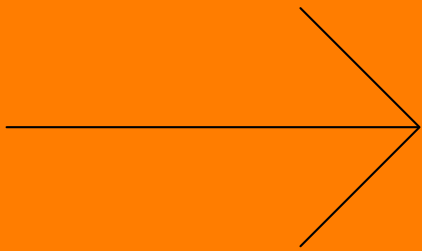


30 for 2030

DDC

*Knowledge
Base for
Circular
Economy*



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DDC

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Economics [...] is not a matter of discovering laws: it is essentially a question of design.

— Kate Raworth, Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist

For the Thirty Partners

In preparation for your contribution to 30 for 2030, we have prepared this brief to ensure we all have the same starting point and knowledge base on the circular economy. We hope that it provides the 30 with a solid understanding of the problem we want to address and find answers to. On a very general level, the document sketches out what we know from the circular economy concept. And it is also an attempt to take the temperature on what the circular economy looks like in Denmark today.

We know that the circular economy is a complex issue that can - and should - be approached from many angles. We insist on treating the circular economy as an innovation agenda that requires a new mindset among companies, consumers, and decision-makers. We see it as a systemic challenge that requires new collaborations across public, private, and civil sectors. And we see the circular economy as a new paradigm where results and success for companies and products are measured on entirely new parameters.

The target of 30 for 2030 is not to formulate policy recommendations or draw up new action plans.

The joint conversation for 30 for 2030 aims to raise our gaze together and create a clear and inspiring vision and direction for a circular change in Denmark. We want to make a motivating and engaging story about how Denmark can be a laboratory for the circular economy. And we want to inspire and mobilize more actors to participate in designing the transition to an irresistible circular society.

As one of the 30, your role is to qualify and strengthen the shared vision with all of your knowledge, experience, and dreams.

Thank you very much for your contribution.

Regards,

Julie Hjort

*Director of Sustainable Transition,
DDC - Danish Design Center*



Starting Point

In many ways, we have an excellent strategic starting point for the transition to a circular economy in Denmark; knowledge, capacity, political goodwill, and companies with the courage to make a difference and try out new business models.

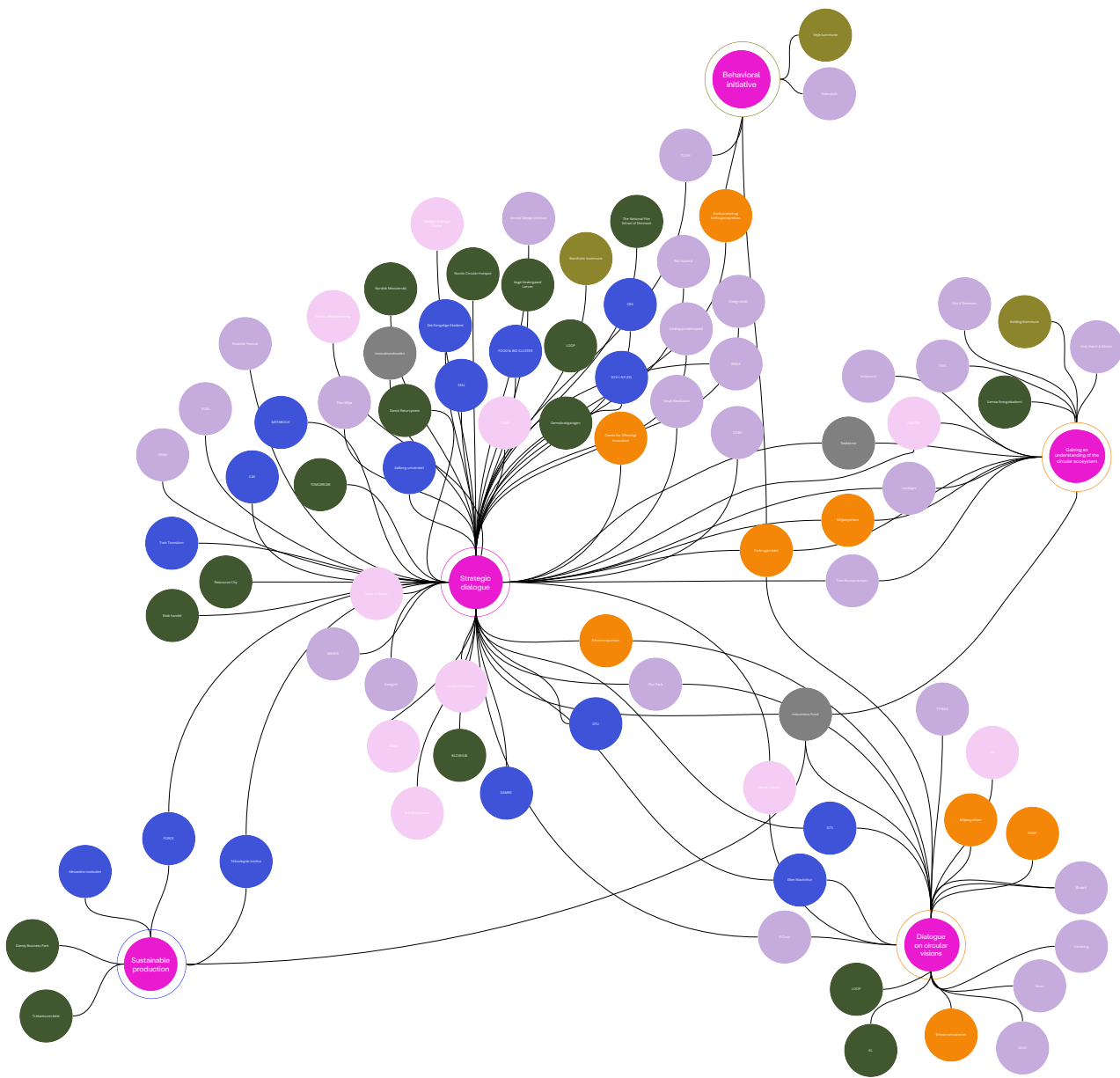
But the circular economy is also complicated, complex, and characterized by diverse actors with differentiated agendas. That makes finding a common starting point for dialogue and sparing about future initiatives and solutions challenging.

Therefore, to create a common ground that can be used as a starting point and with the help of relevant companies, organizations, and professionals, we have identified several indicators that help paint the picture of our status on the circular transition in Denmark (see actor landscape on p. 04).

This starting point must be challenged if we want to succeed in making the transition.

This document was first shared with our 30 partners on our 30 for 2030 initiative and mission to design our irresistible circular society in April 2022.





The above shows a sketch mapping of a selection of the circular ecosystem in Denmark, made in connection with the 30 for 2030 initiative.

The circles represent organizations centered around a specific workshop, initiative, or topic.

- National political actor
- Company
- Municipality
- Business promotion/association
- Knowledge actor
- Foundation
- Other actor

Each purple circle represents an initiative or topic that has been the focal point of the dialogue with the actors.



Our Understanding of the Concept – *Circular Economy*

The circular economy is a societal model in which economic growth is decoupled from resource consumption. The remedy is a more efficient use of resources. A circular economy challenges the idea of a linear value chain that starts with the extraction of resources and ends up as waste. Instead, products and value chains must be part of a circular economy and designed so that resources are used efficiently, the product's life is extended, and it can be reused, remanufactured, and recycled without losing value.

The circular economy also contains messages that manufacturers must see their products as material banks and resources for new products. [1]



[1] DAKOFA

Three Bottom Lines, Side by Side

At DDC - Danish Design Center, we believe it is a limited and inappropriate approach to accessing the circular economy through a narrow focus on materials and resources alone. To us, the work of accelerating the transition to a circular economy demands that we take an active stance on what kind of world we want to be a part of and, in addition, also ensure that a circular society is a balanced society.

Social, environmental, and economic benefits should be assessed at the same level. An overly narrow focus on material use and resources in the circular economy can overshadow other significant dimensions of sustainable change: namely, a focus on reducing greenhouse gas emissions and conserving and supporting biodiversity.

Therefore, it is necessary to focus on a broad type of value creation in our common transition to a circular society.



A circular economy is based on three principles that are driven by design [2]:

- **Eliminate waste and pollution**
- **Circulate products and materials**
(by maintaining as high a value as possible)
- **Regenerate nature**

We must support the three principles in a transition to renewable energy and the use of renewable materials.

“

We never can be fully circular, it is against the laws of physics, like things cannot be used and reused forever.

It is important that the regenerative principle is incorporated. We put lots of work into making that clear.

We should not make circular economy so technical. It is about how we can minimize the hazards; how can we keep things in high value in loops as long as possible.

— Amelia Kuch, Policy Insights Manager · Ellen MacArthur Foundation

[2] Ellen MacArthur Foundation · [link](#)

The Three Scopes

In the circular economy, we look at greenhouse gas emissions at three levels; scope 1, 2, and 3. Each level illustrates the point of the value chain where the emissions originate from [3]:

Scope 1) Direct greenhouse gas emissions coming from sources that are controlled or owned by a company/organization. For example fuel combustion in oil boilers, means of transport, and the like.

Scope 2) Indirect greenhouse gas emissions associated with the purchase of energy, e.g. electricity, steam, heating, or cooling consumed at the company/organization's facilities.

Scope 3) Indirect emissions, also called value chain emissions are the result of activities that are neither owned nor controlled by the company/organization, but which have an indirect impact on its value chain. Scope 3, thus, covers everything that scopes 1 and 2 do not, and scope 3 emissions from one company are another company's scope 1 and 2 emissions.

Often, scope 3 emissions represent the majority of a company/organization's total greenhouse gas emissions.

To implement a fully circular economy, it is essential to include scope 3 - i.e., work with the entire value chain.

[3] GHG Inventory Development Process & Guidance, EPA (United States Environmental Protection Agency) · [link](#)

Where Do We Stand on Circular Economy Today?

Circular Economy is Crucial in Cutting Down on the Global Greenhouse Gas

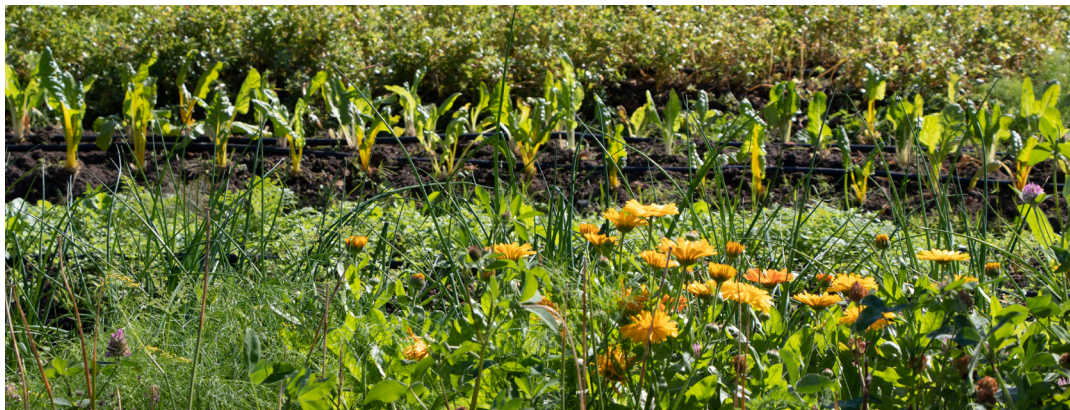
Globally, resource extraction and processing account for 90 percent of the total loss of biodiversity and water stress. Production and consumption of materials account for nearly 50 percent of global greenhouse gas emissions.

In other words, if one is to achieve a goal of an emission-free society, then a transition to sustainable energy only solves 55 percent of the problem. The remaining 45 percent must be taken care of through a circular economy that alters production, behavior, and consumption throughout society [4].

But the potential of the circular economy are often overlooked in Danish climate and environmental policy and are not a prioritized and integral part of the 70 percent reduction target.

Only 8.6 Percent of the World is Circular

The world is only 8.6 percent circular [5], and we are running out of resources and materials. In 2021, Denmark hit *Earth Overshoot Day* on July 29, and in 2022 it was March 28. On these dates, the earth's natural resources for 2021 and 2022, respectively, were exhausted - the rest of the year, the globe runs a deficit spending.



[4] Ellen MacArthur Foundation, Completing the Picture · [link](#)

[5] Circularity Gap Report 2022

The Political Agenda - a Strong Focus on Waste

There are several political strategies and action plans for the circular transition - nationally and globally, among others:

- The Paris Agreement
- The SDGs (especially SDG 12: Responsible production and consumption)
- European Green Deal: Full Circular Economy by 2050
- The extended producer's responsibility
- EU taxonomy
- Denmark's strategy for the circular economy - the Danish business community's transition to a circular economy in 2030
- National action plans e.g., for Waste and Resources
- The Climate Partnerships
- Innomission for circular economy, plastics, and textiles

To many, these policy objectives and the path to a circular economy may seem open and difficult to navigate. Several of the objectives have waste agendas as a dominant focus and/or a strong focus on a specific industry (such as textiles, plastics, or construction).

There have already been examples of innovative circular solutions showing the great potential in spanning industries and waste / material fractions - and not least actors and ecosystems.

Across the circular actor landscape, the political framework is, therefore, perceived by many as being fragmented and difficult to orient oneself in.

Lack of a Goal and a Direction

Circular economy is often considered difficult to understand and grasp. It usually ends up being used as an intellectual and technical concept that is seen as challenging to navigate.

Therefore, there is a lack of easy-to-understand, concrete and motivating goals for the circular transition - what does it look like when we succeed?

A shared goal is necessary to bring actors across industries and links in the production chains to create the chains of change that can accelerate the transition.

The Company in the Circular Economy

Only between 10 and 16 percent of SMEs work with the pervasive aspects of the circular economy, such as circular business models, value chains, take-back schemes, or the design of products that are easy to recycle.

Among companies, the most common way of working with the green and circular transition is to make production more sustainable and energy more efficient (scope 1).

The barriers inhibiting the company-wide transformation are lack of resources in the form of time and employees, uncertainty about the gains (in relation to climate, economy, etc.), and lack of capital. [6]

An economy can be made circular in many ways; thus, the circular future also consists of a wide range of solutions that complement each other. Among other things, this can be done by companies rethinking their business models, by the emergence of new value chain collaborations, or by consumers changing their behavior, for example, by leasing or renting products instead of buying them.

Furthermore, there are numerous examples of the great value in thinking in circular pathways from the beginning when developing business models from scratch in, e.g. start-ups.

[6] REG LAB: SUCCESFULD CIRKULÆR OMSTILLING I SMV'ER

Value Chains in the Circular Economy

For companies in specific industries, up to 90 percent of their greenhouse gas emissions are outside their direct control at various stages of their value chain (i.e., belonging to the scope 3 category). Therefore, we must think about resource consumption across value chains and sectors - also from a global perspective. This is relevant for the many small and medium-sized enterprises that are part of national and international value chains.

But 75 percent of the largest Danish companies lack objectives for scope 3 - and only 4 percent of the total Danish companies do reportings on scope 3. [7]

The Consumer in the Circular Economy

Denmark comes in ninth among the countries that consume the most. Consumers are critical in the circular economy - not only as buyers but because they become valuable co-producers and suppliers of future goods and raw materials. That requires the company to work with customer engagement above the traditional sales communication and marketing level. Customers must also be involved in the part that includes the use, care, reuse, and recycling. We do not yet know the circular consumer well enough and therefore cannot work actively to change the linear behavior patterns and, for instance, lower the level of consumption. [8]

[7] Dansk Industri
[8] Forbrugerrådet

The Cities in the Circular Economy

Cities consume the vast majority of the world's resources - up to 75 percent of the planet's natural resources are consumed in the cities. [9]

Similarly, cities produce 50 percent of all waste worldwide and emit 60 to 80 percent of the globe's greenhouse gasses. This is precisely why cities play a crucial role in developing sustainable and circular societal solutions.

To work across sectors and industries a systemic approach, with more holistic thinking, is crucial [10]. We need to rethink and redesign the city into a circular version of itself in close collaboration with the city's users and solution providers - who at the same time need to develop new ways of creating value on all three bottom lines within the cities. It is not just about economic gains and savings but also about creating social gains with a focus on the well-being of citizens and ensuring "liveability" and the good life in the cities.

“

To me, the circular economy is only one aspect of a sustainable future. Social value, green cities, and diversity are just as prevalent in my preferred future.

— Metabolic

[9] Arup

[10] Richardson, 2019

Design & Innovation

In Europe, Denmark takes the lead in the field of innovation, but we do not make full use of our strengths and are unable to adapt to an ever-changing global innovation landscape.

The primary challenges are a lack of coordination across the innovation landscape and a lack of structure to promote speed and agility. Elements that may prove to be crucial to the innovation needed to succeed in the circular transition. [11]

“

Denmark has a very good set up for both large companies but also small startups to test, try and innovate. There is a culture and a long history with innovation. Having these experiences, it is part of a mindset that is not seen in many other countries.

— Amelia Kuch, Policy Insights Manager · Ellen MacArthur Foundation

[11] University of Twente: *Peer Review of the Danish R&I System: Ten steps, and a leap forward: Taking Danish innovation to the next level* - [link](#)

“

The design tools help us broaden and organize our thoughts and think more of what we can do for this planet and people. This co-creation tool is an eye-opener.

— Company participating in the UrbanTech-program

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Putting something as unmanageable as circular economy into models and frameworks so that it is easy to understand and to work with is extremely commendable.

Company participating in the program, UrbanTech

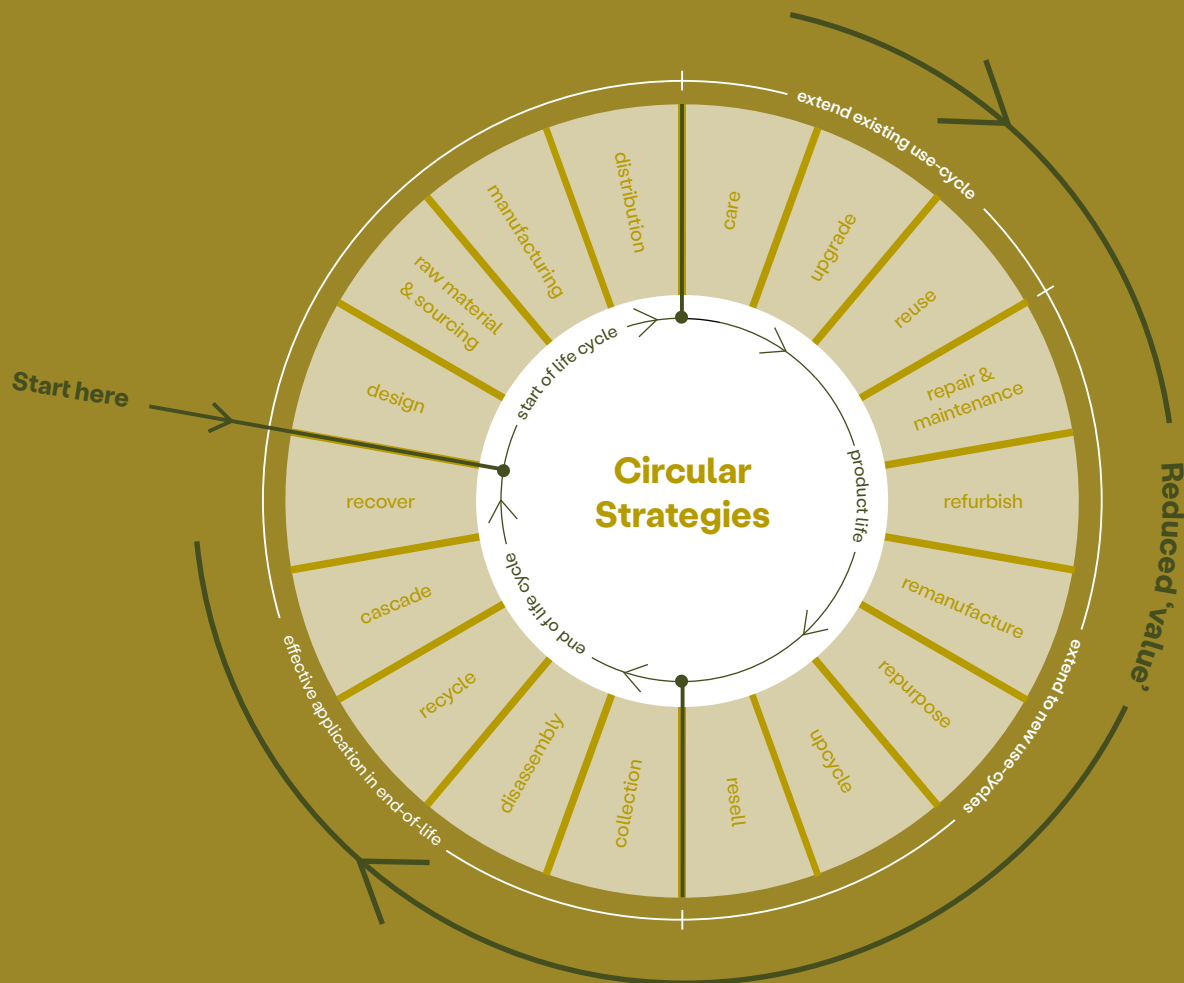
56 percent of Danish companies believe that competencies related to the design field are important in order to support the work related to the circular transformation in their company. 41 percent also point out that competencies to facilitate innovation and development processes are significant and 43 percent point out that competencies in the design and development of circular products or services are of great or very great importance for supporting the transition to a circular economy. [12]

[12] Design Delivers Green, a new survey conducted by the Danish Design Center and Epinion.

Transition to a Circular Economy

Companies need to transition to a circular economy. Business models and value chain collaborations need to be rethought. All raw materials and products must be able to go back into use and production cycles so that the value of the resources is utilized as much as possible throughout the product life cycle. This must happen by, for instance, products being designed differently from the start - they must be designed to be separated and mended, and business models must promote the use of leasing, renting, service and maintenance agreements, take-back, pay-per-use, and sharing models.

DDC



Denne illustration er udarbejdet af Dansk Design Center og er en del af det cirkulære toolkit - Designing Your Circular Transition. Værktøjet er blevet udviklet med inspiration fra 'Circular Business Model' af In Futurum samt forskningsprojektet, CIRCit Nord project.

Start of Product life

Design

Design of products is considered the first circular strategy and therefore priority as well as it influences the rest of the life cycle.

Circular design/eco-design involves the application of guidelines that involves a variety of guide of how to e.g. design for/with: dis-assembly, timelessness, emotional attachment, easy recognition of materials, non-toxic and, renewable/recycable materials, digital elements, as few incampatible and dissimilar materials as possible.

[13] EU Eco-Design Directive

Raw material & sourcing

Raw materials covers the selection of resources and materials that go into the products that is to become a part of your system.

When choosing materials, consider: durability, renewability, recyclability & secondary recyclability.

You can also consider aspects such as where the materials originate from and how the working conditions are for the people dealing with the materials (i.e. social sustainability aspects).

Manufacturing

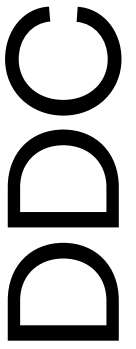
Manufacturing concerns improvement of circularity, efficiency and effectiveness in the product manufacturing and you can consider the following: favour cleaner production, efficiency, processes, equipment toxicity and other environmental aspects of handling material production waste.

Finally, you can also consider social sustainability aspects, design for reduced energy consumption and prioritising renewable energy.

Distribution

Considerations about distribution are e.g.; design for effective loading and transport which concerns transport of larger quantities at a time and stackable products. It also concerns return logistics, reduction of emissions linked to transport, choosing local suppliers, minimisation of the weight of components and selection of strong, robust and durable packaging with long lifespan that do not degrade during multiple transportation.

Product life



Care

Caring is about how to extend the lifetime of products as much as possible by (continuously) taking care of them during their use phase.

This is done by e.g. considering effective use along with procedures for caring to facilitate the extension of the lifetime of products.

Examples of this could be facilitation of emotional/personal attachment to products, educational videos, provision of care kits, manuals etc.

Upgrade

The product is still functional, but new changes, evolution and new features are added to extend the lifetime of products.

Upgrades can extend the product value by enhancing the function of an existing product to even beyond its original design condition.

Potentially, it can also reduce value loss from continued use of parts and products.

Reuse

Reuse of (discarded) products involves that they are still in good condition and fulfill original functions aiming to keep the product attractive to as many different users as possible, and for as long as possible and preventing it turn into waste. Reuse may involve minimum cleaning and repackaging. The reused product should still be functional, efficient, and attractive. People might reuse pre-owned products due to lower prices, patina or if they are better than new ones.

Repair & maintenance

Repair and maintenance involve thinking about how to correct, replace and/or fix broken/damaged components of a defective product aiming to maintain the original functionality to the same user and thereby extend the life time of products and reduce the need for new resources, avoiding waste and producing fewer emissions.

Repairing and maintenance can happen with different frequencies and also be part of a product/service-system.

Refurbish

Refurbishing is about repairing a returned product after a certain period of use so that it satisfies certain mechanical specifications and operating conditions within the limitations of what is considered acceptable by rebuilding or repairing major components that are close to failure - even if there are no reported failures in the components. The main difference from remanufacturing is that refurbishment is usually less rigorous and costly and involves less dis/re-assembly.

Remanufacture

Remanufacturing involves collecting and returning used products, disassembling, sorting, cleaning, inspecting, repairing and reconditioning, assembly, testing and finally combining and upgrading them with new parts to make products that both look and perform as new and can be sold as new.

Repurpose

Repurposing is about identifying new use phases for products (discarded/not in use) or their parts and use them in new/different contexts.

Repurposing requires thinking outside the box and possibly outside your industry.

When working with repurposing aspects consider e.g.: using durable and robust components and materials, easy and non-destructive disassembly and provision of manuals and relevant documentation.

Upcycle

Upcycling is about resuing or redesigning products, which often involves working in a creative manner in order to identify the second use scenarios or functions that the products/materials will become a part of in its new use phase.

Upcycling is about transforming bi-products, waste materials and/or unwanted products into new materials, components or products of same or even higher quality or value.

Resell

Strategies for reselling can e.g. involve collaborations with partners about enabling reverse logistics aiming to achieve take back systems or establishing sharing economies which are examples of business models that operate within the resell strategy.

Reselling can be placed earlier in the wheel and be a part of several steps in a circular business model.

End of Product life

Collection

Consideration about collection and sorting of products after the use stage(s).

These aspects are (and will be) influenced by laws and regulations on a domestic, european and international level.

Societies are moving in a direction towards increased demands within collection and sorting of different materials e.g. textiles, plastic, metals etc.

Disassembly

Design disassembly make it easier for products to prolong its useful life. It can also help ensure that products are being recycled and enable entire components to be reused. In fact, the degree to which your product can be disassembled often determines how the product will end its life. You can consider: at few parts and use of tools as possible, integrated instructions and minimal time for disassembly, easy inspection, identification of materials, direct re-use of parts etc.

Recycle

Recycle concerns recovery of waste material where it is being re-processed into (new) products, materials or substances - either for their original or another purpose.

Recycling destroys the energy and value that were placed into the product originally and adds additional energy and resources for the recycling process required - even more additional energy and resources are required to transform the recycled materials back into a new product.

Cascade

When cascading, new applications of processed materials usually have a lower demand for resource quality. It is important to consider the cascading process early in the design process.

A material starts its lifetime at the highest quality possible, and the quality of the material naturally declines over time. Every step of the cascade has a certain lifetime. The resource should be used in a new application before the quality is too low.

Energy recovery

Energy recovery occurs by burning materials when the material no longer fulfills a purpose of use. Energy recovery should only take place after materials have been recycled more than once. The biggest problem with recycling materials is the toxic fumes emitted by specific materials and additives added to products.



