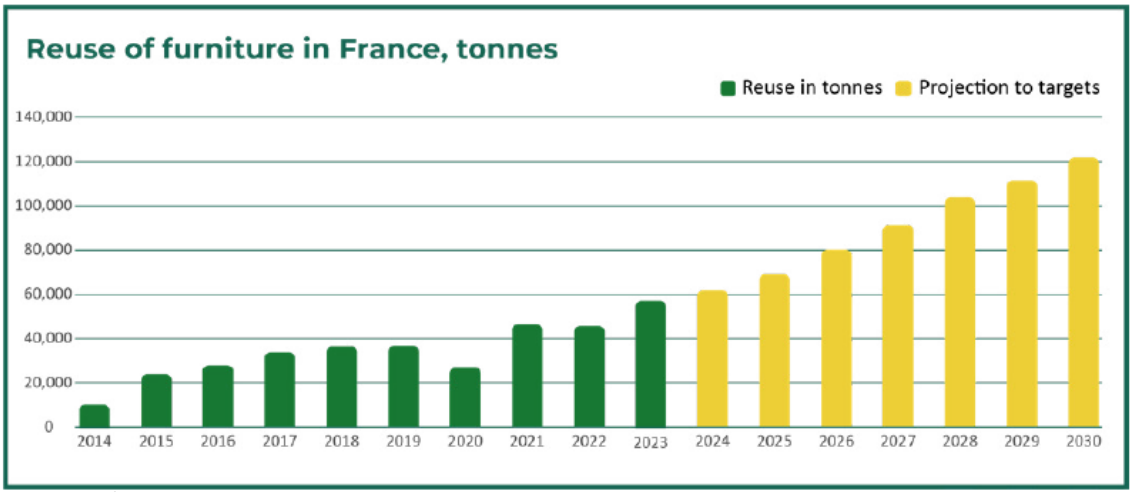

Figure 6-12: Reuse of furniture in France

Source: (RREUSE, 2025)

The French government has set performance targets for collection and recovery for Ecomaison, in accordance with the market share of the organization and with the annual volumes placed on the market by producers. These are:

- Collection rate: 45% in 2024, 48% in 2026 and 51% in 2028
- Recycling rate: 90% in 2024, 92% in 2026 and 94% in 2028

The targets for 2024 have been fulfilled already in 2023, as Ecomaison has collected 1.5 million tonnes of furniture waste (almost 90% waste-stream coverage) in that year, representing 55% of the collection rate. Of this, 97% was recovered through reuse, recycling and energy recovery (Ecomaison, 2026a). However, while this is above the target of 90%, it is unclear how much of this share it represented by energy recovery.

The stakeholders consulted for this study (Consortium, 2026) reported that refurbishing is taking place mostly in B2B arrangements, i.e. in contract and professional furniture. Thus, it is focused on the office furniture sector for businesses and public organisations, where refurbishment, component replacement and resale are already established.

Regarding furniture remanufacturing, there is currently no evidence of such activity. Business models are also missing. The main reason for this, as cited by the stakeholders, is that remanufacturing can only take place in the original producer facility or an authorised one. An independent remanufacturer would need to comply with safety and intellectual property requirements.

Secondary market channels

A report by Market Data Forecast (Market Data Forecast, 2026) estimates the size of the European[23] second-hand market for furniture at USD 45.69 billion (approximately EUR 39 billion) in 2024, with the prospect of reaching USD 72 (approximately EUR 62 billion) billion by 2033. In terms of product categories, sofas and couches lead the resale market in 2024, accounting for approximately 38% of the market. The same study reports that the online platforms were the main distribution channel, accounting for almost 54% of the market share in 2024. Moreover, the following notable players of secondary market for furniture are identified in the report: IKEA, eBay, Wayfair, Vinted, Craigslist, Kaiyo, AptDeco, Vestiaire, Selency and Whoppah.

The stakeholders consulted for this study (Consortium, 2026) also confirmed that the most common retail channels for reused furniture are online marketplaces (e.g. Wallapop, Facebook Marketplace, Widado, Label Emmaus). Other channels include physical flea markets, charity organisations, municipal reuse centres, second-hand furniture shops and professional office furniture refurbishment companies, but also companies offering circular business models (e.g. rental services), albeit less commonly than in third countries such as India and the US. Overall, digital platforms, including social media, remain the most common channels for secondary market of furniture. The market is not yet professionalised and difficulties to increase the number of professional repairers persist. The stakeholder notes that the most common difficulty relates to the cost of transport to the repair shops.

A Dutch study (van Brecht & van den Berg, 2025) conducted with a representative group of consumers shows that 63% of them prefer to use charity (thrift) shops to buy second-hand products. Online marketplaces, such as the Dutch www.marktplaats.nl, are also preferred by the majority of consumers (60% of the respondents). Markets or

[23] The report covers both non-EU countries (UK, Russia, Switzerland and Türkiye and EU countries (France, Spain, Germany, Italy, Sweden, Denmark, the Netherlands and Czechia)

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fairs and for-profit second-hand shops are used by 26% and 20% of the respondents, respectively. Furniture is among the product categories most commonly bought in second-hand market channels About 70% of all respondents declared to have bought at least rarely second-hand furniture in the past 12 months before the survey. This happened mostly through charity stores (31%) and the digital marketplace www.marktplaats.nl (26%). Importantly, 42% of the respondents said they would buy second-hand furniture more often in the future.

Questions for stakeholders

Q2-11: To what extent do the findings regarding repair, refurbishment, remanufacturing, take-back schemes, reuse and second-hand markets reflect current practice in your Member State? Are there additional data sources available?

6.2.6. Structure of the market/sector

Key indicators of the sector

The EU is home to about 125 000 companies active in the furniture manufacturing sector. **Table 6-14** below shows the number of these companies as a function of their size, i.e. number of employees (Micro – 0 to 9 employees, SMEs – 10 to 249 employees and Large – 250 employees and more) in each of the EU MSs and the EU as a whole, in the furniture manufacturing sector in 2024.

Table 6-14: Number of enterprises by size in furniture manufacturing sector (2024).

	Micro	SME	Large	Share Micro	Share SME	Share Large
EU-27	115 356	9 025	366	92%	7%	0.29%
Belgium	2 012	97	:	N.A.	N.A.	N.A.
Bulgaria	2 323	352	9	87%	13%	0.34%
Czechia	4 525	352	5	93%	7%	0.10%
Denmark	533	138	5	79%	20%	0.74%
Germany	7 956	1 983	68	80%	20%	0.58%
Estonia	794	125	0	86%	14%	0%
Ireland	1 132	137	:	N.A.	N.A.	N.A.
Greece	3 239	159	:	N.A.	N.A.	N.A.
Spain	8 881	1 243	18	88%	12%	0.18%
France	12 189	509	18	96%	4%	0.14%
Croatia	1 211	166	5	88%	12%	0.36%
Italy	11 911	2 525	44	82%	17%	0.30%
Cyprus	294	22	0	93%	7%	0%
Latvia	861	96	4	90%	10%	0.42%

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	Micro	SME	Large	Share Micro	Share SME	Share Large
Lithuania	2 537	294	20	89%	10%	0.70%
Luxembourg	18	5	0	78%	22%	0%
Hungary	3 439	270	7	93%	7%	0.19%
Malta	428	23	0	95%	5%	0%
Netherlands	10 953	390	7	97%	3%	0.06%
Austria	2 591	475	10	84%	15%	0.33%
Poland	23 141	1 743	96	93%	7%	0.38%
Portugal	3 768	770	7	83%	17%	0.15%
Romania	5 743	635	22	90%	10%	0.34%
Slovenia	1 136	102	2	92%	8%	0.16%
Slovakia	837	121	6	87%	13%	0.62%
Finland	968	111	3	89%	10%	0.28%
Sweden	1 936	172	7	92%	8%	0.33%

Note: ":" indicates that data is not available. When data is not available for a certain enterprise size, the share is not calculated to avoid misleading overrepresentations.

Source: (Eurostat, 2026a)

As **Table 6-14** shows, the furniture manufacturing sector is dominated by micro-enterprises. In virtually all EU MSs, the share of micro-enterprises in this sector is above 90%, with 92% at the aggregate EU level. Small and Medium Enterprises (SMEs) occupy the next place with shares between 3% (in the Netherlands) and 22% (in Luxembourg). However, this dominance of the micro enterprises is not translated in terms of turnover. Instead, the SMEs are dominating the sector making 50% of all turn-over in the sector at the EU level – see **Table 6-15.** In some MSs (e.g. Estonia), this share reaches 81% of all turn-over in the sector, mostly because there are no large companies present in the furniture manufacturing in this MS.

The cumulated net turnover of the EU enterprises in 2024 was around EUR 115 billion.

Table 6-15: Net turnover by enterprise size in furniture manufacturing sector (2024)

	Micro (EUR mil.)	SME (EUR mil.)	Large (EUR mil.)	Share Micro	Share SME	Share Large
EU-27	17 000	57 483	40 691	15%	50%	35%
Belgium	475	1 468	:	N.A.	N.A.	N.A.
Bulgaria	157	443	274	18%	51%	31%
Czechia	373	1 341	252	19%	68%	13%
Denmark	:	406	:	N.A.	N.A.	N.A.
Germany	2 353	9 419	10 582	11%	42%	47%
Estonia	115	492	0.00	19%	81%	0%
Ireland	256	483	:	N.A.	N.A.	N.A.

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	Micro (EUR mil.)	SME (EUR mil.)	Large (EUR mil.)	Share Micro	Share SME	Share Large
Greece	220	122	:	N.A.	N.A.	N.A.
Spain	1 551	5 174	1 487	19%	63%	18%
France	1 106	3 136	3 113	15%	43%	42%
Croatia	143	428	235	18%	53%	29%
Italy	3 251	15 449	7 914	12%	58%	30%
Cyprus	36	52	0.00	41%	59%	0%
Latvia	65	163	167	16%	41%	42%
Lithuania	166	803	1 812	6%	29%	65%
Luxembourg	:	0.00	0.00	N.A.	N.A.	N.A.
Hungary	213	560	364	19%	49%	32%
Malta	35	33	0.00	52%	48%	0%
Netherlands	1 769	2 615	769	34%	51%	15%
Austria	679	2 090	886	19%	57%	24%
Poland	2 255	5 172	8 177	14%	33%	52%
Portugal	438	1 732	487	16%	65%	18%
Romania	366	1 277	1 060	14%	47%	39%
Slovenia	178	184	:	N.A.	N.A.	N.A.
Slovakia	94	364	409	11%	42%	47%
Finland	271	705	296	21%	55%	23%
Sweden	292	1 583	1 133	10%	53%	38%

Note: ":" indicates that data is not available and N.A. indicates that share cannot be calculated due to missing data. When data is not available for a certain enterprise size, the share is not calculated to avoid misleading overrepresentations.

Source: (Eurostat, 2026a)

Table shows the wage bills in EUR millions in the furniture manufacturing sector, by enterprise size in the EU MSs and EU as a whole, in 2023. In most EU MSs, the SMEs have the largest share in the national wage bill in the furniture manufacturing. In many countries, this share is over 50%. Exceptions are Lithuania, Poland and Slovakia where the large enterprises pay more than half of the wage bill in the respective countries.

Table -: Wages and salaries by enterprise size in furniture manufacturing sector (2023)

	Micro (EUR mil.)	SME (EUR mil.)	Large (EUR mil.)	Share Mirco	Share SME	Share Large
EU-27	2 627	10 596	7 034	13%	52%	35%
Belgium	45	228	:	N.A.	N.A.	N.A.
Bulgaria	20	80	53	13%	52%	35%
Czechia	34	209	42	12%	73%	15%
Denmark	:	118	:	N.A.	N.A.	N.A.
Germany	466	2 384	2 202	9%	47%	44%
Estonia	19	96	0	17%	83%	0%

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	Micro (EUR mil.)	SME (EUR mil.)	Large (EUR mil.)	Share Mirco	Share SME	Share Large
Ireland	:	76	:	N.A.	N.A.	N.A.
Greece	28	24	:	N.A.	N.A.	N.A.
Spain	312	898	214	22%	63%	15%
France	214	654	612	14%	44%	41%
Croatia	25	78	47	16%	52%	31%
Italy	360	2 050	854	11%	63%	26%
Cyprus	7	10	0	42%	58%	0%
Latvia	13	38	30	17%	46%	37%
Lithuania	26	215	320	5%	38%	57%
Luxembourg	:	0	0	N.A.	N.A.	N.A.
Hungary	34	97	74	17%	47%	36%
Malta	6	6	0	47%	53%	0%
Netherlands	225	396	154	29%	51%	20%
Austria	118	510	255	13%	58%	29%
Poland	238	878	1 275	10%	37%	53%
Portugal	77	345	75	15%	69%	15%
Romania	90	265	247	15%	44%	41%
Slovenia	30	45	:	N.A.	N.A.	N.A.
Slovakia	8	63	76	5%	43%	52%
Finland	42	139	63	17%	57%	26%
Sweden	47	242	211	9%	48%	42%

Note: ":" indicates that data is not available and N.A. indicates that share cannot be calculated due to missing data. When data is not available for a certain enterprise size, the share is not calculated to avoid misleading overrepresentations.

Source:

The EU furniture manufacturing sector employed over 800 000 people in 2023. **Table 6-16** shows this number (i.e. persons with an employment contract) split by enterprise size. Mirroring the wage bill, the SMEs in the furniture manufacturing sector employ the highest share of all people working in this sector. At the EU level, as well as in most MSs, this share is above 50%, and in some cases (e.g. Czechia, Estonia) reaching over 70%. The only MSs in which large enterprises dominate with respect to the share of employees are Lithuania and Poland. Depending on the MS, together, micro-enterprises and SMEs, employ between 70% and 100% of the workforces employed in the sector.

In some Member States (e.g. Belgium, Lithuania and Malta), the number of micro-enterprises (see Table 6-14) exceeds the number of employees recorded in this enterprise size class. This can be explained by Eurostat's definition of employees, which covers only persons working under a contractual employment relationship with the enterprise. In micro-enterprises, it is relatively common for the business owner to be actively involved in the day-to-day operations and, in some cases, to be supported by family members. As these individuals may not be employed under a formal employment contract, they are not included in the employee statistics. Consequently, micro-enterprises can operate with few or no recorded employees despite having one or more persons actively working in the business. Hence, this apparent anomaly is largely an artefact of the structure and operating model of micro-enterprises.

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3746 **Table 6-16: Number of employees[24] by enterprise size in furniture manufacturing**
3747 **sector (in 2023)**

	Mirco	SME	Large	Share Mirco	Share SME	Share Large
EU-27	130 000	426 704	254 550	16%	53%	31%
Belgium	1 579	6 073	:	N.A.	N.A.	N.A.
Bulgaria	3 713	10 208	4 804	20%	55%	26%
Czechia	2 508	12 390	2 302	15%	72%	13%
Denmark	760	5 568	3 060	8%	59%	33%
Germany	18 595	66 125	46 380	14%	50%	35%
Estonia	1 506	5 100	0	23%	77%	0%
Ireland	:	1 528	:	N.A.	N.A.	N.A.
Greece	2 744	1 938	:	N.A.	N.A.	N.A.
Spain	11 832	37 337	7 132	21%	66%	13%
France	5 559	18 409	15 479	14%	47%	39%
Croatia	2 222	5 265	3 072	21%	50%	29%
Italy	16 745	69 068	23 793	15%	63%	22%
Cyprus	511	499	0	51%	49%	0%
Latvia	1 602	2,703	1 773	26%	44%	29%
Lithuania	2 428	11 903	14 613	8%	41%	50%
Luxembourg	:	0	0	N.A.	N.A.	N.A.
Hungary	3 808	7 869	4 663	23%	48%	29%
Malta	345	587	0	37%	63%	0%
Netherlands	4 746	11 609	3 101	24%	60%	16%
Austria	4 177	12 824	5 389	19%	57%	24%
Poland	21 998	67 690	83 768	13%	39%	48%
Portugal	6 512	22 826	5 159	19%	66%	15%
Romania	9 911	24 085	17 794	19%	47%	34%
Slovenia	1 371	1 783	:	N.A.	N.A.	N.A.
Slovakia	821	4 483	4 081	9%	48%	43%
Finland	911	3 333	1 463	16%	58%	26%
Sweden	1 663	6 479	5 191	12%	49%	39%

[24] "Number of employees" refers to persons working under an employment contract, thus excluding self-employed persons (including owner-managers and contributing family workers).

Note: ":" indicates that data is not available and N.A. indicates that share cannot be calculated due to missing data. When data is not available for a certain enterprise size, the share is not calculated to avoid misleading overrepresentations.

Source: (Eurostat, 2026a)

Using the data presented in **Table** and **Table 6-16** the individual annual average wage was calculated and presented in **Table 6-17.**

Table 6-17: Annual average individual gross wage in furniture manufacturing and annual minimum gross wage[25] (EUR, 2023).

	Annual average individual gross wage in furniture manufacturing by enterprise size			
	Micro	SME	Large	Minimum wage
EU-27	20 210	24 833	27 633	N.A.
Belgium	28 765	37 566	N.A.	23 460
Bulgaria	5 483	7 851	11 085	4 788
Czechia	13 537	16 872	18 097	8 748
Denmark	N.A.	21 212	N.A.	: m
Germany	25 073	36 056	47 487	23 964
Estonia	12 649	18 794	N.A.	8 700
Ireland	N.A.	49 712	N.A.	22 920
Greece	10 375	12 466	N.A.	10 920
Spain	26 387	24 064	29 989	15 120
France	38 413	35 534	39 521	20 964
Croatia	11 098	14 811	15 290	8 400
Italy	21 506	29 679	35 906	#VALUE!
Cyprus	14 286	20 160	N.A.	11 280
Latvia	8 327	13 885	16 853	7 440
Lithuania	10 725	18 034	21 896	10 080
Luxembourg	N.A.	N.A.	N.A.	30 096
Hungary	9 002	12 376	15 846	7 488
Malta	16 174	10 511	N.A.	10 020
Netherlands	47 472	34 094	49 578	23 940
Austria	28 295	39 757	47 274	#VALUE!
Poland	10 825	12 966	15 219	9 732
Portugal	11 812	15 127	14 602	10 644
Romania	9 093	11 013	13 904	7 248
Slovenia	21 532	24 980	N.A.	14 436
Slovakia	9 135	14 160	18 711	8 400

[25] Calculated based on the monthly gross wages reported for semester 2 of 2023 by multiplying by 12 to obtain the annual gross wages.

	Annual average individual gross wage in furniture manufacturing by enterprise size			
Finland	46 553	41 773	43 281	#VALUE!
Sweden	28 340	37 422	40 643	#VALUE!

Note: ": m" denotes missing data because Denmark, Italy, Austria, Finland and Sweden do not have a statutory national minimum wage

Source: Own calculations based on (Eurostat, 2026a) and (Eurostat, 2026c)

Overall, there is a wide variability among the EU MSs with respect to the individual wages paid in the furniture manufacturing sector. Thus, the individual average wage ranges from around EUR 5 500 per year for a micro enterprise in Bulgaria to about EUR 50 000 per year paid by a large enterprise in the Netherlands. In general, the highest individual wages in furniture manufacturing are paid in the Western MS, such as Germany, France, the Netherlands and Finland, while the lowest wages are paid by the enterprises in the Eastern MSs, namely Bulgaria, Romania, Hungary, Latvia and Slovakia. The average wages at the EU level range between EUR 20 200 per year for micro enterprises and EUR 27 600 per year for large enterprises.

In virtually all MSs, the large enterprises pay the largest wages. In most cases, the SMEs pay higher wages than do the micro enterprises, but there are also MSs in which micro enterprises surpass the SMEs in this respect – e.g. Spain, France, Malta, the Netherlands and Finland.

Compared to the statutory national minimum wage in each MS, the furniture sector pays higher wages, even in micro-enterprises.

Key actors of the sector

As seen in the previous subsection, the furniture industry in the EU is dominated by micro enterprises employing between 1 and 9 employees, followed by SMEs (10 to 249 employees). Hence, the industry is highly fragmented. Although Europe hosts several internationally recognised manufacturers, including major producers of kitchen, office and upholstered furniture, no single manufacturer holds a dominant share of the overall EU furniture market.

When it comes to retail, the European furniture market is characterised by a relatively concentrated retail sector dominated by a limited number of multinational groups. In many cases (e.g. IKEA) the dominant retailers are also manufacturers. It is, thus, difficult do disentangle the key actors according to the two activities. Nevertheless, according to an analysis by Furnilytics (Meijerink, 2025), the main players on the EU market are INGKA Group through its brand IKEA, Lars Larsen Group with three brands (JYSK, ILVA, Bolia) and XXXLutz KG with four brands (XXXLutz, Möbelix, Mömax, POCO). INGKA and Lars Larsen are also global players with about 20% of their sales outside Europe. This picture of the key retail players, in particular IKEA, JYSK and XXXLutz, is also confirmed by the stakeholders responding to the online survey conducted for this study (Consortium, 2026). However, in general, MSs also have local retailers that share the market with the dominant EU or global retailers.

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Thus, the sector is characterised by a large number of specialised manufacturers operating alongside a small number of powerful retail groups.

Position of SMEs in the distribution channels

According to the European Furniture Industries Confederation (EFIC, 2024) and Eurostat data (see **Section 0**), the EU furniture sector consists predominantly of SMEs and micro-enterprises, with micro-enterprises forming the largest share of firms. This fragmented production structure also influences how furniture reaches the market, as many producers lack the scale required for proprietary international retail networks.

The stakeholders consultation survey (Consortium, 2026) conducted as part of this preparatory study reveals that micro-enterprises and SMEs in the EU are mostly present in the manufacturing of custom-made furniture and its installation, but also in commercial and office furniture (e.g. in Bulgaria, the Netherlands), and rather seldom in kitchen furniture.

6.2.7. Market failures in the EU furniture market

Furniture waste

Furniture is a product category that poses complex logistical issues with respect to waste management across Europe. According to a report by RREUSEE (RREUSE, 2026), only around 10% of the furniture consumed annually in the EU is recycled, while reuse and remanufacturing account for a very small share. According to 2016 statistics by the European Federation of Furniture Manufacturers (Union Européenne de l'Ameublement), the rest of 80% to 90% of the EU furniture waste in municipal solid waste stream is incinerated or sent to landfill (Furniture News, 2016). The same federation estimates that the EU furniture waste accounts for more than 4% of the total municipal solid waste.

Feedback received from EFIC during the stakeholder consultation (Consortium, 2026), highlighted that robust estimates of furniture waste generation at EU and Member State level are difficult to produce. This is due to the long and heterogeneous lifespans of furniture products and the diversity of end-of-life pathways, which include reuse, donation, resale, recycling, municipal bulky waste collection, and commercial waste management. As many of these routes are not comprehensively monitored or reported, significant data gaps remain regarding the quantities of furniture reaching end of life.

Hence, Eurostat does not provide data on post-consumer waste for a dedicated category of furniture waste stream. Instead, it provides data on bulky waste within the municipal waste reporting obligations (Eurostat, 2026d). For the purpose of this work, we take this waste category as the closest proxy for furniture post-consumer waste reported in official EU statistics. However, this bears the caveat pointed out by EFIC through the stakeholder consultation survey (Consortium, 2026), namely that the boundaries between furniture waste and other bulky waste streams are often unclear and differ across local authorities. As a result, estimates of furniture waste frequently

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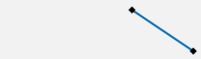
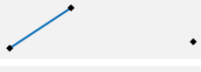
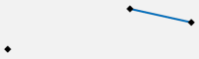
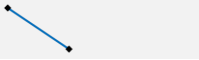
rely on assumptions regarding the composition of bulky waste. For example, a study commissioned by the German Environment Agency (Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) estimates that furniture accounts for around 61% of the weight of bulky waste in Germany.

Table 6-18: Bulky waste generation in kilograms per capita.

	2020	2021	2022	2023	Trend
EU-27	:	:	31.1	30.4	
Belgium	30.5	30.6	26.4	26.3	
Bulgaria	19	22.7	18.4	19.2	
Czechia	66.2	67.8	59.5	54.9	
Denmark	68.8	63.7	53.2	50.2	
Germany	35.8	38.6	30.6	29.9	
Estonia	10.5	12.1	10.2	10.1	
Ireland	128.4	92.3	87.1	78.8	
Greece	10	10.2	10.4	10.5	
Spain	18.5	19.7	18.7	19.8	
France	67.3	76.5	72.2	68.7	
Croatia	33.9	33.3	35.5	36.7	
Italy	:	18.2	17.4	17.8	
Cyprus	12.3	12.7	13.2	12.2	
Latvia	20.6	22.3	20	27.3	
Lithuania	17.2	20.2	16.1	15.5	
Luxembourg	27.3	28.8	19.8	18.4	
Hungary	21.4	24.6	:	21.9	
Malta	132	109.1	109.4	90.2	
Netherlands	35.5	31.6	39	38	
Austria	41.7	38.3	33.1	32.7	
Poland	:	21.4	17.7	17.3	
Portugal	19.7	20.5	19.8	20.4	

	2020	2021	2022	2023	Trend
Romania	2.4	2.5	2.3	1.4	
Slovenia	27.9	30	27.6	45.3	
Slovakia	36.4	34.4	29.8	29.4	
Finland	1.6	:	3.7	3	
Sweden	38.3	37.2	:	:	

Note: ":" indicates that data is not available.

Source: (Eurostat, 2026d)

Malta and Ireland are the highest bulky waste generators with around 100 kilograms of waste per capita, though both MSs show a clear downward trend since 2020. In fact, most of the EU countries have displayed reduction in their bulky waste from 2020 to 2023, and this is also true at EU level. However, for some countries the data need to be regarded with caution. For instance, in the case of Bulgaria it has been documented that some reporting has been misleadingly optimistic (Zero Waste Europe, 2025), while in some cases, anomalies in the reporting has been detected. For instance, Czechia reported higher amounts of separate bulky waste collection relative to total bulky waste generated in 2022 and 2023, respectively. This reflects methodological limitations in Eurostat waste statistics, including differences in the estimation of waste generation, inconsistent inclusion of commercial waste, and the allocation of pre-treatment operations such as sorting to recycling categories. These issues can lead to double counting or misalignment between generated and collected waste streams, resulting in apparent inconsistencies at country level.

Table 6-19 below presents estimates for the amount of furniture waste collected in France, Italy, Germany and the EU27, based on literature source provided by stakeholders through the consultation survey.

Table 6-19: Estimates of furniture waste generated in specific MSs and EU27.

Country	Amount collected (million tonnes)	Amount treated (million tonnes)	Per capita amount collected (kg)	Year, source
France	1.46	1.37	21.3	2023, Ecomaison
Italy	1.55	N.A.	25	N.A. Arnold et al., 2023
Germany	1.7	N.A.	20	N.A. Arnold et al., 2023
EU27	10.8	N.A.	21	.

It should be noted that the figures for Italy presented in **Table 6-19** suggest higher amounts of furniture waste than the ones reported by Eurostat as proxied by bulky waste (see **Table 6-18**) and which may contain other streams of waste in addition to furniture. This seems counterintuitive. However, it should be noted that the figure of

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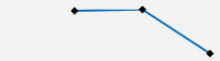
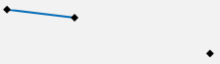
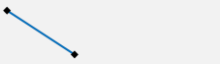
1.55 million tonnes of furniture waste, based on which the per capita amount is calculated, is the results of an extrapolation of the amounts of furniture waste measured into different waste streams collected in four major Italian areas, and hence, it may be overestimated due to the methodology employed. On the other hand, the waste figure does not consider flows not collected by the municipalities, so it may also be underestimated. Another, most plausible explanation, lays in the information provided by an Italian EPR expert (Coizet, 2025) in an interview for renewablematter.eu, who reveals that furniture waste is, in fact, part of three other waste streams in addition to bulky waste, namely wood, rigid plastics, and metals. Based on data from four Italian regions, the expert estimates that furniture represents 70% of all waste collected under the four waste streams. In addition, relative to the quantity of furniture put on the market yearly, the waste generated represents approximately 62% in Italy.

Table 6-20 shows the rate of recycling and reuse of bulky waste at EU-27 and MS level. The rates are calculated as the share of the amount (in thousand tonnes) of bulky waste recycled or reused in the total amount of bulky waste generated.

Table 6-20: Rate of recycling and reuse of bulky waste.

	2020	2021	2022	2023	Trend
EU-27	17%*	15%*	16%*	14%	
Belgium	15%	15%	13%	9%	
Bulgaria	80%	94%	89%	73%	
Czechia	8%	4%	36%	55%	
Denmark	7%	0%	0%	2%	
Germany	12%	9%	10%	9%	
Estonia	7%	13%	14%	14%	
Ireland	2%	0%	0%	0%	
Greece				0%	
Spain	89%	89%	89%	88%	
France	13%	13%	12%	9%	

Croatia	9%	9%	25%	30%	
Italy		12%	13%	8%	
Cyprus	0%	0%	0%	0%	
Latvia			0%	0%	
Lithuania	6%	14%	2%	2%	
Luxembourg	0%	0%	0%	:	
Hungary	8%	7%		2%	
Malta	0%	0%	0%	0%	
Netherlands	14%	14%	14%	14%	
Austria	5%	1%	1%	1%	
Poland		10%	7%	7%	
Portugal	0%	0%	0%	0%	
Romania	0%	0%		0%	
Slovenia	5%	0%	0%	0%	
Slovakia	0%	0%	0%	0%	
Finland	0%		0%	0%	
Sweden	4%	4%			

Note: ":" indicates that data is not available. *based on the sum of the generated waste and/or recycled and reused bulky waste reported at MS level

Source: (Eurostat, 2026d)

As the table shows, the rate of recycling and reuse at EU-27 level is somewhat declining, but slightly above the level of 10% reported by other sources (RREUSE, 2026). It lies in the range of 14-17%. However, there are large discrepances among

countries, with Bulgaria and Spain as outliers; as noted above, the Bulgarian data need to be regarded with caution. France who has a mature EPR scheme exhibits comparable rates with Belgium and Germany. This might be due to the fact that Belgium and Germany already benefit from well-developed separate collection and treatment systems for bulky waste, which may result in comparable recycling performance despite differences in policy instruments, i.e. the lack of an EPR scheme for furniture. Also, furniture represents only one component of bulky waste, and the French ERP scheme may influence outcomes such as collection, reuse and preparation for reuse, which could be substituted by a well-organised bulky waste management, rather than recycling alone. Differences in reporting methodologies may further contribute to the observed similarities.

Hence, the way bulky waste, and by extension, furniture waste is treated and the routes it takes varies significantly among the MSs depending on available collection systems, the existence of EPR schemes and the availability of recycling infrastructure (Consortium, 2026).

In terms of waste legislation, the majority of the stakeholders who responded to our first consultation activity via a survey distributed online (Consortium, 2026), agree **that there are gaps in the current legislation regarding the collection, recycling, and disposal of end-of-life furniture**. The most frequently cited gap is the lack of a harmonised EU-wide framework for end-of-life furniture management, particularly regarding EPR schemes, collection systems, targets, and waste management practices. Stakeholders repeatedly noted that only a few MSs have operational EPR schemes for furniture, while others have none or are still in the process of developing them (see also **Section 0** above). This fragmentation creates unequal levels of maturity across Europe, generates administrative burdens, limits economies of scale, restricts the availability of secondary raw materials, and weakens incentives for circular product design and recycling investments. Moreover, some stakeholders raised concerns about the lack of clarity regarding the scope and implementation of existing EPR schemes. Differences in product definitions, covered categories and reporting practices create compliance challenges, legal uncertainty and the risk of duplicate reporting, particularly for companies operating across multiple MSs.

A second major concern noted by the survey respondents is the absence of dedicated requirements for separate collection and sorting of furniture waste. Furniture is often managed under general bulky waste regulations rather than as a distinct waste stream. As a result, valuable furniture and materials are frequently mixed with other waste streams, reducing opportunities for reuse, refurbishment, dismantling and high-value recycling. Several stakeholders highlighted that existing collection methods often damage furniture, lowering its reuse potential. Closely related is the widespread concern that too much end-of-life furniture is currently incinerated or landfilled, despite its significant potential for reuse and material recovery. Stakeholders argued that current legislation does not sufficiently discourage incineration or does not create incentives to prioritise higher-value recovery options. Some respondents also mentioned that public policies and financial incentives often favour energy recovery over material recycling.

Another commonly cited gap is the lack of adequate infrastructure and investment for furniture recycling. Stakeholders stressed that recycling rates remain low because collection, sorting and recycling systems are underdeveloped. Scaling up recycling

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capacities, particularly for complex materials and multi-material furniture products, was seen as essential for improving circularity outcomes.

Many stakeholders also identified the absence of clear targets and requirements for reuse, refurbishment, preparation for reuse, recycling and material recovery. They argued that regulatory measures should better reflect the waste hierarchy by promoting reuse and refurbishment before recycling and disposal.

A further concern relates to the lack of harmonised standards, traceability requirements and material information systems. Stakeholders highlighted the absence of common rules for identifying material composition, tracking materials throughout the value chain, establishing end-of-waste criteria, and ensuring the quality and safety of recovered materials. Better traceability was viewed as necessary to support high-quality recycling, component reuse and the recovery of valuable materials.

Several respondents also pointed to the need for clearer and more harmonised rules on eco-modulation and circular product design incentives. In their view, the current regulatory framework does not sufficiently reward products that are easier to repair, dismantle, reuse or recycle. Harmonised methodologies could provide stronger incentives for manufacturers to invest in circular design solutions.

A number of respondents also highlighted sector-specific information gaps, particularly for certain materials and components. For example, textile elements in upholstered furniture are not always addressed adequately within furniture legislation, creating challenges for identification, separation, recycling and alignment with other textile regulations. Metal-containing furniture components were likewise mentioned as requiring better identification and separation systems to improve recovery outcomes.

Finally, a smaller number of stakeholders identified additional legislative gaps, including:

- The lack of requirements for manufacturers to identify furniture with information such as the producer and manufacturing year.
- Insufficient guidance on which furniture materials are most suitable for recycling versus energy recovery.
- The absence of legal requirements to provide information on substances of concern and material composition needed to facilitate component reuse and high-quality recycling.

Overall, stakeholders converge on the need for a more coherent EU-wide policy framework that combines harmonised EPR systems, dedicated collection and sorting requirements, stronger incentives for reuse and recycling, improved traceability, and investments in recycling infrastructure to move furniture waste management higher up the waste hierarchy and reduce dependence on landfill and incineration. These needs align well with the objectives of the EU Bioeconomy Strategy. By extending the lifetime of furniture and improving the recovery of wood and other bio-based materials, these measures support the efficient use and cascading utilisation of biological resources, thereby contributing to both circular economy and bioeconomy objectives.

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Market power

As shown in **Section 6.2.6**, the furniture sector in the EU is composed of a very large number of firms, with over 100 thousand of micro enterprises and SMEs. Hence, the sector is very fragmented. However, the market is characterised by a highly differentiated product (European Commission - DG GROW, 2026), as the market players compete through a wide variety of products defined by multidimensional attributes such as design, quality, durability, brand and reputation, but also sustainability aspects (e.g. EU Ecolabel). Thus, the large number of players and the wide product differentiation make the competition structure in the furniture market to be of monopolistic nature, i.e. companies have some ability to influence prices within their market segment.

While market entry is relatively easy for small-scale producers (niche and local producers), scaling-up is more difficult, as demonstrated by the disproportionate number and SMEs and micro-enterprises compared to the large companies (see **Table 6-14**). Therefore, the segment dominated by large-scale producers, that enjoy economies of scale and strong vertical integration (from design to material sourcing and production), is more concentrated (Global Wood, 2025). Hence, it exhibits differentiated oligopolistic competition, i.e. few market players (e.g. IKEA, JYSK, XXXLutz), each of them with limited but positive ability to set the price.

According to a report by CSIL (CSIL, 2024), the European furniture market became more concentrated in 2023 as leading retailers expanded through mergers and acquisitions and continued organic growth. For instance, XXXLutz completing several acquisitions (Conforama Iberia, Tejo Mobel, and Home24) that reinforced its presence in existing markets and facilitated expansion into Spain and Portugal. At the same time, major retailers such as IKEA and JYSK reported European sales growth of 6% compared with 2022, further strengthening their market positions. These developments were accompanied by increasing convergence between retail business models, with many furniture companies adopting multichannel and omnichannel approaches that combine physical stores with digital sales channels.

The views on market power collected via the stakeholders' survey (Consortium, 2026) are not convergent among the stakeholders. These depend on the market segment in which they are active, reflecting the complexity of the market and the high variety of products in this product group. While some stakeholders agree that in their market segment there are dominant players, others disagree and depict a picture closer to that of perfect competition in which they have no ability to influence the price. However, the respondents agree that downstream players (large buyers, retailers), exercise significant influence on product specifications such as design, materials used or standards applied.

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6.2.8. Public procurement

The public procurement (PP) in the EU uses a Common Procurement Vocabulary (CPV) that attributes a code to each work, service or material that is acquired through public procurement procedures. The CPV is governed by Commission Regulation (EC) No 213/2008. According to this Regulation, the CPV code for furniture in PP is 39000000-2 (Furniture (incl. office furniture), furnishings, domestic appliances (excl. lighting) and cleaning products). Some relevant sub-codes within the furniture category include:

- 39130000 — Office furniture
- 39110000 — Seats, chairs and related products, and associated parts
- 39120000 — Tables, cupboards, desks and bookcases
- 39100000 — Furniture
- 39150000 — Miscellaneous furniture and equipment

The furniture segment most relevant for PP is office furniture, including desk, chairs, shelves and cabinets. This is needed in administrative buildings, universities and research institutions, hospitals, etc.

With the publication of the 2008 Communication on “Public procurement for a better environment" (European Commission, 2008), the European Commission established a common EU approach to Green Public Procurement (GPP) and called for the development of common EU GPP criteria that contracting authorities could use on a voluntary basis. This is generally considered the starting point of the EU-wide **voluntary GPP criteria framework**, with common criteria developed for priority product groups. Furniture is one of the priority groups. Subsequently, the GPP criteria were expanded and revised, creating product-group-specific criteria that are now available for sectors such as furniture, computers, electricity, cleaning services, roads etc.[26] For furniture, the specific criteria are available since 2017, created on the basis of a technical report elaborated by the JRC from 2017 (Joint Research Centre, 2017).

These criteria remain voluntary unless specific legislative instruments introduce mandatory requirements for particular product groups. Assessing the potential relevance and impact of mandatory green public procurement (GPP) criteria would require a robust estimate of the share of public procurement within the overall EU furniture market. However, the research conducted for this study indicates a significant lack of publicly available data on the volume and value of furniture purchased by public authorities. As a result, it is difficult to quantify the size of this market segment and its relative importance within total furniture demand.

Available market studies that provide quantitative estimates of furniture demand tend to focus on broader commercial market segments rather than public procurement specifically. For example, a global market report (Market Reports World, 2026)

[26] The complete list of works, services and goods, along with the criteria, can be found at the following list: https://green-forum.ec.europa.eu/green-business/green-public-procurement/gpp-criteria-and-requirements_en

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indicated that more than 68% of office furniture is replaced every six to years, suggesting a steady demand in this market segment. However, the report does not distinguish between office furniture purchased by public institutions and that purchased by private organisations. For the United States market, the report estimates that the education and healthcare sectors account for 21% and 17% of domestic furniture demand, respectively. While these sectors are often strongly associated with public provision, the report does not differentiate between public and private entities. Similarly, office furniture represents approximately 44% of domestic demand, but no breakdown is available between public and private purchasers.

Questions for stakeholders

Q2-12: Do you have knowledge of data, sources of data or estimates regarding the share of furniture PP in the total market size, even at the level of a specific Member State?

6.3. Market and stock data

6.3.1. Average product life

Determining the average product life of furniture is challenging because furniture may be replaced for technical, functional, economic or aesthetic reasons. Its lifespan depends on the product type, material and construction quality, intensity of use, maintenance and repair, as well as changes in household circumstances, interior design and consumer preferences. The available evidence is therefore widely dispersed. The 2024 Dutch study on ecodesign for furniture finds that most estimates fall between 5 and 20 years and notes that the available quantitative evidence is generally based on surveys, expert estimates and product-specific sources rather than comprehensive market data (Saes et al., 2024). Cooper et al. similarly identify a lack of robust quantitative evidence on furniture lifetimes and show that furniture may be discarded while it retains functional value (Cooper, Kaner, et al., 2021).

Direct lifetime estimates corresponding exactly to the Prodcom categories used in this study are not available. The working values in **Table 6-21** therefore combine three types of evidence:

- observed use or replacement periods, which are given the greatest weight where available
- acquisition cycles, which provide a proxy for the period before replacement
- reference lifetimes used in LCAs, Environmental Product Declarations and furniture stock models, which are used where observed data are unavailable

This distinction is important. Cooper et al., drawing on an Austrian consumer survey, report that consumers normally use a sofa for 8.6 years, a desk for 8.8 years and a wardrobe for 10.5 years, but would like these products to last 13.2, 17.9 and 19.0 years respectively (Cooper, Kaner, et al., 2021).The JRC furniture report separately distinguishes a standard or nominal lifespan of 30 years from an average furniture lifespan of 15 years (European Commission. Joint Research Centre., 2014). Yang et al.

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use a 15-year functional unit across the furniture products assessed in their LCA, but this is a methodological reference period rather than an observed market lifetime (Yang et al., 2025a).

The analysis covers eight selected finished-furniture categories. These comprise the seven finished-product categories included among the eight largest categories by production value, together with metal office furniture, which replaces parts of furniture of wood n.e.s. because furniture components do not have an independent in-use lifetime.

Table 6-21: Working average lifetimes for selected furniture categories.

Furniture category	Working average lifetime	Evidence, derivation and confidence[27]	Source
Kitchen furniture (31021000)	15 years	The Dutch study reports that Europeans acquire new kitchen furniture on average every 15 years. This replacement cycle is used as the closest available proxy for average use duration. **Confidence: medium.**	Dutch ecodesign study
Wooden furniture for dining and living rooms (31091250)	15 years	The Dutch study reports 15–20 years for dining-room and solid-wood tables. The JRC also uses a 15-year reference lifetime for tables. The common lower-bound value of 15 years is therefore applied as a conservative central estimate. **Confidence: medium to high.**	Dutch ecodesign study, JRC furniture report
Wooden bedroom furniture (31091230)	13 years	The Dutch study reports 10.5 years for wardrobes, 10–20 years for dressers and chests, and 5–20 or 15–20 years for beds. Austrian consumer evidence similarly reports an observed use period of 10.5 years for wardrobes, compared with a desired/expected lifetime of around 19 years. The JRC uses 15 years for sleeping solutions and 10 years for cabinets. As the category covers both storage and sleeping furniture, the midpoint between the wardrobe and sleeping-furniture estimates is used, rounded to 13 years. **Confidence: medium.**	Dutch ecodesign study, Cooper et al., JRC furniture report
Other wooden furniture (31091300)	15 years	This is a heterogeneous residual category. Relevant evidence includes 15–20 years for bookcases, 10–20 years for dressers and chests, and a general average furniture lifespan of 15 years in the JRC review. The 15-year value is used as the most appropriate general assumption for durable wooden furniture. **Confidence: low to medium.**	Dutch ecodesign study, JRC furniture report, Yang et al.

[27] Note: Confidence indicates the robustness and directness of the evidence supporting each working lifetime estimate, including consistency across available sources and the degree of match with the relevant furniture category.

Furniture category	Working average lifetime	Evidence, derivation and confidence[27]	Source
Wooden office furniture (31011200)	12 years	An Austrian consumer survey by Wieser et al. (2015), reported in Cooper et al. and the Dutch ecodesign study, found an observed desk use period of 8.8 years, compared with a desired/expected lifetime of around 18 years. The Dutch study also compiles a 15-year desk estimate, while the JRC review reports 8 years for a school desk, 15 years for tables and 20 years for one desk LCA. A 12-year value balances observed use with these longer reference lifetimes. **Confidence: medium.**	Dutch ecodesign study, Cooper et al., JRC furniture report
Metal office furniture (31011100)	15 years	The JRC identifies an average furniture lifespan of 15 years and reports lifetimes of 10–15 years or 15 years for office seating. It also reviews metal-dominant office tables and chairs with nominal lifetimes of 30 years. The 15-year average is used for replacement and disposal modelling, while the 30-year values indicate technical durability rather than typical use duration. **Confidence: medium.**	JRC furniture report
Upholstered seats with wooden frames (31001250)	10 years	The Dutch study reports a general seating range of 7–15 years, 7–10 years for upholstered chairs and an economic lifespan of 11.7 years for seating. The Austrian survey reports 8.6 years of observed use for sofas, compared with a desired/expected lifetime of around 13 years. The midpoint is approximately 10 years. **Confidence: medium to high.**	Dutch ecodesign study, Cooper et al.
Metal furniture, other (31091100)	15 years	No directly observed lifetime is available for this broad category. The JRC reports an average furniture lifespan of 15 years and reviews metal-dominant furniture with nominal lifetimes of 30 years. The Dutch study also identifies metal furniture as generally long-lasting. A 15-year value is therefore used for expected replacement and disposal. **Confidence: medium to low.**	JRC furniture report, Dutch ecodesign study

Additionally, stakeholder consultation responses provided lifetime estimates (Consortium, 2026). Average values ranged from 5 to 30 years for indoor storage furniture, beds and indoor tables, from 5 to 20 years for indoor seating, and from 10 to 20 years for outdoor storage. Both reported estimates for outdoor seating and tables were 10 years. Lower and upper bounds ranged from 2 to 50 years, with some respondents indicating no defined upper limit for indoor storage and tables. One respondent considered upholstered beds comparable to upholstered seating. Overall, the responses broadly encompass the working lifetimes in **Table 6-21** and reinforce the variation between furniture types and market segments.

Questions for stakeholders

Q2-13: Do the working average lifetimes in Table 6-22 broadly reflect typical lifetimes for selected furniture items in the EU market?

Q2-14: Are additional data available on furniture lifetimes, particularly by product type, material and construction (e.g. solid wood, wood-based panels, metal or plastic), price/market segment or intensity of use?

6.3.2. Current stock

The current stock is the number of furniture units in use across the EU-27 in a given year. No public dataset records furniture in use, so the stock is estimated from sales. The stock in 2024 is approximated by summing the annual sold production quantity of each product over its average lifetime: a unit sold within the last L years, where L is the average lifetime established in the previous section, is assumed to remain in use, and older units are assumed to have been disposed of. This provides a first-order estimate.

Sold production quantities are taken from Eurostat's sold production, exports and imports (ds-059358) for 2003-2024. The estimate reflects units produced and sold within the EU rather than apparent consumption: it excludes imported furniture and is not adjusted for units subsequently exported. As set out in **Section 6.2.4**, import and export quantities are not reported in comparable physical units for most furniture codes, so a consumption-based stock in units cannot be constructed.[28] The figures below therefore measure the stock of EU-produced furniture in use.

The estimate covers eight finished-furniture categories. These are the largest categories by EU-27 sold production quantity. A quantity basis is used because stock is measured in units rather than value. Parts of furniture are excluded, as components have no in-use lifetime independent of the finished products into which they are incorporated, and metal office furniture is included in their place.[29]

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[28] The stock is based on sold production and excludes the growing share of demand met by extra-EU imports (Section 6.2.4). The true number of units in use in the EU is therefore higher, particularly for import-intensive categories such as metal furniture.

[29] Data for metal office furniture begin only in 2011, giving a 14-year rather than 15-year window and marginally understating that category's stock

Table 6-22 Estimated stock of furniture in use, EU-27, 2024 (units).

Product category	Prodcom code	Working Lifetime (years)[30]	Stock 2024 (units)
Other wooden furniture[31]	31091300	15	2 293 448 778
Kitchen furniture	31021000	15	1 361 102 709
Wooden furniture for dining and living rooms	31091250	15	987 278 876
Wooden bedroom furniture	31091230	13	951 629 821
Wooden office furniture	31011200	12	476 426 718
Metal office furniture	31011100	15	316 775 507
Upholstered seats with wooden frames	31001250	10	297 080 414
Total			**6 683 742 823**

Source: (Eurostat, 2026f)

The estimated stock of the seven unit-based categories totals approximately 6.68 billion units in 2024. Other wooden furniture holds the largest share at 34.3%, followed by kitchen furniture at 20.4% and wooden furniture for dining and living rooms at 14.8%. Wooden bedroom furniture adds a further 14.2%, and the office and upholstered-seating categories together account for around 16%.

Metal furniture (other) is reported by PRODCOM in kilograms rather than units and is presented separately. Summed over a 15-year lifetime, its stock is approximately 18.5 million tonnes.

Table 6-23 Estimated stock of metal furniture in use, EU-27, 2024 (tonnes)

Product category	Prodcom code	Lifetime (years)	Stock 2024 (tonnes)
Metal furniture, other	31091100	15	18 480 797

Source: (Eurostat, 2026f)

[30] The stock estimate assumes that products remain in use for the full working lifetime and does not account explicitly for premature end-of-life due to moving, damage or changing preferences. Available waste data do not report product age or reason for disposal and therefore cannot directly validate this assumption.

[31] Other wooden furniture is a heterogeneous residual category whose 15-year lifetime carries the lowest confidence of the eight lifetime assumptions. As the largest single component of the estimated stock, this figure should be read as indicative.

Questions for stakeholders

Q2-15: Do the estimated stock levels presented above appear reasonable in terms of order of magnitude and relative importance of the different furniture categories?

Q2-16: Are data available that could improve the stock estimates, particularly by accounting for imported and exported furniture, typical product weights, actual disposal rates or premature end-of-life?

6.3.3. Annual sales growth

Annual sales growth was assessed using the EU-27 sold production value of eight selected finished-furniture categories over the period 2015–2024. Sold production value measures the value of EU-manufactured products sold by producers and therefore does not represent total retail sales or apparent EU consumption. Nominal values are expressed in current euros. Real values were calculated in constant 2021 euros using the Eurostat producer price index for the manufacture of furniture, NACE C31, with 2021 equal to 100 (Eurostat, 2026f, 2026e).[32]

Across the eight categories, aggregate nominal sold production value increased from EUR 43.4 billion in 2015 to EUR 50.6 billion in 2024. This represents an overall increase of 16.4% and a compound annual growth rate of 1.7%. However, after adjusting for producer price changes, aggregate sold production value declined from EUR 47.4 billion to EUR 42.8 billion in constant 2021 euros. This corresponds to an overall real decline of 9.8% and a real CAGR of −1.1%.

The annual trend was uneven. Nominal sold production value fell by 7.1% in 2020, before rebounding by 15.6% in 2021 and a further 10.1% in 2022. In real terms, the 2021 rebound amounted to 11.4%, but production value subsequently declined by 1.0% in 2022, 5.6% in 2023 and 7.9% in 2024. The divergence between nominal and real values after 2021 indicates that much of the increase in nominal production value reflected higher producer prices rather than growth in real production value.

At product level, kitchen furniture was the only category to record positive real growth over the full period, with a real CAGR of approximately 1.0%. Wooden dining and living-room furniture and other metal furniture were broadly stable in real terms, with annual declines of around 0.4%. The largest real declines were recorded for metal office furniture, at −3.7% per year, and upholstered seats with wooden frames, at −3.4% per year.

[32] Eurostat, Producer prices in industry, total, annual data, dataset sts_inpp_a, Manufacture of furniture, NACE C31, EU-27, unadjusted data, index 2021 = 100.

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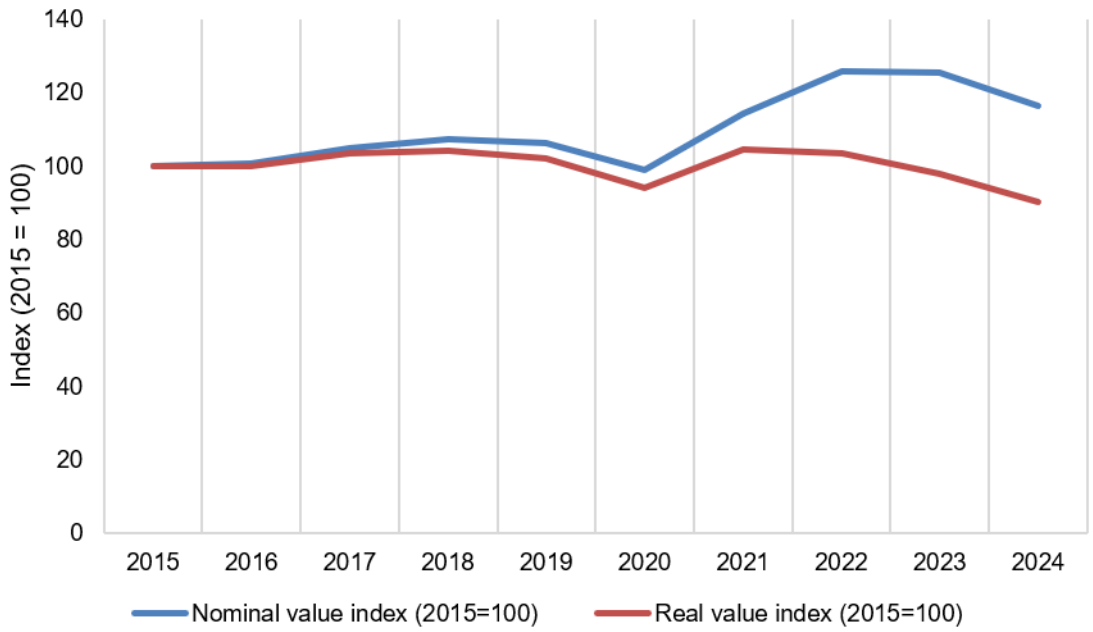

4162

4163 **Figure 6-13 Aggregate nominal and real sold production value of selected**
4164 **furniture categories in the EU-27, 2015–2024, index 2015 = 100**

4165 Source: (Eurostat, 2026f, 2026e)

4166 **Table 6-24: Nominal and real growth in sold production value by furniture**
4167 **category, EU-27, 2015–2024.**

Furniture category	Nominal value CAGR	Real value CAGR
Kitchen furniture	3.88%	0.97%
Wooden dining and living-room furniture	2.52%	−0.35%
Metal furniture, other	2.46%	−0.41%
Other wooden furniture	1.01%	−1.82%
Wooden office furniture	0.93%	−1.90%
Wooden bedroom furniture	0.33%	−2.48%
Upholstered seats with wooden frames	−0.58%	−3.36%
Metal office furniture	−0.88%	−3.66%
Aggregate, all eight selected categories	**1.70%**	**−1.15%**

4168 Source: (Eurostat, 2026f, 2026e)

Questions for stakeholders

Q2-17: Do the nominal and real sales volume trends presented above broadly reflect developments observed in the EU furniture market since 2015?

Q2-18: Are alternative data or price indices available that could better distinguish changes in furniture production volumes from changes in producer prices?

6.4. Market trends

6.4.1. General market trends

Many of the existing trends in furniture market are due to the long-lasting changes in consumer habits and business practices that were formed due to and during the COVID-19 pandemic. These trends were driven by the activities that characterised the pandemic time, such as lockdowns, remote work, increased time spent at home, and the acceleration of digital commerce.

Specifically, the rapid shift to remote and hybrid work created a surge in demand for certain furniture segments such as office desks, which in many cases need to be adapted for homes, where the space is more limited than in an office, ergonomic chairs, adjustable sit-stand office, storage solutions and home accessories that allow to combine living space with home-office space (Office Cubicles and Furniture, 2023). Thus, many consumers who previously worked exclusively from offices needed to create dedicated workspaces at home. Furniture manufacturers and retailers responded by expanding their home-office product lines and, in fact, partially shifted from business customers to householder consumer. Essentially, this created a new demand segment (Ahrenberg, n.d.).

Next, the lockdown has made people give their homes more care and attention, creating more cosy spaces in their homes and using their kitchen more often. This has increased the demand for functional, adaptable and space-saving but comfortable furniture design. All these came along with higher quality and durability requirements, i.e. consumer want long-lasting products. The durability requirements have been particularly visible in the case of kitchen furniture, also as a result of the Coronavirus pandemic, during which kitchen has become the hub of homes, when people where restricted from visiting restaurants. In fact, the kitchen furniture sector has become the clear frontrunner in the furniture industry in terms of turnover (Ahrenberg, n.d.).

The COVID-19 crisis but also geopolitical reasons had an effect on the supply side of the market, in particular on the supply chain. The CSIL report (CSIL, 2024) shows that most furniture manufacturers surveyed for the study in 2023, reported to have shortened their supply chains bringing them to regional or even country level. This is particularly true for manufacturers located in Portugal, Italy, and Spain. The continuous relocation of the upstream segments is also driven by the need to shorten the time to market as well as by business sustainability objectives and supply security.

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6.4.2. Market channels and production structure

According to a report by CSIL (CSIL, 2024), the European furniture market remains highly competitive being the third largest market in the world. Most of this market (over 80%) is supplied by local production and only a small portion is sources from imports. In fact, the EU manufacturing sector is a global trend setter in terms of design, with around 12% of all designs registered in the EU Intellectual Property Office being related to furniture products (European Commission - DG GROW, 2026).

The Coronavirus pandemic has also altered the distribution channels, i.e. how furniture arrives to consumers. Thus, furniture showrooms have been replaced with virtual showrooms and online shopping/e-commerce has become mainstream. Customers are able to configure their desired furniture to bespoke design and have it delivered to their homes.

A survey conducted in 2021 by Maison&Objet (Cylindo, 2022) among furniture manufacturers reveal the main market channels used in B2B and B2C sales. These are presented in **Figure 6-14**Error! Reference source not found.**.** As the figure shows, the majority of the furniture companies conduct sales online, via website, e-shops and specialised platforms, in the case of B2B sales, and via e-shops and marketplaces, in the case of the B2C sales.

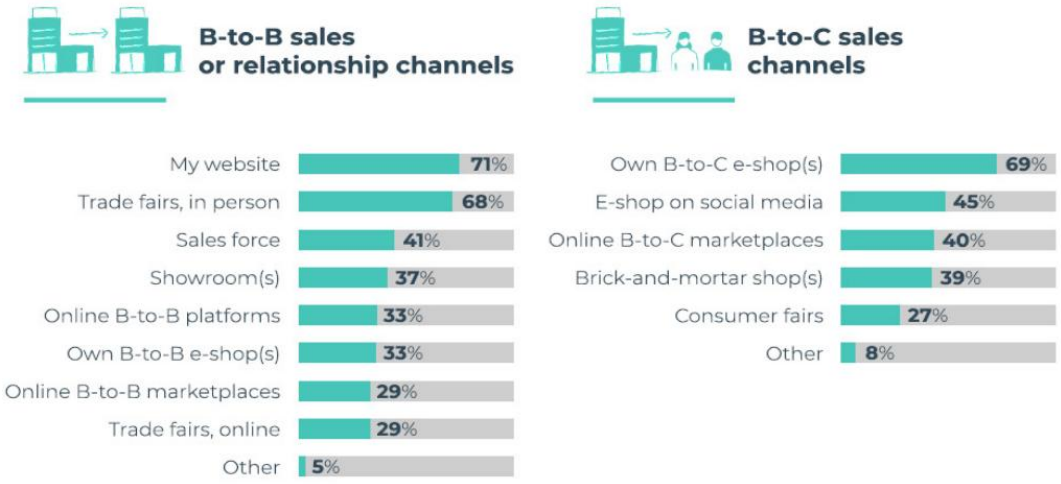

Figure 6-14: Market channels in B2B and B2C furniture sales

Source: (Cylindo, 2022)

In addition, the second-hand furniture market is expanding due to affordability concerns, increasing sustainability awareness, expanding circular economy policies, but also due to rising furniture prices. Consumers are increasingly viewing second-hand products as a normal purchasing option rather than a niche alternative. This has led to the professionalisation and specialisation of the resale platform focusing on vintage furniture, design furniture, refurbished furniture or just curated used furniture.

6.4.3. Trends in product design

Furniture design is increasingly guided by circularity principles, with growing emphasis on durability, modularity, repairability, disassembly, refurbishment, and the use of recycled and bio-based materials (see **Section 0** for the latter). These approaches aim to extend product lifetimes, retain material value for longer, and facilitate reuse, remanufacturing, and recycling, thereby reducing resource consumption and waste generation.

Design for durability and longevity aims to extend furniture lifetimes through robust construction, high-quality materials, and timeless design, thereby reducing replacement rates and resource consumption. Extending product durability is the predominant circular design strategy observed in the furniture sector. This is achieved both through product-oriented design choices and through alternative business models (see **Section 0** below for the latter). At the product level, durability is enhanced by enabling maintenance, repair, and upgrading, often through modular configurations and design for disassembly and reassembly. Such approaches allow individual components, especially those with shorter lifespans, to be easily accessed, replaced, or refurbished, thereby prolonging the overall service life of the furniture. Simplified product design with fewer and standardised components further support user-led assembly, disassembly, and relocation, while also reducing logistical burdens. In parallel, design strategies such as adaptability and upgradability ensure that products remain functional and relevant over time, accommodating changing user needs (Pei et al., 2024).

Thus, design for disassembly is a critical element for durability. It ensured that furniture components and materials can be separated without damage, facilitating repair, refurbishment, remanufacturing, and material recovery at end-of-life (Ankarberg et al., 2023).

These trends have been observed in the industry practice, particularly among leading furniture manufacturers. However, the evidence is qualitative, based on case studies and design strategies, and only to a limited degree in terms of statistical penetration of these design features. For instance, large-scale producers such as IKEA are adopting “design for disassembly” as a core product strategy, integrating design for disassembly principles across product lines, enabling repair, refurbishment and reuse through modular configurations and standardised components (World Design Council, 2025). Similarly, commercial/non-domestic furniture manufacturers for office and business-to-business (B2B) furniture claim to design for long lifetimes, easy disassembly to enable repair, refurbishment or recycling at the end of a product’s life.

At the product level, modular systems, particularly in seating and office furniture, are widely commercialised, allowing reconfiguration, upgrading and component replacement (Dezeen, 2026a). In fact, modular furniture is not new. Since as early as the 1960s, systems designed to be disassembled, reconfigured and expanded over time have been part of the market. Early examples already combined flexibility with durability, with manufacturers maintaining the availability of extension components and spare parts over long periods. The USM Haller system is a well-known illustration of this approach, having embedded both adaptability and longevity into its design decades ago. Other companies, have similarly developed product ranges based on long-lasting, modular system architectures (Fogelberg, 2023).

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Another office furniture manufacturer[33] that has been involved in circular design since early 1990s, has, for more than 20 years, been developing modular designs. Furniture, like chairs and tables, is built step by step, similar to assembling a Lego model. This approach makes it easier to repair products or replace worn parts, helping to keep them in use for longer and retain the value of their materials and components (Ellen MacArthur Foundation, 2021).

While these examples demonstrate a clear shift towards durability- and modularity-oriented design in industry practice, comprehensive quantitative evidence on the overall market penetration of these approaches remains limited. The current challenge lies less in demonstrating the feasibility of modular design at the level of individual product lines and more in scaling such approaches across the industry. This entails extending modularity to a wider range of furniture categories, manufacturers and price segments. In this context, design plays a critical role, as the transition towards circularity depends not only on the development of modular and durable products, but also on the design of the associated service and system solutions that enable their effective use, reuse and reconfiguration over time.

The perception of the stakeholders with respect to the preferences of end users for certain technical and non-technical features of furniture products in their purchasing decisions has also been measured via the stakeholders' survey. In total, 19 stakeholders responded to this question of the survey. The average results are presented in Table 6-25. The stakeholders could choose the level of importance on a Likert scale of five options: not important, of minor importance, of medium importance, of high importance, a priority.

Table 6-25: Trends in technical and non-technical features – importance according to stakeholders (averages)

	Feature	Trend importance
Technical features	Material composition	high importance
	Structural design	medium importance
	Surface properties and finishing	high importance
	Durability and service life	high importance
	Reparability, disassembly and reassembly	medium importance
	Safety and compliance	high importance
	Sustainability standards	medium importance
	End-of-life potential	medium importance
Non-technical features	Purchasing price	a priority
	Country of origin	medium importance
	Mode of purchase	medium importance

[33] https://www.ahrend.com/en/About-Ahrend/making-a-difference-together/sustainable-products/circular-design/

	Feature	Trend importance
	Origin of the main raw material	medium importance
	Aesthetic and Design Features	high importance
	Brand-Related and Reputational Features	medium importance
	User-Experience and Lifestyle Features	high importance
	Marketing	high importance

Source: (Consortium, 2026)

Thus, all technical and non-technical features are estimated to have a medium importance or higher in end-users' purchasing decision. Among the technical criteria, material composition, surface property and finishing (e.g. hardness and scratch resistance, resistance to abrasion, heat, moisture, staining etc.), durability and service life (e.g. expected technical lifetime, resistance to environmental stress, warranty period etc.) and conformity with legal and standardisation requirements (i.e. safety and compliance) are rated, on average, as being of high importance in end-users' purchasing decision. Sustainability standards in terms of compliance with environmental product standards, as well as the end-of-life potential of the product (e.g. recyclability, separability of materials etc.) are regarded, on average, of only medium importance when deciding on a furniture product.

Among the non-technical criteria, the end-users give the highest importance (a priority) to the purchasing price. In fact, this is the only feature rated, on average, as a priority.

Visual and sensory perception of the product, i.e. the aesthetic features of the furniture item, the subjective user experience and marketing are rated, on average, as being of high importance. Country of origin or the origin of the main raw material, as well as branding and reputation of the manufacturer and the mode of purchase (online vs offline) weigh less in the purchasing decision.

Stakeholders also mentioned other technical features as having a high importance in the purchasing decision of furniture: quality of consultation and planning, in the case of customised furniture, especially kitchen furniture, availability of delivery and installation services, and the possibility for customed manufacturing. Trust in the retailer and the availability of after-sales services such as customer service and complaint management as non-technical features were also mentioned as having a high and respectively medium importance in the purchasing decision.

The stakeholders were also asked about their views with respect to the importance end users place on circular design features in the manufacturing practices and on the adoption of circular economy principles in manufacturing and business practices. A total of 11 stakeholders answered these questions. The results are presented in **Table 6-26** and **Table 6-27**.

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Table 6-26: Importance given by end-users to circular design features in the manufacturing practices from the perspective of the stakeholders surveyed (averages)

	Design for durability	Design for repair and refurbishment	Modular and reconfigurable desing	Design for recycling	Design for dis-assembly and re-assembly	Design with reduced material combination per product	Design for reconfiguration	Design that incorporated recyled materials
Indoor storage furniture	high	medium	medium	low	medium	low	medium	medium
Indoor seating furniture	high	high	high	medium	medium	low	medium	medium
Beds	high	medium	high	medium	medium	low	medium	medium
Indoor tables	high	medium	medium	medium	medium	low	low	medium
Outdoor storage furniture	high	medium	high	medium	high	low	medium	medium
Outdoor seating furniture	high	medium	medium	medium	medium	low	medium	medium
Outdoor tables	high	medium	medium	medium	medium	low	medium	medium

Source: (Consortium, 2026)

Design for durability is regarded to be of high importance across all furniture categories, while a design with reduced material combination per product is regarded as low importance across all furniture categories. The rest of the circular design features are rates, in general, as being of medium importance.

Table 6-27: Importance given by end-users to circular economy principles in the manufacturing and business practices from the perspective of the stakeholders surveyed (averages)

	Repair and refurbishment services for their products	Take-back and reverse logistics	Use of secondary materials	Use of sustainable and sustainably-sources materials	Extended warranties	Furniture-as-a-Service (leasing/pay for use)	Availability of spare parts for many years	Provide repair and care instructions
Indoor storage furniture	medium	low	low	medium	medium	low	medium	medium
Indoor seating furniture	medium	medium	medium	medium	high	low	medium	high
Beds	medium	medium	medium	medium	high	low	medium	high
Indoor tables	medium	low	medium	medium	high	low	medium	high
Outdoor storage furniture	medium	medium	medium	medium	high	low	medium	high
Outdoor seating furniture	medium	medium	medium	medium	medium	low	medium	high
Outdoor tables	medium	medium	low	medium	high	low	medium	high

Source: (Consortium, 2026)

In terms of circular economy principles in business practices, the consumers are perceived to give a high importance to the availability of extended warranty and instructions for repair and care. This shows that consumers are willing to repair their furniture products, either through the manufacturer's warranty, repair shops or self-repair, provided that instructions for this are available. Furniture-as-a service is a circular practice that is least appealing to end users, at least in the domestic setting, showing that the domestic consumers prefer to own their furniture.

It is worth noting that the above importance assessments (Table 6-26 and Table 6-27) are subjective and based on a small number of responses which are by no means representative of the whole sector.

6.4.4. Innovation

Novel technologies

Technological innovation starts from the design stage of the product to its end of life. Trends in product design and product development include the increasing use of digital tools such as 3D modelling, including rendering the product design for customer visualisation, simulation tools for testing designs, ergonomics, and material performance, as well as Artificial Intelligence (AI)-assisted design and product customization (Rame et al., 2023).

Digitalisation also plays an increasingly important role at the production stage using digital twin technology. Digital twins can simulate cutting patterns, and material flows to optimize the use of wood, panels, fabrics, and other material inputs. Using this technology, manufacturers can identify opportunities to reduce scraps and improve resource efficiency, reduce waste and improve quality control. This contributes to both cost savings and sustainability objectives (Fadim, 2025).

Augmented Reality (AR) and Virtual Reality (VR) have become increasingly common in e-commerce, especially within the furniture market. In fact, in 2022, furniture retail sector ranked among the top three products that used AR in selling furniture online (Lau & Tang, 2025). Major furniture retailers, such as IKEA, have integrated this into their retailer digital intrastate, enhancing confidence in product evaluation, supporting more informed purchasing decisions, and can shortening the decision-making process. As a result, AR and VR are reshaping the furniture retail sector, replacing abstract visualization with realistic virtual representations of consumers' spaces. A survey conducted by Forrester Consulting on behalf of Cylindo (Cylindo, 2023) found that more than half of the respondents[34] (52%) were planning to adopt AR for product visualisation in the next 12 months. Moreover, 32% of the respondents believed that product visualization, using solutions such as 3D visualization tools, AR, VR, AI etc., will become standard in furniture industry and even a key element differentiating it from other sectors until 2028-2030.

The furniture sector has been adjusting to the lasting effects of the COVID-19 pandemic by embracing digitalisation and new customer engagement methods. Manufacturers are increasingly using technologies such as 3D visualisation and virtual reality to allow customers to better explore and customise products before purchase. At the same time, companies are integrating advanced technologies into their production processes to improve efficiency and reduce lead times. The industry has also accelerated its shift towards online retail channels, with e-commerce becoming an increasingly important sales platform. In addition, many furniture businesses have introduced contactless delivery (click and collect) and installation options to enhance convenience while safeguarding the health and safety of both customers and staff. This

[34] The survey was conducted with decision-makers responsible for product visualisation in their organisation and they were equally distributed among the following countries: United States, United Kingdom, Canada, Australia, Italy and Germany.

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has led to a strong digitalisation of the retail segment of the furniture sector (FDT Bureau, n.d.).

Another important area of innovation is represented by the materials used to produce furniture. Driven by the need of becoming more sustainable, the sector has put efforts in developing sustainable material solutions. Such solutions include bio-based materials, low-carbon wood products,[35] recycled plastics, textiles and metals, as well as bio-based adhesives and coatings replacing fossil-based chemicals (S. Peters, 2025). Such creative technologies are being developed to make the sector more sustainable. Therefore, recent interior design trends are dominated by natural materials. Along with oak, maple and birch, algae are emerging as an innovative and sustainable raw material for furniture manufacturing, offering an alternative to conventional plastics and other resource-intensive materials.

Thus, due to their rapid growth and renewability, algae may provide significant environmental benefits while reducing reliance on fossil-based inputs. In particular, algae and seaweed are emerging as potential feedstocks for biopolymers and bio-composites used in furniture and interior products. Several prototype and early commercial applications have already been demonstrated, including seaweed-based furniture (IMM Cologne, n.d.), lighting products and composite materials (Dezeen, 2026b; Silfverstolpe, 2025). However, most algae-based furniture applications are still at an early stage of market deployment, with technology readiness levels generally ranging from pilot-scale validation to niche commercialisation (approximately TRL 5-8). Their future uptake will depend on further improvements in material performance, production scalability and cost competitiveness.

Algae contain alginate, a natural biopolymer that gives materials strength, flexibility, and resilience, making them suitable for applications such as furniture textiles, foams, faux leather, and plastic-like components. Designers and manufacturers are increasingly experimenting with algae-based materials to create furniture that is biodegradable, resource-efficient, and aesthetically appealing. Beyond their use as a raw material, algae can also contribute to healthier indoor environments: because microalgae naturally produce oxygen and absorb pollutants, innovative solutions are being developed to integrate them into buildings to improve indoor air quality. Furthermore, algae-derived products support circular economy objectives by minimizing waste and using materials that can naturally decompose at the end of their life cycle, demonstrating the potential of bio-based innovation in the furniture sector (IMM Cologne, n.d.). Other trends in furniture materials include the use of kapok, rubber, foam and spunbonded fabric for upholstery.

Other novel materials used in furniture manufacturing reflect the increasing attention given by the industry to circularity, through the use of materials derived from agricultural residues, food-industry by-products, and biological growth processes. Recent developments include protein-based biodegradable adhesives, fillings made from fruit kernels, lightweight materials based on fast-growing fibres, 3D-printed furniture components produced from orange peel waste, fungal mycelium composites

[35] This represents wood products with low life-cycle carbon footprints: sustainable sourcing, carbon storage in the material itself, efficient manufacturing processes, and/or the use of recycled wood content.

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and bacterial nanocellulose leather substitutes. These innovations aim to reduce dependence on fossil-based resources, lower greenhouse gas emissions, and support circular economy objectives by enabling the use of renewable, biodegradable, and recyclable materials in furniture products (S. Peters, 2025).

Novel business models

Furniture as a Service

A research study (Pei et al., 2024) that uses a multiple case study methodology finds that while some companies are developing complementary service systems to improve product performance and longevity, only a few have successfully implemented circular business models. One such business model, though in its early stages (Pei et al., 2024), is the Furniture-as-a-Service (FaaS) model, whereby the furniture is rented out or leased, to which other related services, such as maintenance, refurbishment, installation, updating, reconfiguration, and logistical services are added. Thus, customers are paying for the access to use the furniture instead of for its ownership. This contributes to extending usage duration by promoting more intensive and sustained product use.

Companies such as Ahrend,[36] Lyght Living,[37] Vepa[38] and Desko[39] are prominent examples of furniture providers implementing FaaS business models. Their products are intentionally developed to facilitate efficient maintenance, component replacement, repair, and the integration of upgraded parts. Notably, firms like the Dutch office furniture manufacturer Ahrend have reoriented their business models to support product life extension, building on earlier adjustments in design and manufacturing processes. Ahrend's leasing programme, "Furniture as a Service," [40] was launched as a pilot in 2016 in cooperation with the Ellen MacArthur Foundation and has been fully implemented since 2018.

In addition, Nornorm,[41] a specialised provider of rental furniture, has been operating since its creation in 2020, as a B2B provider of subscription-based office furniture solutions. The company offers corporate clients access to high-quality furniture from various furniture brands, under a FaaS model. Its customer base includes companies seeking to improve their environmental performance, as well as start-ups and co-working spaces prioritising flexibility and avoiding upfront capital expenditure (Fogelberg, 2023). Since 2022, the company has scaled up its operations and accelerated its circular business model, as a result of substantial funding contributions (EUR 110 million) from a number of companies, including IKEA.[42] According to company statements, the firm is currently furnishing up to 25,000 m² of office space per month across Europe, with further growth expected.

[36] https://www.ahrend.com/
[37] https://lyght-living.com/
[38] https://vepa.co.uk/sustainability/furniture-as-a-service/
[39] https://desko.co.uk
[40] https://www.ahrend.com/en/services/furniture-as-a-service/
[41] https://nornorm.com/services
[42] https://nornorm.com/about

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Refurbish and resale

According to results from a recent CSIL report (CSIL, 2026), the second-hand market is undergoing a marked shift, evolving from a niche segment into a more mainstream component of the furniture industry. Although online general marketplaces still account for the largest share of second-hand furniture transactions, a smaller group of specialised and curated furniture resale platforms is also growing in importance.

One part of the second-hand market is comprised of refurbished furniture. This is furniture that has previously been used and is restored to a functional and acceptable condition through activities such as cleaning, repair, replacement of worn components, reupholstering, refinishing, or upgrading. The aim is to extend the useful life of the product and return it to the market for further use.

Demand for refurbished furniture is increasing in some areas, particularly in public procurement. Thus, public institutions that have set targets for large reduction in CO_2 emissions are taking the lead in procuring refurbished furniture rather than new furniture, as refurbishment typically uses only about 10% of the materials required for new products. One examples of provider that supports this demand is the Dutch company Vepa[43] which has developed a business model whereby it sources used office furniture from the second-hand market and refurbishes it for public clients such as government bodies, schools, and ministries. In addition to environmental benefits, refurbishment can also offer practical advantages. For example, these purchases can often be covered by maintenance budgets and may not require formal procurement procedures, which are usually more complex and time-consuming.

Private companies have so far been less willing to refurbish furniture instead of buying new items. While the cost difference is generally limited, a key challenge is logistics, as refurbishment needs to be carried out while business operations continue. Looking ahead, this suggests that furniture could be developed to be more flexible and adaptable, allowing it to be updated or expanded over time. At the same time, refurbishment activities do not appear to negatively affect furniture retailers. Instead, they create opportunities for offering combined solutions that include both new and refurbished products (F. Peters, 2025). This approach can support longer-term business relationships and reduce dependency of the sector on new construction activity.

Take-back programmes

The remanufacturing and resale business model is often combined with take-back programmes run by manufacturers or retailers. Furniture take-back programmes are circular business model initiatives that enable the collection and recovery of furniture at the end of its service life. Within such programmes, used furniture from own production or retail activity, but also from other manufacturers is reconditioned, repaired, refurbished or even remanufactured and put back on the market, thereby reducing resource consumption and waste generation.

[43] https://vepa.co.uk/sustainability/refurbish-and-remanufacture/

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IKEA is leading the way in this business model through its "Second Chance" programme, which allows customers to return used furniture in exchange for a voucher.[44] Customers can assess their furniture online and receive an offer before returning the items to the store. The collected furniture is then resold through IKEA's dedicated Second Chance section, extending product lifetimes and reducing waste. The programme has achieved significant scale. In 2023, more than 430,000 furniture items were given a second life through the scheme. At the same time, IKEA reported a reduction in its CO_2 footprint while continuing to grow its revenue. Beyond the environmental benefits, the programme also helps maintain customer engagement by encouraging repeated interactions with the brand and strengthening brand loyalty (von Leyser, 2025). The example demonstrates how take-back and resale schemes can support circularity objectives while creating business value and can be adapted by companies of different sizes.

Direct-to-consumer

Direct-to-customer (D2C) is a business model that is becoming increasingly important in the furniture market. It enables furniture manufacturers to sell their products directly to end customers, bypassing intermediaries such as wholesalers, distributors, or traditional retailers. Sales are typically made through the company's own channels, including websites, brand-owned stores, or showrooms. However, it is the online form of D2C mode that has been boosted in the past decade as a result of the expansion of e-commerce which was in turn accelerated by the Covid-19 pandemic.

The model allows manufacturers to own the enter process from production to end-of-life, if combined with a take-back programme (see above). With a D2C model, furniture manufacturers retain a larger margin while maintaining affordable prices, as the retailer mark-up is eliminated (Univio, 2023). At the same time, it has several merits in furthering circularity in the industry, as it shortens value chains, thus saving Greenhouse Gas (GHG) emissions creates stronger incentives for take-back schemes, refurbishment, and circular services and facilitates business models such as furniture-as-a-service and resale platforms (see above) through direct customer relationships.

Brands such as IKEA, Ahrend or Vitra have long implemented the D2C model through their network of company-owned stores. However, more recently, a new generation of furniture companies, such as Sklum (Spain) and Tikamoon (France), relying on online-only or digital-first D2C model have emerged, selling primarily through their own online channels and bypassing traditional retail networks. These new companies, such as are also called digital-native furniture brands because they grew using an online D2C model.

Online product configuration and visualisation

Furniture is among the product categories where consumers place a high value on personalisation. Digital product configurators allow customers to select different fabrics, colours and finishes without requiring manufacturers to produce and photograph every possible product variant. These tools are particularly valuable for companies with

[44] See, for example, IKEA Germany: https://www.ikea.com/de/de/second-hand/sell-to-ikea/

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extensive product portfolios and a large number of possible configurations, as they enable customers to better understand and assess customised products before purchase. The growing importance of these tools is reflected in their increasing adoption across the sector. Recent research (Cylindo, 2022) shows that in 2022, about 56% of the top 100 European furniture brands offered a configurator on their product pages, compared with 48% in 2021, indicating a continued shift towards more personalised and digitally enabled customer experiences.

Online product configuration and visualisation business model allows consumers to customise their furniture item using advanced digital tools such as 3D and AR for a realistic visualisation. With these tools, customers can design and customise furniture products, explore them in detail through 3D visualisations, and even see how they would look in their own homes (e.g. using digital twins of their own space) before making a purchase. By helping customers better understand the final product and how it fits their space, immersive technologies such as 3D visualisation and AR can reduce uncertainty when buying furniture online and increase customer engagement and satisfaction (Vasileva, 2025).

This model goes hand-in-hand with the online-only D2C and enables its success as, otherwise, the nature of the product (large and expensive to ship, traditionally purchased after physical inspection) would make the D2C model challenging to implement (Univio, 2023). This business model allows customers to personalise their desired furniture item and it eliminates the need for physical showroom space, providing as the same time convenience for the customer.

In the survey with the stakeholders conducted as part of this study, we have also asked their views with respect to the importance that end users give to a range of circular economy business models in the furniture market. The stakeholders could choose a level of importance bases on a 3-point Likert scale: low, medium or high. Only 8 stakeholders provided answers to this question in relation to at least one furniture category and one business model from those listed in the survey. The average results are presented in **Table 6-28**.

Table 6-28: Importance given by end-users to circular economy business models from the perspective of the stakeholders surveyed (averages)

	Furniture-as-a-Service (leasing/pay for use)	Industrial remanufacturing and redeployment to new users (mostly in B2B)	Offering refurbished products as default (mostly in B2B)	Producer-linked digital platforms enabling reuse marketplace	Long product families (main structure remains on the market for many years)
Indoor storage furniture	low	low	medium	medium	high
Indoor seating furniture	low	low	medium	medium	medium

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	Furniture-as-a-Service (leasing/pay for use)	Industrial remanufacturing and redeployment to new users (mostly in B2B)	Offering refurbished products as default (mostly in B2B)	Producer-linked digital platforms enabling reuse marketplace	Long product families (main structure remains on the market for many years)
Beds	low	low	medium	medium	medium
Indoor tables	low	low	medium	medium	medium
Outdoor storage furniture	low	low	medium	medium	medium
Outdoor seating furniture	low	low	medium	medium	medium
Outdoor tables	low	low	medium	medium	high

Source: (Consortium, 2026)

Furniture-as-service is regarded of low importance across all categories of furniture. This is consistent with the findings from **Table 6-27** Source: (Consortium, 2026)

Design for durability is regarded to be of high importance across all furniture categories, while a design with reduced material combination per product is regarded as low importance across all furniture categories. The rest of the circular design features are rates, in general, as being of medium importance.

Table 6-27in which the stakeholders also rated this circular business model as low in end-user's priorities. However, stakeholders reported that this circular economy business model is slowly rising in importance for the end users of furniture. Long-lasting product families is a circular business model that is of highest importance to the consumers. This signals that consumers are willing to keep a furniture item for a long time as long as they are able to reconfigure or update their furniture using the same structure.

Design for durability is regarded to be of high importance across all furniture categories, while a design with reduced material combination per product is regarded as low importance across all furniture categories. The rest of the circular design features are rated, in general, as being of medium importance.

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Questions for stakeholders

Q2-19: Do the trends in product (circular) product design presented in this section reflect our view or perception on the sector?

Q2-20: Are there other circular business models not captured in this section but of a greater importance or popularity than the ones presented here?

Q2-21: Which circular business models and circular product characteristics do you consider most relevant for future policy measures addressing furniture products, and why?

Q2-22: Are you aware of data on the market share of furniture-as-a service and potentially its split between domestic and commercial?

6.5. Consumer expenditure base data

6.5.1. Average EU price for private consumers

The average price of furniture for private consumers was estimated using Eurostat's sold production, exports and imports dataset (Eurostat, 2026f). The most accurate approach would include dividing apparent consumption value (sold production + imports − exports) by apparent consumption quantity, requiring import and export data in physical units. However, for most furniture product codes, Eurostat does not publish import or export quantities at EU-27 level: only monetary values in euros are available. This is a structural data limitation that also prevents the calculation being performed at an aggregate level for C31 (manufacture of furniture), as Eurostat does not publish a division-level total within the dataset.

For seven of the eight core product codes, the average price is therefore calculated as a simplified proxy: **average price = sold production (EUR) / sold production quantity (units)**. This reflects the average price at which EU manufacturers sold furniture, but includes the portion subsequently exported outside the EU and does not account for imports. It should therefore be read as an approximation of the manufacturer selling price rather than a true consumer price. 'Parts of furniture, of wood n.e.s.' (31002050) is excluded from this table entirely, as Eurostat does not report production quantity for this code.

Table 6-29: Average EU-27 production price, by furniture product, 2014–2024 (EUR per unit).

Year	Kitchen furniture	Wooden dining & living room furniture	Upholstered seats (wooden frames)	Other wooden furniture	Wooden bedroom furniture	Wooden office furniture	Wooden furniture for shops
2014	131.66	90.79	158.00	32.72	86.44	111.36	266.53
2015	133.96	96.98	210.16	39.08	92.29	105.67	279.39

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Year	Kitchen furniture	Wooden dining & living room furniture	Upholstered seats (wooden frames)	Other wooden furniture	Wooden bedroom furniture	Wooden office furniture	Wooden furniture for shops
2016	132.03	92.72	189.60	30.52	91.42	74.12	274.45
2017	124.45	92.22	203.10	34.66	79.69	109.67	255.54
2018	72.53	85.64	222.80	29.16	66.82	101.02	228.52
2019	106.43	83.08	204.30	40.45	58.84	104.67	207.36
2020	119.99	90.32	201.64	30.47	60.43	102.95	218.56
2021	129.41	97.22	223.61	32.26	60.04	101.52	217.57
2022	154.67	86.83	230.15	44.46	89.17	94.34	325.00
2023	157.46	117.18	268.67	53.33	91.02	118.36	352.43
2024	178.31	144.00	270.19	61.01	83.24	108.03	415.11

Source: (Eurostat, 2026f).

The average EU-27 production price increased across most product categories between 2014 and 2024. Wooden furniture for shops recorded the highest average price in 2024, at EUR 415 per unit, followed by upholstered seats with wooden frames at EUR 270 per unit. Kitchen furniture rose from EUR 132 per unit in 2014 to EUR 178 per unit in 2024, though the series shows a notable dip to EUR 73 per unit in 2018, which may reflect a data reporting anomaly rather than a genuine market price movement. Other wooden furniture and wooden bedroom furniture recorded the lowest EU-27 average prices across the period, at EUR 61 and EUR 83 per unit respectively in 2024. Wooden office furniture showed an unusual dip in 2016 (EUR 74 per unit against a surrounding range of EUR 100-118), which is similarly likely to reflect an underlying data quality issue rather than a real price movement.

Metal furniture (other) is presented separately in **Table 6-30** as it is the only furniture product code for which Eurostat publishes complete import and export quantity data at EU-27 level. This allows a more precise calculation excluding the exported portion, which better approximates the price at which furniture was sold within the EU: domestic sales = (sold production value - exports value) / (sold production quantity - exports quantity).

Table 6-30: Metal furniture (other): average domestic sales price, 2014–2024 (EUR per kg).

Year	Domestic sales value (EUR)	Domestic sales quantity (kg)	Domestic sales average price (EUR/kg)
2014	2 695 685 118	1 174 721 364	2.29
2015	2 830 711 612	1 045 402 210	2.71
2016	2 557 202 691	1 115 843 721	2.29
2017	3 174 758 599	841 413 733	3.77
2018	3 000 303 940	834 199 967	3.60
2019	2 916 942 607	875 998 192	3.33

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Year	Domestic sales value (EUR)	Domestic sales quantity (kg)	Domestic sales average price (EUR/kg)
2020	2 711 044 070	831 145 162	3.26
2021	3 121 781 689	902 357 152	3.46
2022	3 243 411 902	855 568 222	3.79
2023	3 671 137 952	977 263 743	3.76
2024	3 328 712 781	666 255 490	5.00

Source: (Eurostat, 2026f).

The domestic sales price of metal furniture rose from EUR 2.29 per kg in 2014 to EUR 5.00 per kg in 2024, a 118% increase over the decade. Prices were broadly stable from 2014 to 2020, ranging between EUR 2.29 and EUR 3.77 per kg, before rising more sharply from 2021 onward, consistent with broader inflationary pressures in raw material and energy costs observed across EU manufacturing in this period. The sharp increase between 2023 (EUR 3.76/kg) and 2024 (EUR 5.00/kg) is particularly notable.

To complement the Eurostat-derived price estimates above, which reflect manufacturer selling prices, the following section presents observed retail prices from a pan-European furniture retailer across three EU countries, showing the consumer price level and the price spread within each product category.

The retail price of furniture can vary widely depending on the product category, material composition, dimensions, design, brand, country or market, and the retailer placing the product on the market. To provide an indicative comparison of consumer-facing prices,

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Table 6-31 presents observed retail prices for selected furniture products in four countries representing Eastern, Northern, Southern and Western Europe. The products were selected from IKEA and JYSK catalogues in Poland, Denmark, Portugal and Germany and were chosen as broadly representative examples corresponding to the main furniture categories assessed in this study. As these are consumer-facing catalogue prices, they include VAT.

The prices should be interpreted as indicative examples rather than representative average prices for each product category. They reflect one selected product per category and may be affected by country-specific pricing strategies, promotions or IKEA Family or Business prices. To facilitate comparison, prices originally reported in Polish złoty, and Danish kroner were converted into euros using a common exchange-rate reference date.[45]

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[45] Prices observed in Poland and Denmark were originally reported in the respective national currencies and converted into euros using the European Central Bank euro foreign exchange reference rates for 15 July 2026: €1 = PLN 4.3258 and €1 = DKK 7.4754. Converted prices have been rounded to two decimal places and are presented to facilitate comparison between the selected national markets

4666 **Table 6-31 Indicative retail prices for selected IKEA furniture products in Germany, Poland and Denmark, 2026.**

Furniture type	Representative IKEA product	Comparable JYSK product	Germany		Poland		Portugal		Denmark	
			IKEA	JYSK	IKEA	JYSK	IKEA	JYSK	IKEA	JYSK
Kitchen furniture — 31021000	KNOXHULT base cabinet, 120 cm (30326790)	No directly comparable fitted kitchen cabinet identified	EUR 119.00	—	EUR 98.25	—	EUR 119.00	—	EUR 120.39	—
Wooden furniture for dining/living room — 31091250	VIHALS table, 107 cm (49589970)	AABENRAA dining table, 80×120 cm (SKU 3670323)	EUR 69.00	EUR 119.00	EUR 69.12	EUR 108.42	EUR 69.99	EUR 139.00	EUR 66.75	EUR 106.88
Parts of furniture of wood n.e.s. — 31002050	BERGSHULT shelf, 80×20 cm (70421238)	RABERG wardrobe shelves, 2-pack, 73×50 cm (SKU 3670593)	EUR 7.99	EUR 20.00	EUR 8.09	EUR 21.96	EUR 12.99	EUR 20.00	EUR 13.24	EUR 20.07
Upholstered seats with wooden frames — 31001250	POÄNG armchair (39240787)	UDSBJERG armchair, beige/oak (SKU 3650085)	EUR 79.00	EUR 89.99	EUR 80.68	EUR 115.35	EUR 69.00	EUR 109.00	EUR 86.82	EUR 106.88
Other wooden furniture — 31091300	KALLAX shelving unit, 77×77 cm (20275814)	HORSENS bookcase, 5 shelves, 70×197 cm (SKU 3640334)	EUR 27.99	EUR 50.00	EUR 34.44	EUR 52.01	EUR 29.99	EUR 55.00	EUR 46.69	EUR 46.82

Furniture type	Representative IKEA product	Comparable JYSK product	Germany		Poland		Portugal		Denmark	
			IKEA	JYSK	IKEA	JYSK	IKEA	JYSK	IKEA	JYSK
Wooden bedroom furniture — 31091230	MALM high bed frame, 140×200 cm (29931596)	STUBBERUP bed frame, 140×200 cm (SKU 3670406)	EUR 159.00	EUR 269.00	EUR 161.59	EUR 277.41	EUR 169.00	EUR 299.00	EUR 195.31	EUR 267.41
Metal furniture other — 31091100	BAGGEBO shelving unit (50481172)	VINDINGE hall unit, 4 shelves, chrome (SKU 3670009)	EUR 17.00	EUR 100.00	EUR 15.95	EUR 138.47	EUR 15.99	EUR 129.00	EUR 17.26	EUR 113.71
Wooden office furniture — 31011200	MICKE desk, 105×50 cm (80213074)	VORDINGBORG desk, 60×120 cm (SKU 3630112)	EUR 89.99	EUR 159.00	EUR 80.68	EUR 173.15	EUR 79.99	EUR 179.00	EUR 80.13	EUR 160.39

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6.5.2. Maintenance and repair costs

Maintenance and repair activities for furniture can help extend product lifetime and delay disposal. The type and cost of maintenance depend on the furniture category, material composition, size, design, whether the product is flat-pack or pre-assembled, and whether the repair can be carried out by the consumer or requires a professional repairer. Basic maintenance activities, such as cleaning, tightening screws and fittings, lubricating moving parts, applying protective oils or repairing small surface damage, can often be carried out by consumers at low or negligible cost. More substantial repair activities, such as structural repair, replacement of mechanisms, upholstery repair, repair of kitchen units or worktops, or replacement of doors and facades, typically require specialist labour and can be more costly.

The European furniture repair market is relatively fragmented and is largely composed of small enterprises. According to the EEA/ETC CE report on Europe's repair sector, the EU furniture and home-furnishings repair sector included 16,936 enterprises in 2019, generating EUR 1,236 million in production value and employing 26,708 persons. This implies an average of around 1.6 persons employed per enterprise, confirming the small-scale structure of the sector (Manoochehri et al., 2022). The same report notes that furniture repair can take place through professional repairers, carpenters, second-hand operators and consumer DIY repair. DIY repair may be particularly relevant for furniture because consumers can avoid transport costs for bulky products, although repair can be limited by lack of skills, lack of spare parts and product design (Manoochehri et al., 2022).

Furniture repair is also affected by product design. Modern furniture often combines wood, plastics, natural and synthetic fibres, metals, paints and glues. These material combinations can make furniture lighter and cheaper, but can also make repair, reuse and recycling more difficult than for traditional wooden furniture (Manoochehri et al., 2022). The same report notes that design for disassembly, modularity, standardised components, access to replacement parts and simple instructions can facilitate furniture repair, while the integration of electronic or motorised components, for example in smart wardrobes or electric sofas, can make repair more complex and reduce the scope for DIY repair (Manoochehri et al., 2022).

In France, the furniture PRO Ecomaison operates a repair bonus for selected furniture and bedding repairs. The bonus is not the full repair cost, but a flat-rate discount applied by certified repairers. Ecomaison states that the repair price must be higher than the bonus amount. The scheme provides a useful proxy for the relative scale of furniture repairt costs, although it does not provide full market prices. Ecomaison's furniture repair bonus includes, for example, EUR 35 for furniture hardware/accessories, EUR 65 for other furniture or furniture parts, EUR 65 for repair of kitchen worktops, cabinets, facades or doors, and higher amounts for replacement of selected kitchen components. Ecomaison also reports broader bonus ranges of EUR 30–60 for sofas and bedding, EUR 30–40 for chairs and stools, furniture from EUR 35, and kitchens/closets from EUR 65. (Ecomaison, 2026b).

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Table 6-32: Estimated costs and support amounts for furniture maintenance and repair activities.

Maintenance or repair activity	Description	Costs or support amounts, approx.
Regular inspection and tightening	Visual inspection, tightening screws, hinges, fittings and handles. Can usually be carried out by the consumer.	No monetary or negligible cost
Cleaning and surface maintenance	Cleaning, applying wood oil, leather cleaner, leather conditioner or other care products.	Low cost, see Section 6.5.5
Minor DIY surface repair	Filling small holes, cracks or scratches using filler or repair products.	Around EUR 5 for basic repair filler products (e.g. Ikea TRIXIG hole repair filler)
DIY repair of simple furniture components	Repair or replacement of simple parts such as screws, fittings, handles, fabric, shelves or basic wooden components.	Low cost where parts or tools are available, mainly consumer time
Furniture hardware or accessory repair	Repair or replacement of hinges, fittings, handles, drawers or other accessories.	Ecomaison repair bonus: EUR 35 Dutch repair company cost: EUR 85/hour (replacing kitchen cabinet hinges)
General furniture or component repair	Repair of furniture structures or components, excluding more specific kitchen elements.	Ecomaison repair bonus: EUR 65 German repair company: EUR 20–300 for common minor repairs, depending heavily on damage and size of furniture
Kitchen worktop repair or replacement	Repair or replacement of kitchen worktops.	Ecomaison repair bonus: EUR 65 for repair, EUR 200 for replacement Dutch repair company: EUR 125-450 for worktop repair
Kitchen cabinet or carcase repair or replacement	Repair or replacement of kitchen cabinet carcasses.	Ecomaison repair bonus: EUR 65 for repair, EUR125 for replacement Dutch repair company: itchen cabinet installation at EUR 150-400 and general handyman rates around EUR 85/hour
Door or facade repair or replacement	Repair or replacement of doors, facades and similar visible components.	Ecomaison repair bonus: EUR 65 for repair, EUR 90 for replacement

Maintenance or repair activity	Description	Costs or support amounts, approx.
		Dutch repair company: EUR 85-175 for repairing an MDF door, with significant ranges for façade replacements depending on the size of the facade
Upholstered seating and bedding repair	Repair of sofas, armchairs, chairs, bed bases, mechanisms, padding or upholstery.	Ecomaison repair bonus: EUR 30-60, depending on product and repair type German repair company: Between EUR 200-300 depending on material, complexity, labour time, size, etc.

6.5.3. Disposal costs

Furniture disposal costs vary significantly between Member States and municipalities. In many cases, consumer-facing costs are not charged directly at the moment of disposal, but are covered through municipal waste fees, bulky waste collection services or Extended Producer Responsibility (EPR) schemes. Furniture is commonly managed as bulky waste at end-of-life. In Germany, for example, the German Environment Agency reports that furniture is mainly disposed of through bulky waste and estimates that around 1.7 million tonnes of furniture are disposed of annually in municipal bulky waste (Wagner, Steinmetzer, Theophil, Strues, & Kösegi, 2022).

Where furniture EPR schemes are in place, disposal costs are typically financed through an eco-contribution or eco-participation charged when new furniture is placed on the market. These fees are generally intended to cover collection, transport, sorting, reuse, repair, recycling and residual treatment. France provides one of the clearest examples, with Ecomaison covering household furniture and Valdelia covering professional furniture. The French household furniture eco-participation varies by product family, material, weight and the presence of recycling disruptors, while Valdelia applies material-based rates expressed per kilogram for professional furniture.

Where disposal is managed through municipal bulky waste systems rather than a product-specific EPR scheme, consumer costs vary widely across and within Member States. Some municipalities provide free drop-off at recycling centres or free home collection up to a defined volume, while others charge by item, volume, weight or collection. The examples in **Table 6-33** therefore illustrate the range of consumer-facing disposal costs observed across selected Member States often by a particular region, thus should not be interpreted as national average disposal costs.

Stakeholder consultation confirmed this variation. Respondents noted that direct consumer disposal fees specifically linked to furniture are uncommon in several Member States, with costs instead covered through general municipal waste charges or applied to additional collection services. In Italy, for example, furniture is treated as bulky waste, with municipal curbside collection generally provided free of charge, while

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charges may apply for collection from apartments or through private services. Similar arrangements were reported for Austria and Germany, where additional bulky-waste collections may be charged by volume, weight or collection. Stakeholders also highlighted differences in collection and sorting infrastructure across Member States, which can affect the availability and cost of end-of-life treatment.(Consortium, 2026).

Table 6-33: Examples of disposal and end-of-life management costs in selected Member States.

Country/area	System or operator	Example fee or cost	Source
France	Ecomaison, household furniture EPR	Furniture and fittings: EUR 0.01–99.69 per unit, depending on weight, material and recycling disruptors	Ecomaison
France	Ecomaison, unpadded seating EPR	EUR 0.03–95.11 per unit, depending on weight, material and recycling disruptors	Ecomaison
France	Ecomaison, padded seating EPR	EUR 0.08–112 per unit, depending on weight	Ecomaison
France	Valdelia, professional furniture EPR	Material-based rates, for example EUR 0.05–0.28/kg depending on material and product family, bedding EUR 0.25/kg	Valdelia
Netherlands, Amsterdam	Municipal bulky waste system	Bulky waste, including large household items such as tables, can be taken to a recycling centre free of charge	Municipality of Amsterdam
Netherlands, Maastricht	Municipal bulky waste system	EUR 22 processing charge for the first 100 kg, plus EUR 1.10 for each additional 5 kg	Municipality of Maastricht
Belgium, Brussels-Capital Region	Regional bulky waste collection	One free collection of up to 3 m³ per year and per household for bulky household waste, including furniture, with additional bulky waste charged at EUR 28/m³ incl. VAT, up to 5 m³	Bruxelles-Propreté
Belgium, Leuven	Municipal bulky refuse collection	EUR 16 base charge plus item-based fees, for example two chairs EUR 10.50, table EUR 10.50, two-person sofa EUR 21, three-person sofa EUR 32, double bed EUR 21 or EUR 10.50 per commenced 0.5 m³ for other items	City of Leuven
Germany, Frankfurt	Municipal bulky waste system	Bulky waste collection up to 10 m³ free of charge for residents connected to the fee-based waste collection system	FES Frankfurt
Germany, Hamburg	Municipal bulky waste system	EUR 35 for bulky waste collection up to 8 m³, plus EUR 5 per additional m³	City of Hamburg
Italy, Milan	Municipal bulky waste system	Street-level bulky waste collection, including furniture, is free of charge within limits, while collection from inside the building or upper floor is paid	AMSA Milan

Country/area	System or operator	Example fee or cost	Source
Ireland, Dublin	Municipal bulky waste collection	EUR 50 per collection for up to five individual bulky household items, including furniture, with an additional EUR 50 per additional five items	Dublin City Council
Ireland, Galway	Municipal bulky goods collection	Item-based charges, for example armchair EUR 9, double bed EUR 18, single bed EUR 9, chest of drawers EUR 18, couch EUR 18, shelving unit EUR 9 and wardrobe EUR 18	Galway City Council
Finland, Helsinki	HSY Sortti pick-up service	EUR 70–140 for pick-up of large objects from the property, including sofas, with delivery for reuse or recycling included	HSY
Finland, Helsinki	HSY Sortti stations	Individual items such as armchairs, spring mattresses and sofas are charged according to volume when delivered to Sortti stations	HSY
Sweden, Stockholm	Municipal recycling centres	Private individuals can leave bulky waste and furniture at recycling centres free of charge	Stockholm Vatten och Avfall

6.5.4. Consumer attitudes towards reparability

Furniture-specific consumer survey evidence on reparability is relatively limited compared with evidence for electronics, household appliances and textiles, and the available evidence therefore needs to be interpreted cautiously. However, furniture is a durable, higher-value and bulky product category for which consumers may have a stronger interest in durability, maintenance, repair and reuse than for lower-value products. This is supported by a 2023 YouGov survey across 18 international markets, which found that 36% of consumers would consider purchasing pre-owned furniture, the second most-considered second-hand category after cars, ahead of clothing and shoes (32%) and electronics (27%). Within Europe, however, Germany and Italy recorded the lowest shares (31% each) among the countries surveyed (YouGov, 2023).

The European Commission behavioural study on consumers' engagement in the circular economy focused mainly on five product groups (vacuum cleaners, dishwashers, televisions, smartphones and clothing), but includes relevant focus group and literature evidence on furniture (LE Europe. et al., 2018). In the survey, 93% of respondents agreed that they keep things they own for a long time, 78% agreed that they recycle unwanted possessions, and 64% agreed that they repair possessions if they break, while only 28% agreed that they buy second-hand products, suggesting that keeping products longer and repairing them are more established behaviours than second-hand purchasing. For furniture specifically, focus group participants expressed positive views towards second-hand furniture and furniture made from recycled materials, motivated not only financially but also aesthetically (interest in vintage or refurbished pieces). Willingness to engage in circular practices was driven mainly by financial factors and the practical need to dispose of products, with environmental reasons mentioned to a lesser extent. As discussed in the lifetime assessment in

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Section 6.3.16.3.1,Austrian consumer evidence also indicates a substantial gap between observed furniture use periods and the lifetimes consumers would like furniture to achieve (LE Europe. et al., 2018).

Repair behaviour remains constrained by cost and convenience. According to EPRS, based on the 2020 Special Eurobarometer on attitudes towards the environment, 31% of EU-27 participants had repaired a product rather than replacing it in the six months before the survey. Repair rates depend on product type: the cost of repair is the most important reason consumers avoid repair and willingness to pay for repairable products depends on how reparability information is presented. Other barriers include preference for a new product, obsolescence, repair being impossible, lack of knowledge about how or where to repair, and the effort involved (Šajn, 2022).

Stakeholder consultation provided additional furniture-specific evidence on willingness to pay. One respondent assessed willingness to pay a premium for durable furniture as high, particularly among business customers and purchasers of higher-quality domestic furniture. Willingness to pay for repair and for refurbished or second-hand furniture was assessed as medium, with willingness to repair depending strongly on product quality and value. Consumers were reported to be less willing to repair low-cost furniture, while refurbished furniture was considered more accepted in office and contract markets than in the domestic market. The respondent also assessed willingness to pay for modular furniture and products containing recycled content as medium, and for bio-based or renewable materials other than wood as low to medium (Consortium, 2026).

The EEA/ETC CE repair-sector study notes that DIY repair can be attractive for furniture because it is less technologically complex than electrical equipment and transport costs can be avoided, but consumers may lack the skills for high-quality repairs. Product design also determines whether consumers can act on positive attitudes: modern furniture often combines wood, plastics, fibres, metals, paints and glues, making repair more difficult than for traditional wooden furniture, while modularity, standardised components, spare parts and simple instructions support repair. Embedded electronic or motorised components (e.g. electric sofas) reduce the scope for DIY repair (Manoochehri et al., 2022). Sector evidence also indicates that high transport and labour costs can make significant repair and refurbishment costly, particularly where re-upholstery is required (European Environment Bureau, 2017).

Table 6-34: Main factors influencing consumer attitudes towards furniture reparability.

Factor	Relevance for furniture
Product price and value	Consumers are more likely to consider repair for higher-value and larger products (e.g. sofas, beds, kitchen furniture), while cheap furniture is more likely to be replaced. Stakeholder consultation also indicates greater willingness to pay for durability among purchasers of higher-quality furniture (Consortium, 2026).
Expected product lifetime	Austrian consumer evidence indicates that sofas, desks and wardrobes are typically used for around 8.6, 8.8 and 10.5 years respectively, while consumers would like them to last around 13.2, 17.9 and 19.0 years respectively (Cooper, Kaner, et al., 2021).

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Factor	Relevance for furniture
Repair cost	High repair cost relative to the price of a new product is the most important barrier to repair (Šajn, 2022). Transport and labour costs can make significant repair and refurbishment (e.g. re-upholstery) costly (European Environment Bureau, 2017).
Convenience and effort	Repair may be discouraged by the cost of transporting bulky furniture to a repairer, while DIY repair can avoid these transport costs. However, consumers may lack the skills needed to carry out high-quality repairs (Manoochehri et al., 2022).
Product design	Modular, disassemble and ready-to-assemble products support repair; mixed materials (wood, plastics, fibres, metals, glues), non-standard components and embedded electronics (e.g. electric sofas) hinder it (Manoochehri et al., 2022).
Availability of information	Lack of repair information, spare-part information and standardised reparability claims reduces consumers' ability to choose repairable products (European Environment Bureau, 2017).
Skills and tools	DIY repair is comparatively attractive for furniture, which is less technologically complex than electronics, but consumers may lack the skills or confidence for high-quality repairs (Manoochehri et al., 2022).
Second-hand and reuse attitudes	Across 18 international markets, 36 % of consumers would consider purchasing pre-owned furniture, second only to cars among the categories surveyed (YouGov, 2023). Furniture-specific focus groups also identified financial and aesthetic motivations for purchasing second-hand or recycled-material furniture (LE Europe. et al., 2018).
End-of-use convenience	Donation, resale, take-back and collection options influence whether unwanted furniture is reused, repaired or disposed of (Cooper, Kaner, et al., 2021).
Emotional attachment	Consumers may be more likely to repair furniture with sentimental, aesthetic or high replacement value (Cooper, Kaner, et al., 2021).

Source: Own synthesis based on (LE Europe. et al., 2018), (European Environment Bureau, 2017), (Manoochehri et al., 2022), (Šajn, 2022), (YouGov, 2023), (Cooper, Kaner, et al., 2021) and stakeholder consultation (Consortium, 2026).

6.5.5. Other consumer costs

Other consumer costs associated with furniture include the cost of care products, minor repair products, replacement accessories, delivery/shipping cost, spare parts and assembly services. These costs are generally optional and depend on the product type, material, design and whether the consumer assembles and maintains the product themselves. For flat-pack furniture, self-assembly is common and does not usually involve a direct monetary cost, although it requires consumer time, space, instructions and, in some cases, basic tools.

Furniture lifespan is influenced not only by product design and material quality, but also by how products are used and maintained by consumers. A 2024 Dutch study on ecodesign for furniture notes that regular cleaning, maintenance and minor repairs can help preserve furniture quality and extend product lifetime. However, consumers are

rarely provided with clear guidance on how to maintain or repair furniture. The same study also notes that, particularly in lower market segments, repair costs can be high relative to the price of buying new furniture (Saes et al., 2024).

Other furniture-sector evidence similarly identifies poor consumer information and limited spare-parts availability as barriers to longer furniture use. The EEB report on the circular economy in the furniture sector notes that consumers are rarely given guidance on how to maintain and repair furniture and that the lack of spare parts, for example for broken hinges or damaged cupboard doors, can encourage the purchase of new furniture rather than repair (European Environment Bureau, 2017).

Table 6-35 provides illustrative examples of other consumer costs associated with furniture, including assembly services, care products, minor repair products and spare parts. These examples are based on selected retailer prices and are intended to indicate the order of magnitude of costs that consumers may face, rather than representative EU average prices.

Table 6-35: Examples of other consumer costs associated with furniture.

Cost item	Description	Costs, approx.	Source
Self-assembly	Assembly by the consumer, common for flat-pack furniture.	No direct monetary cost, excluding consumer time, space and tools.	Own elaboration
Professional assembly	Retailer-linked or independent handyman assembly services.	IKEA Germany/Taskrabbit: from around EUR 39 minimum charge. Zoofy Netherlands: from around EUR 65/hour, with the final cost depending on the item and complexity.	IKEA Germany / Taskrabbit; Zoofy Netherlands
Delivery / shipping	Parcel or bulky-furniture home delivery; cost varies with size, weight, order value and service level.	IKEA Germany: parcel and larger-furniture delivery charges vary by delivery option. JYSK Germany: delivery charges vary according to order size and service.	IKEA Germany delivery; JYSK Germany delivery
Wood treatment oil	Product used to maintain and protect wooden furniture surfaces.	IKEA example: around EUR 5 for 250 ml and around EUR 11 for 500 ml; OBI example: around EUR 14 for 500 ml.	IKEA Netherlands; OBI Germany
Hole or crack repair filler	Product used for minor repairs to small holes and cracks in wood or wood-based furniture.	IKEA example: around EUR 5 for 150 ml; OBI example: around EUR 18 for 500 ml.	IKEA Germany; OBI Germany
Leather conditioner	Product used to maintain and protect leather furniture surfaces.	IKEA example: around EUR 5 for 250 ml; BAUHAUS example: around EUR 3.50 for 375 ml.	IKEA Germany; BAUHAUS Germany
Leather cleaner	Product used to clean leather or artificial-leather furniture surfaces.	IKEA example: around EUR 5 for 250 ml; BAUHAUS example: around EUR 4.15 for 375 ml.	IKEA Germany; BAUHAUS Germany
Small spare parts and accessories	Screws, knobs, plugs, fittings, hinges, handles, drawer parts or protective pads.	Small IKEA spare parts may be free of charge. Illustrative DIY-store prices include furniture hinges at around EUR 2-5, furniture handles at around EUR 6	IKEA Netherlands spare parts; OBI Germany furniture hinges; OBI Germany drawer runners

Cost item	Description	Costs, approx.	Source
		and basic drawer runners at around EUR 3-13, depending on specification.	

Questions for stakeholders

Q2-23: Do the price estimates and indicative retail prices presented above broadly reflect consumer prices for furniture in the EU? Are there more representative price data available?

Q2-24: Do the maintenance, repair and disposal cost examples broadly reflect the costs faced by consumers across Member States? Are additional data available, particularly by furniture type?

Q2-25: Do the findings on consumers' willingness to pay for durability, repairability, refurbished furniture and other circular characteristics reflect your experience of the market, including differences between product and market segments?

6.6. Value chain and materials sourcing

6.6.1. Value chain activities and stakeholders

The value chain in furniture can be divided in the following segments: raw material sourcing, manufacturing, distribution and logistics, including packaging, product use phase and end-of-life phase. This value chain is complex and fragmented with very weak vertical integration across its segments.

6.6.2. Sourcing of raw materials

Estimates based on Eurostat data shows that wood is the dominant raw material for furniture production making up 57% of the production value. This is followed by textiles, rubber, leather and other types of soft materials for upholstered furniture making together 20% of the production value. Metal furniture is only 12% of the total value of furniture production, while the last place is taken by other types of materials like plastic, bamboo, cane, glass, rattan etc., with 11% of the production value (FURN360 Consortium, 2017). The furniture industry competes with construction, paper, packaging, and bioenergy sectors for wood resources.

A report by the European Environment Agency (Arnold et al., 2023), citing a 2017 report, also confirms that wood is the main material in the composition of furniture. This composition is shown in Table 6-36 by selected furniture categories. Only metal furniture and non-upholstered seats are made of steel as the main material (80%).

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Table 6-36: Indicative composition of selected furniture, EU28.

Furniture type	Indicative composition (principal materials, percentages)						
	Textile	Aluminium	Steel	Wood	Plastic/Latex	Foam	Chipboard
Kitchen			2%	40%	2%		54%
Metal furniture		20%	80%				
Non-upholstered seats			80%		20%		
Other furniture				50%	50%		
Upholstered search/sofas	15%		10%	45%		30%	
Wooden furniture				50%			50%

Source: own adaption from (Arnold et al., 2023)

Several sources (European Economic and Social Committee, 2022a; European Commission - DG GROW, 2026; European Furniture Industries Confederation, 2022) point to the challenges faced by the industry in relation to sourcing of raw materials. First, the EU furniture industry faces increasing difficulties in securing reliable access to high-quality raw materials. In particular, wood is becoming more expensive and less readily available as demand rises across competing sectors such as construction and renewable energy. The industry is particularly concerned about the growing competition for wood resources and the diversion of timber towards energy production, which can limit the availability of material for higher-value manufacturing activities such as furniture production.

Second, furniture manufacturers are facing rising procurement costs due to high raw material prices, trade-related barriers, and supply-chain disruptions caused by international events such as the Covid pandemic and the war in Ukraine. At the same time, disruptions in global value chains have led to material shortages, longer delivery times, and higher transport and logistics costs. Import tariffs on certain primary and secondary wood materials may further increase sourcing costs, while exports of European timber and subsidies granted to non-EU buyers may reduce the availability of raw materials within the EU market (European Economic and Social Committee, 2022b). In this context, the European Economic and Social Committee has called for the reduction or elimination of such tariffs to improve the availability and affordability of wood inputs for European manufacturers, as well as for the use of trade-defence and other policy instruments to strengthen the competitiveness of the European furniture.

Lastly, the industry faces challenges in ensuring fair and sustainable sourcing practices. European manufacturers compete with imported raw materials, such as timber, that may be produced under less stringent environmental and social standards, potentially creating an uneven playing field. Industry stakeholders have therefore called for stronger enforcement of sustainability requirements in trade agreements, improved verification of imported timber, and clearer consumer information on the origin and sustainability characteristics of materials entering the EU market (European Economic

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and Social Committee, 2022b). These measures are considered important for strengthening value chains, supporting responsible sourcing, and maintaining the competitiveness of the European furniture industry.

According to Eurostat data (Eurostat, 2025), the top five EU MSs in terms of production of sawlogs and veneer logs, the type of roundwood used in the furniture industry, are Germany, Sweden, Finland, Poland and Austria, with amounts between 40 000 and 11 000 thousand cubic meters in 2024.

Table 6-37 shows the production of sawlogs and veneer logs, the type of industrial roundwood used as input in the furniture industry. Sawlogs are the high-quality wood logs sawn into boards and timber used for the solid wood furniture, kitchen furniture, office furniture and furniture components. Veneer logs are lower-quality logs that are peeled or sliced into thin sheets used for veneered furniture, plywood furniture or decorative surfaces.

As the table shows, the production of sawlogs and veneer logs in the EU has been relatively stable in and around the Covid-19 pandemic years, with a slight decline in 2023 and 2024, the latest years for which data is available. Among the top producers, Germany and Sweden have seen the sizable declines in the past 2-3 years, while in Austria the production has increased in the past five years.

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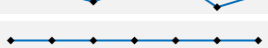
4909 **Table 6-37: Sawlogs and veneer logs production in the EU MSs (thousand cubic metres, under bark).**

	2018	2019	2020	2021	2022	2023	2024	Trend
EU – 27*	218 396	220 026	217 437	229 433	224 605	199 269	200 196	
Belgium	2 601	2 601	2601	:	:	:	:	
Bulgaria	1 613	1 560	1 417	1 524	1560	1 290	1 249	
Czechia	14 428	19 115	:	17 739	14 635	10 333	9 502	
Denmark	:	:	:	:	:	:	:	
Germany	41 608	41 290	46 974	47 431	45 662	38 628	36 996	
Estonia	4 754	4 270	4 387	4 088	4 529	3 834	3 562	
Ireland	2 108	2 069	2 152	2 511	2 318	:	:	
Greece	:	:	:	:	389	327	:	
Spain	5 466	5 406	4 114	4 141	5 913	5 939	5 939	
France	17 223	16 808	15 857	17 897	17 494	14 922	:	
Croatia	2 675	2 628	2 469	2 394	2 426	2 385	2 596	
Italy	1 891	5 588	3 352	3 352	:	:	:	
Cyprus	2	2	2	2	2	2	2	
Latvia	7 423	7 263	7 379	7 827	7 692	6 000	5 500	
Lithuania	3 700	3 547	3 032	3 425	4 052	3 763	3 774	
Luxembourg	136	100	81	58	53	51	56	
Hungary	1 343	1 274	1 155	1 326	1 410	1 091	1 235	
Malta	0	0	0	0	0	0	0	
Netherlands	285	246	215	210	221	202	:	

	2018	2019	2020	2021	2022	2023	2024	Trend
Austria	10 395	9 870	8 504	10 420	10711	10 037	11 197	
Poland	17 794	17 000	16 913	18 508	18 533	17 524	17 735	
Portugal	2 115	1 937	1 974	2 071	2 036	1 373	1 625	
Romania	8 436	8 187	9 169	9 081	7 676	7 845	7 637	
Slovenia	2 833	2 476	1 971	1 977	2 265	2 161	2 403	
Slovakia	5 370	4 967	3 913	4 244	4 130	3 388	4 397	
Finland	26 384	23 211	22 279	26 093	25 702	24 561	25 726	
Sweden	36 600	37 400	37 200	39 300	38 300	34 400	34 400	

Note: ":" indicates that data is not available. *based on the sum of production reported at MS level, estimated using available MS data for the nearest year if a country did not report in a certain year.

Source: (Eurostat, 2025)

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Table 6-38 presents the calculates shares of non-EU imports in the apparent consumption of the main categories of wood-based materials used in furniture manufacturing. The Eurostat data on which the calculations are based refer to quantities of materials measured in cubic metres. The apparent consumption is calculated as EU production plus import minus export.

It should be acknowledged that while the dataset covers intermediate wood products that constitute key inputs to furniture manufacturing, the reported quantities reflect total production and trade and are not specific to furniture end uses. Therefore, the estimated shares of imports in apparent consumption presented in **Table 6-38** should be regarded as proxies for the exposure of furniture manufacturing to imported wood-based materials, rather than as direct measures of import dependence within the furniture sector.

Table 6-38: Share of non-EU imports in EU consumption of wood-based intermediates.

	Sawnwood (including sleepers)	Veneer sheets	Plywood	Particle board, oriented strandboard (OSB) and similar board	Fibreboard
2015	10%	31%	46%	4%	5%
2016	10%	27%	46%	6%	5%
2017	11%	35%	44%	8%	7%
2018	13%	36%	50%	7%	9%
2019	13%	45%	49%	6%	9%
2020	13%	44%	54%	7%	11%
2021	16%	45%	51%	7%	10%
2022	11%	55%	50%	7%	7%
2023	7%	50%	49%	4%	11%
2024	6%	37%	44%	4%	8%

Note: EU estimates based in the data available at the MS level for the nearest year if a country did not report in a certain year.

Source: own calculations (Eurostat, 2026g)

As the table shows, the reliance of the EU furniture manufacturing on non-EU imports of wood-based inputs is relatively weak, for most products. In particular, the dependency regarding sawnwood, one of the main inputs of the industry, is around 10%, with a slight decline in the past 3 years for which data is available. The highest dependency is exhibited by veneer sheets and plywood, while the lowest is given by particle board.

According to trade data provided by (Eurostat-Comext, 2026), the top 10 import source countries for wood sawn (HS2-4-6 code 4407) are Ukraine, Norway, Cameroon, Brazil, Bosnia and Herzegovina, United Kingdom, Switzerland, United States, Gabon,

Canada. However, Ukraine is by far the largest source of wood sawn import to the EU-27, with over 676 thousand tonnes in 2024 and over 581 thousand tonnes in 2025. By comparison, Norway, the second largest source has provided only about 387 thousand tonnes in 2024 and around 400 thousand tonnes in 2025.

Ukraine is also a top country from which EU-27 imports sheets for veneering (HS2-4-6 code 4408). Other top source countries of this intermediary material are Gabon, Ivory Coast, Serbia, United States, Cameroon, United Kingdom, China, Kazakhstan and Türkiye. Particle board, oriented strand board "OSB" and similar board (HS2-4-6 code 4410) are imported mainly from Ukraine, Switzerland, United Kingdom, Norway, Türkiye and China. Türkiye is the main import source country for fibreboard (HS2-4-6 code 4411) followed by Switzerland, China, Ukraine, Brazil, Norway, United Kingdom and Serbia. Smaller amounts, of around 1 thousand tonnes, are also imported from Thailand, United States, Canada and Chile.

Finally, China and Brazil are competing for the first place as source of import of plywood, veneered panel and similar laminated wood (HS2-4-6 code 4412) in the EU. While in 2024 China was the leader by a large margin, this margin has shrunk in 2025 when imports from China and Brazil have reached 488 thousand tonnes and 456 thousand tonnes respectively. Ukraine follows in the 3rd place with 145 thousand tonnes, while Chile, Viet Nam and Indonesia follow with quantities below 100 thousand tonnes.

Table 6-39 shows the top 10 non-EU source countries from which the EU imports the main wood-based intermediaries used in the furniture industry, along with the amounts imported in 2025.

Table 6-39: Imports of wood-based intermediaries from top 10 source countries ('000 tonnes, 2025).

Partner	4407 - Wood sawn	Partner	4408 - Sheets for veneering	Partner	4410 - PB, OSB and similar	Partner	4411 - Fibreboard of wood or other ligneous materials	Partner	4412 - Plywood, veneered panel and similar laminated wood
Ukraine	581	Gabon	61	Ukraine	278	Türkiye	187	China	488
Norway	400	Ukraine	54	Switzerland	160	Switzerland	108	Brazil	456
Cameroon	18	Ivory Coast	21	United Kingdom	108	China	62	Ukraine	145
Brazil	158	Serbia	18	Norway	99	Ukraine	54	Chile	81
Bosnia and Herzegovina	139	United States	16	Türkiye	43	Brazil	35	Viet Nam	74
United Kingdom	121	Cameroon	14	China	25	Norway	29	Indonesia	42
Switzerland	121	United Kingdom	11	Serbia	3	United Kingdom	19	Gabon	32
United States	116	China	8	Malaysia	1	Serbia	16	Türkiye	28

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Partner	4407 - Wood sawn	Partner	4408 - Sheets for veneering	Partner	4410 - PB, OSB and similar	Partner	4411 - Fibreboard of wood or other ligneous materials	Partner	4412 - Plywood, veneered panel and similar laminated wood
Gabon	105	Kazakhstan	6	Montenegro	1	Thailand	1	Kazakhstan	26
Canada	77	Türkiye	6	Thailand	1	United States	1	Georgia	21

The import data suggest that the EU-27 relies on a relatively concentrated group of non-EU suppliers for several wood-based intermediate inputs used in furniture and related wood-product value chains. Ukraine is the most prominent supplier across several categories of wood-based intermediaries and is especially dominant in sawn wood imports. This creates a potential vulnerability for EU downstream users, including furniture manufacturers, where supply disruptions or logistical constraints affecting Ukraine, particularly in the context of the ongoing war, could have wider effects. In other product groups, export exposure is more dispersed but still concentrated around a limited number of non-EU suppliers: Türkiye for fibreboard, China and Brazil for plywood-type products, and several tropical-wood-producing countries for veneer sheets. The EU is therefore not dependent on one country across all wood inputs, but it does rely on a relatively small set of external suppliers for specific materials.

Questions for stakeholders

Q2-26: Are there significant market barriers, supply-chain risks or raw-material challenges that are not sufficiently captured in this analysis? Please provide supporting evidence where possible.

6.7. Preliminary conclusions and recommendations Task 2

The market analysis confirms that furniture represents a large and diverse product group characterised by a fragmented manufacturing structure, extensive intra-EU trade, and substantial variation in products and. While the sector is dominated by micro-enterprises, which account for approximately 92% of furniture manufacturers in the EU, production, trade and consumption are concentrated in a limited number of product groups, which are very diverse and broad. The analysis therefore supports the use of representative product categories in subsequent tasks rather than the assessment of the furniture sector as a single homogeneous product group. Moreover, in the development and assessment of the future ESPR requirements, careful consideration should be given to proportionality, compliance costs and implementation feasibility for SMEs.

The market analysis, stakeholder consultation and review of emerging business models indicate growing interest in product durability, repair, reuse and refurbishment across the furniture sector. In particular, stakeholder consultation indicates that durability is consistently regarded as the most important circular design feature across

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all furniture categories, while consumers are also perceived to value extended warranties, repair information and the availability of spare parts. In contrast, service-based business models such as Furniture-as-a-Service currently appear to have limited relevance in household markets, although they are emerging in some business-to-business segments. These aspects may therefore warrant particular attention in the identification and assessment of policy options in the subsequent tasks of the study.

The assessment conducted under this task further highlights the importance of raw material availability and supply-chain resilience. Wood remains the dominant material used in furniture manufacturing and the sector faces increasing competition for wood resources from other industries. While the EU appears largely self-sufficient in several key wood-based intermediate products, dependency on non-EU suppliers remains significant for some materials, particularly veneer sheets and plywood. These findings suggest that future policy measures should consider both material efficiency, including strategies that reduce demand for virgin materials through durability, repairability and increased use of recycled content, and the availability of sustainable material inputs.

A further finding concerns the role of digitalisation and innovation in supporting the transition towards a more circular furniture sector. Emerging practices include the use of digital design tools, product visualisation technologies, digital sales channels, take-back programmes, refurbishment services and innovative bio-based or recycled materials. These developments demonstrate that circular business models and product design approaches are already emerging in parts of the sector and may provide useful evidence for the development of future policy measures. In particular, take-back and refurbishment schemes can provide practical insights into the product characteristics that facilitate product lifetime extension, repair, refurbishment and material recovery, while innovations in materials and design may inform future product requirements related to durability, repairability and resource efficiency. Thus, even if ESPR regulates products rather than business models, existing business models can provide evidence about which product features support circular outcomes and are therefore relevant when designing product requirements.

The analysis also identifies a number of important data limitations. Significant gaps remain regarding furniture waste generation, repair activities, reuse volumes, second-hand markets volumes and end-of-life management practices across Member States. Data availability is particularly limited for measuring the contribution of circular business models and material flows. Further data limitations arise from confidentiality in Member State production data and the lack of comparable physical import and export data for most furniture categories, which restricts the estimation of apparent consumption and furniture stock in physical units. These limitations should be considered during the construction of the base cases and in the assessment of policy impacts in subsequent tasks.

In terms of product scope for the Impact Assessment study, the market analysis conducted in this task supports maintaining a broad scope, while focusing the quantitative assessment on the most economically significant furniture categories. Production, sales and apparent consumption data indicate that a relatively small number of product categories, as classified by Prodcom, account for a substantial share of the EU furniture market. In particular, kitchen furniture, upholstered seats with wooden frames, wooden dining and living room furniture, wooden bedroom furniture,

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other wooden furniture, wooden office furniture, furniture parts and metal furniture emerge as the most relevant product groups from a market perspective.

The furniture market is found to be highly heterogeneous in terms of materials, product lifetimes, business models and circularity potential. It is therefore clear that the Impact Assessment will need to consider furniture product categories separately where significant differences exist in their market characteristics and circularity performance. In particular, furniture parts warrant separate consideration due to their relevance for repair, refurbishment, remanufacturing and lifetime extension strategies. Their role in enabling circular business models could be explored further when developing policy options.

The market analysis suggests that representative base cases should be selected from among the furniture categories with the highest production, sales and apparent consumption, while simultaneously reflecting the principal material systems and use patterns of furniture products placed on the EU market. The evidence collected under Task 2 indicates that the following categories should be considered as candidates for representative base cases:

- kitchen furniture;
- wooden dining and living room furniture;
- furniture parts;
- upholstered seats with wooden frames;
- wooden bedroom furniture;
- metal furniture.

The above categories account for a significant share of production, sales and consumption within the EU furniture market, while also reflecting differences in product function, material composition and market characteristics. Together, they provide a representative basis for the assessment of potential policy impacts.

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7. MEErP Task 3 – Users

7.1. Objectives of MEErP Task 3

Task 3 of the MEErP Users traditionally covers consumer behaviour in the use phase relating to energy use. In the revised methodology, Task 3 is intended to identify social, cultural and infrastructural barriers or restrictions to potential ecodesign measures and relevant user-specific parameters. Task 3 should therefore investigate pre-purchase, post-purchase and disposal behaviour and specifically consider purchasing reasons, second-hand/refurbished/repaired products, consumer information, willingness to pay, circularity barriers, infrastructure and the influence of design aspects on purchasing decisions.

For furniture, this makes purchasing behaviour particularly relevant because longer product lifetime is a central circularity objective, while the realised service life can be shortened by replacement decisions that occur before technical failure. The purpose of this section is therefore not to define one “average” furniture consumer, but to identify the demand-side conditions that can enable or constrain the uptake of more durable, repairable, reusable and resource-efficient furniture. This means, additional factors influencing how a product is bought, used, maintained and discarded, e.g. maintenance practices, repair networks, second-hand markets, collection and take-back schemes as well as influencing factors on the actual service life of furniture play a greater role.

Specifically task 3 aims to supply the user-side evidence needed to assess several of the Article 5(1) product aspects that cannot be determined from technical/material analysis alone, notably repair maintenance/refurbishment practices (as distinct from technical feasibility, covered in Task 4), reusability in practice, and the behavioural drivers of premature disposal and expected waste generation.

Task 3 therefore aims to:

- Analyse pre-purchase aspects including consumer groups, frequency of purchase, purchasing channels, drivers, behaviour and motivations.
- Identify typical use and misuse patterns during the use phase, real lifetime data on how long people actually keep furniture (as compared to maximum technical lifetime), how they maintain it, and why they finally discard or give it away.
- A mapping of engagement in potentially lifetime extending circular practices including a mapping of typical behaviours, infrastructure and barriers and enabling factors to repair, reuse (second-hand/resale), and refurbishment.
- Furthermore, data will be collected and analysed on typical end-of-life decisions made by consumers, typical collection routes and patterns as well as the condition of discarded furniture items. Collection and waste treatment practices, channels and actors may vary significantly by Member State and regional conditions.
- Task 3 aims to supply the behavioural and user perspective evidence base for Task 4's technical mapping and Task 5’s Base Case definition and Task 6's design options. The most important takeaways from Task 3 is data on how long

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furniture stays in use and design aspects and factors influencing the actual lifetime of furniture.

7.2. Consumer Purchasing Behaviour

The evidence base is heterogeneous. The most detailed EU-wide furniture-specific consumer survey dates from 2013 and covered 5,072 consumers in ten European countries, while newer evidence is often country-specific, commercially produced or focused on selected furniture types or circular practices (CEPS/CSIL, 2014). More recent studies from Croatia, Germany, Finland and other European countries are therefore used to triangulate the main patterns, but their results are not treated as a statistically representative EU-wide ranking (Pirc Barčić et al., 2021; Knauf, 2015; Hakala et al., 2015). Furthermore, data from the ESPR Preparatory Stakeholder survey are taken into consideration to better understand interconnections between aspects, get insights into real-world industry experience and observed consumer behaviours in real-world settings.

7.2.1. Consumer Groups

EU furniture consumption is dominated by domestic consumption, which accounts for 82% of overall furniture consumption, while non-domestic consumption accounts for approximately 18% and is mainly linked to office furniture (Saes et al., 2024). Household users are therefore the central demand-side group for Task 3, but office, hospitality, education, healthcare and public-sector buyers remain relevant because purchasing contexts, functional requirements and replacement decisions can differ between these segments (Saes et al., 2024). For office furniture, (Mura, 2025) reported that in 2024 EU consumptions, was dominated by furniture for corporate offices and small businesses (69%), followed by furniture for public service offices (14%), education, libraries and other uses (10%) and, with a rising share compared to 2019, home office furniture (7%). This is broadly consistent with earlier EU-level estimates suggesting that public-sector expenditure represents around 15% of the office furniture market (European Environment Bureau, 2017).

The distinction is also policy relevant. Public procurement represents a separate demand channel because the ESPR allows for mandatory Green Public Procurement requirements to be set, and the JRC methodology explicitly links the assessment of such requirements to evidence from Task 3 as well as later tasks. This means that household-oriented consumer information and professional or public procurement criteria should not automatically be assumed to operate in the same way.

Buyers of furniture can be distinguished into three main user groups: private consumers (B2C), private professional and institutional buyers (B2B), and public-sector buyers. These groups differ in purchasing processes, decision criteria and the role that product information can play.

1. **B2C (private/domestic) buyers**: Private individuals furnishing a home are the largest buyer group by volume for most domestic furniture (storage furniture, domestic seating, outdoor furniture). This buyer type is characterised by low-

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frequency purchasing decisions (furniture is bought rarely relative to most consumer goods), high price sensitivity in the mass-market segment, and purchase decisions driven substantially by aesthetics, fit-to-space and occasion (moving house, redecorating, life events) rather than by a structured evaluation of durability or sustainability credentials. Consumers may use information such as guarantees, Ecolabels, brand reputation, materials and, especially for online purchases, consumer reviews as proxies for product quality. Where such information is absent, however, individual consumers generally have limited technical knowledge to independently assess durability, reparability or expected lifetime. Consumer-facing ESPR information therefore needs to be understandable and linked to attributes that are meaningful at the point of purchase. The assessment of typical consumer behaviour and factors influencing actual service lifetime is particularly relevant for this group..

2. **Private B2B/contract and institutional buyers**: Office furniture, hospitality/contract furniture, and furniture for privately operated institutional settings, including education and healthcare, are typically bought by a procurement function acting on behalf of an end user who has little or no say in the purchase. Private B2B/contract buyers purchase at larger scale and lower frequency per unit of furniture placed on the market, are more likely to evaluate total cost of ownership (including expected lifetime, maintenance or refurbishment cost and resale/residual value) rather than purchase price alone, and increasingly build sustainability criteria (recycled content, take-back commitments, EPD availability) into tender specifications, particularly where the buying organisation has its own corporate sustainability reporting obligations. This buyer type is also the one most likely to already engage with leasing/subscription models and manufacturer take-back schemes, since asset management practices in this segment are generally more formalised than in domestic purchasing.

3. **Public procurement (GPP-relevant purchasing)**: Public sector bodies and publicly operated institutions, including (public service offices, schools/universities, hospitals, prisons, libraries, and sports facilities form a distinct buyer group with particular relevance to ESPR. The same types of institutional end uses may therefore fall under either private B2B or public procurement depending on whether the purchasing organisation is privately or publicly operated. Public procurement is one of the few channels where sustainability criteria can be mandated directly through purchasing rules rather than relying on end-consumer choice. EU GPP (Green Public Procurement) criteria for furniture already exist and may give this buyer segment more structured environmental purchasing criteria relative to private B2C and private B2B purchasing (Donatello, Shane et al., 2017).

4. **Intermediary/channel buyers**: Furniture manufacturers rarely sell directly to the end user; retailers, distributors, and (increasingly) online marketplaces sit between production and the final buyer and exercise their own purchasing power and assortment decisions that shape what is actually available to B2C and smaller B2B buyers for purchase. This intermediary layer is often the retailer, not the manufacturer or the end consumer, and often determines which durability/sustainability information reaches the point of sale (own-brand product specifications, private-label sourcing decisions, marketplace listing requirements). Online marketplaces add complexity: third-party sellers on a marketplace

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platform may not be subject to the same assortment curation as a retailer's own buying process, which must be taken into account when determining if any future ESPR information requirement actually reaches the point of purchase across different retail channels.

Questions for stakeholders

Q3-1: What approximate share of sales is B2C, B2B/contract and public procurement, and does this materially affect product specifications, consumption preferences and expected lifetime?

Q3-2: Do products sold through B2B/contract channels differ systematically from equivalent domestic products in durability, construction, repairability, warranty, maintenance or expected lifetime? Please provide examples or quantitative ranges.

7.2.2. Consumption patterns

The most detailed consumer evidence comes from a European Commission consumer survey conducted in 2013 with 5,072 consumers across ten European countries, namely Italy, Germany, France, Austria, the United Kingdom, Poland, the Netherlands, Romania, Sweden and Spain (Csil et al., 2014). Even though the survey results might be somehow outdated, the survey remains useful because of its detailed and furniture-specific character. Still, Uncertainty regarding the timeliness of the survey results was taken into account when analysing today's purchase behaviour, especially given the expanded use of online channels, rising inflationary pressure and relatively new circular business models (Boston Consulting Group (BCG), 2025; Csil et al., 2014; Malby et al., 2025; Simon-Kucher & Partners, 2024).

Frequency of purchase

Furniture is a durable product category and is, on average, purchased less frequently than many consumer goods. Still, the evidence does not support treating it simply as a once-in-a-lifetime purchase. A substantial share of consumers reported recent purchases or near-term purchase intentions, although results are not directly comparable because time windows, samples and markets differ.

In the (Csil et al., 2014) consumer survey from 2013, 83% of respondents indicated they had either purchased furniture during the previous three years or planned to purchase within the following twelve months while no significant difference was observed between the surveyed countries. The most frequently named furniture categories included storage furniture, such as wardrobes, closets or TV furniture (mentioned by 50% of respondents), followed by sofas and/or armchairs (42%), beds and mattresses (42%), and kitchen furniture (29%).

In a more recent Croatian survey, 72.5% of respondents said they had purchased furniture at least once during the previous year and 48.3% reported one to two purchases, although the non-representative sample limits wider generalisation (Pirc Barčić et al., 2021). Additionally, a German study (Popp, 2023) investigated how many percent of Germans that had bought furniture or home furnishings from IKEA in the

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past two years were planning to so again in the next two years in 2021. For different furniture categories, the following values were found (see Table 7-1)

Table 7-1: Share of previous IKEA buyers (past two years) planning to buy furniture or home furnishing at IKEA in the next two years.

Furniture category	Living room	Dining room	Kitchen	Bedroom	children's room	Bathroom	Outdoor furniture
Share in %	50.7%	31.5%	29.5%	34.7%	29.3%	28.0%	33.8%

Source: Adapted from (Popp, 2023).

For most furniture categories, around one third of respondents indicated that they were planning to buy furniture in the next two years again, while for living room furniture and furnishing the share was substantially higher at above 50% (Popp, 2023).

In general, furniture purchasing appears to have become more frequent over time, as Technopolis notes a shift away from furniture as a lifetime purchase and towards more regular buying and replacement over roughly the past two decades. This shift matters because more frequent replacement can reduce realised product lifetimes even when products remain technically usable (Saes et al., 2024). This means, purchase and disposal decisions can also reinforce each other. Qualitative research on sofas found that selling, donating or otherwise giving away existing furniture can create physical and social “room” for new acquisition, while replacement before technical failure was described as normal and socially accepted, especially when donated rather than thrown away (Haugrønning et al., 2021).

Questions for stakeholders

Q3-3: Do you have quantitative consumer data on the frequency of purchase of different furniture types, ideally differentiated by B2C, B2C and public procurement purchase.

Purchase channels

Furniture purchasing is becoming increasingly hybrid. Physical stores remain important for the transaction itself, while online channels play a substantial role in search, comparison and pre-purchase information. According to a BCG consumer survey, which covered 16,412 respondents across nine European countries, 32% of European consumers claimed to use online channels as their main source of information for furniture purchase decisions, while 15% say they regularly buy furniture online (Malby et al., 2025). Looking further into delivery practices, 53% of surveyed European consumers usually use home delivery as their main delivery method, while the remaining consumers claimed to use mixed channels or in-store pick-up only (Boston Consulting Group (BCG), 2025). (Olšiaková, 2026) (survey among JYSK customers in Slovakia) similarly find a prevalence of physical stores (54% shopped exclusively in such stores), while 32% claimed to use both physical and online channels and 14% shopped exclusively online. Evidence from Croation consumer research similarly found that physical stores remained dominant, but online furniture purchasing increased from

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6.5% before COVID-19 to 14.3% during the pandemic; manufacturer websites and seller/webshop websites were among the most frequently used information sources (Pirc Barčić et al., 2021).

Second-hand channels form a relevant but still non-mainstream part of furniture acquisition. (Malby et al., 2025) reports that 20% of surveyed European consumers regularly buy second-hand furniture. (Simon-Kucher & Partners, 2024) report that 56% of Europeans have pre-owned furniture, while (Hakala et al., 2015) show that second-hand and inherited furniture can be particularly important for young consumers with limited budgets.

Questions for stakeholders

Q3-4: Do you have quantitative data on the share of online purchases for furniture as compared to physical purchase channels? Please differentiate by furniture type, consumer groups, etc., sales market, etc.

7.2.3. Purchase drivers

Across the furniture-specific evidence, purchase decisions are primarily shaped by whether a product meets immediate functional, aesthetic, quality and budget requirements. Sustainability and circularity can influence the decision, but they generally appear as additional criteria rather than the first filter. The relative ordering varies by study and consumer segment, yet the same core clusters recur consistently. The exact ordering of importance varies by study and market segment, but durability/quality, functionality, design/appearance and price repeatedly emerge as the strongest clusters. Evidence further suggests that purchase behaviour is context dependent. Consumers can place strong value on functionality, design and quality while still making the final choice within a constrained price range, and recent economic pressure can increase the weight of affordability in that trade-off (Csil et al., 2014; Knauf, 2015; Malby et al., 2025; Pirc Barčić et al., 2021; Saes et al., 2024). In mass-market purchasing, price, visual fit, functionality and perceived quality are particularly important, while consumers have limited ability to assess technical characteristics such as durability or repairability without supporting information (Csil et al., 2014). (Furmston, 2026) further identify housing moves, preferences for new items and changing interior trends as relevant acquisition triggers.

In professional purchasing contexts (e.g., office, hospitality, education, healthcare and other contract furniture) furniture is typically purchased through organisational procurement rather than directly by the final user. Design, price, quality and material characteristics remain important, but requirements can differ strongly by application: hotels may place greater emphasis on overall design, whereas hospitals and other intensive-use settings may prioritise safety and resistance to heavy use. Public procurement is particularly relevant to ESPR because sustainability requirements can be incorporated directly into purchasing criteria rather than relying only on individual consumer preferences.

Demographic variables alone appear to explain only part of purchasing behaviour. In a 2025 survey of 320 JYSK customers in Slovakia, gender did not significantly influence whether respondents purchased furniture and age did not significantly influence the

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preferred physical-versus-online shopping channel (Olšiaková, 2026). However, a Croatian wood-furniture survey by (Pirc Barčić et al., 2021) found age differences in information behaviour: 45% of 18-24-year-olds sought detailed product information compared with 20% of respondents aged 65+, while older respondents were more likely to consult experts. (Hakala et al., 2015), based on interviews with 22 young consumers in Germany and Finland, found that limited budgets strongly shaped acquisition choices. Low-cost new furniture was often combined with second-hand, inherited or recycled furniture, while entry into working life could enable more selective and expensive purchases. Sustainability was therefore sometimes expressed through the acquisition channel rather than through the purchase of explicitly eco-labelled products. **Table 7-2** summarizes the available evidence on the importance of product characteristics and consumer considerations in purchase decisions.

Table 7-2: Importance of purchase drivers for furniture.

Cluster and related concepts	Overall importance	Furniture-specific evidence
Functionality & fit for purpose: Functionality; practical use; fit to needs/space; convenience	Very high	(Csil et al., 2014) identifies fit for purpose among the leading criteria. (Pirc Barčić et al., 2021): (Croatian wood-furniture survey), 96% rated functionality important/very important. (Furmston, 2026 and Knauf, 2015) also identify functionality as a dominant purchase factor.
Durability & perceived quality: Durability; stability; material/surface quality; expected lifetime; resistance to wear	Very high	Durability was one of the leading (Csil et al., 2014) criteria and 82% stated willingness to pay for greater durability. (Pirc Barčić et al., 2021) found 90% importance for material/surface quality. (Knauf, 2015) and (Hakala et al., 2015) likewise link quality strongly to stability, longevity and repairability.
Design & aesthetics: Appearance; style; taste; trends; visual fit; interior coherence	Very high	Design was among the most important criteria in (Csil et al., 2014). (Pirc Barčić et al., 2021) found 93% rated design important/very important. (Knauf, 2015), (Hakala et al., 2015) and (Furmston, 2026) all identify appearance or style as a central furniture-specific driver.
Price & value: Affordability; low price; value for money; ability to save	Very high	Reasonable price was a decisive (Csil et al., 2014) criterion. (Boston Consulting Group (BCG), 2025) reports (2025) 65% of German respondents mentioning value for money and 53% mentioning the ability to save/low price. Price is also central in (Knauf, 2015) and especially important for young first-home consumers in (Hakala et al., 2015).
Ease of care & maintenance: Easy cleaning; maintenance effort; serviceability	High	(Csil et al., 2014) found 78% willingness to pay for ease of maintenance. In (Pirc Barčić et al., 2021), cleaning and maintenance was important/very important for about 84%. This indicates that lifetime-related attributes can matter when they translate into practical user benefits.

Cluster and related concepts	Overall importance	Furniture-specific evidence
Health & material safety: Protection of human health; no hazardous substances; safer materials	High	In (Csil et al., 2014), 75% expressed willingness to pay for protection of human health and 76% considered information on hazardous substances important. Health therefore appears to be a comparatively tangible sustainability-related benefit.
Environmental sustainability: Lower environmental impacts; local sourcing; responsible materials/origin	Medium	Environmental friendliness ranked below design, function, quality and price in (Csil et al., 2014). (Boston Consulting Group (BCG), 2025) reports sustainability at 28% and local sourcing at 29% among German purchase drivers and finds a declining relevance of sustainability in purchase decisions in the past year, suggesting that under inflation and economic uncertainty, sustainability-related furniture attributes may be weakened by price sensitivity and budget constraints. (Hakala et al., 2015) and (Knauf, 2015) describe ecological aspects as relevant but secondary.
Circularity-related attributes and acquisition: Repairability/refurbishability; recycled content; modularity; reuse/second-hand	Medium / emerging	Young consumers in (Hakala et al., 2015) used second-hand, inherited and recycled furniture to combine environmental values with affordability and budget constraints. (Boston Consulting Group (BCG), 2025) reports 20% regularly buying second-hand furniture. In an upcoming EU Ecolabel stakeholder survey, repair/refurbishment and material choice were frequently selected as relevant for certified furniture purchasing.
Brand, familiarity & reputation: Brand; familiarity; loyalty; brand as quality proxy	Low as a direct driver	(Csil et al., 2014) generally ranked brand low, and (Pirc Barčić et al., 2021) found only about 20% rated brand important/very important. However, (Furmston, 2026) note that consumers may rely on brand reputation and price as proxies when objective durability information is unavailable.

Source: Own illustration

This pattern indicates that sustainability-related features can matter, but they compete with purchase drivers that are more immediate and personally salient to users, such as design, taste, functionality, price and perceived quality. It also suggests that ESPR-related information is more likely to influence choices when it is linked to concrete user benefits, such as longer durability, easier maintenance, safer materials or better resistance to wear and tear.

Questions for stakeholders

Q3-5: Which product characteristics that could potentially be regulated under ESPR currently influence actual purchasing or procurement decisions: expected lifetime, repairability, recycled content, material composition, refurbishment capability or take-back? Can the relevance of these product aspects be quantified and can you provide quantitative data on this?

7.2.4. Role of sustainability and circularity in purchase decisions

The strongest furniture-specific evidence indicates an attitude-behaviour gap. In (Csil et al., 2014), willingness to pay was highest for attributes with direct user benefits: durability (82%), ease of maintenance (78%) and friendliness to human health (75%). Willingness to pay was lower for environmental friendliness and fair labour conditions (56% each), material origin (32%) and product origin (20%). This suggests that sustainability is more likely to influence furniture choice when it is translated into benefits that are concrete for the purchaser, such as longer life, lower maintenance effort or safer materials.. More recent evidence points in the same direction. In the (Boston Consulting Group (BCG), 2025) consumer survey in Germany, sustainability (28%) and local sourcing (29%) ranked below value for money and low-price considerations. (Hakala et al., 2015) similarly found that ecological considerations mattered to young consumers but were secondary to price, appearance and quality; environmentally motivated behaviour was often realised through second-hand or inherited furniture rather than through purchasing new eco-labelled products (highlighting the importance of price).

When specifically looking at circularity aspects, surveys and market reports show that many consumers are at least open to pre-owned furniture, even if ownership preferences and quality concerns remain barriers. (Simon-Kucher & Partners, 2024) report that 56% of Europeans have pre-owned furniture, and globally 62% of Gen Z respondents reported having pre-owned furniture compared with 44% of Baby Boomers. The Eurobarometer survey 388 (European Commission, 2014), although less recent and mostly not furniture-specific but EU-specific, found that 55% of respondents would buy furniture second-hand. The survey also provides broader evidence on barriers to circular consumption, although the results are not furniture-specific and should therefore be used only as supporting context. Among barriers to buying second-hand products, 43% of respondents mentioned lower quality, 41% health and safety concerns, and 20% respectively less appealing appearance or never having thought about it. For refurbished products, 52% claimed to prefer a new product, while 39% lacked trust in quality and around one third had never heard of the option or reported that the option was not available in their area. 22% saw no price advantage compared with buying new. The same Eurobarometer data showed that ownership preferences were a major barrier to access-based models. For leasing or renting, 61% of respondents preferred to own the product while for sharing schemes, 54% preferred to own the product. Other relevant barriers identified were accessibility (limited available offers) or a lack of awareness of any offers (European Commission, 2014).

Inputs from a recent EU Ecolabel furniture stakeholder survey (conducted in parallel to the ESPR stakeholder survey) points to limited market penetration and limited consumer awareness of the EU Ecolabel scheme. Among respondents, 37% stated that consumers or purchasers are generally not aware of the EU Ecolabel when buying furniture, while 23% believed certified furniture is perceived as more expensive. The available stakeholder responses suggested a possible price premium in the range of 0-20%, although this could not be quantified accurately and may vary between products. These findings should be interpreted as stakeholder perceptions rather than direct measurements of consumer willingness to pay. When the same stakeholders were

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asked which design aspects matter most for purchasing or procurement of EU Ecolabel certified furniture, durability/expected lifetime was selected most often, followed by design for repair or refurbishment and material choices, price, recycled content and safer material profiles. These findings are to some extent consistent with other furniture but eco-consciousness and health-aspects, in general, were slightly more relevant.

Recent cross-product evidence supports the existence of an attitude-behaviour gap between stated willingness to pay and actual premium payment. PwC's 2024 Voice of the Consumer Survey found that 80% of consumers claimed to be willing to pay more for sustainably produced or sourced goods (not furniture-specific), with some consumers claiming that they were willing to pay on average 9.7% more for certain environmental characteristics (PricewaterhouseCoopers, 2025). For furniture specifically, BCG's European consumer survey revealed that, 52% of consumers regularly considered sustainability in their furniture purchase decision, while only 19% were willing to pay a green premium for furniture (Malby et al., 2025). The EEA's 2024 circular economy survey provides broader EU consumer context by finding that 59% of Europeans were willing to pay more for sustainable products in general, down from 72% in 2007 (European Environment Agency (EEA), 2024). The decline was attributed to inflation and cost-of-living pressures, which is consistent with the affordability concerns reported in more recent consumer sentiment evidence (European Environment Agency (EEA), 2024; Malby et al., 2025). Global consumer evidence also points in two directions: While environmental sustainability has become a standard consideration for many consumers, economic pressure limits uptake. Simon-Kucher & Partners report that the perceived importance of sustainability declined by 6% in 2024 compared with 2022, likely because of inflation and reduced purchasing power. Still, cost remained the primary obstacle, with 38% of respondents finding sustainable alternatives too expensive, while accessibility barriers declined from 25% in 2022 to 12% in 2024 (Simon-Kucher & Partners, 2024).

These results suggest that users respond more strongly to personally meaningful benefits, such as durability, maintenance and health, than to more abstract sustainability attributes such as material origin or country of origin. This also suggest that sustainability claims may be more important when delivering practical benefits to consumers that matter at purchase, such as longer service life, lower maintenance effort or lower exposure to hazardous substances.

Questions for stakeholders

Q3-6: Which ESPR-relevant product information is most likely to influence actual furniture purchase decisions, in particular information on durability, repairability, materials, SoCs, maintenance requirements and environmental performance? Where possible, please differentiate between B2C, B2B and public procurement.

Q3-7:

Low-cost, mass-market furniture are currently an important part of the furniture market, particularly for price-sensitive consumers. Which ESPR requirements or design measures could most effectively improve the environmental performance and lifetime of such products without undermining their affordability?

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7.2.5. Consumer-facing information

Consumer-facing information is particularly important for furniture because purchasers cannot readily observe several characteristics at the point of sale, including expected durability, repairability, material safety and some environmental attributes. (Furmston, 2026) find that consumers often lack objective durability information and therefore rely on proxies such as brand reputation and price. The available evidence also shows that consumers actively search for information, but do not necessarily consider the information currently available to be sufficient or easy to compare. In the 2013 CEPS/CSIL survey, almost 90% of respondents stated that they always or often search for information online before buying furniture, slightly more than 80% always or often use product labels, and around 70% consult shop assistants. Manufacturer websites and seller/webshop websites were among the most frequently used information sources. Information behaviour also differed by age, with younger respondents more likely to seek detailed product information and older respondents more likely to consult experts. However, only 26% of respondents considered the product information displayed in shops to be sufficient, while 66% considered it only sometimes sufficient and 8% considered it insufficient. Importantly for ESPR, 86% stated that it would be important to receive information in a standardised format that enables comparison between furniture products (Csil et al., 2014).

In the survey, consumers were also asked which furniture product information they consider important. **Table 7-3** summarises the results. These findings indicate that consumers want information that helps them judge practical performance and safe use, and that sustainability information should be connected to these information categories where possible. The fact that hazardous substances were considered important by a majority of respondents also shows that health-related information can be a strong entry point for sustainability-relevant product communication.

Table 7-3: Attributes valued in consumer-facing information.

Information category	Considered important (%)	Implication
Durability	81%	Directly relevant to expected service life and one of the strongest information demands.
Dimensions	80%	Shows the importance of immediately practical, product-specific information.
SoCs	76%	Health and safety information is highly salient and can provide a concrete entry point for sustainability communication.
Materials used	68%	Relevant for quality, maintenance, safety and environmental interpretation.
Cleaning instructions	68%	Links pre-purchase information to maintenance effort and potential lifetime.

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Information category	Considered important (%)	Implication
Environmental sustainability	51%	Relevant to a majority, but less important than performance, dimensions and health-related information.
Disposal and recycling instructions	Around 40%	Lower pre-purchase salience than durability, use and maintenance information.

Source: Adapted from (Csil et al., 2014).

However, more information is not automatically better information. (Knauf, 2015) found, for example, that explicit lightweight framing increased scepticism about quality despite higher acceptance when equivalent functionality and appearance were guaranteed. A small qualitative study of young German and Finnish consumers also reported scepticism towards existing environmental labels and difficulty identifying actual country of origin (Hakala et al., 2015). Persisting greenwashing concerns reinforce the need for substantiated and comparable claims. Simon-Kucher & Partners found that 57% of consumers across product groups feel that greenwashing occurs at brands they use, and around 80% sometimes or always conduct their own research before purchase (Simon-Kucher & Partners, 2024). A 2025/2026 industry report found that 76-78% of furniture shoppers would pay more when sustainability claims are substantiated (Ward, 2025).

For ESPR, this points towards a practical information challenge: Users are interested in durability, health, and, to some extent, about materials and environmental sustainability, but they need claims to be standardised, comparable and substantiated. Without that, sustainability claims may remain secondary to price, design and functionality, or may be distrusted because of perceived greenwashing. Despite this awareness about already available product information (e.g., via labels and certification schemes) seems to be somehow lacking. For the EU Ecolabel, the recent stakeholder survey suggests that recognition itself may be a limiting factor: Most respondents believed consumers or purchasers were generally unaware of the label when buying furniture. This means that the existence of a credible label does not automatically guarantee influence at the point of purchase. However, the relevance of environmental labels and criteria may vary geographically and by buyer type. Earlier JRC data on furniture procurement showed substantial differences between Member States in the uptake of Green Public Procurement criteria, indicating that environmental purchasing practices are not uniform across Europe (Cordella, Mauro et al., 2014). Visibility, comprehensibility and the ability to connect the label with product attributes that buyers already value is therefore relevant alongside the underlying certification criteria, while labels may already play a more prominent role in procurement contexts.

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Questions for stakeholders

Q3-8: Do you have quantitative evidence or market experience showing that providing specific product information (e.g. expected lifetime, durability class, repairability, warranty, material composition or environmental performance) changes furniture purchase decisions or willingness to pay?

Q3-9: How should information on durability and other circularity characteristics be presented so that consumers can meaningfully compare furniture products? For example, would consumers benefit more from numerical information (e.g. expected lifetime in years), classes/scores, minimum performance levels, or another format?

Q3-10: Which ESPR information should be visible directly at the point of purchase, and which information could instead be provided through a Digital Product Passport or other digital source? Does this differ between physical stores, online marketplaces and professional procurement?

Q3-11: How can ESPR avoid information overload while ensuring that the most relevant environmental and circularity characteristics remain visible and understandable? Which information should therefore be prioritised for consumers at the point of sale?

7.2.6. Conclusions on pre-purchase aspects and purchasing behaviour

The furniture-specific evidence supports several conclusions for the pre-purchase phase.

- First, sustainability information is unlikely to displace the core decision logic of furniture purchasing. Functionality, durability/quality, design and price consistently dominate. ESPR information is therefore more likely to be decision-relevant when sustainability and circularity are expressed through these tangible attributes - for example, expected lifetime, repairability, ease of maintenance, material safety and resistance to wear - rather than through abstract environmental claims alone.
- Second, comparable pre-purchase information appears to address a genuine information and awareness gap. Consumers search online, use labels and consult retailers, yet only a minority consider in-store information fully sufficient, and most consumers favoured a standardised comparison format. For ESPR, this supports making key product information available before purchase in a standardised and comparable form, rather than relying on information that becomes accessible only after purchase. Because purchasing is increasingly hybrid, the same core information should be accessible in physical retail, retailer/manufacturer websites and online marketplaces.
- Third, information quality is at least as or more important than information quantity. The influence of framing, scepticism toward green claims and eco-labels, and the limited EU Ecolabel awareness reported by stakeholders all indicate that poorly explained or weakly recognised claims may have little effect or may even reduce consumer confidence. Consumers might also be overwhelmed by a high amount of reported product information and the high

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number of labels on the market, which may confuse consumers and make it difficult to identify which labels are credible and relevant. ESPR information should therefore be concise, substantiated, easy to grasp and directly interpretable, with harmonised terminology and metrics that allow products to be compared without requiring consumers to have expert knowledge in the field.

- Fourth, information alone is unlikely to overcome affordability constraints. The furniture evidence shows significant interest in sustainability but a much smaller willingness to pay a green premium, while price and value remain among the strongest purchase criteria. This is relevant for ESPR because consumer information can support better choices where alternatives are available, but minimum product-performance requirements may be necessary to improve durability or circularity across the market without depending entirely on consumers voluntarily paying more.

Questions for stakeholders

Q3-12: Which ESPR-relevant product characteristics should concretely be addressed through minimum performance requirements, and which are better addressed through information requirements? Where possible, please propose concrete requirement levels or thresholds, suitable test or assessment methods, and practical approaches for compliance verification and market surveillance.

7.3. Aspects in the use phase

7.3.1. Impacts & saving potential in the use phase

For most furniture products, direct environmental impacts during the use phase are comparatively small, since furniture generally does not consume energy during normal operation. Exceptions may include furniture with electrical or electronic functions, such as electrically height-adjustable desks. For conventional furniture, environmental impacts are instead concentrated primarily in material extraction, manufacturing and other upstream life-cycle stages. This is supported by (Yang et al., 2025b), who assessed 25 furniture products across different categories and found that **traditional use-phase activities of furniture account for less than 1% of total life-cycle impacts** on average. These impacts mainly arise from cleaning, maintenance and care and, depending on the modelling approach, may also include repair activities and replacement of components. Maintenance and cleaning requirements can differ between furniture types, upholstered and textile-based furniture, for example, may require vacuuming, detergents or other cleaning processes and therefore generate somewhat higher use-phase inputs than other furniture types. Nevertheless, the contribution of routine cleaning and maintenance generally remains small compared with the environmental impacts associated with material production and furniture manufacturing (Cordella & Hidalgo, 2016; Yang et al., 2025b).

The main environmental relevance of the furniture use phase therefore lies not in the impacts generated during use itself, but in determining the actual time that the product remains in use. Furniture is generally a durable and comparatively long-lived product.

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Therefore, extending its actual use-time can reduce environmental impacts per year of service by postponing the production of replacement furniture. For example, where the same functional need can be met by using a wardrobe for 20 rather than 10 years, the impacts associated with producing a replacement product are distributed over a longer period (except if keeping furniture longer does not replace new purchase). (Cordella & Hidalgo, 2016) consequently identify durability and the actual duration of use as key parameters affecting the environmental performance of furniture.

From an ecodesign perspective, lifetime extension can therefore provide considerable environmental saving potential through improved durability, maintainability and repairability, provided that these characteristics translate into a longer period of actual use. However, technical durability alone does not determine actual furniture use-time. Furniture may be replaced even if it remains technically functional (Saes et al., 2024). Research on furniture consumption indicates increasing replacement before functional failure and the emergence of shorter-use or “fast furniture” consumption patterns, interpreting furniture items rather as a trend than a durable, long-lasting product (Haugrønning et al., 2021). For ESPR, this distinction is important. Measures supporting technical longevity, including durable construction, repairability and maintainability, remain central because they enable furniture to remain functional for longer. At the same time, the environmental benefit of these measures ultimately depends on whether consumers continue using, repairing, reusing or passing on the product rather than replacing it prematurely. The principal saving potential associated with the furniture use phase therefore lies in aligning technical lifetime with actual service life, thereby reducing the frequency with which new furniture needs to be produced to provide the same function.

7.3.2. Factors influencing lifetime of furniture

A central distinction for furniture is between technical/design lifetime and actual use-time. Technical lifetime describes how long a product is capable of functioning under defined conditions. Actual use-time describes how long it remains in the possession and use of a consumer before it is stored, passed on, replaced or discarded. For furniture, these two periods can diverge substantially because replacement is frequently triggered by aesthetic, situational or social factors rather than by physical failure. Increasing technical durability is therefore necessary but not sufficient to ensure a longer realised service life (Cox et al., 2013; Furmston, 2026; Haugrønning et al., 2021; Saes et al., 2024; Wieser et al., 2015)

The evidence on furniture lifetime combines fundamentally different concepts and methods. Some sources measure how long consumers actually keep furniture, others report desired or expected lifetimes, social acceptance periods, administrative or economic lifetimes, or technical/design estimates. During the ESPR stakeholder survey one manufacturer further noted that there is currently no standardised approach for determining the expected lifespan of furniture, and that actual furniture lifespans are strongly influenced by customer use, which varies widely and is largely outside the manufacturer's control.

Table 7-4 aims to differentiate the lifetime concepts reported in the literature.

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Table 7-4: Different concepts of "lifetime".

Lifetime concept	Meaning in this chapter	Policy relevance / caution
Technical/design lifetime	How long furniture is physically capable of functioning under tested or assumed conditions.	Relevant to durability requirements but can overstate realised lifetime if users replace furniture earlier.
Actual use-time influe	How long a consumer actually uses or keeps the item before storage, passing-on, replacement or disposal.	Most directly relevant to realised furniture impacts and waste generation.
Desired / expected lifetime	How long consumers want or expect a product to last or function.	Influences purchase, maintenance, repair and replacement decisions; should not be treated as an observed lifetime.
Social lifetime	How long an item remains aesthetically or socially acceptable to the user (incl. social norms).	Important for trend-sensitive furniture because it can end before physical failure.
Economic / administrative lifetime	Lifetime used in insurance, depreciation or other administrative/model contexts.	Useful as contextual estimates but not direct evidence of consumer use-time.

Source: Conceptual distinction synthesised from lifetime concepts investigated in Wieser et al. (2015), Cox et al. (2013), Technopolis (2024), Haugrønning et al. (2021), CE Delft (2019) and UBA (2022).

When looking at the main factors influencing the actual lifetime of furniture, evidence indicates an interaction between several interconnected product characteristics and consumer behaviour. The recurring factors below are therefore not independent: Perceived quality shapes expectations, expectations influence maintenance and repair decisions, and the value or attachment assigned to an item influence whether wear is tolerated or treated as a reason for replacement.

The following **Table 7-5** summarises and clusters identified factors potentially influencing the lifetime and their relative importance.

Table 7-5: Factors influencing the lifetime of furniture.

Lifetime influencing factors / concepts	Indicative importance	Evidence
Material and construction quality Durable materials; type of materials; stability; resistance to wear; repairable construction (see also Task 4)	Very high	Physical quality determines how long furniture can remain functional and aesthetically acceptable. Evidence links shorter lifetimes particularly to low-value fast-furniture models, cheaper materials and lower (perceived) durability, while solid wood and robust construction are associated with longevity. (Furmston, 2026) report a substantially lower lifetime for fast furniture.

Lifetime influencing factors / concepts	Indicative importance	Evidence
Functionality and continued fit to user needs Practicality; comfort; size; fit to space; household function	Very high	Furniture is retained while it continues to meet practical needs. In (Furmston, 2026), practicality was the most frequently mentioned characteristic of loved or long-owned objects; loss of practicality was a key reason for falling out of love with an item.
Life stage, household change and space constraints Moving; cohabitation/separation; children; downsizing; room-function changes	Very high	Furniture lifetime is often terminated by a change in the household rather than product failure. Moving, changes in household composition and room refurbishment repeatedly appear as triggers in (Hebrok, 2016), (Furmston, 2026), (Haugrønning et al., 2021) and ESPR stakeholder survey responses.
Aesthetics, style and timelessness Appearance; colour; trends; perceived shabbiness	High	Furniture can be replaced while still functional if it looks worn, dated or no longer fits the desired interior. Trend-oriented furniture therefore has a potentially shorter social lifetime than more timeless designs. This also concern low-priced fast furniture.
Consumer expectations and perceived durability Expected lifespan; confidence in quality; guarantee; price/brand/reviews as proxies	High	(Wieser et al., 2015) show that low expectations can reduce willingness to invest in repair or premium products and can justify early replacement once a product is considered to have “done its time”. Expectations are shaped by price, brand, online reviews and guarantee length, although these are imperfect proxies for durability.
Emotional attachment, meaning and perceived value Memories; inheritance; identity; sentimentality	High	Positive attachment can prolong lifetime by increasing willingness to care for, preserve and repair furniture. (Hebrok, 2016) found inherited furniture was often kept for long periods, while (Furmston, 2026) found sentimentality and memories among the recurring characteristics of longest-owned furniture. Negative attachment can also facilitate disposal.
Economic conditions and repair/replacement calculus Purchase price; repair cost; changing financial situation	Medium to high	Low replacement prices and costly or inconvenient repair can favour early replacement. Qualitative evidence also identifies changes in financial status as situational triggers. However (Furmston, 2026) report that income did not explain disposal motives in their survey, so income alone should not be treated as a consistent predictor.

Lifetime influencing factors / concepts	Indicative importance	Evidence
Maintenance, care and repairability Cleaning; maintenance; repair access; replaceable wear parts	Medium / unknown	Maintenance and repair can preserve functional and aesthetic condition. Conversely, limited guidance, high repair costs, lack of motivation or poor repairability can shorten use-time. Stakeholders in the ESPR survey also emphasised that actual lifetime depends strongly on use and care but reported that actual lifetime extension by maintenance and care practices is not known.
Consumer information and access to services Lifetime information; care advice; repair/reuse infrastructure	Medium	Consumers may struggle to judge durability and often rely on unreliable proxies. (Cox et al., 2013) therefore recommend clearer expected-lifetime information and better signposting to care, repair and reuse services, especially for expensive workhorse products such as large furniture.
Socio-demographic characteristics Age; education; household size; income	Moderate / context dependent	In (Wieser et al., 2015), older respondents showed longer use-times for most products; income and education were also positively related to use-time, while household size was negatively related. Other studies report mixed demographic effects, so these relationships should not be generalised beyond the specific samples.

Source: (Cox et al., 2013; Furmston, 2026; Haugrønning et al., 2021; Hebrok, 2016; Saes et al., 2024; Wieser et al., 2015); ESPR stakeholder survey.

7.3.3. Quantitative evidence on furniture lifetime

The strongest directly comparable consumer evidence in the supplied material comes from (Wieser et al., 2015). Their representative Austrian survey of 1,009 adults aged 18-65 asked respondents how long they typically use selected products before storing, passing on or discarding them. Consumers reported an average use-time of 8.6 years for couches, 8.8 years for desks and 10.5 years for wardrobes. Desired lifetimes were substantially longer: 13.2 years, 17.9 years and 19.0 years respectively. The gap is important for ESPR because it indicates that extending technical durability alone will not automatically produce equivalent extensions in actual use-time. **Figure 7-1** represents the difference between reported consumer lifetimes and expected consumer lifetimes. Other than that, data on actual observed lifetime seems to be mostly lacking in the literature.

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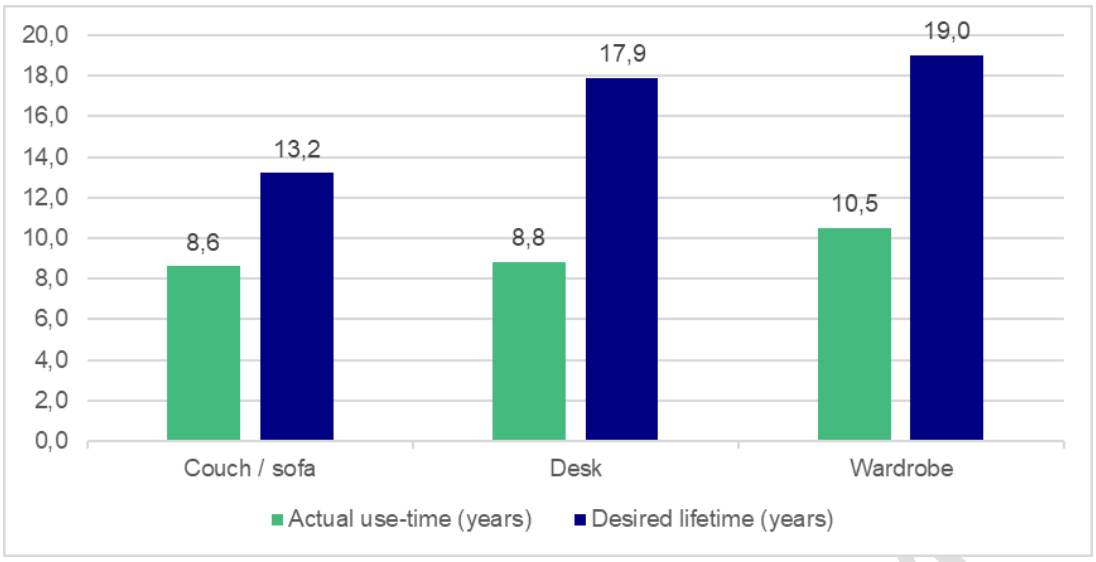

5591

5592 **Figure 7-1: Comparison of actual furniture use-time and expected lifetime of**
5593 **furniture items**

5594 Source: Adapted from Wieser et al. (2015).

5595 As previously explained, the lifetime concept materially differs between studies/reports
5596 and in most cases not even technical lifetime is differentiated from actual lifetime.
5597 Furthermore, categorisation of furniture types differed substantially between datapoints
5598 making meaningful comparative analysis even harder. Some lifetime data found in the
5599 literature that seemed to represent the actually observed time rather than the technical
5600 lifetime (together with the level of confidence) are listed in **Table 7-6** below.

5601 **Table 7-6: Estimations of actual and expected lifetime of furniture**

Furniture type	Actual / reported use-time	Desired / expected lifetime	Evidence type	Source / caution
Couch / sofa	8.6 years	13.2 years	**High confidence.** Consumer-reported actual use-time vs desired lifetime	(Wieser et al., 2015), Austrian consumer representative survey; strongest comparable evidence found.
Desk	8.8 years	17.9 years	**High confidence.** Consumer-reported actual use-time vs desired lifetime	(Wieser et al., 2015), Austria.
Wardrobe	10.5 years	19.0 years	**High confidence.** Consumer-reported actual use-time vs desired lifetime	(Wieser et al., 2015), Austria.
Sofa	5-10 years	-	**Medium confidence.** Social lifespan / period considered acceptable by consumers	(Haugrønning et al., 2021); qualitative/social-lifetime concept, not directly comparable with Wieser et al. (2015).

Furniture type	Actual / reported use-time	Desired / expected lifetime	Evidence type	Source / caution
Sofa	7.8 years	-	**Medium confidence.** Reported lifetime	(Cooper, Furmston, et al., 2021), US data: geographic context differs.
Fast furniture	5-7 years	-	**Low-medium confidence.** Reported typical lifetime	(Furmston, 2026); broad fast-furniture category.
Outdoor furniture	3-4 years, up to 6 years	-	**Low-medium confidence.** Replacement cycle	Reported by (Saes et al., 2024) as secondary source; replacement cycle rather than technical life.

Source: (Cooper, Furmston, et al., 2021; Furmston, 2026; Haugrønning et al., 2021; Saes et al., 2024; Wieser et al., 2015); ESPR stakeholder survey.

A much broader range of lifetime values is available for individual furniture types but the lifetime concept underlying these estimations are not always clear (estimations, commercial, depreciation tables, secondary/blog data or other concepts and data). They are therefore useful for bounding plausible lifetimes but should not be pooled into a single “average lifetime”. Therefore, available evidence is condensed as “ranges” for certain product types (see **Table 7-7**).

Table 7-7: Broad furniture lifetime ranges reported in the literature

Furniture type (& material)	Lifetime reported (years)	Source & type of evidence
Furniture, average	5-20	(Saes et al., 2024)
By material type		
Wooden furniture	10-13	(Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
Metal furniture	10-13	(Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
Plastic furniture	8	(Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
By use context		
Outdoor furniture	3-6	(Saes et al., 2024) estimated typical replacement cycle
Office furniture	Chair: 5-15 Desks: 10-20	(TAUW, 2025) estimation
Retail context	8	(Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
By type/ functionality		

Furniture type (& material)	Lifetime reported (years)	Source & type of evidence
Seating, general	7-15	(Saes et al., 2024) secondary synthesis of several source estimates; (Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
Upholstered seating	7-10	(Saes et al., 2024) secondary synthesis of several source estimates; (Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
Sofa / couch	5-15 Leather/ high segment: up to 20	(Wieser et al., 2015) and (Cooper, Furmston, et al., 2021) consumer data on actual lifetime; (Haugrønning et al., 2021) social lifetime; (Saes et al., 2024) secondary synthesis; (Snijder et al., 2019) economic lifespan in insurance services
Desk/ Table	5-20	(Wieser et al., 2015) primary evidence; (Saes et al., 2024) secondary data synthesis incl. commercial estimates; (Snijder et al., 2019) economic lifespan in insurance services
Bed	5-20	(Saes et al., 2024) secondary data synthesis incl. commercial estsimates; (Snijder et al., 2019) economic lifespan in insurance services; (Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
Storage (incl. wardrobe, chest, shelves, cabinets, etc.)	10-20	(Wieser et al., 2015) primary evidence; (Saes et al., 2024) secondary data synthesis incl. commercial estimates; (Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables
Kitchen	15-25	(Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022) German depreciation tables; European Furniture Manufacturers Federation data; ESPR stakeholder survey

Source: (Cooper, Furmston, et al., 2021; Haugrønning et al., 2021; Saes et al., 2024; Snijder et al., 2019; TAUW, 2025; Wagner, Steinmetzer, Theophil, Strues, Kösegi, et al., 2022; Wieser et al., 2015); ESPR stakeholder survey.

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Questions for stakeholders

Q3-13: Do you have, or can you provide first-hand consumer data on the actual use-time of different furniture types? Where possible, please provide the product type you refer to, average/median lifetimes, distributions or ranges, sample size, geography and information on the reason why use ended.

Q3-14: What is the best available estimate or range for actual first-user lifetime for each furniture base case? Please distinguish this from technical/design lifetime, warranty period and accounting/depreciation lifetime. Please distinguish B2C, B2B and public procurement.

Q3-15: Do you have fleet, warranty, take-back, customer-service, asset-management or disposal data that could be used to validate actual lifetime rather than expected lifetime?

Q3-16: Approximately what share is replaced because of technical/structural failure versus non-technical reasons such as moving, changing space requirements, aesthetics or refurbishment?

Q3-17: Which specific components or failure modes currently limit the useful lifetime of each type of furniture? Would increasing the durability of these components materially extend the actual lifetime of the whole product (taking into account also social reasons for disposal)? Are there furniture types for which further technical durability would provide little benefit because products are normally replaced for non-technical reasons?

7.3.4. Consumer reasons for disposal

Furniture disposal is not synonymous with technical end-of-life. Across the evidence, consumers frequently remove furniture that remains usable because the product no longer fits the household, desired interior or current life situation. The decision to dispose is therefore better understood as the end of a user-product relationship than simply as the point of physical failure. Consumer reasons for disposal strongly correspond to factors influencing the lifetime as discussed before. The following reasons are important for furniture disposal:

- **Life transitions and space changes**: Repeatedly identified across consumer studies and stakeholder input. (Hebrok, 2016) found changing household structure and financial position to be common triggers. (Furmston, 2026) observed disposal during moves, downsizing and family-house clearances. Manufacturers likewise reported relocation and changing household needs as major replacement drivers.
- **Aesthetic change and desire for renewal**: Furniture is often discarded while still functional because it looks dated, worn or no longer fits personal taste. (Haugrønning et al., 2021 and Hebrok, 2016) describe style and room renewal as central drivers. In stakeholder evidence, replacement of kitchens was predominantly attributed to emotional/psychological reasons rather than durability.
- **Functional failure, instability and wear**: Physical failure remains important, especially for workhorse furniture. (Cox et al., 2013) found large furniture is often

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expected to be reliable and may be discarded when broken. However, surface wear and instable appearance can also trigger disposal before functionality is lost.

- **Repair barriers** (see **Section 0**): Barriers include convenience, costs and perceived unrepairability.
- **Loss of practical fit**: (Furmston, 2026) found practicality central to furniture value and a key reason for wanting to discard items. (Hebrok, 2016) also recorded furniture being disposed of because there was no longer a use for it after moving or changing a room function.
- **Low perceived value or lack of attachment**: Emotional value can either extend or shorten lifetime. In (Hebrok, 2016), inherited furniture was often kept longer, whereas some disposers believed old furniture had no value to others or had simply completed its role. (Furmston, 2026) likewise link low attachment to disposability.
- **Ease and convenience of disposal**: Convenient disposal can reduce the incentive to repair or search for a new owner. (Hebrok, 2016) describes the relief associated with freeing space and the convenience of the recycling station; (Furmston, 2026) similarly links disposal to house clear-outs and refreshes
- **Limited knowledge or effort required for reuse channels**: Some consumers seek to reduce waste by passing furniture on, but reuse routes are not always considered or understood. Hebrok (2016) interviewed people disposing of furniture at a recycling centre who noted they had not considered selling or giving away furniture, citing perceived lack of demand or the effort involved. Cox et al. (2013) likewise found limited knowledge of furniture reuse channels.

Hebrok (2016) provides particularly direct evidence because the study interviewed consumers as they brought furniture to a recycling station. Items had been owned for between approximately 2 and 30 years, demonstrating that some furniture was discarded after relatively short use while other items remained in households for decades. Furniture was frequently disposed of because it was worn, considered ugly or unfashionable, or no longer suited the household after a move or change in room function. The study explicitly notes that much furniture reaching the recycling centre had not lost its physical function. The same study illustrates how attachment changes lifetime. Inherited furniture in the sample had often remained with owners for around 7-30 years, suggesting that inherited or emotionally meaningful items can acquire additional value. At the same time, some unwanted furniture was stored in attics or garages for years before final disposal, showing that end-of-use and end-of-life are not necessarily simultaneous.

Recent ESPR survey stakeholder evidence points in the same direction. One manufacturer reported that relocation and aesthetic renovation account for a significant share of disposal. Another stakeholder described that for seven collected kitchens used for an average of 24 years the vast majority were classified as fully functional and reusable or as having only minor repairable damage. The associated consumer feedback indicated predominantly emotional or psychological motives for replacement. This clearly demonstrates that long-lived furniture can still be replaced before technical failure.

Cox et al., 2013) provide a useful conceptual explanation: consumers want products not to break before they are ready to replace them, but they do not necessarily value durability beyond the period for which they expect to keep the item.

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The following chapters further provide recurring reasons and barriers for engagement or non-engagement in maintenance and repair practices by consumers, which were found to be connected to several similar phenomena.

7.3.5. Maintenance practices and consumables

In the next few chapters, practices that have the potential to extend the actual service life of furniture are evaluated and analysed from a consumer behavioural perspective. Since furniture is in general a long-lasting product with a high technical lifetime and low use-phase impacts, the extension the time a piece of furniture actually stays in us, is one of the biggest levers for lowering the environmental impacts of furniture. Such practices include maintenance to avoid premature damages, repair of damaged furniture, as well as reuse and resale practices, for example, when a piece of furniture is not wanted or needed anymore by one consumer but might still be reusable for another user. Therefore, consumer and infrastructure aspects will be analysed, while prevailing barriers to higher uptake will be identified.

Maintenance and care are relevant because the condition of furniture during use influences whether a product reaches its potential service life or is replaced earlier because of aesthetic degradation, functional deterioration or perceived obsolescence. Routine and preventive care can therefore act on the real lifetime of furniture, rather than only on its technical durability. At the same time, data on maintenance are neither well captured in the sales/market statistics, nor in technical test standards. Quantified data on how maintenance extends lifetime is hard to come by.

The environmental relevance is two-sided. Extending furniture life can reduce the need for premature replacement, but maintenance itself can require electricity, water and cleaning or care products. One furniture LCA assumes monthly vacuum cleaning of upholstered parts using a 900 W vacuum cleaner for 80 seconds per month, equivalent to about 0.24 kWh/year. Wet-cloth cleaning is modelled at around 1.5 litres/year for wood, plastic and metal components and around 3 litres/year for sofas or storage units. These figures are, however, modelling assumptions rather than observed consumer frequencies (Yang et al., 2025b). Maintenance can also be environmentally counterproductive when inappropriate cleaning damages the product. One study, for example, reports that common domestic cleaning methods can alter or degrade some upholstery finishes and backcoatings, including fire-retardant treatments. Appropriate care therefore concerns not only the frequency of maintenance, but also the compatibility of methods and products with the furniture material (Yates et al., 1999).

Furthermore, maintenance needs and practices can differ strongly by material type and use context (domestic vs. office/contract).

Types of maintenance

Furniture maintenance covers a spectrum from low-effort routine cleaning to preventive material care. In everyday use, the most basic practices are wiping, dusting and vacuuming, especially for upholstered surfaces. These activities are often integrated into general household cleaning rather than treated as a separate furniture-maintenance routine.

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Reactive cleaning includes spot treatment and stain removal after visible soiling. Upholstery is particularly relevant because households use a range of domestic cleaning methods, sometimes without product-specific or material-specific guidance. Removable textile covers can also be washed where the product is designed for this purpose (Yates et al., 1999). In the ESPR stakeholder survey, one manufacturer reported that machine-washable, tool-free removable covers are standard on its platform.

Preventive care includes oiling or waxing wood, polishing, conditioning leather, retightening screws or fittings, lubricating moving mechanisms, rotating or flipping cushions to distribute wear, and using touch-up products for minor surface damage. These practices aim to slow material degradation or address early signs of wear before more extensive intervention is required (ESPR stakeholder survey) (Ackermann, 2018, 2020; Ackermann et al., 2021).

Variations between furniture and material types

Maintenance requirements differ substantially by material, exposure and use context. This limits the usefulness of uniform maintenance prescriptions across all furniture. ESPR survey stakeholders similarly stressed that upholstered and non-upholstered products require different care, and that exact frequencies or products cannot always be specified generically.

Table 7-8: Exemplary typical maintenance practices of furniture

Furniture/material type	Typical maintenance practices	Specific considerations
Wooden furniture	Wiping; re-oiling or waxing; scratch touch-up; occasional retightening of joints/fittings.	Moisture cycles can contribute to cracking and warping; oil/wax can slow moisture ingress and UV-related degradation. Annual oiling is described as sufficient by consumers for wooden garden furniture in (Ackermann, 2020)
Upholstered furniture	Vacuuming; spot/stain removal; washing removable covers where permitted; occasional professional deep cleaning; cushion rotation/flipping.	Embedded grit can mechanically degrade fibres, and visible staining can reduce aesthetic acceptability. Cleaning methods must be compatible with fabrics, finishes and backcoatings.
Leather upholstery	Gentle cleaning and conditioning.	Care aims to prevent cracking and maintain surface condition; light-coloured leather can be perceived as difficult to keep clean.
Metal / outdoor furniture	Timely treatment of corrosion/rust; cleaning; lubrication of hinges and recliner/tilt mechanisms.	Outdoor exposure increases the importance of maintenance. A manufacturer in the stakeholder survey reported that cleaning outdoor furniture in professional use can substantially affect lifetime.

Furniture/material type	Typical maintenance practices	Specific considerations
Office / contract furniture	Professional cleaning and replacement of wear components	The notes indicate a more developed specialist consumables/refurbishment market for office seating. One manufacturer assumed that B2B maintenance may also be organised through professional cleaning.

Source: (Ackermann, 2020; Gregson et al., 2009); ESPR stakeholder survey.

Questions for stakeholders

Q3-18: Do you agree that these are the most common or relevant maintenance aspects for different types of furniture?

Q3-19: Which preventive maintenance activities materially affect the lifetime of each base case, rather than merely appearance or cleanliness? Is there evidence that carrying out these practices at recommended intervals extends furniture lifetime? Please provide the approximate lifetime difference where possible.

Q3-20: What maintenance frequency, consumables and professional services should realistically be assumed for the Task 5 base cases?

Maintenance guidance and quantitative evidence

The supplied evidence suggests that maintenance guidance is uneven. Furniture-care information is often provided as simple cleaning or care instructions rather than as comprehensive, product-specific maintenance documentation. In the ESPR stakeholder survey, manufacturers gave examples such as wiping with a dry or mildly damp cloth, machine washing covers at up to 40°C where specified, vacuuming with a soft brush attachment, and periodically checking and retightening assembly fastenings. One manufacturer recommended that care and maintenance information be provided in a clear, standardised format through the Digital Product Passport (DPP).

Stakeholders also cautioned against overly generic prescriptions. Manufacturers reported limited visibility of how customers actually maintain furniture and argued that useful instructions need to be tailored to the specific product. Industry-association respondents identified the use of unsuitable detergents or care products as a common misuse pattern and advised against harsh cleaners, solvents, abrasives, standing water, and oils or conditioners not recommended by the supplier.

Selected furniture-specific quantitative evidence is summarised in **Table 7-9** below.

Table 7-9: Quantitative findings on maintenance in furniture.

Evidence	Quantitative finding	Source / interpretation
Cleaning spills on upholstered suites/sofas	32% used a damp cloth; 25% a cloth with washing-up liquid; 17% a scrubbing brush with washing-up liquid.	(Yates et al., 1999) Observed/reported consumer cleaning choices.

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Evidence	Quantitative finding	Source / interpretation
Cleaning stains on upholstered suites/sofas	53% used Vanish bars; 41% used Stain Devils.	(Yates et al., 1999) Product-specific cleaning choices in the study.
Washing removable cushion covers	87% would consider washing removable cushion covers in a washing machine.	(Yates et al., 1999) Indicates strong willingness, not necessarily actual practice.
Aftercare information for removable covers	95% of suites surveyed had removable covers, but only 22% of non-washable suites provided clear labels warning against machine washing.	(Yates et al., 1999) Indicates a substantial information gap.
Wooden garden furniture	Oiling once per year is described as typically considered sufficient by consumers.	(Ackermann, 2020) Qualitative/design research rather than a population estimate.
Veneered TV/video cabinet case	Vacuuming/dusting twice per week and polishing once per week.	(Gregson et al., 2009). No representative prevalence data.
Use-phase cleaning inventory assumption	Monthly upholstery vacuuming: 0.24 kWh/year; wet-cloth cleaning: about 1.5 L/year for wood/plastic/metal components and 3 L/year for sofas or storage units.	(Yang et al., 2025b) Modelling assumptions, not measured behaviour.

Source: (Ackermann, 2020; Gregson et al., 2009; Yang et al., 2025b; Yates et al., 1999).

Overall, quantitative evidence remains fragmented. There are clear gaps regarding the frequency and intensity of maintenance by consumers, the possible and actual lifetime extension attributable to maintenance, and the associated environmental impacts of maintenance practices and consumables.

Consumer knowledge, awareness and motivation

The evidence does not support a robust EU-wide estimate of how many consumers understand or perform appropriate furniture maintenance. What the evidence does show is that maintenance decisions can be triggered by visible changes, perceived value and attachment to the product (Ackermann, 2020; Ackermann et al., 2021).

Large furniture can be perceived as an investment product because of its cost or perceived preciousness, which can encourage care beyond basic cleaning. Product attachment is also associated with greater willingness to undertake restorative maintenance. For wooden tables, visible deterioration such as greying can act as a cue that care is needed, while the visible improvement after varnishing or refinishing can reinforce future maintenance behaviour (Ackermann, 2020; Ackermann et al., 2021).

Furniture can also acquire value through continued use and personalisation. (Ackermann et al., 2021) use examples of bed frames and kitchen cabinets to illustrate how customisation or creative adaptation can foster appropriation and care. (Gregson et al., 2009) similarly show that successful restoration of a dining table can increase the

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value users attach to it and lead them to change household practices in order to protect it.

However, knowledge and motivation do not always translate into appropriate care. (Yates et al., 1999) show that consumers use a wide range of household cleaning methods on upholstered furniture, while aftercare warnings were often missing. This illustrates that users may be willing to maintain products but lack the information needed to select a suitable method.

Questions for stakeholders

Q3-21: Are important maintenance practices currently not performed because instructions, consumables or suitable replaceable elements are unavailable?

Q3-22: Which concrete maintenance information should be provided to extend the product lifetime, via ESPR information requirements and in which form? Where possible, please propose concrete requirement levels or thresholds, suitable test or assessment methods, and practical approaches for compliance verification and market surveillance.

Potential barriers to maintenance

A first barrier is lack of product- and material-specific knowledge. Consumers may not know which care activities are required or may rely on ordinary household cleaning products that are unsuitable for particular finishes, coatings or upholstery. Illustrative evidence on removable sofa covers shows that although removable covers were widespread, explicit warnings against machine washing were provided for only a minority of non-washable products (Yates et al., 1999).

A second barrier is the availability of suitable guidance and consumables over the product lifetime. Stakeholders note that appropriate guidance on product-specific care practices is crucial to avoid common misuse patterns. If this information is missing, it can make otherwise simple maintenance difficult to carry out correctly. Product-specific manufacturer documentation of the kind found in other product groups under repairability-index-style frameworks, e.g. the French indice de réparabilité/indice de durabilité, which scores manufacturer commitments on documentation availability, ease of disassembly, and spare-parts availability/price/duration for the product categories it currently covers. Furniture is not currently among the product categories covered by the French index, but its documentation/disassembly/spare-parts criteria could inform furniture-specific maintenance-guidance assessments.

Time, effort and perceived economic value can also limit maintenance. For lower-value furniture, consumers may perceive professional cleaning, restoration or specialised care as disproportionate. Conversely, higher emotional or financial value is associated with greater willingness to invest effort in restorative care (Gregson et al., 2009).

The physical characteristics of the product can themselves create barriers. (Gregson et al., 2009), for example, describe cream leather sofas that owners found very difficult to keep clean.

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Finally, guidance must balance completeness with usability. A manufacturer in the ESPR survey noted that extensive product variation makes it difficult to prescribe universal maintenance frequencies or care products and warned against overwhelming customers with excessive detail. From an ESPR perspective, the evidence therefore points toward concise, product-specific instructions for relevant care actions, while recognising that the evidence base is currently too weak to define universal quantitative maintenance frequencies for furniture as a whole.

7.3.6. Repair

The most elaborated and useful data on repair occurrences, reasons and actors and repair rates comes from (Dorland & Jørgensen, 2025), who conducted a comparative survey on repair decisions across three product categories incl. furniture. The number of respondents was n=1,005, the geographic scope was the capital region of Denmark. Furniture types assessed were sofas/recliners, cabinets/dressers, shelves/bookshelves, dining tables/chairs, desks/office chairs and beds. This chapter is therefore mostly based on (Dorland & Jørgensen, 2025) coupled with input from the ESPR stakeholder survey and gives meaningful insights into practical and behavioural aspects of repair decisions.

Repair reasons, practices and existing infrastructure

Repair actors

During their study (Dorland & Jørgensen, 2025) found that consumer self-repair is the dominant repair route for furniture reporting that almost 80% of furniture repairs were carried out by consumers or friends and family themselves. The source figure (compare **Figure 7-2**) indicates roughly 77-78% self-repair. When consumers do not repair the item themselves, the most visible external routes are carpenters and retailers; family/friends and other repair routes account for much smaller shares.

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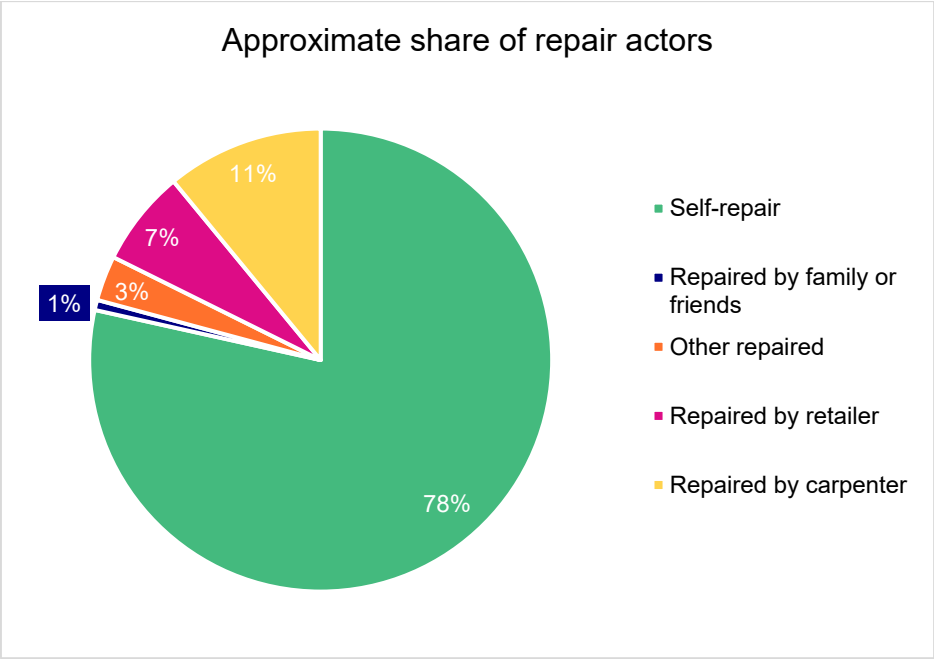

Figure 7-2: Estimated share of repair actors

Source: Own figure adapted from (Dorland & Jørgensen, 2025).

During the ESPR stakeholder survey, some respondents provided insights into existing repair practices or market capabilities, noting that minor and component-level repairs are already performed through several routes: self-repair, on-site repair by fitters or craftspeople, spare parts sent to customers, specialist retailers, manufacturer after-sales services and local joiners. One NGO reported a high share of consumer self-repair. This is consistent with the findings from (Dorland & Jørgensen, 2025).

Questions for stakeholders

Q3-23: Which share of furniture is typically self-repaired, which share goes into formal repair streams? How does this differentiate between different furniture types?

Repair practices

Repair competences remain comparatively strong for simpler wooden furniture. The findings therefore challenge the idea that consumer repair competences have disappeared universally. Repair activity is more feasible where the material and construction can be handled with ordinary household skills; more complex furniture can require specialist competences (Dorland & Jørgensen, 2025). (TAUW, 2025) also report that repair of office furniture is already practised, but that no exact data are available on how common this is in offices in the Netherlands or Europe. During the ESPR stakeholder survey, craft-made and bespoke furniture was repeatedly described by manufacturers or industry associations as a favourable case: Durable materials, higher purchase value, direct customer-provider relationships and skilled joiners make diagnosis, adaptation and repair easier and economically more acceptable.

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Available repair infrastructure

Since the availability and maturity of repair infrastructure is highly context-specific and regionally differs, general conclusions on the availability of infrastructure could not be made. Furniture repair infrastructure is uneven and generally less formalised than for some other product groups (e.g. electronics) (see also Task 2). Manufacturer- or retailer-run repair/refurbishment schemes are more developed in the B2B/office furniture segment (base cases 1 and 4, Section 3.2) than in domestic segments, reflecting the more contractual, asset-management-driven nature of office furniture procurement.

Stakeholder feedback to the ESPR survey also noted that commercial furniture repair is supported mainly through manufacturer and retailer after-sales services, complemented by professional specialists where more complex interventions are required. An industry association reported that repairs are often performed at the customer's premises, which is particularly relevant for bulky furniture and can avoid transport to dedicated repair facilities. Access to repair services was also reported to depend on the market channel. According to one stakeholder input, customers of brand-name furniture can often obtain support through retailers or directly from manufacturers, while repair possibilities for "no-name" furniture depend more strongly on retailer service. While stakeholders report that some interventions can be carried out by consumers themselves, repairs involving safety risks, specialist tools or specific competences may require professional technicians. This is however only indicative evidence rather than representative for all countries and areas in the EU. Overall, the survey portrays furniture repair infrastructure as a distributed system of after-sales services, retailers, specialist repair providers and on-site interventions. However, the responses do not provide sufficient evidence to assess the geographical coverage, capacity or accessibility of repair services across the EU.

Typical failures and breakages that lead to repair

Specific failure modes leading to repair

The ESPR stakeholder survey indicates that furniture breakage and failures are strongly dependent on the product type, construction, materials, intensity and type of use, and user behaviour. Manufacturers in particular cautioned against defining universal “failure points”, noting that many repair or replacement-part requests may arise from transportation, delivery, assembly or relocation rather than recurrent technical failure during use. Nevertheless, several recurring patterns can be identified across the stakeholder responses. Across stakeholder groups, the most frequently mentioned failure-prone elements are moving and functional components, including hinges, drawer runners, opening and adjustment mechanisms, castors, fittings and shelf supports, as well as joints, connectors, legs and structural elements exposed to repeated use or overloading.

For storage furniture, stakeholders mainly reported damaged hinges, runners, fittings and shelves, alongside scratches, edge damage and moisture-related degradation. For seating, upholstery wear, tears and stains, foam degradation or sagging, castors, gas

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lifts, armrests and structural joints were particularly relevant. Some respondents also highlighted failures of glued or stapled connections and mechanisms in sofas. For tables and other surfaces, common issues include scratches, chips, deterioration of finishes, loose joints and unstable legs. Beds reported similar structural failures, with additional problems related to slats, mechanisms and motors. Moisture-related swelling and corrosion were specifically mentioned for kitchen and bathroom furniture, while outdoor furniture is affected by weathering, UV degradation and corrosion.

Breakage timing and product-group patterns

According to (Dorland & Jørgensen, 2025), furniture generally breaks less often and later than clothing and electronics in the study. This data is also useful in the light of furniture lifetime although it is neither representative of the maximum technical nor the social lifetime of furniture and captures only furniture items that are broken. The study indicates that, on average, 42% of furniture items are more than 10 years old when they break (compare **Figure 7-3**).

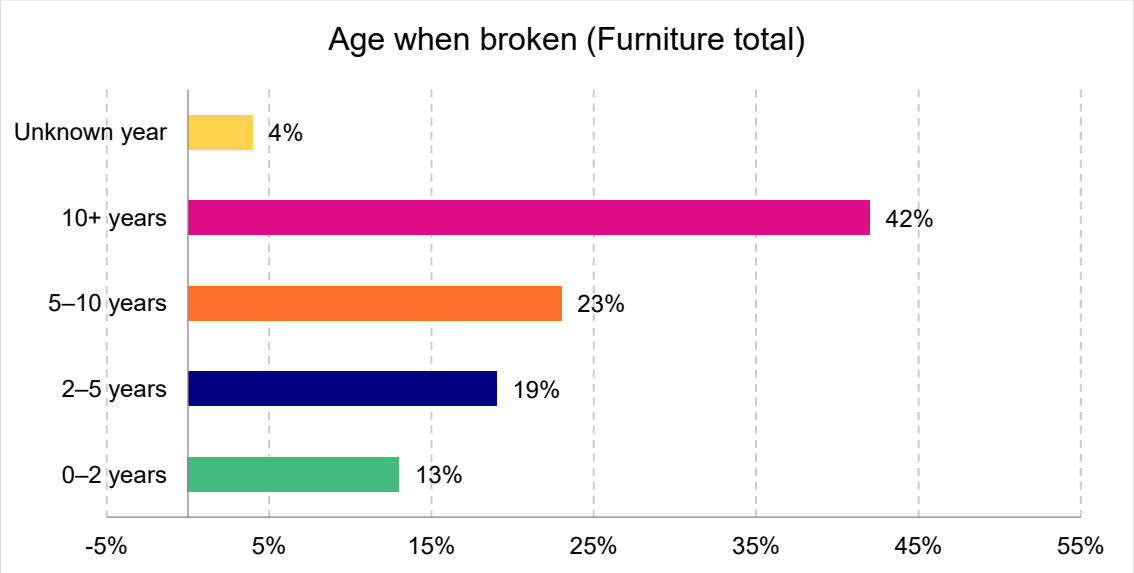

Figure 7-3: Reported average years until breakage of all broken furniture items

Source: Own figure adapted from (Dorland & Jørgensen, 2025).

The study further breaks down typical time to breakage by product categories (see **Figure 7-4**; **Table 7-10**). Shelves are identified as an outlier because breakage is relatively concentrated in the first two years. The authors relate this potentially to differences in material quality, for example lightweight versus sturdier wood. After 2-5 years, around 40% of beds, cabinets and dressers are reported to be broken. Failure in desks and office furniture, dining tables, chairs, sofas and recliners most often occurs after 10+ years (46-51% of failures) (Dorland & Jørgensen, 2025).

5929 **Table 7-10: Typical time to breakage by furniture type**

Furniture group	0–2 years	2–5 years	5–10 years	10+ years	Unknown year
Beds	14%	25%	27%	33%	—
Cabinets and dressers	16%	24%	18%	37%	5%
Desks and office furniture	8%	11%	29%	47%	5%
Dining tables, chairs, etc.	7%	20%	18%	51%	4%
Shelves	31%	15%	19%	27%	8%
Sofas and recliners	11%	16%	26%	46%	2%
Furniture total	13%	19%	23%	42%	4%

5930 *Source*: Adapted from (Dorland & Jørgensen, 2025).

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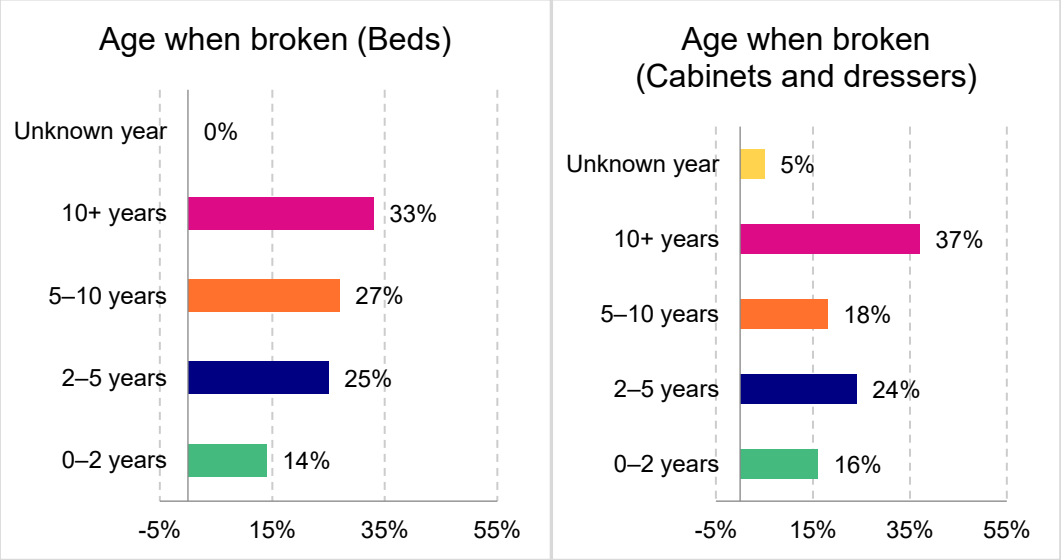

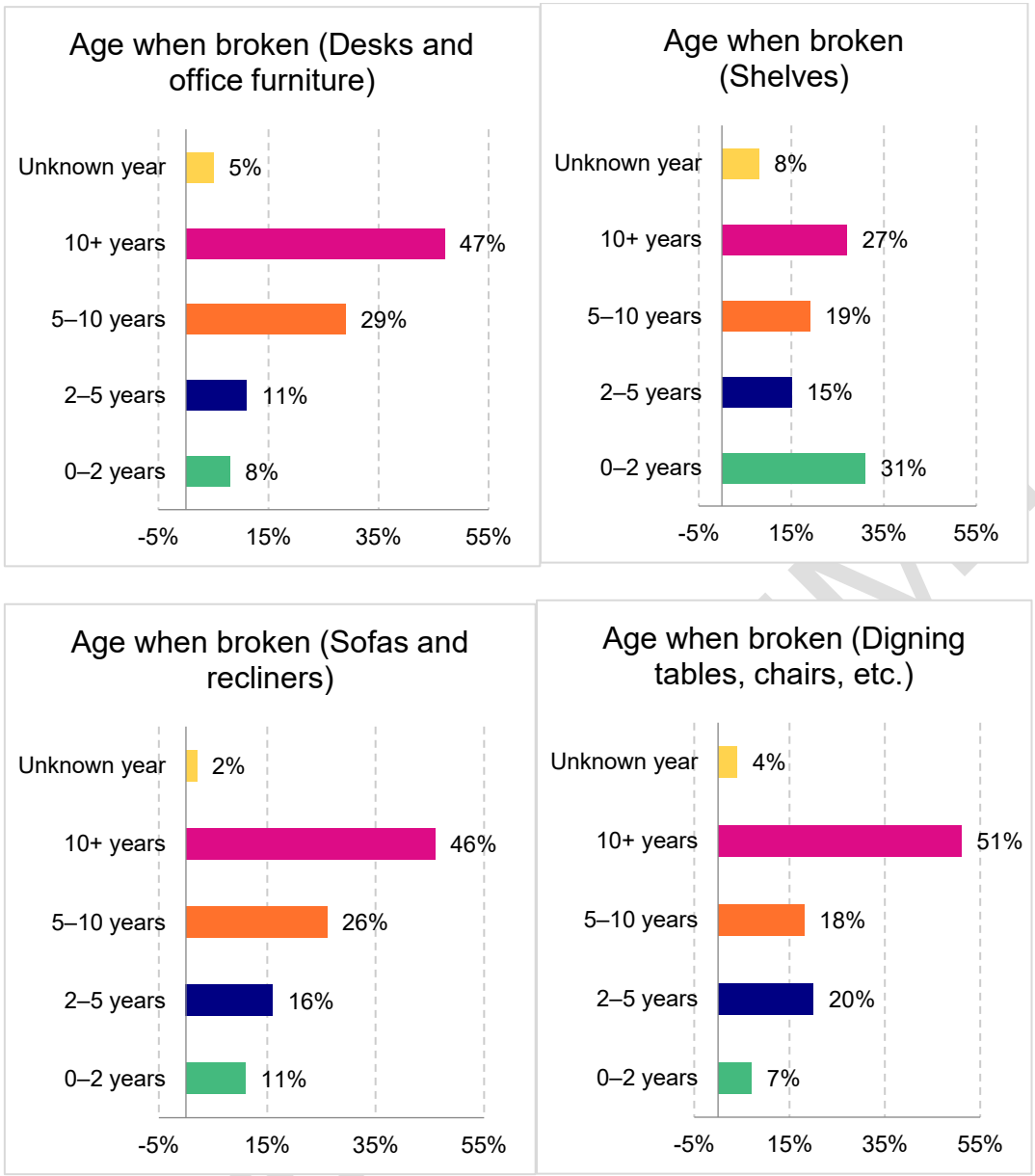

Figure 7-4: Typical time to breakage by furniture type.

Source: Own figure adapted from (Dorland & Jørgensen, 2025)

EU-wide statistics or indicative numbers on kitchen-specific repair are currently limited. Specifically for kitchens, a 2025 survey by Which? of 2,496 UK consumers who had purchased a kitchen 5–10 years (across 9 brands) earlier asked whether their kitchen had required repairs and whether it showed signs of damage or wear; 32% reported that their kitchen had required repairs while 44% reported damage or wear after at least five years of ownership, with scratches to cabinet finishes (15%) and failures of soft-close mechanisms (12%) being the most commonly reported issues (Healey, 2026). The Houzz Germany Kitchen Trends Study 2023 indicates that kitchen renovations are typically extensive rather than limited to individual repairs: among respondents renovating their kitchens, 96% replaced worktops, 93% cabinets, 89% sinks, 86% lighting and 79% backsplashes, while 82% of those renovating cabinets replaced them completely (Houzz, 2023).

Another US furniture-damage survey by SquareTrade, reported that half of US households had damaged furniture in the previous year and that Americans spent more than USD 23.5 billion replacing and repairing furniture (Allstate Protection Plans, 2019).

Questions for stakeholders

Q3-24: For the most common failures, what is the typical repair cost relative to the price of replacement? Please include parts, labour and transport/on-site service where relevant.

Q3-25: Which components would need to become more accessible, replaceable or standardised for a repairability requirement to materially increase repair rates?

Q3-26: Which components genuinely require spare-part availability, and for how many years after placing the product on the market would availability provide meaningful benefit?

Repair rates

Across furniture, (Dorland & Jørgensen, 2025) report an average repair rate of 42%. A further 45% is not repaired, while 12% is classified as “not yet repaired / storage”. Furniture therefore has a substantial repair incidence, but also the highest storage share among the three product categories compared in the study (compared to electronics and clothing).

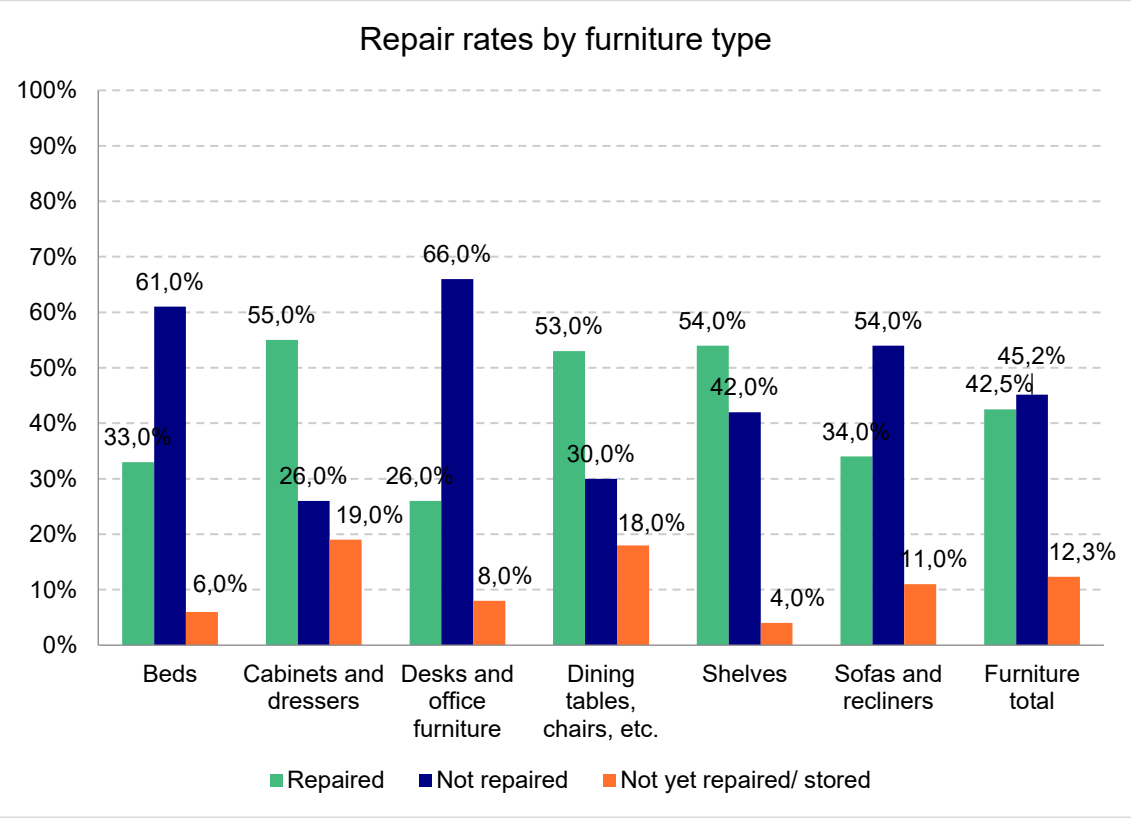

Figure 7-5: Repair rates by furniture type.

Source: Own figure adapted from (Dorland & Jørgensen, 2025)

Repair rates differ strongly by furniture type. Cabinets/dressers, shelves and dining tables/chairs have repair rates above 50%. Office furniture is much less often repaired: 26% is shown as repaired, while 66% is not repaired and another 8% is not yet repaired/in storage, together corresponding to the 74% as remaining unrepaired. Sofas/recliners are also repaired less often (34%) despite potentially carrying emotional attachment. Cabinets, dresser, dining tables and chairs dominate the “storage/ not yet repaired” category with a bit less than 20% being stored (see Figure 7-5) (Dorland & Jørgensen, 2025).

Repair drivers and barriers to repair

Repair drivers

Financial considerations were the primary repair driver identified in the study. In the furniture repair reasons figure (**Figure 7-6**), “cheaper” was the largest stated reason for repair at 34%. Consumers may therefore repair furniture such as cabinets or dressers because repair is less expensive than buying a replacement.

Attachment and social significance are also important. Product attachment accounts for 29% of the furniture-total repair reasons shown in the figure. Dining tables and chairs are highlighted as furniture that can accumulate memories and social value, which can strengthen repair efforts. The authors therefore argue that attachment is shaped not simply by age, but by social significance, material feasibility and competences.

Environmental motivation is comparatively weak. Waste prevention accounts for 16% of the furniture-total repair-reason distribution shown in the supplied figure, while the product-group analysis indicates lower shares for several furniture types (approximately 3–15% depending on the furniture group) (Dorland & Jørgensen, 2025).

Figure 7-6 reports the average reasons for furniture repair while **Table 7-11** provides product category breakdown.

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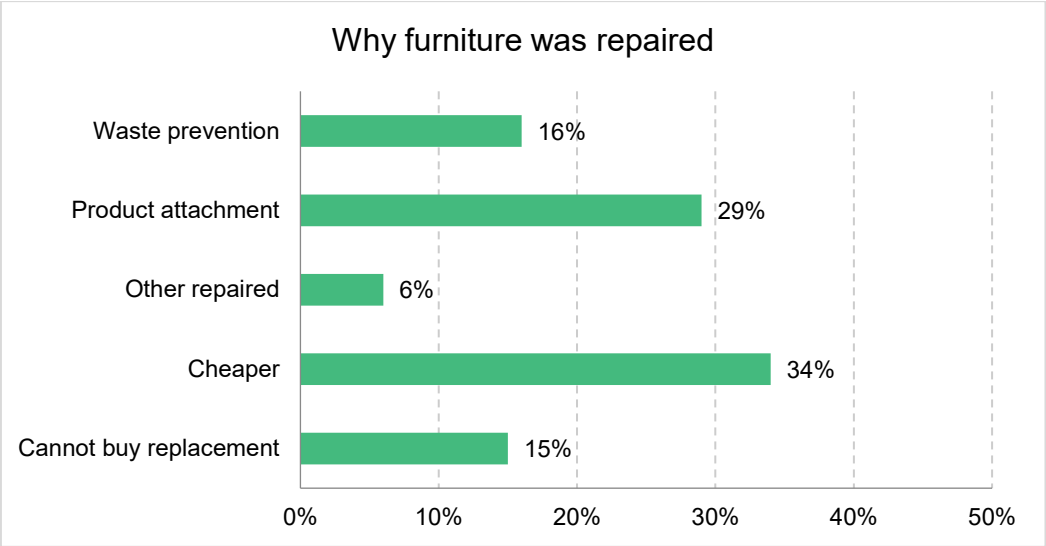

Figure 7-6: Reasons for furniture repair.

Source: Own figure adapted from (Dorland & Jørgensen, 2025)

Table 7-11: Reasons for furniture repair split by furniture type.

Reason for repair	Office furnit.	Cabinet/ dresser	Sofa/ recliner	Bed	Shelve	Dining table/ chair
Cheaper	11,3%	32,5%	14,2%	15,1%	20,5%	20,5%
Product attachment	13,2%	15,9%	14,9%	8,1%	20,5%	22,5%
Waste prevention	5,6%	11,3%	6,0%	9,5%	2,7%	14,6%
Cannot buy replacement	1,7%	8,9%	8,8%	5,2%	11,6%	11,6%
Other	3,6%	5,5%	4,0%	4,0%	8,5%	2,8%

Source: Adapted from (Dorland & Jørgensen, 2025)

Barriers to repair

(Dorland & Jørgensen, 2025) found that perceived or actual unrepairability was the largest stated reason explaining why furniture was not repaired (33% over all furniture types; see **Figure 7-7**). The study links this especially to composite materials and to upholstered furniture, where complex construction and the need for specialised upholstery competences can exceed ordinary consumer skills. Economic and convenience barriers are also material: “too expensive” represents 20% of reasons for non-repair, buying a replacement 18%, not investigating repairability 11%, and repair being too time-consuming 8%. Lack of repair locations rank lower accounting for 3% maybe also driven by the prevalent practice of self-repairing rather than professional

repair in case of failure. This is further consistent with feedback from some industry stakeholders in the ESPR survey who stressed that full return transport to a factory or repair shop is not the normal model for furniture but that many repairs are undertaken at the customer premises. This reduces logistics burdens also for professional repair where such service networks are available.

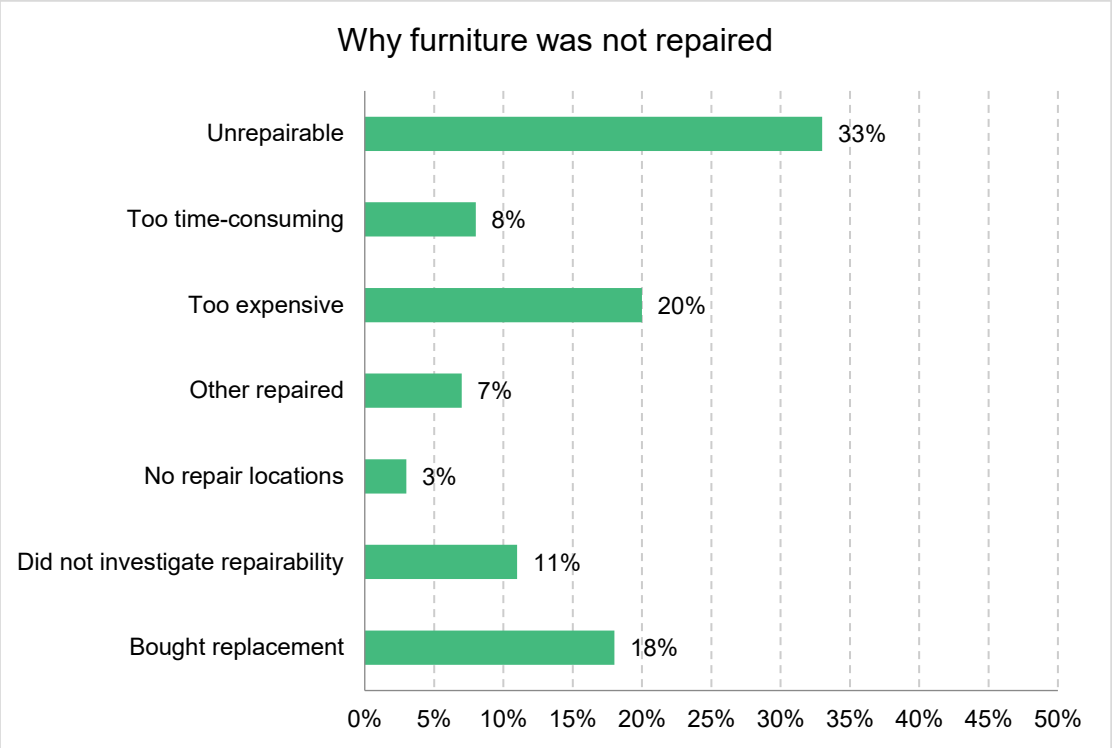

Figure 7-7: Reasons for furniture non-repair.

Source: Adapted from (Dorland & Jørgensen, 2025)

Table 7-12 provides furniture category breakdown of reasons for non-repair.

Table 7-12: Reasons for furniture non-repair split by furniture type.

Reason for non-repair	Office furnit.	Cabinet/ dresser	Sofa/ recliner	Bed	Shelve	Dining table/ chair
Unrepairable	23,0%	3,1%	15,7%	26,7%	11,6%	8,7%
Too expensive	17,1%	7,8%	10,8%	5,2%	5,6%	4,6%
Bought replacement	9,4%	5,5%	8,0%	11,0%	5,6%	5,6%
Not invetsigated	3,5%	0,8%	6,7%	5,2%	5,6%	3,6%
Time-consuming	5,6%	3,0%	3,9%	2,3%	2,7%	1,7%

Reason for non-repair	Office furnit.	Cabinet/ dresser	Sofa/ recliner	Bed	Shelve	Dining table/ chair
No repair location	1,7%	0,8%	1,9%	1,1%	0,0%	0,7%

Source: Adapted from (Dorland & Jørgensen, 2025)

Office furniture combines several barriers: the authors relate lower repair incidence to composite materials, lower emotional attachment and perceived unrepairability. They also note that cosmetic damage to desks can trigger perceived obsolescence even when the item remains functionally intact. Sofas/recliners are a further example where emotional attachment may be present, but repair is constrained by (perceived) unrepairability and specialist upholstery skills being required (Dorland & Jørgensen, 2025). Overall, the study's implication is that repair potential depends on the alignment of repairable design, available competences, acceptable cost and emotional/social value while being mainly driven by a practice of self-repair.

During the **ESPR furniture survey send to stakeholders**, respondents were also asked to rate the relevance of predefined barriers to repair, reuse and refurbishment as low, medium or high (from a possible set of 53 stakeholder survey records). For descriptive comparison, the relevance ranking "high" was assigned a quantitative value of 3, "medium" a value 2 and "low" a value of 1. Because stakeholders were unevenly represented and the sample sizes were too small for meaningful quantitative analysis, stakeholder-specific differences were assessed through additional free-text comments provided by the stakeholders during this survey.

Repair attracted the broadest and most detailed set of comments. Overall, the survey responses indicate that, even if repair is technically possible, its feasibility and attractiveness depend heavily on design, component availability, product quality, labour requirements, cost aspects and competition with low-cost new furniture items, service access and the value of the item being repaired.

Repair was assessed at two levels. First, respondents were asked to rate five broad barrier categories (technical, social/cultural, information, economic and infrastructure barriers to repair), with the number of responses per category ranging from 27 to 30. A second, more granular question asked respondents to rate ten specific factors that may prevent repair (number of responses ranged from 13 to 19). The two views are complementary: the broad question indicates which barrier families are most salient, while the granular question identifies the concrete mechanisms underlying them. **Figure 7-8** and **Figure 7-9** show how relevant respondents rated barriers to repair.

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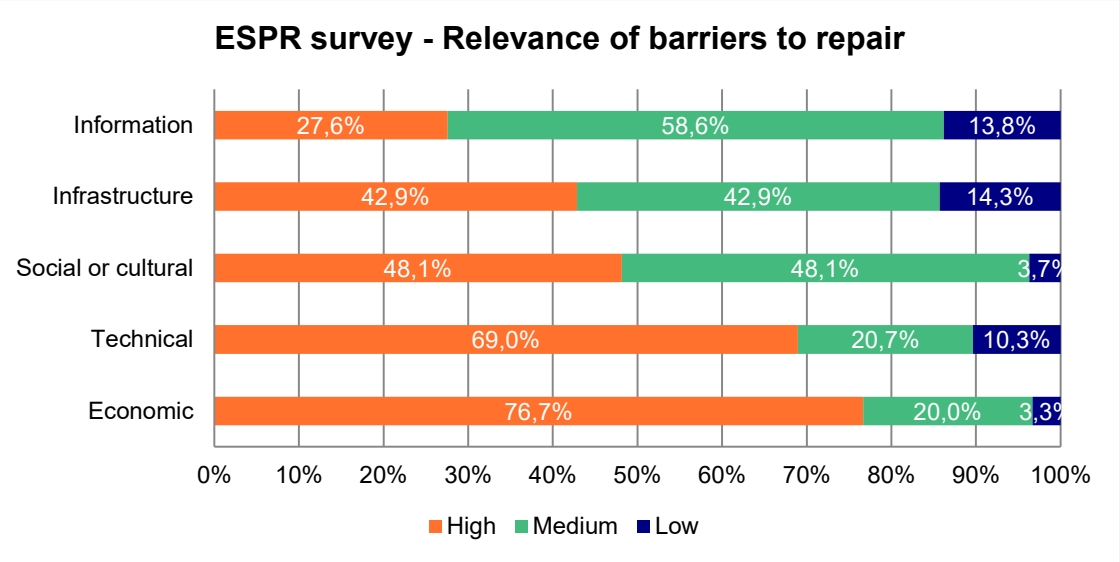

Figure 7-8: Importance of barriers to repair reported by surveyed stakeholders.

Source: Own illustration based on the results of the ESPR stakeholder survey.

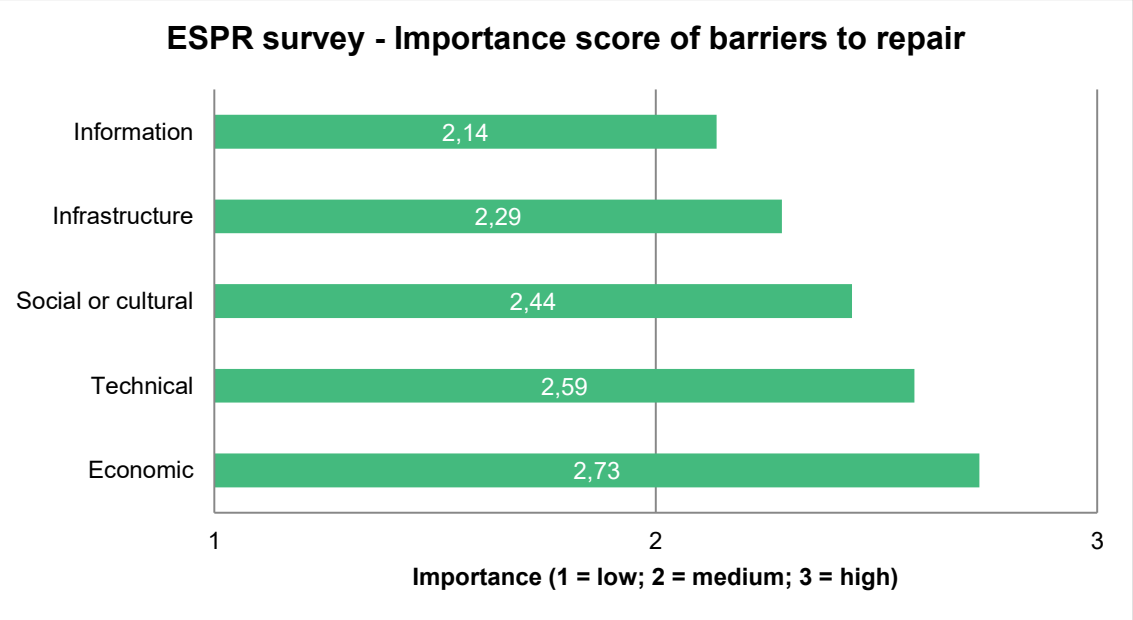

Figure 7-9: Average importance of barriers to repair to stakeholders.

Source: Own illustration based on the results of the ESPR stakeholder survey.

The broad ratings show a clear concentration of relevance around **economics and technical design**. Economic barriers received a “high relevance” rating from 23 of 30 valid respondents (76.7%) and reached the highest category importance score indicating high average relevance (2.73 out of 3). Technical barriers followed closely: 20 of 29 respondents (69.0%) rated these barriers with “high relevance” (overall importance score score of 2.59). **Social or cultural barriers** were also widely regarded as medium to highly (each 48.1% of respondents) relevant by 27 respondents (importance score: 2.44) with only one “low relevance” rating. **Infrastructure barriers** were predominantly assessed as a highly or medium important repair barrier (42.9%

each; n=28) with 14.3% claiming low relevance. This results in medium average importance of 2.29 assessed by the surveyed stakeholders. **Information barriers** were rated the least important with 58.6% assigning a medium, 27.6% a high and 13.8% a low relevance to these barriers (average importance score of 2.14).

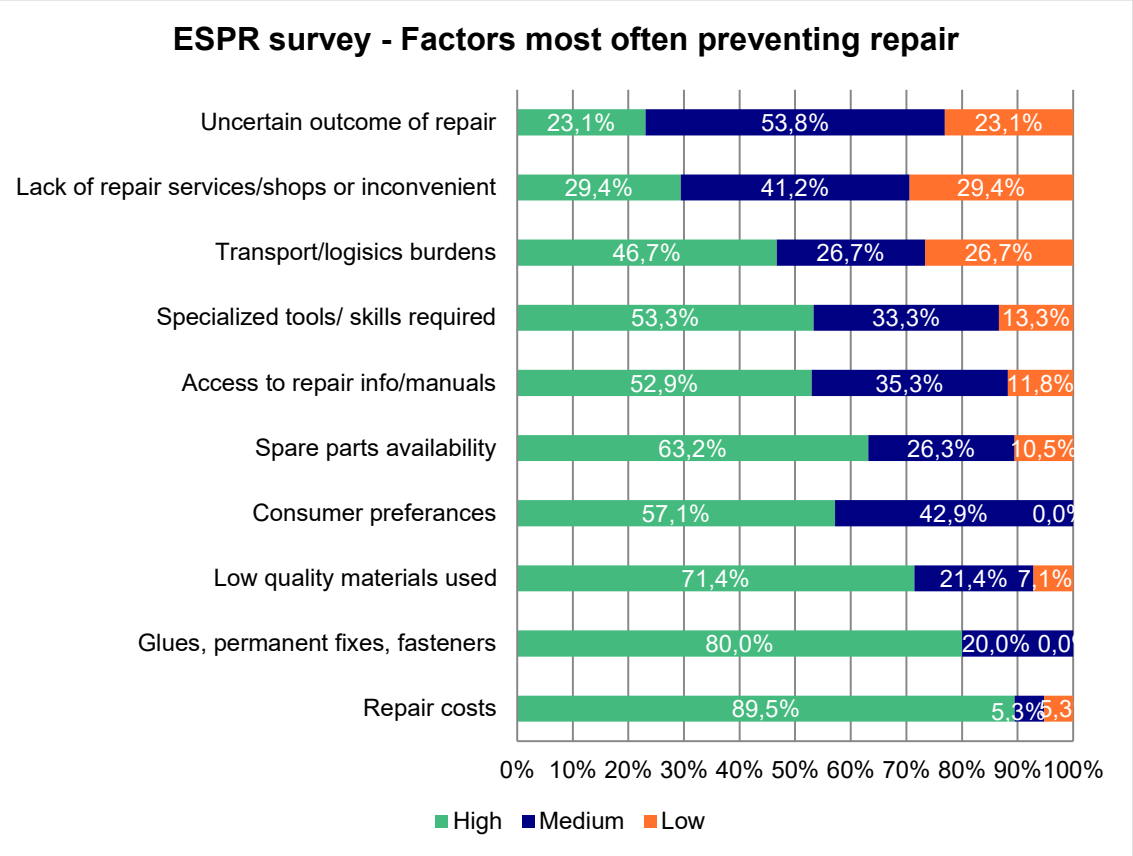

Figure 7-10: Importance of factors most of preventing repair reported by surveyed stakeholders.

Source: Own illustration based on the results of the ESPR stakeholder survey.

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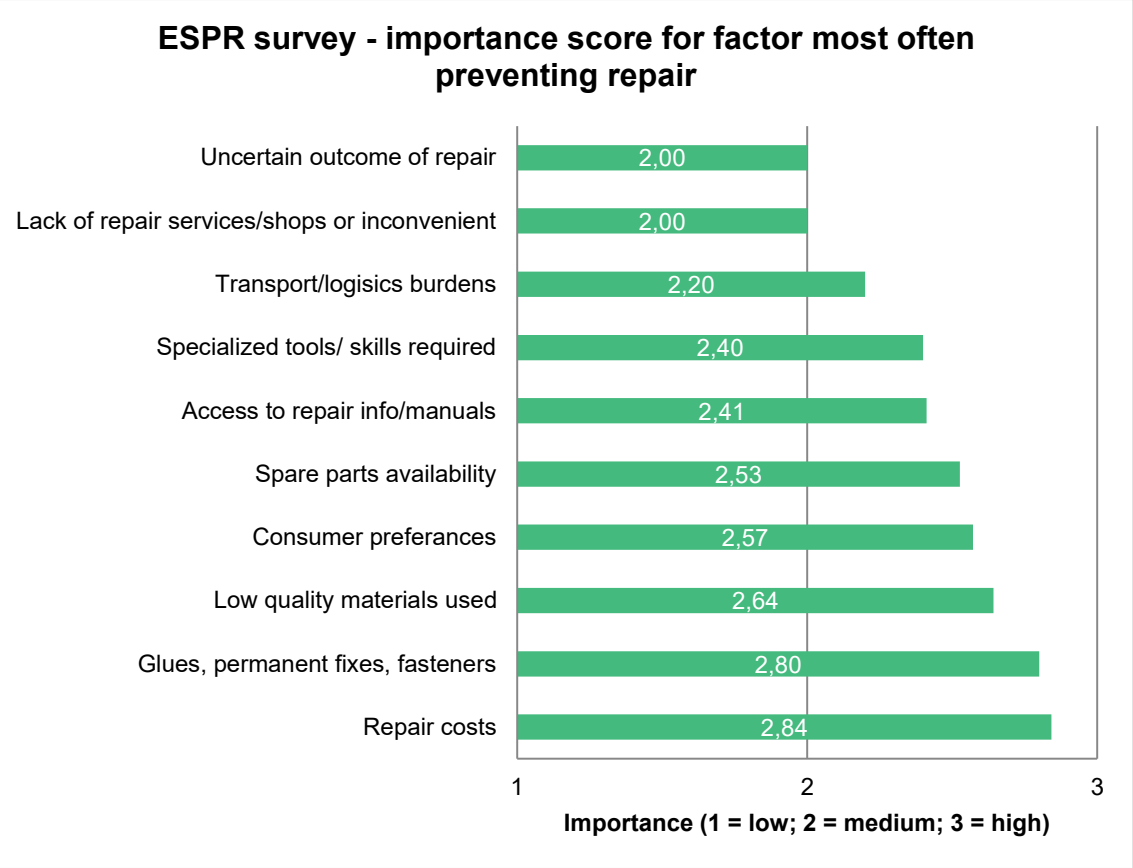

Figure 7-11: Average importance of factors most of preventing repair to stakeholders.

Source: Own illustration based on the results of the ESPR stakeholder survey.

The granular ratings sharpen this picture. **Repair cost** was the most important repair barrier overall with 89.5% assigning high importance to it. Almost equally important were **glues, permanent fixings and problematic fasteners**, with 12 of 15 respondents (80.0%) rating them high and no one assigning a low relevance to this aspect (importance score 2.80). The next most important barriers identified were the **use of low-quality materials** (71.4% scoring it high; importance score of 2.64), **consumer preferences** (57.1% scoring high, none low; importance score of 2.57), **lacking spare-part availability** (63.2% scoring high; importance score 2.53), **access to repair information/manuals** (52.9% scoring high; importance score of 2.41) and the **need for specialised tools or skills** (53.3% High; importance score 2.40). By contrast, **transport/logistics burdens** were rated more mixed and rather of medium overall importance to repair (46.7% high, 26.7% medium; 26.7% low). The lowest scores, even though still ranked as a medium important repair barrier by stakeholders, were **lack of repair services/shops** (29.4% high, 41.2% medium and 29.4% low) and **uncertainty about the outcome of repair** (23.1% high, 53.8% medium and 23.1% low).

This is important for ESPR: the strongest quantitative signals concern product-level design and material quality, spare parts and repair economics, whereas service availability and uncertainty of repair outcome for consumers appear more context-dependent. The following **Table 7-13** shows the most important repair barriers that have been identified in the stakeholder consultation process.

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6091 **Table 7-13: Main barriers to furniture repair identified in the stakeholder survey.**

Barrier cluster	Explanation
Repair-unfriendly design and difficult non-destructive disassembly	Permanent or glued joints, staples, non-standard fittings, inaccessible components and non-removable upholstery can make opening, dismantling and reassembly slow, damaging or impossible. This increases labour requirements and can turn minor failures into replacement decisions. Research organisations, public authorities, NGOs, suppliers, an end-of-life operator, manufacturers and several industry associations raised it. However, one industry association explicitly rejected a blanket claim that bonded joints are inherently inferior, and some industry/manufacturer responses stressed that many products can already be disassembled or repaired.
Spare parts availability, compatibility and product identification	Repair can fail because suitable components are unavailable, non-economical, brand/model-specific or difficult to find. Missing product identifiers also make it hard to locate the correct parts and manuals. Raised strongly by NGOs, research organisations, consumer organisations and manufacturers, and also qualified by industry associations. Industry responses often stressed product-range and supply-chain differences
High repair cost relative to low-cost new furniture	Professional labour, time needed, diagnosis, spare parts and transport can approach or exceed the price or perceived value of a furniture item. The problem is most acute for low-cost mass-market furniture and less acute for durable, high-value or emotionally valued pieces. This barrier was agreed upon between all responding stakeholder types. Still, some industry respondents stressed that price is only one part of a broader decision.
Low material quality and short-lived "fast furniture"	Low-grade boards, plastics or weak constructions may be damaged during repair, may not hold fixings after repeated assembly, or may fail again quickly after repair. Low purchase prices also reduce willingness to invest in repair. Stakeholders generally distinguished low-cost furniture from high-quality solid-wood, craft or bespoke products, which were seen as more repairable and also more worth repairing to consumers.
Missing or hard-to-access repair information	Users and independent repairers may lack repair manuals, disassembly instructions, maintenance guidance, spare-part information, compatibility data, product identification and clear information on repair rights or services. Some industry associations argued that minor repair information and support are already available and that information is not a major barrier for many products or for custom furniture.
Specialised skills, tools and confidence required	Some repairs require re-upholstery, joinery or other specialist skills, specific tools, or confidence that consumers might not have. Specialist requirements can also increase professional repair costs and lower consumer self-repair. Industry respondents often framed specialised skills as manageable where a skilled craft network or after-sales service exists rather than as an inherent barrier.

Barrier cluster	Explanation
Limited or inconvenient repair services and service coverage	Consumers may struggle to identify nearby repair providers, manufacturer-supported services or skilled tradespeople. Coverage can differ between regions, and repair markets may be too small or unstructured to support convenient access in some cases. On the other hand, some industry associations contradicted this pointing to existing manufacturer, retailer and on-site service networks.
Bulky-furniture logistics, transport and time	Large furniture is costly and inconvenient to move to workshops and repairers; carrying, vehicles and return transport add labour, cost and impacts. In many cases on-site repair would therefore be preferable, but this requires organised service provision. Personal time and coordination are also barriers. Some industry responses indicated that return transport is less relevant to consumers because on-site repair and existing retailer/manufacturer logistics can handle many cases.
Preference for replacement, trends and convenience	Furniture is tied to interior design, life-stage changes and aesthetic preferences. Damage can become a trigger for redecoration, especially where replacement is cheap and easy. Repair may be perceived as inconvenient or as producing an inferior-looking product. Those barriers were names by all stakeholders, but some argued that price and accessibility matter more than social norms, while some respondents noted stronger attachment and repair willingness for high-quality furniture than for cheap/lower quality pieces.
Uncertainty about repair quality, durability and warranty	Consumers may be unsure whether a repair will restore appearance, safety and durability, and actual lifetime extension. Uncertainty of diagnosis and total cost can also deter repair. This barrier was less frequently raised than cost/design and some industry respondents argued that experienced joiners can assess feasibility reliably, suggesting that the barrier is partly linked to trust in provider competence.
Weak incentives and underdeveloped repair business models	Sales-oriented business models may provide limited incentives for long-term spare-parts supply, repair information or service provision. Some respondents described the repair market/business model as insufficiently structured. This was not a universally agreed upon but secondary barrier, raised explicitly by a research organisation and an industry association and indirectly by stakeholders linking service scarcity to weak economics.

Source: ESPR furniture stakeholder survey.

Economic barriers

Economic viability was the clearest and least contested repair barrier during the stakeholder survey. The quantitative evidence ranks economic barriers first and places repair cost above every other factor. The evidence provided in the free-text responses from the stakeholders provide further insights to this issue. If consumers choose or are forced to consult a professional repair (e.g., if necessary (specialty) skills and tools or repair information are lacking or furniture is not designed for easy repair) costs can quickly add up and can contain costs of diagnosis, skilled labour, call-out time, spare parts, transport and/or administration. In comparison, a replacement furniture product,

particularly in the low-cost segment, may be readily available at a comparatively low price. Therefore, the price of high costs of repair can be perceived as unproportionate compared to the purchase of low-priced a new furniture replacement item. In this setting, consumers do not compare repair with the original purchase price alone but also the immediate inconvenience and uncertain final cost of repair plays a role (compared with the certainty and speed of buying new).

This dynamic was reported by all survey respondent groups, including manufacturers, industry associations, research organisations, consumer organisations, public authorities, NGOs, certification actors, suppliers and service providers. Stakeholders repeatedly distinguished between low-cost mass-market furniture and higher-value, durable or bespoke furniture. For high-quality products, the remaining value of the item and the feasibility of skilled repair can justify repair action. For inexpensive furniture, the labour share alone can exceed the perceived residual value leading to non-repair. Besides costs, some industry respondents also emphasised that age, condition, personal value and design preferences enter the repair decision and influence the accepted cost of repairing from a consumer perspective.

For ESPR, attacking this barrier directly is difficult since it cannot directly reduce wages, create local repair markets, influence consumers opinion about appropriate costs of repair, or determine the retail price of replacement furniture. It can, however, affect several inputs to the repair bill. Non-destructive access to priority components, standard or reusable fasteners, clear diagnosis and repair information, and reasonably available spare parts can shorten professional repair time and make self-repair possible for simple failures which would probably reduce overall repair costs to consumers.

A related economic issue is the weak or underdeveloped business model for repair from a “repair supplier” perspective. A few stakeholders described repair services as insufficiently structured or argued that sales-oriented value chains provide weak incentives for long-term parts and after-sales support. This was not a universal claim, and other industry respondents pointed to existing service networks. Nevertheless, it matters for ESPR because product-level repairability has limited practical value if the transaction cost of providing remains too high hindering actual uptake of repair and therefore lifetime extension of furniture pieces.

Technical barriers

Technical barriers are the second most named category as shown in Figure x and y. Across stakeholder groups, respondents repeatedly linked repairability to the ability to disassemble the product without damage, reach the failed component, replace it and reassemble the furniture while maintaining functionality. The technical design aspects of furniture are discussed in more detail in Task 4 of the ESPR Preparatory Study. Therefore, in this chapter technical design aspects will be discussed only shortly, discussing their relevance for repair.

Glued or permanently fixed joints, staples, non-standard fittings and bonded non-removable upholstery assemblies were repeatedly named by stakeholders because they can turn a small component failure that should be easy to repair into destructive dismantling and whole-product replacement. Upholstered furniture was singled out

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repeatedly because textiles, foam and frames may be permanently connected. Low-quality materials and construction also play an important role for the technical repairability potential. Stakeholders repeatedly mentioned particle boards, plastics and weak constructions that may break during disassembly, lose fixing strength after repeated assembly or fail again shortly after repair. If relevant parts do not retain structural integrity during disassembly, repair and reassembly, repair becomes technically unfeasible. For furniture intended to remain in use for many years, repeated repair intervention capability can therefore be closely linked to durability and actual lifetime. Spare-parts availability also has a technical dimension. Brand- or model-specific components, discontinued parts and missing product identifiers can make an otherwise feasible repair technically impossible. For craft furniture, some manufacturers noted that a joiner may reproduce custom parts even decades later, while for industrial furniture, the same option may not exist

Still, the stakeholder evidence provided for these technical barriers were not completely uniform. Some industry associations argued that especially high-quality or craft-made furniture are, in fact, mostly technically repairable and that bonded joints should not automatically be considered inferior. In terms of product requirements, some survey respondents encouraged outcome-oriented requirements, such as access to priority parts or demonstrated and non-destructive repair capability, over banning certain technologies, e.g. particular joining technologies. For spare-parts, survey results point to considering the functional importance, susceptibility to failures of components, and the product or construction type.

Consumer-related social and cultural barriers

Social and cultural barriers were on average rated as medium to highly relevant repair barriers (see figure x). Rather than a direct cause of non-repair stakeholders described this barrier as context-specific and differing between consumers. As explained in the previous chapters, furniture is closely linked to interior design, life changes and aesthetics. A failure may therefore coincide with a desire to redecorate, upgrade functionality or change style, which can make replacement more attractive even where repair is technically and economically feasible and meaningful. Another important behavioural aspect in repair or replacement decisions is convenience: If replacement is cheap and immediate, repair can take more time and lead to less predictable outcomes.

Stakeholder views again varied. Several stakeholders (incl. consumer organisations, research organisations, manufacturers and industry associations) reported consumer preference for new products, changing trends or low familiarity with professional repair as barriers to repair. A certification stakeholder recognised the importance of behavioural aspects but argued that price and accessibility are more important than social norms. An industry association, on the other hand, emphasised psychological and emotional reasons for disposal instead of repair. “Consumer preferences” were mostly ranked of medium importance in the survey (see figures x and y). Uncertainty about repair quality, durability, aesthetics and warranty forms a related confidence barrier. This factor was less strongly related to repair barriers than cost or design in the survey, but it can become decisive where consumers cannot predict the final appearance, lifetime or total price of the repaired product. Available repair information, professional standards and competent providers can reduce this uncertainty.

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The evidence therefore supports treating behavioural aspects as important influencing factors of repair that are strongly interrelated and dependent on personal contexts, situations, preferences and trust but also other product aspects like expected costs of repair, original price of the furniture to be repaired and expectations towards lifetime (extension), quality of materials and durability. Furthermore, transaction costs (incl. information availability and convenience of logistics and services) can play a key role in personal repair decisions. In general, behavioural aspects can differ substantially between individuals and are therefore the most difficult to influence or predict.

Infrastructure, service and logistics barriers

Infrastructure and logistics were rated as relevant but overall, less important the cost and design barriers to repair. Many respondents described repair shops, specialist providers and skilled tradespeople as difficult to find, regionally unevenly spread and available, or insufficiently visible. Large furniture creates an additional practical problem: Moving an item to a workshop/repairer can require a vehicle, carrying assistance or return transport, adding both cost and inconvenience for consumers. For some products, on-site repair is therefore the only realistic route (e.g., large furniture appliances like wardrobes or kitchen elements).

Still, several industry associations noted that manufacturers, retailers, joiners and craft businesses already provide repair services, and that furniture repair often takes place at the customer premises rather than through reverse transport to a factory. The more precise barrier appears to be uneven accessibility and transaction friction: Service networks may work well for particular brands, regions or high-value products while being difficult to access for mass-market products or consumers outside established after-sales channels.

ESPR cannot directly act on creating repair infrastructure. It could, however, reduce dependence on scarce infrastructure by enabling modular component replacement, enable common-tool access and spare part availability, and provide repair instructions for self- and on-site repair. It can also make existing services easier to use by improving product identification and repair information.

Information barriers

Information barriers were ranked lowest by stakeholders in the survey compared to the other barriers but still showed, on average, medium importance. Still, information becomes critical once a consumer or repairer decides to attempt repair. Missing product identification, repair manuals, disassembly instructions, maintenance guidance, spare-parts information and compatibility data can increase diagnosis time and prevent access to components. Several respondents also highlighted language-barriers and accessibility: While information may technically exist, it might be difficult for the end user or an independent repairer to find and apply.

For this barrier, stakeholder views diverged most clearly. Some research organisations, NGOs, consumer organisations, suppliers, public authorities, manufacturers and certification actors described information gaps as material barriers. By contrast, some industry associations argued that minor repairs are already supported by

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manufacturers, specialty retailers or local providers and that information does not constitute a major obstacle for furniture repair. Information may also be adequate within a direct manufacturer or craft-service relationship but weak for older products, second owners, discontinued models or independent repair channels.

For ESPR, this makes information a relatively targeted policy lever and low-hanging fruit. Requirements could ensure durable product identification and access to the information needed for priority repairs, while avoiding unnecessary documentation for simple or inherently self-explanatory products. A digital product passport or equivalent digital access point could support this function, but the objective should be practical repair access rather than information volume. This means, information is an enabling condition, but it does not replace technical repairability, economic viability or social reasons for repair-or-replacement decisions.

How repair barriers interact and implications for ESPR

As already explained, these repair barriers are not independent from each other but rather characterised by complex interactions and several influencing factors. For example, a product that is technically difficult to dismantle and repair quickly or uses fragile materials increases diagnosis, disassembly and repair time. This raises labour cost and may require specialist skills. If the spare part is hard to identify or unavailable, additional search time and uncertainty are added. Bulky transport or a home visit then increases the service cost further. Against a low-priced replacement product, the consumer may rationally choose replacement even if the underlying failure is technically minor. In this chain, the 'economic barrier' is partly the downstream expression of technical and information barriers.

This interrelatedness is central for policy design. **Figure 7-8** and **Figure 7-9** identify economics as the strongest barrier category, while **Figure 7-10** and **Figure 7-11** show that the most highly rated factors include glues/permanent fixes, material quality and spare-parts availability. At the same time, this shows a limitation for what product policy can achieve on an individual level. Even a highly repairable product may not be repaired if local services are absent, labour is expensive, the user wants a new design or the replacement product is extremely cheap. ESPR can help remove avoidable product-level obstacles or improve the economics of repair at source, but achieving high repair uptake depends on complementary consumer, market, labour and circular-economy policies and incentives.

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Questions for stakeholders

Q3-27: Are common repairs currently constrained primarily by product design, spare parts, labour cost, consumer willingness, skills or another factor? Please distinguish by furniture type.

Q3-28: Would design changes such as removable upholstery, replaceable fittings, non-destructive fasteners or accessible mechanisms significantly reduce repair time/cost? If possible, quantify the difference.

Q3-29: Do manufacturers/retailers already provide on-site repair, parts-by-post or other repair services at significant scale? What proportion of relevant failures can these services address?

Q3-30: Would product repairability requirements create significant manufacturer inventory, logistics or compliance costs? What would be a proportionate approach?

Recommendations and proposed solutions

Within the ESPR stakeholder survey consultation, a few stakeholders proposed a set of interventions that could help to mitigate the aforementioned barriers to repair:

- Design products so that priority components can be accessed, removed and replaced without destructive disassembly; use modular construction, suitable fasteners and removable/replaceable upholstery where technically appropriate.
- Ensure long-term, affordable availability of relevant spare parts and improve standardisation or compatibility where feasible; provide durable product identification so that the correct parts and documentation can be found.
- Provide repair, maintenance and disassembly information in accessible formats and relevant languages. Several respondents proposed QR-code/DPP-type access to manuals, spare-parts catalogues, compatibility information and repair histories.
- Develop repairability evaluation methods and standards that distinguish product types, priority parts and different repair routes rather than relying on a single generic design criterion. Ongoing standardisation work was repeatedly cited, including CEN/TC 207 work on maintenance, repair, refurbishment and upgrade capability and guidance for disassembly/reassembly instructions for furniture. Respondents also referred to the future information platform associated with the EU Right to Repair framework.

Although not directly relevant to ESPR measures, further repair levers worth noting include on-site repair, collection/pick-up options and better information on available providers. Some respondents suggested financial support where transport or labour costs otherwise make the service uneconomic. Also relevant are business models that reward durability, upgradeability, repair services and long-term customer relationships rather than only first-sale volume.

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Questions for stakeholders

Q3-31: Which concrete ESPR requirements would you recommend for improving the repairability of furniture, and how should these requirements be formulated in terms of performance and information requirements, including appropriate thresholds, test methods, compliance verification and market surveillance?

Conclusions: Repair

For repair, the survey identified a complex network of interlinked mutually reinforcing barriers including repair-unfriendly design and limited component access and disassembly potential increasing labour and skill requirements. Spare-part and information gaps add uncertainty for consumers. Logistics and limited-service accessibility further reinforce the cultural/social and economic disadvantage for bulky items. Overall, these factors further raise total repair costs relative to cheap replacement furniture. Stakeholder disagreement mainly concerns the scale of the technical, information and infrastructure gaps, with industry associations more likely to point to existing repair routes and product-specific exceptions. For ESPR, the most directly product-related issues are non-destructive access and disassembly/reassembly possibility, replaceable parts (upgradability/ modularity), spare-part availability, availability of product identification and repair information. Price, service coverage and consumer preferences are decisive to repair decisions but are broader market conditions that product requirements can influence only partly and less directly.

7.3.7. Reuse, refurbishment, rental and leasing models

This chapter examines three strategies that can extend the time over which furniture provides a useful function or increases the intensity with which existing products are used: sharing/leasing, refurbishment, and reuse/resale. The three strategies overlap in their objective of retaining product value and avoiding or postponing the production of replacement furniture, but they operate through different market structures and require different enabling conditions (see also **Table 7-14**). Rental and leasing are covered only briefly as they are not the focus of this investigation. Refurbishment is treated in some more detail as the ESPR furniture stakeholder survey provided a comparatively rich assessment of its barriers. The main focus, however, lays on reuse and resale, covering consumer behaviour, second-hand channels, infrastructure, environmental effects, replacement of new purchases and potential rebound effects. For the purpose of this chapter, reuse/resale here refers only to the transfer of furniture to another user where the product can continue to provide its function without undergoing a professional restoration, repair or refurbishment process beforehand.

This includes peer-to-peer resale, free transfer between private persons, online marketplaces, flea markets, charity or social-enterprise channels, and commercial second-hand retail. Refurbishment, by contrast, involves a deliberate intervention intended to restore or improve the condition, functionality or appearance of a used product before continued use or resale. It can therefore include cleaning and hygienisation, disassembly, diagnosis, repair, component replacement, refinishing, reupholstery, testing and reassembly. Sharing/leasing and furniture-as-a-service

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models differ again because they organise access and repeated use through a service or contractual model rather than through a conventional one-off purchase and ownership model.

These distinctions are relevant for ESPR. Second-hand furniture can circulate through large informal and peer-to-peer markets in which low price, convenience and local availability are central. Refurbishment is particularly relevant where the product has enough residual value to justify professional work; this includes a greater relevance in B2B, office and public-procurement contexts than in routine private household purchasing. Leasing and furniture-as-a-service are also most established in the office/B2B segment, where asset management and end-of-lease processes can support repeated use cycles. Across all three strategies, ESPR can influence the technical conditions that determine whether furniture remains suitable for further use - for example durability, repairability, repeated disassembly and reassembly, maintainability, replaceable components and product information - but market demand, logistics, service provision and transaction convenience remain important complementary conditions for actual uptake.

Table 7-14: Scope and distinguishing features of reuse, refurbishment and service models.

Strategy	Main mechanism	Furniture context highlighted in the notes	Main enabling conditions / constraints
Sharing / leasing / renting	Increase intensity of use or support repeated/longer use through service-based access models.	Most established in B2B/office furniture; domestic models exist but remain niche.	Asset management, take-back/end-of-lease processes, refurbishment procurement requirements, service organisation and enhanced product durability in design.
Refurbishment	Restore or renew a used product before continued use or resale.	Professional services, B2B/office, public procurement, high-quality and higher-value furniture.	Technical access, replaceable parts, cleanability, service capacity, reverse logistics, viable labour economics, quality assurance and demand.
Reuse / resale	Transfer a still-useful product to another user, without or only minor preparation.	Large informal/C2C market plus second-hand retail, charities, social enterprises and established office-furniture resale.	Residual value, local demand, transportability, product condition, trust, hygiene, information, convenient channels and actual displacement of new purchases.

Source: Own illustration incl. input from ESPR furniture stakeholder survey.

Sharing and Leasing Models

Rental, leasing and furniture-as-a-service as models that can potentially increase the intensity of use of furniture or support longer product lifetimes by keeping products

within managed service cycles and potentially increasing the useful life and design for durability. The strongest furniture-specific application is in the B2B and office segment. In these settings, formal asset management, sustainability reporting and end-of-lease refurbishment obligations can create a clearer business case for maintaining, retrieving, refurbishing and reallocating furniture than is typically available in private household markets. Office furniture is therefore placed at the centre of existing furniture-as-a-service and leasing activity. Such models can support circularity where products are designed to withstand repeated use, transport and intervention, and where service providers have an incentive to preserve functional value over multiple use cycles rather than to maximise one-off replacement sales. Domestic furniture leasing exists, but the notes characterise it as a niche rather than a mainstream acquisition model. In this respect, leasing models connect closely with the refurbishment and reuse conditions discussed below: durable structures, replaceable high-wear parts, repeated disassembly and reassembly, clear product identification and efficient reverse logistics all improve the feasibility of recirculating furniture after an initial user no longer needs it.

Refurbishment

Role, actors and infrastructure

Refurbishment sits between repair and reuse. While repair is mostly relevant if a user wants to extend the useful life of a piece of furniture to keep in use him-/herself, refurbishment often involves business models coordinating take-back or collection of end-of-use furniture to restore it and give it a second lifetime (esp. relevant in business contexts). The ESPR stakeholder survey shows that successful refurbishment requires three conditions simultaneously:

- the furniture must be technically restorable,
- the intervention must be economically viable,
- and the resulting product must be trusted and marketable.

This makes refurbishment more dependent on professional service capacity than simple peer-to-peer reuse. The relevant actors therefore include manufacturers, professional refurbishers, joiners and artisan workshops, cleaning and hygienisation providers, logistics operators, retailers/resellers, and - particularly in office and public-procurement contexts - organisations managing larger furniture portfolios. Stakeholders described existing artisan and regional capabilities for high-quality or bespoke furniture and referred to growing refurbishment segments in some markets. One industry association cited a programme as an example combining refurbishment for continued use by the original owner with take-back, refurbishment and resale to a new user. At the same time, the maturity of the market was described as uneven: some respondents pointed to existing provider networks, while others identified fragmented collection, workshop, storage and redistribution capacity.

Compared with reuse, refurbishment has a stronger processing chain. A product may need collection, condition assessment, cleaning or hygienisation, disassembly, repair, replacement of components, refinishing or reupholstery, testing, reassembly, storage and resale. This chain can add value by turning a worn product into a credible second-

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market offer, but it also adds labour, infrastructure and coordination costs. The stakeholder evidence therefore consistently links technical design to business-model viability: A product that is difficult to disassemble, clean or reassemble may be technically difficult and economically unattractive to refurbish at scale.

Inputs from the stakeholder survey on barriers to refurbishment

Figure 7-12 and **Figure 7-13** show the relative importance that respondents to the ESPR survey assigned to pre-selectable barriers to refurbishment.

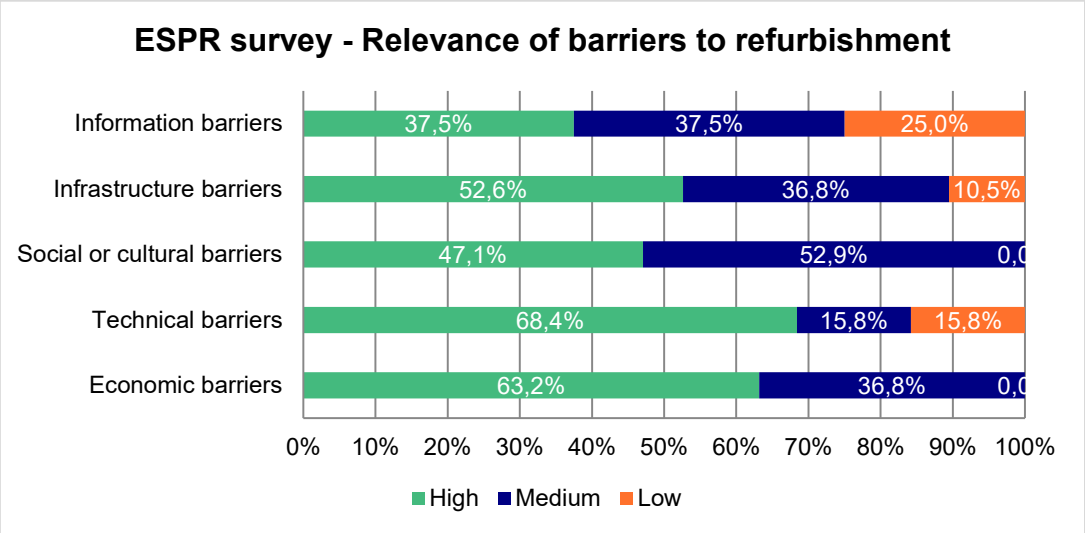

Figure 7-12: Importance of barriers to refurbishment reported by surveyed stakeholders.

Source: Own illustration based on the results of the ESPR stakeholder survey.

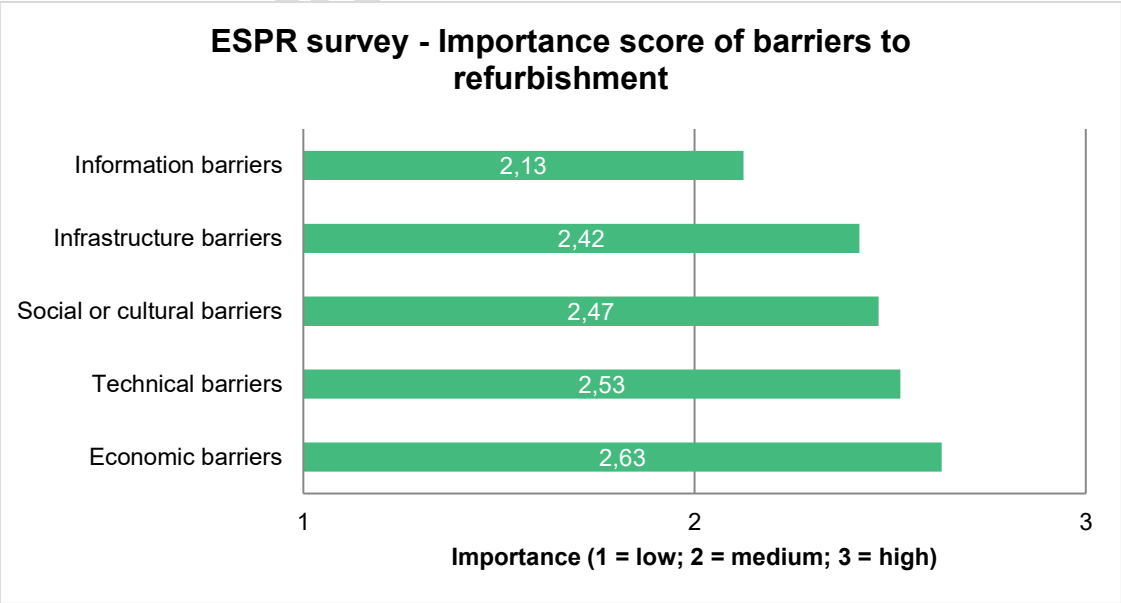

Figure 7-13: Average importance of barriers to refurbishment to stakeholders.

Source: Own illustration based on the results of the ESPR stakeholder survey.

The quantitative ESPR stakeholder survey shows that refurbishment is constrained by several barrier types at the same time rather than by one dominant bottleneck. Economic barriers received the highest score (2.63), with 63.2% of respondents rating them highly relevant and all remaining respondents rating them medium relevant. Technical barriers were even rated high more often by more respondents (68.4%) but the average importance was slightly below the economic one (2.53). Social/cultural barriers were rated “medium” or “high” by every survey respondent (score 2.47), while infrastructure barriers also showed medium-high overall importance (score 2.42). Information barriers were more divided and, on average, only of medium importance (score 2.13). The free-text answer provided by stakeholders gave further insights into the interconnectedness of barriers.

Economic, and technical barriers

Economic and technical barriers are described as closely connected. Professional refurbishment is labour-intensive: dismantling, cleaning, hygienisation, diagnosis, testing, repair, reassembly, skilled reupholstery, storage and transport can make the final product only slightly cheaper than a new item. This is particularly problematic for low-cost mass-market furniture, where the residual value is too small to absorb professional processing costs. In contrast, stakeholders repeatedly mentioned that durable, high-quality, solid-wood, craft or design furniture, plays an important role as it is more likely to retain enough value to justify intervention.

Technical feasibility encounters the same problems as repair. Products that cannot be dismantled without damage, can be difficult or uneconomic to refurbish. Upholstered furniture is especially demanding because the elements that visibly age - covers, padding and high-load zones - may require deep access for cleaning or replacement. Surface damage may be reversible, but structural fatigue, weak boards, damaged connectors or low-quality base materials can make the outcome unreliable even when an intervention is technically possible.

The stakeholder evidence also contains an important counter-position. One manufacturer stated that technical barriers should be low, and several industry respondents pointed to functioning refurbishment markets for high-quality products. Rather than contradicting the wider findings, this suggests that refurbishment barriers are highly product dependent. Where furniture is already designed for refurbishment/repairability and made from robust materials, refurbishment can be viable. The policy challenge is therefore not to assume that all furniture is inherently difficult to refurbish, but to define enabling product conditions that make a larger share of the stock suitable for repeated intervention.

Infrastructure, information, quality assurance and market acceptance

Refurbishment also depends on an infrastructure. Public authorities, research organisations, NGOs, suppliers and some industry/manufacturer respondents described professional provider capacity and reverse-logistics networks as fragmented or uneven. Collection, workshop processing, cleaning, testing, storage and redistribution require space and coordination. Limited quantities or product variety compared to new furniture (e.g., specific dimensions, colours large matching batches)

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can make refurbish less attractive to consumers (e.g., office and public procurement, where buyers may need many comparable units rather than one unique second-hand item).

Other stakeholders stressed that provider networks are already improving and pointed to artisan workshops, joiners and established market segments. This means infrastructure is not uniformly absent, but its scale and economic viability vary strongly by region and product value. High-value furniture can support specialised regional service networks; low-value mass-market furniture may not generate enough margin for collection, workshop processing and resale. ESPR can make products faster and cheaper to identify, dismantle, clean, test and reassemble, but it cannot directly create local workshop capacity, reverse-logistics networks or sufficient market volume.

Information has a specific role in refurbishment because the product has been intentionally modified. Buyers may not know which components were replaced, how the product was cleaned or tested, whether previous damage remains, or what useful life and warranty can reasonably be expected. Public authorities and research organisations in the stakeholder survey were particularly likely to call for clearer product history, while industry and suppliers also raised documentation and assurance. Some respondents argued that direct physical inspection is sufficient for simple furniture. Still, this reveals less about hidden structural repair, replaced components, hygiene treatment or remaining durability. Furthermore, quality assurance, warranty and legal responsibility were raised as related concerns. One stakeholder indicated uncertainty about how refurbished quality should be communicated and who is responsible when a product has been substantially modified. The stakeholder notes that this creates legal-liability issues (GPSR) as it is not clear if a product must comply with the same product-specific requirements as new products.

Traceable product and process information, common grading approaches and documentation of refurbishment work could reduce uncertainty, while warranty, liability and consumer-rights questions require coordination with broader legal frameworks.

Market acceptance is similarly linked to visible quality. Refurbished furniture can be perceived as less clean, less reliable, less fashionable or less certain than a new product. Stakeholders nevertheless indicated that acceptance improves where cleanliness, workmanship and quality are visible, the process is credible, and the price advantage is meaningful.

Implications for ESPR

Stakeholder-proposed measures that could be addressed through ESPR include design for disassembly, cleaning, testing, component replacement and reassembly; removable covers, padding and other high-wear parts; durable materials that tolerate repeated intervention; standardised records of refurbishment work and product history; and product information that can be carried through digital product records. Furthermore, some stakeholders identified measures that are relevant for enabling refurbishment and reuse but which are not directly addressable (or best addressed) through ESPR product requirements. These include include stronger reverse logistics, better coordination between manufacturers, refurbishers, logistics providers and

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retailers, and demand-building through public procurement and verified environmental-benefit information..

Questions for stakeholders

Q3-32: What proportion of returned/used furniture is technically suitable for refurbishment, and what proportion is economically worthwhile to refurbish? Please differentiate by furniture type. Which product characteristics most strongly determine whether refurbishment is economically viable?

Q3-33: Which furniture categories already have a commercially viable refurbishment market, and which are unlikely to become viable even with better product design?

Q3-34: What are the typical refurbishment operations and costs: collection, inspection, cleaning/hygienisation, dismantling, parts, reupholstery/refinishing, testing, storage and redistribution?

Q3-35: What information on product history, previous repairs, components or materials is actually needed by professional refurbishers to reduce diagnosis time or uncertainty?

Q3-36: Which concrete ESPR requirements would you recommend to improve the refurbishability of furniture, and how should these requirements be formulated in terms of performance and information requirements, including appropriate thresholds, test methods, compliance verification and market surveillance?

Reuse and resale of furniture

Scope, status quo and market structure

Unlike professional refurbishment, reuse does not necessarily require systematic intervention before transfer. The product may still be functional, but it must be transferred to another user without excessive cost, damage, uncertainty or inconvenience. This makes peer-to-peer exchange possible at very low transaction cost for some products, but it also means that condition assessment, transport and trust are often shifted directly to the seller and buyer.

Evidence points to furniture as having one of the more mature informal second-hand markets among consumer product groups. Common channels include flea markets, charity or social-enterprise shops, commercial second-hand retail, online platforms, auctions and direct transfer between friends and family. Formal infrastructure varies considerably by Member State and region. Bulky, low-value items often move through free-giveaway channels or disposal, whereas high-value, designer or durable solid-wood furniture is more able to sustain resale and auction markets. Furthermore, reuse is selective rather than uniform across the furniture stock. While high-quality solid-wood, free-standing, designer and customisable furniture are favourable candidates for reuse/resale (such products rather retain functional, social and economic value), demountable low-cost furniture can face oversupply, damage from repeated assembly and transport making it non-reusable, or low confidence that it will survive another use cycle. (Bayerisches Staatsministerium, 2019) reports that damage caused during

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assembly/disassembly, transportation and delivery can limit the supply of reusable furniture. The same sources note that large furniture such as wardrobes is constrained to relatively local markets because suitable transport is costly and not always available to private households.

Questions for stakeholders

Q3-37: Do you have quantitative data on the share of furniture that enters a second use cycle, differentiated by furniture type and, where possible, by resale, donation, informal transfer, retailer/manufacturer take-back and professional reuse channels?

Q3-38: Which furniture types currently have the highest and lowest realistic potential for reuse, and what product characteristics most strongly determine whether furniture retains sufficient functional and economic value for a second use cycle?

Q3-39: Which design characteristics currently prevent otherwise functional furniture from being reused, for example because of damage during disassembly, transport or reassembly, missing components, poor cleanability or limited adaptability to a new user or space?

Q3-40: For low-cost mass-market furniture in particular, which design improvements could most effectively increase the likelihood of a second use cycle?

Reuse channels, actors and aspects of infrastructure and logistics

The second-hand furniture market consists of several transaction types rather than one integrated channel. (Delanoeije & Bachus, 2022) provide particularly useful evidence from Flanders by combining administrative data from the Flemish reuse network with a representative survey of 1,500 citizens. Their channel data illustrate the importance of informal exchange alongside organised reuse networks and second-hand retail. For furniture received for free, online channels (24.5%), the reuse network (24.2%) and friends/family (24.1%) were almost equally important, followed by garage sales/fairs (11.2%), other routes (8.7%) and second-hand retail (7.3%). For furniture bought second-hand, friends/family dominated at 54.3%, followed by online channels (17.1%), other routes (10.8%), associations/good causes (9.7%) and garage sales/fairs (8.1%).

Table 7-15: Observed furniture channels, actors, transactions and associated costs in Flanders, Belgium.

Furniture received for free	Share	Furniture bought second-hand	Share
Online	24.5%	Friends or family	54.3%
Reuse network	24.2%	Online	17.1%
Friends or family	24.1%	Other	10.8%
Garage sales / fairs	11.2%	Associations / good causes	9.7%
Other	8.7%	Garage sales / fairs	8.1%
Second-hand retail	7.3%	-	-

Source: Adapted from (Delanoeije & Bachus, 2022).

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The channel split shows why reuse policy cannot focus only on formal second-hand retail. Personal networks and online peer-to-peer exchange account for a large share of transactions, while organised reuse networks are particularly relevant to free transfers. The notes interpret the Flemish evidence as showing that most reuse occurs outside fully formal channels.

The physical characteristics of furniture make local infrastructure especially important. Reuse of a small chair can be relatively simple, while a wardrobe, sofa or large desk may require a vehicle, several people, temporary storage and coordination between households. Standard parcel delivery is often unavailable or uneconomic. The resulting local radius reduces the pool of potential buyers and makes reuse highly dependent on local demand.

Consumer participation and demand for second-hand furniture

Available evidence shows that second-hand furniture is neither marginal nor universal. In Flanders, 27.2% of respondents indicated that they had bought reusable furniture during the previous year, averaging 1.2 items, while 23.6% had received reusable furniture for free, averaging 1.0 item. Around 18.2% of the furniture currently present in surveyed households was reported to be second-hand (Delanoeije & Bachus, 2022). Furniture was also the largest category by weight in the formal Flemish reuse network in 2018, accounting for 41.1% of sales, although the measured reuse volume of furniture was 2.22 kg per capita compared with 14.85 kg per capita across household goods overall. This deviation can be interpreted in the light of a substantial share of furniture reuse occurring through informal channels that are not captured in formal network weights.

When it comes to consumer motivations to engage in reuse, a Eurobarometer survey reported that 55% of EU consumers would consider buying second-hand furniture, with at least half saying so in 17 Member States. Reported willingness ranged from 79% in Sweden, 76% in Finland and 73% in Denmark to 26% in Malta, 28% in Romania and 32% in Bulgaria. This indicates potentially large Member-State differences in social acceptance and market maturity of second-hand use and resale of furniture (European Commission, 2014).

A recurring finding is that consumers appear more willing to sell, donate or give away furniture than to buy it second-hand (Haugrønning et al., 2021). Evidence from Norway on sofas illustrates the scale of attempted circulation through online platforms. In 2016, around 46,400 sofas were offered for free and 157,000 were offered for sale on a single (the largest) second-hand marketplace, corresponding to up to 9% of Norwegian households attempting to dispose of furniture through that single platform (Haugrønning et al., 2021). The number of sofas that actually found a new owner is unknown. This asymmetry between offering and successfully reselling furniture suggests that second-hand markets can experience oversupply in some product categories even where consumers are willing to pass on usable goods. It also means that the environmental value of reuse cannot be inferred simply from the volume of furniture entering resale channels. A used item produces the greatest avoided-production benefit when it finds a new user who would otherwise have bought new furniture.

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Furthermore, demand is dependent on materials, quality and type of second-hand furniture. In general, high-quality solid-wood furniture in good condition tends to retain demand, whereas bulky low-value or highly space-specific furniture can be difficult to sell or give away. Upholstered furniture raises additional hygiene and cleanliness concerns (Haugrønning et al., 2021). Still, during the ESPR stakeholder survey, some stakeholders contested these concerns. NGOs, a consumer organisation and some research respondents described second-hand furniture as already socially accepted in some markets, and one NGO even stated that demand can in some cases match or exceed the supply of reusable furniture.

Questions for stakeholders

Q3-41: What transport distances, handling requirements and associated costs should realistically be assumed for reuse of different furniture types, particularly bulky products such as sofas, wardrobes and large tables?

Q3-42: Which information about a used furniture product would materially facilitate reuse or resale, and for which reuse channels would such information actually be used?

Q3-43: For professional reuse, retailer take-back and B2B/public procurement, would standardised information on condition, dimensions, age, repair history, materials or remaining functionality meaningfully reduce transaction costs or increase buyer confidence?

Assessment of ESPR stakeholder input on reuse barriers

The ESPR furniture stakeholder survey provides a useful overview of the relative importance of barrier categories from the perception of surveyed stakeholders. This evidence should nevertheless be interpreted with caution as consumers were not surveyed directly. Rather the surveyed stakeholder was asked for their opinions on typical barriers to reuse providing a different perspective to the discussion compared to direct consumer evidence. The survey results are shown in **Figure 7-14** and **Figure 7-15**. Economic barriers ranked highest with a score of 2.45 which implies lower values than for refurbishment and repair but still medium to high importance. 59.1% rated them highly relevant, a further 27.3% medium and the rest as low. Social/cultural barriers followed closely at 2.36, with 56.0% assigning a high relevance. Infrastructure (2.22), technical barriers (2.13) and information barriers (2.09) were somewhat lower but still averaged medium importance. This distribution supports an important interpretation.

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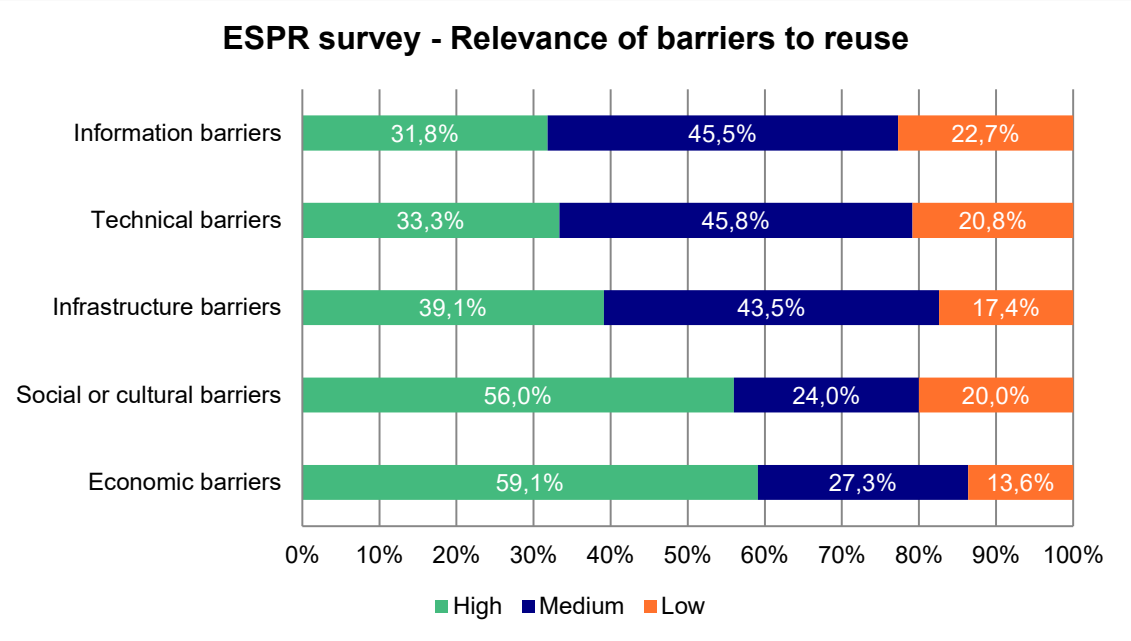

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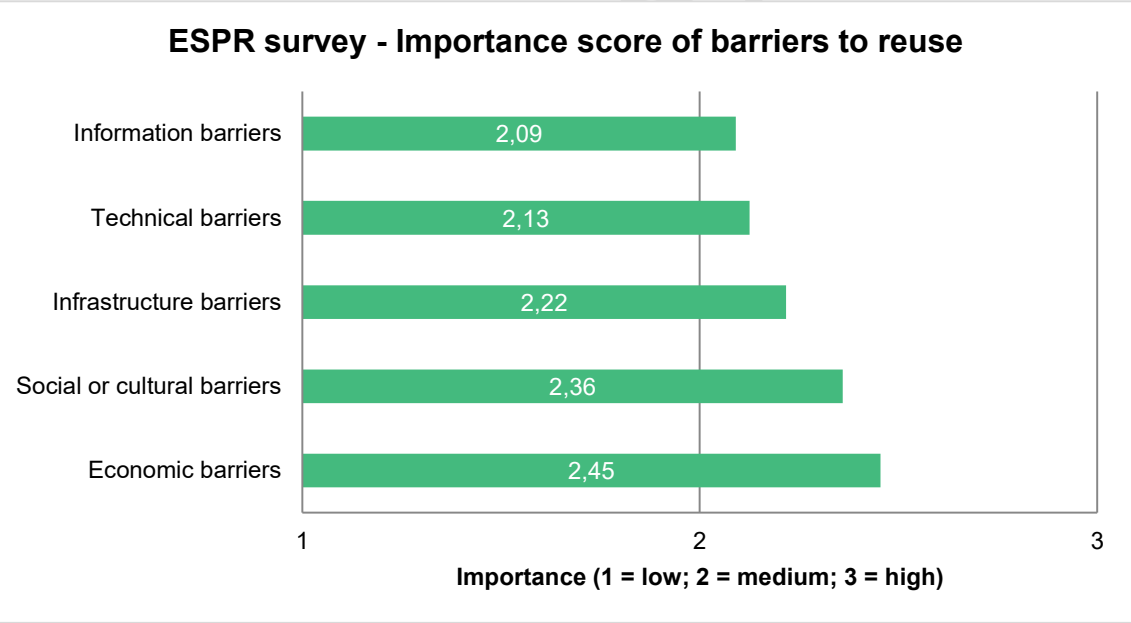
6604 **Figure 7-14: Importance of barriers to reuse reported by surveyed stakeholders.**

6605 Source: Own illustration based on the results of the ESPR stakeholder survey.



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6607 **Figure 7-15: Average importance of barriers to reuse to stakeholders.**

6608 Source: Own illustration based on the results of the ESPR stakeholder survey.

6609 The free-text survey responses provided further insights into the practice and barriers
6610 of furniture reuse.

Economic and logistical barriers

The strongest reuse barrier is the relationship between residual value and transaction cost. To resell a piece of furniture, a household may need to clean it, photograph it, create a listing, answer enquiries, arrange viewings or collection and keep the item available until a buyer is found. The buyer may have to organise transport and accept uncertainty about condition and potential risk of scam. For bulky furniture, a vehicle and carrying assistance may be necessary. When a comparable new product is inexpensive and includes convenient delivery, warranty, etc., the price difference may be too small to compensate either side for this effort. This mechanism was reported broadly across stakeholder groups and aligns with the literature. The availability of cheap new furniture depresses demand for used low-value items, while high-quality, durable and design-led furniture can retain enough residual value to sustain resale. Furthermore, transport cost can be large relative to product value. Large wardrobes, storage units and sofas may be confined to a relatively small geographic market, and products that cannot be dismantled into manageable units or without damage become even more expensive or practically impossible to move.

Convenience becomes particularly important during life transitions. Stakeholders noted that moves, household changes and the need to clear space can make speed more important than resale value. Easy bulky-waste disposal can then compete directly with reuse. This fits the wider evidence that furniture disposal and acquisition are often connected to housing and life-stage changes.

ESPR can influence this barrier only partly. Modular construction, lower transport volume, repeated disassembly and reassembly, durable connectors, replaceable missing components and robust structures can reduce handling damage and transport and preparation cost. However, end-of-life collection, storage when no longer in use, second-hand platform fees, the price of competing new furniture combined low-cost convenient delivery are market and infrastructure conditions that are harder to address directly via product regulation.

Technical suitability, condition and transferability

Technical barriers matter because they determine whether a used product survives the transfer process and remains credible to the next user. Furniture that is still functional may nevertheless be unsuitable for reuse if it cannot be moved through a building, dismantled without damage or reassembled reliably. Missing fittings, worn surfaces, weak structures and non-repairable components can eliminate any potential reuse value. Stakeholders repeatedly differentiated robust, high-quality furniture from low-cost “fast furniture”, where weak construction and poor repairability can make a second ownership cycle uncertain becoming unstable after moving or broken after disassembly.

A further furniture-specific issue is transferability. Built-in, bespoke or highly space-specific products may have long technical lifetimes but fit only a narrow set of rooms or users. A fitted kitchen or custom storage system can remain functional while being difficult to install elsewhere. High-quality free-standing furniture has a broader potential market because it is less dependent on one building configuration. This limits the

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extent to which reuse can be increased through durability alone. Technical longevity does not guarantee that a suitable second user exists and can be easily found.

For upholstered furniture, removable and washable covers and replaceable cushion inserts can support both hygiene and visible renewal.

Social, cultural, hygiene and aesthetic barriers

Social and cultural barriers ranked second highest in the stakeholder survey. The main concerns were preference for new products and current styles, hygiene and cleanliness, and uncertainty about quality or status. Used furniture may be perceived as outdated, temporary, lower-status or less reliable, especially where wear is visible. Upholstered furniture, beds and textile surfaces are more sensitive because buyers may worry about dirt, odour, pests, contamination or hidden damage. These concerns are partly objective and partly perceptual, and their importance varies strongly between products, markets and user groups.

The stakeholder evidence also cautions against assuming that second-hand furniture is generally stigmatised. Several NGOs, a consumer organisation and a research respondent described active and accepted second-hand markets, and sustainability-oriented identity can itself support reuse. The evidence therefore points to segmentation rather than a single social barrier. Hard, cleanable, durable or high-value furniture may be readily accepted, while upholstered items and visibly worn mass-market products face greater resistance.

Cleanable materials, removable or washable textiles, replaceable covers and durable aesthetic components can improve hygiene and visual condition. Credible information can further reduce uncertainty. By contrast, fashion, status and preference for a new interior are largely behavioural and lie outside the direct ESPR scope. ESPR can improve the quality of second-hand supply, but it cannot ensure that consumers prefer a used style to a new one.

Information, quality assurance and trust

Information barriers received the lowest average score in the stakeholder survey, but they can become important when the buyer cannot easily inspect the product or when reuse becomes professionalised. Buyers may lack reliable information on dimensions, age, materials, repair and maintenance history, condition, remaining service life or value. Sellers may not know how to price the product or which channel to use. Missing grading or guarantees can increase perceived risk, especially where defects are hidden or where large quantities are procured remotely. Stakeholders disagreed on the severity of this problem. One industry association argued that furniture condition can often be assessed through direct inspection, while a consultancy pointed to well-established online platforms in Denmark. Informal C2C reuse can often function with photographs, measurements and physical inspection. Professional reuse, retailer take-back, B2B resale and public procurement may require more structured and transferable information because buyers need consistency, comparability and confidence across multiple units. For ESPR, a proportionate information strategy therefore seems more meaningful than simply maximising data. A digital product passport could increase

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convenience and reduce transaction costs (even though maybe less meaningful for informal furniture reuse).

Questions for stakeholders

Q3-44: Which reuse-related barriers could realistically be addressed through ESPR product requirements, and which primarily require complementary measures outside product design, such as collection, logistics, resale infrastructure or quality-assurance schemes?

Environmental benefits and secondary lifetime

The following sub-chapter deals with the potential environmental benefits of reuse. The environmental rationale for reuse is that continued use of an existing product can avoid or postpone the material extraction and production associated with a new furniture item. (Russell et al., 2023) compared reuse, repair and refurbishment pathways for three wooden chair case studies and found reuse to be the lowest-impact option in all cases. The study also illustrates that “more durable” is not automatically synonymous with “lower impact”: a heavier, high-quality chair can embody more material and production impact than a lightweight chair. The environmental outcome depends on whether the higher technical lifetime is actually realised in service and on how value-retention strategies alter the need for replacement production.

(Hrafnkelsdóttir, 2022) modelled the climate implications of selling the same weight of second-hand furniture instead of producing, selling and discarding new furniture, using furniture-specific environmental data across 21 furniture subcategories. The study estimated around 42% lower climate impacts for the reuse scenario, with an improved scenario saving up to 80%. The result was sensitive to replacement rates, transport and the mix of items sold. This reinforces the point that reuse is not environmentally beneficial simply because a product changes ownership; the transaction must plausibly prevent or postpone a new purchase and avoid excessive logistics impacts.

(Snijder et al., 2019) provides a useful concept of secondary lifetime for online-marketplace trading. In the estimates reported in the notes, second-hand trading increased furniture life expectancy by a factor of around 1.5. The estimated lifetime extension was 4.6 years for furniture on average, 5.3 years for couches, 6.1 years for tables and 4.4 years for beds. These values illustrate the potential significance of a second ownership cycle: extending actual service life by several years can be more relevant to life-cycle impacts than small changes in routine use-phase burdens.

Table 7-16: Selected quantitative evidence on environmental effects and secondary lifetime.

Source	Furniture-specific result	Interpretation / caution
(Russell et al., 2023)	Reuse had the lowest impact in all three wooden-chair case studies.	Case-study evidence; shows trade-offs between durability, weight/material input and actual service lifetime.
(Hrafnkelsdóttir, 2022)	About 42% climate-impact reduction; up to 80% in an improved scenario.	Model result sensitive to displacement/replacement, transport and item mix.

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Source	Furniture-specific result	Interpretation / caution
(Snijder et al., 2019)	Estimated secondary-life extension factor 1.5; +4.6 years furniture average, +5.3 couches, +6.1 tables, +4.4 beds.	Marketplace-based modelling; represents potential extension rather than direct observation of every transaction.
(Bubinek et al., 2025)	Ideal case: 69 t furniture reuse saves 126 t CO2e (1.8 kg CO2e/kg reused); reuse-system operation 0.28 kg CO2e/kg.	Large benefits under full displacement/no rebound but strongly reduced by rebound mechanisms.

Source: Own illustration.

Replacement of new purchases and rebound effects

The environmental benefit of reuse depends critically on the replacement or displacement rate: the extent to which acquiring a reused item actually substitutes for the purchase of a new item rather than adding another piece of furniture to the household. This is a more useful concept than reuse volume alone when estimating avoided production. (Delanoeije & Bachus, 2022) report a score of 2.9 on a 0-10 scale, which can be interpreted as reused furniture replacing a new acquisition in only around 29% of cases. Under this interpretation, roughly seven out of ten reused acquisitions are additional rather than direct substitutes for new furniture. The authors link the low replacement rate to the quality of inflows: Maintaining sufficient quality across ownership changes is essential if second-hand furniture is to compete credibly with new products.

(Bubinek et al., 2025) expand this issue through a climate-account and rebound assessment. Under the ideal assumption of 100% displacement and no rebound, approximately 69 tonnes of furniture reuse would save 126 tonnes CO2e, equivalent to around 1.8 kg CO2e per kilogram of reused furniture. The operation of the reuse system itself caused only 0.28 kg CO2e per kilogram of reused goods and was therefore small relative to the avoided production impact. However, the estimated furniture rebound effect was at least around 80% and could reach 167%, meaning that the theoretical climate benefit could be strongly reduced or even reversed.

Two mechanisms are especially important. First, low displacement means that second-hand purchases only partly replace new purchases. (Bubinek et al., 2025) use a 35% displacement rate as a conservative case. Second, re-spending occurs when second-hand furniture is much cheaper than equivalent new furniture and the resulting monetary savings are spent on other consumption that causes additional emissions. The study estimated a second-hand price of around 8.5 DKK/kg (approximately EUR 1.2/kg) compared with around 71 DKK/kg (approximately EUR 9/kg) for equivalent new furniture. Still, low displacement alone did not fully cancel the climate benefit in the study, but combining low displacement with re-spending “almost always” resulted in backfire in the model.

This finding creates a policy tension. Raising second-hand prices could theoretically reduce the re-spending rebound, and (Bubinek et al., 2025) calculate very large price increases would be required under some assumptions. Yet low second-hand prices are

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also socially valuable because they allow lower-income consumers to access furniture they might otherwise not afford. Furthermore, reuse would become less attractive if prices become similar to purchasing new. That's why durability, reliability and repairability of the original product are relevant here because they determine the quality of the stock entering the second-hand market. These rebound results also qualify simple claims about "avoided products". A second-hand transaction can extend a product's life and still provide limited climate benefit if it is an additional purchase; conversely, a high-quality reused item that directly replaces a new item can generate substantial savings. For ESPR and Task 5 and 6 modelling, the replacement/displacement rate should therefore be treated as a central parameter whenever environmental savings from reuse are quantified. Sensitivity analysis is preferable to assuming a one-to-one replacement of new furniture.

Questions for stakeholders

Q3-45: Do you have data on the typical secondary lifetime of reused furniture, i.e. how long different furniture types remain in use after transfer to a second owner?

Q3-46: Do you have quantitative evidence on the displacement/replacement rate of second-hand furniture, i.e. the share of reused furniture acquisitions that actually replace the purchase of a new product rather than representing additional consumption?

Q3-47: Could you provide examples of furniture products or business models that already achieve comparatively high reuse rates or retain high second-hand value, and identify the design characteristics that enable this?

Q3-48: Which concrete ESPR requirements would you recommend to improve the reusability of furniture, and how should these requirements be formulated in terms of performance and information requirements, including appropriate thresholds, test methods, compliance verification and market surveillance?

7.4. End-of-life behaviour

7.4.1. Collection of furniture waste

Furniture reaches end-of-life systems through several parallel collection routes rather than through one harmonised EU furniture-waste stream. For household furniture, municipal bulky-waste services and civic amenity or recycling centres are the main formal routes in many Member States. Collection may take the form of scheduled kerbside or door-to-door collection or user drop-off. Furniture can also be captured through retailer or manufacturer take-back, social enterprises, charities and reuse networks before it enters conventional waste treatment (**Table 7-17**). Bulky items may additionally be abandoned or illegally dumped where transport, cost or uncertainty about accepted items makes formal disposal inconvenient.

The absence of a furniture-specific waste code is a central data and routing issue. Used furniture can be recorded as bulky waste, separately collected wood, scrap metal or residual waste; furniture with integrated electronic components may instead enter

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WEEE systems. This makes collection volumes difficult to quantify and also means that the way furniture is handled is determined by the broader waste stream into which it falls. Stakeholders explicitly confirmed that an EU-average collection route is difficult to define because national collection systems, EPR schemes and treatment infrastructures differ substantially (German Environment Agency, 2022).

Table 7-17: Possible collection channels and routes for furniture waste in the EU.

Collection route	Typical role	Relevance for preserving reuse potential
Municipal bulky-waste collection / civic amenity sites	Main formal household route in many Member States.	Reuse potential depends strongly on separate handling, protection from damage and early screening.
Retailer / manufacturer take-back	More developed in some B2B markets and under furniture EPR systems such as France.	Can create a controlled return route and facilitate sorting, reuse, refurbishment or recycling.
Charities, social enterprises and reuse networks	Intercept products before or alongside the waste stream.	Generally, the route most directly oriented toward preserving whole products for a second user.
Informal resale / donation	Peer-to-peer sale, giveaway and personal networks; often statistically invisible.	Can avoid waste status entirely, but volumes are poorly captured in official statistics.

Source: Own illustration.

Stakeholder evidence illustrates this national variation. A French consumer-organisation respondent referred to the furniture EPR system operated by Ecomaison and Valdelia. An Italian public-authority response described household furniture as bulky waste managed mainly through municipal collection centres, free or scheduled kerbside services and, in some cases, one-for-one take-back. Another public-authority response, referring to a Spanish regional context, provided indicative shares of around 45% scheduled municipal bulky collection, 35% civic amenity sites and 20% informal reuse/second-hand. Due to the large regional variations these numbers should be treated as illustrative rather than representative.

It is important that collection practice might influence subsequent reuse potential. A Bavarian study conducted by the State Ministry for the Environment and Consumer Protection examined 1,134 discarded furniture items at 60 recycling centres. Around 24% were damaged; of the recorded damage, 36% was attributed to collection-system stages: 13% to throwing/loading into the collection system, 8% to transport, 3% to storage and 12% to pre-treatment or compaction (see **Figure 7-16**). The study identifies household collection, separate capture of reusable items and cooperation between collection points and reuse/repair networks as important means of preserving value (Bayerisches Staatsministerium, 2019).

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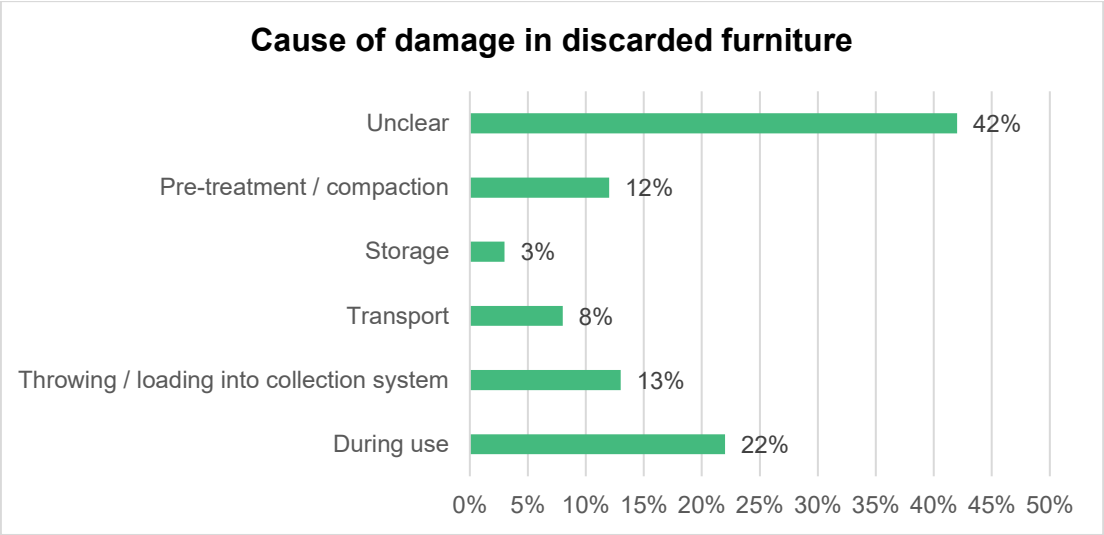

Figure 7-16: Cause of damage for broken furniture items collected at Bavarian recycling centres.

Source: Own illustration based on (Bayerisches Staatsministerium, 2019)

Questions for stakeholders

Q3-49: At which stage of current collection and sorting systems are furniture items with reuse or refurbishment potential identified, and what share of this potential is currently captured before products enter destructive treatment?

Q3-50: Which collection practices most frequently reduce the reuse or recycling potential of furniture, for example through compaction, throwing/loading, weather exposure, destructive dismantling, mixed storage or transport damage?

Q3-51: Would separate collection or earlier sorting of reusable furniture materially increase the share entering reuse or preparation for reuse? If possible, please provide quantitative estimates of the potential improvement and associated collection or sorting costs.

Q3-52: For which furniture types would improved product design such as repeated non-destructive disassembly, more robust connectors, replaceable components or easier material separation meaningfully improve outcomes under existing collection and treatment systems?

7.4.2. EU waste generation and routing

EU-wide furniture waste generation remains uncertain and should be interpreted cautiously. A frequently cited (European Environment Bureau, 2017) estimate places furniture waste at about 10.8 Mt for the EU27 and the UK. This figure was not based on direct furniture-waste reporting but assumed furniture represented 3.75% of municipal solid waste, within a reported Member-State range of 2-5% and applied an additional factor to account for business furniture. The estimate is therefore useful as an order of magnitude but not as a harmonised current EU measurement. Germany provides a more detailed national example. (German Environment Agency, 2022) estimated around 3.6 Mt of furniture waste per year, equivalent to approximately 43 kg per

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person. Around 1.7 Mt, or about 20 kg per person, was estimated to be collected separately as bulky waste; furniture was estimated to account for roughly 61% of bulky waste by weight. Other furniture enters wood-waste, WEEE, scrap-metal, commercial or residual-waste streams, again illustrating why collection statistics do not equal total furniture waste.

In addition to post-consumer furniture waste, losses can also occur before products reach the consumer. Unsold furniture represents an important pre-consumer or pre-use flow, resulting for example from overproduction, overstock, minor product defects or commercial obsolescence. An ADEME study estimated that unsold furniture represented 2.3% of furniture-sector turnover in France in 2019, equivalent to approximately EUR 296 million. Minor defects accounted for 33% of reported causes, while overproduction or overstock accounted for 29% and end-of-series or marketing obsolescence for 18%. The routing of these unsold products also shows that only a small share was retained through repair: 39% entered destocking channels, 38% were recycled, 10% donated, 8% destroyed and only 5% repaired (ADEME, 2021). These figures indicate that material and product losses can arise before the use phase and should therefore be considered alongside post-consumer furniture waste when assessing end-of-life and waste-routing patterns.

The stakeholder survey reinforces these data limitations. Industry respondents stressed that furniture placed on the market cannot be converted one-to-one into waste because service lives are long and variable and products may be stored, donated, resold or refurbished. An Italian estimate cited by stakeholders suggested about 2.4 Mt of furniture placed on the market annually and more than 1.5 Mt of furniture waste inferred from municipal waste streams in four major areas, but the respondents themselves noted that flows outside municipal collection were missing, and the result was probably an underestimate. For ESPR Task 3, these figures are therefore best used as contextual evidence; further explanations are provided in Task 4.

Overall routing and treatment

Available evidence indicates that much discarded furniture still enters treatment routes that destroy the product rather than preserve it for a second use. The older EU-level estimate most frequently repeated in the literature estimates that approximately 80-90% of European furniture waste was landfilled or incinerated, with only around 10% recycled (European Environment Bureau, 2017). This data should not be used as a precise description of the current EU situation, but it shows the low level of material and product-value retention via recycling, reuse or other practices. Stakeholders emphasised that treatment routes differ strongly by Member State. Industry respondents mentioned a well-developed waste-to-energy infrastructure in Austria, while other countries presumably placed more emphasis on recycling, such as Italy. A Dutch public-authority response similarly stated that most discarded furniture is incinerated and that furniture recycling remains limited. These responses are qualitative national examples.

France provides one of the clearest current national datasets because furniture has been covered by a dedicated EPR scheme since 2012. According to Ecomaison data reported in the notes, 1.29 Mt of furniture was collected in 2023, compared with 3.06 Mt placed on the market. Of collected furniture, 97% was recovered in some form: 5%

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through reuse, 45% through recycling and 47% through energy recovery. The remaining 3% was not reported as recovered. This illustrates that a high formal recovery rate does not necessarily imply a high product-reuse rate: reuse remained a small share of the collected volume (Eléments d'ameublement, n.d.; Furnishing elements, n.d.).

Share of reusable furniture

Reuse differs from conventional waste treatment because the most favourable route often occurs before an item becomes waste. Furniture may be sold or given away through formal or informal reuse channels. However, informal and peer-to-peer routes (incl. peer-to-peer donations/sales) are largely invisible to waste statistics, so EU-level reuse volumes are poorly quantified (FURN360, n.d.). Formal reuse is also selective. Reuse organisations may screen incoming items and accept only furniture that can be sold or restored economically. The availability of transport is especially important for bulky furniture: Even technically reusable items can be lost if collection requires destructive dismantling, compaction or costly long-distance transport. Separate collection, household pick-up, direct routing to reuse operators and coordination between municipal and social-economy actors therefore affect whether reuse potential is realised (Bayerisches Staatsministerium, 2019).

The share of furniture that is still reusable when collected is particularly important because it indicates how much potential value remains in the stock at discard. However, national evidence uses different definitions: Some sources report items immediately reusable without intervention; others include furniture requiring minor repair or improved handling; still others report the share actually reused after market, sorting and logistical constraints. These measures can therefore not be combined into one EU average.

For Germany, the German Environement Agency estimated that around 10% of furniture in bulky waste is reusable, corresponding to roughly 200,000 tonnes per year if captured (German Environment Agency, 2022). The Bavarian recycling-centre study provides more detailed empirical evidence: 11.4% of the estimated furniture stream was classified as directly suitable for preparation for reuse, while a further 16.3% could become reusable through changes in collection and handling. A much larger share fell into a category requiring broader preparation or behavioural changes. Depending on assumptions regarding quality and market constraints, the study estimated a practically realisable preparation-for-reuse potential of 39.2% under favourable assumptions, but only 7.2% under restrictive assumptions. This wide range demonstrates that physical condition is necessary but not sufficient: economics, demand, handling and access to suitable networks determine what is realised (Bayerisches Staatsministerium, 2019).

UK evidence reports a higher reusable fraction. A WRAP study from 2012 estimates that roughly half of the 672,000 tonnes of furniture collected through municipal kerbside bulky-waste systems was reusable with no more than slight repair. RREUSE members reportedly collected 215,000 tonnes of furniture for repair, reuse and recycling in 2019, of which 40% was reused; this is an achieved rate within a specialist reuse network and is therefore not directly comparable with the share of all municipal furniture that is physically reusable. France likewise reported only 5% actual reuse of formally collected furniture in 2023 (Cooper, Furmston, et al., 2021; *Furnishing elements*, n.d.).

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The ESPR stakeholder survey supports the conclusion that a meaningful share of discarded furniture still retains product or component value, but the estimates vary too widely to calculate a robust average. One industry-association response estimated 40-60% as fully functional and reusable, 20-30% as showing minor but repairable damage, 20-30% as damaged but with reusable components, and 10-20% as heavily damaged and not reusable. Public-authority responses were more dispersed, with estimates ranging from only a few percent to around 30% for fully functional furniture and much higher shares for items that were damaged but still repairable or component-recoverable. These ranges likely reflect different collection systems, product mixes, assumptions and definitions.

Product type also matters. Public-authority respondents associated minor repairable damage particularly with storage furniture, office furniture and tables, while seating and wooden furniture were frequently described as having scratches, broken fittings or upholstery wear. Modular furniture and beds may retain reusable metal frames, wood panels or fittings even when the complete item is no longer reusable. Heavily damaged shares were reported as highest for mattresses, upholstered seating and low-cost composite furniture affected by moisture or structural failure. An NGO response gave an especially wide estimate of 20-90% fully functional furniture because some member organisations accept only donations that are already intact and reusable; this is a clear example of selection bias and should not be interpreted as the condition of the general waste stream. A small kitchen-furniture pilot cited by an industry association provides an additional illustration: the vast majority of seven kitchens collected through a take-back arrangement were recorded as either fully functional and reusable or as having only minor repairable damage. The sample is far too small for generalisation, but it reinforces the qualitative finding that furniture may enter end-of-life systems while retaining substantial functional value.

The evidence points to a systematic gap between technical reuse potential and realised reuse. Product design can influence this gap by ensuring that furniture survives repeated handling, can be disassembled and reassembled without damage, and retains replaceable components and cleanable surfaces. However, this will not translate into higher reuse if collection itself destroys the product or if reusable items are not identified before shredding, compaction, mixed bulky-waste treatment or wrongly discarded. For monitoring, future data systems should distinguish at least between furniture directly reusable, repairable/preparable for reuse, component-reusable and non-reusable, rather than recording only the final treatment route.

Questions for stakeholders

Q3-53: Which data sources or estimation approaches would you consider most suitable for deriving representative furniture waste-generation rates for the ESPR base cases, given the absence of a dedicated furniture waste code?

Q3-54: Which end-of-life routing assumptions would you consider representative for the different furniture base cases for use in the LCA/LCC modelling? Please provide typical values or plausible ranges where available.

Q3-55: Which end-of-life aspects should, in your view, be addressed through ESPR product requirements and which are better addressed through complementary waste-management, EPR or collection-system measures?

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7.5. Mapping to ESPR product aspects - behavioural/infrastructure evidence

Task 3 complements the technical assessment in Task 4 by examining whether technically possible lifetime-extending practices are actually realised under current consumer, market and infrastructure conditions. The following summarises the main implications for selected ESPR product aspects.

7.5.1. Durability

Task 3 distinguishes technical lifetime from actual use-time. Furniture may leave its first use phase while still functional because of moving, changing household needs, aesthetics or preferences rather than technical failure. Consequently, improved technical durability is an important enabling condition for longer product life, but does not by itself guarantee longer actual use.

Durability requirements are therefore particularly relevant where they also preserve the product's functional condition and value for subsequent users. Reuse and resale can extend service life where furniture remains attractive, transferable and sufficiently robust to withstand another use cycle. However, actual lifetime remains dependent on consumer behaviour, product type and access to suitable reuse channels.

7.5.2. Reparability and the possibility of maintenance/refurbishment

Task 4 assesses whether furniture is technically maintainable, repairable or refurbishable; Task 3 assesses whether these interventions occur in practice and what prevents them.

The evidence does not indicate a general absence of furniture repair. Repair rates vary considerably by product type, and self-repair is particularly important. For furniture that was not repaired, perceived or actual unrepairability was the main barrier (33%), followed by repair cost (20%) and replacement instead of repair (18%); lack of repair locations accounted for only 3%.

This suggests that ESPR leverage lies particularly in making common failures practically repairable through accessible components, suitable construction and repair information, while recognising that economic viability and consumer motivation also determine uptake. For maintenance, evidence confirms relevant practices but remains insufficient to quantify how much preventive care extends actual furniture lifetime. Product-specific, concise maintenance information may therefore support appropriate care, but a universal maintenance frequency or quantified lifetime-extension effect cannot currently be derived. Refurbishment requires stronger supporting infrastructure than many simple repairs because collection, cleaning, component replacement, workshop processing and resale may all be involved. It is therefore particularly relevant for higher-value furniture and organised B2B/procurement contexts.

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7.5.3. Reusability

Task 3 shows that technical reusability and realised reuse are different concepts. Furniture can remain physically reusable but fail to reach another user because of low residual value, transport constraints, insufficient demand, hygiene or quality concerns, or inappropriate collection and handling.

Reuse also cannot automatically be treated as one-to-one substitution for new furniture. The Flemish evidence used in this task indicates a displacement level of around 29% under the interpretation applied here, while other modelling likewise shows that environmental savings are highly sensitive to displacement and rebound effects. Environmental assessments should therefore distinguish reuse volume from the extent to which reused furniture actually avoids a new purchase.

For ESPR, the main product-side contribution is to improve the quality of furniture entering second-life markets through durability, repairability, cleanability and repeated non-destructive disassembly/reassembly. However, collection and resale systems are equally important: reusable furniture can still be lost if it is damaged during collection or routed directly into mixed bulky-waste treatment.

7.5.4. Expected Generation of Waste

Task 3 provides evidence on when furniture becomes waste and how it enters end-of-life systems, rather than establishing the final quantitative waste-generation model.

Furniture waste is not captured through one harmonised EU route. It may enter bulky waste, wood waste, scrap-metal, residual-waste or, for some products, WEEE-related streams. National collection and treatment systems differ substantially, which limits the extent to which technically recyclable or reusable characteristics automatically translate into actual recovery.

At the same time, a meaningful share of furniture reaches collection while still reusable, repairable or retaining reusable components. Collection itself can reduce this potential: in the Bavarian study, 36% of recorded furniture damage was associated with collection-system stages. Consequently, expected waste generation depends not only on technical product lifetime but also on replacement behaviour, reuse demand and whether collection systems preserve or destroy remaining product value. ESPR product requirements can support this by maintaining durability, repairability and reusability, but complementary collection and preparation-for-reuse systems determine how much of this potential is ultimately realised.

7.6. Preliminary conclusions Task 3

The main conclusions from Task 3 are:

- **Actual use-time can differ substantially from technical lifetime.** Technical durability is therefore necessary for lifetime extension, but its benefit depends on continued use, resale/reuse and consumer behaviour.

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- **Repair already occurs to a meaningful extent and is often self-organised.** The evidence points more strongly to product repairability, repair cost and perceived value than to a general lack of repair locations as barriers. Repairability requirements should therefore focus on making relevant failures practically and economically repairable.
- The contribution of preventive maintenance to actual furniture lifetime cannot currently be quantified reliably. More evidence is required before quantitative maintenance assumptions can be established.
- **Reuse can substantially extend product life, but reuse volume should not be equated with avoided new production.** Displacement/replacement rates and rebound effects should be considered when quantifying environmental benefits; the marketplace evidence reviewed in Task 3 suggests a secondary-life extension factor of around 1.5, but this is a modelling estimate rather than a universal observed value.
- **There is a substantial gap between technical reuse potential and realised reuse.** Product quality and design influence this gap, but collection practices, transport, local demand and reuse-market infrastructure are also important.
- **The relevance of supporting infrastructure differs by furniture type and market segment.** More formalised repair, refurbishment, take-back and leasing structures are found particularly in B2B/office markets, whereas domestic furniture relies more strongly on self-repair, informal resale and local collection channels. Product requirements should therefore be assessed together with the behavioural and infrastructural conditions of the relevant base case.

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8. MEErP Task 4 – Technologies

8.1. Objectives of MEErP Task 4

Task 4 aims to gather information on the technologies that make up furniture, the techniques used to produce and recycle furniture and the materials used in doing so. It forms the basis for gathering the data on the product Base Cases that will inform the assessments during the LCA in Task 5 and the Design Options development in Task 6 of the Preparatory Study.

The analysis aims to cover the technologies, materials and techniques used in furniture today, comparing across different types of processes and actors, looking at what common practice is today to define the baseline, the Best Available Technology (BAT) – available today, and the Best Near Available Technology (BNAT) in development but not yet at commercial scale. This enables identifying practices that can lead to more sustainable outcomes.

Furniture is made up of over seven structurally unrelated material families, each with its own supply chain, SoC category, production chemistry, and end-of-life pathway. Since ESPR complements MEErP's focus on energy consumption with a comprehensive set of product lifecycle aspects, Task 4 has been structured by material type so that each aspect's causal drivers (production chemistry, sourcing, SoC presence) are explained together, before being compared against the prioritised ESPR aspect list.

8.2. Definition of Base Cases

In order to support the Life Cycle Analysis in Task 5, Task 4 aims to come up with a Bill of Materials for typical furniture products. There are thousands of different furniture products and configurations on the EU market, from a single flat-pack shelving unit to an upholstered office chair, and no single "average furniture item" can meaningfully represent that diversity. In MEErP preparatory studies, this heterogeneity is managed by defining a limited set of **base cases**. Typically, 5 to 6 products are chosen to be reasonably representative of the products placed on the market and detailed enough that a full technical and environmental profile (BoM, SoC, production, distribution, use, end-of-life) can realistically be built around each one.

Since furniture is such a heterogeneous product group, the scoping of these "average" products is considered from several complementary directions across tasks, each contributing a different lens on where the boundaries between base cases should sit:

- **Task 1 (scope):** existing legislative and standardisation definitions, which commonly distinguish furniture by broad function — seating, lying, work/support surfaces, and storage.

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- **Task 2 (markets):** market relevance, i.e. which product categories or dominant material types account for the largest sales volumes or placed-on-market quantities, ensuring the base cases chosen actually reflect where the bulk of the market (and therefore likely the bulk of the environmental impact) sits.
- **Task 3 (users):** consumer preferences and use patterns, capturing how people actually select, use and dispose of furniture, and where user behaviour meaningfully differentiates otherwise similar products (e.g. expected lifetime, refurbishment habits, care/maintenance behaviour).
- **Task 4 (technologies):** common material properties, functions, or production/process techniques. This determines whether two functionally different products such as a bookshelf and a wardrobe share almost the same material and process profile and could sit within a single base case, while two functionally similar products (a mass-market flat-pack chair vs. a solid-wood artisan chair) can have such different material/process profiles that treating them as one base case would be misleading.
- **LCA Data Mapping**: In addition, an LCA data mapping exercise has been undertaken to identify existing BoMs in Environmental Product Declarations (EPDs) on the market. These data points are higher resolution, but always show only one product and may not be representative for the market, given that not all products on the market have EPDs and there are various reasons why certain products undergo LCAs, while others do not (proof of sustainability, researcher preferences etc.).

The final base-case list therefore emerges from considering these multiple perspectives rather than any one of them alone. A split based on function only (Task 1) risks putting together products with very different material/process footprints, while a purely material/process-driven split (Task 4 alone) risks producing base cases that don't map cleanly on to how the market or legislation segments furniture.

To enable an analysis to take place, Task 4 must, however, start from some initial consideration of potential base cases. The list shown in the table below gives an idea of initial considerations based on displaying a variety of furniture products from the assessment in Task 1-3. This list opens additional questions, however, and is intended to illustrate what base cases could be. Depending on scope, it could also be necessary to obtain data and develop base cases for built-in furniture. In each case, base cases may enable broader understanding based on material type (e.g. storage based on solid wood or panels may be similar to a table based on solid wood or panels). **Please note that a more elaborated approach to base cases will be presented in the October 6th stakeholder meeting for further discussion with stakeholders.**

Table 8-1: Illustrative potential base cases (not yet concluded).

#	Base case	Rationale
1	Storage furniture (wood-based panel, e.g. wardrobe/shelving)	Very high market volume (especially flat-pack/mass retail)
2	Domestic seating – upholstered (sofa/armchair)	Complex multi-material, textile/foam, low recyclability today
3	Office desk/workstation (metal + wood-based panel)	High B2B volume, refurbishment market exists

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#	Base case	Rationale
4	Office seating	High material diversity, existing repair/refurb schemes
5	Outdoor furniture (plastic/metal/wood)	Different degradation/durability profile, surface treatments, UV exposure

8.3. Bill of Materials

The bill of materials is very difficult to define for such a heterogenous product group. Each type of furniture product can be characterised by entirely different dimensions, material construction and purpose. The available market data in Task 2 also does not provide a clear segmentation, as PRODCOM reporting codes do not provide high differentiation between materials. In the literature, the following examples have been found:

- (Bauer et al., 2018) refer to a 2001 EU Ecolabel study stating: “the average Swedish furniture product consists, by weight, of 70% wood (-based material),15 % padding materials (mainly polyurethane and polyester foam), 10% metals and 5% other materials (plastics, textiles, glass, etc.).”
- The EEB study estimated the compositions shown in Table 8-2(European Environment Bureau, 2017):

Table 8-2: Material Composition of different furniture products.

Furniture item	Indicative composition (principal materials only)						
	Textiles	Alu	Steel	Wood	Plastic / Latex	PU foam	Chip board
Kitchen Furniture [1]			2 %	40 %	2 %		54 %
Metal furniture [3]		20 %	80 %				
Non upholstered seats [3]			80 %		20 %		
Other furniture [3]				50 %	50 %		
Upholstered seat/ sofa beds/ futon [3]	15 %		10 %	45 %		30 %	
Wooden furniture [3]				50 %			50 %

Source: Table reproduced from (European Environment Bureau, 2017): [1] WRAP Reducing the impacts of home products [2] Europur (2016) Flexible polyurenthane foam in mattresses – overview of possible end of life solutions. Volume and mix of end of life material from mattresses [3] Industry expert

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In terms of product weight, Merseyside Council and the Re-use network in the UK came up with a long list of furniture items and their average weights. Here the ranges can be stated as follows ("Community Fund," n.d.):

Table 8-3: Overview of furniture weights stated by Merseyside Council and Re-use network.

Category	Min (kg)	Max (kg)	Range width (kg)	Lightest item	Heaviest item
Beds frames (excluding 11 kg headboard)	21	40	19	Single bed frame	Bed frame king-size
Seating	5	51	46	Pouffe / stool	Recliner
Storage	11	92	81	Blanket box / Ottoman	Welsh dresser
Surfaces (tables & desks)	14	34	20	Table, small/coffee/nest	Dressing table

Source: ("Community Fund," n.d.)

In the LCA literature, Yang et al. carried out an Environmental Footprint assessment of 25 different furniture pieces based on Environmental Product Declaration data (Yang et al., 2025b).

Table 8-4: Material Composition of different furniture products in 25 EPDs by Yang et al. 2025.

Functional category (mapped)	n pieces	Min weight (kg)	Max weight (kg)	Avg weight (kg)
Seating (task/office)	3	14,05	20,26	16,8
Seating (dining/general)	5	4,4	9,32	6,4
Seating (upholstered)	4	25,75	73,84	49,8
Seating (stool)	2	5,01	7,11	6,1
Surfaces (occasional table)	2	5,9	11,62	8,8
Storage	3	61	79,36	69,2
Surfaces (desk/table)	5	14,6	41,35	31,2

Source: (Yang et al., 2025b).

The different furniture types investigated by Yang et al. (2025) have a range of different material compositions which are too detailed to show here. The BoM for potential base cases in the preparatory study can be derived in a similar way, however. In the next section, the results of screening 224 EPD in the furniture market are shown, however, these are not market weighted and due to issues with granularity of declared variables cannot always be used to deduce high resolution of material composition.

The following tables show the results of this analysis split by furniture sub-category. Over 200 materials are provided in the entries for different EPD, sometimes at high levels of detail, other times in very general terms: engineered wood products or recycled wood, paint, metal. The full (ca. 200) sub-materials listed and weighted by their relevance in the EPDs is in the annexes (section 11.1). Since EPDs are only done by specific manufacturers for a specific purpose, the true average composition on the market may be much higher. The PRODCOM sales and production categories only provide general type of furniture or in some cases “other wooden furniture”, which makes this also difficult to determine.

For beds too few EPDs were found to make well founded assumptions.

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7173 **Table 8-5: Bill of Materials in EPDs analysed for Seating.**

Seating	Non-upholstered chairs		Upholstered Sofas		Upholstered Multipurpose Office Chairs		Upholstered Task Chairs		Upholstered Visitor and Lounge Chairs	
Material category	**Weight [kg]**	**Share [%]**	**Weight [kg]**	**Share [%]**	**Weight [kg]**	**Share [%]**	**Weight [kg]**	**Share [%]**	**Weight [kg]**	**Share [%]**
Adhesives, coatings and finishes	0.004	0.04%	1.03	2.07%	0.60	4.27%	0.03	0.18%		0.00%
Composites		0.00%		0.00%	0.05	0.36%	0.04	0.23%		0.00%
Electric and electronic components		0.00%		0.00%		0.00%		0.00%		0.00%
Glass		0.00%		0.00%		0.00%		0.00%		0.00%
Metals – Ferrous	4.60	40.53%	4.88	9.81%	4.20	30.04%	5.63	31.38%	4.84	40.10%
Metals – Non-ferrous	0.70	6.13%	1.07	2.15%	1.29	9.23%	3.18	17.76%	1.28	10.57%
Minerals		0.00%		0.00%		0.00%		0.00%		0.00%
Other materials and components	0.52	4.58%	0.10	0.20%	0.08	0.58%	0.37	2.06%	0.02	0.15%
Other materials and components (Metal)		0.00%		0.00%		0.00%		0.00%		0.00%
Paper and printed paper		0.00%	0.03	0.05%	0.00	0.00%		0.00%		0.00%
Plastics	4.51	39.72%	4.25	8.54%	2.44	17.45%	7.28	40.59%	3.73	30.89%
Textiles and upholstery materials	0.50	4.37%	8.55	17.19%	1.64	11.75%	1.02	5.70%	2.13	17.67%
Wood based materials	0.53	4.63%	29.84	59.99%	3.68	26.30%	0.37	2.09%	0.08	0.62%
Average weight (kg)	**11.35**		**49.73**		**13.97**		**17.93**		**12.06**	

7174 **Table 8-6: Bill of Materials in EPDs analysed for Tables.**

Table	Wood-based Desk		Metal-based Desk		Mixed material Desk		Wood-based Dining table		Metal-based Dining table		Wood-based Coffee table		Wood-based Meeting table	
EPD-based BoM	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**
Adhesives, coatings and finishes	0.14	0.52%	0.22	0.47%	0.74	1.27%	0.65	1.37%	0.46	0.66%	0.36	2.36%	1.00	0.89%
Composites	0.05	0.17%		0.00%		0.00%	0.18	0.38%			0.50	3.24%		0.00%
Electric and electronic components		0.00%		0.00%	1.20	2.06%		0.00%				0.00%		0.00%
Glass		0.00%		0.00%		0.00%		0.00%	39.07	55.86%		0.00%		0.00%
Metals – Ferrous	9.33	33.40%	11.17	23.86%	21.61	37.11%	4.75	10.01 %	1.28	1.83%	1.95	12.67%	20.75	18.57%
Metals – Non-ferrous	0.66	2.36%	0.12	0.25%	0.21	0.36%	0.01	0.03%	0.24	0.34%	1.17	7.56%	8.60	7.69%
Minerals		0.00%		0.00%		0.00%		0.00%	0.75	1.07%		0.00%		0.00%
Other materials and components		0.00%	13.01	27.78%	12.20	20.95%	2.24	4.71%			0.20	1.28%	0.87	0.78%
Other materials and components (Metal)		0.00%	13.99	29.88%		0.00%	0.90	1.90%	28.14	40.23%		0.00%		0.00%
Paper and printed paper		0.00%		0.00%		0.00%		0.00%				0.00%		0.00%
Plastics	0.31	1.11%	0.31	0.66%	0.98	1.67%	0.40	0.85%			0.08	0.54%	1.84	1.65%
Textiles and upholstery materials		0.00%	0.18	0.38%	0.81	1.38%		0.00%				0.00%	0.44	0.39%

Table	Wood-based Desk		Metal-based Desk		Mixed material Desk		Wood-based Dining table		Metal-based Dining table		Wood-based Coffee table		Wood-based Meeting table	
Wood based materials	17.44	62.44%	7.83	16.73%	20.50	35.20%	38.33	80.75 %			11.16	72.36%	78.25	70.02%
Average weight	**27.93**		**46.82**		**58.23**		**47.47**		**34.97**		**15.42**		**111.76**	

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Table 8-7: Bill of Materials in EPDs analysed for Storage Units.

Storage	Wood-based Small/Drawers		Metal-based Small/Drawers		Wood-based Low closed		Metal-based Low closed		Wood-based Tall closed		Metal-based Tall closed		Metal-based Open	
EPD-based BoM	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**	**kg**	**%**
Adhesives, coatings and finishes	0.06	0.21%	0.60	5.89%	0.09	0.17%		0.00%	0.21	0.37%	1.26	3.36%	0.12	0.39%
Composites		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Electric and electronic components		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Glass		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Metals – Ferrous	4.75	15.42%	9.10	88.63%	2.54	4.95%	22.23	99.99%	1.11	1.99%	32.02	85.40%	0.96	3.16%
Metals – Non-ferrous		0.00%	0.07	0.71%		0.00%		0.00%		0.00%	0.36	0.96%		0.00%
Minerals		0.00%	0.00	0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Other materials and components		0.00%	0.02	0.22%	0.07	0.14%		0.00%		0.00%		0.00%		0.00%
Other materials and components (Metal)	2.81	9.12%		0.00%	1.66	3.24%		0.00%	1.70	3.04%		0.00%	1.77	5.85%
Paper and printed paper		0.00%		0.00%		0.00%		0.00%		0.00%	0.00	0.01%		0.00%
Plastics	1.70	5.54%	0.46	4.50%	4.41	8.61%	0.00	0.01%	4.07	7.31%	1.03	2.75%	2.31	7.63%
Textiles and upholstery materials		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Wood based materials	21.45	69.71%	0.01	0.05%	42.44	82.88%		0.00%	48.68	87.30%	2.82	7.51%	25.09	82.96%
Average weight	**30.77**		**10.27**		**51.21**		**22.23**		**55.76**		**37.49**		**30.24**	

These EPDs are in principle grouped by similar environmental outcomes. In a next step, the study team will need to determine how to approach the base cases – either as a sensitivity analysis of different material compositions or a “Frankenstein” furniture piece based on market relevance.

Questions for stakeholders

Q4-1: Representativeness of the identified product categories

Do the preliminary product masses and material compositions identified for storage furniture, tables and seating represent products currently placed on the EU market? Please indicate any material categories or product type that appear under or overrepresented.

Q4-2: Bed frames

Which bed frame types should be considered representative of the EU market in terms of product mass, material composition and structural design?

Q4-3: Kitchens

To what extent can typical kitchen furniture elements, such as cabinets, drawer units and shelving, dining tables, be represented by the storage and table types already identified in the preliminary analysis? If they are not adequately represented, please identify which are the main differences, and which adjustments would be needed in relation to e.g., mass, composition of the bill of materials.

Q4-4: Other product categories

For outdoor furniture, bathroom furniture, children's furniture and multifunctional furniture (i.e, a piece of furniture that can be used both as seating and as storage), are there types that differ significantly from the product groups identified? If so, which should be prioritised on the basis of their EU market relevance?

8.4. Overview of Materials and components used in furniture

The following sub-sections aim to give an overview of materials used in the production of furniture. Much of furniture production relates to the logistics of material and component supply, followed by assembly into final products at the final “furniture manufacturer”. The material types used to make up furniture each have their own value chain and production processes which determine the embodied energy of the final product and whether it contains SoC or emits VOC for instance. To be able to understand the impacts and intervention points, the following sections therefore describe the main constituents of each material group, followed by the production processes and sourcing considerations. The depth of the analysis is intentionally deeper on the materials representing the highest volume and relevance: wood and upholstery (foam and textiles), followed by medium depth on metal, plastics, adhesives/coatings and brief handling of glass and fasteners.

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Figure 8-1 below gives an overview of the materials entering the furniture value chain,

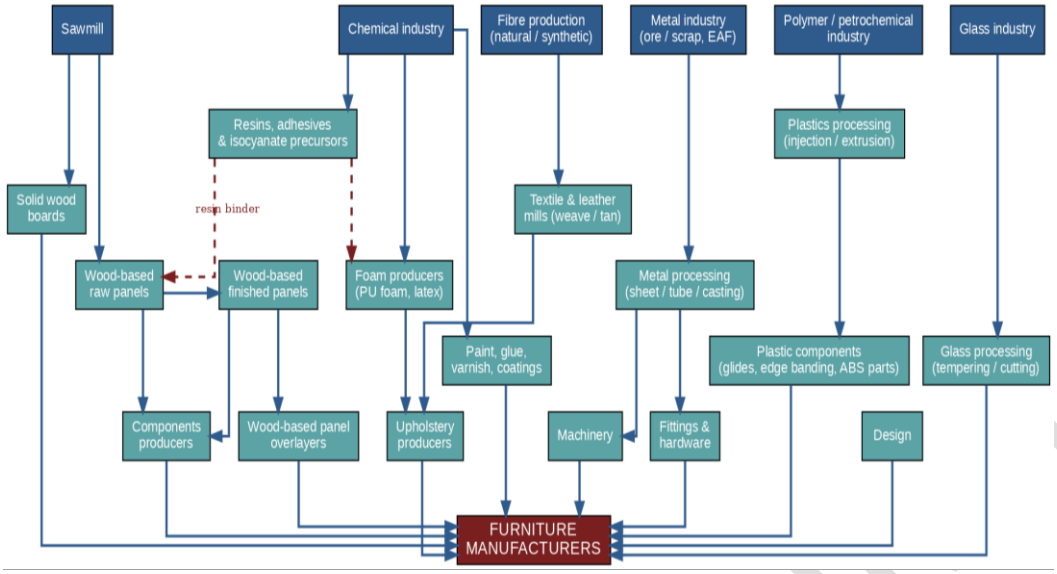

Figure 8-1: Expanded Material Value Chain in Furniture Production

Source: own illustration adapted from CSIL 2014.

8.4.1. Wood (solid wood and wood-based panels)

Wood is the most widely used material in furniture, and depending on the product can come in many different forms.

Solid wood: Solid hardwoods (e.g. oak, walnut) and softwoods (e.g. pine, spruce) remain common in traditional and high-quality furniture production. Hardwoods grow slowly and have a higher density, while softwoods grow faster, and are lighter. Durable species like oak, pine, teak, and mahogany are valued for their ability to be refinished and reused. Solid wood is generally preferred for high-quality furniture, doors, window frames and floor coverings and used in products desired to be long-lasting, e.g. dining tables, cabinets, shelving units. It tends to have a high aesthetic value, preserving natural texture and giving a timeless aesthetic appeal. As a result, it is more expensive than other types of wood and generally heavier to move.

Engineered wood products: Engineered wood products are made from bonding wood veneers or fibres together with adhesives. Panels use various wood sources to make a uniform wood structure without knots or grain, making it much easier to manufacture since they are mixed with adhesives and pressed. They play an increasing role in the market, with the main types used in the furniture industry being plywood, oriented strand board (OSB), medium density particle board (MDP), high density fibreboard (HDF), and medium density fibreboard (MDF) (Bianco et al., 2021). The adhesives used are often synthetic (e.g. formaldehyde) and can release volatile organic compounds (VOCs), raising environmental and health concerns. However, low emission adhesives are well-established to meet mandatory VOC emission limits and bio-based alternatives are under development.

The table below gives an overview of different types of engineered wood panels and their properties.

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Table 8-8: Overview of Engineered Wood Products.

Panel type	Raw material form	Manufacturing process (brief)	Typical density	Typical furniture use	Comments
Particleboard (chipboard)	Wood particles/chips (often recovered/ recycled wood, sawmill residues)	Particles blended with resin, formed into a mat, hot-pressed	~500–800 kg/m³	Flat-pack/RTA furniture cores, cabinet interiors, shelving	Least expensive panel type; highest potential recycled-wood content of the panel family; lower moisture resistance unless melamine-faced
Medium-density fibreboard (MDF)	Refined wood fibres (not particles)	Fibres blended with resin and wax, formed into uniform mat, hot-pressed — creates denser, stronger surface layers and a less dense core	~700–800 kg/m³	Painted/moulded furniture fronts, cabinet doors, decorative mouldings	No visible grain; machines/cuts cleanly (favoured for CNC routing and painted finishes); generally stronger and heavier than particleboard
High-density fibreboard (HDF)	Refined wood fibres, higher compression	Similar to MDF at higher density	>800 kg/m³	Backing panels, drawer bottoms, laminate flooring substrates	Denser/stronger than MDF; less common as a primary furniture surface material
Plywood	Thin wood veneers	Veneers glued together with grain direction alternated (cross-laminated) between layers	Varies by veneer count/ species, similar to OSB	Structural furniture components, higher-grade cabinetry, curved/moulded parts	Generally, the most expensive of the panel family; higher structural strength and moisture resistance than particleboard/MDF; recyclability complicated by multiple veneer/adhesive layers

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Panel type	Raw material form	Manufacturing process (brief)	Typical density	Typical furniture use	Comments
Oriented strand board (OSB)	Larger wood strands/flakes	Strands oriented in layers at approximately right angles, bonded under heat and pressure	580-680 kg/m³	Rarely used in finished/visible furniture; more common in furniture-adjacent construction or as a low-visibility structural element	Coarser, unfinished appearance; primarily a construction material but occasionally used in industrial/robust furniture design

Source: Own compilation, a deep assessment is in the WBP BREF (Raunkjær Stubdrup, K. et al., 2016)

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The European Panel Federation website provides statistics on the production of different types of panel board and their percentage use in furniture for the EU27, UK and EFTA region as shown in the table below. After some declining years, the production increased by 2.7% from 2023 to 2024, and the share of furniture increased from 47% to 49% between these two years (European Panel Federation, 2026).

Table 8-9: Overview of wood panel type production in the EU and end use in furniture.

Wood Panel Type	Countries	Production 2024 (million m^3)	% of wood panel market	% used in furniture
Particleboard	EU27 + UK + EFTA	31.3	53 %	68 %
Medium Density Fibreboard (MDF)	EU27 + UK + EFTA	11.3	19 %	53 %
Oriented Strand Board (OSB)	EU27 + UK + EFTA	7.1	12 %	4 %
Softboard	EU27 + EFTA	5.3	9 %	-
Plywood	EU27	2.7	5 %	26 %
Hardboard	EU27 + EFTA	0.4	1 %	19 %
Total wood-based panels		58.1	100 %	49 %

Source: Compiled by authors based upon sub-pages of (European Panel Federation, 2026).

Sourcing considerations

A roundwood log can produce several outputs. UNECE/FAO gives an illustrative example where one cubic metre of small-diameter roundwood may yield approximately 0.41 m^3 sawnwood, 0.43 m^3 chips, 0.09 m^3 sawdust, and 0.07 m^3 shavings. Those co-products may go to different sectors, including furniture, panels, pulp, packaging and energy (Forest Product Conversion Factors: Project Overview and Status, 2009). Furniture may use sawnwood for solid components, veneer for visible surfaces, particleboard or MDF for carcasses and panels, plywood for structural or shaped parts and residues indirectly through panel production.

To reduce reliance on virgin timber, the furniture industry is increasingly turning to reclaimed wood and engineered wood products made from secondary resources such as recycled wood fibres, sawdust, and industrial byproducts.

The type of wood determines to what extent recycled content can be added. Recycled content for wood products describes the origin of the wood fibre entering a product, not its processing stage or structural form. Since solid wood retains its original structure, "recycled solid wood" in practice mostly means reclaimed/reused wood (e.g. from deconstruction or furniture reuse) rather than fibre reprocessing. Reclaimed solid wood, often sourced from old furniture, construction sites, or discarded wooden pallets, may be repurposed into rustic-style furniture, countertops, and wall panels (Carvalho et al., 2026b). Engineered wood products are where recycled fibre content is added. As the

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manufacturing process already involves breaking material down the wood into particles or fibres before re-forming it, particleboard and MDF manufacture can absorb reclaimed wood chips, sawmill residues, and post-consumer wood (e.g. from discarded furniture or construction) much easier than solid-wood or veneer-based products can (Raunkjær Stubdrup, K. et al., 2016). This is why particleboard can have a high % recycled content, while plywood and solid wood generally cannot. MDF and plywood typically rely more heavily on virgin fibre due to fibre/veneer quality requirements. Historically, MDF has therefore had very low recycled content rates, however, projects such as EcoReFibre are developing novel solutions to this (Carvalho et al., 2026b).

According to the data given by the European Panels Federation, in 2019, 24 % of EU particleboard production came from roundwood (sustainably managed forests), 33 % from industrial by-products (e.g. sawdust from sawmills) and 43 % from recovered wood sources (furniture, construction and demolition wood etc.) (European Panels Federation, 2020). There are large regional variations between countries in the make-up of particleboard, as shown in **Figure 8-2**.

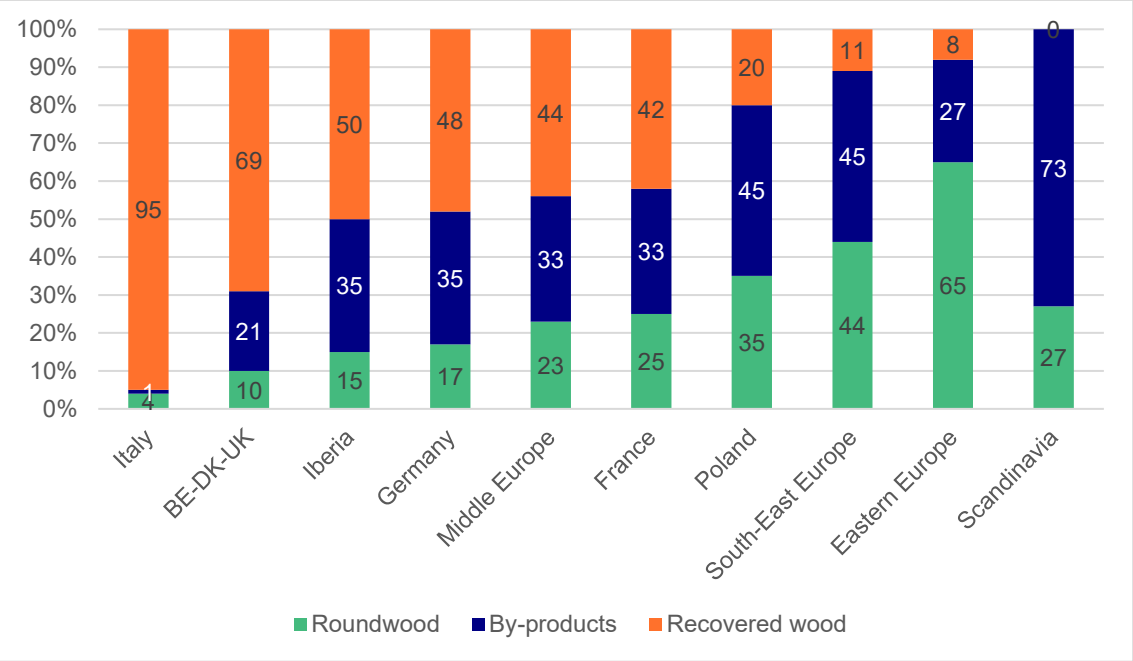

Figure 8-2: Overview of particleboard production composition by region.

Source: data from (European Panel Federation, 2020), based on EPF Members, UNECE contributors and IKEA study. Regional definitions: BE-DK-UK = Belgium, Denmark and the UK; Eastern Europe = Estonia, Latvia, Lithuania and Slovakia; Iberia = Portugal and Spain; Middle Europe = Austria, Czech Republic and Switzerland; Scandinavia = Finland, Norway and Sweden; South-East Europe = Bulgaria, Greece, Hungary and Romania.

Species and origin: softwood (e.g. pine, spruce) dominates panel and structural applications, while hardwood (e.g. oak, beech) is more common in solid-wood furniture and veneers (Raunkjær Stubdrup, K. et al., 2016); increasing use of fast-growing plantation species, and growing research interest in alternative/underutilised fibre sources (agricultural residues, non-plantation species) as pressure on conventional fibre supply grows (Donini et al., 2025).

A significant share of panel and component material (and increasingly, finished furniture) entering the EU market originates outside the EU (e.g. Southeast Asia, and other major furniture-manufacturing regions), which has implications both for the due diligence burden described above and for the transport/distribution-phase footprint.

The mass flow of wood has been put into Sankey diagrams (**Figure 8-3**) by the JRC in the EU from 2012 to 2021 (Camia et al., 2026), and enables selection of different country profiles of woody biomass flows.

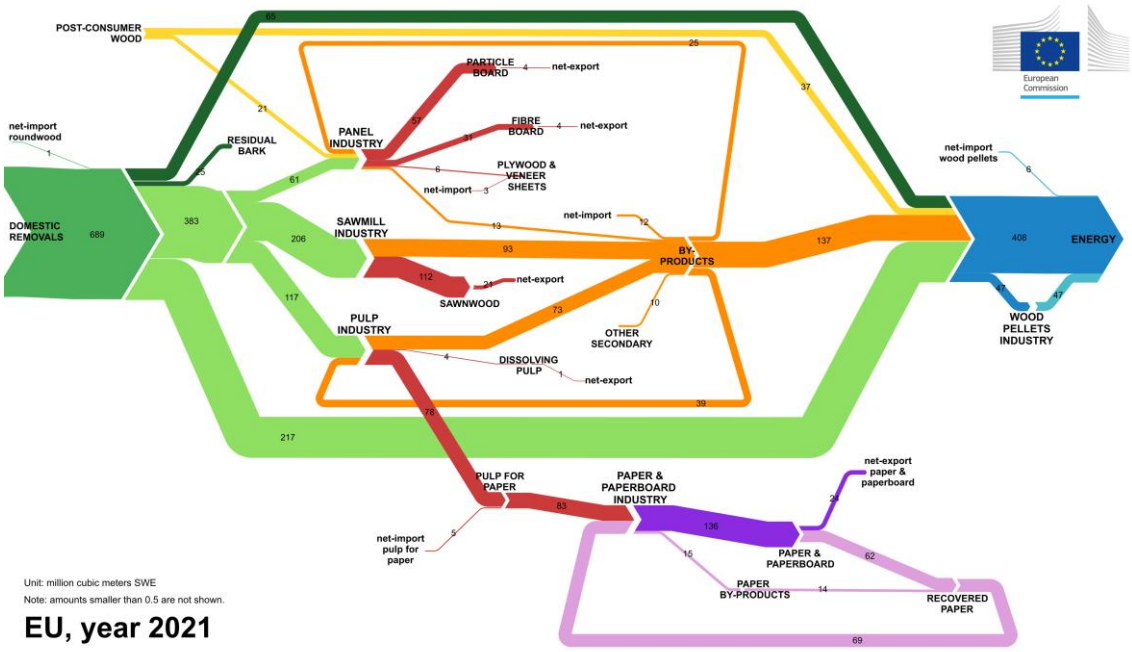

Figure 8-3: EU mass flow of wood in 2021.

(In million cubic meters SWE, values smaller than 0.5 and trade of solid wood products not shown

Source: reproduced from (Camia et al., 2026) (full resolution).

Legal sourcing and due diligence

FSC and PEFC forest-certification schemes are the main market signals for legal and sustainably managed sourcing and are already referenced in EU Ecolabel and GPP furniture criteria. Furniture is one of the wood product categories in scope of the EU Deforestation Regulation, which from its application date requires operators placing wood-containing furniture on the EU market to demonstrate via a Due Diligence Statement that the wood content is legally harvested and deforestation-free, with geolocation traceability back to harvest plots. This is a higher compliance burden for composite/panel products (particleboard, MDF), where fibre from many different sources is blended in a single board, than for solid-wood or single-veneer-sourced products, increasing sourcing-complexity for base cases with high panel content vs. those built primarily on solid wood.

The conclusion from these processes: the nominal panel type (e.g. particleboard) can carry a different sourcing, recycled-content and regulatory-compliance profile depending on whether it is manufactured domestically within the EU or imported as a panel, component, or finished product from outside it.

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Production processes

While the core manufacturing processes are broadly similar across panel types (raw wood material prepared → blended with resin/adhesive → formed into a mat or layered veneer stack → bonded under heat and pressure → finished/sanded), the specific process steps, energy intensity and predominant panel type in use can differ by region.

The diagrams below give an illustrative view of solid wood and panel manufacturing processes.

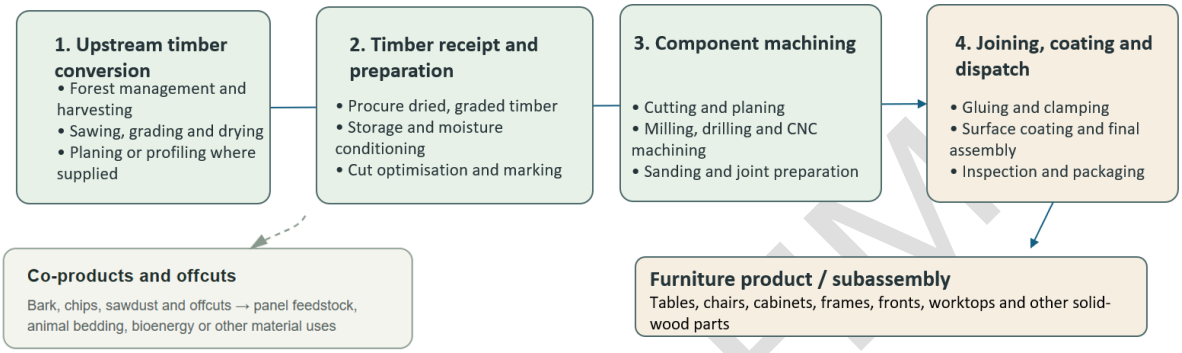

Figure 8-4: Solid-wood furniture manufacturing route.

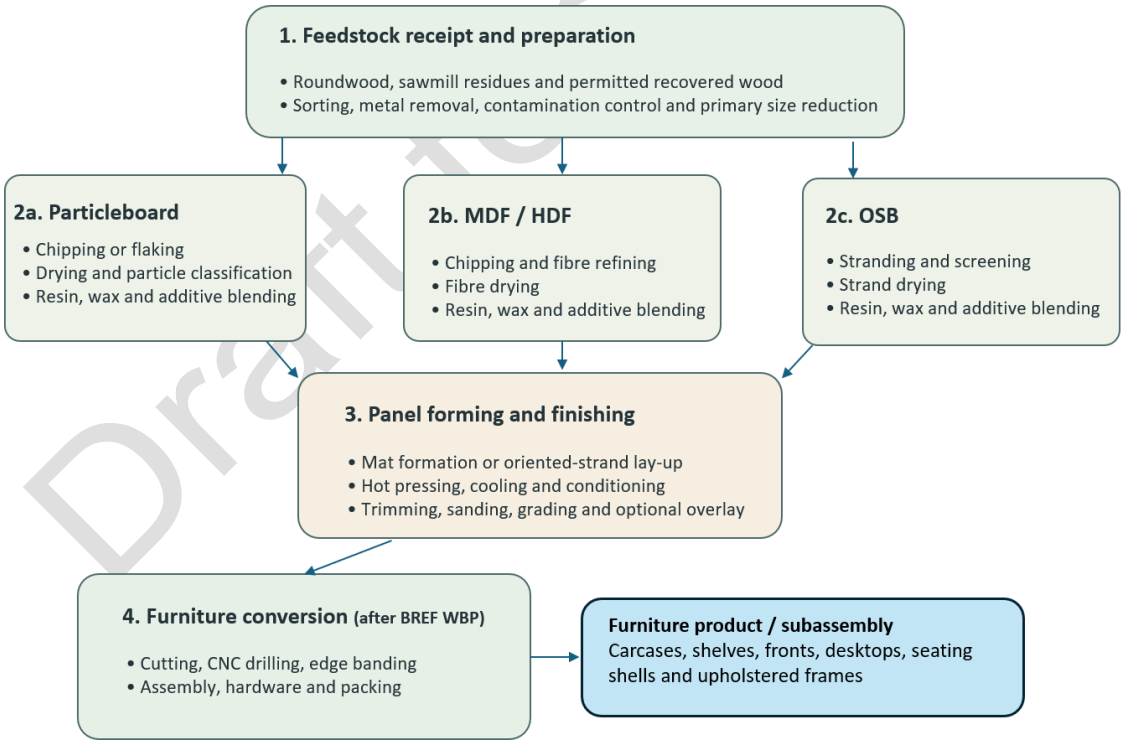

Figure 8-5: Particleboard, MDF and OSB manufacturing routes.

Wood processing for furniture has three energy- and resource-intensive steps of higher relevance for ESPR due to their environmental footprint, resource consumption or potential substances of concern.

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(a) Drying. Green/freshly harvested hardwood has a high moisture content and must be dried for stable indoor furniture use to prevent warping and dimensional instability. Conventional kiln drying is a batch process and is the most intensive energy use in primary solid-wood processing. Most sawmills meet this thermal demand by combusting green wood residues/bark on site, which substitutes fossil fuel but does not address the exergy losses of conventional venting kilns (moisture-laden air vented without heat recovery). Using recovered post-consumer wood (which is much drier than fresh timber) requires less than half of the thermal drying energy. (Raunkjær Stubdrup, K. et al., 2016).

(b) Panel manufacture (pressing/resin curing). Engineered panel production embodies substantial energy in both process heat (drying particles/fibres to ~3–5% moisture, then hot-pressing) and the chemical/embodied energy of the resin binder itself. In 2009, synthetic resins represented 43% of the direct material manufacturing costs of a raw wood panel, while energy accounts for 26% and raw wood accounts for 31%. Best available technologies in the Wood-based Panels Production BREF require an energy management plan, combustion-plant optimisation and heat recovery specifically as process heat is the dominant energy consumer (Raunkjær Stubdrup, K. et al., 2016).

(c) Machining, dust extraction and finishing. CNC machining/routing energy is generally a smaller share of gate-to-gate demand than drying or pressing, but pneumatic dust extraction is a relevant continuously-running electrical load in secondary woodworking (both panel and solid-wood processing) and can be up to 20% of the electrical load in production sites (Raunkjær Stubdrup, K. et al., 2016).

Regional differences

The structure of the EU wooden furniture industry itself varies by geography scale and type of the process in important ways. These determine the material yield, energy intensity per functional unit, and joinery/fastening choices that impact durability, reparability and recyclability aspects. The following categories are analytical archetypes rather than mutually exclusive or geographically uniform industry models. Individual firms may combine features from more than one archetype.

- **High-volume panel processing:** characterised by large, highly automated facilities running homogeneous engineered panels (particleboard, MDF) through integrated CNC nesting, automated storage/retrieval and robotic edge-banding lines. Predominantly flat-pack output with mechanical fastening (cam locks, screws), which is a by-product of cost and logistics optimisation rather than a deliberate circularity choice align well with "design for disassembly." Flat-pack geometry can also reduce per-product distribution-phase transport emissions compared with shipping assembled frames.

- **Design-led solid-wood/artisanal clusters:** this model is characterised by networks of an anchor firm surrounded by specialised micro-SMEs producing bespoke solid-wood components, largely using standalone manual/semi-automated machinery (band saws, jointers, planers). This model typically favours permanent joinery (glue, dowels, mortise-and-tenon), durability and finish quality, which extends product lifespan but complicates end-of-life

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disassembly, leading to durability-vs-recyclability trade-offs. Natural material heterogeneity (knots, grain, moisture variability) in solid wood leads to potentially higher losses and variable offcut rates when compared to panel processing.

- **Emerging Circular-bioeconomy-oriented model:** characterised by facilities more closely integrated with sustainable forestry supply chains and emerging cascading-use practices for wood residues (e.g. routing offcuts to insulation, bioethanol or fibre recovery rather than combustion/landfill), and piloting technologies such as thermal/steam and thermo-mechanical fibre recovery (de-bonding) for closed-loop panel recycling. This typology is the closest to several of the BNAT examples on recycled-content and end-of-life.

These differences show why two “wooden furniture” base cases built from what seem to be similar materials (e.g. a flat-pack particleboard wardrobe vs. a solid-oak wardrobe) can have very different production-phase footprints and end-of-life profiles.

Questions for stakeholders:

Q4-5: How do costs for wood vs resin vs energy requirements drive panel production today – do they support use of more recycled content from post-consumer wood?

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8.4.2. Upholstery: textiles & foams

Upholstery combines textile or leather covering materials with foam or fibre padding and, frequently, chemical treatments (flame retardants, stain repellents) applied to meet performance or safety requirements. Since upholstery is also the component most often replaced or reupholstered during a product's life, this material group is closely tied to the reparability and reusability ESPR aspects.

Table 8-10: Types of cover material.

Cover type	Composition	Production process (brief)	Typical furniture use	Circularity issues
Natural fibre textiles (cotton, linen/flax, wool)	Natural fibres, alone or in blends; generally woven, knitted or non-woven	Fibre preparation → spinning → weaving/knitting → pretreatment → dyeing/printing → finishing	Upholstered furniture and removable/non-removable furniture covers	Can be mechanically recycled where sufficiently pure; treatments, dyes and blending can affect recycling routes and quality
Synthetic fibre textiles (polyester, polyamide/nylon, acrylic)	Synthetic polymer fibres, alone or blended	Fibre production/spinning → weaving/knitting → pretreatment → dyeing/printing → finishing	Widely used for furniture upholstery, including high-durability applications	Some synthetic fibres can incorporate recycled feedstock; recycling depends strongly on composition, additives and contamination
Blended fibre textiles	Two or more fibre types, commonly natural/synthetic combinations such as cotton/polyester	Fibres blended during yarn production and/or combined in textile construction → weaving/knitting → wet processing/finishing	Upholstery where properties of multiple fibres are required	Fibre blends can significantly complicate fibre-to-fibre recycling; conventional mechanical recycling generally favours relatively homogeneous feedstocks
Genuine leather	Tanned animal hide	Hide preparation → tanning (e.g. chromium or vegetable) → post-tanning/dyeing → finishing → cutting	Furniture upholstery, particularly seating	Chromium tanning requires control of chromium chemistry, including Cr(VI) formation; environmental results are sensitive to allocation of livestock impacts between hides and other animal products

Cover type	Composition	Production process (brief)	Typical furniture use	Circularity issues
Coated/synthetic leather	Polymer coating, commonly PU or PVC, on textile or non-woven substrate	Substrate production → polymer coating/lamination → curing/drying → surface finishing → cutting	Upholstery requiring leather-like appearance, durability or cleanability	Multi-material coating/substrate construction complicates material recovery; PVC may contain plasticisers and other additives requiring chemical management

Sources: Textiles BREF (2023); Tanning BREF (2013); Commission Decision (EU) 2016/1332; JRC Textiles Preparatory Study (2024/25); ECHA PVC assessment (2023)

Table 8-11: Types of filling/padding material.

Filling type	Composition	Production process (brief)	Typical furniture use	Circularity issues
Polyurethane (PU) foam	Cellular polyurethane produced by reaction of polyols with di-/polyisocyanates, with additives according to required properties	Reactive mixing/foaming → slabstock or moulded foam production → curing → cutting/shaping	Widely used cushioning material in upholstered seating, including seat and back cushions	Mechanically recyclable into bonded/rebonded foam; chemical recycling routes are developing. End-of-life recycling remains constrained by collection, sorting, foam diversity and contamination and lack of markets for bonded foam.
Latex foam (natural or synthetic)	Flexible cellular material based on natural rubber latex, synthetic latex, or mixtures	Latex compounding → foaming → moulding → vulcanisation → washing/drying	Premium/"natural" seating and cushioning segment	Durable elastic cushioning; EU Ecolabel criteria address residues/emissions from latex foam production. End-of-life recycling infrastructure is relatively limited

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Filling type	Composition	Production process (brief)	Typical furniture use	Circularity issues
Polyester fibre / wadding	Loose, carded or thermally/mechanically bonded polyester fibres; virgin or recycled feedstock	Fibre production → opening/carding → web formation → bonding and/or filling	Cushion wraps, backrests, padding layers and loose filling	Can contain recycled polyester; relatively homogeneous polyester filling may offer better recycling potential than bonded/mixed-material assemblies, although contamination and attachment to other materials can impede recovery
Feather/down filling	Animal-derived feather/down	sorting/separation → washing → sterilisation/drying → grading → filling into cushion/ticking	Loose cushions, back cushions and specialist/natural-material upholstery	End-of-life options depend on cleanliness and combination with other materials; feather/down entails animal-origin sourcing and hygiene requirements
Natural fibre filling	Cotton, wool, coir/coconut fibre, wool, cotton and other natural fibrous materials	Cleaning/preparation → carding/forming → needling/bonding where applicable	Padding layers, specialist/natural upholstery and traditional furniture construction	Renewable material options; recycling/biodegradation potential depends strongly on binders, treatments and combination with other materials
Bonded/rebonded PU foam	Flexible PU foam flakes/offcuts or recovered foam bonded together, commonly using a polyurethane/diisocyanate binder	Foam collection/sorting → shredding/flaking → binder addition → compression/curing → cutting	Dense cushioning, padding and support layers; also widely used outside furniture in carpet underlay, mats and acoustic applications	Established mechanical recycling route for PU production trim and increasingly post-consumer foam. Produces a lower-value composite foam and does not return the polymer to virgin-equivalent material

Sources: PU Foam and bonded PU foam: (EUROPUR, 2021), JRC, Textiles Industry BREF (2023); JRC, Preparatory Study on Textile Products (2024–2026); Donatello et al., Revision of EU Ecolabel Criteria for Furniture Products – Final Technical Report (2017);)

Sourcing considerations

Fibre/feedstock origin: recycled PET is already commercially mainstream in polyester textile covers and fibre fill, giving upholstery covers a more developed recycled-content pathway than upholstery foam, where recycled/bio-based polyol content remains a comparatively minor and less standardised share of the market.

Natural vs. synthetic fibre: natural fibres (cotton, wool, linen) offer better biodegradability and lower fossil dependency but typically require blending with synthetic fibres to meet furniture-grade abrasion (Martindale) and durability requirements, which can undermine end-of-life recyclability.

Leather sourcing and allocation: leather is a co-/by-product of meat production, which affects how its environmental footprint should be allocated, and tanning method (chrome vs. vegetable) is a significant sourcing/SoC aspect.

Certification and traceability: analogous to FSC/PEFC for wood, schemes such as GOTS/OEKO-TEX (textiles) and the Leather Working Group (Responsible Leather - Leather Working Group, n.d.) provide market signals on fibre origin and chemical management, and are already referenced in EU Ecolabel textile/furniture criteria.

Regional sourcing patterns: textile and leather cutting/sewing, and a large share of global foam production, are concentrated outside the EU (particularly in Asia), which carries implications for chemical-compliance verification (dyes, finishes, flame-retardant formulations) at the point of import rather than domestic manufacture.

Production process and regional differences

The core upholstery process chain runs through textile/leather production (fibre → yarn/hide → fabric → dyeing/finishing/coating) and foam production (polyol/isocyanate or latex reaction → foaming → curing/shaping) as two parallel tracks that come together at the cut-and-sew and cushion-filling stage, before final assembly onto the furniture frame:

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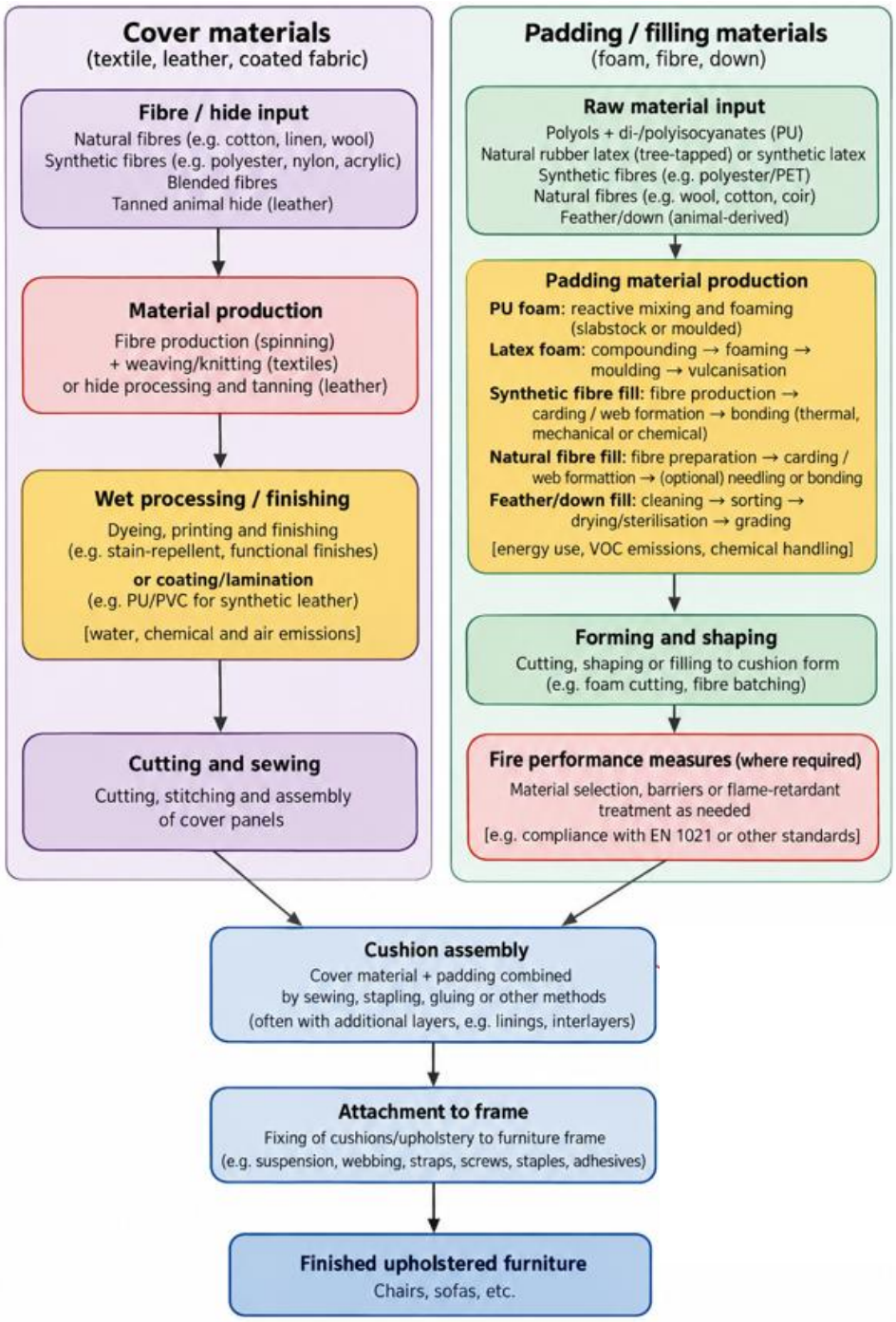

Figure 8-6: Overview of Upholstery Manufacturing Process.

Source: own elaboration.

Textile weaving/knitting and finishing capacity remains significant within the EU for higher-value contract and design-led segments (e.g. Kvadrat textiles dominates the EPD data), but a substantial share of both fabric and cut-and-sew garment-style upholstery work has moved to lower-cost manufacturing regions, mirroring the broader apparel/textile industry's geography.

Leather tanning is geographically concentrated in a smaller number of specialised tanning regions/countries (reflecting both traditional expertise and, in some cases, less stringent chemical-discharge regulation), which is directly relevant to the chromium-

tanning SoC point in the table above. Some circular start-ups are also now turning waste leather into new leather (e.g. Circuleather).

PU foam production is comparatively capital-intensive and includes handling of hazardous chemicals which fall under the Seveso Directive 2012/18/EU for quantities above 10t (isocyanate handling), which tends to favour production in a moderate number of larger, more regulated facilities. There are 109 plants in the European Economic Area +UK, with a combined production of 1.1 million tons in 2020, of which about 50% of slabstock foam is used by furniture applications (EUROPUR, 2021).

As with wood-based panels, the same nominal material (e.g. "polyester cover fabric" or "PU foam") can carry a different chemical-compliance and recycled-content profile depending on whether it was produced domestically within the EU or imported as a textile, foam block, or finished upholstered component.

End-of-life: upholstery is, alongside mixed-material engineered wood panels, one of the two hardest material groups in furniture to recycle at end-of-life. Cut, glued and flame-retardant-treated foam is rarely separated from its cover fabric in current dismantling practice, and blended-fibre covers face the same contamination barriers that limit textile-to-textile recycling generally. This makes design-for-disassembly at the cushion/cover level (e.g. removable, unzippable covers) plus washing these to remain stains or hygiene concerns one of the more consequential reparability/recyclability levers for this material group specifically.

8.4.3. Metals

Metal components, predominantly steel and aluminium, are used across almost every furniture product type, whether as full structural frames (desks, task chairs) or as smaller fittings and hardware (hinges, castors, connectors, screws). Metals are easier to manage from a circularity perspective via established scrap-based recycling which already provides high recycled content in many applications, and metal components are usually easier to separate and recover at end-of-life, if not permanently bonded to other materials.

Most of the metal used in the furniture industry is steel which is used in frames, mechanisms and springs. Non-ferrous metals include aluminium, brass, copper and bronze. Aluminium is used more in outdoor and office furniture (Ajans, 2024), it can corrode but doesn’t rust. Market research indicates that globally metals are mostly used for beds and sofas, followed by chairs and tables. More specific data available from France where materials used in different furniture with input from French furniture industry in 2015 are listed in the table below - the numbers give a good indication of the percentage of metals used, but could differ over time and per country (Éco-mobilier, n.d.):

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Table 8-12: Metals used in different types of furniture - estimated percentages in France (2015).

Type of furniture	Sub-type	% of metals used	Remarks
Seating		23%	
	Sofas / padded chairs	16%	Mostly on office chairs, which were composed of 50% metals.
	Non-padded chairs	41%	
Sleeping / lying	Bed frames	20%	
Storage		9%	
Tables		10%	
	Tables	6%	
	Outdoor tables	39%	

Source: Adapted from (Saes et al., 2024) based on data from Éco-mobilier (2015)

Compared with other furniture materials, metals carry a high carbon footprint and high production energy demand. Despite this, Technopolis (2024) argues metals can still be an attractive material choice from an environmental perspective for three reasons: (1) metal components typically have a long lifespan, (2) metal can be recycled into functionally equivalent products (unlike many polymers, which downcycle), and (3) because so much of the metal currently used is still virgin material, there is substantial opportunity to capture large environmental gains simply by shifting the input mix toward recycled content.

A simplified manufacturing overview is provided in the figure below:

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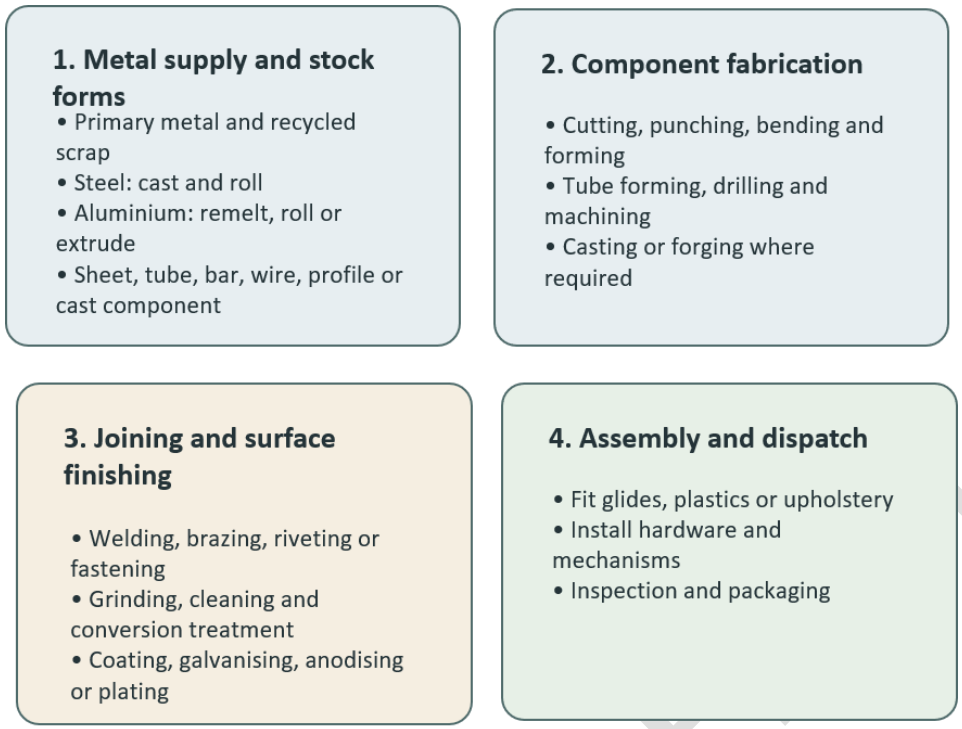

Figure 8-7: Overview of Metals Manufacturing Process.

Source: own elaboration.

Furniture-specific metalworking (tube bending, stamping, welding, powder-coating) is comparatively low-energy relative to the upstream production of the metal stock itself. More important is whether the steel or aluminium input comes from primary (ore-based) or secondary (scrap-based, electric-arc-furnace/EAF) production: secondary steel production uses roughly 70% less energy than ore-based primary steel production, and aluminium recycling saves approximately 95% of the energy needed for primary aluminium production (International Aluminium Institute, n.d.), (Technopolis (2024)).

Recycled-content declarations at the alloy/component level are difficult to obtain in practice, for structural reasons rather than mere reporting laxity (Technopolis (2024)):

- European metal suppliers' recycled-content share fluctuates over time and access to large volumes of recycled content is not guaranteed; suppliers commonly blend recycled and virgin material and rarely offer a 100%-recycled product, and in some cases do not themselves know the exact recycled fraction of the material they supply. This makes it correspondingly difficult for furniture producers to know, or to specify, the exact recycled-metal percentage in a given component.

- Ferrous metals (steel) are inherently easier to recycle than non-ferrous metals (aluminium, copper, bronze), since ferrous scrap is magnetic and can be separated from mixed waste streams with simple magnetic separation, whereas non-ferrous separation relies on eddy-current separators, which struggle to detect smaller non-ferrous particles reliably.

- Current EU recycled-content levels are estimated at roughly 20% for steel and 32% for aluminium; because recycled steel and aluminium are typically blended

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with virgin material at the supplier level rather than segregated by end-use sector, Technopolis (2024) estimates that furniture-sector recycled-content shares are likely similar to these EU-wide averages, rather than furniture having its own distinct (better or worse) supply pool.

End-of-life recycling and reuse rates for metal in furniture are estimated by several sources to be far below the recycling rates achieved for metals generally. Based on literature review and expert interviews, the EEB study in 2017 estimates reuse of metal furniture in Europe at around 8% and recycling at around 8% (European Environment Bureau, 2017). Technopolis (2024) investigated these numbers and found "experts we interviewed had similar estimates, between 5 and 10%". This compares to 85–95% of end-of-life steel recycled back into new steel products and 76% of end-of-life aluminium recycled at the level of the metal sector overall, with recycling rates in the automotive sector of 86% (International Aluminium Institute, 2020).

The issue is therefore a furniture-specific collection and disassembly problem: metal components in furniture are typically joined to, or embedded within, other materials (wood, foam, textile, plastic), which makes furniture-specific disassembly difficult and costly compared with the cleaner metal streams available from cars, ships, or construction demolition.

This presents an opportunity in the fact that furniture has a lower quality bar for recycled-metal input than sectors such as automotive, shipbuilding, or construction, meaning functionally equivalent furniture products are technically achievable using lower-quality recycled metal than those higher-spec sectors could accept (although this may generally lead to poor outcomes in alloy purities across industry). However, it is not the main consumer of metals so unlikely to push major change in metal supply at the same time. Furniture-specific recycling-rate rules may not be large enough to shift supplier-side behaviour, and could instead simply push furniture producers toward importing higher-recycled-content metal from outside the EU. This suggests that raising EU-wide metal recycling rates in general may be a more effective lever than a furniture-specific recycled content requirement. Mandatory Extended Producer Responsibility (EPR) is assessed by Technopolis (2024) as likely to have a large effect on furniture reuse and recycling rates, with a larger effect still if paired with mandatory ecodesign measures on durability, repairability and recyclability.

Disassembly cost and complexity remains the main issue: welded or riveted metal-to-metal or metal-to-panel joints are durable and low-cost to produce but essentially permanent, whereas mechanically fastened connections (screws, cam-locks, clips) allow the metal component to be recovered intact for reuse or clean scrap recycling. Furniture made of multiple bonded materials is difficult and costly to disassemble, and easier disassembly is expected to directly support higher metal recycling rates and/or better scrap quality. The scale of this effect is, however, not yet quantified (Technopolis (2024)).

8.4.4. Plastics

Plastics are used in furniture as structural or semi-structural components (chair shell, legs, drawer runners) typically in single polymers such as PP or ABS, and as small functional parts (glides, edge banding, cable management) sometimes in less easily

Draft for SHM 1

identified or mixed polymer types, including PVC. PP, PE, PVC, PC and ABS are commonly grouped as thermoplastics, while PP, PE and PVC are also used as matrices in wood–plastic and natural-fibre composites. Thermoplastics soften when heated and can generally be remoulded. They are therefore particularly relevant to injection-moulded furniture, sheet products and furniture components designed for mechanical recycling.

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7558 **Table 8-13: Overview of thermoplastics used in furniture.**

Polymer	Typical furniture applications	Relevant properties	Main limitations and circularity relevance
Polypropylene (PP)	One-piece chairs, stools, tables, storage products, chair shells and living hinges	Low density, low cost, chemical resistance, fatigue resistance and easy injection moulding	Relatively low stiffness and susceptibility to creep and UV degradation unless stabilised. It is a common choice for mono-material furniture and can be mechanically recycled, although additives, colourants and mixed assemblies complicate recovery.
Polyethylene (PE), particularly HDPE	Outdoor furniture, garden furniture, benches, recycled “plastic lumber,” table tops and synthetic rattan	Moisture resistance, impact resistance, chemical resistance and low maintenance	Lower stiffness than some engineering plastics and susceptible to creep under sustained loads. UV stabilisers may be required. Recycled HDPE is particularly relevant for outdoor furniture and panels.
PVC	Flexible upholstery coverings, synthetic leather, edge banding, foils, profiles and some rigid sheet products	Low cost, versatility, water resistance and ease of processing; properties can be modified using plasticisers and stabilisers	Chlorine chemistry and additives can complicate environmental assessment and recycling. Plasticised PVC can also present durability and additive-management issues. It is not equivalent to easily recyclable PP or PE. EU Ecolabel criteria exclude any PVC use from the product.
ABS	Hard shells, housings, office-furniture components, fittings and technical parts	Good impact resistance, stiffness, dimensional stability and surface finish	More difficult to recycle through standard household systems than common polyolefins. Outdoor use generally requires protection against UV exposure.

Polymer	Typical furniture applications	Relevant properties	Main limitations and circularity relevance
Polycarbonate (PC)	Transparent chairs, screens, cabinet elements, lighting components and impact-resistant furniture parts	High impact strength, transparency, dimensional stability and heat resistance	Relatively high material cost, susceptibility to scratching.
PMMA / acrylic	Transparent or translucent panels, cabinet doors, table elements and decorative surfaces	High optical clarity, weatherability and glass-like appearance	More brittle and scratch-sensitive than PC. Recycling is possible but generally requires a dedicated material stream.
PET and recycled PET	Upholstery fibres, textile components, sheet products and some recycled furniture components	Good stiffness, dimensional stability and established recycling infrastructure in some applications	Furniture components may contain coatings, dyes, blends or reinforcements that make recycling more difficult than recycling clean PET packaging.
Polyamides (PA/nylon)	Castors, hinges, structural fittings, wear-resistant parts and technical components	High strength, wear resistance and good engineering performance	Higher cost and, for some grades, moisture absorption. Reinforced or blended grades are more difficult to recycle.

7559 Source: own compilation, drawing on (Lawson, 2024), (Shamsuyeva & Endres, 2021)

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Elastomeric polymers

Polyurethane (PU) is particularly important in upholstered furniture. It is used for: flexible foam in seat cushions, backs and mattresses, rigid foam for insulation or lightweight cores; coatings and synthetic leather; adhesives and sealants; and elastomeric components (Lawson, 2024).

PU is highly versatile because its formulation can produce soft foams, rigid foams, coatings, adhesives and elastomers (Pu et al., 2024). It is therefore one of the most important polymers in furniture even when it is not visible as the external material. The main circularity challenge is that flexible furniture foam is generally a crosslinked or thermoset material and cannot simply be melted and remoulded like PP or PE. Foam recovery may require reuse, rebonding, chemical recycling or other specialised processes. It is also often permanently bonded to textiles, wood, metal frames and adhesives, which makes dismantling difficult.

Thermoplastic polyurethane (TPU) is used where flexibility, abrasion resistance and elasticity are required, for example in soft-touch surfaces, flexible edges, castors, protective components and some coated fabrics. Unlike conventional crosslinked PU, TPU can be reheated, although recycling still depends on the absence of incompatible materials and additives.

Polymer composites used in furniture

Many furniture products are not made from a single polymer. They are polymer composites, in which a polymer matrix is reinforced with wood flour, bamboo, flax, hemp, glass fibre, carbon fibre or other fillers.

Wood–plastic composites typically use PE, PP or PVC as the polymer matrix, combined with wood flour or other lignocellulosic fibres. They can be used for: outdoor furniture; decking-like furniture components; panels and tabletops; benches; screens and partitions; and moulded structural parts. The polymer provides moisture resistance and processability, while the wood component can improve stiffness and alter the appearance.

However, the combination of wood and plastic creates a multi-material product that is more difficult to recycle than a mono-polymer product. Moisture absorption by the wood component and poor compatibility between the fibre and polymer can also affect performance. The furniture-composites literature identifies matrix selection, fibre type, fibre-to-polymer ratio, structural performance, safety and end-of-life behaviour as key design criteria (Ichim et al., 2024). Thermoset composites cannot simply be remelted, while thermoplastic composites may be mechanically recycled or reheated but can experience fibre shortening and loss of performance. Reviews of sustainable fibre-reinforced composites emphasise that environmental benefits must be assessed across materials, processing, performance and end-of-life stages rather than inferred from the use of natural fibres alone

Hemp, flax, jute, kenaf and other fibres can be combined with PP, PE, PLA, polyester, epoxy or polyurethane matrices to produce lightweight panels and seating shells. Thermoplastic matrices offer the possibility of remelting, whereas thermoset matrices generally provide higher dimensional stability or temperature resistance but are more

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difficult to recover. The environmental relevance depends on the complete composite. A natural fibre does not automatically make a product biodegradable or recyclable, particularly where it is embedded in epoxy, polyester or PU (Maiti et al., 2022).

Epoxy, unsaturated polyester and phenolic resins are commonly used as thermosetting matrices in fibre-reinforced composites, laminates, adhesives and protective coatings. They provide high strength, stiffness and durability, but generally present more difficult recycling routes after curing because the crosslinked thermoset matrix cannot simply be remelted and reshaped.

EoL and recycled content

A mono-material moulded PP or ABS chair shell, produced by injection moulding from a single resin, can be mechanically recycled relatively easily if collected separately and could be made from resin input with recycled-content. Small multi-material plastic parts such as glides bonded to metal, PVC edge-banding laminated to a panel substrate, cable-management clips embedded in an assembly are, however, far more likely to end up in a non-recyclable residual fraction because separation at end-of-life is impractical at the scale and value of the individual part.

Recycled-content availability is higher for commodity mono-material mouldings (particularly PP, where post-consumer and post-industrial recyclate markets are relatively mature), and lower for the smaller, mixed, or technically demanding parts. In the EU Ecolabel, for furniture where the product weight exceeds 20 % of the total product weight (excluding packaging), recycled content criteria apply and the average recycled content of plastic parts (not including packaging) shall be at least 30 % w/w.

A brief scan of products claiming recycled content finds examples of recycled plastics commercially feasible in furniture but does not provide a statistically representative market-uptake rate. The evidence is strongest for PP, HDPE, rPET/PET and ABS, with weaker furniture-product evidence for PC, PVC, PU, PA/nylon and thermoset composites.

Examples:

- PP: 100% recycled PP is claimed for Magis Bell Chair and POLIMAIR products; Emeco reports a 90% waste-PP content for its 1 Inch Reclaimed chair, while Vitra reports post-consumer recycled PP without publishing a percentage.
- HDPE: outdoor furniture manufacturers commonly use recycled HDPE, but fixed product-level percentages are often absent or variable. Claims range from “recycled HDPE” to “up to 100% recycled plastic.”
- rPET/PET: 100% post-consumer recycled polyester is commercially mature in upholstery textiles; Emeco demonstrates a structural chair material containing 90% post-consumer recycled PET.
- ABS: HAY/Ahrend’s Revolt: black seat/back contains 100% post-consumer recycled ABS. The claim applies to the shell/seat-back, not the complete chair.

Claims are not always consistent, i.e. “100% recyclable” is not “100% recycled,” “100% circular” is not automatically “100% recycled content,” and a recycled-content percentage may apply only to a shell, textile or polymer fraction rather than the complete furniture product.

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8.4.5. Other materials used in furniture

Furniture may incorporate a wide range of conventional, recycled, bio-based and emerging materials. Examples of other relevant material groups include bamboo, rattan, cane, cork, paper and cardboard, glass, stone and concrete, carbon-fibre composites, mycelium-based materials, agricultural residues and post-consumer or marine plastics. Their environmental performance is highly context-dependent and cannot reliably be inferred from whether a material is described as renewable, recycled or bio-based. Relevant factors include feedstock origin, processing, binders and coatings, transport, durability, repairability, disassembly and end-of-life treatment.

For material characteristics and examples of innovative or circular materials, reference libraries exist (some proprietary) and to some extent provided by materials suppliers, examples are MATREC, Material ConneXion and the Circular Material Library. For environmental performance, generic life-cycle inventory data may be obtained from ecoinvent and, for construction-related materials, ÖKOBAUDAT. Where available, product-specific Environmental Product Declarations provide more specific information. Furniture-specific sourcing and environmental criteria are also set out in Commission Decision (EU) 2016/1332 establishing EU Ecolabel criteria for furniture.

Bamboo, rattan and cane are bio-based, lignocellulosic materials valued for their low density, flexibility and, in some applications, high strength-to-weight ratio. Rattan is used for frames and woven structures, cane for woven seating and panels, and bamboo for strips, laminated boards and panels. Cork, harvested from the bark of cork oak without felling the tree, is lightweight, resilient and naturally water-resistant; it is used in seats, acoustic panels, insulation and decorative surfaces. For these materials, environmental performance depends on cultivation or harvesting practices, transport, processing, adhesives and coatings. Relevant EU Ecolabel criteria include independent third-party chain-of-custody certification, restrictions on genetically modified virgin material, and minimum shares from sustainably managed or qualifying recycled sources (Commission Decision (EU) 2016/1332).

Paper- and cardboard-based materials, including corrugated board and honeycomb panels, can provide lightweight, high-strength structures for temporary, modular and flat-pack furniture. Their environmental advantages include low mass and the possible use of recycled fibres, although coatings, laminates, contamination and mixed-material construction may hinder recycling. Glass is used for tabletops, shelving and cabinet doors, often in thermally tempered form for improved strength and safety. Mechanical fixings are preferable to permanent bonding where repair, disassembly and recycling are priorities. Stone, marble and concrete offer durability, hardness and distinctive finishes, but their high mass can increase impacts from extraction, processing, transport and installation. Local sourcing, long service life, component reuse and replaceability are therefore important design considerations.

Carbon-fibre and other technical composites enable very light and stiff structures, but thermoset matrices are difficult to recycle; fibre recovery through mechanical, thermal or chemical processes remains technically and economically challenging (Karuppannan Gopalraj & Kärki, 2020). Emerging bio-based options include mycelium-based composites grown on agricultural residues such as straw, hemp shives or sawdust. These materials can provide lightweight, acoustic and impact-absorbing components, but are currently best suited to non-load-bearing indoor applications

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because of moisture sensitivity and durability limitations (Alaneme et al., 2023). Finally, sorted marine debris, discarded fishing nets and post-consumer plastics can be processed into feedstock for large-format 3D printing. This enables the production of large furniture components without conventional moulds, although performance and circularity depend on polymer purity, contamination, additives, collection systems and future recyclability. The Print Your City! project illustrates this approach for recycled-plastic urban furniture (*Print Your City*, n.d.).

8.4.6. Coatings and surface treatments

Coatings and surface finishes include lacquers, paints, laminates, veneers, oils and waxes. These are typically a small fraction of a furniture item's total weight but play a large role for substances of concern (through solvent-based formulations, VOC emissions, and occasionally PFAS-based stain-resistant treatments) and environmental footprint through the associated production processes and, at end-of-life, through the way coatings can hinder clean material recycling by binding surface layers to the substrate beneath them.

Coatings can be grouped into three main types:

- **Wet/solvent-based coatings** (conventional lacquers, paints, stains): applied as a liquid, typically by spraying, rolling or dipping, and cured either by solvent evaporation (conventional lacquers) or by a chemical curing reaction, forming a thin film on the surface. This is the traditional finishing route across wood and, to a lesser extent, metal furniture parts. The film forms by evaporating a liquid carrier (the "solvent") and a meaningful share of the applied product is designed to evaporate into the air during application and drying, making this the direct physical source of the VOC emissions associated with conventional lacquers. The main way to reduce the environmental footprint and SoC profile is to shift toward water-based or high-solids formulations, which reduce the solvent fraction that needs to evaporate, and which is already used to differentiate in EU Ecolabel and Blue Angel furniture criteria.
- **UV-cured coatings**: applied as a liquid resin formulation (much like wet coatings) but cure almost instantly under UV light exposure through a photochemical reaction, rather than by evaporating a solvent over minutes to hours. This gives UV-cured coatings very low VOC emissions at the application stage (there is very little solvent to evaporate in the first place, since curing happens by light-triggered polymerisation, not drying). Increasingly used for wood-panel and some plastic-component finishing. While this gives very low VOC emissions at the application stage, the cured film itself still behaves like a bonded surface layer at end-of-life.
- **Metal-based surface treatments** (electroplating, anodising, powder coating, autocatalytic/electroless plating as a metallisation pre-treatment on plastics): electroplating deposits a thin metal layer (e.g. zinc, nickel, chromium) onto a substrate via an electrochemical reaction in a chemical bath. Anodising electrochemically grows a protective oxide layer directly out of the aluminium substrate itself (rather than depositing a separate material on top of it), and powder coating applies a dry polymer powder electrostatically before melting/curing it into a continuous film in an oven. This process family is governed at EU level by the Surface Treatment of Metals and Plastics (STM)

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BREF and where heavy-metal related SoC aspects (e.g. Chromium 6) are concentrated (JRC, 2025).

It is also relevant to consider surface finishes for wooden panel boards. These can be generally split into fused resin-composites, glued-on layer or removable surface film. Each has a relevance for treatment at end of life.

- **Melamine-faced panels** (most common surfacing for flat-pack/mass-market furniture): a decorative paper printed with a wood-grain or solid-colour pattern is impregnated with melamine-formaldehyde resin, then pressed onto the raw particleboard or MDF surface under heat and pressure. The heat cures the resin, fusing the paper into a hard, thin (under 1 mm), scratch- and moisture-resistant plastic-like skin that is chemically bonded to the panel surface. Once cured, this is not a "layer of paint" that can be sanded or stripped off. The melamine resin cross-links into a thermoset plastic fused to the wood fibres at the surface, making a wood/plastic composite rather than "wood with a coating" that means these boards present a mixed-material recycling problem.
- **Veneered panels**: a thin slice of real wood (typically well under 1 mm thick) is glued onto the panel surface, usually with a PVAc or urea-formaldehyde adhesive, then lacquered or oiled on top for protection. This is closer to a separable layer than melamine faced panel as the veneer is a distinct wood material glued on, rather than a resin fused into the surface. However, recovering it cleanly requires overcoming the adhesive bond, which is rarely economical at furniture end-of-life scale.
- **Laminate (HPL – high-pressure laminate)**: similar in principle to melamine facing but thicker and more robust. Multiple layers of resin-impregnated kraft paper are stacked and pressed at high pressure and temperature into a dense, rigid sheet (under a few millimetres thick), which is then glued onto the panel as a separate manufacturing step, typically with a contact or PVAc adhesive rather than being fused directly like melamine facing. HPL is common on higher-wear surfaces (kitchen worktops, some office furniture) because the pressed-paper/resin stack is harder and more impact-resistant than a directly fused melamine facing.
- **Paint/lacquer finishes** (solvent- or water-based, or UV-cured): unlike the three options above, these are coatings as described above. A liquid or UV-curable formulation is sprayed or rolled onto the raw or primed panel surface and cured into a thin film, typically tens of micrometres thick. This can be mechanically sanded off the substrate, which is why paint/lacquer-finished panels are somewhat less of a recycling barrier than melamine-, veneer- or laminate-faced ones, even though the coating chemistry may carry a solvent/VOC profile.

Where plastic furniture components are painted, metallised, or otherwise surface-finished (e.g. chrome-look coatings on plastic furniture feet or trim, common in the office/contract segment), the STM BREF covers surface treatment of plastics (autocatalytic/electroless plating on plastic substrates as a pre-treatment for decorative metallisation) alongside metals (JRC, 2025). Metallised or heavily painted plastic parts are challenging for circularity as the surface layer both introduces a coating-chemistry SoC question (solvent-based basecoats, chromium-based pre-treatments) and, at end-of-life, contaminates the underlying resin for mechanical recycling purposes in the same way that laminates and veneers do for wood panels.

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In distinguishing between furniture product base cases, it is important to note the coating type of different components and its reversibility. The coating system can be solvent-based, water-based, UV-cured, or metal-plating and it may be a load-bearing part of a laminated composite (e.g. a melamine facing that is structurally integral to a panel) versus a separable surface layer (e.g. an oil or wax finish that can be sanded off). This determines whether "design for coating removal" is a realistic disassembly/recycling intervention for a given base case.

8.4.7. Joining and Fastening Methods

Joining methods influence several aspects of furniture sustainability: structural strength, durability and service life; ease of assembly and installation; repairability and replacement of individual components; disassembly for reuse, refurbishment and recycling; separation of different material streams; production-stage energy use and worker exposure; substances of concern associated with adhesives, coatings, plating, sealants and process chemicals.

Joining methods require assessment against both service-life performance and reversibility. A permanent joint may provide excellent strength and durability but make repair or material separation more difficult. Conversely, a detachable joint may improve circularity but require more components, space, cost or design complexity. Furniture employs a very wide range of joining and fastening techniques. Podskarbi et al., (2017) identify 84 groups of furniture joints and connecting solutions, although these can be grouped into a smaller number of process families, including shaped/traditional joints, adhesive bonding, dowels and biscuits, nails and staples, screws, bolts and cam fittings, snap/expansion fittings, and welding or other material-specific joining processes. A number of sources exist covering fasteners and joining methods by material type, such as the Joinery Handbook for Softwood production (Swedish Wood, 2020), overviews are also given in (Lawson, 2024), (Ratnasingam, J., 2022). Various research also exists in the literature determining fastener performance. In the following, we provide a grouping based on relevance for ESPR, grouping into six families across material types.

1. **Detachable mechanical fastening**

   Detachable mechanical fasteners include screws, bolts, threaded inserts, cam-and-dowel fittings, knock-down connectors, accessible clips and some press-fit systems. They generally offer the strongest basis for repair, refurbishment, component replacement and non-destructive disassembly, particularly when standardised fasteners are accessible and reusable. However, mechanical fastening alone does not guarantee design for disassembly: hidden fasteners, glued inserts, damaged substrates or mixed-material assemblies can still prevent effective separation. Design for disassembly research generally identifies fully disassemblable connections, including accessible cam-and-bolt systems, as preferable where repair and material recovery are priorities (Sydor & Stańczyk, 2025).

2. **Permanent mechanical fastening**

   Nails, staples, pins, rivets, clinched joints, swaged joints and tight interference fits are widely used where rapid production, low cost or a permanent connection is

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required. They typically have a lower substance-of-concern profile than adhesive systems, although metal coatings, plating and production-stage exposure may be relevant. Their main circularity limitation is that removal is often labour-intensive or destructive, potentially damaging wood, panels, upholstery or coatings. Riveted or clinched same-metal assemblies may still have reasonable recycling potential, but mixed-material joints are more difficult to separate.

3. Integral and form-fit joints

Integral joints use component geometry rather than separate fasteners or adhesives. Examples include mortise-and-tenon, dovetail, finger and box joints, wedges, interlocking plywood joints and moulded hinges or living hinges in plastics. These systems can reduce part count and material diversity, and unbonded or wedged versions can be highly reversible. In practice, many traditional wood joints are reinforced with permanent adhesives, which improves strength and durability but reduces disassembly potential. The circularity performance therefore depends not only on the joint geometry but also on whether the joint is bonded.

4. Adhesive joining

Adhesives are used for wood assembly, veneers, edge-gluing, laminates, upholstery, foam bonding, edge banding and structural bonding between metal, plastic, glass and composite parts. PVAc and EPI are important in wood-based assembly; EVA (ethylene vinyl acetate) and polyolefin hot melts are common in edge banding and lamination; reactive PUR is used where higher moisture and heat resistance are required; and epoxy, acrylic/MMA and contact adhesives serve more specialist structural, laminate and upholstery applications. The substances-of-concern profile is formulation-specific and may involve formaldehyde, solvents, isocyanates, sensitising resin systems or other hazardous classifications. The EU Ecolabel therefore restricts hazardous substances in adhesives, resins, sealants and related products rather than treating all adhesives as equivalent.

Adhesives generally reduce repairability and clean material separation because they are difficult to remove without damaging the joined components. Conventional EVA and polyolefin hot melts are thermoplastic and may soften under heat, whereas reactive PUR hot melts cure into a crosslinked network and are substantially less reversible.

5. Welding and thermal joining

Welding includes metal inert gas or metal active gas (MIG/MAG), tungsten inert gas (TIG), resistance and laser welding for metal furniture, as well as ultrasonic, vibration, hot-plate and infrared welding for thermoplastic components. These methods provide strong, durable and often lightweight joints without adding an adhesive layer or a separate mechanical fastener. Their disadvantages are that they are generally permanent, and repairs usually require specialist equipment. Welding can support recycling where it joins compatible components made from the same metal or polymer, but welded mixed-material assemblies, coated parts and embedded inserts can still complicate separation. Production-stage concerns include energy use, fumes, shielding gases, surface coatings and thermal degradation products.

6. Textile and upholstery joining

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Upholstery uses sewing, stitching, zips, hook-and-loop systems, tufting, staples and adhesive lamination. Removable covers and mechanically attached textiles generally provide better opportunities for cleaning, repair and replacement than permanently bonded textile–foam–substrate constructions. Staples are efficient but difficult to remove, while adhesive lamination can prevent the separation of fabrics, foam, backing layers and frames. Textile finishes, coatings, mixed fibres, flame retardants and adhesive residues may also affect recycling and material recovery.

The joining methods can therefore be compared according to their reversibility, repairability and capacity to preserve clean material streams. The following comparative table summarises the typical implications of each joining family. It should not be interpreted as an absolute ranking: a durable same-material weld may offer better recycling potential than a detachable mixed-material assembly, while a mechanically fastened product may still be difficult to disassemble if fasteners are inaccessible or combined with permanent adhesives.

Table 8-14: comparison of joining and fastening methods for ESPR.

Joining family	Reversibility	Repair-ability	Clean material separation	Main sustainability implication
Detachable mechanical fastening	High, if accessible and reusable	High	High to medium	Generally, the strongest option for repair, refurbishment and component replacement
Permanent mechanical fastening	Low to medium	Low to medium	Medium	Efficient and robust, but removal may be destructive or labour-intensive
Integral/ form-fit joints	Medium to high when unbonded; low when glued	Medium to high when accessible	Medium to high	Can reduce components and material diversity, but performance depends on adhesive use and joint damage
Adhesive joining	Generally low; higher for some thermoplastic hot melts	Low to medium	Low to medium	Enables strong, lightweight and visually clean products but often impedes repair and material separation

Joining family	Reversibility	Repair-ability	Clean material separation	Main sustainability implication
Metal or plastic welding	Low	Low	Medium to high for same-material assemblies	Durable and material-efficient, but generally permanent and specialist to repair
Textile/ upholstery joining	High for zips and removable covers; low for staples and lamination	High for removable covers; low for bonded constructions	Medium to low	Removable upholstery can extend product life; bonded multilayer structures hinder recovery

Source: author elaboration, comparative ratings of the different joining families based on design-for-disassembly principles. These are qualitative assessments rather than standardised performance scores; actual performance depends on accessibility, substrate damage, joint durability, mixed-material interfaces and the availability of repair parts.

The Design for Disassembly standard EN 17902:2023 evaluates dis/re-assembly capability based on priority parts. Classifications on the provided disassembly information, the skillset, number of (specialist) tools and number of persons required to disassemble, ease of access and number of different fastener/connector types and their re-usability. The number of disassembly/assembly steps (disassembly depth) also play an important role.

Questions for Stakeholders

Q4-6: Joining and adhesives

Does this list accurately capture the main joining systems commonly used in furniture?

Can a representative mix of adhesives and resins be defined for the different product types or across them? If so, could you please indicate a reference composition?

8.5. Final Assembly and Distribution

Furniture production is not a single process and represents several parallel manufacturing lines (panel pressing, metalworking, foam chemistry, textile finishing) that are brought together only at final assembly. In this section, we consider what happens when these different aspects converge at the furniture manufacturer.

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Table 8-15: Overview of production processes and environmental relevance.

Production stream	Core process steps	Key environmental parameters
Wood-based panel manufacture	Wood chipping/refining → resin blending → mat forming → hot pressing → sanding/finishing	Energy (heat for pressing/drying), resin/formaldehyde emissions, wood dust, water use
Solid wood processing	Sawing, kiln drying, planing, joinery, finishing	Energy for drying, VOCs from finishing
Metal component manufacture	Cutting, stamping, welding, powder coating/electroplating	Energy, surface-treatment chemicals, metal scrap
Plastic component manufacture	Injection moulding, extrusion	Energy, virgin vs recycled resin feedstock
Foam production	Polyol + isocyanate reaction (PU foam)	VOCs, blowing agents, isocyanate handling
Textile/upholstery manufacture	Weaving/knitting, dyeing, coating, cut-and-sew	Water/chemical use in dyeing, fibre origin
Assembly	Frame assembly, upholstery attachment, hardware fitting, packaging	Adhesive/mechanical fastening choice affects reparability

The last section on materials gives a brief introduction on what happens at each stage (panel pressing, metalworking, foam chemistry, etc.); this subsection addresses where it happens, at what scale, and how the final integration/assembly step differs depending on both.

Every furniture product is eventually put together in a single assembly operation by a furniture manufacturer: frame, panels, hardware, and (where relevant) upholstery or foam components are brought together into a finished item, packaged, and shipped. At the assembly stage labour intensity, plant scale, and sourcing strategy can differ strongly. For example, a one-person workshop and a large integrated manufacturer may carry out the same type of work (fitting components together, fixing hardware, packing), but with very different levels of automation, different joining-methods, and a different relationship to the upstream component supply chain.

This makes assembly an important part in the production chain for considering differences between regions and company size when developing ESPR interventions (e.g. reversible/mechanical fastening systems, take-back logistics, digital product passport data capture).

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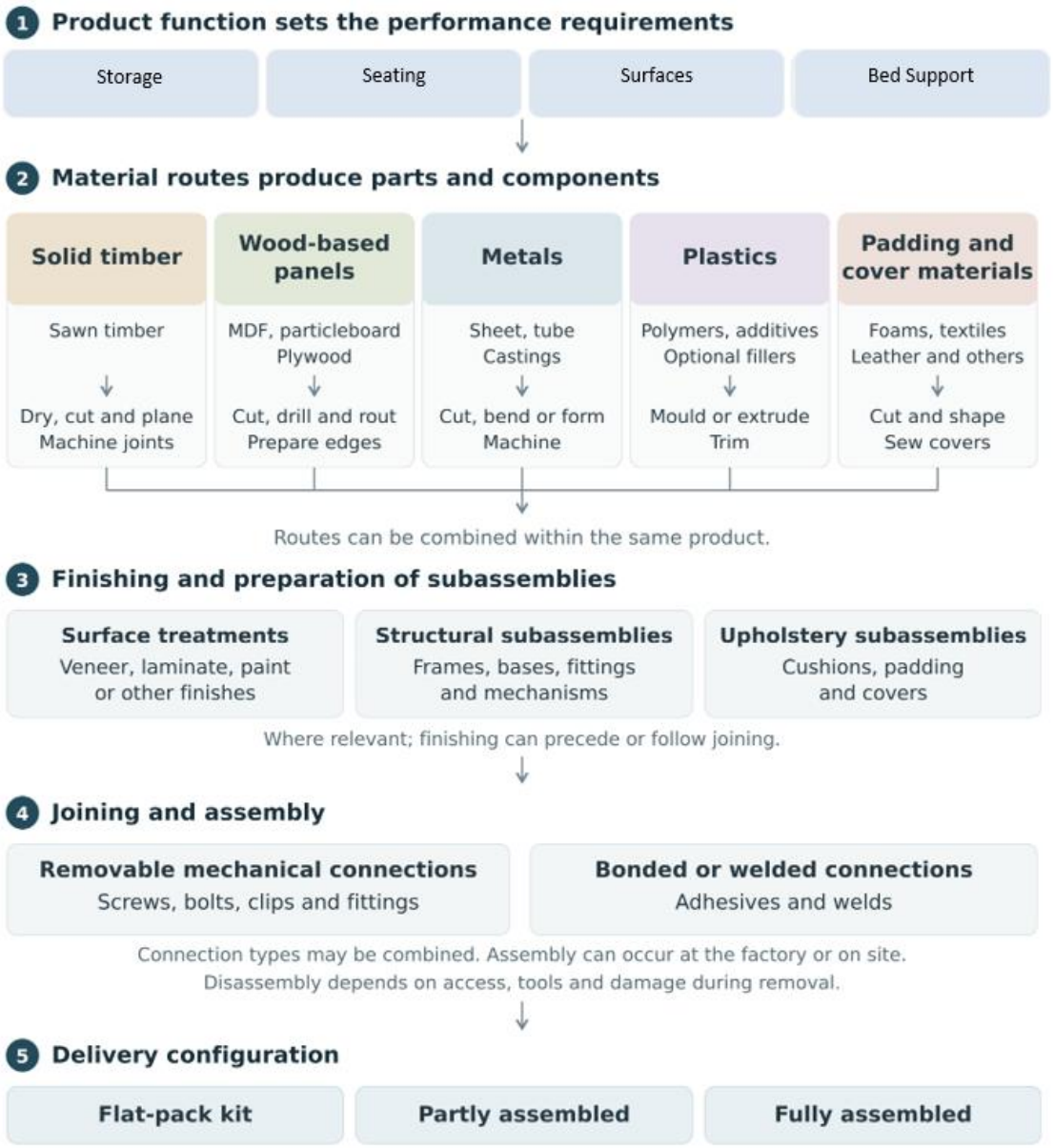

Figure 8-8: Schematic overview of furniture manufacturing routes.

Source: Own elaboration. Operations are illustrative and may be combined, reordered or outsourced; final assembly may occur after delivery. Other materials: glass, stone/ceramics and natural materials such as rattan are not explicitly shown. Purchased components such as fittings, mechanisms and prefabricated parts can enter directly at assembly.

Company size impacts on production methods used

Supply-chain integration varies with firm size, but also with product segment, production volume, geographic supply base and make-or-buy strategy. Larger manufacturers may have the scale to internalise processes such as panel processing, metalworking, finishing or final assembly, which can give them closer control over material and joining choices. However, large firms may also outsource or geographically fragment production, while smaller firms can retain selected upstream processes, particularly in bespoke and solid-wood production. Where SMEs purchase finished panels, frames, fittings or upholstery from suppliers, their direct visibility and

influence over embedded material and chemical choices may be more limited unless contractual specifications and supplier data systems are in place.

Production technology differs across furniture firms and production systems. A study of Central European furniture firms specifically finds that production processes depend on both company size and production characteristics, and describes the role of CNC, robotic systems, glue centres and integrated digital production systems (Červený et al., 2022). Company size can affect the feasibility of highly integrated automation, but it is not determinative. Small workshops often rely on manual and standalone equipment, particularly for bespoke, variable or low-volume products, whereas high-volume standardised production can justify integrated CNC nesting, automated storage, drilling/hardware-insertion and assembly systems. CNC itself is not exclusive to large firms. Consequently, design-for-disassembly measures should be assessed against the manufacturing route: a fastening solution designed for an automated line may require different tooling, manual installation, redesigned components or an alternative reversible fitting in lower-volume production.

Furniture supply chains can allocate component manufacture, final assembly, delivery, installation and post-sale support among manufacturers, retailers, logistics providers, installers and end users. Delivery may range from complete in-home setup to curbside delivery or flat-pack products assembled by the customer (Umbrex, n.d.). Three illustrative assembly/integration models demonstrate the relationships:

- **Fully factory-assembled:** The product is assembled before dispatch, whether by the brand owner or a contract manufacturer. This is common in many upholstered, solid-wood and premium furniture ranges. It can provide good process control where assembly is retained within the manufacturer's own operations, although traceability still depends on the documentation of purchased components and outsourced processes. Transport volume may be higher than for equivalent knock-down products, but this varies by product geometry and packaging design.

- **Flat-pack / ready-to-assemble (RTA):** supplied as separate components for assembly at the point of sale or by the end user. It commonly uses mechanical fittings such as cam locks, dowels, screws, bolts or snap-fit systems because these can be assembled with consumer-accessible instructions and tools. Such fittings can create a favourable starting point for repair and disassembly, especially where joints are accessible, standardised and designed for repeated cycles. However, RTA assembly does not by itself guarantee repairability or non-destructive disassembly: some joints, panel materials and fittings degrade or are damaged during removal. Design-for-disassembly requirements should therefore specify reversibility, tool access, number of intended assembly cycles, availability of replacement fittings and avoidance of irreversible auxiliary adhesives (Sydor & Stańczyk, 2025).

- **Hybrid / partial pre-assembly with on-site or third-party final assembly:** common in contract and office furniture (fitted kitchens, large office workstations, contract seating installed in bulk), where sub-assemblies are factory-built but final integration into the finished installation happens on-site by a fitting/installation contractor rather than the original manufacturer or the end consumer. It introduces additional actors and handovers, increasing the need

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for clear technical specifications, joining instructions, material documentation and responsibility allocation.

The three models above are driven by transport economics: unassembled flat-pack components pack far more densely (lower cubic volume per unit, since panels nest and voids are eliminated) than a fully assembled item, reducing per-unit transport cost and emissions. Flat-pack furniture is successful in mass-market, high-volume, long-distance-shipped product categories, while fully factory-assembled models remain economically viable mainly for lower-volume, higher-value, or shorter distance shipping segments where the transport cost is less important than the product value.

It can be concluded from this that the transport/logistics model a product category uses is a strong predictor of its disassembly-friendliness, independent of any ecodesign requirement. At the same time, requirements assuming producer control over the finished, in-use product configuration are most viable for fully-assembled products and weakest for hybrid/contract-installed products, where the finished configuration depends on decisions made by an installer who may not be the ESPR-obligated "producer".

Requirements on assembly/disassembly instructions or digital product passport data being made available at the point of use are largely already satisfied by necessity for flat-pack products (instructions must exist for the consumer to assemble the product) but would represent a new obligation for fully-assembled and hybrid products, where no equivalent consumer-facing instructions currently exist.

8.5.1. Distribution

Table 8-16: overview of distribution dynamics in furniture.

Distribution model	Typical base cases	Volume/ weight efficiency	Packaging implications	Relevance
Flat-pack (RTA – ready-to-assemble)	Storage furniture, desks, some seating	High (low transport volume per unit)	More packaging material per functional unit but lower transport emissions	Dominant in mass-market retail; also affects reparability (mechanical fasteners)
Fully assembled	Upholstered sofas/armchairs, some office furniture	Low (bulky, "selling air")	Large packaging/protective materials, higher transport emissions per unit	Common for high-end/upholstered segment
B2B/contract distribution	Office furniture, bulk institutional orders	Medium–high (palletised, standardised)	Reusable transport packaging more common	Refurbishment/leasing models more established here

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Distribution model	Typical base cases	Volume/ weight efficiency	Packaging implications	Relevance
Direct-to-consumer/e-commerce	Growing across all segments	Depends on packaging optimisation and whether delivery is of single/few items or not.	Higher share of single-item packaging, more return logistics	Increasing due to online furniture retail growth

To be detailed: sensitivity analysis for different transport distances in context of production, re-use, and recycling.

8.5.2. Packaging

Packaging represents another material stream which is covered by its own regulation and requirements depend largely on the distribution model as stated above. As e-commerce increases, the amount of packaging for furniture has also been increasing.

The Packaging and Packaging Waste Regulation (PPWR) (EU) 2025/40 that applies since 12 August 2026.

EU regulatory instruments (Ecolabel, GPP) and LCA case studies identify the same material set for furniture packaging:

- corrugated cardboard (highest use, especially in flat-pack),
- EPS/PE foam or moulded pulp for corner/edge protection,
- wood pallets/crates for bulk and B2B shipment,
- and plastic films/straps.

GPP furniture criteria require packaging to be "easily separable by hand into recyclable parts consisting of one material (e.g. cardboard, paper, plastic etc.)" and set a ≥50% recycled-content threshold by weight. Plastic parts above 50g must be polymer-labelled to facilitate recyclability at end of life.

In each base case estimating packaging amounts can be done by looking at specific furniture models where packaging is listed separate from product characteristics. How much packaging is required depends strongly on whether it is delivered assembled or flat pack, as well as whether it is picked up or sent to the user.

- Flat-pack storage (wardrobes, shelving, cabinets): Usually 2–3 separate packages per unit (frame / doors / fittings). Material: corrugated cardboard dominant, foam or moulded-pulp corner blocks, fitting bag (also now in paper).
- Table: a single package is typical, but there are difference by tabletop material: wood/laminate tops behave like flat-pack storage (cardboard + corner protection); glass or stone tops need rigid crating or thick foam edge protection.

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- General chair: single box, foam/pulp corner protectors, small fitting bag. Upholstered chairs may have lower cardboard % and include plastic film for the upholstery.
- Sofa: lowest packaging-mass-to-product-mass ratio, but highest packaging volume per unit. Cushions typically bagged separately in film; frame parts individually wrapped or boxed.

Does the industry follow any typical packaging ratios?

8.6. Bill of Chemicals

Where the Bill of Materials considers what a product is made of, the Bill of Chemicals considers which substances were used to make the product in that form. In furniture, the Bill of Chemicals profile is shaped less by the bulk materials themselves (e.g. wood, metal, textile) than by the auxiliary chemistry applied to them, such as resins used to bind panels, flame retardants, plasticisers in coated fabrics, and surface finishes. Given the complexity of the above-mentioned auxiliary chemistry and the diversity of materials involved, the present section approaches the Bill of Chemicals from multiple complementary angles, structured according to the substance groups and material occurrences described below. The list of materials declared in EPDs (see Annex, **Table 11-2**) builds the basis for the analysis.

This section does not aim to provide an exhaustive inventory of all chemicals potentially occurring in furniture. Instead, it identifies substances and substance groups that are prioritised for further analysis in the accompanying Substances of Concern (SoC) analysis under Task 5, based on the following aspects:

- **REACH/CLP**: substances of very high concern (SVHCs) under REACH, or substances with specific severe harmonized classification under the CLP Regulation (e.g. carcinogens, mutagens, reproductive toxicants, endocrine disruptors, PBTs, and vPvBs), in the following referred to as SoCs of category A and B.
- **Persistent Organic Pollutants (POPs)**: legacy chemicals that are already heavily regulated but may still be circulating in recycled feedstock, in the following referred to as SoCs of category C.
- **'circularity blockers'**: substances that negatively affect the reuse and recycling of materials in the product, irrespective of whether they are strictly classified as SVHC or hazardous under REACH or CLP respectively, or POPs, in the following referred to as SoCs of category D.

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8.6.1. Identification of SoCs of categories A, B, and C

Substance groups based on the EU Ecolabel criteria for furniture

The EU Ecolabel furniture criteria (Commission Decision (EU) 2016/1332 of 28 July 2016 Establishing the Ecological Criteria for the Award of the EU Ecolabel for Furniture (Notified under Document C(2016) 4778) (Text with EEA Relevance), 2016) provide a useful starting point for identifying substances of concern in furniture. However, according to recital (5), the criteria are intended to limit "the use of hazardous compounds, the levels of hazardous residues, [and] the contribution of furniture to indoor air pollution", thereby addressing SoC corresponding to categories A, B, and C, as defined in Article 2(27) ESPR, but not category D ('circularity blockers'). Article 6.6 of the Regulation (EC) No 66/2010 on the EU Ecolabel further specifies that 'the EU Ecolabel may not be awarded to goods containing substances or preparations/mixtures meeting the criteria for classification as toxic, hazardous to the environment, carcinogenic, mutagenic or toxic for reproduction (CMR), in accordance with Regulation (EC) No 1272/2008 (CLP), nor to goods containing substances referred to in Article 57 of Regulation (EC) No 1907/2006 (REACH).

A full list of substances addressed through the various EU Ecolabel criteria is provided in the Annex (Chapter 10.1); however, this list includes only those substances and substance groups explicitly mentioned in the criteria. It should also be noted that the EU Ecolabel approach is not limited to explicit listing of individual substances. Criterion 2 establishes an overarching prohibition of SVHCs and of substances and mixtures meeting a defined set of CLP hazard classifications, generally subject to material- or use-specific derogations. Additional criteria address restricted substances in specific material groups, for example criterion 3.2 for wood, cork, bamboo, and rattan. Accordingly, the Annex list is not exhaustive: further substances may be present in furniture and may also be covered indirectly through the general restriction of SVHCs and relevant CLP-classified substances and mixtures.

The following substance groups are identified as priority groups based on the screening of the EU Ecolabel criteria for furniture. Each group is described briefly here; material- and component-specific occurrence is addressed in **Section 0.**

- **Formaldehyde and formaldehyde-based resins**: Formaldehyde is a specific volatile organic compound (VOC) of particular relevance in furniture, primarily associated with wood-based panels and with resin and adhesive systems used in their manufacture (e.g. urea-formaldehyde, melamine-urea-formaldehyde, phenol-formaldehyde). It is classified as a Carcinogen Category 1B substance and is of particular importance for indoor air emissions from composite wood products. Historically, wood-based panels and finished furniture containing formaldehyde were assessed using E1/E2 classification limits under standards such as EN 13986 (E1 ≈ 0.124 mg/m³ under EN 717-1). From 6 August 2026, such products are subject to the formaldehyde emission requirements under REACH Annex XVII, Entry 77 (0.062 mg/m³ for the finished product).
- **Flame retardants**: Referenced across several material categories, including wood and wood-based panels, plastics, and upholstery materials (textiles, leather, coated fabrics, and padding). Historically halogenated (brominated)

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compounds played a major role; a shift is described toward inherently flame-retardant fibres, physical fire barriers (Mohd Sabee, M.M.S.; et al., 2022), or halogen-free/organophosphate-based alternatives.

- **Plasticisers, especially phthalates**: Used as additives occurring in several material categories, particularly plastics and upholstery-related materials (textiles, leather, coated fabrics, padding), where flexibility, softness, or processing performance is required. Phthalates are highlighted as a relevant subgroup, in particular in the context of PVC-backed coated fabrics/synthetic leather and PUR foam assessment.
- **Several PFAS and other finishing chemicals**: PFAS-based chemistry is historically associated with stain-, water-, and dirt-repellent finishes on textiles and coated fabrics, the substance group is widely regulated under REACH (above 0.1 % w/w in articles).
- **Heavy metals and chromium compounds**: Addressed in relation to several materials and material streams where metal content may occur intentionally (as additives) or unintentionally (as impurities/contaminants). Referenced for surface coatings on wood/wood-based and metal component parts; for plastics, where specific heavy-metal-containing additives are addressed (e.g. Cd, Cr(VI), Pb, Hg, Sn); as contaminants in recycled wood used for wood-based panels; and for upholstery padding materials (notably latex and PUR foams). Chromium compounds are of particular relevance in metal surface treatment processes and, where applicable, leather tanning.
- **Biocides/preservatives**: Biocidal products, including wood preservatives, are addressed as chemicals that may occur across several furniture materials and process stages, including manufacture/finishing of solid wood and wood-based panels, and as possible additives in plastics, textiles/leather/coated fabrics, and upholstery padding materials.
- **VOC-/SVOC-relevant coating chemicals**: Addressed primarily in connection with surface treatments, including optical brighteners, water-/dirt-/stain-repellent treatments, adhesives, stabilisers, and varnishes. Includes individual substances (e.g. toluene, styrene, tetrachloroethylene) and aggregate parameters (aromatic hydrocarbons, total VOCs). Occurs mainly in coatings and finishing layers applied to wood and wood-based panels and to metal component parts, and in upholstery padding materials (latex, PUR foams).
- Others, including **azo dyes / aromatic amines in dyestuff for dyeing and non-pigment printing, auxiliaries** and **lubricating oils.**

REACH Annex XVII Screening

The assessment of relevant entries of REACH Annex XVII is based on the furniture materials in **Table 11-2** (Annex) and their usual applications and should therefore be understood as a screening. On the basis of materials, it is possible to identify potentially relevant substance groups and regulatory topics typically associated with furniture materials and components. REACH Annex XVII is suitable for a material-based screening approach**,** as it establishes specific restrictions for the manufacture, placing on the market and use of certain hazardous substances, mixtures, and articles**.**

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8159 The following overview therefore focuses on those Annex XVII entries that are typically
8160 relevant for furniture-related materials.

8161 **Table 8-17: REACH Annex XVII entries relevant to materials used in furniture.**

REACH Annex XVII Entry	Typical furniture relevance	Affected materials based on Table 11-2
27 – Nickel and its compounds	Relevant for metallic parts intended to come into direct and prolonged skin contact, e.g. handles, knobs, armrest trims, frame parts, hinges or decorative metal elements depending on use design. The restriction applies where nickel release from the skin-contacting part exceeds 0.5 µg/cm²/week.	Stainless steel; steel; low-alloy steel; brass; metal coating; hinge; fasteners; feet/levelers; hardware; metal trims and decorative metal parts
43 – Azocolourants and azodyes	Relevant for textile and leather upholstery materials or other coloured soft furnishings used in furniture where there may be direct and prolonged skin contact. Entry 43 restricts certain azo dyes and aromatic amines in textile and leather articles.	Autex acoustic textile; Kvadrat textile; polyester cloth; polyester fabric; polyester fibre; felt; wool; textile (unspecified); recycled fabric; polyurethane/polyamide blend; surface materials with textile or leather-like coverings
50 – PAHs	Relevant for rubber and plastic components that may come into direct, prolonged or short-term repetitive contact with skin or the oral cavity under normal or reasonably foreseeable conditions of use. In furniture this may concern feet, grips, edge protections, wheels/castors, soft-touch polymer parts, coated plastic parts or elastomer components.	Rubber, synthetic; synthetic rubber; thermoplastic elastomer (TPE); natural rubber; plastic film; PVC; soft-touch plastic parts; feet/levelers; cable insulation; coated plastic or rubber components

REACH Annex XVII Entry	Typical furniture relevance	Affected materials based on Table 11-2
51 – Phthalates (DEHP, DBP, BBP, DIBP)	Highly relevant for furniture containing plasticised materials, especially soft PVC, coated fabrics, cable insulation, films, edge materials, synthetic leather and soft polymer accessories. The restriction covers articles containing the listed phthalates equal to or greater than 0.1% by weight individually or in combination in the plasticised material.	PVC; edgeband-PVC; plastic film; electrical cable/wire; synthetic rubber; surface materials; coated fabrics; plastic parts; soft polymer components; other plastic (unspecified) where plasticisers may be used
63 – Lead and its compounds	Relevant for accessible consumer-facing parts made of or containing metal alloys, coatings, pigments, stabilisers or PVC-related additives. For furniture, this may include metal fittings, decorative coatings, accessible painted parts, brass components, cable materials and PVC parts. Entry 63 is used to restrict lead in consumer articles and accessible parts thereof.	Brass; copper alloys; zinc; PVC; electrical cable/wire; paint; primer; topcoat; powder coating; metal coating; plastic parts with pigments or stabilisers; fasteners; hardware; metal (unspecified)

REACH Annex XVII Entry	Typical furniture relevance	Affected materials based on Table 11-2
77 – Formaldehyde and formaldehyde-releasing substances	Highly relevant for furniture and wood-based articles. This is particularly important for MDF, HDF, particleboard, plywood, laminated boards, veneered boards, coated wood-based panels, certain foams, textiles and bonded assemblies. From 6 August 2026, articles must not be placed on the market if formaldehyde released under the specified test conditions exceeds 0.062 mg/m³ for furniture and wood-based articles.	MDF; HDF; raw HDF; particleboard; raw chipboard; laminated particleboard; laminated board; engineered wood products; plywood; wood veneer; melamine laminate; TFL; HPL; phenolic resin; adhesive; lacquer/varnish; primer; topcoat; polyurethane foam; textile composites and bonded assemblies

Source: Own compilation based on REACH Annex XVII.

POPs Screening

Using the same screening-based approach as for REACH Annex XVII, the same material list based on EPD declarations (**Table 11-2**, Annex) was also assessed for potential relevance in relation to substances listed under the EU POPs Regulation. However, this screening does not demonstrate the actual presence or absence of specific POP substances in the materials concerned but rather identifies substance groups that may be relevant based on typical applications and material characteristics.

Table 8-18: POPs relevant to materials used in furniture.

POP substance/group	Why relevant	Affected materials based on Table 11-2
Short-chain chlorinated paraffins (SCCPs)	Relevant because SCCPs have historically been used as secondary plasticisers, flame retardants and processing additives in PVC, rubber, coatings, adhesives, textiles and leather-type materials.	PVC; edgeband-PVC; synthetic rubber; natural rubber; thermoplastic elastomer (TPE); electrical cable/wire; paint; coatings; sealants/adhesives; textile back-coatings; leather-like or coated surface materials

POP substance/group	Why relevant	Affected materials based on Table 11-2
Polybrominated diphenyl ethers (PBDEs), including DecaBDE	Relevant because PBDEs, including DecaBDE, have been used as brominated flame retardants in plastics, textiles, electrical components, cables and upholstered applications. They are particularly relevant for furniture containing electronic functions, plastic housings, cables or flame-retarded upholstery materials.	Plastic parts; ABS; PP; PA; HIPS-like thermoplastics; electrical and electronic components; electrical cable/wire; LED lighting; upholstered components; textile back-coatings; polymer housings
Hexabromocyclododecane (HBCDD)	Relevant because HBCDD has been used as an additive flame retardant in textiles and upholstered furniture, particularly in coated textile applications, and also in certain polymeric materials. It is therefore relevant mainly for upholstered or flame-retarded furniture components.	Upholstery textiles; textile back-coatings; polyurethane or polystyrene-related fillings where applicable; electrical and electronic components; flame-retarded plastic parts
Perfluorooctane sulfonic acid (PFOS), its salts and PFOS-related compounds	Relevant because PFOS-related chemistry has historically been associated with water-, oil- and stain-repellent treatments in textiles, leather and upholstery applications. Such treatments may occur in furniture fabrics and coated soft surfaces.	Textile (unspecified); polyester fabric; wool; recycled fabric; coated textiles; upholstery textiles; leather-like coverings; surface treatments; stain- or water-repellent finishes
Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds	Relevant because PFOA-related substances have been used in surface treatments and fluorinated performance finishes, especially where water, oil or stain repellency was required. These uses may be relevant for treated upholstery textiles, coated surfaces and some technical components.	Textile (unspecified); polyester fabric; upholstery textiles; coated fabrics; leather-like coverings; surface coatings; water- or dirt-repellent finishes; certain plastic parts; electrical and electronic components
Perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds	Relevant because PFHxS has been used in similar technical contexts as other PFAS, including performance treatments and technical applications, and may occur in treated textiles or certain technical components.	Textile (unspecified); coated fabrics; upholstery materials; leather-like coverings; surface finishes; electrical and electronic components

POP substance/group	Why relevant	Affected materials based on Table 11-2
Pentachlorophenol (PCP), its salts and esters	Relevant because PCP has historically been used as a wood preservative and may remain relevant for legacy, recovered or treated wood materials. For furniture, relevance is generally highest where treated wood, reused wood streams or older imported components are involved.	Wood (unspecified); solid wood; pine; oak; beech; ash; plywood; recycled wood; wood veneer; wood-based materials; imported legacy wood components; certain heavy-duty treated textiles if applicable
Dechlorane Plus	Relevant because Dechlorane Plus is a chlorinated flame retardant used in thermoplastic materials such as nylon, ABS and PP, as well as in technical and electronic applications. It is therefore most relevant for furniture with electrical functions or flame-retarded technical plastics.	Polyamide (Nylon); nylon 6,6; PP; ABS; plastic parts; electrical and electronic components; electrical cable/wire; LED lighting; technical polymer housings
UV-328	Relevant because UV-328 has been used as a UV absorber/stabiliser in plastics, coatings, paints, sealants, resins and electronic applications to prevent degradation and discoloration. This makes it relevant for coated and plastic furniture components exposed to light and ageing.	Paint; lacquer/varnish; primer; topcoat; coatings; adhesives; sealants/resins; plastic parts; ABS; PP; PA; electrical and electronic components

Source: Own compilation based on POP Annex I.

These groups are not equally relevant for every furniture product. In practice:

- Upholstered furniture increases relevance for PFAS, HBCDD, PBDEs, SCCPs
- PVC, cables and soft polymers increase relevance for SCCPs
- Electrified furniture / sit-stand desks / LED-integrated furniture increases relevance for PBDEs, Dechlorane Plus, UV-328, PFAS in E&E components
- Wood-based or recycled wood materials increase relevance for PCP
- Coated plastics and light-exposed polymer parts (mainly outdoor use) increase relevance for UV-328

Summary

Taken together, the three screenings in **Section 8.6.1** point to a consistent set of substance groups that recur across sources and screening methods, in particular:

- Formaldehyde and formaldehyde-based resins;

- PBDEs, HBCDD, and Dechlorane Plus (flame retardants), with relevance concentrated in upholstered, electrified, or technical furniture components;
- Phthalates;
- SCCPs;
- PFAS (PFOS, PFOA, and PFHxS) with relevance concentrated in upholstery textiles and coated surface materials;
- Heavy metals including chromium compounds, nickel (REACH Annex XVII Entry 27) and lead (REACH Annex XVII Entry 63), linked to accessible, skin-contacting metal parts;
- Pentachlorophenol (PCP), a legacy wood preservative of particular relevance for recovered or legacy wood materials;
- VOC-/SVOC-relevant coating chemicals, *to be assessed in closer detail;*
- UV-328, stabiliser used in coatings, plastics, and technical components.

Questions for Stakeholders:

Q8-1: The following existing information requirements are present in legislation:

- REACH requires suppliers to disclose any Candidate List SVHCs (Annex XIV) above 0.1% w/w (Art. 33), and to provide Safety Data Sheets for hazardous or PBT/vPvB substances or preparations containing them (Art. 31);
- CLP requires clear hazard classification and labelling and record-keeping for classification data;
- POPs above specific limits are banned, though POP rules don't mandate downstream information sharing in general. Nonetheless, for several substances a labelling requirement applies for products containing the substance. In addition, the waste management of substances listed in Annex IV of the Regulation or products in which they are contained must "ensure that the POP content is destroyed or irreversibly transformed so that the remaining waste and releases do not exhibit the characteristics of POPs". To be able to comply with these requirements, it stands to reason that information on the content of such POPs would be available as a minimum to waste management operators of relevant products;
- The Waste Framework Directive's SCIP database collects SVHC data to aid waste operators;

please provide available information on the relevant substances, including, where applicable, information on substances of very high concern, hazardous substances, , and persistent organic pollutants in your products.

Feedback on these questions can be provided using the feedback form available on the project website, in which more detailed questions have been pre-structured to facilitate input; however, this is optional and not a mandatory format for submission.

8.6.2. Identification of substances in furniture that negatively affect the reuse and recycling of materials in the product

SoCs of category D are substances that negatively affect the reuse and recycling of materials, also referred to as "circularity blockers'". They are commonly understood as substances that primarily cause technical difficulties during recycling processes. This

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occurs when the substance physically or chemically degrades the properties of the recovered material. This includes impurities that reduce mechanical performance, alter processability, or introduce structural defects in the secondary material, even where the substance is not subject to a specific legal threshold.

The following substances affect the technical quality and act as physical or chemical "circularity blockers":

- **Urea-Formaldehyde (UF) Resins:** Cured resins remain physically bound to wood fibres, leading to reduced internal bond strength and increased thickness swelling in secondary panels (widely used today; confirmed by stakeholders responding to the questionnaire).
- **Melamine:** As an additive flame retardant, its massive particulate loads physically contaminate secondary foam streams, making high-quality recovery economically prohibitive (widely present today; confirmed by stakeholders responding to the questionnaire).
- **Per- and Polyfluoroalkyl Substances (PFAS):** These "forever chemicals" contaminate mechanical textile recycling streams, risking the reintroduction of toxicants into consumer goods with direct skin contact (still used besides ban of individual substances and the evaluation of the restriction of PFAS as a group).
- **Phthalates (DEHP):** Found in **PVC edge-banding**, these plasticisers are not chemically bound and leach out to contaminate secondary mixed-plastic recovery streams (not added / used in production today, but phthalates remain heavily present in older/post-consumer furniture).
- **UV-328 (Phenolic Benzotriazole):** As a Persistent Organic Pollutant (POP), its presence in legacy outdoor plastics legally prohibits mechanical recycling into new consumer goods (not added / used in production today, but UV-328 remains present)
- **Chromium (VI) and Chromium (III),** e.g., Chromium Sulfate**:** the latter is used as tanning agent preventing the safe biological recycling or composting of leather waste due to heavy metal leaching and microbial toxicity (Cr(III) widely used in new leather furniture; Cr(IV) is a legacy chemical in leather and was specifically reported by stakeholders responding to the questionnaire)
- **Acrylic Micro-shards (from UV-Cured Acrylic Topcoats):** Zero-VOC, UV-cured acrylic lacquers are widely applied today to seal and protect wood panel surfaces, forming brittle films that shatter into insoluble micro-shards when panels undergo hydrothermal recycling acting as localised structural defects in recycled MDF.

In a wider sense, this also concerns legacy chemicals that are SoCs of category A, B or C today, incorporated into furniture components before their use was restricted and persisting physically or chemically well beyond end of life. Since such substances are typically bound within or coated onto the material and not separately labelled or documented, they are difficult to identify or remove during sorting and shredding, and often enter secondary streams undetected alongside compliant materials. This risks non-compliance of the resulting secondary material, limiting permissible end-uses, undermining confidence in recycled content, and pushing otherwise recoverable material toward energy recovery or disposal instead of high-value recycling.

Several material streams identified in this study illustrate this mechanism:

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- **legacy wood** may contain pentachlorophenol (PCP) from historical wood preservation treatments;
- **legacy leather**, particularly from older upholstered seating, may contain chromium(VI) compounds originating from historical tanning processes, as highlighted directly by stakeholder feedback on post-consumer leather;
- **legacy upholstery and plastic/electronic components** may contain brominated flame retardants such as PBDEs or HBCDD, historically used in textiles, foams, and plastic housings before their restriction; and
- **legacy PVC-containing components** (e.g. edge-banding, cables, coated fabrics) may contain phthalates or short-chain chlorinated paraffins (SCCPs) used as plasticisers or additives before current restrictions applied.

Questions for Stakeholders:

Q8-2: Can you confirm specific entries from the list above? Can you specify other substances that negatively affects the reuse and recycling of materials in the product in which it is present, especially if the technically hinder recycling? Please give reasons for your answers in each case.

Feedback on these questions can be provided using the feedback form on the project website, in which more detailed questions have been pre-structured to facilitate input; however, this is optional and not a mandatory format for submission.

8.7. End of Life

At End of Life (EoL) a furniture item's recyclability is determined by decisions taken at the design and manufacturing stage: how materials are joined, which adhesives and coatings are used, whether components can be separated by hand. This section aims to understand what currently happens to the product once discarded, where the biggest gaps are between today's practice and the theoretical recyclability implied by its material composition, and what is stopping this from improving.

Furniture end-of-life outcomes are, however, also shaped by factors that are out of scope of ESPR. ESPR sets criteria when a product is put on the market, so can address how easy a product is to sort, disassemble and recycle if and when it reaches a facility capable of doing so. Here aspects such as material characteristics for recycling, reversible vs. permanent joints, separable vs. fused surface treatments, avoidance of components that cannot be picked up by sensor-based classification, recycled-content design choices, and information on substances (e.g. via DPP) can play a role. These aspects determine the upper limit on what a well-functioning waste management system could recover from a given product – a DPP on certain aspects may help with sorting for recycling.

Not addressable via ESPR are Member-State waste-policy and infrastructure factors, which may play a larger role in whether a piece of furniture can be treated at EoL under these conditions. These include whether a sorting/dismantling facility exists in a given collection area, whether landfill/incineration is priced so cheaply that sorting is not

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worth investing in, and how a Member State enforces (or does not enforce) separate collection obligations. These are determined by national/regional waste infrastructure investment, landfill tax design, and Waste Framework Directive implementation. Even an optimally-designed, mono-material, easily-sortable product cannot outperform the system it is discarded into, so it is essential that complementary measures are introduced where necessary to the extent possible under ESPR.

This section therefore aims to document current EoL pathways as far as possible and their BAT/BNAT technical possibilities (addressable by ESPR design requirements), while also indicating where country-level infrastructure and economic factors currently limit real-world outcomes regardless of product design.

8.7.1. Collection

The EU furniture sector generates furniture waste at a scale most commonly cited as ~10–10.8 million tonnes annually, with historically 80–90% landfilled or incinerated and a residual ~10% recycling rate (European Environment Bureau, 2017). This figure is a top-down proxy, assuming furniture is a fixed 3.75% of the municipal solid waste (MSW) stream and adding a scaling factor of 18% for commercial (B2B) waste. It assigns the non-landfilled/non-incinerated residual to "recycling" by default, without distinguishing collected-for-recycling from material that yields usable secondary feedstock.

If we take a look at this top-down calculation again for the latest year data provided in Task 2, bulky waste on average in the EU of 30.4 kg per capita is approximately 6% of total EU-27 municipal solid waste, which was 511 kg per capita in 2023 (Eurostat). As stated in **Section 0**, a bottom up estimate states 61% of bulky waste in Germany (UBA 2022). An older study by WRAP finds 42% of bulky waste by weight is furniture in the UK.

German bulky waste (29.9 kg/capita in 2023) is 4.88% of German total MSW (613 kg/capita, Destatis). Applying the 61% furniture share to that gives an implied German furniture share of MSW ≈ 3.0%, in the same zone as the EEB 2017 3.75% assumption.

Applying Germany's 61% furniture-of-bulky-waste ratio to the EU-27 bulky-waste-share-of-MSW (5.95%) gives an implied EU-wide furniture share of MSW ≈ 3.63%, while the WRAP UK estimate implies 2.5% of MSW would be furniture. France's EPR scheme (Ecomaison) collects 1.6 Mt of furniture and bedding per year, covering ~90% of household furniture waste; extrapolated by population share, this implies an EU household-only baseline in the 11.7 Mt range, or 5.1% of MSW before commercial waste is added.

These top-down calculations appear to confirm in general terms the widely cited EEB estimate, providing a new number of 10.48 Mt in 2023 following the same methodology. A sensitivity model varying MSW share (2.5–5.0%) and commercial share (18%) produces a total EU generation range of 6.98–13.97 Mt, with the ~10 Mt figure as a midpoint rather than a validated number.

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Table 8 2: Updated top down waste generation estimate, 2023.

MSW share	Household furniture waste	+ 18% commercial
2.5%	5.73 Mt	6.98 Mt
3.75%	8.59 Mt	10.48 Mt
5.0%	11.46 Mt	13.97 Mt

8.7.2. Treatment Pathways

Given the lack of a dedicated furniture waste stream or waste codes, clear conclusions on the treatment pathways taken is difficult to determine.

The highest quality data available come from countries which have EPR schemes; however, these do not represent the wider European market which does not yet have EPR schemes. Stakeholders responding to the questionnaire indicated that they mostly do not have data, due to furniture statistics being mixed in with other data sources such as bulky waste or waste wood.

Table 8-19: Treatment Pathways Ecomaison 2023.

Furniture/material category	Reuse	Recycling	Incineration (energy recovery)	Landfilling
Wooden furniture	~4%	~67% (particle boards)	~29%	0%
Metal furniture	~4%	Metals fully recycled	<20%	0%
Upholstered beds/seating/textiles	~4%	~5%	~74%	15%
Outdoor plastic furniture	~4%	~96% (mechanical recycling)	<1%	0%

Source: stakeholder questionnaire / reporting France

Table 8-20: Estimated pathways in Andalusia, Spain.

Category	(Prep for) reuse	Recycling	Incineration	Landfilling	Other (export/informal reuse)
Storage	8–15%	45–60%	N.A.	20–35%	2–5%
Seating	5–10%	30–45%	N.A.	25–45%	2–5%

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Category	(Prep for) reuse	Recycling	Incineration	Landfilling	Other (export/informal reuse)
Surfaces/ Tables	10–18%	50–65%	N.A.	15–30%	2–5%
Beds	2–5%	20–35%	N.A.	40–60%	2–5%
Other	5–12%	35–50%	N.A.	25–40%	2–5%

Source: stakeholder questionnaire.

An industry association in Germany provided an estimate for storage furniture of Reuse: ~5%; Recycling: ~25% (into particleboard); Incineration: ~70%; Landfilling: ~0%.

The feedbacks demonstrate clearly that there is a lack of highly granular data outside EPR schemes, and there is a clear split between countries that have incineration and waste-to-energy infrastructure vs landfill policy, differing waste wood usage regulations.

The rate of landfill, recycling or incineration of furniture waste is dependent on the local waste management infrastructure. As shown in **Figure 8-9**, in many countries in Southern and Eastern Europe, landfill rates remain very high (up to 81%) for municipal solid waste, with a number of countries still landfilling far more than the 10% target for municipal waste targeted by 2035. Countries with high landfill rates also have low recycling rates. A number of countries in central and northern Europe have very low landfill rates and have instead much higher waste incineration. The EU-wide Waste-to-Energy/incineration share of MSW treatment has held relatively stable at 25–27% since 2011, while recycling has gained 9% in the same time period and landfilling has reduced by 11% (CEWEP - The Confederation of European Waste-to-Energy Plants, 2026).

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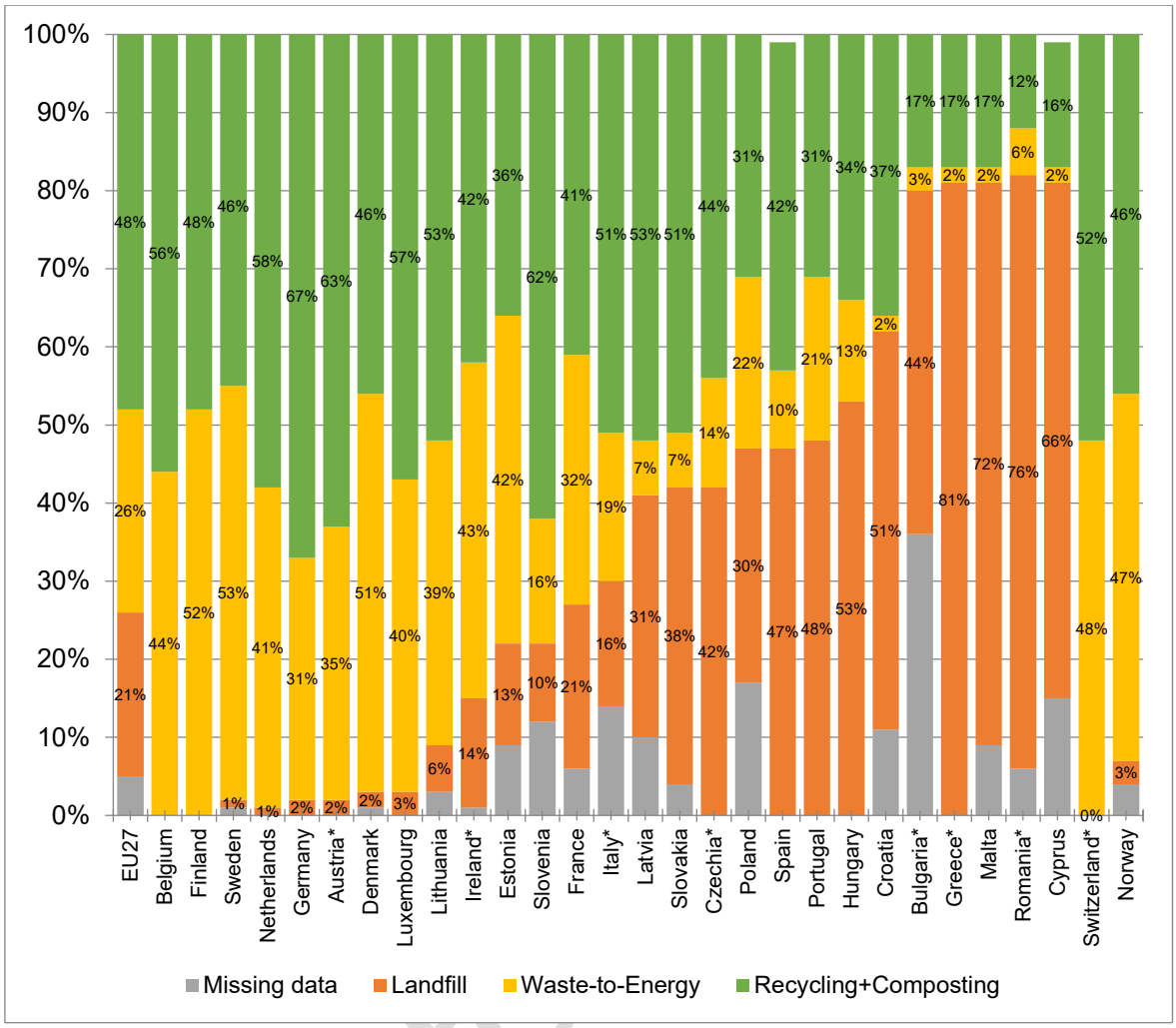

Figure 8-9: Municipal waste treatment in Europe by country, 2023.

Graph by CEWEP in April 2026, Data Source: Eurostat. * = 2023 data. Percentages are calculated based on the municipal waste reported as generated in the country (CEWEP - The Confederation of European Waste-to-Energy Plants, 2026).

A major way to dispose furniture is the free collection service by local councils. Even where basic Municipal Solid Waste collection infrastructure exists, whether a given country's waste system finds it worthwhile to invest in sorting capacity is determined by landfill economics. EEA analysis of Member State landfill taxes finds a "fairly clear and linear correlation between the total landfill charge and the percentage of municipal waste recycled and composted," and notes that all five EU Member States with the highest recycling rates (Germany, Austria, Slovenia, the Netherlands, Luxembourg) use a well-designed landfill tax or landfill ban (EEA, 2022). Landfill tax levels vary across the EU: Malta had no landfill tax as of 2023 (only a gate fee, rising from EUR 40 to EUR 120/tonne by 2027), but also no waste to energy plant. Gate fees may rise when waste is mixed or unsorted. Several Member States apply substantially higher per-tonne charges that make sorting-then-recycling the cheaper option. Where landfill is cheap or untaxed, there is a straightforward financial disincentive to invest in the sorting capacity that would otherwise divert material to recycling, regardless of what sorting technology exists on the market.

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ESPR requirements that improve recyclability via mono-materials, sorting or disassembly are therefore first contingent on these steps being applied locally in waste management systems to create any improvements.

The table and figure below show an overview of what can happen to different furniture waste streams.

Table 8-21: Overview of potential furniture treatment pathways.

Route	Applicable materials/base cases	Typical share
Landfill	Mixed/upholstered furniture, contaminated wood	Still significant in several Member States
Incineration (energy recovery)	Treated wood, upholstered furniture & foam, shredder residues as RDF	Common EoL route for treated wood (not clean-wood recyclable)
Wood recycling	Clean/untreated wood, some particleboard cores	High in countries with less stringent classification frameworks and less WtE competition; constrained by contamination (adhesives, coatings, fittings)
Metal recycling	Steel/aluminium frames, fittings	High technical recycling rate possible when separated, but estimates in last section indicate lower than possible.
Plastics recycling	Mono-material plastic components	Limited by multi-polymer parts, additives (FR, colourants)
Refurbishment	Office furniture (well-established secondary market), informal re-use for domestic furniture	Growing via B2B refurbishment/leasing models
Textile/upholstery recycling	Covers, foam	Currently very limited; foam-to-foam and fibre-to-fibre recycling still nascent

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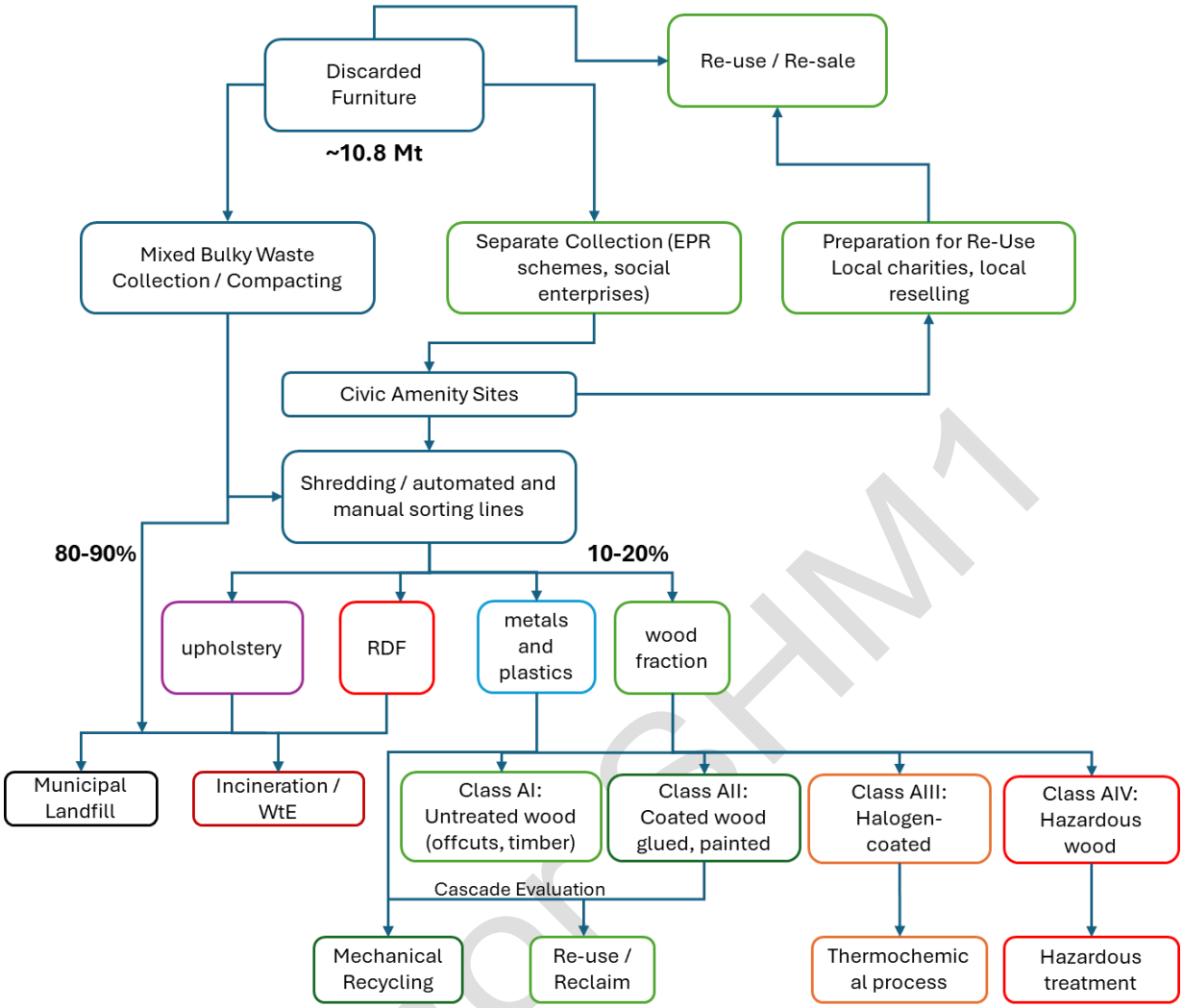

Figure 8-10: Overview of Furniture EoL Waste Flows.

Source: Own Illustration

8.7.3. Waste Wood

In 2022, a total of 46.8 Mt of waste wood are generated in the EU, while only 41.4 Mt were treated. Adding to this the fact that the EU imported a net 1.3 Mt of waste wood, means there is a significant gap between what is collected for treatment and the totals generated of 6.7 Mt of wood. Ikenze et al.'s report (Ikenze et al., 2024) states that 10.37 Mt of generated waste wood is attributable to municipal waste in 2020. The rest of waste wood comes from manufacturing and industry. Specifically for furniture manufacturing waste, Eurostat gives a combined waste wood data point of 2.0 Mt from furniture, other manufacturing and repair/installation of machinery.

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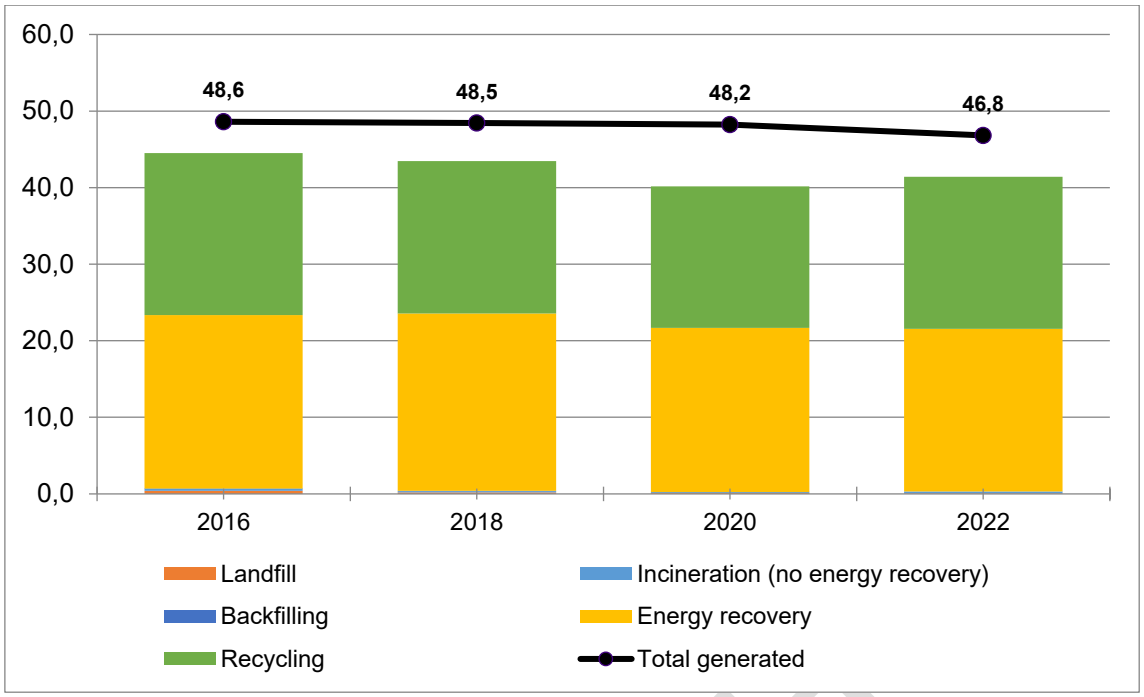

Figure 8-11: EU27 wood waste: generated vs. treated by method, 2016–2022 (million tonnes).

Source: Eurostat (env_wasgen for generation, env_wastrt for treatment), waste category W075 (wood wastes), hazardous + non-hazardous combined, EU27. The black line is total wood waste generated. The stacked bars are total wood waste treated, broken down by method.

Whether or not and how furniture is reused or recycled depends on how countries set end of waste criteria, classify and manage their waste wood. Depending on the national legislation, waste wood is usually classified into different categories. For instance in Germany the waste wood regulation (AltholzV) classifies as the following (AltholzV - Verordnung Über Anforderungen an Die Verwertung Und Beseitigung Von Altholz, 2025):

A I (Natural, Untreated Wood)

- Includes clean, untreated wood from pallets, crates, or furniture without coatings.
- Can be directly recycled or used in particleboard production.

A II (Coated or Varnished, Non-Toxic Wood)

- Contains wood with paint, varnish, or adhesives but without harmful substances.
- Can be used for material recycling or energy recovery.

A III (Wood with Halogenated Organic Compounds in Coatings, but No Heavy Metals)

- Includes furniture or construction wood with PVC coatings or laminated surfaces.
- Mainly used for energy recovery in specialised incineration plants.

A IV (Treated Wood Containing Hazardous Substances)

- Wood with preservatives, pesticides, or heavy metals (e.g., railway sleepers, telephone poles).

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- Requires special disposal or incineration under strict environmental controls.

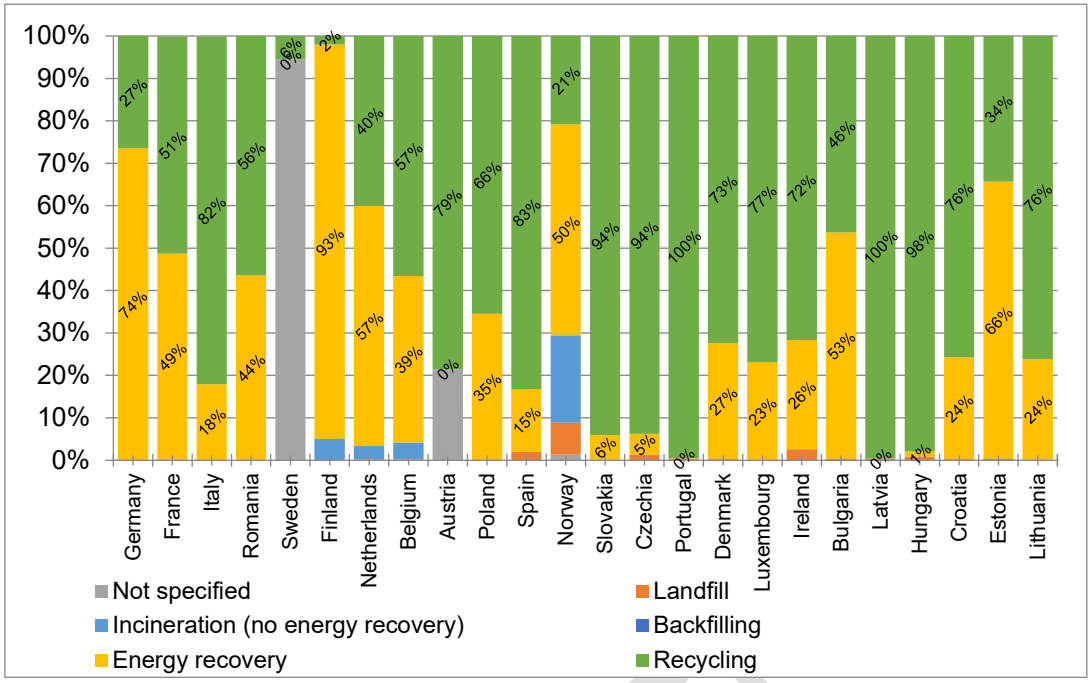

Figure 8-12: EU27 wood waste treatment by country, 2022.

Source: Eurostat (env_wastrt), waste category W075 (wood wastes), hazardous + non-hazardous combined. Countries with under 100,000 tonnes treated in 2022 are excluded. "Not specified" reflects the gap between reported treatment operations and the total treated figure (e.g. Sweden and Austria report incomplete operation-level breakdowns for 2022).

The country-level wood waste treatment data from Eurostat offers the closest available proxy for how end-of-life wooden furniture may be handled once it enters the waste system. Germany treats the large majority of its wood waste (74%) through energy recovery, with recycling as the minority pathway (27%), while Italy, Portugal, Latvia and Hungary run in the opposite direction, reporting 80–100% of wood waste recycling. While these high treatment rates imply that all wood is being treated, the data is also somewhat unreliable. Due to a different calculation basis, these data appear to provide different conclusions than other country-specific studies, such as (Flamme et al., 2020) who conclude that in the German case, 15 % of waste wood entered material recycling, 6 % was thermally treated (disposed of via incineration), and 79 % went to energy recovery in 2016 (compared with Eurostat data stating 26.4% went to recycling in the same year).

The implication for furniture specifically is that the same product such as a wooden wardrobe faces a fundamentally different EoL treatment outcome depending on which country it is discarded in. ESPR design requirements premised on recyclability in this case must take into account: where landfilling or energy recovery are dominant, recycling is unlikely while some member states already manage to recycle very large proportions of the waste wood.

Cascading use of wood

The cascading use of wood concept reframes EoL furniture as one part in a larger system: wood fibre should pass through successive rounds of material use, each round

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extracting value at the highest level still technically possible given the fibre's degraded quality and contamination before finally being combusted for energy recovery or landfilled as a last resort. Provisions to support wood cascading have been written into EU law via the recast Renewable Energy Directive (RED III), which requires the Commission to adopt an implementing act on applying the cascading principle to forest biomass.

In the responses to the stakeholder survey, stakeholders responded that cascading use is already practiced, but mostly indirectly: through suppliers, secondary raw material inputs (e.g., recycled-content particleboard), or third-party end-of-life processing (e.g., producer responsibility organisations, PROs) rather than through a furniture manufacturer's own closed-loop process. Very few respondents described cascading as integrated into their own production processes; most either buy pre-cascaded material (e.g., particleboard already containing recycled wood) or supply components/technology that enable someone else's cascading. This implies that any cascading principles or targets should be applied upstream to board suppliers rather than at the assembly level.

Two respondents noted that production setups are shaped by local geography. If a manufacturer is far from a board mill, it may be more efficient both in cost and CO_2 terms to use wood residues (shavings, off-cuts) for on-site energy generation rather than transport them long distances for material recycling. Additionally, recycling/waste infrastructure is concentrated near urban areas and designed for municipal waste streams, not industrial waste streams, pushing the industry toward managing (and often burning) its own waste internally to minimise cost.

As shown in **Section 0**, particle board is where most recycled content is taken up in wood today, however, it varies strongly by country, with some countries like Italy having over 90% recycled content and others like Germany much less due to their waste classification laws. The achievable recycled-content threshold for panel-based furniture is not primarily a manufacturer design choice, it is dependent on how much clean, sorted post-consumer fibre each national system can supply within their own waste wood classification limits.

Kopp & Luo2022) see two factors as particularly prominent influencing the success of especially wood cascading:

- Competition between using wood residues for bioenergy production vs. material recycling. This competition does not only play out on the market, but it manifests in energy/recycling infrastructure and conflicting energy and waste policy. It is further complicated by a lack of conclusive environmental assessments.
- The low quality of waste wood including pollution with additives, and a lack of documentation on such pollution at the end of life can hinder its usability for reprocessing. A lack of suitable treatment infrastructure to increase quality aggravates the effect.

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8.7.4. Preparation for Reuse, Refurbishment

When furniture is collected in formal channels, it can enter re-use and refurbishment.

Under the European Union's Waste Framework Directive (Directive 2008/98/EC), "preparation for reuse" (or preparing for re-use) is defined as "checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing".

Here it is important to distinguish between:

- **Reuse (Non-Waste Loop)**: This covers any operation where products or components are not waste and are used again for the same purpose. Examples include peer-to-peer online sales (e.g., selling a table on eBay), direct donation, or swapping furniture before it enters a waste collection stream. This is covered by **Section 7.3.7** in Task 3.
- **Preparation for Reuse (Waste Recovery Loop)**: This applies only after a product has legally become waste, meaning it has been discarded by its owner, collected by municipal bulky waste trucks, or deposited in a Civic Amenity Site (CAS) (CE Delft and Partners, 2018). Once it enters the waste stream, it must undergo formal recovery operations to legally "exit" its waste status and safely return to the market. It focuses on maintaining the original integrity of the item. Operations are restricted to checking structural stability, deep cleaning/sanitizing, and basic, localised cosmetic repairs (e.g., tightening a hinge, gluing a loose joint, or applying a touch-up varnish). The goal is to bring the item back to a safe, functional state with minimal change to its physical mass (DIN-TS 35205).
- **Refurbishment (Intermediate Restorative Loop)**: an industrial or professional process that restores a used product to a satisfactory operating and aesthetic condition without altering its core design, structural frame, or original performance specifications (DIN-TS 35205 Clause 3.2.6)). Interventions go beyond basic cleaning to include re-upholstering worn outer fabrics, replacing damaged non-structural sub-assemblies (such as drawer runners or table leaves), or re-sanding and re-lacquering worn surfaces (bringing refurbished product again on the market). The item returns to the market as a restored second-hand product, typically accompanied by a limited or second-hand warranty.
- **Remanufacturing (High-depth industrial loop)**: an industrial process using used products or components to create a product where at least one major change occurs that impacts the safety, original performance, intended purpose, or nature of the product (DIN-TS 35205 Clause 3.2.7). It may involve stripping the item down to its bare load-bearing structure (such as a bare solid wood frame or steel chassis), re-machining parts, and replacing major sub-assemblies (e.g., stripping out degraded polyurethane foam and replacing it with new cushioning, or remaking structural frames). Under the EU Blue Guide, a remanufactured item is legally considered a new product when placed on the market and must undergo standardised industrial laboratory testing (e.g., EN/ISO abrasion, pilling, and structural safety tests) and carry a new-product warranty.

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Table 8-22: Comparison of Preparation for Re-use and Refurbishment.

Technical Parameter	Preparation for Reuse	Refurbishment	Remanufacturing
Legal Waste Status	Applied specifically after an item has legally entered the waste stream (WFD Art. 3(16))	Applied to waste items (as recovery) or non-waste products (as waste prevention)	Placed on the market legally as a brand-new product under EU product safety rules (EU Blue Guide)
Intervention Depth	Surface-level, non-invasive (checking, deep cleaning, localised minor fixes)	Mid-level, restorative (re-upholstering, surface refinishing, non-structural part replacement)	Core-level, invasive down to bare load-bearing frame/chassis
Component Replacement	Minor hardware only (screws, glues, small brackets).	Non-structural sub-assemblies (outer fabrics, worn cushion layers, drawer slides)	Major structural sub-assemblies (frames, core cushioning, mechanical re-engineering)
Product & Warranty Status	Restored second-hand item exiting waste status	Restored second-hand product (satisfactory state, second-hand / reduced warranty)	Legally new product (backed by full new-product statutory warranty and declarations)
Testing Standards	Manual visual and physical functional checks.	Targeted material checks (REACH SVHC compliance on new replacement fabrics/finishes)	Comprehensive EN/ISO laboratory testing (Martindale abrasion, tear strength, pilling, structural safety)
Legacy Chemical Risk	hazardous chemicals are left inside.	surface fabrics/coatings replaced; internal core padding may remain	legacy foams, restricted flame retardants, and hazardous coatings are fully stripped and replaced
Tool/Skill Complexity	Standard manual tools; basic carpentry/cleaning skills.	Specialised tools; industrial upholstery/assembly skills.	High-depth industrial machinery; OEM or specialized workshop re-machining and assembly lines

Source: based upon information in DIN TS 35205:2024-09, EU Waste Framework Directive 2008/98/EC, and EU Blue Guide 2022/C 247/01

Before any preparation for re-use can begin, discarded furniture undergoes a manual vetting process at Civic Amenity Sites (CAS) or Social Economy Organisation (SEO) centers (CE Delft and Partners, 2018). Operators conduct manual visual checks and functionality tests to identify items with viable reuse potential. This step separates repairable items from heavily contaminated or severely damaged products that are technically inadequate for the preparation-for-reuse channel.

Separate door-to-door collection at source avoids compacting in waste trucks and structural damage. Refurbishment and preparation for reuse are more economically and physically viable if furniture is designed for disassembly, allowing it to be taken apart easily without destroying the base material.

Stakeholders stated the following barriers to re-use:

No EPR coverage for reuse/refurbishment activities. Multiple respondents (NGO, consumer organisation) identify this as the key legislative gap: EPR schemes rarely fund preparation-for-reuse, so recycling and disposal are economically favoured over reuse and repair because they are cheaper and less labour-intensive. Social enterprises that prioritise reuse are placed at a competitive disadvantage without financial support.

Collection methods destroy reuse potential before it can be assessed. A Dutch public authority stated incineration is cheaper than reuse/refurbishing, so furniture is incinerated "in spite of its technical potential"; and press/compaction collection vehicles make disassembly and reuse impossible once furniture is compacted.

Legal classification as "waste" blocks reuse. The same authority flagged that national law makes it difficult for goods to be reclassified as non-waste once collected, creating a direct regulatory barrier to reuse.

Textile/upholstery condition is the single biggest determinant of reusability for seating. An industry association noted that even when a frame is structurally sound, visible wear, staining, odour or fading on upholstery fabric often blocks reuse or resale. pointing to maintenance information, cleanable/removable covers, and design for reupholstery as key levers.

Leather materials are frequently lost to incineration due to compliance uncertainty. An End-of-Life service provider argued that placing full traceability/testing burden on recyclers for hazardous substances (e.g., Chrome VI) makes high-value reuse "almost impossible in practice," even though much recovered leather remains durable and usable.

Reasons for disposal are rarely technical failure: The Horizon "R-evolve" pilot (cited by an industry association) found kitchens averaging ~24 years old were still mostly "fully functional" or only "minor damage" when replaced, driven by taste/life-events, not durability failure.

8.7.5. Mechanical recycling

To prevent contamination and preserve wood structure, early physical separation before waste is mixed or crushed leads to better outcomes. This includes targeted dismantling of furniture at municipal/commercial levels and setting up dedicated streams with advanced, clearly labeled collection containers and high-control methods at civic amenity sites.

Where there are waste wood classifications, regulations may require wood to be visually inspected and sorted into classifications before being further processed.

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Physical Sorting Processes

Manual/visual sorting: the most common technique at furniture take-back and bulky-waste facilities, particularly for pre-shredding selective dismantling. Cheap and flexible, but slow, inconsistent, and depends on labour availability.

Magnetic separation: removes ferrous metal contaminants (nails, screws, brackets) via magnetic rollers integrated directly into shredding lines; mature, cheap, effective for ferrous fractions.

Eddy-current separation: the non-ferrous equivalent (aluminium, copper), using induced currents to eject non-magnetic metals; well established but less reliable than magnetic separation for small or thin non-ferrous particles.

Density/gravity separation: (weight or air-classification based), removes heavier contaminants such as stones and glass, and can coarsely separate foam/textile from denser wood or metal fractions.

Near-infrared (NIR) spectroscopy and hyperspectral imaging: the current state-of-the-art for wood-specific contamination detection: NIR light is reflected off the material surface, and the spectral signature identifies whether wood is clean, coated, laminated, or chemically treated, without needing to physically breach the surface. IR-based systems have demonstrated raising the clean-wood fraction strongly in trial sorting runs (Pigorsch et al., 2014).

Wood

Mechanical recycling of waste wood aims to repurpose clean, untreated wood into valuable raw materials. In the context of furniture recycling, post-consumer furniture products are collected, sorted, and transferred to the wood-based panels (WBP) industry as recovered wood. In Europe, the wood-based panels industry relies heavily on this resource; for instance, recovered wood (which includes recycled old furniture, packaging, and demolition wood) constitutes about 48% of the wood used in a typical European particleboard (Carvalho et al., 2026a).

The mechanical recycling of wood and furniture waste generally involves the following key physical steps (Kekes et al., 2024):

- Chipping: This initial step reduces large pieces of wood waste, such as logs or furniture components, into smaller, uniform wood chips.
- Shredding: Shredding breaks down bulky furniture items and debris into smaller, irregular pieces. Shredders are typically equipped with one or more magnetic rollers to automatically extract ferrous contaminants like nails and screws. However, because shredding physically degrades the wood structure, it can reduce the potential for high-value direct reuse; therefore, some experts recommend sorting and selective dismantling prior to shredding.
- Grinding and Milling: These processes further reduce wood chips to very fine particle sizes, such as sawdust or wood flour, which are required for manufacturing composite boards.

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- Screening and Sorting: Particles are screened to ensure uniformity in size and to remove remaining non-wood contaminants like glass, stones, or plastics. Operations such as magnetic attraction, electromagnetic induction (for paramagnetic and diamagnetic metals), and weight separation (for stones and glass) are typically deployed at early processing stages.
- Pelletizing: Finely ground wood particles are compressed into dense, uniform pellets, commonly used as a renewable biofuel

Coatings, adhesives and fittings on end-of-life furniture are rejected by recyclers because they compromise panel quality and breach contaminant limits set by industry. The Horizon Europe Wood2Wood project (2024–2027) directly addresses the challenges in wood waste recycling for construction and demolition as well as municipal furniture wood waste. The project is investigating a range of new technological solutions: advanced sorting (robot/mixed-reality contaminant identification), decontamination/upcycling (a piloted steam-explosion process already producing furniture-grade particleboard from old, coated furniture wood), and digital tracking (LCA-based cascade prediction, Digital Product Passport).

Upholstery

PU Foam

EUROPUR members estimate that 50% of PU Foam goes to furniture production and 35% to mattresses, leading to an estimate of 350.000 and 400 000 tons of post-consumer foam per year from furniture in the EU (EUROPUR, 2021).

During the processing of trimming foam blocks to size in the EU, up to 24% of the tonnage produced becomes offcuts which can be used to make PU bonded foam, “trim foam”, used in carpet underlay or gym mats and acoustic insulation. Europe produced 316,000 tonnes of trim foam in 2018 from production off-cuts. However, PU bonded foam has different characteristics compared with PU foam, in particular a much lower density (20 to 40 kg/m3 vs 60-400 kg/m3). According to EUROPUR, the market is already over-supplied with such PU bonded foam. (EUROPUR, 2021)

The vast majority of postconsumer PU foam from mattresses and furniture goes to incineration or landfill. According to EUROPUR, post-consumer foams could be recycled in much the same way as post-production scraps but the lack of an offtake market for these foams poses a barrier, and a tracking system would also need to be in place in case of legacy chemicals (EUROPUR, 2021). Furthermore, postconsumer waste streams are frequently contaminated with inorganic or organic residues, and are heterogeneous, multilayer materials that often include textile compounds, adhesives, and dust from furniture they were a part of (Velasco et al., 2026).The vast majority of postconsumer PU foam from mattresses and furniture goes to incineration or landfill. According to EUROPUR, post-consumer foams could be recycled in much the same way as post-production scraps but the lack of an offtake market for these foams poses a barrier, and a tracking system would also need to be in place in case of legacy chemicals (EUROPUR, 2021). Furthermore, postconsumer waste streams are frequently contaminated with inorganic or organic residues, and are heterogeneous, multilayer materials that often include textile compounds, adhesives, and dust from furniture they were a part of (Velasco et al., 2026).

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Textiles

In standard municipal furniture waste, the upholstery textiles (often complex blends of polyester, nylon, and cotton) are rarely recycled. As textiles in furniture are usually glued to the PU foam underneath, they are almost entirely sent to Thermal Recovery (incineration) or landfill. Stripping glued textiles from foam mechanically results in torn fibres and foam loss, destroying the economic value of both materials.

8.7.6. Thermal Recovery (Incineration)

Incineration is a conventional thermal treatment process that utilizes complete oxidation under high temperatures to decompose organic waste. The process typically involves several sequential stages (Kekes et al., 2024).

- **Drying:** Post-consumer wood and municipal solid waste often contain significant moisture. During the initial stage of incineration, heat is applied to evaporate water from the biomass, ensuring optimal combustion efficiency.
- **Combustion:** The dried waste is exposed to high temperatures (typically between 800°C and 1,200°C) in the presence of excess oxygen. This achieves complete oxidation, converting carbon-based materials into heat, carbon dioxide (CO_2), and water vapor.
- **Post-Combustion and Ash Generation:** Any remaining combustible residues undergo final oxidation to ensure organic components are fully converted. This stage yields two distinct ash residues: bottom ash (heavy solid residues left at the bottom of the furnace) and fly ash (fine, volatile particulates carried along with the flue gases).
- **Waste-to-Energy (WtE) & CHP:** Modern incinerators operate as combined heat and power (CHP) plants. The thermal energy released from burning organic furniture components is used to produce steam, which drives turbines to generate electricity or supplies thermal energy for municipal district heating networks.
- **Ash Valorisation:** Bottom ash containing non-combustible minerals and metals can be processed and recovered as a secondary raw material, commonly substituting gravel in road construction.
- **Refuse-Derived Fuel (RDF) & Solid Recovered Fuel (SRF):** Upholstery foam, non-recyclable textiles, and highly contaminated wood fractions that cannot be separated are often shredded, dehydrated, and prepared into RDF or SRF. These fuels are incinerated as high-quality alternative energy sources in cement kilns, paper mills, or specialised industrial boilers.

Burning bulky waste reduces its physical volume by up to 90%, significantly relieving pressure on municipal landfills. High-temperature combustion is highly effective at destroying harmful pathogens, toxic organic compounds, and chemical coatings (such as paints, pesticides, and preservatives) present in treated wood. It is the only legally compliant and safe disposal route for heavily contaminated Class AIV wood waste

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(wood impregnated with hazardous preservatives like creosote or heavy metals) which is strictly prohibited from entering recycled wood-based panel production.

8.7.7. Thermochemical Processes

An overview of thermochemical processes used for wood processing is given below (Kekes et al., 2024):

Pyrolysis: Heating wood waste in the complete absence of oxygen decomposes the organic materials into three high-value outputs: biochar (which sequesters carbon and amends soil), bio-oil (a renewable fuel or chemical feedstock), and syngas. It is highly useful because it can process lightly contaminated wood without releasing pollutants.

Gasification: deconstructing wood waste at high temperatures under limited oxygen to generate syngas (a hydrogen-rich gas used for electricity, district heating, or industrial synthesis of plastics and fertilisers)

Hydrothermal Carbonization (HTC): Operating under milder temperatures in the presence of water, this process is suited for wet or high-moisture EoL wood, converting it into a dense, carbon-rich solid fuel known as hydrochar.

Torrefaction: A mild pyrolysis (200–300°C) that drives off moisture and volatiles, dramatically increasing the energy density and grindability of recovered wood biomass.

8.7.8. Biochemical processes

For wood that is contaminated with heavy metals, paints, or hazardous preservatives (Class AIII or AIV wood), direct mechanical recycling is legally prohibited (Raunkjær Stubdrup, K. et al., 2016). Remediation is the process of removing or neutralizing these pollutants so the wood can safely re-enter circular loops.

Bioremediation: This emerging biochemical pathway uses the natural abilities of specialised microorganisms or wood-decaying fungi to break down organic toxins or extract heavy-metal preservatives from wood waste and process water (Kekes et al., 2024).

Biochemical Fractionation: Instead of downcycling wood waste into particleboard, this biochemical process uses organic solvents (like ethanol or acetone) under mild conditions to fractionate lignocellulosic biomass (Kekes et al., 2024).

It solubilizes hemicellulose and cellulose while extracting high-purity lignin. The cellulose pulp is converted into high-grade containerboard, and the functionalised lignin is blended with biopolymers (like PLA) to manufacture high-strength structural materials.

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8.7.9. Chemical Recycling

Major chemical companies are developing advanced chemical recycling (glycolysis and acidolysis) to break down EoL PU foam back into liquid polyols, the chemical elements needed to make virgin-quality foam. While proven at pilot scales, post-consumer municipal waste streams are currently too heterogeneous (mixed with adhesives, dust, and textiles) for this to be a reliably employed at this moment in time Biotechnological processes based on enzymatic depolymerization of PU Foams have long term potential but are at an earlier stage of technological development. (Velasco et al., 2026)

8.7.10. Barriers to recycling and material recovery

20 respondents provided inputs on barriers to recycling of furniture materials in practice, the following barriers were mentioned the most by these respondents:

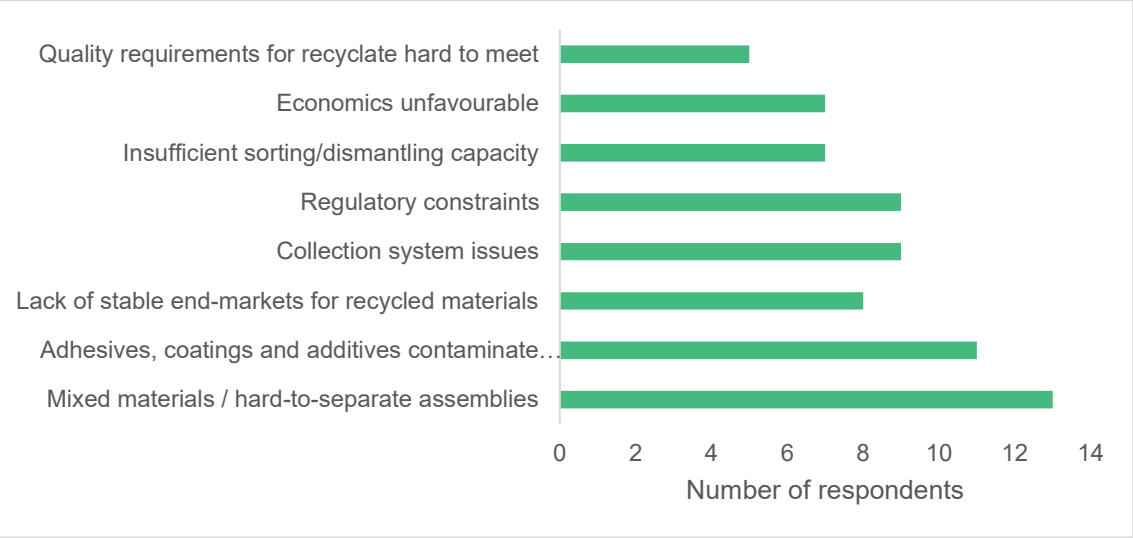

Figure 8-13: Stakeholder Responses to Barriers at EoL (N=20).

Mixed materials / hard-to-separate assemblies (13 respondents): Highlighted for upholstered furniture (sofas, seating), kitchens/bathroom furniture and furniture where particleboard, metal, foam, textile and plastic are combined in permanently joined structures (staples, adhesives, foam bonding). One manufacturer stated that gluing/stapling fabric across foam into a wood frame "forces whole products into incineration; there is no economic way to separate them."

Adhesives, coatings and additives (11 respondents): Cited for MDF/particleboard furniture, lacquered furniture, and panels with laminates/melamine finishes; the chemicals in resins, varnishes and flame retardants complicate recycling into new boards. However, a supplier to furniture manufacturers explicitly rejected this premise, arguing that paint/coating layers are only a few hundred g/m² and their contamination contribution is "minimal to non-existent."

Collection system issues (9 respondents): Furniture typically collected mixed with general bulky waste, arriving damaged, wet or contaminated; one public authority noted collection via compaction/press vehicles is cheaper but makes disassembly and

material recovery impossible afterward as valuable materials are lost through the collection method chosen for cost reasons.

Regulatory constraints (9 respondents): Hazardous/legacy substances (brominated flame retardants, treated wood, Chrome VI in old leather) restrict recycling options; one EoL service provider argued that placing full traceability/testing responsibility on recyclers makes high-value reuse of otherwise durable leather "almost impossible in practice," and calls for clearer rules, realistic testing protocols and shared responsibility.

A public authority stated that national waste law makes it hard to reclassify collected goods as non-waste, blocking reuse.

Lack of stable end-markets for recycled materials (8 respondents): Recovered wood, foam and mixed textile fractions face limited/volatile demand. Examples were given such as recycled wood fibre (MDF/particleboard) "loses quality and has low market value"; recycled foam struggles because the market is already saturated by rebonded mattress foam and virgin foam remains cheaper/higher-quality; a leather-focused EoL provider noted "there is too much new leather available," undercutting demand for reused/recycled leather.

High costs / time constraints (7 respondents): Collection, transport and manual dismantling costs frequently exceed the value of recovered materials, particularly for low-cost/low-value furniture (particleboard, foam) an economic barrier underlying several of the other categories. A public authority added that the business case for disassembly halls is negative even with subsidies. The cost of separating materials often exceeds the value the separation would generate

Insufficient sorting/dismantling capacity (7 respondents): Manual dismantling is described as labour-intensive and "economically unfeasible," especially for low-value furniture; automated sorting is described as still limited.

Quality requirements for recyclate hard to meet (5 respondents): Manufacturers need homogeneous, low-moisture, contaminant-free secondary materials; furniture waste streams are typically mixed and inconsistent.

Multiple respondents note that separation is often technically possible but not economically viable: dismantling costs and low/no market value for recovered fractions (especially foam, MDF, mixed textiles) undercut recycling even where sorting technology exists. This suggests that design interventions alone will have stronger impact if linked with demand-side measures (recycled-content mandates, Green Public Procurement) and further sorting/dismantling infrastructure investment.

Contamination and separability barriers are strongly furniture-type dependent, not uniform: upholstered furniture, mattresses and outdoor/leather items are consistently flagged as the hardest cases, while indoor rigid storage furniture (wood/metal) is repeatedly described as comparatively unproblematic.

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8.8. BAT and BNAT

In the next section we consider Best Available Technologies and Best Near Available Technologies. Here it is proposed to first consider the Best Available Techniques and Emerging Technologies relating to the production of furniture and management at EoL. In the next section we consider BAT and BNAT from an ESPR point of view more at the product level – which design options can support best available technologies from the point of view of different ESPR aspects such as disassembly or recycled content.

8.8.1. Best Available Technologies

The prior sections make it clear that furniture manufacturing is a set of parallel processes (panel pressing, surface finishing, metal/plastic surface treatment, foam/textile production, assembly). Each of these processes is governed (if criteria exist) by a different EU BAT reference framework (BREF) under the Industrial Emissions Directive (IED, 2010/75/EU). In some cases, voluntary reference documents (EU Ecolabel/GPP criteria) also function as a BAT benchmark where no binding BREF exists. Furniture manufacturing therefore acts as an assembler of components whose most impactful processes are regulated (if at all) upstream by generic BREFs that were not written with furniture specifically in mind. Any requirements must therefore be translated to become relevant for furniture; at the same time furniture manufacturing sites are only IED/BREF-relevant to the extent they cross certain manufacturing capacity thresholds.

Redefining the BAT for production processes of the upstream materials is beyond the scope of this study, however, the BREFs identified for upstream production processes are listed below.

Wood-based panels and solid wood processing

The most relevant document for furniture is the BAT Reference Document for the Production of Wood-based Panels (WBP BREF), adopted under IED Article 13. This covers particleboard, MDF and OSB pressing which is in IED Annex I with capacity thresholds.

BNAT: formaldehyde-free bio-based resins (tannin-glyoxal, lignin-based, glyoxal-urea systems); binderless panels using self-bonding lignocellulosic mechanisms

Upholstery: textile covers, leather and foam/fill

There is no BREF for upholstery textile finishing or PU foam production at furniture-component level; the applicable reference frameworks are the Textiles BREF (for textile finishing processes above IED thresholds of dyeing, coating, backing) and general chemical-sector BAT documents for isocyanate-based foam production, supplemented by EU Ecolabel/GPP furniture criteria, which function in practice as the best-practice benchmark furniture manufacturers may be assessed against when not meeting Textiles BREF capacity thresholds. For leather there is a BREF on Tanning of Hides and Skins.

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Metals

Metal component production (steel, aluminium smelting) is governed by BREFs (Iron and Steel BREF; Non-Ferrous Metals BREF) that sit far upstream of furniture manufacturing and are already covered in the Metals preparatory study. For furniture the questions are limited to recycled-content sourcing and surface treatment/joining.

Coatings and surface treatment (cross-material: wood, metal, plastics)

Coatings and surface treatments are covered by two BREF documents:

- STS BREF ("Surface Treatment using Organic Solvents including Preservation of Wood and Wood Products with Chemicals") governs solvent-based and other organic-solvent surface treatment activities above a 150 kg/h or 200 tonnes/year solvent-consumption threshold, including the coating of wood, furniture, and other metal/plastic goods.
- STM BREF ("Surface Treatment of Metals and Plastics") governs electrolytic and chemical surface treatment (electroplating, anodising, chemical conversion coating) of metals and plastics; the current version dates from 2006 and is under revision, with a first draft (D1) published in 2025 that proposes declaring hexavalent-chromium (Cr(VI))-based plating as a negative BAT, i.e. a technique the revised BAT conclusions would no longer permit, in favour of trivalent-chromium or chromium-free alternatives.

8.8.2. Best Near Available Technologies

The following technologies were identified as emerging technologies with relevance for furniture production and circularity.

Debondable, Bio-Based, and Reversible Adhesives

Around 43% of recovered fibreboard panels carry varnishes, films, or impregnated papers that degrade the quality of recycled fibres. It is noted that while "de-bondable adhesives for finishes may soon reach industrial feasibility, those for binding fibreboard [cores] remain at a low TRL." (Carvalho et al., 2026b)

(Carvalho et al., 2026b) list a range of active Horizon Europe Research Projects are looking into this issue (2025–2029):

- CIRCULAR-C: developing bio-based adhesives, coatings, and fibres for wood panels utilising reversible chemical bonds to dramatically improve recycling loops.
- SUSPENSE & SUSBOARD: Collaborating to synthesise bio-based, 100% formaldehyde-free binders from renewable feedstocks to replace fossil-derived adhesives in wood panels and insulation.
- SWOP (2019–2023) & INGUMA (2024–2027): Focused on creating fully recyclable, non-toxic bio-based resins to replace toxic urea-formaldehyde binders in particleboards and plywood.

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A review of emerging bio-based adhesives has been made by (Gonçalves et al., 2021), who cite issues with technical and economic feasibility beyond the lab scale. These formulations include natural polymer formulations based on Tannin & Lignin-Based Chemistry or Modified Soy Protein Isolate (SPI) (Gonçalves et al., 2021).

Advanced Sorting and Mechanical Separation (TRL 6)

Standard mechanical and manual sorting methods cannot achieve the purity levels required for high-value recycling. Near Infrared and colour/texture cameras can increase sorting efficiencies when linked with AI diagnostics and machine learning.

The Wood2Wood project is developing human-robot collaboration and mixed-reality technology for improved accuracy of sorting and pollutant removal of contaminated wood waste, as well as chemical and bioremediation upcycling processes.

This is being looked at by the EU projects EcoReFibre, Wood2Wood, and WoodTreat.

mTMP and Dry Impact Reactors for MDF-to-MDF Recycling (TRL 5-6)

Medium-density fibreboard (MDF) and high-density fibreboard (HDF) are extensively used in flat-pack furniture, but have been difficult to recycle commercially in the past from post-consumer fibreboards back into new fibreboard. Under the EcoReFibre consortium, plants are piloting moisture-modifying Thermo-Mechanical Pulping (mTMP), steam-based extraction, and dry impact reactors to defibrate post-consumer boards (Carvalho et al., 2026b). The consortium aims to yield high-quality secondary wood fibres, allowing manufacturers to safely substitute up to 25% of the virgin wood fibre used in new MDF and HDF panels.

Steam Explosion for Adhesive Elimination

Standard recycling shreds wood but leaves petrochemical binders intact, which structurally weakens the secondary board and prevents high-value reuse. Developed by the LERMAB laboratory, this biochemical process subjects furniture waste wood to high-pressure hydrolytic steam explosion. The process aims to cleanly dissolve and extract urea-formaldehyde (UF) glues, retrieving uncontaminated wood fibres to manufacture 100% recycled panels (Papatheologou et al., 2024).

Chemical and Composite Recovery

Current depolymerisation technologies for PU foam available at industrial scale (single phase recycling), can be further improved to obtain repolyols of higher purity. Via the improvement of the technology itself or via better sorting of input foams, which could be facilitated as well via the Digital Product Passport.

Split phase recycling of foams, which is a chemical depolymerisation method for flexible PU foams, breaks down and recovers from shredded foam two chemical constituents: recycled polyether polyols and aromatic building blocks.

The Hydrothermal Carbonation (HTC) process has been developed by Neveon at lab scale to recycle unsorted PU materials containing admixtures and adhesions of polyolefins and biomass. This approach can handle damp, wet, and heavily soiled materials. The resulting intermediate product is dry, compact, freeflowing, and transportable, making it an ideal input for the following pyrolysis process. (Stakeholder Feedback)

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Another stakeholder suggested innovations that achieve the same functionality with less material input, including advanced filling materials, low-density materials, renewable foam solutions and other renewable alternatives to conventional fossil-based materials.

For plastics, advanced recycling technologies, including dissolution and depolymerisation processes, which could increase access to high-quality recycled feedstocks. Other promising developments include bio-based plastics, the use of post-consumer and non-packaging plastic waste streams, and natural fibre composites that may reduce emissions and material use while maintaining performance.

The following EU projects are looking at this BNAT:

- ECOBULK: developing cross-sectoral recycling technologies for composite materials. It develops mechanical and chemical methods to recover, upgrade, and reuse complex composite plastics and polymers shared across the furniture, automotive, and construction industries that currently end up in landfills.
- URBANREC: Advanced chemical glycolysis, PUR (polyurethane) foam rebonding, and catalytic hydro-gasification with plasma. These techniques break down bulky, traditionally unrecyclable composite furniture (like sofas and mattresses) into raw base chemicals, renewable adhesives, and fuel.
- FRANCESCA: Closed-loop remanufacturing pipelines designed to tackle the complexity of mixed-material furniture. It is creating technical demonstrators to track and recover complex materials that are currently discarded due to quality inconsistencies in traditional recycling streams.

Digital Tracking and Eco-Design Infrastructure

Fragmented waste collection and a lack of traceability regarding chemical additives make it risky and expensive for recyclers to accept post-consumer wood feedstock. This is being looked at in the accompanying DPP report, however, the Wood2Wood project has also developed specific waste wood DPP tools to improve supply chain and treatment via a DPP.

The following EU projects look at this BNAT:

- Cir4Fun: Advanced Eco-Design digital tools combined with novel eco-labelling strategies. The project is testing new tracking systems that standardize how consumers and recyclers access data about a piece of furniture's dismantling process and component recyclability.
- R-EVOLVE: testing the operational integration of the Digital Product Passport (DPP) intertwined with "Furniture as a Service" circular business models.

3D Printing & Additive Manufacturing

- Waste Prevention and Customised Production
- Circular Filament Materials
- On-Demand Spare Parts: Because bio-based filaments can be printed with extreme geometric precision, they provide an ideal route for on-demand spare parts to repair furniture, preventing premature disposal and eliminating the waste associated with traditional subtractive machining.

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8.9. ESPR Criteria: Level of Relevance Assessment

Within the new context of ESPR, Task 4 aims to provide the technical foundation that links the physical/technical characteristics of the product group to the product aspects listed in Article 5(1) ESPR (durability, reliability, reusability, upgradability, reparability, possibility of maintenance and refurbishment; presence of substances of concern; energy and resource use/efficiency; recycled content; possibility of remanufacturing and recycling; environmental footprint; expected waste generation; etc.).

Furniture is a final product, that can be a single material (e.g. solid wood chair) or made up of different components that may be replaced or disassembled (e.g. sofa). This means it can be classified as a non-complex and complex product. It is intended to be used for years or decades, making it a durable product. Furniture is neither dissipative, nor single-use disposable (like packaging). It is therefore relevant for recyclability, recycled content and remanufacturing at end of life, while any persistent materials (substances of concern) can also impact the ability to recover or recycle or re-use the output materials from these processes.

In task 1 the following clusters were prioritised for further analysis in Task 4:

Durability & Reliability: For furniture, this means e.g. technical product lifetime, structural integrity, fabric abrasion resistance, and joint stability over time.

Repairability and possibility of maintenance: This covers how easily a user can e.g. clean a textile, replace a broken caster on an office chair, or swap a gas cylinder.

Recyclability, Recovery of materials and recycled content: Recyclability applies to the aluminum/steel frames and clean plastics. Material recovery is highly relevant for engineered woods (like MDF or particleboard), which often cannot be purely recycled but are cascaded or sent for energy recovery. Recycled content varies strongly by material type e.g., recycled wood fibre, plastics or recycled steel for frames.

Design for Disassembly/modularity: relevant for modular furniture. For example, designing a modular sofa where a user can purchase an additional chaise section to upgrade its size. This can lead to extended lifetime.

Resource Efficiency: relevant for choice of material lightweighting and reducing material inputs.

Expected Generation of waste: this can be a result of other aspects, as well as re-usability and refurbishment loops.

Table 8-23: Overview of ESPR aspects and initial relevance assessment.

Circularity Aspect Group	Environmental Benefit Potential	Technical Feasibility	Market Dynamics
Durability & Reliability	High impact reduction	Established testing exists	Prevents premature replacement

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Circularity Aspect Group	Environmental Benefit Potential	Technical Feasibility	Market Dynamics
Repairability & Maintenance	Directly extends product lifespan	Requires modular design shifts	Repairs that cannot be done by end-users may be limited by labor costs
Recyclability & Recovery	Diverts volume from landfill	Dependent on disassembly	Established secondary market for metals, may compete with energy recovery
Recycled Content	Reduces virgin resource extraction	Secondary supply chains exist	Price volatility and number of recycling cycles is a barrier, competition with energy recovery in some markets
Reusability & Remanufacturing	Keeps virgin materials in use	High for B2B commercial furniture	Low demand in B2C consumer market
Design for disassembly/modularity	Enabler for other ESPR aspects, longer lifetimes	DfD Established and practiced in some market segments	Design for assembly is already widely practiced in consumer segments, standards exist for disassembly. Depends on choice of joining/fasteners.
Resource efficiency	Can reduce material footprint and embodied energy, may pose trade-offs with e.g. recycling value, durability	Lightweighting being implemented	Applied by large scale manufacturers already

8.10. ESPR Aspects

Nb: this analysis is a first consideration on how to look at these aspects - a more detailed consideration by base case may be necessary, once these are defined. Design options which support ESPR Aspects will be analysed in Task 6 (next project phase).

8.10.1. Lifetime Extension: durability, reliability, and reusability

Technical ecosystem

Furniture durability outcomes are set predominantly at the level of joint and panel design and material choice. Most case furniture (wardrobes, cabinets, shelving units)

follows a panel-based construction using particleboard or MDF cores, often melamine-faced or veneered and joined with a mix of cam-lock/dowel systems, screws, staples, or structural adhesives, frequently in hybrid combinations.

Energy impacts tend to be greater for metals and plastics than wood, but the durability of materials made from wood can be lower especially in the absence of appropriate treatment (Cordella & Hidalgo, 2016). Solid wood and mechanically-fastened metal frames are the most inherently durable structural choices, while engineered wood panels trade some structural durability for stability and lower cost.

Coatings/surface treatments protect the substrate from wear and moisture but themselves degrade over time and are not always repairable in place (e.g. a scratched lacquer finish can be refinished, a chipped melamine facing generally cannot).

Upholstered seating furniture (chairs, sofas) consists of both frame material (solid hardwood vs. engineered wood vs. metal), and upholstery (including e.g. suspension system (springs vs. webbing vs. foam-only), and joint type (e.g. mortise-and-tenon, dowelled, corner-blocked, or stapled)). Upholstery and cushioning typically degrade well before the frame, meaning a single "durability" rating for an upholstered item would need to average the frame and the upholstered parts on different timescales.

In low-cost, ready-to-assemble (RTA) contexts (“Fast Furniture”), material and finish choices reduce achievable service life:

- Material choice: solid wood and metals are progressively replaced with cheaper composite materials such as plastic, chipboard, particleboard, or MDF (Cooper, Kaner, et al., 2021).
- Aesthetic degradation of components: metal structural elements are often replaced by cheap composite alloys with wafer-thin decorative finishes (e.g. brass-effect plating rather than solid brass) (Cooper, Kaner, et al., 2021). These finishes wear away rapidly, making the furniture look prematurely aged and triggering disposal.

The related effects of repeated disassembly, joint rigidity/modularity, and panel thinning on structural durability are discussed together with their design remedies in the section on disassembly (8.10.3), since they arise from the same joint and fastener choices.

A market-wide material substitution trend away from solid wood and metal toward cheaper engineered materials such as plywood and particleboard (Saes et al., 2024), can be linked directly to reduced achievable lifespan. However, this cannot be considered in isolation, since material lightweighting using these materials also enables multiple lifecycles of the wood material through cascading use.

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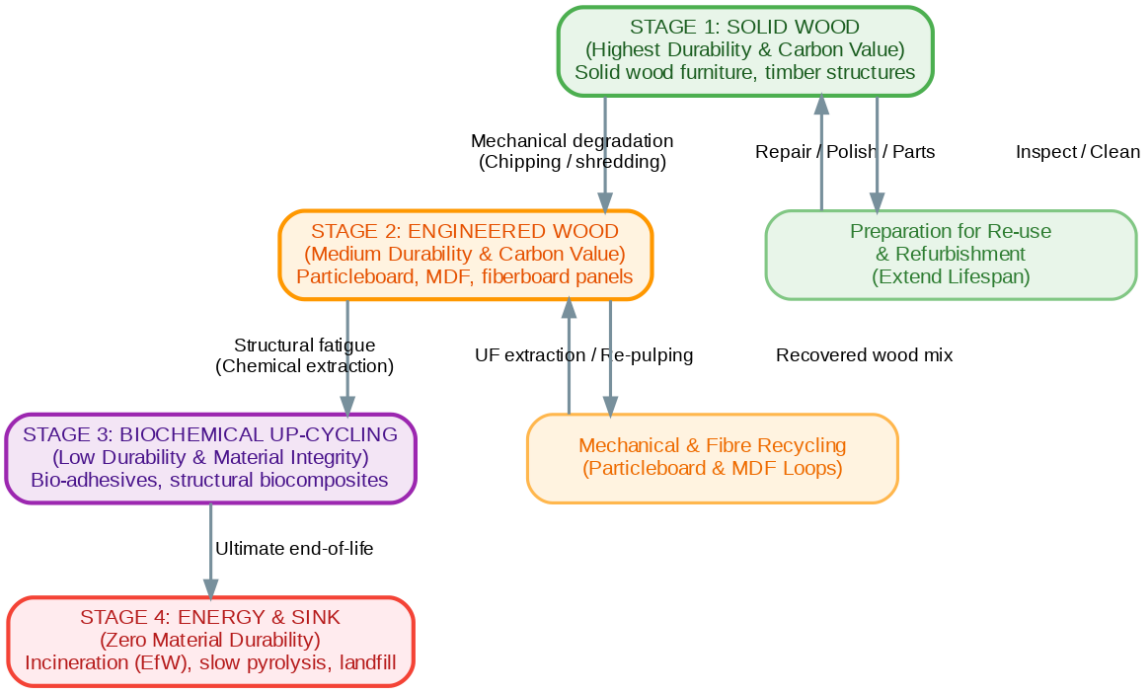

Figure 8-14: Simplified Wood Cascading Framework.

Source: own elaboration

Ultimately, the durability of a product needs to match its intended service life for the consumer, which can also mean surviving multiple lifetimes, allowing repair or exchange of broken parts and also being aesthetically pleasing enough at the end of its first service life to warrant re-sale and re-use. Overdesigning durability could conceivably also lead to negative impacts, if the product is prematurely discarded and becomes a non-separable composite waste that must be sent to incineration or landfill. While over-standardising for recyclability risks eroding the "emotional value" and aesthetic/design freedom that makes people keep furniture longer, i.e., over-optimising for circularity could paradoxically shorten effective product life by reducing attachment to the product.

Failure Modes and Standard Testing

Structural failure in seating is concentrated at joints through loosening, cracking or joint fatigue under repeated loading and at high-stress connection points such as arm rests, front seat edge or the backrest. This is where, for example, furniture durability testing standard EN 1728 specifies test methods for the strength and durability of the structure of all types of seating, independent of use, materials, or manufacturing process. EN 12520 sets the minimum mandatory safety, strength and durability requirements for domestic seating for adults up to 110 kg, referencing EN 1728 test methods together with EN 1022 and EN 13759. For tables and storage, EN 1730 (tables) and EN 16122 (storage furniture, including slam and extension-element cycling) play the equivalent role. Cyclic durability testing for storage furniture is designed to detect loosening, cracking, and joint fatigue through repeated cycles simulating long-term use of thousands of drawer open/close cycles or sustained surface loads.

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On joinery specifically, laboratory reliability testing found hazard rates for dowel joints roughly 8× higher than confirmat screw joints, and eccentric-connector joints up to 57× higher, indicating fastener choice can impact on joint reliability over a range of nearly two orders of magnitude (Kłos, R. et al., 2018).

Section 5.4.1 lists a range of representative standards used to test durability and safety performance of furniture and joints – however, it also identifies that upholstery currently has no durability standard.

Performance Levels

As a (non-exhaustive) preliminary example of upholstered seating:

Bad Case: Non-reversible glued joints exclusively, sub-minimum panel thickness, no compliance testing beyond basic CE self-declaration. Consumer lifespan as low as 3–7 years may be expected for low-cost upholstered seating.

Base Case: EN 12520 domestic seating compliance represents the current EU baseline. Non-domestic (contract) seating under EN 16139 defines two severity tiers: general use and extreme use for non-domestic seating rated for adults up to 110 kg. Sofa/seating lifespans cluster around 7–15 years.

BAT: LEVEL/FEMB certification treats compliance with the relevant EN durability standards (the EN 1728/12520/16139 family) as a mandatory prerequisite rather than an optional award criterion, and awards additional points for spare-parts and functionally compatible replacement part commitments extending to 7 or 10 years.

BNAT: Structural joinery and panel specifications that anticipate the disassembly/repair requirements set out in §8.10.3 (e.g. panel thickness and joint types selected to withstand the repeated disassembly cycles required for non-destructive repair), rather than durability and repairability being optimised independently.

8.10.2. Maintenance and repairability

Unlike durability, which is a function of design and materials choices made at manufacture, maintenance and repair outcomes are dependent on what information and what physical/logistical means reach the user after purchase. Here four information-delivery channels are relevant:

(i) point-of-sale/in-box user manuals covering assembly, use limits, and care;

(ii) care labelling on upholstery covering materials (cleaning codes, washing/dry-cleaning instructions); and

(iii) post-sale channels — warranty terms, spare parts access, and (increasingly) digital product passport data fields.

(iv) p ost-sale physical/logistical channels – field-replaceable wear parts, spare-parts supply, and take-back or refurbishment/remanufacturing infrastructure run by manufacturers or independent operators

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The GPP Technical Background Report for furniture found that the use phase itself is negligible in terms of direct environmental impact (no significant energy/water consumption in normal furniture use), but that durability and reparability factors occurring across the use phase are what determine whether the embodied impact of manufacture is amortised over a long or short service life. Maintenance and repair information is therefore understood as a way to improve lifetime, although as stated in Task 3 there is little quantative data on by how much.

In practice, the quality and completeness of care instructions varies strongly by sales channel and price tier. Manufacturer-supplied care guides for upholstered and outdoor furniture typically cover cleaning frequency and method, environmental placement advice (avoiding direct sun/heat sources, moisture), and load/use restrictions. At the regulatory level, the EU Ecolabel framework is the only EU-level voluntary instrument that currently mandates structured consumer information as a condition of a quality mark eligibility.

A set of physical design features supports both maintenance and repair jointly, since they reduce the effort of both cleaning and part replacement:

- Removable, machine-washable upholstery covers, allowing cleaning or full replacement without reupholstery.
- Easy-clean, durable surfaces and accessible fittings.
- Durable/corrosion-resistant surface materials for outdoor or high-exposure use.
- Replaceable wear parts (gas lifts, castors, armrests, upholstery, hinges are typically named) and accessible spare-parts/repair information, ideally via a Digital Product Passport.

On the repair and refurbishment side specifically, component-level reversibility and standardisation of fixing types and dimensions across a manufacturer's range determines whether spare parts and repair skills are transferable between product generations. Refurbishment is more dependent on local infrastructure: take-back logistics and formal refurbishment or remanufacturing operations run either by original manufacturers or by independent refurbishers.

Failure modes and standards testing

There is no dedicated EN test standard for "maintenance" or for "repairability" as an outcome, since both are procedural/informational/logistical rather than physical properties that can be cycle-tested directly (the physical disassembly capability that underpins repair is classified via EN 17902). Inadequate or absent care information may lead to preventable premature failure (e.g. moisture ingress into unsealed panel edges, UV-driven fading and embrittlement of coatings/upholstery, mechanism damage from incorrect use, loss of warranty coverage due to non-compliant maintenance). EU Ecolabel furniture criteria under Criterion 10 (Consumer Information) require that a single consumer information document be provided with the product, in the language of the country where it is placed on the market, with instructions on how to properly clean the product (Decision (EU) 2016/1332).

For office and non-domestic furniture, LEVEL/FEMB certification awards points for take-back programmes (up to 2 points), for product-as-a-service/leasing offerings (1

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point), and for extending original-replacement-part supply commitments to 7 or 10 years (up to 3 points) [FEMB Sustainability Requirements 2023, §5.13.7–5.13.9]. The corresponding disassembly- design prerequisites of the same certification are discussed in §8.10.3.

The UK Furniture Industry Research Association (FIRA) published a remanufacturing standard for office and contract furniture, covering seating, tables/desking, and storage units (FIRA/REMAN001:2019). It specifies the remanufacturing process– product custody, inspection, disassembly and reassembly, and testing – together with requirements for replacement parts, warranty terms and a warranty register, and mandatory/optional environmental product information and labelling [FIRA, FIRA/REMAN001:2019].

Adhesive/sealant industry associations note permanent bonding is sometimes structurally necessary; craft/SME associations note bespoke/built-in installations are not always compatible with full disassembly, which limits the repair and remanufacturing pathway for those product types regardless of information provision.

Performance Levels

Bad case: No user manual or care information beyond basic assembly instructions; no spare parts availability stated. no field-replaceable components; no take-back or refurbishment pathway offered. Common in low-cost, non-branded flat-pack and online marketplace furniture.

Base Case (BC): Manufacturer-supplied basic assembly instructions; care instructions present but inconsistent in coverage, format, and language completeness across the EU single market. Some components (legs, handles, drawer runners) field-replaceable, others (bonded panel joints, integrated foam/frame upholstery units) not. Spare parts availability inconsistent and undocumented outside EU GPP/EU Ecolabel-covered products. Informal secondhand/repair channels exist but are not standardised.

BAT: EU Ecolabel-licensed furniture: single consumer information document in the market-country language (Criterion 10), five-year minimum guarantee at no additional cost, and five-year minimum spare parts availability at cost proportional to product price (Final Product Requirements). A user manual with well-illustrated assembly/disassembly instructions usable with basic tools and unskilled labour, and a documented spare-parts list with defined availability period. Removable, machine-washable upholstery covers, easy-clean, durable surfaces.

BNAT: Digital Product Passport-linked maintenance and repair information: machine-readable, product-specific care/repair/spare-parts data accessible via QR code or equivalent, dynamically updatable post-sale (e.g. recall notices, revised care guidance, verified spare-parts sourcing), and interoperable across retailers and repairers rather than a single static paper or PDF document – combined with formalised take-back and refurbishment pathways offered as standard.

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8.10.3. Design for Disassembly and Modularity

In low-cost, ready-to-assemble (RTA) contexts ("Fast Furniture"), the technical priorities of durability, repairability, and material efficiency can undermine one another. The following consequences are specific to structural durability; the same underlying joint/fastener choices also determine repairability and end-of-life material separation:

- **Material choice:** solid wood and metals are progressively replaced with cheaper composite materials such as plastic, chipboard, particleboard, or MDF
- **Repeated Disassembly**: While RTA furniture is designed for initial home assembly, composite panels do not handle stress well. When cheap wood fibres or recycled wood composite panels are used, they are significantly less resistant to repeated disassembly and fastener reuse. Tapping screws back into the same particleboard holes during a move or repair strips the material, quickly destroying the joint's structural integrity (Montanini, Emma, 2025).
- **Aesthetic Degradation of Components**: To save costs, metal structural elements are often replaced by cheap composite alloys with wafer-thin decorative finishes (such as brass-effect plating on handles rather than solid brass) (Cooper, Kaner, et al., 2021). These finishes wear away rapidly, making the furniture look prematurely aged and triggering disposal.
- **Joint Rigidity**: To make a piece of furniture easy to pack flat and assemble, a high number of modular joints and reversible fasteners may be used (like cam locks or wooden dowels). However, excessive modularity reduces the overall structural stiffness of the piece. Multiple joint connections introduce mechanical play and act as points of weakness under load compared to a solid, permanently glued frame (Montanini, Emma, 2025).
- **Thinning of Panels**: To reduce shipping weight and material costs, thinner profiles of composite panels may be used. However, thinner panels compromise joint durability and limit the number of physical reassembly cycles a joint can survive (Montanini, Emma, 2025).

Technical Ecosystem

Furniture joinery spans a spectrum from fully reversible mechanical fasteners (cam-locks, bolts, expandable connectors, wooden dowels used dry) to semi-reversible fasteners (screws, confirmat/eccentric connectors) to non-reversible joining (staples, structural adhesives, welding). Design for Disassembly is well supported when a product has "low disassembly depth" (few steps, basic or no tools) and is accompanied by clear disassembly instructions, in the future possibly by DPP.

In low-cost, ready-to-assemble (RTA) contexts, the goals of flat-pack assembly, structural rigidity, and repeated disassembly durability can trade off against one another:

- Repeated disassembly: composite panels do not handle stress well. Cheap wood-fibre or recycled wood composite panels are significantly less resistant to repeated disassembly and fastener reuse – tapping screws back into the same particleboard holes during a move or repair strips the material, quickly destroying the joint's structural integrity (Montanini, Emma, 2025).

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- Joint rigidity vs. modularity: to make a piece easy to pack flat and assemble, a high number of modular joints and reversible fasteners (cam locks, wooden dowels) may be used. Excessive modularity reduces overall structural stiffness – multiple joint connections introduce mechanical play and act as points of weakness under load compared with a solid, permanently glued frame (Montanini, Emma, 2025).
- Panel thinning: thinner composite panel profiles, used to reduce shipping weight and material cost, compromise joint durability and limit the number of physical reassembly cycles a joint can survive (Montanini, Emma, 2025).

Mechanical quick-release joints “add unit cost versus staples and glue” and require tighter manufacturing tolerances but according to one stakeholder are considered manageable if designed in from day one; they are expensive only as a retrofit to an existing glued construction. Manufacturers can therefore aim to implement standardisation: using a consistent family of fixing types and component dimensions across a product range, so that disassembly, spare parts, and repair skills remain transferable between product generations.

Primary Failure Modes & Standard Testing

A dedicated CEN standard for furniture disassembly/reassembly capability exists: EN 17902:2023, "Furniture - Circularity - Evaluation method for dis/re-assembly capability", was published by CEN/TC 207. It establishes a set of criteria for assessing the ability to access, remove, replace and reassemble "priority parts" of a furniture product, intended to be applied at the design stage and stated to be applicable across different designs, materials and construction methods [EN 17902:2023]. The standard is a criteria/evaluation method, and does not set pass/fail thresholds or a numeric scoring scale and it excludes disassembly carried out solely to separate materials for end-of-life material-recovery.

For office and non-domestic furniture, LEVEL/FEMB certification makes "design for remanufacturing" and "design for recycling" mandatory prerequisites: certified products must have publicly available disassembly instructions, must be disassemblable with standard tools and no special training (electrical mechanisms and gas lifts excepted), and must allow component replacement without loss of product quality [FEMB Sustainability Requirements 2023, §5.13.2–5.13.3]. This means that, for the >1,000 products already certified under LEVEL, disassembly-for-remanufacturing is already included. FEMB also awards points for take-back programmes (up to 2 points), for product-as-a-service/leasing offerings (1 point), and for extending original-replacement-part supply commitments to 7 or 10 years (up to 3 points) [FEMB Sustainability Requirements 2023, §5.13.7–5.13.9].

The reliability of fastener types reported by Kłos, R. et al. (2018) is relevant, as fastener families with lower cyclic hazard rates are better suited to designs intended for repeated disassembly.

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Performance Requirements

Bad case: Bonded, non-modular construction with no reversible fasteners; disassembly, where physically possible at all, is destructive and requires specialist tools. No disassembly instructions provided.

Base Case (BC): Mixed reversible/irreversible joinery typical of mainstream retail furniture: some elements (legs, feet, hardware) use reversible fasteners, others (bonded panel joints, integrated foam/frame upholstery units) do not. Disassembly depth and tooling requirements undocumented.

BAT: Furniture designed for disassembly/reassembly using common basic tools and unskilled labour, with technical drawings demonstrating the disassembly sequence and standardised fixing types across the product range, meeting the LEVEL/FEMB design-for-remanufacturing/design-for-recycling prerequisites.

BNAT: Furniture assessed against EN 17902 criteria populated with quantified, product-specific thresholds (not yet defined in the standard itself), combined with a fully furniture-adapted EN 45552/45553/45559 methodology and a consumer-facing repairability/durability index analogous to France's indice de réparabilité. Structural joinery specified jointly with durability targets rather than reversibility being pursued as an independent goal.

8.10.4. Material recovery, recyclability and recycled content

On Recyclability, stakeholders stated the following:

- Mono-material design / easy separation into clean material streams; avoid permanent bonding and mixed materials as well as recycling disruptors (e.g., WEEE-type mixed foams/textiles).
- Metals should be visible/identifiable and easy to separate
- Foam-specific innovation: meltable PU foam (e.g., "V-foam") to improve recyclability of cushioning.

Table 8-24: Overview of design interventions for improving recyclability.

Design Intervention	Engineering Principle	Impact on Recyclability
Reversible Joining Systems	Use of mechanical fasteners (screws, interlocks) instead of chemical adhesives or welding.	Enables clean separation of disparate materials, preventing the contamination of recycling streams and allowing for high-purity recovery.
Mono-materiality	Engineering product from a single polymer or material type.	Simplifies the waste stream, removing the need for complex sorting and ensuring high-quality secondary raw materials.

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Design Intervention	Engineering Principle	Impact on Recyclability
Non-destructive Dismantling	Designing for the rapid separation of upholstery, foam, and frames without damaging the primary components.	Increases the economic viability of recovery by reducing labor time and preserving the value of individual components for reuse.
Material Identification	Implementation of labels declaration of SoC to ensure substance disclosure and transparency.	Provides data for accurate sorting; ensures that hazardous substances do not enter recycling.

Multiple respondents stated that recyclability is only meaningful at end of life and is secondary to durability/lifetime extension; several stress recycling delivers little benefit unless material volumes/quality are high, and system-level/LCA assessment is needed rather than a single design rule. Two respondents argue full material separability mandates are premature because no industrial-scale recycling process yet exists for some material streams.

No recyclability standard for furniture exists, but it may draw on the general EN 45555:2019 (general methods for assessing recyclability and recoverability) standard (even if originally developed for Energy Related Products).

Recycled Content

Stakeholders were asked (i) the maximum share of recycled content achievable in their products without compromising performance, (ii) which recycled materials need greater market availability, and (iii) what factors currently limit the use of recycled content in furniture components.

Wood and wood-based panels: reported maximum recycled content shares range from 20% to effectively 100% in particleboard and HDF, with particularly high rates in Italy. The constraints are regional variation in waste-wood sorting quality, contamination affecting tooling, and competition from subsidised bioenergy use, which several respondents argue should be restricted to wood unsuitable for material recycling. Additional complexity arises from differing regulations such as Waste Wood Regulation classifications between Germany and Austria. Differences are driven by availability of wood in each country depending on an abundance in access to virgin fibres and countries where there is a real business case for recycled content (IT, BE, etc)

Metals (steel, aluminium): already well established, with reported recycled content shares up to 80–100% and steel's recycled content directly tied to production route (10 -30% via Basic Oxygen Furnace versus 80–100% via Electric Arc Furnace). The main limiting factor is that demand for scrap already exceeds supply, and this problem is expected to increase as recycled metal demand grows, pushing up cost rather than limiting technical feasibility.

Plastics: here responses show a wide range, heavily dependent on recycling route and accounting method. One respondent reports up to 100% via chemical recycling under

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mass-balance attribution, but only around 30% via mechanical recycling; others report a practical range of 20–60%. Structural constraints include reliance on packaging-derived feedstock (which upcoming packaging legislation is expected to reduce further), inconsistent recyclate quality ("downgraded" recyclate lacking colour and mechanical consistency), and fragmented, non-comparable certification schemes.

PU foam: has the most technical limitations. A producer-responsibility body reports around 7% recycled content via chemical recycling (closed loop) versus roughly 50% via mechanical/rebonded routes but rebonded foam cannot match virgin foam's comfort and density properties. One manufacturer stated that recycled content can reach up to 100% in base and support layers but close to 0% in comfort layers, because rebonded foam cannot reproduce the required softness and density spectrum.

Textiles: depend strongly on fibre type. Recycled PET from bottles into polyester fabric is the most mature route however, it is now under pressure as packaging regulation aims to increasingly keeps PET within closed packaging loops. Textile-to-textile recycling remains minimal: thermomechanical recycling requires near-pure (99%) polyester feedstock, while chemical recycling requires over 80% fibre purity and remains far costlier than thermomechanical processing. Wool has no chemical recycling route at all, and mechanical recycling shortens fibres, reducing durability. A fashion and textile industry association warns against any single recycled-content threshold applied across all textile components.

Glass: noted as the least developed recycling category, with recycling systems built around bottle glass, not the high-purity, high-transparency glass required in furniture. Recycled content in furniture glass today is drawn mainly from pre-consumer (post-industrial) waste.

Leather: a circular-leather start-up reports up to 100% recycled content can be achieved via open-loop reuse of post-consumer leather and offcuts, but describes the constraint as insufficient consumer demand, not supply or technology.

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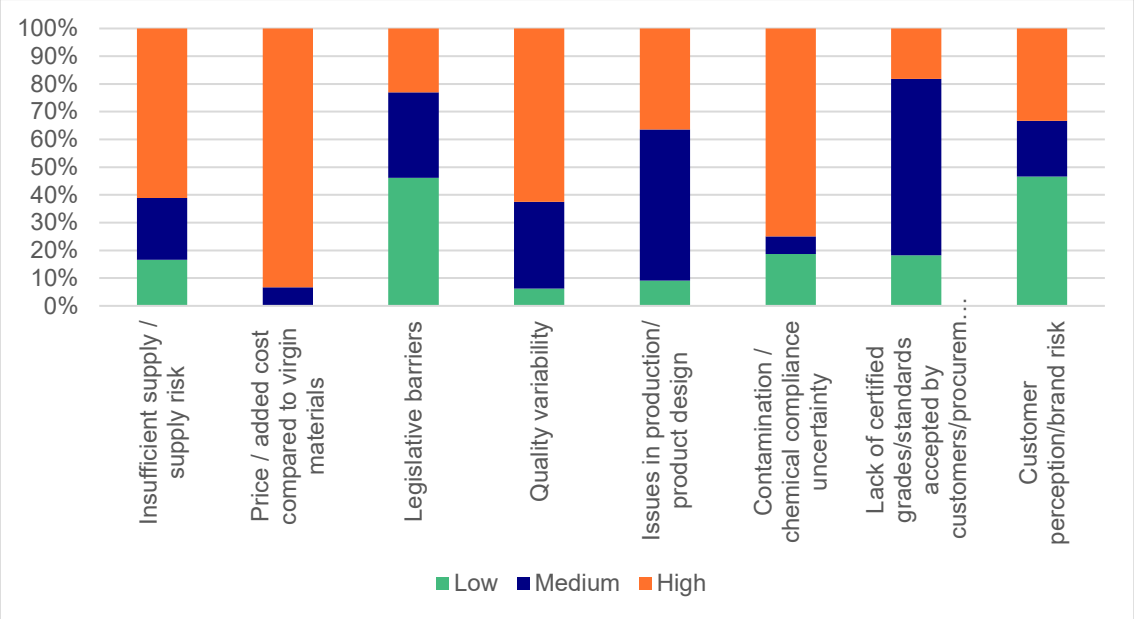

Figure 8-15: Responses to the question: What are the main issues that limit your ability to increase the amount of recycled content in furniture components?

The two most frequently cited "high" barriers are insufficient supply / supply risk and price premium versus virgin material. Supply constraints stem from weak collection and sorting infrastructure, competing end-uses (wood for energy), and shrinking non-packaging plastic feedstock as related legislation comes into force. Price constraints are structural: recycled processing, certification and handling costs frequently exceed the price of virgin material, and customers are broadly unwilling to pay a premium - one government agency describes this as "a vicious circle."

Quality variability and contamination / chemical-compliance uncertainty follow closely, most strongly in foam, textiles and plastics, where legacy chemical content in post-consumer material is difficult to verify against REACH requirements. Lack of certified grades and standards is rated medium-to-high, particularly for plastics and recovered leather/upholstery materials, where no broadly accepted grading system currently exists. Customer perception and brand risk is consistently the lowest-rated barrier, generally seen as manageable through communication and labelling, though foam (hygiene perception) and leather (perceived downgrade) are exceptions.

Existing Standards

ISO 22095 provides the overarching international standard defining chain-of-custody models: identity preservation, segregation, controlled blending, mass balance, and book and claim. It standardises terminology so that a "recycled content" claim means the same thing regardless of which model a company uses. New companion standards ISO 22095-2 (mass balance) and ISO 22095-3 (book and claim) were published to give harmonised, auditable requirements for two different accounting approaches. ISO 22095-2 for plastics/chemicals mass-balance model which chemicals suppliers rely on, and ISO 22095-3 for "book and claim" allocation which enables credits to be allocated across other products. A responding environmental NGO to the stakeholder survey raised objections to using this book and claim approach as a legitimate basis for recycled-content claims.

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Wood

A voluntary, industry-run standard is the European Panel Federation (EPF) Standard for delivery conditions of recycled wood (also called the EPF Industry Standard for recycled wood use), which sets contaminant limit values for wood entering panel production (e.g., arsenic 0.025 g/kg, cadmium 0.050 g/kg, lead 0.09 g/kg, chromium 0.025 g/kg, as well as limits on fluorine, chlorine, pentachlorophenol (PCP) and creosote (benzo(a)pyrene), measured per kg of dry panel [EPF Standard, europanels.org]. It also caps contaminating non-wood materials (soil, concrete, plastics, metal, textiles) at 2% of dry weight and moisture at 20%.

In addition, several forest-sourcing/chain-of-custody schemes for virgin and reclaimed timber exist (FSC Recycled, FSC Controlled Wood, "post-consumer reclaimed" categories).

Germany's Altholzverordnung (AltholzV, 2002) classifies waste wood into four categories (AI–AIV) by contamination level and restricts which categories may be used for material recycling versus energy recovery only; it also bans landfilling of waste wood (§9). Austria's RecyclingholzV (2012) separately sets End-of-Waste criteria for recycled wood based on pollutant content. The UK's BSI PAS 111:2012 ("Specification for the requirements and test methods for processing waste wood") applies broadly the same limit values as the EPF Standard. There is no common EU-wide legislation governing waste wood classification - recyclers in Central and Eastern Europe generally follow the German Altholzverordnung criteria informally, in the absence of their own national standard (Lesar et al., 2018). In general, the EPF industry standard sets more permissive pollutant limits than the German Altholzverordnung, meaning material compliant with Altholzverordnung is automatically compliant with EPF, but not vice versa.

Plastics:

EN 15343:2007 is the current European standard for traceability of physical recycled content in plastics. It links formally to EN ISO 14021:2016 (self-declared environmental claims) and to related plastics-recycling standards EN 15344 (recycled PE), EN 15345 (recycled PP), EN 15346 (recycled PVC), EN 15347 (characterisation of plastics waste), and EN 15348 (recycled PET). However, stakeholders state that certification schemes based on it remain fragmented and not fully comparable across the market; discussions are underway in CEN either to revise EN 15343 or to create a new Chain-of-Custody standard series for recycled plastics.

PU Foam

CertiPUR is the relevant independent certification scheme for flexible PU foam, verifying the foam is manufactured without a defined list of restricted substances (certain flame retardants, heavy metals, formaldehyde, phthalates, ozone depleters). It is a chemical-safety scheme rather than a recycled-content scheme, but is directly relevant to the risk of banned substances recirculating in higher post-consumer recycled content.

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Textiles

For textiles, the Global Recycled Standard (GRS) and Recycled Claim Standard (RCS), which are both owned by Textile Exchange exist. RCS verifies recycled input and chain of custody only (no environmental/social criteria); GRS additionally requires environmental management criteria and restricts hazardous chemicals in production.

LEVEL/FEMB certification for office/contract furniture has recycled content thresholds of 30% (1 point) and 50% (2 points) by weight of total product materials [FEMB Sustainability Requirements 2023, §5.12.1–5.12.2], packaging recycled-content thresholds of 60%/90% for paper or cardboard and 40%/60% for plastics [FEMB Sustainability Requirements 2023, §5.9.2–5.9.3], and non-hazardous waste-reduction thresholds (under 5% disposed and under 20% to other recovery for entry-level points; 10% total reduction for higher points) [FEMB Sustainability Requirements 2023, §5.15.1–5.15.2].

Performance Levels

Bad case: Multi-material bonded assembly (mixed panel substrates, glued veneers/laminates, mixed-polymer components) with no recycled content and no design consideration for end-of-life separation. On disposal, the product is landfilled or incinerated with energy recovery at best.

Base Case (BC): Predominantly wood/wood-based panel construction with some mono-material components (metal legs/frames, which recycle at high rates) but limited design for disassembly at material level. Recycled wood content variable and largely undocumented outside GPP/EU Ecolabel-covered products. Overall EU furniture recycling rate around 10%, with reuse activity described as low and largely informal.

BAT: sustainably certified and/or recycled wood content in wood/wood-based components, recycled plastic content up to 100% where achievable, and EU Ecolabel-equivalent restrictions on non-recyclable material combinations (e.g. PVC exclusion under several national and the EU Ecolabel schemes). Monomaterial or near-monomaterial construction of a kind already demonstrated commercially, e.g. steel table legs kept single-alloy specifically to remain fully recyclable; design for disassembly at EoL.

BNAT: Furniture designed and assessed against a fully furniture-adapted EN 45555/45556/45557 methodology (recyclability/recoverability, proportion of re-used components, proportion of recycled content), combined with EN 17902-informed disassembly-for-recycling design, achieving near-total material recovery through mono-material or cleanly-separable multi-material construction, with recycled content verified and quantified in Digital Product Passport data rather than self-declared.

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8.10.5. Resource Efficiency

Technical ecosystem

Resource efficiency in furniture is driven primarily by two related design levers: substituting material-intensive inputs (solid wood, virgin metal) with lighter or less resource-intensive alternatives, and reducing the absolute mass of material used per functional unit (lightweighting) through thinner panels, hollow-core or honeycomb-core constructions, and optimised structural geometry.

The market-wide substitution trend away from solid wood and metal toward engineered wood materials such as plywood, particleboard, and MDF (Saes et al., 2024), reduces resource intensity as engineered wood panels typically require less virgin material input per unit of structural performance, and can incorporate recycled or residual wood fibre (e.g. from sawmill by-products or post-consumer wood) that would otherwise be a lower-value output. This is the same substitution trend discussed in Section 8.10.1 in relation to reduced structural durability and wood cascading – the three effects (resource efficiency, durability, cascading potential) are joint consequences of a single material choice and need to be weighed together rather than assessed as independent design goals.

Lightweighting strategies include:

- Thinner solid panels or engineered-wood panels, reducing material mass and shipping weight/volume – traded off against the joint-durability and reassembly-cycle impacts.
- Hollow-core or honeycomb-core panel constructions, which reduce core material use while retaining panel stiffness for a given thickness.
- Structural optimisation to reduce material use for a given load-bearing requirement. 3D printing, finite element analysis and AI-aided design are enabling advanced design approaches here.
- Use of recycled or recovered wood fibre and recycled metal/plastic content as a substitute for virgin material input, which reduces primary resource extraction independently of any change in component mass.
- Energy impacts of material production also differ by material family: production of metals and plastics is generally more energy-intensive than wood-based materials (Cordella & Hidalgo, 2016), meaning that a shift from metal/plastic to engineered wood can deliver a resource efficiency benefit at the production stage even where it introduces the durability trade-offs.

A related resource-efficiency lever is the use of bio-based materials: materials derived from renewable biological feedstocks (wood and wood fibre, but also bio-based plastics, bio-based foams/adhesives, natural fibres such as jute, hemp, or flax, and bio-based leather alternatives) as substitutes for fossil-derived or virgin-extracted inputs. Wood itself is the dominant bio-based material in furniture.

- Bio-based plastics and composites (e.g. wood-plastic composites, bio-based polyurethane foams) can substitute fossil-based plastics in components such as chair shells, foam cushioning, or edge banding, reducing fossil resource input,

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though their end-of-life recyclability and compostability profiles vary widely and are not automatically superior to conventional plastics.

- Bio-based adhesives (e.g. soy-, lignin-, or tannin-based binders) are being explored as substitutes for formaldehyde-based or fully synthetic adhesives in panel products.
- Natural fibre reinforcement and upholstery materials (e.g. jute, hemp, flax, coir) can substitute synthetic fibres or foam in upholstery and cushioning, with a generally lower embodied-carbon feedstock, though performance (durability, cleanability) needs to meet the same levels.

The case for bio-based materials rests on feedstock renewability and, in some cases, lower production-stage embodied carbon does not automatically improve durability, repairability, or recyclability. A bio-based substitute that degrades faster (e.g. certain bio-based foams or untreated natural fibres) or that cannot be separated from other materials at end of life could reduce net resource efficiency across the whole life cycle, reinforcing the need for system-level assessment rather than single-attribute optimisation. Certification and traceability of bio-based content (e.g. bio-based carbon content declarations, sustainable biomass sourcing/chain-of-custody standards such as FSC/PEFC for wood-derived inputs) are relevant as the mechanism for verifying claims, analogous to the recycled-content declarations.

As with durability and recyclability, resource efficiency should not be assessed in isolation: a lightweighted or heavily substituted product that fails prematurely and cannot be repaired or recycled may deliver a worse whole-life resource outcome than a heavier, more durable equivalent, despite lower material input per unit at the point of manufacture. System-level LCA assessment, rather than a single design rule (e.g. “minimise mass” or “maximise recycled content”), is needed to resolve this trade-off.

Failure Modes and Standard Testing

Resource efficiency is typically assessed via material declarations, bill-of-materials mass accounting, and life-cycle assessment (LCA) or EPD methodologies rather than furniture-specific EN durability/safety standards. Where lightweighting is pursued, the intention behind the lightweighting likely drives impacts on durability but apply the same durability cycling tests enables testing performance.

Performance levels

Bad case: No consideration of material efficiency in design; heavy, over-specified virgin- material components used throughout with no lightweighting and no recycled content, or conversely aggressive lightweighting/material substitution pursued purely for cost reduction with no regard to the resulting durability or disassembly consequences.

Base Case (BC): Mainstream engineered-wood substitution (particleboard/MDF cores) adopted primarily for cost reasons, with some resource-efficiency co-benefit but no documented recycled-content share or lightweighting rationale; material choice not linked to a documented durability or end-of-life assessment.

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BAT: Documented material efficiency strategy combining lightweighting (thinner or hollow-core panels, structural optimisation) with a declared minimum recycled-content and/or certified bio-based content share (e.g. FSC/PEFC-chain-of-custody wood, verified bio-based feedstock for plastics/foams/adhesives), where the resulting durability and disassembly-cycle performance has been verified against the relevant EN standards.

BNAT: Whole-life LCA-based material and mass optimisation performed jointly across resource efficiency, durability, repairability, and recyclability targets, with material choice – including the renewable/bio-based vs. recycled vs. virgin fraction – and component mass treated as a single optimisation problem rather than resource efficiency being pursued as an independent design goal.

8.10.6. ESPR Aspects Trade-Offs

The following table is an initial consideration of which ESPR aspects support each other and which trade off against each other. The cells are categorized as follows:

- Synergy (green): improving one aspect tends to improve the other, or the same design intervention serves both.
- Tension (red): improving one aspect tends to degrade the other; a design trade-off exists.
- Mixed / context-dependent (yellow): the relationship can go either way depending on execution, material, or product category.

Several tensions raised by stakeholders are cross-cutting:

- Emotional attachment vs. standardisation: over-standardising for recyclability or disassembly risks eroding the aesthetic/design freedom and “emotional value” that makes people keep furniture longer – over-optimising for circularity could paradoxically shorten effective product life by reducing attachment to the product.
- System-level assessment vs. single design rules: multiple respondents across durability, disassembly, and recyclability sections stressed that no single design rule (maximise durability, maximise reversibility, maximise recycled content) is safe to mandate in isolation; a system-level LCA view is needed because the aspects interact, as this matrix illustrates.
- Recycled-content supply and quality vary strongly by material stream, so a single recycled-content threshold applied uniformly across all materials and components risks being either trivially easy for some streams or technically unachievable for others.

As a general design principle emerging from the matrix: durability and repairability/disassembly are the most consistently synergistic pairing (repair capability is largely a downstream consequence of good disassembly design), while durability and resource efficiency/lightweighting are the most consistently tense pairing (material reduction is the most direct route to both, but pulls in opposite directions). Recyclability sits in the middle, drawing directly on disassembly capability but also requires consideration against durability and resource-efficiency.

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9596 **Table 8-25: Matrix with initial consideration of ESPR Aspect Trade-offs**

	Durability & Reliability	Maintenance & Repairability	Disassembly & Modularity	Recyclability & Material Recovery	Resource Efficiency & Bio-based
Durability & Reliability	—	Synergy: a durable frame has a longer life if worn/failed parts can be repaired. Tension where non-serviceable durable assemblies (bonded foam/frame units) block later repair.	Tension: excess modularity/reversible fasteners reduce structural stiffness and joint life; repeated disassembly strips composite panel fixings. Synergy possible if joints are engineered jointly for both from the outset.	Mixed: durable mono-material designs are often also easy to recycle, but overdesigning durability risks premature disposal of composite assemblies that cannot be separated (non-separable waste to incineration/landfill). Recycled-content use can itself reduce durability in specific streams (mechanically-recycled wool/textile fibres shorten and weaken; rebonded PU foam cannot match virgin comfort-layer density).	Tension: substitution of solid wood/metal for cheaper composites (resource-efficiency driver) can be linked to reduced achievable lifespan. Recycled-content constraints reinforce this: recycled/rebonded PU foam and recycled textile fibres can show performance loss versus virgin material – depending on concentration.
Maintenance & Repairability		—	Synergy: the same fasteners and accessibility that enable disassembly directly enable repair (gas lifts, castors, hinges, upholstery are all disassembly-dependent replaceable parts).	Well maintained / washed covers may reduce contamination at EoL. Better collection systems may enable better uptake in preparation for re-use / refurbishment.	Synergy: repair and spare-parts availability extend the service life over which embodied material/energy is amortised, improving whole-life resource efficiency. Tension: bio-based/lightweighted components that wear faster may increase repair frequency and net resource use over time. Storage and supply of spare parts increases associated resource consumption.

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	Durability & Reliability	Maintenance & Repairability	Disassembly & Modularity	Recyclability & Material Recovery	Resource Efficiency & Bio-based
Disassembly & Modularity			—	Synergy: reversible mechanical fasteners and non-destructive dismantling are the primary enablers of clean material-stream separation at end of life; the same design capability assessed under EN 17902 for repair purposes underpins recyclability outcomes. EN 17902 excludes disassembly performed solely for end-of-life material separation – the same physical capability serves two different purposes and is evaluated differently. Permanent bonding needed for structural/aesthetic reasons blocks both.	Tension: mechanical quick-release joints add unit cost, material, and tighter manufacturing tolerances versus staples/glue. Synergy: standardising fixing types across a product range reduces material/part variety and manufacturing waste.
Recyclability & Material Recovery				—	Synergy: recycled-content use reduces virgin resource extraction, and wood cascading extends total material value retention across multiple product lifecycles. Tension: recycled-content supply is structurally constrained – scrap-metal demand already exceeds supply, wood recyclate competes with subsidised bioenergy use, and recycled processing/certification costs frequently exceed virgin material price, meaning higher recycled-content mandates do not automatically translate into a resource-efficiency gain if supply cannot scale. Full material-separability mandates may also be premature where no industrial-scale recycling process yet exists for a given stream.

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9. Preliminary conclusions Task 4

Furniture is made up of very different material streams which have different production processes and supply chains behind them. The role of the furniture manufacturer is often to cut and shape these material components for assembly into the final furniture product. That means that material-based interventions mainly affect upstream suppliers, while the furniture manufacturer can set requirements or choose specific materials that might meet these requirements.

For the majority of these material stream-inputs (wood-based panels, plastics, metals, surface treatments) Best Available Technologies have already been detailed and set via BREF documents supporting the Industrial Emissions Directive. While meeting these BAT in practice may have different implementations which do not always lead to the same results, some of these criteria have often been in place for more than a decade already. Redefining BAT for these material streams is beyond the scope of this study, but it is important to understand which choices and Best Near Available Technologies may be soon coming available if this can lead to better environmental outcomes.

These materials play a key role in the eventual environmental footprint of the furniture, where the choice of furniture design, materials and components determine whether it can be taken apart to support transport, repaired easily, or the materials can be separated for recycling at end of life.

At End of Life the treatment pathway taken by furniture is dependent on the country's EoL treatment infrastructure and processes. There are no waste codes or specific furniture statistics, since it is usually collected under "bulky waste". The most advanced EPR system for furniture is in France, which allows for better EoL data and also establishes separate collection systems that can improve the potential re-use and recycling of furniture as it is less likely to be damaged by compactor trucks or contaminated in collection by e.g. rain.

The largest problems for EoL performance appear to be composite materials that cannot easily be separated, contaminated waste streams, and the costs of logistics and treatment vs the value of the recycled materials that result. While metal and mono-plastics can be well recycled, foams and textiles/leather can be hard to separate and lack a suitable market for recyclates. There is no harmonised framework for waste wood across the EU, which leads to differing interpretations and treatments across countries. Some countries like Italy have well-established particleboard recycling operations, while countries like Germany have four classification levels which mean contaminated or treated wood is harder to recycle mechanically and ends up going into incineration for energy. Other countries do not have many WtE or recycling facilities and send large amounts of MSW instead to landfill.

The choices made on the design are often informed by the type of business model, with flat-pack furniture being optimised for transport and self-assembly, making it inherently "designed for disassembly". Bespoke furniture can more easily be shipped "uneconomically" due to the higher price segment. This also has implications for who is

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responsible for sound assembly – whether the product is assembled by the manufacturer, the end-consumer, or an installer.

Bills of material were initially defined based upon EPD analysis of 224 products. This led to initial non-sales weighted material distributions for 20 different types of furniture. To develop base cases, it is important to take into account:

- Materials used
- Type of production (SME vs large scale automation)
- Transport type (fully assembled vs flat-pack)
- Lightweighting of materials vs durability

The End-of-Life pathways are then dependent on:

- Product types with vs. without established recycling infrastructure (e.g., mono-material textiles vs. metals) rather than uniform rules across all furniture types.
- Composite products entering incineration or landfill
- Where the product may be in a cascading lifecycle (wood cascading -> solid wood recycling enters into particleboard construction)

Nearly every stakeholder group in the stakeholder questionnaire converges on circular-by-design mechanical assembly (reversible fasteners, mono-materials, standardised interchangeable parts) as the principal BAT design logic, as this design direction simultaneously supports disassembly, modularity, repairability and recyclability.

Durability is a defining criteria that sets a limit to how far the other criteria may be implemented. Furniture that meets minimum durability requirements that has reversible fasteners, enabling repair, exchange of parts and dismantling for re-use. Here it is important to take into account the type of materials used, since a thin wood panel is less likely to survive multiple disassemblies compared to a solid wood component. Treat durability as an equal criterium alongside disassembly/recyclability/recycled content.

Standards exist for design for disassembly, durability (use cycles), while some thresholds have also been set on recycled content.

Manufacturers also called for requirements to be performance/outcome-based targets (e.g., prolonged lifetime, reduced waste, verified recyclate quality) rather than prescriptive design mandates (e.g., "must be mono-material"), giving manufacturers flexibility to resolve trade-offs case by case. This should be balanced against NGO/consumer-organisation calls for firmer design mandates (e.g., mandatory spare parts, phase-out of SoC).

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11. Annexes

11.1. Overview of Bill of Materials (BoM) by Environmental Product Declarations (EPD)

As part of the LCA Mapping task, 224 EPDs from across the world were analysed to determine the BoM of different furniture items. The material balance for each of these was summed together to give a global BoM. This is, however, not representative of the product group since these EPDs do not represent average products on the market but are the best indication of materials used in different material types.

The overview tables below give the average materials reported by weight across all EPDs analysed, and a full break down of each material reported and the associated granularity. For instance, sometimes “engineered wood products” or “recycled wood” is reported which are not clearly defined. This shows the difficulty of mapping specific substances and materials to existing LCAs.

Table 11-1: Over category shares of materials declared in 224 EPDs.

Material Category	Weight (kg)	Relevance (%)
Wood based materials	6 188.521	46,99%
Metals – Ferrous	3 996.065	30,34%
Textiles and upholstery materials	1 193.169	9,06%
Plastics	631.2443	4,79%
Other materials and components	339.8209	2,58%
Metals – Non-ferrous	330.1226	2,51%
Other materials and components (Metal)	255.853	1,94%
Adhesives, coatings and finishes	104.6679	0,79%
Electric and electronic components	58.3406	0,44%
Composites	56.299	0,43%
Glass	14.4	0,11%
Paper and printed paper	0.9345	0,01%
Total	**13 169.44**	**100,00%**

10339 **Table 11-2: Overview of all materials declared in 224 analysed EPDs.**

Category	Mass (kg)	Relevance (%)
Adhesives, coatings and finishes		
Acrylic (PMMA)	0.6	0.57%
Adhesive	45.5103	43.48%
Epoxy adhesive	1.881	1.80%
Hardener	0.03	0.03%
Lacquer/Varnish	1.03	0.98%
Metal coating	0.14346	0.14%
Paint	26.1529	24.99%
Phenolic resin	0.0281	0.03%
Polish	0.16	0.15%
Powder coating	21.109	20.17%
Primer	2.14	2.04%
Surface coating	0.1831	0.17%
Topcoat	2.29	2.19%
Wood treatment oil	3.41	3.26%
Composites		
Fibre reinforced composite	0.03	0.05%
Fibreglass (GRP)	46.662	82.88%
Glass-filled epoxy	0.1	0.18%
Glass-filled polyamide	1.386	2.46%
HPL (High Pressure Laminate)	4.47	7.94%
LED lighting	1.8597	3.30%
Polyamide (Nylon)	0.0836	0.15%
Polyamides incl. glass fibres	1.3	2.31%
Polypropylene (PP)	0.2268	0.40%
PP GF30	0.1609	0.29%
TFL (Thermally Fused Laminate)	0.02	0.04%
Electric and electronic components		
Electrical cable/wire	0.45	0.77%
Electronic component	57.8906	99.23%
Glass		
Glass	14.4	100.00%
Metals – Ferrous		
Cast iron	12.93	0.32%
Cold-rolled steel	6.3625	0.16%
Fasteners	1.37	0.03%

Category	Mass (kg)	Relevance (%)
Feet/Levelers	0.022	0.00%
GI steel sheets	1.9851	0.05%
Hinge	9.5	0.24%
LED lighting	7.632	0.19%
Low-alloyed Steel	175.2	4.38%
Metal - Steel low alloy	0.13	0.00%
Metal (unspecified)	239.043925	5.98%
Mild steel	134.172	3.36%
Stainless steel	24.79	0.62%
Steel	3381.867	84.63%
Zinc	1.06	0.03%
Metals – Non-ferrous		
Aluminium extrusion	43.83	13.28%
Aluminum	228.276	69.15%
Brass	0.56	0.17%
Copper	1.4	0.42%
Extruded aluminum	1.77	0.54%
Metal - Aluminium	8.64	2.62%
Zinc	45.6466	13.83%
Other materials and components		
Actuator	47	13.83%
Back pressure paper	0.04	0.01%
Backing material	41.0574	12.08%
Bio-based material	186.4251	54.86%
Chemical treatment	1	0.29%
Cork	0.59	0.17%
Electrical cable/wire	3	0.88%
Fasteners	1.36	0.40%
Filler	1.7	0.50%
Fossil-based material	4.1639	1.23%
Hardware (unspecified)	4.5359	1.33%
Linoleum	4.64	1.37%
Mineral filler	2.46656	0.73%
Mineral oil	0.001	0.00%
Other (unspecified)	29.928	8.81%
Polybak (backing material)	10	2.94%
Silicone	0.113	0.03%
Switch	1.8	0.53%
Other materials and components (Metal)		

Category	Mass (kg)	Relevance (%)
Metal (unspecified)	255.853	100.00%
Paper and printed paper		
Paper	0.9195	98.39%
Sticker/Label	0.015	1.61%
Plastics		
ABS	85.9139	13.61%
ABS edgeband	5.21	0.83%
Acrylonitrile Butadiene Styrene (ABS)	1.06	0.17%
Copolyester Ether (COPE)	2.81	0.45%
Edge tape	0.16	0.03%
Edgeband- PVC	0.45	0.07%
EVA	0.24	0.04%
Fossil-based material	22.79437	3.61%
HDPE	1.995	0.32%
HPL (High Pressure Laminate)	2.96	0.47%
LDPE	0.308	0.05%
LED lighting	1.5	0.24%
Melamine laminate	87.04	13.79%
Natural rubber	0.02	0.00%
Nylon 6,6	0.2268	0.04%
Nylon Plastic	8.53	1.35%
Other (PP / PA)	0.01	0.00%
Other (unspecified)	4	0.63%
Other Plastics	0.8	0.13%
PCR PA*	1.2	0.19%
Plastic - ABS	0.79	0.13%
Plastic - Acrylonitrile butadiene styrene (ABS)	0.167	0.03%
Plastic - Nylon (PA)	1.27	0.20%
Plastic - Rubber	0.16	0.03%
Plastic (ABS)	0.00485	0.00%
Plastic (unspecified)	52.3267	8.29%
Plastic film	0.03	0.00%
Plastic Generic	1.1793	0.19%
Plastic Parts	27.441	4.35%
Polyamide & Nylon	0.4	0.06%
Polyamide (Nylon)	164.7106	26.09%
Polyester fibre	2.73	0.43%
Polyethylene (PE)	3.346	0.53%

Category	Mass (kg)	Relevance (%)
Polypropylene (PP)	94.9532	15.04%
Polystyrene (PS)	0.18	0.03%
Polyurethane (PU)	37.636	5.96%
POM & PA	0.02	0.00%
POM (Acetal)	8.931	1.41%
PP master	0.17	0.03%
PP Plastic	0.53	0.08%
PVC	1.635	0.26%
Rubber, synthetic	0.05	0.01%
Surface material (laminate)	1.76	0.28%
Synthetic rubber	1.222	0.19%
Thermoplastic elastomer	0.4	0.06%
TPE	1.9736	0.31%
Textiles and upholstery materials		
Autex acoustic textile	5.1	0.43%
Dacron (polyester fibre)	0.62	0.05%
Felt	0.02	0.00%
Kvadrat textile	1020.9	85.56%
Polyester Cloth	0.114	0.01%
Polyester fabric	67.2286	5.63%
Polyester fibre	1.808	0.15%
Polyurethane (PU)	62.4209	5.23%
Polyurethane foam	15.68	1.31%
Polyurethane/Polyamide blend	0.6273	0.05%
Recycled fabric	1.7	0.14%
Textile (unspecified)	16.69	1.40%
Wool	0.26	0.02%
Wood based materials		
Ash (solid wood)	46.784	0.76%
Beech (solid wood)	0.39	0.01%
Bio-based material	18.925145	0.31%
Cork	0.39	0.01%
Engineered Wood Products	42.1	0.68%
Fibreboard	67.03	1.08%
Hardwood (solid)	1.5876	0.03%
HDF	25.535	0.41%
HPL (High Pressure Laminate)	49.0808	0.79%

Category	Mass (kg)	Relevance (%)
Kraft paper	0.139	0.00%
Laminate	4.3	0.07%
LAMINATED BOARD	58.8928	0.95%
Laminated particleboard	22.9899	0.37%
Laminex MDF	229	3.70%
Leg (4) / wood	6.328	0.10%
Linoleum	20.321	0.33%
MDF	598.4873	9.67%
Melamine laminate	158.83	2.57%
Oak (solid wood)	21.61	0.35%
Particleboard	3385.3688	54.70%
Pine (solid wood)	529.99	8.56%
Plywood	205.9845	3.33%
Raw Chipboard	67.32	1.09%
Raw HDF	6.69	0.11%
Recycled wood	13.825	0.22%
Solid wood (unspecified)	32.76	0.53%
TFL (Thermally Fused Laminate)	0.01	0.00%
Wood (unspecified)	523.962	8.47%
Wood veneer	49.89	0.81%
Total Mass all EPD	**13 169.43691**	**100.00%**

11.2. Additional details for BoS

Table 11-3: Full list of substances referred to the EU Ecolabel criteria for furniture.

Substance / mixture / contaminant / chemical	CAS No.	Where stated (page)
1,1,1-trichloroethane		32
4-Nonylphenol	104-40-5	24
4-Nonylphenol, branched	84852-15-3	24
4-Octylphenol	1806-26-4	24
4-Phenylcyclohexene		32
4-tert-Octylphenol	140-66-9	24
Acenaphthene	83-32-9	25
Acenaphthylene	208-96-8	25
Alkylphenolethoxylates (APEOs)		24
Anthracene	120-12-7	25
Aromatic hydrocarbons (total)		32
Arylamines		

Substance / mixture / contaminant / chemical	CAS No.	Where stated (page)
Arsenic (As)		15; 30; 33
Benzo[a]anthracene	56-55-3	24
Benzo[a]pyrene	50-32-8	24
Benzo[b]fluoranthene	205-99-2	24
Benzo[e]pyrene	192-97-2	24
Benzo[g,h,i]perylene	191-24-2	25
Benzo[j]fluoranthene	205-82-3	24
Benzo[k]fluoranthene	207-08-9	24
Cadmium (Cd)		15; 19; 30; 33
Carbon disulphide		32
Chloralkanes		
Chlorine (Cl)		15
Chlorophenols		30
Chromium (Cr)		15
Chromium, total (Cr)		30; 33
Chromium VI (CrVI)		19; 33
Chrysene	218-01-9	24
Cobalt (Co)		30; 33
Copper (Cu)		15; 30; 33
Creosote (Benzo(a)pyrene)		15
Dibenzo[a,h]anthrancene	53-70-3	24
Flame retardants / Antimony Trioxide (ATO)		11; 33
Fluoranthene	206-44-0	25
Fluorene	86-73-7	25
Fluorine (F)		15
Formaldehyde		32
Hg (Mercury)		30; 33
Indeno[1,2,3-c,d]pyrene	193-39-5	24
Lead (Pb)		15; 19; 30; 33
Lubricating oils		13
Mercury (Hg)		15; 19; 30; 33
mono- and di-chlorinated phenols (salts and esters)		30
N,N-Dimethylacetamide	127-19-5	
Naphthalene	91-20-3	25
Ni (Nickel)		30; 33
Nickel		11; 30; 33
Nitrosamines (group)		32
N-nitrosodi-n-butylamine (NDBA)		32
N-nitrosodiethylamine (NDEA)		32
N-nitrosodimethylamine (NDMA)		32
N-nitrosodi-i-propylamine (NDIPA)		32
N-nitrosodi-n-propylamine (NDPA)		32
N-nitrosomethylethylamine (NMEA)		32

Substance / mixture / contaminant / chemical	CAS No.	Where stated (page)
N-nitrosomorpholine (NMOR)		32
N-nitrosopiperidine (NPIP)		32
N-nitrosopyrrolidinone (NPYR)		32
Nonylphenol, mixed isomers	25154-52-3	24
Octylphenol	27193-28-8	24
Other chlorophenols		30
Paints, varnishes, resins and adhesives		13
Pentachlorophenol (PCP)		15
Phenanthrene	85-1-8	
Polyoxyethylated nonyl phenol	9016-45-9	24
Polyoxyethylated octyl phenol	9002-93-1	24
Polyoxyethylated p-nonyl phenol	26027-38-3	24
Pyrene	129-00-0	25
Sb (Antimony)		30; 33
Selenium (Se)		33
Styrene		32
Tetrachloroethylene		32
Tin (Sn)		19
Toluene		32
Trichloroethylene		32
Vinyl chloride		32
Vinyl cyclohexene		32
VOCs (total)		32
Zinc compounds		11

10343 Source: Commission Decision (EU) 2016/1332

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10345 **Table 11-4: Additionally identified substances.**

Substance / Mixture / Contaminant / Chemical	CAS No.
Urea-Formaldehyde (UF) Resins	9011-05-6
Methylene diphenyl diisocyanate (MDI)	26447-40-5
Toluene diisocyanate (TDI)	
Melamine	108-78-1
PFOS (Perfluorooctane sulfonic acid)	
PFHxS (Perfluorohexanesulfonic acid)	
Basic Chromium Sulfate	39380-78-4

Substance / Mixture / Contaminant / Chemical	CAS No.
Triglycidyl Isocyanurate (TGIC)	2451-62-9
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7
UV-328 (Phenolic Benzotriazole)	25973-55-1
N-octyl-isothiazolinone (OIT)	26530-20-1
Dichloro-n-octyl-isothiazolinone (DCOIT)	64359-81-5
Ethylene-Vinyl Acetate (EVA)	
Chloroprene (2-chloro-1,3-butadiene)	126-99-8
Polychloroprene (Neoprene)	
Zinc oxide	
Lead monoxide	
p-toluenesulfonic acid (p-TSA)	
Dinonylnaphthalenedisulfonic acid	
Dodecylbenzenesulfonic acid	
Benzophenone	119-61-9
Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide (TPO)	
Ethyl (2,4,6-trimethylbenzoyl) phenylphosphinate (TPO-L)	
d-limonene	
Glycidyl Methacrylate (GMA)	106-91-2
Polyethylene-graft-Maleic Anhydride (PE-g-MA)	
Maleic Anhydride	108-31-6
Polyamidoamine-Epichlorohydrin (PAE)	
1,3-dichloropropan-2-ol (1,3-DCP)	96-23-1
3-monochloropropan-1,2-diol (3-MCPD)	
Epichlorohydrin	

Substance / Mixture / Contaminant / Chemical	CAS No.
Hydroxymethylfurfural	
Polylysine	
Hexamethylenediamine (HMDA)	
Bis(hexamethylene)triamine (BHT)	
Expandable graphite	
Bis([dimethoxyphosphoryl]methyl) phenyl phosphate (BDMPP)	
Exolit OP 550 (Phosphorous polyols)	
Beta-hydroxyalkyl amide (HAA) / Primid	
Acrylonitrile Butadiene Styrene (ABS)	
Polypropylene (PP)	
beta-chlorocatecholborane (Cl-CatB)	
Oxalic acid	
Polymeric methylene diphenyl diisocyanate (pMDI)	
Zinc Pyrithione (ZNP)	
Titanium Dioxide (TiO2)	13463-67-7
Pentabromodiphenyl ether (PentaBDE)	
Tris(1,3-dichloroisopropyl)phosphate (TDCIPP)	

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12. Open Strategic Autonomy Assessment

This annex applies the methodological framework outlined in JRC143885 ("Method for the assessment of EU Open Strategic Autonomy aspects in the context of the Ecodesign for Sustainable Products Regulation") to the European furniture manufacturing sector. It aims to assess the structural aspects defining the supply chains and potential vulnerabilities relating to wood-based panel (WBP) production, chemical binder supply chains, and market dynamics in proposed ESPR scenarios.

The initial application of the methodology finds that OSA is of low relevance for the furniture product group.

12.1. Methodology

This evaluation covers four core Open Strategic Autonomy (OSA) and lifecycle aspects for furniture manufacture in the EU:

- Aspect 1: Material Composition
    - 1.1 Critical/strategic raw materials
    - 1.2 EU import bans / sanctions exposure
    - 1.3 Fossil-based feedstock
- Aspect 2: Energy Demand
    - 2.1 Energy-intensive manufacturing
    - 2.2 Use-phase energy (Energy-related Products only)
- Aspect 3: Market Dynamics
    - 3.1 Forecasted demand
    - 3.2 Import reliance
- Aspect 4: Production and Recycling Routes
    - 4.1 Critical processes
    - 4.2 Route diversity
    - 4.3 EoL treatment potential

In step 1, the aspects above are screened for relevance. Then in Step 2, a Bill of Materials (up to 5 materials + up to 2 ancillary inputs) is scored against both the OSA parameters and life-cycle circularity indicators. If found to have a high relevance score, potential ecodesign requirements (recycled content, lifetime extension, substitution, etc.) are defined as scenarios. In the finals step 4, each scenario is re-scored and compared against the Step 2 baseline to show OSA improvement (or trade-off).

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12.2. Bill of Materials

The initial relevant materials from the Bill of Materials assessment are:

Table 12-1: OSA Bill of Materials.

Material / input	Category	Mass share (indicative)	Furniture Share of EU production
Wood-based panel (PB/MDF/OSB)	Main material	60–75% wt (structural furniture)	68% of particleboard, 38% MDF market; panel industry uses only 8% of total primary roundwood, while the energy sector consumes over 40% of primary roundwood and 64% of total wood resources (EPF Strategic Wood Availability Policy Paper)
Synthetic thermosetting resin (UF/MF/PF/pMDI)	Fossil feedstock	~10% of panel mass	
Steel (hardware, springs, frames)	Other material		low
Polyurethane foam / polyester textile	Other material, fossil-based	Depends on product, estimated 300-400 kt per year	~50% of EU production goes to furniture sector.
LLDPE shrink film / poly packaging	Ancillary, fossil feedstock	Per-unit mass not yet established	

12.3. Evaluation of OSA aspects for furniture

12.3.1. Aspect 1 — Material composition

1.1 Supply risk / CRMs: not relevant. Furniture consists primarily of wood/timber, metals (standard steel, aluminium), plastics, and textiles. While trace alloying elements in steel or aluminium are critical raw materials (CRMs), they are present in miniscule amounts rather than a "significant share" of the overall product weight. Rating: not relevant, score 0.

1.2 Sanctions exposure: relevant.

- Under Regulation (EU) 2023/1115 on Deforestation-free Products (EUDR), timber and timber products are subject to strict sourcing declarations and potential bans from high-risk deforestation areas.

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- Russian and Belarusian timber/plywood exports have been under EU sanction since 2022 (anti-dumping duties of 14.4%–15.8% in Regulation (EU) 2021/1930), with reciprocal Russian export bans; birch plywood specifically is affected given Russia/Belarus/Ukraine's pre-war ~80% share of global birch plywood production.
- After an investigation opened against Chinese hardwood plywood in 2025, provisional duties of up to 62.4% were imposed mid-2025, and definitive duties of up to 86.8% were confirmed in November 2025 alongside evidence of Chinese exporters relabelling hardwood plywood as "softwood" using ultra-thin face veneers to dodge the classification. Plywood is a small share of total furniture panel input relative to particleboard and MDF, which are predominantly EU-sourced.
- A defensive trade instrument (not a sanction) targets EU melamine imports from China, which have been under continuous anti-dumping duty since 2011 (renewed 2017, 2023, converted to ad valorem Feb 2025) — a resin precursor, not the finished product, sitting upstream in the panel BoM.

1.3 Fossil feedstock: low relevance. Thermosetting resins (urea-formaldehyde, melamine-formaldehyde, phenol-formaldehyde, pMDI) are fossil-derived and account for roughly 10% of panel mass but a disproportionate share of material cost; transport packaging (LLDPE shrink film) is fully fossil-based. Polyurethane foam and polyester textile are fully fossil-derived and can be a larger share of total product mass, but they do not account for the majority of the product's mass on average across the entire furniture product group. Plastics otherwise form a relevant material used in furniture, but less volume than wood.

12.3.2. Aspect 2 — Energy demand

2.1 Cumulative energy demand: not relevant. Furniture manufacturing is primarily an assembly and finishing industry. It is not classified as a primary energy-intensive industry like steel, basic metals, or primary chemical synthesis.

2.2 Use-phase energy: not relevant. Furniture is not an Energy-related Product (ErP).

12.3.3. Aspect 3 — Market dynamics

3.1 Demand growth (CAGR): not relevant. stable to low, tied to housing and demographics. EU wood-based panel production contracted in 2022–2023 but rebounded 2.7% in 2024 (EPF); overall furniture demand growth is not a meaningful driver of import dependency on its own.

3.2 High EU Import reliance: not relevant. The EU maintains a strong domestic furniture manufacturing sector (especially in Italy, Poland, and Germany). The percentage of domestic consumption met by non-EU imports is relatively low compared to products with high import reliance.

Extra-EU imports' share of EU furniture consumption rose from 18% (2019) to approximately 22% (2025), with China the clear leading external supplier, ahead of Turkey and Vietnam (CSIL, European Furniture Industry 2026). This is a current and worsening trend, with effects on EU manufacturers already visible, e.g. closing plants and redundancies. However, this import-reliance pressure is not the kind that ecodesign requirements can mitigate well. For other product groups like steel and tyres, ecodesign requirements (recycled content, material substitution) change what

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the product is made of, displacing specific imported raw materials (iron ore, coking coal, natural rubber) that competing supply chains cannot easily substitute. Furniture's import competitiveness gap is different as Chinese suppliers are becoming equally capable of meeting panel-sourcing, resin, design-for-disassembly, and Digital Product Passport requirements as EU manufacturers are. The gap comes from labour cost, manufacturing scale and state backing.

12.3.4. Aspect 4 — Production and recycling routes

4.1: critical processes: Furniture manufacturing does not utilize critical technologies listed under the EU's economic security framework.

Sub-aspect 4.2 (Single production route in Europe): Not Relevant. There are highly diverse, decentralised production routes for furniture

Sub-aspect 4.3 (Untapped EoL recirculation potential): Relevant. There is large, untapped potential here. Most post-consumer furniture waste in the EU is landfilled or sent for thermal recovery (incineration for energy) due to the technical difficulties of separating mixed-material composites, adhesives, and treated woods. True material recycling is very low.

The technical routes for improving furniture's material circularity such as post-consumer MDF fibre recovery, particleboard remanufacture, bio-based resin substitution are less constrained by feasibility than by which end-of-life pathway the same waste-wood stream is directed toward. EPF estimates the panel industry draws on only 8% of primary roundwood while the energy sector consumes over 40% of primary roundwood and 64% of total wood resources. While the recast Renewable Energy Directive (RED III) theoretically establishes a "cascading use" hierarchy prioritizing material recycling, category A1/A2 waste wood suitable for panel remanufacture is the same feedstock that combined heat and power biomass plants and pellet producers are structurally positioned to draw on, as that feedstock carries caloric value and those operators benefit from state-backed demand for renewable energy generation that panel manufacturers competing on a materials market do not.

A recycled-content requirement for panels only delivers its intended circularity benefit if the waste-wood market isn't simultaneously diverted toward energy recovery; otherwise the requirement adds demand pressure for a small pool of materials and increases costs rather than reducing them.

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12.4. Overall scoring summary

Table 12-2: Scoring summary of OSA aspects for furniture.

Sub-aspect	Score	Driver
1.1 CRM	0	Not relevant
1.2 Sanctions	1	Deforestation and defensive anti-dumping trade instruments (not sanctions per se)
1.3 Fossil feedstock	1	Relevant for Upholstery, plastic furniture and elements, high costs of resins.
2.1 Cumulative energy demand	0	Not energy-intensive
2.2 Use-phase energy	0	Not an ErP
3.1 Demand CAGR	0	Flat/low growth
3.2 Import reliance	0	End product market is seeing increasing imports from Asia
4.1 critical processes	0	None
4.2 production routes	0	Diversified
4.3 EoL recirculation potential	1	Untapped potential

According to the JRC scoring guidelines:

A score higher than 5 suggests that a product group is highly relevant for EU Open Strategic Autonomy. A score lower than 5 indicates the product group has low relevance and limited potential to improve EU dependencies

A score of 2-3 places furniture in the **Low Relevance** category. For this reason, OSA will not play a major role in developing ecodesign criteria and further scenario analysis has been screened out at this stage.

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