

**Contemporary review with focus on sustainability and circular economy in the European Union, with in-depth chapters about plastic and metals**



RISE has identified that many of the Stakeholder Association's members (Intressentföreningen) are affected by the changes in legislation and policy around sustainability and circular economy that are taking place in the EU and Sweden. Thus, the purpose of this report is to give the Stakeholders' Association members an policy-overview around circularity and sustainability in the EU with in-depth chapters about plastic and metals.

## Swedish Summary / Svensk sammanfattning

RISE har identifierat att många av Intressentföreningens medlemmar (fd Swerea IF) berörs av de stora omställningarna kring hållbarhet som sker i vår omvärld. En pådrivande faktor är lagstiftning och policy som mer skarpt tar ett grepp om hållbarhetsområdet som ett led av FN:s 17 Hållbarhetsmål. Syftet med föreliggande rapport är därmed att ge intressentföreningens medlemmar en policyöversikt om cirkulär ekonomi och hållbarhet i EU med fördjupade kapitel om plast och metaller.

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Den 30 mars lade EU-kommissionen fram ett lagpaket inom ramen för den europeiska gröna given (The Green Deals) som ska få hållbara produkter att bli norm, främja cirkulära affärsmodeller och ge konsumenterna mer inflytande i samband med den gröna omställningen. Kommissionen föreslår nya regler som ska göra nästan alla fysiska varor på EU-marknaden mer miljövänliga, cirkulära och energieffektiva under hela deras livscykel, från det att de designas och genom daglig användning fram till dess att de antingen återanvänds eller är uttjänta.

Paketet innehåller också ett förslag om nya regler för att ge konsumenter mer inflytande under den gröna omställningen genom att se till att de är bättre informerade om produkters hållbarhet och bättre skyddade mot greenwashing. EU-kommissionen presenterade samtidigt en ny strategi som ska göra textilier mer hållbara, reparerbara, återanvändbara och återvinningsbara, motverka "snabbmode", textilavfall och destruktion av osålda textilier samt se till att de tillverkas med full respekt för sociala rättigheter. Ett annat förslag syftar till att främja den inre marknaden för byggprodukter och se till att det befintliga regelverket är lämpligt för att uppnå hållbarhets- och klimatmålen när det gäller den bebyggda miljön.

Förslaget till förordning om ekodesign för hållbara produkter, som ingår i ramverket, handlar om produktdesign, att införa nya krav för att göra produkter mer hållbara, tillförlitliga, återanvändbara, uppgraderbara, reparerbara, lättare att underhålla, renovera och återvinna, samt energi- och resurseffektiva. Alla reglerade produkter ska i framtiden ha digitala produktpass. Därmed blir det lättare att reparera eller återvinna produkter och enklare att spåra ämnen genom hela värdekedjan. Även märkning kan införas.

Förslaget innebär att de nuvarande ekodesignreglerna utvidgas på två sätt: dels för att omfatta så många produkter som möjligt, dels för att bredda tillämpningsområdet för produktkraven. I förslaget fastställs kriterier för inte bara energieffektivitet, utan också för cirkularitet.

Ett fördjupande kapitel om plast ser över policy och standarder som är relevanta för plastmaterial. Vidare har trenderna i framtida lagstiftning om plastavfall och materialanvändning utvärderats. Många menar att den nuvarande lagstiftningen är alltför fokuserad på insamling av avfall samtidigt som åtgärder för att främja design för återvinningsbarhet och användning av återvunnen material i produktionen saknas. EU-kommissionen har satt upp ett mål att "tio miljoner ton återvunnen plast ska hitta vägen till nya produkter på EU-marknaden senast 2025". Av över 27 miljoner ton plastavfall som samlas in i Europa varje år går mindre än hälften till återvinningsanläggningar.

Kapitlet om metaller ser också över relevant policylagstiftning och kommande riktlinjer. Inom metallindustrin har man länge arbetat med att minska sin materialförbrukning och öka användningen av återvunna råvaror. Men för att klara EU:s och Sveriges klimatmål om att minska koldioxidutsläppen med minst 80 % till 2050 behöver resursstrategierna förbättras ännu mer.

Slutsatsen är att för att nå cirkularitet är det viktigt att förstå ekosystemet för materialet, och lösningen är mer samarbete kring optimering av materialet och samverkansbehov för förbättrad sortering av olika typer av material.

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## 1) Background

***"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*<sup>1</sup>**

In 1987, the World Commission on Environment and Development (WCED), which had been set up in 1983, published a report entitled «Our common future». It developed guiding principles for sustainable development. Sustainability is the foundation for today's leading global framework for international cooperation—the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs, adopted 2015 by all United Nations Member States). These development goals recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.<sup>2</sup>

The Paris agreement, the legally **binding international treaty on climate change** was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015.<sup>3</sup> The goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century.

***The Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brought all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.***

Corresponding to the ambitions to combat climate change together with a growth strategy, the European Commission presented, in December 2019, its Communication on "**The European Green Deal**", one of its main priorities. **The aim is to make Europe climate neutral by 2050.**

The Green Deal defines future political proposals of significance for, among other things, energy, industry, the economy, agriculture, biodiversity and, one of the main ambitions, a more circular economy. And to accelerate the work towards a circular economy, the Commission adopted in 2020 the **new Action Plan for Circular Economy**, it is one of the main building blocks of the European Green Deal.

The new action plan announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented, and the resources used are kept in the EU economy for as long as possible. It also introduces legislative and non-legislative measures targeting areas where action at the EU level brings real added value.

This chapter will thus investigate the European Green Deal and the new Circular Economy Action plan and the actions that comes in line with these proposals.

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<sup>1</sup> Report of the World Commission on Environment and Development, Our Common Future, 1998

<sup>2</sup> Ibid

<sup>3</sup> The Paris Agreement, UNFCCC

## 2) The European Green Deal

The European Union's (EU) Green Deal is the EU's main new growth strategy to transition the EU economy to a sustainable economic model. The overall objective of the EU Green Deal is for the EU to become the first climate neutral continent by 2050, resulting in a cleaner environment, more affordable energy, smarter transport, new jobs and an overall better quality of life.

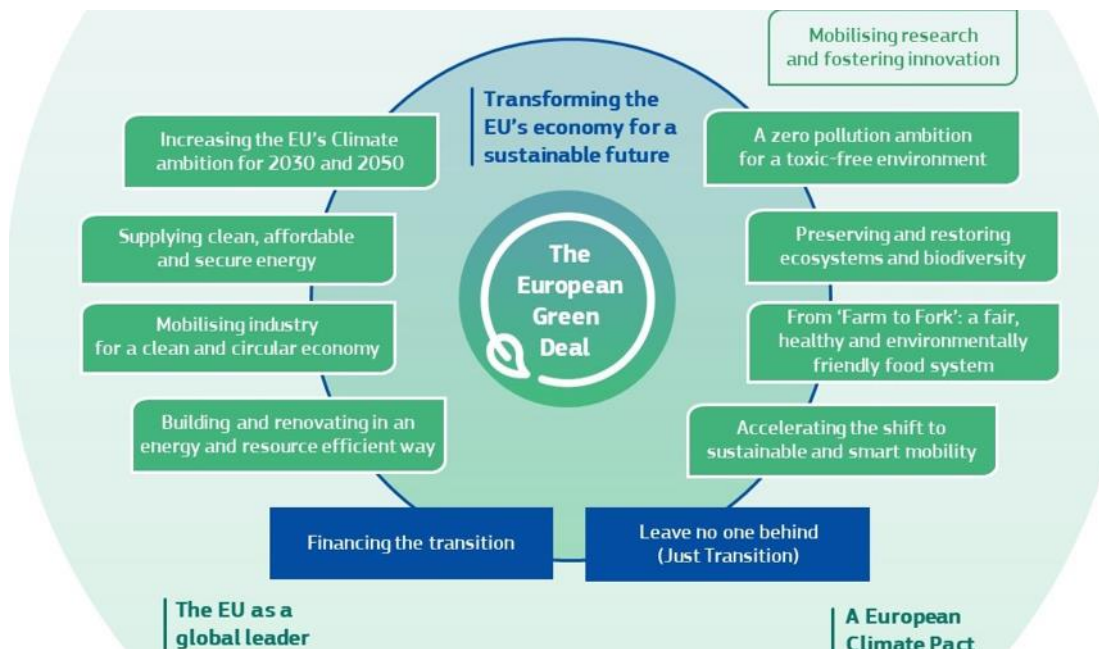


Figure 1 The European Green Deal

The European Climate Law requires that all EU policies contribute to achieving the EU Green Deal objective. As a result, the EU Commission are reviewing every EU law to ensure its alignment with the EU emission reduction targets, under the "Fit for 55 package" - a set of policy initiatives intended to help Europe achieve the goal of at least 55 percent net emission reduction by 2030. This process has already begun. A selection of the key legislation that the EU Commission proposes to revise considering the revised emissions reduction target is:

- the Renewable Energy Directive;
- the Energy Efficiency Directive;
- the Emissions Trading System;
- the Effort Sharing Regulation;
- the Land Use, Land Use Change and Forestry Regulation;
- the Energy Performance of Buildings Directive; and
- the Energy Taxation Directive

This review is intended to be effective by the time Member States begin updating their national energy and climate plans in 2023, so that these plans reflect the new climate ambition.<sup>4</sup>

<sup>4</sup> <https://www.nortonrosefulbright.com/en/knowledge/publications/c50c4cd9/the-eu-green-deal-explained>

Another important part in the Green Deal is the Just Transition Mechanism (JTM) - a key tool to ensure that the transition towards a climate-neutral economy happens in a fair way, leaving no one behind. It provides targeted support to help mobilize around €55 billion over the period 2021-2027 in the most affected regions, to alleviate the socio-economic impact of the transition<sup>5</sup>.

On March 31, the The Commission presented a package of European Green Deal proposals to make sustainable products the norm in the EU, boost circular business models and empower consumers for the green transition. As also announced in the Circular Economy Action Plan, the Commission is proposing new rules to make almost all physical goods on the EU market more friendly to the environment, circular, and energy efficient throughout their whole lifecycle from the design phase through to daily use, repurposing and end-of-life<sup>6</sup>.

The Commission has also presented a new strategy to make textiles more durable, repairable, reusable and recyclable, to tackle fast fashion, textile waste and the destruction of unsold textiles, and ensure their production takes place in full respect of social rights.<sup>7</sup>

A third proposal aims to boost the internal market for construction products and ensure that the regulatory framework in place is fit for making the built environment deliver on the sustainability and climate objectives.<sup>8</sup>

Finally, the package includes a proposal on new rules to empower consumers in the green transition so that consumers are better informed about the environmental sustainability of products and better protected against greenwashing<sup>9</sup>.

## 2.1 Industry and the Green Deal

Industry makes up more than 20% of the EU's economy and employs around 35 million people. It accounts for 80% of goods exports. Small and medium sized businesses (SMEs) account for over 99% of all European firms.<sup>10</sup> On 5 May 2021, the European Commission presented its updated industrial strategy, which will pave the way for European business policy in the coming years.

The new Industrial Strategy for Europe will lead the twin green and digital transitions and become even more competitive globally. It will help industry to reduce their carbon footprint by providing affordable, clean technology solutions and by developing new business models. With the updated Strategy based on the lessons learnt from the COVID-19 pandemic the EU aims to ensure that European industry can lead the accelerated green and digital transitions. To address these issues, the updated Industrial Strategy is proposing new measures to consider the lessons learned from the crisis and sustain investment. In particular, it focuses on:

- ✓ Strengthening of the resilience of the Single Market
- ✓ Supporting Europe's Open Strategic Autonomy through dealing with dependencies
- ✓ Supporting the business case for the twin transitions

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<sup>5</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en)

<sup>6</sup> European Commission, [New proposals to make sustainable products the norm \(europa.eu\)](#)

<sup>7</sup> European Commission, [Textiles strategy \(europa.eu\)](#)

<sup>8</sup> European Commission, [DocsRoom - European Commission \(europa.eu\)](#)

<sup>9</sup> European Commission, [Circular Economy: Commission proposes new consumer rights \(europa.eu\)](#)

<sup>10</sup> COM 2020 (102), Final, A new Industrial Strategy for Europe



Initiatives known as industrial alliances have produced good results in batteries, plastics and microelectronics.

- The European Battery Alliance (EBA) was launched in 2017 by the European Commission, EU countries, industry, and the scientific community. Batteries are a strategic part of Europe's clean and digital transition and a key enabling technology, essential to the automotive sector's competitiveness.<sup>11</sup>
- The European Clean Hydrogen Alliance supports the large-scale deployment of clean hydrogen technologies by 2030 by bringing together renewable and low-carbon hydrogen production, demand in industry, mobility and other sectors, and hydrogen transmission and distribution. It aims to promote investments and stimulate the roll-out of clean hydrogen production and use. Set up in July 2020, the European Clean Hydrogen Alliance is part of EU efforts to ensure industrial leadership and accelerate the decarbonisation of industry in line with its climate change objectives.<sup>12</sup>
- The European Raw Materials Alliance aims to build resilience and strategic autonomy for Europe's rare earth and magnet value chains. It will identify barriers, opportunities and investment possibilities in the raw materials value chain, while also addressing sustainability and social impact.<sup>13</sup>
- The Circular Plastics Alliance has committed to boosting the EU market for recycled plastics to 10 million tons by 2025.

Alliances on Low Carbon Industries, Industrial clouds and Platforms, and Raw Materials may follow when ready.<sup>14</sup>

In synergy with the objectives laid out in the Industrial Strategy, the Commission will enable greater circularity in industry by:

- assessing options for further promoting circularity in industrial processes in the context of the review of the Industrial Emissions Directive, including the integration of circular economy practices in upcoming Best Available Techniques reference documents;
- facilitating industrial symbiosis by developing an industry-led reporting and certification system, and enabling the implementation of industrial symbiosis;
- supporting the sustainable and circular bio-based sector through the implementation of the Bioeconomy Action Plan;
- promoting the use of digital technologies for tracking, tracing and mapping of resources;
- promoting the uptake of green technologies through a system of solid verification by registering the EU Environmental Technology Verification scheme as an EU certification mark.<sup>15</sup>

## 2.2 Circular Economy Action Plan

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<sup>11</sup> [European Battery Alliance \(europa.eu\)](https://ec.europa.eu/euro-observatory/en/european-battery-alliance)

<sup>12</sup> [European Clean Hydrogen Alliance \(europa.eu\)](https://ec.europa.eu/euro-observatory/en/european-clean-hydrogen-alliance)

<sup>13</sup> [https://ec.europa.eu/growth/industry/strategy/industrial-alliances/european-raw-materials-alliance\\_en](https://ec.europa.eu/growth/industry/strategy/industrial-alliances/european-raw-materials-alliance_en)

<sup>14</sup> A new Industrial Strategy for a globally competitive, green and digital Europe

<sup>15</sup> CEAP

The New Circular Economy Action plan is one of the main building blocks of the European Green Deal. The plan aim, amongst other aspects, to stimulate the development of lead markets for climate-neutral and sustainable products, in the EU and beyond.

Measures that will be introduced under the new action plan aim to:

- make sustainable products the norm in the EU
- empower consumers and public buyers
- focus on the sectors that use most resources and where the potential for circularity is high such as: electronics and ICT, batteries and vehicles, packaging, plastics, textiles, construction and buildings, food, water and nutrients
- ensure less waste
- make circularity work for people, regions and cities
- lead global efforts on circular economy

The Commission will in line with this propose a sustainable product policy legislative initiative. Priority will be given to high-impact product groups and action will include initiative on the common charger, a circular electronics initiative, sustainability requirements for batteries, and new measures in the textiles sector.

## EU Circular Economy Action Plan



Figure 2 The EU Circular Action Plan

The Commission will cooperate closely with stakeholders in key value chains to identify barriers to the expansion of markets for circular products and ways to address those barriers.

### Electronics and ICT

Electrical and electronic equipment continues to be one of the fastest growing waste streams in the EU, with current annual growth rates of 2%. It is estimated that less than 40% of electronic waste is recycled in the EU. To address these challenges, the Commission will present a 'Circular Electronics Initiative' mobilising existing and new instruments. The Commission will also address:

- regulatory measures for electronics and ICT including **mobile phones, tablets and laptops** under the Ecodesign Directive
- focus on electronics and ICT as a **priority sector for implementing the ‘right to repair’**
- regulatory measures on **chargers for mobile phones and similar devices**, including the **introduction of a common charger**
- improving the collection and treatment of waste electrical and electronic equipment<sup>16</sup> including by exploring options for **an EU-wide take back scheme to return or sell back old mobile phones, tablets and chargers**
- review of EU rules on **restrictions of hazardous substances in electrical and electronic equipment**<sup>17</sup> and provide guidance to improve coherence with relevant legislation, including REACH<sup>18</sup> and Ecodesign

### **Batteries and vehicles**

The Commission will propose a new regulatory framework for batteries. This legislative proposal will build on the evaluation of the Batteries Directive<sup>19</sup> and the work of the Batteries Alliance.

The Commission will also propose to revise the rules on end-of-life vehicles with a view to promoting more circular business models by linking design issues to end-of-life treatment, considering rules on mandatory recycled content for certain materials of components, and improving recycling efficiency. Moreover, the Commission will consider the most effective measures to ensure the collection and the environmentally sound treatment of waste oils.

### **Packaging**

The number of materials used for packaging is growing continuously and in 2017 packaging waste in Europe reached a record – 173 kg per inhabitant, the highest level ever. To ensure that all packaging on the EU market is reusable or recyclable in an economically viable way by 2030, the Commission will review Directive 94/62/EC to reinforce the mandatory essential requirements for packaging to be allowed on the EU market and consider other measures.

The Commission will also

- assess the feasibility of EU-wide labelling that facilitates the correct separation of packaging waste at source.
- establish rules for the safe recycling into food contact materials of plastic materials other than PET.
- strictly monitor and support the implementation of the requirements of the Drinking Water Directive to make drinkable tap water accessible in public places, which will reduce dependence on bottled water and prevent packaging waste

### **Plastic**

To increase uptake of recycled plastics and contribute to the more sustainable use of plastics, the Commission will propose **mandatory requirements for recycled content and waste reduction**

<sup>16</sup> Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), OJ L 197, 24.7.2012, p. 38.

<sup>17</sup> Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment, OJ L 305, 21.11.2011, p. 8.

<sup>18</sup> Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and establishing a European Chemicals Agency, OJ L396, 30.12.2006, p. 1.

<sup>19</sup> Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC, OJ L 266, 26.9.2006, p. 1.

measures for key products such as packaging, construction materials and vehicles, also taking into account the activities of the Circular Plastics Alliance.

### Textiles

Textiles are the fourth highest-pressure category for the use of primary raw materials and water, after food, housing and transport, and fifth for GHG emissions. March 30, 2022, the Commission proposed, an EU Strategy for Textiles, based on input from industry and other stakeholders. The Strategy implements commitments made under **the European Green Deal, the new Circular Economy Action Plan and the Industrial Strategy**, and aims to create a greener, more competitive and more modern sector, more resistant to global shocks.

The Strategy proposes actions for the entire lifecycle of textiles products, while supporting the ecosystem in the green and digital transitions. It addresses the way textiles are designed and consumed, including by looking also at sustainable technological solutions and innovative business models. The strategy will aim at strengthening industrial competitiveness and innovation in the sector, boosting the EU market for sustainable and circular textiles, including the market for textile reuse, addressing fast fashion and driving new business models

Some of the measures include<sup>20</sup>:

- New design requirements for textiles under the Ecodesign for Sustainable Products Regulation, setting mandatory minimums for the inclusion of recycled fibers in textiles, making them longer-lasting, and easier to repair and recycle. Under the proposed regulation, sustainable textiles products will become the norm in the EU. The proposal would also ban the destruction of unsold products under certain conditions, including unsold or returned textiles.
- Clearer information on textiles and a Digital Product Passport based on mandatory information requirements on circularity and other key environmental aspects.
- Tight controls on greenwashing, with stricter rules to protect consumers and direct links to the upcoming Green Claims Initiative.
- Action to address the unintentional release of microplastics from textiles. In addition to product design, measures will target manufacturing processes, pre-washing at industrial manufacturing plants, labelling and the promotion of innovative materials.
- Harmonised EU rules on extended producer responsibility for textiles, and economic incentives to make products more sustainable (“eco-modulation of fees”), as part of the revision of the Waste Framework Directive in 2023.
- Support to research, innovation and investments and to the development of the skills needed for the green and digital transitions.
- Addressing the challenges related to halting the export of textile waste.
- The co-creation of a Transition Pathway for the Textiles Ecosystem to establish the way forward and set out concrete step on how to achieve the 2030 goals set by the Textiles Strategy.

The Strategy also will also tackle micro-plastics; textiles made of synthetic fibres, such as polyester and acrylic, are one of the main sources of unintentional release of microplastics into the environment. These microplastics are shed at different stages of the product's life. The binding design requirements to be introduced under the **Ecodesign Regulation for Sustainable Products**, and the Commission initiative to address the unintentional release of microplastics in the environment in

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<sup>20</sup> European Commission, [EU Strategy for Sustainable and Circular Textiles \(europa.eu\)](https://european-council.europa.eu/media/e3000000/1/press-2022-03-30_en.pdf)

the second half of 2022, will both consider measures to prevent and reduce the unintentional release of microplastics. These may address product design, improved manufacturing processes, pre-washing at industrial manufacturing plants, labelling and the promotion of innovative materials.

Companies and manufacturers will need to integrate circularity principles in its business models, and minimise its environmental footprint. The Commission will support the sector in this transition, while engaging in a transparent Transition Pathway<sup>21</sup> with textiles economic actors. The Commission is also working on a common industrial technology roadmap on circularity, which aims to streamline industrial research and innovation, including on textile recycling. Financial support for the sector's transition will be available under Horizon Europe's European Partnerships, the LIFE programme, and the Digital Europe Programme for the development of skilled experts to support the textiles industry in its digitalisation.

### **Construction and buildings**

The construction ecosystem represents almost 10% of EU value added, and employs around 25 million people in over 5 million firms. The construction products industry counts 430,000 companies in the EU, with a turnover of €800 billion. These are mainly small and medium-size enterprises. Buildings are responsible for around 50% of resource extraction and consumption and more than 30% of the EU's total waste generated per year. In addition, buildings are responsible for 40% of EU's energy consumption and 36% of energy-related greenhouse gas emissions. Greenhouse gas emissions from material extraction, manufacturing of construction products, construction and renovation of buildings are estimated at 5-12% of total national GHG emissions. Greater material efficiency could save 80% of those emissions

The Commission will launch a new comprehensive Strategy for a Sustainable Built Environment. This Strategy will ensure coherence across the relevant policy areas such as climate, energy and resource efficiency, management of construction and demolition waste, accessibility, digitalisation and skills. It will promote circularity principles throughout the lifecycle of buildings by

- revise the **Construction Product Regulation, launched 31 March**
  - The revision of the Construction Products Regulation will strengthen and modernise the rules in place since 2011. It will create a harmonised framework to assess and communicate the environmental and climate performance of construction products. New product requirements will ensure that the design and manufacture of construction products is based on state of the art to make these more durable, repairable, recyclable, easier to re-manufacture<sup>22</sup>.
- promoting measures to improve the durability and adaptability of built assets
- **integrate life cycle assessment in public procurement and the EU sustainable finance framework**
- considering a revision of **material recovery targets set in EU legislation for construction and demolition waste and its material-specific fractions**
- promoting initiatives to **reduce soil sealing**

### **Food, water and nutrients**

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<sup>21</sup> The updated EU Industrial Strategy highlights the need to accelerate the green and digital transitions of the EU industry and its ecosystems. To that end, it proposes cooperation between industry, public authorities, social partners and other stakeholders. This co-creation process will lead to transition pathways for each ecosystem. [Textiles Ecosystem Transition Pathway cocreation process \(europa.eu\)](https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013)

<sup>22</sup> European Commission, [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_22\\_2013](https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013)

The Commission will aim at ensuring the sustainability of renewable bio-based materials, including through actions following the Bioeconomy Strategy and Action Plan.

The Commission will

- propose a **target on food waste reduction**, as a key action under the forthcoming EU Farm-to-Fork Strategy
- launch the analytical work to determine the scope of a legislative initiative on reuse to substitute single-use packaging, tableware and cutlery by reusable products in food services (under the sustainable products initiative)
- facilitate water reuse and efficiency, including in industrial processes.
- Develop a Integrated Nutrient Management Plan, with a view to ensuring more sustainable application of nutrients and stimulating the markets for recovered nutrients
- consider reviewing directives on wastewater treatment and sewage sludge and will assess natural means of nutrient removal such as algae

### 2.3 Sustainable Product Initiative

On 30 March 2022, the Commission adopted a package of measures to make sustainable products the norm in the EU. The proposals are central to achieve the objectives of the European Green Deal, and to implementing key strands of the 2020 Circular Economy Action Plan. They will contribute to reaching the EU's environmental and climate goals, doubling the circularity rate of material use and achieving energy efficiency targets by 2030.

Addressing the environmental impact of products throughout their life-cycle and extending their lifetime will lead to more sustainable, circular and more resource-efficient products in the EU. More sustainable products such as electronics, furniture and textiles will contribute to the resilience of the EU economy.

The Commission's initiatives on sustainable products aim to ensure that by 2030<sup>23</sup>

- a significant part of the products on the EU market are designed to be more durable and energy- and resource efficient, repairable, recyclable, and with preference for recycled materials
- companies from all over the world are able to compete on a level playing field without being undercut by others that leave society to deal with their environmental damage
- consumers have access to the information they need to make more sustainable choices, are better protected against practices harmful to the green transition and have longer-lasting products
- companies can access the data they need to ensure environmental sustainability and circularity of their products and business models

Key EU actions for circular and sustainable products

- design to reduce products' environmental impact
- improve product sustainability information for consumers and supply chain actors
- prevent destruction of unsold consumer products
- promote more sustainable business models
- increase green public procurement

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<sup>23</sup> European Commission, [https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/about-sustainable-products\\_en](https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/about-sustainable-products_en)

The proposed Ecodesign for Sustainable Products Regulation is the cornerstone of the Commission's approach to more environmentally sustainable and circular products. It is based on, and will replace, the current Ecodesign Directive<sup>24</sup> 2009/125/EC, which has derived improvements in energy efficiency and circularity of energy-related products for over a decade. Until this happens, the existing directive will continue to operate, including by implementing the new Ecodesign and Energy Labelling Working Plan 2022-2024, also adopted on 30 March 2022.

The Sustainable Products Initiative will also establish a **Digital Product Passport** (DPP) that gathers data on a product and its value chain. The objective of the DPP is to support sustainable production, to enable the transition to circular economy, to provide new business opportunities to economic actors, to support consumers in making sustainable choices and to allow authorities to verify compliance with legal obligations.

*The new "Digital Product Passport" will provide information about products' environmental sustainability. It should help consumers and businesses make informed choices when purchasing products, facilitate repairs and recycling and improve transparency about products' life cycle impacts on the environment. The product passport should also help public authorities to better perform checks and controls.<sup>25</sup>*

The information to be included in the product passport will be determined when preparing product specific rules and may include:

- environmental footprint of a product
- information useful for recycling purposes
- the recycled content of a certain material
- information about the supply chain

First product categories (most likely, but consultation to be held later during 2022):

- Textiles
- Furniture
- Mattresses
- Tyres
- Detergents, paints, lubricants
- Iron, steel and aluminium

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<sup>24</sup> The Ecodesign Directive provides consistent EU-wide rules for improving the environmental performance of products, such as household appliances, information and communication technologies or engineering. The directive sets out minimum mandatory requirements for the energy efficiency of these products. This helps prevent creation of barriers to trade, improve product quality and environmental protection.

<sup>25</sup> European Commission, [https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products\\_en](https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products_en)

## 2.4 The Green Claim Initiative

Today it is difficult for consumers, companies and other market actors to make sense of the many environmental labels and initiatives on the environmental performance of products and companies. There are more than 200 environmental labels active in the EU, and more than 450 active worldwide; there are more than 80 widely used reporting initiatives and methods for carbon emissions only. Some of these methods and initiatives are reliable, some not; they are variable in the issues they cover.

Another issue is greenwashing – companies giving a false impression of their environmental impact or benefits. Greenwashing misleads market actors and does not give due advantage to those companies that are making the effort to green their products and activities. It ultimately leads to a less green economy.

To tackle this issue, the European Green Deal states “Companies making ‘green claims’ should substantiate these against a standard methodology to assess their impact on the environment”.

The 2020 Circular Economy action plan commits that “the Commission will also propose that companies substantiate their environmental claims using Product and Organisation Environmental Footprint methods.”

It is important that claims on the environmental performance of companies and products are reliable, comparable and verifiable across the EU. Reliable environmental information would allow market actors – consumers, companies, investors – to take greener decisions.

This initiative has close links to other policies announced in the Circular Economy action plan:

- the revision of EU consumer law to empower consumers for active participation in the green transition
- a sustainable product policy initiative
- the farm to fork strategy

All these initiatives will seek to establish jointly a coherent policy framework to help the Union to make sustainable goods, services and business models the norm and to transform consumption patterns in a more sustainable direction. They aim to significantly reduce the environmental footprint of products consumed in the Union and contribute to the overall policy objective of EU climate neutrality by 2050.

## 2.5 Proposal for empowering consumers in the green transition and sustainable consumption of goods – promoting repair and reuse

In 2020 The European Parliament called on the Commission to make it easier for consumers and businesses to make sustainable choices, to establish a consumer right to repair and to amend the Sale of Goods Directive (‘the Directive’). The Council welcomed the initiative on the ‘**right to repair**’ with the aim to promote more systematic repairs, including beyond the liability period and at a reasonable cost. This initiative promotes a more sustainable use of goods throughout their useful



life. It will encourage consumers to make more sustainable choices by providing incentives and tools to use goods for a longer time, including by repairing defective goods.<sup>26</sup>

It will also:

- encourage producers to design goods that last longer and are easily repairable
- help reduce unsustainable consumption and its negative impact on the global environment and climate
- help build a circular economy

The initiative will also produce synergies with other initiatives such as those on sustainable products, circular electronics and the empowering consumers in the green transition, as well as with product-specific Eco-design implementing regulations.

The Commission also adopted its proposal for a directive on **Empowering Consumers for the Green Transition** on March 30, 2022. The proposal aims to ensure consumers get adequate information on products' durability and reparability before purchasing a product. In addition, it will strengthen consumer protection against untrustworthy or false environmental claims and premature obsolescence practices<sup>27</sup>.

#### **A new right for information on the durability and reparability of products**

The Commission is proposing to amend the Consumer Rights Directive to oblige traders to provide consumers with information on products' durability and reparability:

- **Durability:** Consumers must be informed about the guaranteed durability of products. If the producer of a consumer good offers a commercial guarantee of durability of more than two years, the seller must provide this information to the consumer. For energy-using goods, the seller must also inform consumers when no information on a commercial guarantee of durability was provided by the producer.
- **Repairs and updates:** The seller must also provide relevant information on repairs, such as the reparability score (where applicable), or other relevant repair information made available by the producer such as the availability of spare parts or a repair manual. For smart devices and digital content and services, the consumer must be also informed about software updates provided by the producer<sup>28</sup>.

## 2.6 End-of-Life Vehicles

The Directive on end-of-life vehicles set clear targets for ELVs and their components. It also prohibits the use of hazardous substances when manufacturing new vehicles (especially lead, mercury, cadmium and hexavalent chromium) except in defined exemptions when there are no adequate alternatives. The ELV Directive sets clear targets for their reuse, recycling and recovery and aims to

- prevent and limit waste from end-of-life vehicles and their components

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<sup>26</sup> [https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13150-Sustainable-consumption-of-goods-promoting-repair-and-reuse\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13150-Sustainable-consumption-of-goods-promoting-repair-and-reuse_en)

<sup>27</sup> European Commission, [https://ec.europa.eu/info/live-work-travel-eu/consumers/sustainable-consumption\\_en](https://ec.europa.eu/info/live-work-travel-eu/consumers/sustainable-consumption_en)

<sup>28</sup> European Commission - Press release, Circular Economy: Commission proposes new consumer rights and a ban on greenwashing

- improve the environmental performance of all economic operators involved in the life-cycle of vehicles

The Commission is currently reviewing the ELV Directive. This initiative proposes improved collection, treatment and recycling of ELVs. It aims to ensure consistency with European Green Deal objectives by encouraging the car industry to adopt a sustainable model for the design and production of cars. The Commission expects to present a legislative proposal for the review of the Directive in Q4 2022.

## 2.7 Sweden and Circular Economy

The Swedish Government has adopted a national strategy for a circular economy that sets out the direction and ambition for a long-term and sustainable transition of Swedish society. The core of the strategy is a vision: ***“A society in which resources are used efficiently in toxin-free circular flows, replacing new materials.”***

The national work for a circular economy in Sweden will focus on sustainable production and product design; sustainable ways of consuming and using materials, products and services; toxin-free and circular ecocycles; and the circular economy as a driving force for the business sector and other actors through measures to promote innovation and circular business models.

### **The Swedish strategy sets out four focus areas:**

1. A circular economy through sustainable production and product design.
2. A circular economy through sustainable ways of consuming and using materials, products and services.
3. A circular economy through toxin-free and circular ecocycles.
4. A circular economy as a driving force for the business sector and other actors through measures to promote innovation and circular business models.

### **Each focus area contains a series of more concrete measures to aim for. These include:**

- steering towards a situation in which products are designed to have a long lifespan;
- promoting greater use of toxin-free recycled materials in new products;
- strengthening the innovation and business climate so that more circular companies can grow;
- promoting the development of Sweden’s bioeconomy so that bio-based, renewable and sustainably produced raw materials can replace fossil-based raw materials in products and production processes;
- improving consumer information to make it easier for individual consumers to make sustainable and circular choices in their everyday lives;
- making it simple and profitable for business operators and private individuals to share, repair and re-use products;
- contributing to resource efficiency, recycling and circular business models through public procurement;
- designing policy instruments that contribute to greater supply of and demand for circular products and services, and re-used and recycled materials;



## 3. Plastics and plastic recycling

### 3.1 Background

A circular use of materials means that someone's waste is someone else's resource. As a response, waste legislation must be updated, as recyclability starts at the design state. Ambitions to build a circular economy means that legislation is continuously reviewed and revised both in Sweden and the EU. Within the EU there are several ambitious measures to promote circularity by promoting reuse and prevent waste generation, in line with the waste hierarchy.

The EU Waste Framework Directive defines a waste hierarchy (Figure 4), which is widely accepted. Waste generation should, firstly, be *prevented*, i.e., by reducing the quantity of waste or increasing the life-span of products. When waste is generated, it should primarily be *re-used* for the same purpose. Where this is not possible, *recycling* is the preferred option. The recycling operations should be ranked by their energy consumption as well as the quality of the output materials. Recycling operations should provide materials that may be used for the original or other purposes, which does not include reprocessing into substances that is used as fuels or for backfilling (where waste is used to substitute other materials). The latter use of waste is called *recovery* and includes energy recovery, i.e., by incineration. *Disposal*, by means of landfilling, is the least preferred option.



Figure 4, The waste hierarchy

The European Commission has set a target that **“ten million tons of recycled plastics find their way into new products on the EU market by 2025”**. Out of over 27 million tons of plastic waste collected in Europe every year, less than half goes to recycling plants. In 2020, about 6.5 million tons of recycled plastics were sold in Europe.<sup>30</sup> The Circular Plastics Alliance is an EU initiative where **300 organizations representing industry, academia and public authorities have joined forces to boost the EU market for recycled plastics. Within the alliance matching is done between** voluntary pledges from the supply side (producers and recyclers committing to place recycled plastics on the EU market) and the demand side (converters and brand owners committing to purchase recycled plastics).

<sup>30</sup> European Commission. [https://ec.europa.eu/growth/industry/strategy/industrial-alliances/circular-plastics-alliance/commitments-and-deliverables-circular-plastics-alliance\\_en](https://ec.europa.eu/growth/industry/strategy/industrial-alliances/circular-plastics-alliance/commitments-and-deliverables-circular-plastics-alliance_en). Accessed 2022-03-09

## 3.2 EU Directives applicable to plastic waste management and recycling

Within the EU several directives apply to plastic waste management and plastics recycling.

- Waste Framework Directive
- Packaging and Packaging Waste Directive
- Single Use Plastics Directive
- End of Life Vehicles (ELV) Directive
- Waste Electronics and Electrical Equipment (WEEE) Directive

The Packaging and Packaging Waste Directive is currently being revised and will be updated in mid-2022. Further, the ELV and WEEE directives are also to be revised shortly. It has been argued that **the present versions of these directives are too focused on collection of waste and does not guide neither towards design for recyclability nor use of recycled materials**. Hence, two important focus areas in the revisions are to **promote the demand and availability of recycled plastic materials and implementation of digital product passports**, documents that specify the composition of goods to enable recycling. Further, **product design is incorporated into the waste directives, to either increase the quality of recyclates or decrease the amount of waste by increasing the life-span of products, design for reuse or reduce the amount of material**.

### 3.2.1 Revision of the Packaging and Packaging Waste directive

The overall aim of the revision of the directive is that “all packaging on the EU market is recyclable or reusable in an economically viable way by 2030”.<sup>31</sup> The quote originates from the EU Circular Economy Action Plan which sets the direction for more circular value chains of key products, including packaging.

Some bullet points from the Circular Economy Action Plan regarding packaging are

- **Reduce (over)packaging and packaging waste**, including by setting targets and other waste prevention measures
- **Design for re-use and recyclability of packaging**, including considering restrictions on the use of some packaging materials for certain applications, in particular where alternative reusable products or systems are possible, or consumer goods can be handled safely without packaging
- **Increase the recycled content in packaging materials**
- **Reduce the complexity of packaging materials**, including the number of materials and polymers used.
- Establish rules for **safe recycling of plastic materials into food contact**

### 3.2.2 Revision of the WEEE Directive

According to the Ecodesign Directive devices should be designed for energy efficiency and durability, reparability, upgradability, maintenance and reuse. This is in line with the waste hierarchy, where an increased life-span of products decreases the amount of waste generated. Many of the planned actions regarding electronics and electrical devices are focused on Information and Communication Technology (ICT) such as computers, smartphones, and tablets. Materials recycling of plastics from

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<sup>31</sup> European Commission. 2020. Circular Economy Action Plan

WEEE is challenging due to the presence of hazardous substances such as flame retardants. The Commission plan to restrict the use of certain chemicals and provide guidance to manufacturers to better prepare the plastic material from WEEE for recycling. Some planned actions regarding WEEE, outlined in the Circular Economy Action Plan are

- Focus on electronics and ICT as a **priority sector for implementing the ‘right to repair’**, including a right to update obsolete software
- Regulatory measures on **chargers for mobile phones and similar devices**, including the **introduction of a common charger**, improving the durability of charging cables, and incentives to decouple the purchase of chargers from the purchase of new devices
- Improving the collection and treatment of waste electrical and electronic equipment<sup>22</sup> including by exploring options for **an EU-wide take back scheme to return or sell back old mobile phones, tablets and chargers**
- Review of EU rules on **restrictions of hazardous substances in electrical and electronic equipment** and provide guidance to improve coherence with relevant legislation, including REACH and Ecodesign.

### 3.2.3 Revision of the ELV directive

On the review of the ELV directive, Artemis Hatzi-Hull from the European Commission has reportedly stated that **the current form of the ELV directive has not led to better eco-design of cars, nor to use of recycled materials in the production of new cars.**<sup>32</sup> To increase the recyclability and decrease the amount of waste from vehicles, certain actions are expected.

- Inclusion of **more types of vehicles** in ELV, trucks, motorcycles, and buses.
- More effective **measure to ensure collection of end-of-life vehicles**, currently about 4 million vehicles are missing from the system each year
- The European Green deal identifies vehicles as one of the products where **“the Commission will consider legal requirements to boost the market of secondary raw material with mandatory recycled content”**
- **Specific and measurable targets for material recycling from cars**
- **Extended lifetime of cars** through repair, remanufacture and reuse

### 3.2.4 EU Circular Economy Action Plan & Plastics

The EU Circular Economy Action Plan is one of the main building blocks of the Green Deal and was adopted in 2020-03. The action plan “announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented [...] It introduces legislative and non-legislative measures [...]”

The action plan has a subsection on plastics with the following focus areas

- **Increased recyclability of products and use of recycled materials**

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<sup>32</sup> Auto Recycling World. <https://autorecyclingworld.com/review-and-renew-what-the-new-elv-directive-aims-to-change/> Accessed 20220302

- The Commission will propose mandatory requirements for recycled content and waste reduction measures for key products such as packaging, construction materials and vehicles
  - The Commission further plan to develop rules to measure the recycled content in products
- **Reduce littering**  
Measures are specified in the Single-Use Plastics Directive. Member states should:
    - Implement measures to reduce the overall use of single plastics
    - Prohibit placing on the market of certain single-use plastics such as cups, cutlery and cotton bud sticks. Special focus on products from expanded polystyrene.
    - Enforce EPR for certain product categories, where companies are obliged to pay for cleaning and information campaigns to reduce littering.
    - Enforce labelling on appropriate waste disposal and the presence of plastics on *i.e.* tobacco products and wet wipes.
    - Implement rules that certify that the cap or lid on bottles or containers remain attached to the container throughout the intended use.
- **Reduce the spreading of microplastics**
    - Restrict intentionally added microplastics in products
    - Developing labelling, standardisation, certification and regulatory measures on unintentional release of microplastics, including measures to increase the capture of microplastics at all relevant stages of products' lifecycle
    - Continue to develop and harmonize methods to measure unintentionally released microplastics,
    - Close the gaps on scientific knowledge related to the risk and occurrence of microplastics in the environment, drinking water and foods.
- **Bio-based and biodegradable or compostable plastics**
    - Develop a policy framework on sourcing, labelling and use of these types of plastics. The framework should be based on assessments of the genuine environmental benefits of such plastics in different environments.

### 3.3 Swedish directives applicable to plastic waste management and recycling

#### 3.3.1 Extended producer responsibility

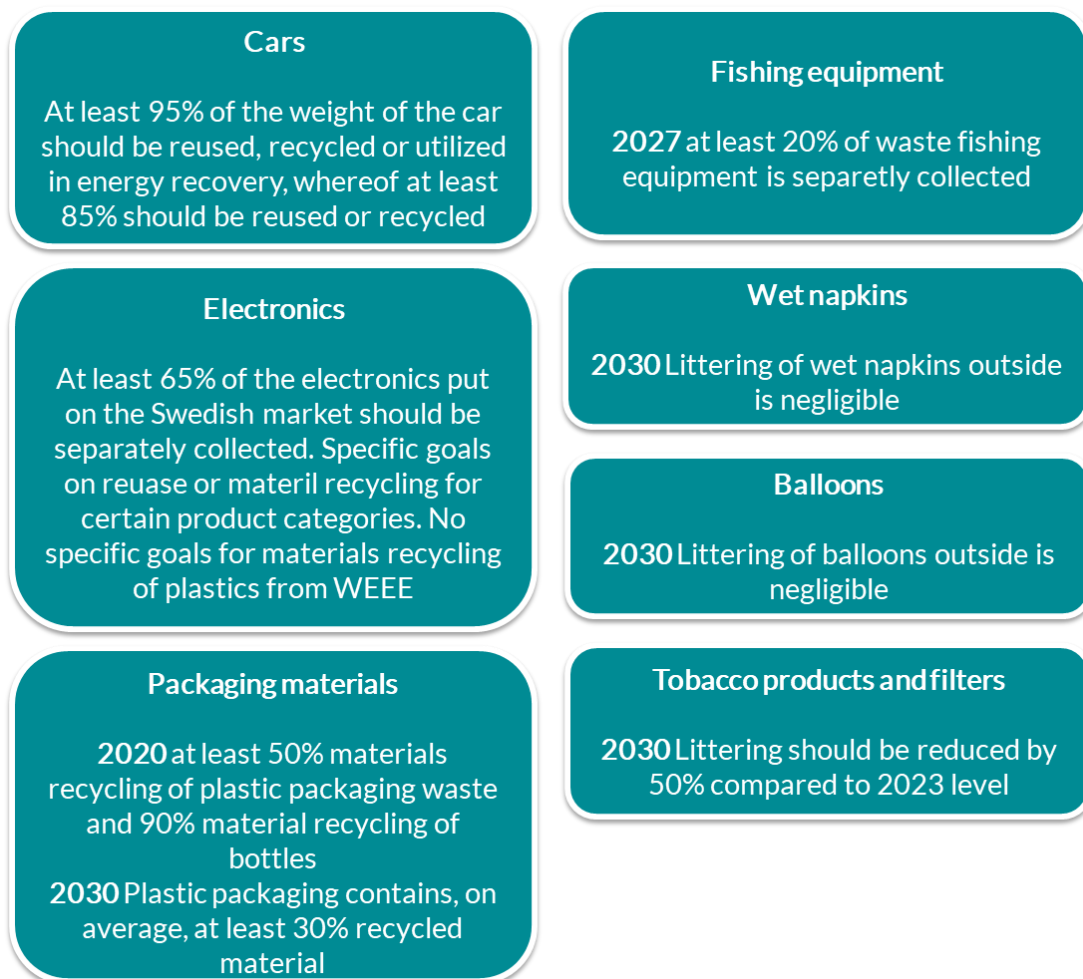
An extended producer responsibility (EPR) means that manufacturers and retailers have a responsibility (financial or physical) for the treatment or disposal of post-consumer products.

In Sweden today, EPR relevant to plastics is active for the product categories specified in Figure 5. All Swedish EPRs are based on EU Directives.



Figure 5, Summary of Swedish EPRs for products relevant to plastics

If a company fails to comply with EPR for their product area they may be charged with environmental sanction fees. Naturvårdsverket is the regulatory unit responsible for inspection and charging of such fees. In a recent commission, made by Naturvårdsverket on behalf of the Swedish government, with the aim to suggest means to increase materials recycling of plastics.<sup>33</sup> Naturvårdsverket suggest increasing the regulatory surveillance within the EPRs of Vehicles, Packaging materials, Tires and Electronics. National goals within the different EPRs are summarized in Figure 6.



<sup>33</sup> Naturvårdsverket. Uppdrag att föreslå åtgärder för att materialåtervinningen av plast ska öka. NV-09063-20. 2021



Figure 6, National goals for EPR of product categories including plastics

The EPRs for tobacco products, balloons and wet napkins was adopted 2022-01. As these are single use products the aim is to reduce littering rather than materials recycling. They are implemented as a response to the EU Single-Use Plastics Directive. Producer responsibility for fishing equipment comes into force in 2023-01.

### 3.3.2 Other national goals on materials recycling of plastics

Outside of the EPR there are national goals for recycling of plastic materials from other waste streams (Figure 7). These goals are in line with the 2018 revision of the EU Waste Framework Directive where the same goals can be found under article 11.



Figure 7, National goals for plastics recycling of construction material and municipal waste

## 3.4 Policy instrument

Naturvårdsverket has, on behalf of the Swedish government, analyzed three different policy instruments to promote materials recycling of plastics.<sup>33</sup>

- **Minimum quota of recycled plastics in specific products**

Legislative demands on the minimum weight% of recycled plastics within specific product categories.

- **Bonus Malus**

The principle behind the Bonus Malus system is that a penalty, malus, is issued when waste is created while a bonus is given after proven recycling into high quality materials.

- **Material recycling certificates**

Certificates will be issued to plastic producers relative to the weight of recycled plastic they produce. A minimum quota of recycled plastics in relationship to the total plastic use is issued by the state. Certificates can then be traded on an open market; hence the plastic recyclers have an income from sales of the actual recycled material as well as certificates. This could generate more money to the infrastructure of recycling and reduce the price of recycled plastics. A company producing plastic products which fails to reach their quota is issued a penalty.

Naturvårdsverket evaluated the potential of the different policy instruments to fulfill the objective of an increased materials recycling of plastics and their economic cost. **They concluded that from these three the “minimum quota of recycled plastics in products” had the strongest potential to fulfill the objective and could lead to a high environmental benefit. Strategic taxes were not analyzed as a**

**policy instrument within this evaluation but is a policy instrument that Naturvårdsverket considers cost efficient.**

Naturvårdsverket believes that a *minimum quota* will increase the demand for recycled plastics. An increased demand should allow for investments in processing and infrastructure of plastics recycling which will lead to a more stable availability, something that is lacking today. Further, as the recycled material will be used in products where it should have similar properties to virgin materials the application of *minimum quota* should also lead to an improvement in quality of recycled material. Naturvårdsverket stresses that a possible implementation of *minimum quota* should be harmonized on an EU-level to not interfere with trade regulations. Further, it is important to critically examine which product groups should be excluded to not risk contamination from recycled materials (*i.e.*, food packaging, medical products and pipes for drinking water).

A minimum quota of 30% recycled material in plastic packaging by 2030 has been suggested from several industrial associations, such as Plastics Europe, America's Plastic Makers and the American Chemistry Council. In line with this the Swedish government revised the Swedish EPR for Packaging materials in 2022 with a goal of 30% recycled material in plastic packaging by 2030. A faster implementation is initiated by the UK government where plastic packaging manufactured in or imported to the UK is taxed unless consisting of at least 30% recycled materials. The new tax will take effect from April 1st, 2022.<sup>34</sup>

### 3.5 Standardisation

A standard may contain product-performance requirements, describe how they may be tested or define the content of services and how they should be performed. It may also contain joint terminology or describe common symbols and signs. In Sweden the standardization body is SIS, in EU it is CEN and globally it is ISO.

Standards have traditionally been developed by the industry to facilitate trade by removing trade barriers, promote common understanding of a product, ensure that products and materials are tailored-made for their purpose, promote the interoperability of products and services and to assure the safety of products. Still, industry is driving standardization work, while there is an increasing interest from NGO's, researchers and even policy makers to participate in standardization work. "The broader competence in these diverse groups facilitates the formation of potentially more robust standards that may have a higher penetration into the market" says Kristin Geidenmark Olofsson, who works as director of regulatory affairs & strategic innovation at Trioworld and is the convenor for two working groups within standardization of plastics recycling.<sup>35</sup> "As a company it is essential to stay up to date with the current legislative initiatives and standardization within your market. If you participate in standardization work, you have the possibility to influence new standards within your sector. Both legislation and technology advances fast regarding plastics recycling, hence standardization work has to be highly agile."

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<sup>34</sup> Gov.uk <https://www.gov.uk/government/publications/introduction-of-plastic-packaging-tax-from-april-2022/introduction-of-plastic-packaging-tax-2021> Accessed 2022-03-08

<sup>35</sup> CEN TC 249 Plastics/ WG 11 Plastics Recycling and ISO TC 61 Plastics/ SC 14 Environmental Aspects/ WG 5 Mechanical & Chemical Recycling

The lack of standards on materials, products and processes from recycled plastics has been identified as a major hindrance for companies' use of recycled raw materials.<sup>36</sup> The European Commission has recently (2022-02) made a draft on standardization requests to the European Standardization Organizations, which, after feedback and remodeling will be issued by the European Commission.<sup>36</sup> The list includes a request on 10 new items to be standardized and updates on 11 existing items within plastics recycling. The standardization work should focus on four priority topics: 1) recyclability and design-for-recycling of plastic products; 2) characterization and classification of the quality of sorted plastics wastes 3) characterization and classification of the quality of recycled plastic materials; and 4) integration of recycled plastics in products.

The requests for new standards are centered around **design-for-recycling guidelines within several sectors; packaging, construction, automotive, electrical equipment and agriculture**. The standards should describe basic principles for qualitative and quantitative assessment of the recyclability in the early stages of product design. Characteristics to be covered are e.g. color, additives, size, material blends and ease to dismantle. Further, **standards for quality grades for sorted plastics waste and quality requirements for application of plastic recyclates in products** are requested. Grades should be based on pre-defined sets of measured characteristics, considering sectorial and market specificities and related information. The technical specifications for plastic recyclates in products should provide application grade requirements, with specific performance ranges for the relevant characteristics per quality grade or trading class, subdivided by market or product segment wherever necessary.

The requests for updates on standards are in **characterization of plastics waste and recyclates of PS, PVC, PE, PET and PP. Additionally, a new standard on characterization of ABS recyclates is requested**. Characterization of plastics waste should be revised to include standardized data sheets providing sufficient information on plastics recycling inputs from all waste streams for recyclers to estimate the characterization of recycling outputs made from these inputs. Similarly, for the plastic recyclates, standards are requested to provide standardized data sheets providing sufficient information on plastic recyclates (rHDPE, rLDPE, rPP, rPET, rPS, rEPS, rPVC) to estimate the technical specifications of the product in which they are subsequently integrated. Standardized data sheets should allow to differentiate between plastic recyclates for general purposes vs. plastic recyclates intended for integration into specific, pre-defined applications.

Further, **the concept of mass-balance is of major significance to how recycling of plastics will develop**. ISO/TC 308 are currently working on the development of **standards within mass-balance and book-and-claim**. The standards should provide standardized means to calculate the mass-balance between biobased/fossil and recycled/virgin materials. **There are several models to do this, and the phrasing of such standards is debated**. Some of the voluntary systems for mass-balance that are already in practice are based on a wide definition of mass-balance, the book-and-claim model, where a sustainability claim made by a company is separated from the physical flow of the goods. It is a common practice within the green energy sector where renewable and fossil-based electrons cannot be physically separated. For materials recycling however, the risk of green-washing using the book-and-keep model is raised, when credits for recycled goods can be transferred between both

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<sup>36</sup> European Commission. <https://ec.europa.eu/docsroom/documents/48814> Accessed 2022-03-02

products and countries. On the other hand, book-and-claim allows diverse downstream customers to create an aggregated demand. There are arguments that this could boost the recycling market to reach a critical mass, with broad adoption by commodity supply chains. Many environmental NGOs, like Zero Waste Europe, however, promotes a strict meaning to mass-balance with a strong chemical and physical traceability of recycled content and segregation of the recycled feedstock.<sup>37</sup> Further they advocate a batch level mass balance where the actual composition, recycled/virgin, of the recyclates are reported in the products sold. A similar, stricter, approach is advocated by Swedish companies Perstorp Holding AB, Trioplast AB and Sekab AB in a press release from 2020.<sup>38</sup>

### 3.6 Sustainable design

The recyclability of a product is established already in the design process. Naturvårdsverket has identified that **there is a lack of encouragement to design products for recyclability**. Instead, **legislation is focused on material collection**. In this section you will be guided in how to apply a sustainable design to your plastic products/details. You will learn how to make **products which are recyclable**.

**Recyclable** – *A product that can be separated from the waste stream through available methods or systems, processed and returned as raw material for use in a new product (ISO 14021, Miljömärkning och miljödeklarationer – Egna miljöuttalanden, Typ II miljömärkning)*

- Recyclability has the prerequisite that there is a **demand for the recyclate** and an **available infrastructure for its recycling**
- Recyclability implies that **processes for recycling must be available today**, not only theoretically possible

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<sup>37</sup> Zero Waste Europe. Booklet on Recycled content in plastics – the mass balance approach. 2021. [https://zerowasteurope.eu/wp-content/uploads/2021/05/rpa\\_2021\\_mass\\_balance\\_booklet-2.pdf](https://zerowasteurope.eu/wp-content/uploads/2021/05/rpa_2021_mass_balance_booklet-2.pdf)

<sup>38</sup> Sekab. <https://www.sekab.com/sv/pressmeddelande/sparbarhet-en-forutsattning-for-hallbar-massbalans-i-industrin>. Accessed 2022-03-14

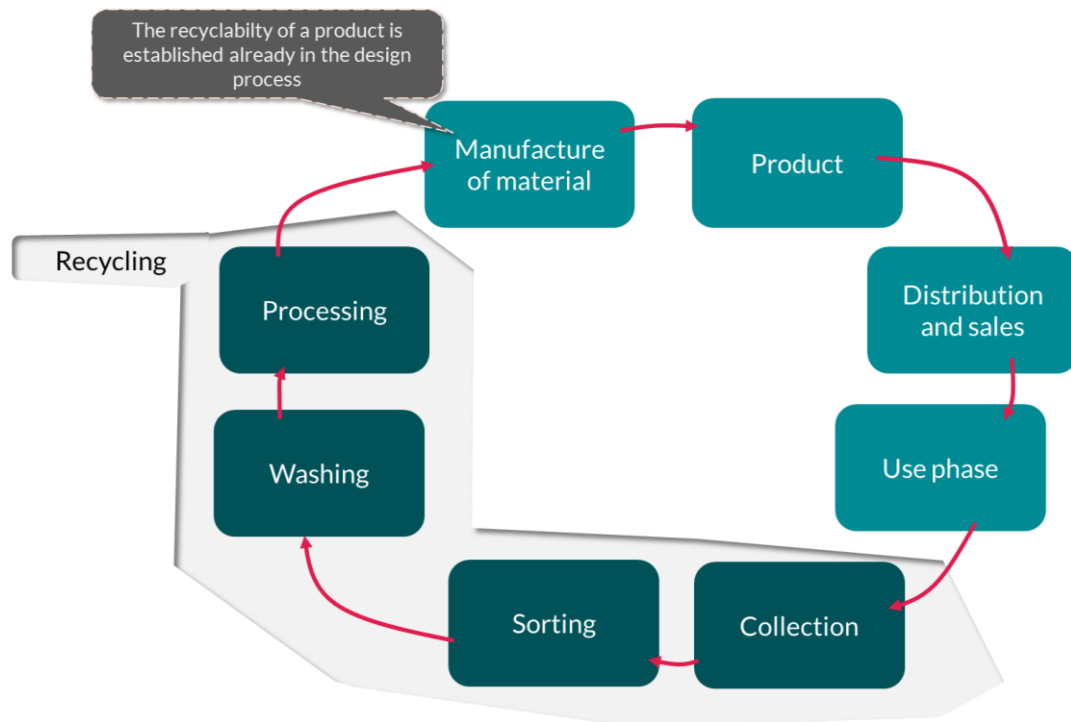


Figure 8, Life-cycle of a product

Keep this in mind when you design your product

- **Do not mix different types of plastics** in one product, they are typically hard to separate which contaminates the recycle.
- **Avoid dark colors**, as these obstructs the detection process in the separation step of recycling and lowers the value of the recycle.
- If possible, use a type of plastic that has a **value as a recycle**.
- **Design products for a long service life** and choose materials appropriate for the expected life length of the product. If applicable, **design for reuse**.
- Packaging materials: Use **adhesives that are water soluble** at moderate temperatures and **prints that may be washed away**.

Using recycled plastics in your products

Recycled plastics does not have the high and homogenous quality of virgin plastics. Typical problems are:

- **Spread in mechanical properties** between batches.
- **Color** – it is often hard to achieve light colors in recycled plastics which limits the coloring options.
- **Odor** – unwanted odors may emerge.
- **Contaminants** such as other types of plastics, oil or dirt may influence the mechanical properties of the recycle.

- Old products which are recycled may contain **regulated chemicals**.

# A guide to use recycled plastics



Do not get stuck in the material specification of your previous, virgin feedstock but focus on the need of the final product. By locking yourself in specific requirements many fractions of recycled plastics are irrationally excluded.



Which material properties are requirements and which are desires? Can you change the color of the product? Can you tolerate a mottled surface?



Recycling is not binary, there is no all or nothing scenario. Recyclate can be blended with virgin plastics. 20% recyclate is better than 0%.



Start with a simple product to build experience and knowledge on the recycled materials.



Learn from other producers and from the suppliers of recyclate.



Use the right plastics in the right place. The best qualities for the most demanding applications, while for some details demands may be lower.

## 3.7 Summary

In this chapter policies and standards relevant to plastic materials and their recycling has been reviewed. Further, the trends in future legislation on plastic waste and material use has been evaluated. The current legislation has been accused of being too focused on collection of waste while measures to promote design for recyclability and the use of recycled materials in production are lacking.

The European Commission has set a target that **“ten million tonnes of recycled plastics find their way into new products on the EU market by 2025”**. Out of over 27 million tons of plastic waste collected in Europe every year, less than half goes to recycling plants. In 2020, about 6.5 million tons of recycled plastics were sold in Europe. Bottlenecks in plastic recycling are known to be difficulties to find recyclate of good and stable quality at relevant volumes, and a difficulty to reach profitability for sorting and recycling of plastics.

Legislative means to boost the use of recycled plastics and minimize plastic waste can be divided into 4 different categories

- **Mandatory quota of recycled material in products**

A mandatory quota of recycled materials in products is predicted to lead to an increased demand and increased capability in the recycling system. The European Commission will propose mandatory requirements for recycled content and waste reduction measures for key products such as **packaging, construction materials and vehicles**. This will probably be implemented in the reviewed version of the waste directives. Further, UK are to **tax plastic packaging** manufactured in or imported

to the UK **unless consisting of at least 30% recycled materials**. The new tax will take effect from April 1st, 2022

- **Design for recyclability**

To optimize product designs for recycling is predicted to generate higher volumes and higher quality of feedstock material. The **quality of recycled materials is crucially dependent on the design of products**. The revision of the Packaging and packaging waste directive considers means to **reduce the complexity of packaging materials** i.e. the number of materials and different polymers used.

Some general advice in design for recycling

- Do not mix different kinds of plastic in one product
- Avoid dark colors
- Design for disassembly/dismantling
- If applicable, design for a long service life, and/or for reuse

- **Waste minimization**

By increasing the life-span of products, minimizing the amount of material used or design for reuse the amount of waste should be decreased. Electronics and ICT are a **priority sector for implementing the 'right to repair'**, including a right to update obsolete software. **Extended lifetime of cars** through repair, remanufacture and reuse are discussed within the revision of the ELV directive

- **Combat littering of plastics**

The Single-Use Plastics Directive state that member state should implement measures to reduce the overall use of single plastics. States should also enforce EPR for certain product categories, where companies are obliged to pay for cleaning and information campaigns to reduce littering and enforce labelling on appropriate waste disposal and the presence of plastics on *i.e.* tobacco products and wet wipes.

## 4. Metal

### 4.1 Background

The Eu has adopted a roadmap to cut emission to zero by 2050 (se chapter 1). The success factor includes forcing the industries both by legal forces (new laws, policies) and by consumer impact. The freedom of action from the industries point of view can be visualized by a funnel, there the industries must adapt new strategies to be profitable in the future. The aim with this chapter, is to explain the challenges that will come, both from extended competition in material and from legal forces. The challenges will most certain come more quickly than in the past. To manage future demand and be



more resilience the companies must work on strategies about the future business plan and future product portfolio.

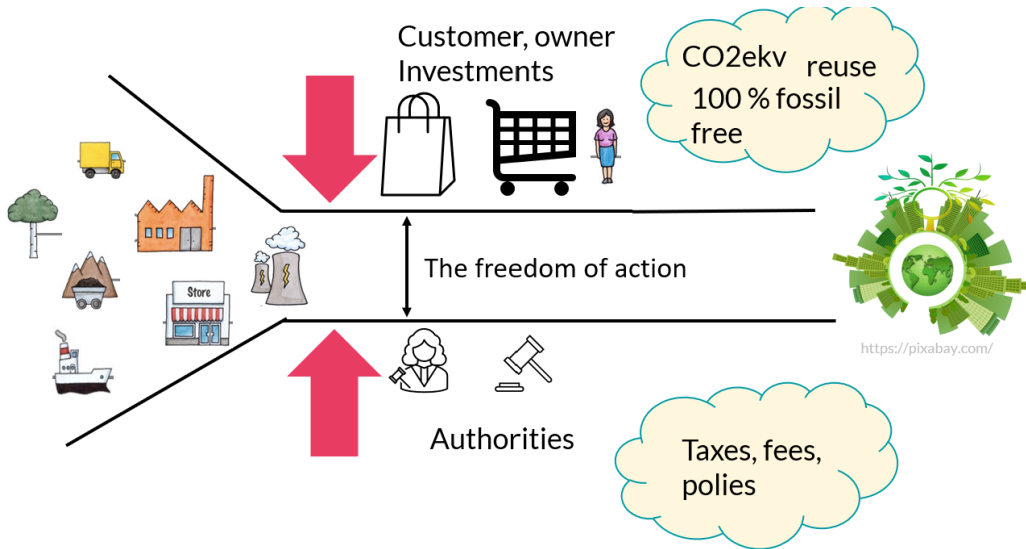


Figure 9: The freedom of action can be visualized by a funnel

## 4.2 Competition of material

Metals are an essential material and are used in technologies, products, and infrastructure. A fundamental property of metals is that can be recyclable many times without losing technical qualities. The industries has a long time been working with a shared roadmap.<sup>39</sup> Recycled metal is more resource-efficient than virgin metal and therefore providing environmental benefits as landfill savings and reduction of waste, emissions and energy.

The production has been working a long time to use metal more efficient by reducing losses in the production and produce goods that are lighter and therefore needs less material. Since melting metal demands a lot of energy, efficient production have contributed to that Swedish casting industries have better environmental performance, compared to many other companies abroad.<sup>40</sup> Mining activities contributes to pollution and demands a lot of energy. Although fossil-free virgin metal can be produced with new technic, the ability to reach de the environmental goal depends on the capability to increase the use of recycled metal.<sup>41</sup>

Compared to other material, metal have long-life span. Iron in building, for example, take decade before the metal returns to the material cycle. Overall, there are three types of material cycles, material that comes from internal production (new scrap stock), scrap in the open market (scrapmarket), and scrap from end-of life,. Scrap that assessed to be non-recyclable in the country

<sup>39</sup> Jernkontoret, "Klimatfärdplan: för en fossilfri och konkurrenskraftig stålindustri i Sverige.", Jernkontoret, Stockholm, D869, 2018. Åtkomstdatum: 30 april 2021. [Online]. Tillgänglig vid: <https://www.jernkontoret.se/globalassets/publicerat/stal-stalind/klimatfardplan2018-1-web.pdf>

<sup>40</sup> P. Nayström och S. Gjuteriföreningen, "Klimatpåverkan av gjutgods", Gjuteriföreningen, Jönköping, 2020-001\_, 2020. [Online]. Tillgänglig vid: [www.gjuteriforeningen.se/](http://www.gjuteriforeningen.se/)

<sup>41</sup> "Major metals demand, supply, and environmental impacts to 2100\_ A critical review | Elsevier Enhanced Reader". <https://reader.elsevier.com/reader/sd/pii/S0921344920304249?token=D266B2BE0E1F13AEAE8C876552240CC21F5A45D73FE8127E573B6D0217FB79F170AC03AC5D174CE20F57C70BBDD07A4C&originRegion=eu-west-1&originCreation=20210901112711> (åtkomstdatum 01 september 2021).



are exported or ends up in landfill.<sup>42</sup> This means that much of the material flows still depends on virgin material, to replace material that becomes waste that doesn't returns to the material cycle.

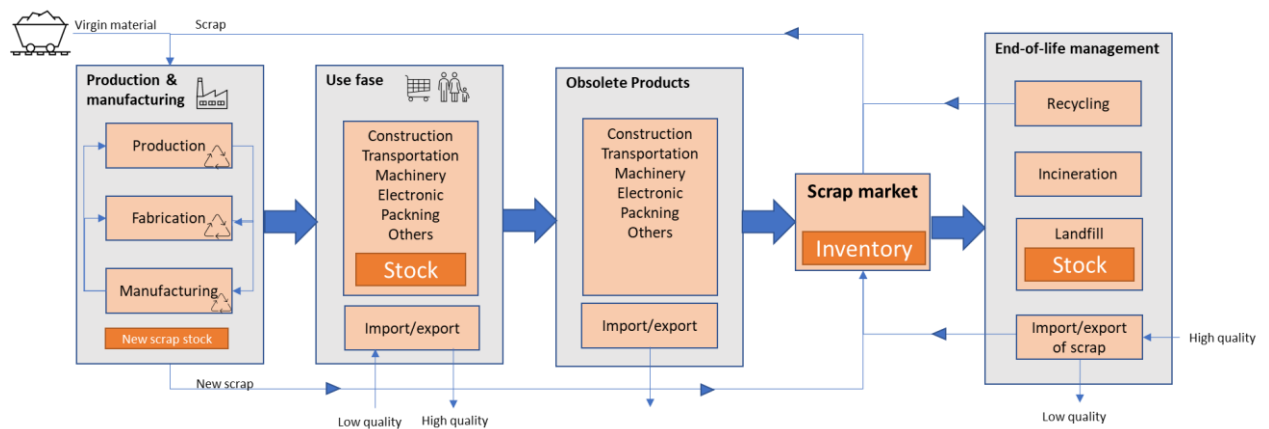


Figure 10, Metals that disappear from the material's cycle need to be replaced by virgin material.

### 4.3 Production and manufacturing

Metal with high technical requirement can be produced with less material and have a longer lifespan and therefore is more resource efficient both energy and material.<sup>43</sup>

There is a compositional mismatch between the demand of reused scrap with good quality, ie little impurities or known amount of alloys, and the availability of scrap in the scrap-market. Metal scrap that doesn't have become products, consist of material with known technical and alloy-information and are easy to reuse. The driving forces to get hold of this internally scrap is high and create business relations, with companies nearby and therefore this scrap rarely reach the open scrap-market.<sup>42</sup>

Another feature of metals is that they are hardly ever used in pure forms but are often mixed with different alloys for different applications and technical demand. The compositional mismatch between virgin metal/alloys and the availability of scrap means that the scrap must be diluted with pure metal and alloys.<sup>44</sup> More impurities in the scrap entails that more virgin material must be used but also a higher risk that production-disruption. Wrong content of alloys can destroy a whole batch which results in higher costs and demand of resources for remelting metals, transportation i.e.<sup>45</sup>

The ability of reusing scrap internally differs between different foundries and the type of material used. But overall, a simplification is that the casting-industries and of steel and iron goods are more used to reuse the internal scrap and sweeten it with new and pure scrap, metal and alloys. Casting

<sup>42</sup> Bom, M. 2021. Gjuteriföreningen "Förstudier Materialförsörjning stål". Gjuteriföreningen, Jönköping, 2021-06, 2020.

<sup>43</sup>LIGHTer. "Vad är lättvikt och varför? | LIGHTer". <https://lighter.nu/sv/meny/om-sip-lighter/vad-ar-lattvikt-och-varfor>

<sup>44</sup> J. Tan, M. V. Wehde, F. Brønd, och P. Kalvig, "Traded metal scrap, traded alloying elements: A case study of Denmark and implications for circular economy", Resources, Conservation and Recycling, vol. 168, s. 105242, maj 2021, doi: 10.1016/j.resconrec.2020.105242.

<sup>45</sup> Å. Lauenstein och L. Sibeck, "Processtyrning i stålgyteriet och renhet hos legeringsämnen. Slutrapport", Svenska Gjuteriföreningen, Jönköping, GF2019-2032, 2019.

with other metals, as aluminum, are more used to handle pre-alloyed metal, and don't have the same ability to by scrap since they are not used to model the metal-composition<sup>46</sup>.

#### 4.4 Use phase and obsolete products

The compositional mismatch in the scrap market also comes from the Swedish industry in a greater extent create products with high technical performance, which a lot goes on export.

The scrap market from EoL depends on obsolete goods that are produced, not today but several years ago, depending on the products life span. Products with shorter life compared to products with longer life span, returns quickly to the metal-system and consist of lower quality. Product with long-life span can have problems with that the content of alloys/impurities may differ. Some alloy/impurities-content can be very hard to use, and other can be used after "sweetened" with clean, often virgin, metal.

Contribution to the mismatch in the scrap-market also comes from increasing demand for metal, which comes from increased consumption.

#### 4.5 End-of -life management

Material from used product, EoL (end of life) needs to be prepared for reuse which includes collection, disassembling, cleaning, and many times have unknown technical information or to many impurities or wrong alloys.

The relation between import/export, net balance shows that importing/exporting of metal scrap both increase every year and therefor increasing net imbalance and a greater dependence from virgin raw material.<sup>47</sup>

##### 4.5.1 Metal recycling

Metal recycling is an important factor to reach sustainable, but metal recycling is often ineffective and for some cases even absent, due to economic cost, social behavior, product design, recycling technologies, and the problems with separation.

The outflow of material from the material-stock must be compensated with new material. Much of the material is imported from countries outside EU. Quality products are dependent of alloys which many of them classified as scarce minerals, i.e production in few countries (China, Brazil, and Russia)<sup>48</sup>and the recycle-rate is low. The demand for scarce minerals will increase tremendously in the future. Scarce minerals is very important as alloys in today's productions but are necessary in new green

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<sup>46</sup> Own experience from foundry-industries. M.Bom

<sup>47</sup> "Production", Production - Jernkontoret. <https://www.jernkontoret.se/en/the-steel-industry/industry-facts-and-statistics/production/> (åtkomstdatum okt. 07, 2021).

<sup>48</sup> T. Henckens, "Scarce mineral resources: Extraction, consumption and limits of sustainability", Resources, Conservation and Recycling, vol. 169, s. 105511, juni 2021, doi: 10.1016/j.resconrec.2021.105511.

technic as solar, electrification, electricity network i.e. Scarce minerals often comes from countries in without democratic and the dependence is a supply-risk.<sup>49, 50</sup>

Today a lot of obsolete products and scrap that are too costly, to upgrade and to recycle, and are exported. Some material/components are disassembled, if they generate a high price or to comply laws or recycle levels. The goal from recycles focusses on the products total weight which entails that bulk-material are recycled and material, in low content or mixed, minerals that often classified as scarce, doesn't return to the material cycle. One way to reduce supply-risk is to recycle more.<sup>44</sup>

#### 4.5.2 Sustainable scrap market

Alloys/impurities in scrap can be seen as a risk or opportunity.

Alloys are content that the production demands and impurities are content that are un-wanted. Since alloys, depending on recipe and content, can produce a wide range of technical specification, unwanted impurities can be demanded from other production chain. Today unwanted impurities are sweetened with clean bulk-material and adding wanted quantities of alloys. To break the dependence of importing material, it is possible to change the scrap marketing by matching content in scrap with the production-chain that want content as alloys. That would generate savings both in saving clean bulk-material and reduce dependence of importing alloys. The problem today is lack of ability to handle small quantities of scrap and problem to guarantee content from error in source sorting.<sup>44</sup>

Since scrap has a lower climate-impact versus ore-metal, there is big investments in scrap-based steelworks.<sup>51</sup> The technic is based on arc furnace and can produce both clean ore pre-alloyed bulk-metals. Since the capacity are growing higher scrap-based steelworks will consume a great deal of scrap generated. But even so that scrap-based steelwork is not as dependent of the content in the scrap, as the smaller foundry, they want high quality scrap since it is easier to optimize the process, reducing energy and costs. Foundry compared to scrap-based steel industries are small and demands small volume. Many foundries produce goods and component that are small but technical advance and are necessary in new technic. Even today these foundries have problems to get hold of good quality-scrap and are omitted to imported resources.<sup>42</sup>

Companies, owners and customer are beginning to set requirements and demand accounting as KPI for recycle rate and energy. Depending on business, it is more or less possible to reach these KPI and goals. And if the goals are to governing it can be counterproductive, driving to less efficiency for the actor or the whole production-chain.<sup>42</sup>

A single actor drives to deliver value and continuously work optimize the production. In the linear production-chain only price and quality a driving efficiency and also sustainability. Today consumers start demanding environmental declaration. Goals must be simple to understand and easy to be measured, as KPI. Common for sustainable are scrap-rate, energy and re. These factors many times work as opposites and the relationship can be described below, figure 11, that all a very important to reach sustainability for a system level but very hard on the tactile level. If production optimize the production for scrap, the consumption of energy rises, or the quality get lower i.e. if you work on high technical performance, it is hard to use scrap with low qualities.<sup>45</sup>

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<sup>49</sup> M. Andersson, M. Ljunggren Söderman, och B. A. Sandén, "Challenges of recycling multiple scarce metals: The case of Swedish ELV and WEEE recycling", *Resources Policy*, vol. 63, s. 101403, okt. 2019, doi: [10.1016/j.resourpol.2019.101403](https://doi.org/10.1016/j.resourpol.2019.101403).

<sup>50</sup> EUROPEAN COMMISSION, "Study on the EU's list of Critical Raw Materials". Åtkomstdatum: 06 april 2021. [Online]. Tillgänglig vid: <https://www.sgu.se/mineralnaring/kritiska-ravaror/>

<sup>51</sup> Jernkontoret, "Skrotbaserad processmetallurgi", Jernkontoret, Stockholm, del 3, 2016. Åtkomstdatum: apr. 30, 2021. [Online]. Tillgänglig vid: <https://www.jernkontoret.se/>

As the production must be seen as an ecosystem-ecoweb, there will be problem to the whole market if one level in the production-chain fails. If industries should remain competitive advantage, it is crucial that the market support, the industry in terms of policies, facilitate material that have low climate impact, sustainable goals that are possible to reach. <sup>42</sup>

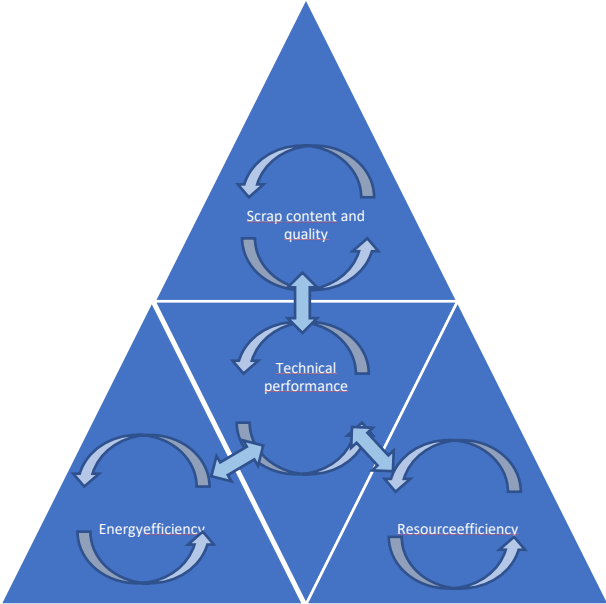


Figure 11, Resource management in the level of production can be described as a triangle of sustainable goals. All part interacts, and big changes in one goal will be on expense of reaching other goals. It is therefore hard to optimize production for every goal, if the technical performance will also improve.

### 4.6 Legal policies

The KPI of scrap-rate are used to follow the transaction from a linear production chain to a full circular chain. To reach the circular metal circularity and break dependence from virgin material and import, it is necessary to treat the stock of material inside the country and to force more material, not only bulk-material, to recycle.<sup>44</sup>

#### 4.6.1 Waste Framework Directive (WFD)

The Waste Framework Directive summit basic waste management principles. The framework also describes when waste ceases to be waste and becomes a secondary raw material, and how to distinguish between waste and by-products. The Directive also introduces the "polluter pays principle" and the "extended producer responsibility".

Right now, there is an ongoing work to update WFD and associated laws, that focuses on the following policy areas: prevention, separate collection, waste oils and textiles and aims to be in line with the objectives set out in the European Green Deal, Circular Economy Action Plan. As a result,

there already has outcome new directives and recommendations. The last changes in waste-laws in Sweden rolled out 2020 (SFS 2020:614) and all parts will be in operation in 2025.

More laws and policies are about to come, and the industries must work with risk management and have plans for how new demands will be handle.

#### 4.6.2 Producer responsibility

Extending product responsible aims to make the manufacturer of the product responsible for the entire life-cycle of the product and especially for the take-back, recycling and final disposal.

Before 2019 there was already legal requirement for packaging, electronic waste, batteries, tires, paper end electrical cars. 2019 the come regulation for singles use (Single Use Plastic Directive 2019/904).

#### 4.6.3 Hazardous waste classification

The classification for hazardous waste aims to track hazardous waste from the producer, the collection and to the management of waste. Before each actor more easily could change the classification and there was hard to track the waste. From 2020 hazardous waste from all actors must be reported in a national waste-register.

#### 4.6.4 Regulation and other driving forces

The cost for get rid of waste are cheap compared to the cost to upgrade material in the waste hierarchy. The recycling-industry has adapted to recycle bulk-material that are easy to separate. Recycle material from used products (i.e. dirty not easy to disassemble) demands treatment before reusing. The more difficult treatment to separate small volume and to secure high quality are therefore more expensive than new material. Therefore, much needs to be done to develop cost-efficient technics to recycle small volume and to secure that different scrap collects without mixing.

The consumption of product increases every year and therefore the volume and mass of waste also increases. This is not sustainable and the cost for material and waste management will increase.

Incineration is at cost-efficient waste-management since it gains electrification and heat that both can be sold. The transformation to incineration instead of landfill has been a great contributing factor to decreasing emission from carbon dioxide between 1980 to 2000.<sup>52</sup> Much material in waste combustion comes from plastic, papers and other material that can be reused.<sup>53</sup> To break the dependence of incineration and support recycling there is taxes i.e., for landfilling, incineration and on emissions, more stringent BREF:s and prevent member state to use energy recovery to account for renewable energy. The taxes on landfilling have increased 100 % since year 2000, tax on incineration increased 60 % since year 2020 and cost for emissions of CO<sub>2</sub>ekv with 1100 % between 2016 to 2021. New BREF document was adopted in 2019 and the BAT conclusion was published 2019<sup>54</sup>. Investments must be more sustainable, and the EU taxonomy is an important tool helping the EU scale up sustainable investment and implement the European green deal.<sup>55</sup> The first step was to demand big companies to report sustainability. The taxonomy also will classified energy, and the proposition are that biofuel and hydropower assessed as be less sustainable and natural gas more sustainable, than today. Since much of the climate impact from the industry depends of the climate impact from energy produced, the classification will directly affect the carbon footprint

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<sup>52</sup> <https://www.energiforetagen.se/>

<sup>53</sup> <https://www.avfallsverige.se/>

<sup>54</sup> <https://www.naturvardsverket.se/>

<sup>55</sup> Regulation (EU) 2020/852

classification system, establishing a list of environmentally sustainable economic activities. It could play an.

Today materials that can be used for coverage on landfilling are excluded of taxes. In a nearby future the demand for construction material for cover landfilling will cease. That means higher cost for waste handling for material that have potential to be reused. Environmental protection laws also make it difficult to reuse material, and a lot of material end in landfilling, just that it is easier transport and quicker. Already today many landfills must decline materials, just that the capacity is too low, and therefore the waste needs long transportation. How the landfilling capacity will develop is hard to foresee. Most landfills are own by municipal and higher demand and legislation will the landfill-capacity to change municipal-purpose. Even though landfills is a big income to the municipal today, future taxes is a high risk and can be very costly in the future, that the municipal have to pay.

Cost for energy and the material are both important driving factor for more efficient production. But to reach sustainable it will be become more important to optimize the production for a waste that can be used as a resource for next actor. Now the driving forces to reduce hazard chemicals are low since the cost for waste are low. Taxes and fees for chemical content may come for waste or products. Since 2017 there is a tax on chemicals in certain electronic goods which aims to reduce the occurrence and spread of dangerous flame retardants in people's homes. Other laws that will affect copper- and brass-industries are the "EPA's proposed Lead and Copper Rule (LCR)" that aims to reduce lead exposure in drinking water. Today plumbing has led as an alloy. Although led, as an alloy can be substituted, there is a problem that scrap from the obsolete product includes lead. So, either the companies must use more virgin copper to sweeten the content or there the led must be separated from the copper.

Industries must check the supply risk for metal, minerals and materials that are crucial. For crucial products risk must be managed. Risk management can include more suppliers, substitute with other products or change product portfolio. In January 2021 a new law about conflict minerals; the Conflict Minerals Regulation. That will ensure that EU importers of scarce minerals as called 3TG (tin, tungsten, tantalum, and gold) meet international responsible sourcing standards.<sup>56</sup> A lot of the 3TG are used as alloys<sup>57</sup> and industries has begun to assess the inherent risks in the supply chain and checked how they are meeting the regulatory requirements. Beside 3TG there are more minerals and material that have the same challengers and can be classified as scarce. The classification as scarce comes from the country's point of view. But for a single industry, there can be other minerals and material that are crucial for the production and can be classified as scared from the company's point of view. Matching scrap, with demanded content of alloys, can be used to lower the supply risk.

#### 4.7. Summary

The metal industries have long worked to reduce their material consumption and increase the use of recycled raw materials. But to meet the EU's and Sweden's climate goal of reducing carbon dioxide emissions by at least 80 % by 2050, resource strategies needs to be improved even more.

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<sup>56</sup> EUROPEAN COMMISSION, "Study on the EU's list of Critical Raw Materials". Åtkomstdatum: 06 april 2021. [Online]. Tillgänglig vid: <https://www.sgu.se/mineralnaring/kritiska-ravaror/>

<sup>57</sup> "Ferroalloys - an overview | ScienceDirect Topics". <https://www.sciencedirect.com/topics/materials-science/ferroalloys> (åtkomstdatum 06 april 2021)

#### Some general advice

- Match scrap to the producer from content in scrap and the producers demand for alloy.
- Improve recycling. Secure recycling goals from content not only weight that favor bulk-materials.
- Design for disassemble/dismantling
- Design for repurchase/long service life and for reuse internal scrap/waste

The demand for pure steel scrap is higher than the supply, and the demand will increase due to the long technical life of high quality products and the growing demand of metal to be used in production of greens technologies (sun, wind and electrification). Even though the recycling rate today is high (aluminum 78 % and steel/iron 83%)<sup>58</sup> only 30% of steel production is scrap-based<sup>59</sup>

High quality steel is a way to reduce material consumption and also reduce climate impact. High-strength steel can reduce weight by about 30 % and reduce energy consumption during life by at least 5 %<sup>59</sup>.

Better sorting and traceability are important to develop. Today's collection and sorting of bulk-materials will increase the mismatch between the market's requirements for purity and the quality of available scrap. This means increased demands to separate into more and more fractions and thus demands for traceability and incentives that contribute to the use of scrap of separated quality.

Product design and process development for reuse are also important. Process control is a way to reduce disruption in the process from human and machinery factors and to be more resilient to impurities. The costs for handling waste are going to increase. And a lot of the waste has a high content of metal, and reusing this waste can both reduce costs and reduce purchase of material. Process control and process development must be progress together and focus both of producing products that are easy to recycling (obsolete products) AND to compose "waste" so that it can be reused direct without waste collection/waste management.

New business models are needed for the transition to a circular economy. Repurchase of obsolete products are one way to secure material with known technical performance and selling service instead of goods are other way. Regardless of the company's roadmap it will become more important to have a closer collaboration with their customers to meet and anticipate future needs and demand.

New guidelines are also important. The lack of industry-wide guideline means that the development of many different system to report environmental performance. Absence of guidelines entails more administration since how environment performance must be declared and calculated different.

The conclusion is that to reach circularity it is important that understand the ecosystem for the material, and the solution is more collaboration about optimizing the material and collaboration need for improved sorting of different types of materials.

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<sup>58</sup> SCB. Återvinning av förpackningar i Sverige. Date: 2021-11-05. [www.scb.se](http://www.scb.se)

<sup>59</sup> Jernkontoret, "Stål skapar miljönytta", Jernkontoret, Stockholm, 2015. Åtkomstdatum: apr. 30, 2021. [Online]. Tillgänglig vid: <https://www.jernkontoret.se/>





## APPENDIX 1) PM summary of interviews within the Stakeholder Association's survey of industry needs regarding sustainability work and policy

Background:

RISE has

**Det finns inga källor i aktuellt dokument.** on behalf of the stakeholder association, conducted a qualitative survey of the members' challenges regarding sustainability work and policies. The survey was conducted through a survey and through interviews.

### Survey

The survey was sent out to all members and the survey was answered by 8 member companies. The survey included 18 questions about sustainability. For each question, they had the opportunity to grade (one to six, one: not important to six: very important) the importance of the issue was **both** based on the company's need to investigate the effects of regulations **and** how much we are going to focus on this issue.

In general, all issues were highly valued, i.e. all issues were valued importantly (over three) where the need to investigate legal requirements/regulations is valued slightly lower than the company's need to implement the changes in the field, see Figure Figure 1.

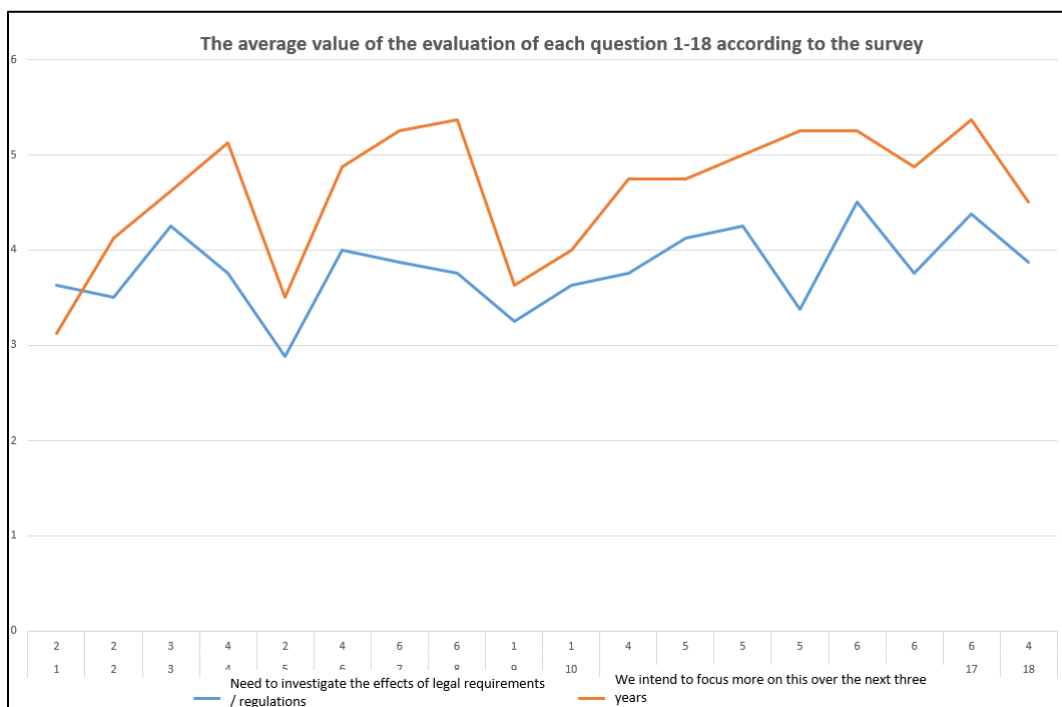


Figure 1: Average of companies' grading of how important each issue is to the company

The following questions were assessed lowest in terms of prioritization/need.

- Question 1: Increased service life of the product in design/manufacture
- Question 5: Industrial symbiosis/sharing of energy/raw materials/waste/equipment
- Question 9: Remanufacturing

The following issues were rated as a priority/need:

- **Question 4: Use of recycled materials**
- **Question 7: resource-efficient manufacturing, less material, chemicals, water, etc.**
- **Question 8: Robust production to reduce waste**
- **Question 14: staff development and education**
- Question 15: accounting for the climate impact of products and production
- Question 16: Sustainable Development Goals and Climate Goals
- Question 17: accounting for the climate impact of products and production according to GHG

The gap between the company's knowledge/need to investigate the effects of laws/regulations and the company's need to work/prioritize the issue was highest for questions 14, 8, 4 and 7 (marked in bold above) in descending order. This can be interpreted that their companies have the most knowledge of the regulations /legislation and know what needs to be done to meet both external and internal requirements in the field. The answers indicate that those issues with more KPIs /known metrics are more heavily prioritized than those without

### Interviews

The purpose of the interviews was to get a deeper understanding of needs and challenges and understand the background to the valuation in the survey. A total of 15 interviews were performed by Marie Bom and the time for the interviews was about 45 minutes.

Based on the survey, focus areas were formulated on which the interviews were based:

- The lifetime of products
- Fossil-free/recycling
- Business models
- New technology
- Own capacity/ability
- Environmental communication

### Need to investigate the effects of legal requirements/regulations

Sweden and the EU have adopted an ambitious target to reduce greenhouse gas emissions by 80-95% by 2050. The goal will be achieved through continued work on resource efficiency and better waste management. Already several new laws/regulations have been rolled out, but these laws/regulations will not be enough to reach the climate goals and further regulations will be needed.

Overall, all companies felt that they had good control over the laws and regulations that will come. The large companies have expertise in the field and are actively working to try to use upcoming rules and requirements as a competitive advantage already now. New laws and regulations usually come with good foresight and when laws/regulations are adapted equally for everyone, this does not mean any disadvantage for competition within the EU. However, there are concerns that competition outside the EU may increase.

Small businesses (SMEs) have a greater need to get advice and support on how to interpret and prioritize all the requirements that come. Smaller companies do not have the same opportunity to have expertise in all areas, and it is common for people to have many different responsibilities. This makes it more difficult to ensure that investments are based on the right facts and analysis.

Uncertainty about the future, both regarding future laws/regulations but also the availability of energy, means that investments are postponed. An investment affects the company for a long time and it is therefore important to ensure that it is right. An inaccurate investment can mean a loss of competitiveness. One example is uncertainty in the energy market, when investments in energy-efficient electrified equipment are postponed or investments are made with alternative types of energy i.e. not BAT (best available technic), due to uncertainty in access.

Even larger companies felt that they need help to understand how future rules/requirements will affect their business. One risk that was highlighted is that the world is changing faster and faster, and even for a large company it is becoming more and more difficult to have sufficient knowledge / information about upcoming laws / rules and more difficult to evaluate how this will affect them. This means that larger companies also request more external monitoring but also the need to network more with other companies to understand how other companies interpret and manage risks with new rules/ requirements.

Several members emphasized that the information about upcoming requirements /laws was very abstract. They thus highlighted a risk that they might undervalue their need to investigate the effects of future laws/regulations, on the grounds that they do not have sufficient knowledge of what that will mean. Everyone highlighted the importance of getting guidelines for how to prioritize and evaluate different aspects in the external monitoring. The risk is that there are too many goals to work with and it will become overwhelming, and the big results will not be reached.

Another risk raised by members was that laws and regulations will be handled too rigidly. Every company have different ability to achieve goals, for example the availability of recycled raw material that fulfills specific technical demands requirements, are though when there are very

### Life span

To achieve the circular economy, both the EU and Sweden have emphasized the importance of extending life expectancy to reach the environmental and climate goals. Through longer service life, materials can be used more efficiently and thus reduce the consumption of both resources to produce materials but also reduce resources to handle discarded products. Sweden and the EU believe that it is important for companies to actively work with design / construction and focus on increased service life but also that companies work to improve maintenance and improve the ability to upgrade the product during the life of the product.

Although increased lifetime expectancy is a national priority for achieving global climate goals, working to extend product life was valued relatively low by participating companies. Companies say that they have already come a long way in this area. Many of the member companies already have life expectancy as a competitive advantage and further extending their service life means a cost that does not contribute to further competitive advantage. This belief was shared by the companies regardless of the business model. The companies that own their products have quality, service life and low maintenance costs as a competitive advantage and not price. The companies that are subcontractors do not have the same influence on the product design and thereby less ability to streamline production. Subcontractors many times sad that they could see opportunities to reduce climate impact, but this takes time, mutual trust, and cooperation. Short-term orders and not to be involved in the product design make it difficult to improve both the part and the final product produced.

Companies also emphasized the importance that new laws/requirements do not contribute to sub-optimization. For example, if everyone works to optimize their own business, a seeming improvement for one company, can lead to deterioration in other parts of the production chain.

## Fossil free/recycling

Topics regarding fossil-free and recycling was valued important for all companies. Driving force comes from both owners and customers and all companies have goals to measure and evaluate fossil free and recycling.

In plastics, there are greater obstacles than in other areas to reaching both fossil-free and a high level of recycling. There is a high willingness to work on materials being fossil-free and recycled. But for plastics, a major complication is that the raw material is cheap and easy to handle, and it is difficult to find recycled/fossil-free raw material with known technical specifications and in sufficient volume. Even if there is an alternative material the price is a big obstacle and customers choose the cheapest, which is not recycled or fossil free. One company offers some products in in recycled raw material, but the demand is low and is mostly used for marketing.

In all materials, more technical information is requested regarding recycled raw materials compares to virgin materials. All companies express frustration that new raw materials come with specific information regarding content and technical characteristics, while recycled raw material has very poor information or very large variations. To have a resource-efficient and robust production, production is optimized to certain technical specifications, and variations in raw materials contribute to production disruptions. Production disruptions are negative for sustainability as it contributes to the consumption of both raw materials and energy and generates more waste.

All interviewees also highlight the importance of the industry being given the right conditions to together solve the material issue. This includes the existence of sufficient information about the material and acceptable volume. Questions regarding traceability and methods for recycling materials are also important. There is also a great need to change customers' behavior so that acceptance of recycled raw materials in products increases.

One obstacle that has been raised is that stricter chemicals legislation and requirements to report chemical content can be a complication to increase the demand for recycled materials. Recycled raw materials contain materials from unknown content and thus difficult to control the content. This uncertainty and the risk that content may negatively have effect on the brand means that it is easier to choose virgin raw material.

Working with fossil-free in other areas, which involves energy consumption, most companies believe that they have already come so far that it is difficult and costly to bring about any further changes. Converts to fossil-free energy sources have been implemented and where it is not possible to convert, the original label energy is purchased.

The driving force is to reduce costs but also environmental requirements from owners and customers. With ever higher energy prices, companies' opportunity for maneuver decreases, which affects the ability to focus on sustainability.

## Business models

Sweden's circular economy roadmap emphasises the need for companies to change their business models. Sustainability should be achieved by selling function instead of product and with business models that contributes to the reuse of products and products with longer service life.

All members consider the issue important. However, all companies have different ability to change the business model.

Companies that own their products and have products with a long service life have already started with rental/leasing and the part of the company's business will become more important. Major companies have already analyzed their existing and upcoming product portfolio and developed roadmaps for a circular economy. Smaller companies have not worked so strategically but many have started the transition. For smaller companies to be able to work with rental and service, it is necessary to create cooperation with other actors when skills and capacity are not available in-house. Creating collaboration with new actors is difficult as it means creating relationships and being able to trust each other and that both actors take responsibility and somewhat share business model. In this transformation, support from industry associations is requested to be able to present good examples and be able to test new business models on a small scale.

Industrial symbiosis, i.e. that work with sharing of resources was valued low, both in terms of regulations and the company's focus. Much is due to the lack of structures and actors who can contribute with competence and drive. A coordinator/broker is needed for these services but also someone who ensures that there is provision in sufficient volume and quality. A basis in industrial symbiosis is also collaboration between different actors, and this means changing business models.

For companies that are subcontractors it is not possible to change their business model today. The focus of sustainability is thus to work with resource efficiency and reduced waste in production.

## New technology

New technology is considered relatively important for everyone. Automating machines and equipment will be needed to further optimize production. Automation requires new skills and smaller companies have less resources for this than larger businesses. Having products connected means collecting information and thus an increased need to be able to evaluate and use the information that is collected. This requires other skills in the company.

New technology can be used to optimize and plan maintenance. Which products are suitable for being connected depends on how they are used and both the customer and the producer need to benefit from connecting products and machines. Connected products mean a strengthened relationship between the customer and for the products, this means an additional cost that should be compared to having replaced the products prematurely, i.e. it can be cheaper to have a planned exchange for the customer.

With new technology comes also questions about how sustainable and robust the technology is. Technology is upgradable for a certain amount of time, but there will come a time of greater need to replace the technology. Major manufacturers have developed digital roadmaps and developed requirements for equipment on how long software should be upgraded and how hardware can be replaced in the future. Smaller companies have not come as far in their digital transformation and may need support regarding how to handle both software and hardware.

## Own capacity/ability

All interviewees believe that they have both the capacity and the ability to meet future sustainability challenges. One exception is that the administrative burden on smaller companies must not increase.

Many people already consider the administrative components to be onerous. Smaller companies realize that they need to meet and report the same requirements as larger companies. Producing detailed information at the product level can be onerous, and many see that it can be difficult to get paid for this work. Today, few customers are willing to pay for the environmental information, while it is difficult to know how the information is produced and how the environmental information should be calculated.

Smaller companies need help analyzing and assessing how they need to adapt to the future and their customers' demands. Electrification will change the entire supply chain and subcontractors will also be needed in the future. What subcontractors produce today will change and the concern is that subcontractors do not have sufficient knowledge of what is required in the future, and thus their competitiveness will decrease. Larger companies highlight the importance that subcontractors will also be needed in the future, but also have a concern that Swedish subcontractors will not have the capacity and ability to deliver what is needed in the future.

## Environmental information

Reporting environmental information has become increasingly important. For environmental information, there is a great need to investigate the effects of laws and regulations and here companies will need to put a lot of resources into.

For larger companies, there are already stated requirements to report environmental and sustainability information based on company level, according to, among other things, the Annual Accounts Act. Many companies use different standards to ensure reliable environmental information. These standards often include setting climate targets for one's own company that includes the entire value chain. In the long term, Detta means that subcontractors will need to present environmental information based on the same level of detail as a larger company.

Larger companies have an ambition to be able to impose environmental requirements on their subcontractors where carbon dioxide and recycling.

## Appendix 2: Questionnaire sent out to members

1. Increase the service life of products in design/manufacture
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
2. Increased equipment life through smart maintenance/upgrade
  - a. We plan to focus more on the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
3. Use of fossil-free and bio-based matter
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
4. Use of recycled materials
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
5. Industrial symbiosis: sharing of energy/raw materials/waste/equipment etc.
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
6. Fossil-free energy use
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
7. Resource-efficient manufacturing, less material, chemicals, water, etc.
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
8. Robust production for reduced waste
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
9. Remanufacturing
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
10. Methods of upgrading
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
11. Digital methods/ Automation for traceability, life-long measurement, maintenance, etc.
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
12. New business models that favour a circular business, such as renting out, charging for usage time
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
13. Adaptability to a sustainable circular climate transition
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations

14. Competence development of staff towards increased sustainability and system understanding
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
15. Accounting for the environmental impact on product and production
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
16. Sustainability and climate goals (e.g. according to Science Based Target initiative (SBTi))
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
17. Accounting for the environmental impact on product and production (e.g. according to the GHG Protocol/Greenhouse Gas Protocol)
  - a. We plan to focus more on the next three years.
  - b. Need to investigate the effects of legal requirements/regulations
18. New logistics solutions with a focus on sustainability
  - a. We intend to focus more on this over the next three years.
  - b. Need to investigate the effects of legal requirements/regulations

This is interesting



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