

CIRCULARTEX GUIDE

FOR CHOOSING UPHOLSTERED
FURNITURE FOCUSING ON
CIRCULAR ECONOMY



trace

a transition towards
circular economy

ABOUT THIS GUIDE

This guide has been prepared as part of the CircularTex project, which is financed by the Innovation Fund Denmark through one of the four mission-driven innovation partnerships, TRACE (Circular economy with a focus on plastics and textiles). The purpose of CircularTex is to develop and test new textile solutions and value propositions for markets that will lead to an extended lifetime and thus contribute to a slowing of textiles. You can read more about the project [here](#).

The guide has been developed by researchers from Aalborg University and three business partners; Gabriel A/S, Holmrís B8 and CarpetCare. The three companies have each contributed a great deal of knowledge and expertise in their field, and together their expertise covers the entire value chain. You can read more about the companies on their websites: [Gabriel A/S](#), [Holmrís B8](#) and [CarpetCare](#).

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This guide is for you who want to change or update the interior of a public or private company or organization, and for you who want to extend the life of your existing furniture, and who at the same time want to do this based on the principles of circular economy.

Upholstered furniture and especially textiles are the focus of this guide. Textiles are often a visually dominant element, which can have a big influence on the desire to invest in new interior. If the principles of circular economy are applied, it is possible to extend the life of existing upholstered furniture through, for example, maintenance, cleaning, or reupholstering.

The purpose of this guide is to guide you through the considerations you should have based on your needs and circular economy. The guide first introduces principles of circular economy and then a decision tree, which will help you find out which of the four steps in the guide you should focus on.

Remember that you can always contact furniture manufacturers, textile manufacturers, or textile service companies directly. They have experts who can guide you in your specific project. If you need more information about the project please contact project manager Louise Møller Haase at Louise@create.aau.dk

In addition to this full guide, a shorter version has been developed: 'a quick guide to choosing upholstered furniture focusing on circular economy'.

PRINCIPLES OF CIRCULAR ECONOMY

This section introduces principles of circular economy and strategies that can be used in working with the circular economy¹. In this guide, the EU definition of circular economy is used:

A circular economy is a model of consumption and production where the life cycle of products is extended, primarily thanks to a better environmentally friendly design that makes it easier to repair, reuse and reproduce old products, an improved durability, better waste management, and new business models based on leasing, sharing, repair and reuse. It stands in contrast to the traditional economy with new purchases and a 'use-and-throw-away' culture².

There are five basic principles of circular economy: Narrow, slow, close, regenerate and inform. The principles can be divided into strategies, called R-strategies. Principles and strategies are illustrated in **Table 1**. The R-strategies follow a hierarchical structure, which illustrates how the strategies should be prioritised. The R-strategies that have a low number should be prioritized over strategies with a higher number. It is important to consider the need to invest in new upholstered furniture, and if you have to invest in new upholstered furniture, it is important to choose upholstered furniture that has a long life both functionally and emotionally.

NARROW is about reducing resource consumption by using fewer products, components, materials and energy throughout the life cycle. This can be done by **avoiding** to acquire (newly produced) furniture, by **rethinking** interior design or by choosing furniture with a **reduced** material consumption.

SLOW is about reducing the speed with which we consume, for example, by **reusing** existing furniture or **buying second hand** furniture. If existing furniture cannot be used as is, its life can be extended through repair or **refurbishment**. Functional parts of the furniture can also be used to **reproduce** furniture with the same or **changed function**.

CLOSE is about closing the resource loop through **recycling** of the materials.

REGENERATE focuses on the use of methods that maintain the natural ecosystems, use renewable energy and non-toxic materials. There is a focus on design, where it is important to avoid toxic materials, both in the original design and production, as well as when there is a focus on the **reuse** of components and the **recycling** of materials. In production, renewable energy is an important energy source. The principle is indirectly related to several R-strategies, including **reuse, repair, refurbish, remanufacture, repurpose** and **recycle**.

INFORM refers to the use of **information technology** as support for circular economy activities. In the circular economy, a good data infrastructure is needed to support data being shared between different actors in the value chain. The principle is therefore indirectly related to all R-strategies, as it functions as a supporting element.

¹ The introduction of circular economy is primarily based on the work of the Ellen MacArthur Foundation, which has been one of the most significant driving forces in the promotion of circular economy (e.g. through the publication Towards the circular economy Vol. 1: an economic and business rationale for an accelerated transition, 2013), as well as Konietzko, Bocken and Hultink (A Tool to Analyze, Ideate and Develop Circular Innovation Ecosystems, Sustainability, 2020), and Kirchherr, Reike and Hekkert (Conceptualizing the circular economy: An analysis of 114 definitions, Resources, Conservation and Recycling, 2017).

² Source: <https://www.europarl.europa.eu/topics/da/article/20151201STO05603/den-cirkulaere-okonomi-definition-betydning-og-fordele>

Principle	Strategy	Definition	Example
NARROW	0: Refuse	Make the product redundant by abandoning its function or offering the same function with a radically different product.	Avoid buying new furniture if the need can be covered by your current furniture.
	1: Rethink	Intensify the use of the product, for example through sharing schemes.	If there is a lot of unused furniture because several people work from home, the layout can be rethought so that it is not necessary to have one office space per employee.
	2: Reduce	Increase resource efficiency in the production or use phase by using fewer resources and materials.	Choose products where a reduced or limited amount of (virgin) materials have been used.
SLOW	3: Reuse	Recycling products that are still in good condition and fulfill their original function.	Recycle existing furniture. There are several suppliers that offer used furniture as part of the portfolio.
	4: Repair	Repair and maintain defective products so that they can be used for their original purpose.	If a piece of furniture is broken, for example an armrest or textile part is loose, then repair the piece of furniture so that it works as intended again.
	5: Refurbish	Refurbish an old product so that it can be used again.	If, for example, the textile is faded or torn, but the furniture is otherwise functional, the furniture could be reupholstered.
	6: Remanufacture	Use parts from a discarded product in a new product that has the same function.	Table legs can be used again by simply replacing the table top.
	7: Repurpose	Use a discarded product or parts from it in a new product with a new function.	Used and cleaned upholstery can be given new life as clothes, bags and accessories.
CLOSE	8: Recycle	Recycle the materials for new materials of the same or lower quality.	Furniture produced from recycled materials, for example textiles from recycled polyester.
SHOULD BE AVOIDED IN CIRCULAR ECONOMY	9: Recover	Incineration with energy recovery.	Not relevant for the choice of upholstered furniture
REGENERATE	3, 4, 5, 6, 7 & 8	Using methods that maintain and sustain natural ecosystems, use renewable energy, and non-toxic materials.	Avoid chemical flame retardants when using wool, which is naturally flame retardant. Renewable energy as an energy source for production.
INFORM	All	Use information technology to support circular economy activities.	Digital platforms to support the R strategies 4 Repair, 5 Refurbish and 6 Remanufacture, through e.g. data management regarding use and information on maintenance.

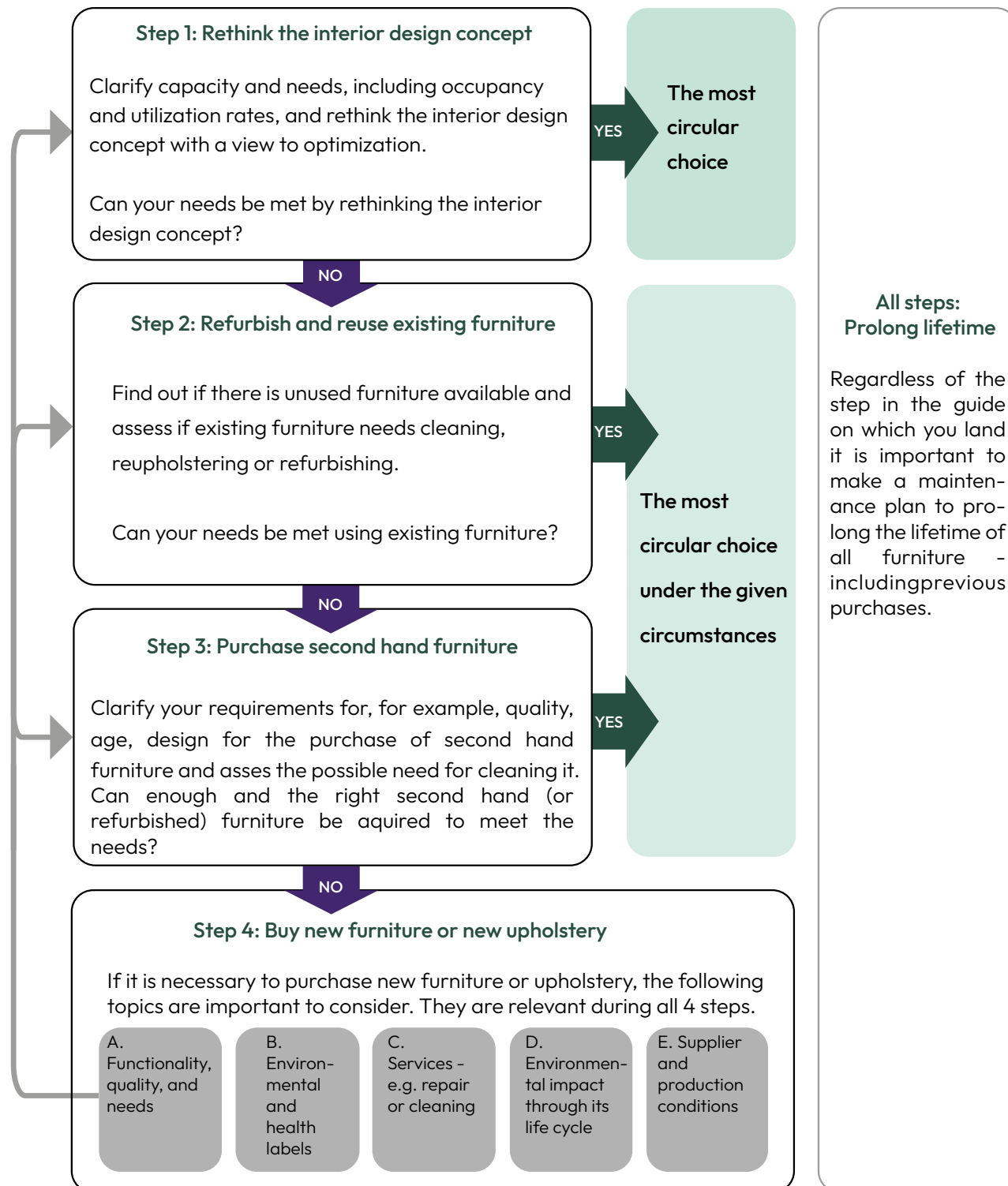
Table 1: Principles and R-strategies for working with circular economy¹.

¹ The table was prepared on the basis of Konietzko, Bocken and Hultink (A Tool to Analyze, Ideate and Develop Circular Innovation Ecosystems, Sustainability, 2020), and Kirchherr, Reike and Hekkert (Conceptualizing the circular economy: An analysis of 114 definitions, Resources, Conservation and Recycling, 2017).

DECISION TREE

FOR CHOOSING UPHOLSTERED FURNITURE

There can be several circular solutions when choosing an interior, a decision tree was therefore developed, which prepares you for the considerations you should make before and when you buy new upholstered furniture. Start at Step 1 in the decision tree, and read more about the individual steps on the following pages.



STEP 1: Rethink the interior design concept

If there is a new or changed need for furniture, Step 1 is to assess whether the premises can be furnished in a (new) way that meet the need, without buying new or reused. It requires that flow, workflows, occupancy rates and activity-based interior design zones be rethought. The benefit is savings on furniture purchases and operation (heating, lighting and cleaning), and at the same time it minimizes unnecessary resource consumption.

Capacity utilization of offices, meeting rooms, etc. is often underutilized, and free m² and furniture can be found if the interior design concept is rethought. Measurements of the occupancy rate for workplaces, meeting rooms, project rooms, etc. in Danish office environments show that the total occupancy and utilization percentage is often below 60% on average¹. Multifunctionality in the interior design also allows for better utilization of m². For example, meeting rooms are often in short supply, while canteens often stand unused for large parts of the day. If, for example, flexible screening can be integrated in the canteen, this could potentially be used as a meeting room.

It is recommended that you consider:

- Professional help to calculate the occupancy rate for the office environment and assess whether it is possible to increase it. Start with simple key figures on occupancy levels either through measurement via sensors, observations or data collected in office systems.
- Furnishing the office environment with 'free seating' or implementing a booking system that makes available capacity visible.
- How the design of the office environment can positively affect the working environment.
- How the interior should be in order to be long-lasting both functionally and stylistically (i.e., emotional durability).

STEP 2: Refurbish and reuse existing furniture

If capacity and furniture cannot be freed up by rethinking the interior design concept, then Step 2 is to investigate the possibilities of refurbishing and reusing existing furniture.

It is recommended that you consider:

- Uncovering whether there is unused furniture in storage, either in storage rooms or on other premises belonging to the company.
- If furniture, which is to be used for new needs, must be cleaned or sanitized before it is put into use. This is important for the indoor climate, as dust, dirt, pollen, viruses etc. accumulates in textiles and cannot be removed effectively enough by ordinary vacuuming.
- Repairing the furniture if it is broken or if a satisfactory result is not achieved by cleaning or sanitizing. Furniture can often be given new life by reupholstering, without it being necessary to change furniture frames and moving parts. Reused furniture can lead to large resource savings, including CO₂ savings². Examine the concrete savings on the websites of manufacturers and suppliers.

¹ Source: <https://spacewell.com/resources/research-and-insights/>

² Source: Castellani, Sala og Mirabella, 2015. Beyond the throwaway society: A life cycle-based assessment of the environmental benefit of reuse. Integrated Environmental Assessment and Management. Volume11, Issue3. Pages 373-382. <https://setac-onlinelibrary-wiley-com.zorac.aub.aau.dk/doi/full/10.1002/ieam.1614> and WRAP, 2011. Benefits of reuse Case Study: Office Furniture. https://wrap.org.uk/sites/default/files/2020-09/WRAP-Office%20Furniture_final.pdf

- Consulting the furniture or textile manufacturers regarding correct cleaning and repair. The manufacturers can also advise you on whether the furniture meets mandatory legal requirements, such as requirements from fire authorities.

Please note that there may be situations where the purchase of new furniture is considered a better solution, e.g. if it requires more resources to repair and maintain the product than is saved by producing a new furniture or for other reasons such as the user's health.

STEP 3: Purchase second hand furniture

If there is no usable furniture on the premises, it might be necessary to invest in new furniture. From a circular economy perspective, it is relevant to uncover the possibility of buying used, refurbished furniture instead of buying newly produced furniture. There can be large resource savings, including CO₂ savings, by buying used furniture, just as there can be financial savings on the furniture investment itself, as the initial depreciation on used furniture often results in large reductions in the purchase price. Find out about possible savings on the websites of manufacturers and suppliers.

It is recommended that you consider:

- The possibility to purchase or find used furniture that can cover the need.
- The need for cleaning and refurbishing the used furniture (as in Step 2)
- Consulting the furniture or textile manufacturers such that the furniture is cleaned and sanitized correctly to avoid the furniture being destroyed. The manufacturers can also advise you on whether the furniture meets mandatory legal requirements, such as requirements from the fire authorities.

STEP 4: Purchase new furniture

If your needs cannot be covered by Steps 1-3, and you therefore have to buy new upholstered furniture or new furniture textile for reupholstery, it is important that you choose the upholstered furniture or textile that matches your needs and the principles of circular economy. The considerations you should make include choosing a furniture or textile that can have a long lifetime, is produced with consideration for resource consumption, the environment and society, can be maintained and repaired and sent for recycling when it has served its purpose.

Context of use

More and more companies and public organizations and institutions are arranging themselves in an activity-based way, often referred to as Activity Based Workplace. Here, different interior zones are defined and mixed, determined by the given activity and context of use. Different types of activities and context of use influence the choice of textile on furniture.

Table 2 lists attention points and recommendations for different activity zones based on use intensity. Remember that there is a big difference between furniture and textile qualities, and consequently their maintenance needs. It is therefore important to contact manufacturers, dealers and professional furniture cleaning companies when in doubt.

There are use cases (e.g. certain departments in hospitals, specialist health sector, prisons and laboratories) which are not included in Table 2, where there may be special conditions that must be taken

Recommendations and points of attention related to intensity of use

	Light	Moderate	High
Activity zones	<ul style="list-style-type: none"> • Informal meeting rooms and lounge areas which are typically located in areas with less traffic. 	<ul style="list-style-type: none"> • Formal meeting rooms • Conference rooms • Personal, permanent workplaces • Quiet rooms 	<ul style="list-style-type: none"> • Canteens • Receptions • Public spaces • Lounge areas • Free seating areas
Points of attention	Covers a wide spectrum of furnishing and activity zones for informal meetings, relaxation or creative expression. Drinking and food intake are often a natural part of these zones.	Some of these meeting rooms will often have representative purposes, which may include food and drink consumption. This will cause more stains than on other textile furniture.	Often exposed to greater wear and tear, and may be exposed to food and drink spillage. There will therefore be various hygiene conditions that must be taken into account in connection with the choice of textile.
Recommendations	Large degree of freedom for choosing textile, colours, type and construction.	<p>Choose furniture of high quality and with high comfort, where aesthetics and design are given high priority, especially for rooms with representative purposes.</p> <p>Make sure that the textile has a texture so that it is easy to remove coffee and tea stains.</p> <p>Choose textiles for permanent workplaces so that they are suitable for office staff to sit down for approx. 6 hours daily, and which can be cleaned and/or cleaned at a fixed interval, depending on quality and type, for reasons of hygiene.</p>	<p>Choose textiles that are robust and resistant to dirt and wear (e.g. a tight weave), as well as suitable for continuous cleaning and cleaning.</p> <p>Avoid textiles that are delicate in color choice and construction.</p> <p>The choice of furniture textiles in these zones should be driven by practical considerations rather than aesthetic considerations. Choose fabrics that are less delicate and susceptible to visible stains.</p>

Table 2 Examples of activity zones based on intensity of use (light, normal, hard), as well as attention points and recommendations.

into account in the design, including hygiene, liquid penetration and risk of vandalism. Special needs, where, for example, liquid must not penetrate the upholstery foam or it must be possible to wash the cover, can often be met in the construction of the furniture. When choosing upholstered furniture in these situations, it is recommended to involve both furniture and textile manufacturers to get the most optimal and circular solution.

Additionally, the following topics should be considered (this applies to all four steps):

- A. Functionality, quality and needs
- B. Environmental and health labels
- C. Services
- D. Environmental impact through the furniture's life cycle
- E. Supplier and production conditions

A. Functionality, quality and needs

When you have to choose upholstered furniture or new textile for reupholstering used furniture, it is important to identify your needs, including the context of use and the function of the furniture. In addition, it is important to choose high-quality upholstered furniture that can last a long time. If you choose the right furniture and/or furniture fabric based on your needs and the function and quality of the furniture, the probability that the furniture will have a long life increases.

It is recommended that you consider:

- **The use of space and furniture:** How should the furniture be used and in what environment?
 - Is it a room with intensive, heavy use (e.g. a kindergarten)?
 - Is there a lot of foot traffic and turnover (e.g. a waiting room or large office)?
 - Is the room/furniture only used for short periods (e.g. conference or meeting rooms)?
 - Is there a risk of spillage and stains (e.g. canteens, cafés or lounge areas)?
- **The placement of furniture in the room:** Where should the furniture be placed in the room?
 - Is the furniture placed in dark (e.g. cinemas or concert halls) or bright (e.g. reception or conservatory) rooms?
 - Is the furniture placed close to entrance/exit doors and outdoor areas with an increased risk of spillage and staining?
- **Cleaning and maintenance needs:** What is the expected need for cleaning, removing and replacing textiles?
 - Is the furniture used in an area where staining is expected, and therefore a need for regular cleaning?

The following aspects influence the functionality of the product:

- **Fibers** have different properties (e.g. aesthetic expression, cleanability/washing properties, comfort) and are therefore well suited for different usages. **The text box** on the following page exemplifies how wool and polyester are particularly suitable for different situations.
- **Colors** can impact how long a piece of furniture is kept. It is important to consider personal/business preferences, as well as practical aspects. Melange colors are well-suited to reduce the visibility of traces of use and thus retain the original expression.
 - **Color fastness** indicates the textile's theoretical resistance to fading under various sources, such as light, rubbing or washing. The higher the fastness number (e.g. light-fastness), the less risk of fading.
- **Textile construction** can influence the textile's properties and in which environments the textile is best suited. The textile can be woven, knitted or non-woven. A tightly woven textile causes dirt and dust to settle on the surface of the textile and can therefore be ea-

sily removed by vacuuming. In addition, the construction of the textile influences, among other things, the wear and pilling properties of the textile.

- **Abrasion number** indicates the textile's theoretical resistance to wear and tear (thread breakage) during use. The higher the wear rate, the stronger the textile. It is important that the specifications are documented.
- **Pilling** indicates the theoretical tendency of the textile to "pill" (i.e. formation of clumps of fiber assemblies). The higher the pilling number, the less tendency to pilling. It is important that the specifications are documented.
- **Aesthetics** can impact how long you will be happy and satisfied with the furniture. The aesthetic expression depends both on the fibres, the colors and the construction.

Natural or synthetic fibers?

As upholstery fibers, wool and polyester are extremely suitable. Wool is a natural fiber with a number of natural properties that are advantageous in upholstery, and which can be achieved without the addition of chemicals. Wool is, for example, naturally dirt repellent, temperature regulating, aesthetically beautiful even through many years of use, naturally durable and longlasting. Polyester is an example of a synthetic fiber that is also often offered in a recycled version. Polyester is durable, often allows washing even at high* temperatures, aesthetically beautiful and lasts for many years.

*Always consult the specific manufacturer before washing the textile

The following illustrates two examples of context of use where different considerations must be taken

Examples

Kindergarten

It is advisable to avoid delicate colors (e.g. bright or white colours) in kindergartens. Instead, choose textiles that can withstand the sometimes hard use. It is also an advantage to choose a melange coloured textile, as it can hide dirt and stains to a greater extent. It may therefore also be relevant to choose a fiber that is either naturally dirt repellent like wool or allows washing in a washing machine (given that the cover can be removed) or cleaning, e.g. polyester. Textiles that are easy to clean can extend the life of the furniture. However, it is not recommended to add dirt repellent treatments to the textile. Consult the manufacturer about cleaning, and ask for information on how resistant the textile is to staining, and whether stains can be removed with a cloth and dishsoap in water.

Concert hall

In a concert hall, the aesthetic expression is of great importance, and it is advisable to choose a beautiful and iconic colour. At the same time, seating comfort is important to consider for furniture that is intended to be sat on for a long time. Therefore, natural fibers – especially wool, which is naturally temperature regulating – are relevant to consider. Additionally, it is an advantage to choose textiles with a high pilling rate, which can help ensure that the textile is kept aesthetically beautiful for a long time without generating fiber joints.

B. Environmental and health labels

When you choose upholstered furniture or new textile for reupholstering used furniture, it is important to uncover the environmental and health properties of the furniture or textile documented through relevant certificates, as described in the following **Text box**. If requirements for the product's environmental and health certifications are envisaged, the probability that the furniture does not cause damage to the environment or human health increases.

It is recommended that you consider:

- **Environmental labels:** Which recognized environmental labels does the furniture or textile have?
 - Is the product certified with e.g. EU Flower Ecolabel, Nordic Ecolabel The Swan, or other certificates?
- **Health labels:** Which recognized health labels does the furniture or textile have?
 - Is the product certified with e.g. EU Flower Ecolabel, Nordic Ecolabel The Swan, or other certificates?
- **Chemical content:** What chemistry is used in the furniture or textile, and is there documentation that the chemistry is not harmful?
 - Is there documentation that the chemical content is not harmful to the environment and health (e.g. safety data sheets (MSDS) or REACH declaration)?

Environmental and health labels

The EU Flower Ecolabel, and the Nordic Ecolabel The Swan are the EU's and the Nordics' official ecolabels respectively, which, among other things, sets requirements for pesticide use, use and discharge of harmful chemicals, presence of heavy metals, etc. Only products with a reduced environmental footprint throughout the product's life cycle compared to similar products can be certified.

Read more about the EU Ecolabel here: [EUBlomsten](#) and Nordic Ecolabel here: [Svanemærket](#)

Oeko-Tex Standard 100 tests for the presence in the finished product of a wide range of substances that have been assessed as harmful to the environment or health.

Read more about OEKO-TEX® Standard 100 here: [Oeko-tex](#)

C. Services

When choosing upholstered furniture or refurbishing used furniture, it is important to find out which life extending and take back services the supplier or other actors offer. The **Text Box** on the following page describes some of the services that suppliers offer. If it is possible to extend the lifetime of the furniture, then the furniture's relative environmental impact will be reduced (see more under point E. **The furniture's environmental impact**). If a take back scheme is offered when the furniture has reached the end of its useful life, the materials can be sent into circulation and thus contribute to closing the resource loop.

It is recommended that you consider:

- **Spare parts and replacement:** Are spare parts available and are they easy to replace?

- Is it easy to get spare parts in case of worn parts (e.g. wheel, gas cartridge, textile)?
- Is it easy to replace spare parts yourself, or does the supplier offer e.g. a service with regular inspection and replacement of wearing parts (e.g. reupholstery)?
- Does the supplier offer security of supply/redelivery of spare parts, if the need for e.g. more upholstered furniture of the same type or with the same expression is needed?
- **Take-back scheme:** Does the supplier offer to take back the furniture at the end of its useful life?
 - Does the supplier have a buy-back guarantee after the end of the useful life or certain interval?
- **Maintenance:** Does the supplier offer a maintenance service?
 - Is there a cleaning and maintenance guide for the furniture or the various parts (e.g. the textile)?
 - Does the supplier offer a maintenance service (e.g. regular cleaning)?
- **Warranty:** What warranties does the supplier offer?
 - Does the supplier offer quality guarantees that ensure longevity (e.g. 10-year guarantee against wear and tear)?

Services can increase the lifespan of furniture and ensure that the resource cycle is closed

Some suppliers offer solutions with lifetime extending services, such as a periodic inspection, where furniture is reviewed, including retensioning, wearing parts are replaced if necessary and the furniture is cleaned if necessary. It can be especially advantageous to purchase services to extend product lifetime in situations where the furniture is exposed to heavy use.

Some suppliers offer to buy back/collect used furniture when they have served their useful life with you, so that they can either be reused, repaired or recycled, as described in Table 1.

D. Environmental impact through the furniture's life cycle

When you have to choose upholstered furniture or new textiles for reupholstering used furniture, it is relevant to uncover the environmental impacts of the furniture and textiles throughout the product's life cycle. A basic principle is that the transition to a circular economy must be aimed at achieving minimal environmental impact, and it is important not to suboptimize¹. There are a number of conditions that have an influence on the environmental impacts, including especially design and material selection. In addition, it is important to consider the relative environmental impact of the furniture and textiles (e.g. the impact per year or per use), so that the real impact of services extending product lifetime can be assessed. The environmental impact of upholstered furniture can be measured with a life cycle assessment (LCA), which measures several environmental parameters, including consumption of fossil and renewable resources, energy and water, but also impact on climate, soil and water environment, acidification etc. The **Text box on the next page** provides further explanation of LCA and environmental product declaration (EPD). Feel free to consult with the supplier about the understanding of the environmental impacts, LCA and EPD documentation.

¹ With suboptimization, the environmental impact is improved at one point in the product's life cycle, but worsens at another point. If the entire life cycle is taken into account in the environmental assessment, such sub-optimizations are avoided.

It is recommended that you consider:

- **The furniture's environmental impacts:** What are the furniture's environmental impacts, and how do these look from your perspective?
 - How does the furniture's environmental impact compare to similar products (e.g. generally higher or lower, or higher on some parameters while lower on others)?
 - Which environmental parameters should be prioritized in relation to internal goals (e.g. climate and resource consumption)?
- **Documentation for environmental impacts:** What documentation is there on the furniture's environmental impact?
 - Is there an LCA or EPD?
 - Are the calculations verified by an independent third party?
 - Are the calculations carried out by a competent sender and are the reports transparent and published?
 - Ecolabels, including the EU Ecolabel and Nordic Ecolabel, as described in **B. Environmental and health labels**, are based on the life cycle approach, and can be used as a supplement in cases where an LCA or EPD is unavailable.
- **Life extension opportunity:** Which services are offered and what impact does these have on the relative environmental impact?
 - Does the supplier offer such services (e.g. regular inspection and maintenance such as cleaning, retensioning, replacement of wearing parts)?
 - Is there lifecycle based documentation for the environmental impact of product lifetime extension services (e.g. calculation of resource/water/energy consumption and climate footprint of such a service versus the production of a new piece of furniture)?

LCA and EPD

LCAs and EPDs can provide an overall picture of the potential environmental impact of upholstered furniture seen throughout the product's life cycle within a number of environmental impact categories, such as climate impact, water consumption, resource consumption, land use, acidification etc.

An LCA is an elaborate method based on extensive data collection, analysis and assessment. The LCA calculations and the report itself can be complex, so please consult the manufacturer for further elaboration.

The following aspects have a fundamental influence on the product's environmental impact:

- **Materials** and fibers have different environmental impacts. Aspects such as the expected lifetime of the fibers and their origin, including whether they are renewable, fossil, reused or recycled fibers, influence the product's overall environmental impact.
- **Design** can influence the furniture's absolute and relative environmental impacts. Aspects such as disassembling the furniture so that parts can be replaced, reused or recycled affect the overall environmental impact of the product. How the furniture is assembled, e.g. when using glue or clips, affects the property of the furniture to be taken apart, whereas (chemical) surface treatments, e.g. flame retardant, dirt repellent or water repellent treatment as well as mixing several materials limit the possibility of recycling the furniture.

It is advantageous to choose a textile that is constructed with only one fiber type, e.g. only polyester, as the recyclability is thereby improved. This contributes to a closed resource loop, as the textile can be recycled when it has served its useful life. The **Text boxes underneath** describe parameters that can affect the climate footprint of upholstered furniture and how the climate footprint can be estimated using complex calculations.

Climate footprint depends on time and quality

The longer an upholstered piece of furniture is used, the lower its relative climate footprint. From a climate perspective, it is preferable to use the furniture you already have. This also applies in relation to other environmental impacts, including resource and energy consumption. It is important that textiles and furniture are chosen in a quality that lives up to the intended function, as well as delivering emotional value: Choose something that you will be happy with for a long time. Quality and longevity are often linked. It may be that there is furniture with a low climate footprint in connection with production, but if the quality only allows use for 5 years – compared to a piece of furniture that can last for 10 years – the climate savings in production may be less significant.

The complex climate calculation

Many studies have been made of the importance for the climate and environment of using products for a long time instead of buying new ones, indicating that this is a good idea due to the environmental impacts associated with the material extraction phase, the production phase and the disposal phase¹. The general assumption in this guide is therefore also that if you, as a consumer, furnish rooms based on the principles of the circular economy – including reuse of furniture, use of recycled materials and implementation of life-extending services – it is possible to lower your overall climate and environmental impact.

Making a climate calculation is a complex task that involves collecting and handling data for resource consumption, energy consumption, production conditions, etc., and includes converting data into a figure for climate impact.

Such calculations can be based on a number of assumptions and influenced by different calculation methods, which can result in (significantly) different figures for climate impact – even for the same product². This is also the reason why no specific figures for climate impact are presented in this guide. Therefore, it is recommended to consult an expert in the field.

¹ See for example Iraldo et al. ([Is product durability better for environment and for economic efficiency? A comparative assessment applying LCA and LCC to two energy-intensive products](#), 2017, *Journal of Cleaner Production*), Ardente et al. ([Environmental assessment of the durability of energy-using products: method and application](#), 2014, *Journal of Cleaner Production*), <https://circularinnovation.ca/circular-business-models-product-life-extension/> as well as the individual manufacturers' websites, which often have calculations for their own products.

² Pizzol et al. ([Same product, different score: how methodological differences affect EPD results](#), 2024 *The International Journal of Life Cycle Assessment*)

E: Supplier and production conditions

When you have to choose upholstered furniture or new textile for reupholstering used furniture, it is generally important to assess supplier and production conditions, i.a. how the supplier takes responsibility for and works with quality, environment and sustainability aspects, and how the upholstered furniture is manufactured. In essence, it is about whether you trust the supplier to act with integrity.

It is recommended that you consider:

- **Documentation and certifications:** How does the supplier document its efforts in and responsibility for quality aspects (e.g. ISO 9001 certification), environmental aspects (e.g. ISO 14001 certification), and working environment (e.g. ISO 45001 certification)? See **Textbox** for more information.
- **Transparency:** Is the supplier transparent about the production of the upholstered furniture (e.g. where and how the furniture is produced)?
- **Availability of information:** Is information about the supplier and the product readily available?
 - Is the information available in physical form (e.g. brochures and information leaflets) and/or digital form (e.g. regularly updated website)?

ISO 9001, ISO 14001 and ISO 45001

ISO 9001 sets demands on organizations' work with quality management and is for many synonymous with a consistently high level of quality for products and customer dialogue.

ISO 14001 sets requirements for organizations' work with environmental management and structures the organizations' efforts to identify, manage, monitor and reduce environmental impacts.

ISO 45001 sets requirements for organisations' work with work-related health and safety for employees and visitors.

Ongoing maintenance

Regardless of which step is relevant for you, from a circular perspective it is important that you prepare a life-extending maintenance plan. In this section, a number of recommendations have been compiled for how you can best maintain and extend the life of your furniture.

Have a maintenance plan drawn up

Active and regular maintenance is important to maintain the appearance of the interior textile or furniture and extend its life. Dust and dirt can change the experience of colors and promote wear. It contributes to a poor indoor climate and also impairs the fire-retardant properties.

Correct maintenance and regular cleaning can extend the life of the furniture significantly (up to 4-6 years) and thereby reduce renovation costs, replacements and disposal.

Vacuum effectively

It is always better to prevent than to 'cure'. Frequent and thorough vacuuming is an important part of an effective maintenance plan that also focuses on the economy. By vacuuming effectively, you avoid loose and dry dirt penetrating the furniture and damaging and soiling the fibres. It is important that the vacuum cleaner has a HEPA filter or similar, as a good filter can retain even small particles, such as pollen, house dust mites and other PM2.5 particles¹, so that they are not recirculated in the room.

Remove stains immediately

Spilling is inevitable, but it doesn't have to leave permanent stains. The most effective way to remove stains is always to remove them immediately. It is recommended that:

1. Remove as much of the spillage as possible. Feel free to use a spoon or the back of a knife to remove viscous or solid substances.
2. If it is a dried-in stain, vacuum as much as possible before further treatment.
3. Use a clean, lint-free cloth and soapy water or lukewarm water to remove stains.
4. Work from the outside in towards the center of the stain to avoid spreading the stain out to make it larger.

Many stains require a special treatment or technique. Therefore, we recommend that you contact a professional for difficult or larger stains.

Which cleaning method should you choose?

There are many different cleaning methods on the market. The following is a review and a recommendation of the methods which, according to experience, are most effective in terms of lifespan extension, ensure a better indoor climate and preserve a beautiful and inviting interior textile.

Carbon dioxide cleaner - possibly added probiotics - RECOMMENDED

Cleaning with carbonic acid is done by applying a warm (65-75 degrees Celsius) pH-neutral strong carbonic acid producing aqueous solution to the furniture, which is worked into the fabric and absorbed.

Please note that no soaps, chemicals etc. are used that cause re-soiling and pollute the indoor climate. Only 1/10 as much water is used as with traditional cleaning, so soaking is avoided. At the same time, there will be a drying time of only 3-4 hours.

The method is suited to be combined with probiotics. The advantage of adding probiotics to the cleaning liquid is that a unique combination of the cleaning effect from the carbonic acid and the effect of the good microbes (bacteria) is created. When they encounter other microbes such as viruses, dirt, odors and food scraps, the good microbes take over the area so that bad (pathogenic) microbes cannot thrive and thus break down. And they keep doing it until there are no more bad microbes left.

¹ Read more about air pollutant particles here: <https://mst.dk/borger/affald-og-forurening/luffforurening/hvad-er-luffforurening>

Extraction cleaner - CAN BE USED

Extraction machines clean the textile by first spraying hot water and cleaning agent into the furniture under pressure and then the water, soap, cleaning agent and dirt are vacuumed out of the upholstery. This method is the most used cleaning method and provides a good absorption of loose dirt.

Be aware that excess soap, detergent and chemicals will be left in the furniture and will evaporate and attract dirt, leaving a greasy surface that causes rapid re-soiling. Moisture in the furniture will also attract dirt. There is a risk of incorrect processing and the drying time is long, typically at least a day.

Steam cleaning - NOT RECOMMENDED

In this method, water is heated to such a high temperature that it turns into steam. The steam is directed into the furniture through a nozzle or brush under high pressure. The method makes it possible to dissolve grease, dirt and bacteria on the surface.

Please note that there is no absorption of dirty liquid, which therefore accumulates at the bottom of the furniture. There is a high risk of incorrect processing, and the method must never be used on glued textiles, as it causes both glue slippage and glue penetration. At the same time, there is a potential risk of accumulated water causing mold and mildew at the base of a textile and upholstery.

Clean with regular intervals

Periodic cleaning offers a number of benefits:

- Ensures that the textile retains its colour, glow, texture and looks clean, neat and inviting.
- Effectively suppresses dust, pollen and allergens.
- Contributes to extending the lifespan of interior textiles by 4-6 years on the useful life, which postpones the need for reupholstery and new purchases.
- Good business case on TCO (total cost of ownership). Often, the cost of cleaning is paid solely via the life extension, i.e. cost-neutral, as you don't replace your furniture as often.

Table 3 lists recommendations regarding the maintenance of furniture textiles. It is always recommended that the recommendations are adapted to your specific circumstances, and that in consultation with the supplier or a professional provider of textile cleaning, a maintenance plan is drawn up for optimal care and maintenance of furniture and other textiles in the interior. Please note that the maintenance requirement depends on the specific furniture fabric chosen.

There are use cases (e.g. certain departments in hospitals, special health sector, prisons and laboratories) which are not included in **Table 3**, where usage can be extra hard, due to e.g. vandalism and risk of liquid penetration. Here, the cleaning and cleaning needs will be greater than described in **Table 3**. It is recommended to contact a professional cleaning and cleaning company for guidance on optimal cleaning and maintenance for the specific context of use.

Recommendations for maintenance of textiles by intensity of use

	Light	Moderate	High
Activity zones	<ul style="list-style-type: none"> • Informal meeting rooms and lounge areas 	<ul style="list-style-type: none"> • Formal meeting rooms • Conference rooms • Personal, permanent workplaces • Quiet rooms 	<ul style="list-style-type: none"> • Canteens • Receptions • Public spaces • Lounge areas • Free seating areas
Preventive measures Circulate the furniture so that the same piece of furniture is not always placed in the most popular places.	Every third year	Every second year	Yearly
Cleaning			
Vacuuming	Monthly	Every second week	Weekly
Stain removal	Continuously	Continuously	Continuously
Dry cleaning and maintenance			
Carbon dioxide cleaning	Every second/third year	Yearly/as needed	2-3 times yearly or as needed
Extraction cleaning	Recommended Can be used with care	Recommended Can be used with care	Recommended Can be used with care

Table 3 Recommendations regarding the maintenance of furniture textiles based on activity zones and intensity of use.