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CIRCULAR ECONOMY

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CONSUMPTION & USE

Expanding the knowledge base around the role of consumers in the circular economy

Promoting circular behaviour in textiles and electronics

Report for the European Environment Agency

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Glossary

Abbreviation	Definition
CE	Circular Economy
CEAP	Circular Economy Action Plan
EEA	European Environment Agency
EPR	Extender Producer Responsibility
SPI	Sustainable Products Initiative
TCO	Total Cost of Ownership
UNEP	United Nations Environment Programme

Executive summary

The purpose of this study is to **increase the knowledge base around the role of individual consumers in relation to the circular economy (CE)**. It aims to help develop a more comprehensive understanding of the CE, contributing to the design of effective policy measures that can encourage the uptake of CE practices by consumers. It also reflects on the implications of the findings in relation to two systems of production and consumption that are prioritised in the Circular Economy Action Plan (CEAP), namely **clothing and household textiles** and **consumer electronics**. The geographic boundaries of the study are EEA countries.

Understanding circular behaviour

The literature identifies three key stages or phases, where consumers make decisions either in favour of linear or CE solutions: the point of acquiring a product, the use phase, and the end-of-life stage. Decisions made **upon purchase** [P] refer to decisions made by consumers that are not yet in possession of a given product; decisions **made upon use** [U] refer to decisions made by consumers having a functional product in their ownership; while decisions made when the product is **no longer useful** [D] refer to the decisions made by consumers having a non-functional product at their disposal.

Various examples of decisions made by consumers at these different points of the decision-making journey are provided in the study, but it is important to note that, in practice, consumer decisions are deeply embedded and shaped by the system of production and consumption in which they operate. Therefore, the description of circular behaviour in this study remains theoretical due to numerous barriers, lock-ins, and other influencing factors (e.g., advertising, social narratives) that consumers face. Consumers, thus, need to be supported by businesses and policy-makers when making decisions.

The study groups factors affecting circular behaviour into the following categories: (1) economic factors, (2) fit between needs and offering, (3) information used for choice, (4) social factors, (5) preferences and beliefs. Behavioural theory and insights can also be used to better understand the psychological underpinning of some of these factors. This is further elaborated in the study, including examples of biases and heuristics that exemplify the above-mentioned factors.

Examples of key findings specific to **clothing and household textiles** include:

- In general, price remains the main economic factor determining whether a consumer is willing to engage in purchases of circular products;
- Although second-hand textiles have lower upfront costs in comparison to new products, pre-worn textiles face negative perceptions;
- The dominant linear business models produce numerous options for consumers to choose from with regard to style, quantity, and availability. In comparison, offerings of circular textiles are more limited, and this is a disadvantage for consumers;
- This is also the case for the use phase of clothes and textiles, when a consumer is required to invest extra time and effort in order to find repair services or to learn and try to repair the garments themselves;
- The main drivers for proper disposal of household textiles are related to adequate and accessible recycling infrastructure and programmes, which are lacking.

Examples of key findings specific to **consumer electronics** include:

- Similar to clothing and household textiles, economic factors play the most important role during the purchase of new products;
- Perceived risks, environmental awareness, and social factors can play a role in determining whether consumers choose to purchase a refurbished, remanufactured, or second-hand product instead of a new one;
- Repair costs can be triggered by the prices of spare parts, either because the product manufacturer sells them purposefully at a higher price than their real cost, or because the parts are old or not produced any more;
- Having the possibility to repair a product (i.e., the product itself being repairable and having access to affordable services) is the most important driver for consumers in order to repair;

- In the disposal phase, the main factors influencing consumer behaviour are those related to the convenience (e.g., of separate collection options), and how time-consuming it can be.

Good practices from national experiences

Data collected through a targeted stakeholder consultation shows that many policies today lean on information- or awareness raising initiatives to encourage behavioural change. This is followed by education and training, and labelling initiatives/indices. These categories of policies aim to provide more and/or better information to consumers, and particularly when purchasing new products (e.g., on product sustainability) or discarding old products (e.g., on sorting practices).

Behavioural policies can be distinguished by the level of intervention in people's lives, so it can be argued that most policies aiming to influence circular behaviour are not very imposing. Few measures shared through the consultation focused strictly on restrictions (bans). It can, thus, be observed that influencing consumer behaviour through a high degree of 'interventionism' is less common here.

There is a clear opportunity to diversify policies and to target less explored areas of a consumer's decision-making journey, as well as different drivers and barriers. Policymakers seem to be less familiar with certain factors, consumer features, or areas of this journey. More evidence can be collected on these with the aim to develop a more diverse range of policy initiatives.

Options for promoting circular behaviour

Based on the above analysis, policy options were considered in terms of their potential to drive circular behaviour in an efficient and effective way. The options are listed in the table below.

Factors	Focus of policies	Policy options
Economic factors	Policies affecting the [perceived] upfront price	Taxation favouring circular alternatives
		Subsidies for circular alternatives
		Loan programmes at reduced interest rates for circular products
	Policies affecting the uncertainty about lifetime costs	Display of Life-Cycle Cost
Fit between needs and offering	Policies aimed at producers	Eco-design requirements
		Take-back obligation for producers and sellers
	Policies aimed at increasing the availability of maintenance and repair options	Subsidy for a regional/national network of Integrated Circular Crafts Centres
		Obligation for making available a replacement product for the duration of maintenance/repair
Information used for choice	Policies aimed at targeted communication	Targeted communication campaigns
	Policies aimed at information provision	Display of circularity performance of products
		Objective information on the quality and usability of used product
Social factors, preferences, and beliefs	Policies aimed at enhancing attachment to products	Enhancing the home assembly of products
	Policies aimed at social norms and advertisement	Regulating the share of advertising in the business models of the media and of entertainment

	Policies aimed at feedback	Providing positive feedback on achievements towards circularity

1 Introduction

This study has been commissioned by the European Environment Agency (EEA). The study is meant to improve the EEA's knowledge base and understanding of consumer behaviour in relation to the circular economy (CE).

1.1 Background and objectives

The **circular economy (CE)** is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems (Ellen MacArthur Foundation, n.d.). The EU's Circular Economy Action Plan (CEAP), launched in 2020, aims to facilitate the EU's transition to a circular economy by establishing a new, regenerative growth model that gives back to the planet more than it takes, maintaining resource consumption within planetary boundaries, and minimising waste and pollution (European Commission, 2020). Europe's CE ambitions provide a policy framework that aims to transform environmental policy in a comprehensive and systemic manner, in line with CE principles. In this context, the **role of consumers** in enabling the transition is prominent. Consumer choices and feedback have the potential to affect decisions both upstream (e.g., in terms of material use or product design) and downstream (e.g., in terms of recycling or re-use). A great deal of policy attention has been devoted so far to reducing the environmental and climate footprint of the production side of the joint production and consumption system, e.g., via the EU-ETS, the Industrial Emissions Directive or the Regulation on CO_2 emissions for cars. This report aims at shedding light on the other side of the joint production and consumption system, namely the consumers. It should be kept in mind, though, that the joint consumption and production system is strongly integrated, with productive systems not only responding to consumer demand but shaping demand. The consumption and production sides of the joint production and consumption system can, thus, influence the quantity and sustainability features of items consumed on the EU Internal Market, and hence their total environmental footprint.

Consumer decisions are considered as part of the CEAP package, with the Sustainable Products Initiative (SPI) proposing to revise the Ecodesign Directive and increase the availability of sustainable products on the EU market (European Commission, 2020). The legislative initiative aims to make some "*products fit for a climate-neutral, resource-efficient and circular economy, reduce waste, and ensure that the performance of front-runners in sustainability progressively becomes the norm*" (European Commission, 2020). The SPI plans to regulate product durability, reusability, upgradeability and repairability, address the presence of hazardous chemicals in products, improve energy and resource efficiency, counter premature obsolescence, incentivise innovative business models, and much more.

One of the key building blocks of the sustainable products policy framework is consumer empowerment (European Parliament, 2021). To enhance the participation of consumers in the CE, the European Commission will propose a revision of EU consumer law (European Commission, n.d.), which will include, *inter alia*, an initiative on substantiating green claims (European Commission, n.d.). The new consumer agenda will contribute to consumers receiving trustworthy and relevant information on products at the point of sale and strengthen consumer protection against green washing and premature obsolescence. The CEAP foresees a number of EU-wide initiatives to empower consumers to better exploit their enabling potential. Innovative policies that can stimulate circular behaviour exist at national and sub-national levels.

The purpose of this study is to **increase the knowledge base** around the **role of consumers in relation to the CE**. The focus of the project is on individual consumers, rather than public or corporate consumers. Our analyses in this area aim to help develop a more comprehensive understanding of the CE, contributing to the design of effective policy measures that can encourage the uptake of CE practices by consumers. The objectives of this study are, thus, three-fold:

1. To identify and define a more circular and sustainable behaviour of consumers and to reflect on what this means for textiles and consumer electronics;
2. To collect good practices on (innovative) policies that can encourage and enable circular and sustainable behaviour of consumers at national or sub-national levels; and,
3. To identify options for policy mechanisms that have the potential to promote circular and sustainable behaviour of consumers more widely.

1.2 Scope of the study

The study considers patterns of consumer behaviour in line with CE principles at a general level, while reflecting on the implications of the findings in relation to two focus systems of production and consumption, namely **clothing and household textiles,** and **consumer electronics**. These two production and consumption systems have been selected to showcase the findings of the report, as they represent key value chains in the CEAP and have their own targeted initiatives (upcoming). According to the CEAP, a lot can be done to improve the circularity of these two sectors. Textiles are currently the fourth highest-pressure category for the use of primary raw materials and water, and fifth for greenhouse gas emissions. While durable, long-lasting textile products used to be the norm in the past, recent decades have witnessed rising demand for relatively cheap and semi-disposable products (ETC/WMGE, 2021; Koszewska M., 2019). Moreover, the Ellen MacArthur Foundation estimates that less than 1% of all textiles worldwide are recycled into new textiles (Ellen MacArthur Foundation, 2017). Meanwhile, electrical and electronic products continue to be one of the fastest growing waste streams in the EU, with less than 40% of end-of life products in the EU being recycled (European Commission, 2020). In both cases, a lot of value is lost when functional, recyclable, or repairable products are discarded; and both sectors are experiencing a rapid turnover in style trends (clothing and household textiles) or technological generations (consumer electronics), leading to 'planned obsolescence' and large amounts of waste. More details on the two sectors can be found in Chapter 3.5.

The geographic scope of the study is EEA countries, including the collection of evidence on policy initiatives which considers EEA countries and their sub-regions. The policy options provided in Chapter 5 examine the transferability of specific policy options at EU level or to other EU or EEA countries.

1.3 Study components and reading guide

Building on the objectives and scope of the study, the report is structured as follows:

- **Chapter 1: Introduction**, outlining the context, objectives and scope of the study;
- **Chapter 2: Methodology**, describing the methodological approach used in the assessment of different components of the study;
- **Chapter 3: Understanding of circular behavioural patterns**, consisting of a theoretical framework for behavioural patterns compatible with the CE, as well as drivers and lock-ins that promote or hinder circular behaviour. The findings are described in the context of the two focus sectors of this study, namely clothing and household textiles and consumer electronics;
- **Chapter 4: Good practices from national and regional experiences**, detailing (innovative) policies identified at national and sub-national levels and their effectiveness in encouraging circular behaviour;
- **Chapter 5: Options for promoting circular behaviour**, providing concrete policy options for stimulating circular behaviour in the clothing and household textile and consumer electronics production and consumption systems;
- **Chapter 6: Conclusions and perspectives**, summarising the findings and conclusions resulting from the study; and,
- **Chapter 7: References**, listing the references used in this study.

2 Methodology

This chapter details the methodological approach used in different sections of the study, including any relevant and overarching definitions or assumptions.

2.1 Review of circular behaviour and patterns

The theoretical underpinning of this study consists of a literature review focused on understanding and describing in detail behaviours or patterns of behaviour that are compatible with CE goals, e.g., reducing the use of resources and generation of waste, purchasing durable and long-lasting products, engaging in the maintenance of products, increasing repair and reuse, keeping value and quality of materials as long as high as possible in the economy and increase the quality of recycling for discarded products.

The list of sources reviewed consists of a mix of academic articles, policy reports, H2020 funded project reports that define what key user behaviours are required for circular business models to work, as well as studies that explore the antecedents or factors for consumer acceptance towards circular solutions, consumers' attitudes towards circular solutions and that investigate external strategies that could help improve the acceptance and adoption of circular solutions. In total, 86 sources were consulted (see bibliography in Chapter 7).

The findings of the literature review are structured as follows:

1. An overview of circular behavioural patterns (Chapter 3.1), where "circular behaviour" (defined as consumer behaviour aligned with CE goals and principles) is described from a theoretical perspective. A comparison is also made between linear and circular behavioural patterns. The chapter underlines the fact that the theoretical description of a circular consumer does not always represent a realistic ambition. Without sufficient efforts from businesses and policy-makers to support consumers in this transition, the burden placed on consumers is heavy and unrealistic. As such, this chapter should be read with caution, remembering that it describes an 'ideal' scenario, not accounting for the social, economic, cultural, and contextual factors that hinder circular behaviour in practice;
2. The latter are further investigated in Chapter 3.2 on drivers, barriers, and lock-ins, which encourage, prevent, or hinder consumers from adopting circular practices. The literature review resulted in five groups of factors affecting circular behaviour, which were ranked according to their importance in driving circular behaviour. No evidence was found comparing the different factors, so expert judgement was used to derive the ranking (based on the team's experience and description of factors in literature);
3. The literature review also includes a section on behavioural insights and biases (Chapter 3.3) to further explain the drivers, barriers, and lock-ins, and provide a theoretical explanation of the psychological circumstances underpinning some of the findings in Chapter 3.2. This section describes the cognitive constraints that consumers face when making decisions and the related biases that lead to the different drivers, barriers, and lock-ins. The section provides a non-exhaustive list of behavioural biases and explains how they are relevant in the context of the present research. The chapter is meant to complement the analysis of drivers, barriers, and lock-ins by introducing a psychological (cognitive) dimension to the research;
4. Based on these findings we propose a framework to analyse circular behaviour, and provide examples of factors driving or hindering circular behaviour in Chapter 3.4.

To complement the literature review on circular behaviour and patterns, two case studies were conducted to exemplify circular behaviour, drivers, barriers, and lock-ins related to two types of products: (1) clothing and household textiles and (2) consumer electronics. The case studies are based on the same literature review, focusing on specific examples.

2.2 Review of good practices

Data was collected on public policies that aim to stimulate circular behaviour. This was done through a targeted questionnaire, sent to European Environment Information and Observation Network (Eionet) members, as well as to other relevant stakeholders conducting research on the CE. The survey, outlined

in Annex A1, groups public policies that aim to stimulate circular behaviour into different types of policies and different factors that they target. For each group of policies, respondents were asked to provide names and evidence of relevant public policies.

Following data collection, a data cleaning exercise was conducted, removing duplicate answers (if applicable) and private initiatives. In some cases, responses were reclassified to more suitable categories. The data was then analysed to provide an overview of current policy practices today: what type of policy measures are dominant, what factors they target most, what stage of the consumer's decision-making journey they focus on. Results are presented in Annex A2.1 and in Chapter 4.

In addition to the targeted survey, an expert meeting with 50+ participants was held in September 2021. It was organised to collect evidence on public policies supporting circular consumer behaviour and to reflect on national experiences implementing or planning those policies. The meeting sought discussions on past experiences, future plans, and proposals for innovative and experimental measures. It aimed to complement the evidence collected through the survey by having an open discussion on real-life experiences as opposed to a long list of measures. The results of the meeting are presented in Annex A2.2.

Based on the data collected through the survey and expert meeting, a list of five policy examples were selected for an in-depth review (Chapter 4). The national initiatives were selected based on what was considered less common but potentially interesting for other countries. The in-depth research of the policy examples included the following aspects: country of implementation, geographic scope, sector coverage, governing body, policy objective, entry into force, description of the measure, points of action in the consumer decision-making journey, drivers, barriers or lock-ins targeted, anticipated effectiveness of the policy measure in stimulating consumer behaviour (according to the EAST principles) (BIT, 2014), empirical evidence of ex-ante effectiveness, empirical evidence of ex-post effectiveness, transferability of the measure to other countries and regions, and relevance of EU-level legislation. In addition to the data collected through the stakeholder consultation, desk research was used to complement the findings.

The selection of policy measures was based on the following criteria:

- Selection by the project team (based on expert judgment) of interesting or innovative examples that could provide lessons learned for other countries. The examples were drawn from the survey data;
- Selection further refined based on discussions in the webinar, distilling what policies were most talked about and considered relevant and meaningful by participants;
- Availability of information (both via relevant documents and links shared through the survey and information found through desk research);
- Range of geographic coverage such that examples originate from different countries;
- Range of policy types such that there is a wider variety of examples; and,
- Range of points/stages of the consumer decision-making journey targeted by policies – ensuring at least a coverage of the three main stages (acquisition, use, disposal) and a variety of sub-stages, to the extent possible.

Chapter 4 also reflects on lessons learned from the stakeholder consultation, bringing the findings into the analysis of policy options in Chapter 5.

2.3 Review of policy options

Bringing together the findings from the literature review in Chapter 3 and the critical assessment of existing policies implemented in EEA countries and/or regions in Chapter 4, as well as general lessons learned from the stakeholder consultation activities, a list of policy options was developed (Chapter 5). The policy options fall under different categories of factors driving or hindering circular behaviour, as defined in Chapter 3.2, namely economic factors, fit between needs and offering, information used for choice, social factors, preferences, and beliefs (in order of decreasing susceptibility to public policies). In addition to these categories, horizontal policy options were considered.

The list of policy options was selected on the basis of the analysis of objective factors and behavioural insights and biases that influence consumer decisions (Table 3-3), taking into account the factors

considered as most amenable to public policy. Policy options were also considered in terms of their potential to be effective and efficient in driving the behaviour of consumers towards more circular choices. For each policy option, the following information is specified: policy objective, description of the measure, how the measure stimulates behavioural change, anticipated effectiveness, ease of implementation, implementation across countries/regions/EU. Justifications are provided based on the research conducted in previous chapters.

3 Understanding circular behavioural patterns

This chapter provides an overview of potential circular behavioural patterns, drivers, and lock-ins, as found in literature (Chapter 3.2). Each of these concepts are defined and described below. This chapter describes an ideal situation that, in reality, faces many challenges. It examines the theoretical behaviour that would exist if all social, economic, and policy actors could enable it, and if all options for the consumer were indeed made available by the production side of the joint production and consumption system.

3.1 Overview of circular behavioural patterns

Before diving into what constitutes circular behaviour, the concept of circular economy (CE) can be further described. The CE has its foundations in a paradigm shift that questions the traditional linear economic model (i.e., the "take-use-dispose" model), which does not value resources as highly as it could (Mazur-Wierzbicka, 2021). In contrast, the CE model is based on the **"take-use-reuse" approach**, which aims to reorganise existing economic systems, increase the efficiency of use of natural resources, transform waste into resources and implement a new approach to production and consumption, maintaining the value of materials for as long as possible. As a result, the CE has the potential to produce fewer greenhouse gas emissions, less waste, and less pollution (Material Economics, 2016; Rood & Hanemaaijer, 2017)[1].

Figure 3-1 Minimising the use of raw materials and emissions in a circular economy (EEA, 2020)

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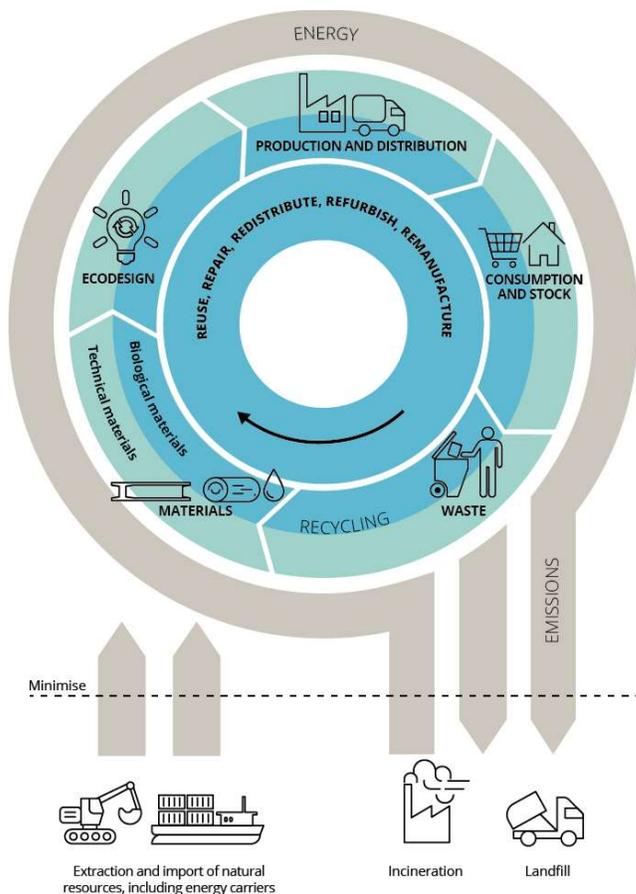
[1] For example, in the Netherlands, implementing a CE was estimated to reduce CO_2 emissions by 10% (Rood & Hanemaaijer, 2017).

Transitioning to a CE requires product (technological), business model, social, and ecosystem innovation. Meeting circular economy goals requires the implementation and upscaling of circular business models on a wide scale, which further demand a supporting policy framework and behavioural change (EEA, 2021; Konietzko, Bocken, & Hultink, 2020).

Consumption is strongly influenced by and embedded in certain prevailing systems relating to infrastructure, availability of products and services (e.g., maintenance, repair), product information, economic incentives, societal norms and habits, and consumer perceptions and values. Numerous studies have focused on identifying the specific factors, perceptions, typologies, and incentives that drive or prevent consumers from acquiring or participating in circular solutions. In this section we present an overview of the key findings from a literature review on these factors, focusing on the main drivers, barriers and associated lock-ins that can promote or hinder consumers to buy or participate in circular solutions.

In a CE, reducing resource use can happen in several ways, as depicted in Figure 1 of Konietzko, Bocken and Hultink (2020). By slowing flows (or "resource loops"), products and materials can be kept in use for as long as possible, and this is one of the key premises of the CE (Bocken, de Pauw, Bakker, & van der Grinten, 2016). Narrowing flows means using fewer components, materials, and energy to create new products, as well as prioritising quality over quantity (Bäunker, 2020). Closing flows can be achieved through reuse and recycling, thereby closing the loop between post-use and production. Regenerating flows refers to removal of hazardous substances and use of renewable energy and materials to regenerate natural ecosystems (Bäunker, 2020). Various design strategies can go into promoting these CE principles, and consumers are integral to these circular value chains and business models. This implies consumers have numerous decisions to make at different stages of a product's life cycle which either support or hinder the CE. In a linear business model, the consumer's role is mostly reduced to the very function of consumption, while in circular value chain consumer responsibilities involve more active decision-making and action and expand to include e.g., maintenance, repair, supply of (used) products, thereby opening different avenues for engagement (Bäunker, 2020). It can be argued that consumers in a CE have more responsibility to make things happen (i.e., to contribute to the CE) and the role of policy is, among others, to make consumers aware of the consequences of their choices. However, this still entails a heavy burden on consumers that can be reduced in the presence of increased availability of circular products and services. These avenues for engagement are further detailed below, along **three main phases** at which engagement with the CE can occur: the point of acquiring a product, the use phase, and the end of use (Wastling, Charnley, & Moreno, 2018). In addition, social media can play a role in influencing desire prior to the acquisition stage, but this is not considered a separate stage of the decision-making journey in this report.

3.1.1 Introduction to circular behavioural patterns

The literature identifies three key stages or phases, where consumers make decisions either in favour of linear or circular-economy solutions: the point of acquiring a product, the use phase, and the end of use (Wastling, Charnley, & Moreno, 2018). There are other points of influence in the consumer decision-making journey (e.g., social media), but acquisition, use, and end-of-life are considered the main ones.

Although in practice, many of the aspects of decisions at different stages can be interrelated[2], the study examines the three stages separately, as this approach allows for a clearer, although simplified, mapping of consumer decisions.

The table below summarises the decisions that the consumers face at each stage of the product process and suggests linear and CE alternatives for each of them. It is to be noted that, in practice, the CE alternatives presented below do not always exist for a given consumer, due to existing barriers and lock-ins (e.g., price and product/service offering), described in Chapter 3.2. This list of decisions and linear vs circular alternatives serves as an input to CE policy analysis (Chapter 5), where the main interest is to identify the policies that can help or directly enable consumers to choose CE alternatives, when these are present, or to make sure that these CE alternatives are indeed present on the market.

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[2] For example, characteristics of a newly purchased product are correlated with the extent to which the product can be repaired in the future.

Decisions made **upon purchase** [P] refer to decisions made by consumers that are not yet in possession of a given product; decisions **made upon use** [U] refer to decisions made by consumers having a functional product in their ownership; while decisions made when the product is **no longer useful** [D] refer to the decisions made by consumers having a non-functional product at their disposal.

Table 3-1 List of decisions and choice alternatives

Code	Decision	Linear economy alternative	Circular economy alternative
Purchase stage			
[P]	**Should I buy/own the product** or not?	Yes, I want the product in my ownership	No, I am fine with not owning the product. This may mean to reconsider the need for the product and/or get access to the product via borrowing (informal exchanges) or product-service systems (leasing, renting, sharing)[3].
[P1]	**If I decide to buy**, should I buy a new or used product?	New product	Used: refurbished, remanufactured, or second-hand.
[P1a]	**If I decide to buy a new product**, which one? (Acknowledging the trade-offs between upfront price, total costs, and other characteristics of the product)	Often, (relatively) cheaper and lower quality[4]	Often, (relatively) expensive products (but not mandatory); but better performance in terms of durability, maintainability, reparability, recyclability, materials, and other CE characteristics
Use stage (product is functional)			
[U]	**Shall I keep using my product** or should I stop using it?	Stop using	Keep using for as long as possible[5]
[U1]	**If the product is kept in use**, how should I take care of it?	Careless usage and improper or no maintenance	Careful use, timely maintenance, cleaning, upgrade, and repair
[U2]	**If the product is no longer used**, what to do next?	Dispose or store the product	Donate, sell, or share with those who may use it more
End of use stage (product is not functional)			
[D]	**Shall I keep it for a while**, or shall I get rid of it?	Get rid of it	Keep hoping to extend its life
[D1]	**If the product is kept**, is it stored or repaired?	Store for long time	Extending the product's life, repair, refurbishing, and upgrade, to maximise reuse and extended use
[D2]	**If the product is not being kept**, how to get rid of it?	Improper disposal and landfilling	Proper disposal, donation, or selling for components, to maximise recycling and reuse

Source: literature review and own analysis

Note that in many cases the solutions listed under linear economy alternatives will lead to subsequent decisions, where some of the alternatives align more with circular economy. Finally, the table below aim to represent a general set of decisions, applicable to all sectors, that is, with no specific product in mind. Certain products will have more nested decisions or some of the listed decision will not be applicable to them.

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[3] We do not distinguish between non-ownership solutions here, although we acknowledge that not using the product would be preferred to using the product through a product-service system, if not having access to the product would not generate negative CE consequences through usage of other products.
[4] This relates to the discussion on built-in obsolescence discussed in Chapters 3.2 and 3.5.
[5] While in general, longer usage is preferred, stop using might be a better option, if the product is transferred to another user with more intensive use (see U2).

3.1.2 Consumer decisions upon purchase

One of the first decisions that a consumer makes is at the stage of acquiring a product. In the traditional linear business model, consumers are encouraged to buy frequently new short-lived products.

From a circular viewpoint, there are multiple questions that a consumer can think about, starting with the question of "do I need the product altogether?" and then of "to buy or not to buy?" These questions relate to various circular strategies, known as **"R strategies"**: recover, recycling, repurpose, remanufacture, refurbish, repair, re-use, reduce, rethink, and refuse (EEA, 2020; Morseletto, 2020), also exemplified in Figure 3-1.

Circular business models offer **alternatives to ownership**, whereby consumers are encouraged to use sharing rental, or leasing services[6] when acquiring products that they could make temporary use of. These models are more widely known as 'product service systems' or 'access-based business models', which provide access to services that meet the consumer's needs, based on the usage of a physical product, without the necessity of owning the product itself (Bocken, de Pauw, Bakker, & van der Grinten, 2016; ETC/WMGE, 2021). Similarly, borrowing a desired item from a friend, family member, or acquaintance meets complies with CE principles. This entails that sharing services could also be free of charge if delivered through informal channels. Figure 3-2 summarises the consumer choices that occur upon purchase and that align with CE principles. It is important to remember that the CE alternatives presented below pertain to an **ideal situation** that needs to be supported by a coherent technical, social and ecosystem infrastructure. The diagram below depicts options that generally, in the current situation of the market for products in the EU[7], are simply not available, for many products and for whole segments of the consumer market. In addition, they are often more expensive and difficult to obtain.

Figure 3-2 Consumer decisions upon purchase in a circular model (own development)
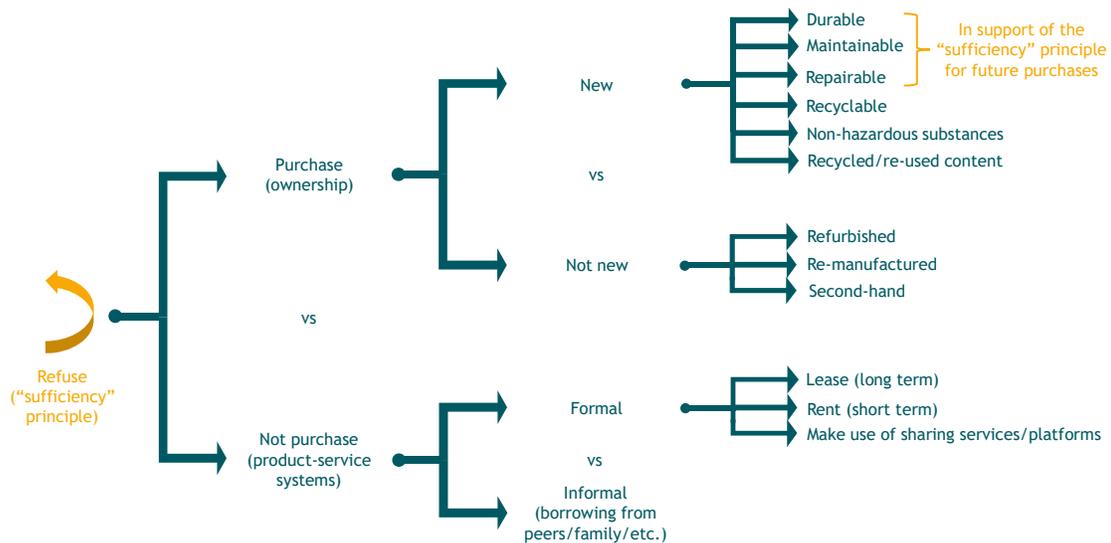
In an ideal CE scenario, consumers deciding to purchase a product face various options: purchasing new, refurbished, re-manufactured, second-hand, etc. In a circular system, purchasing 'new' comes with a series of considerations that may not always come up in a linear system. Examples of 'circularity' **criteria** to consider when acquiring new products include: maintainability, repairability, recyclability, content of recycled or re-used material, durability, toxicity of substances used, etc.[8] These criteria reflect

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[6] Note that leasing may become non-circular if the duration of the lease is shorter than the life duration of the product (as it currently is in the automotive sector, where leasing is a form of consumption credit, pushing for the frequent renewal of cars).

[7] As of the date of drafting of this report (December 2021).

[8] These criteria are additional to other drivers of consumer choices that, in reality, take priority over CE criteria (e.g., price, availability, visibility). Such drivers are discussed in Chapter 3.2.

a choice of long-life products that can be re-introduced into the economy at the end of their lives or that use less virgin resources upon manufacture, i.e., they reflect all principles of the CE depicted. Namely, narrowing and slowing resource loops translates into choosing quality over quantity, and reducing the amount of hazardous substances found in our products ('regenerating flows') such that they can be safely treated at the end of their lives ('closing flows') (Bäunker, 2020). Making choices based on such criteria also has the potential to influence business behaviour. More specifically, through their choices (if these choices truly exist and are attainable for the average consumer), consumers send signals to companies on their preferences and interest in new business models.

In the present (mostly linear) system, circular behaviour is sometimes viewed as cumbersome. It often requires strong commitment and active engagement from consumers, who need to consider the environmental impact of the products and services they consume. In order to make circular behaviour mainstream, consumers, thus, need to be supported by companies and regulators who can enable a more circular system, with more circular options for consumers (this is discussed more in the following chapters). Information on the environmental impact of consumer choices should be easy to access via relevant, trustworthy, and comparable information found, for example, on labels or on a future "digital product passport", as foreseen in the SPI. However, even when such information is available, only certain segments of the population can process the information and act in line with it. Other signals fostering circular behaviour are economic incentives that encourage the purchase of more sustainable products and services, however, these may vary from country to country (see Chapter 4 for good practices). Therefore, an ideal circular behaviour remains attainable only for a fraction of the population and risks staying that way, unless efforts from businesses and policymakers can help make circular choices more accessible, cheaper, and convenient for consumers.

Another way of viewing 'narrowing' and 'slowing' resource loops is consuming less (i.e., purchasing fewer items and using existing items longer). This non-consumerist approach is central to the concept of **"sufficiency"** outlined in certain literature (Bocken, de Pauw, Bakker, & van der Grinten, 2016). This implies the option to refuse acquiring products (whether they are old or new) and reject packaging or other similar items that are considered unnecessary or toxic to the environment (UNEP, 2019). As an alternative, in an ideal scenario, consumers have the option to re-use existing products and reduce their consumption, i.e., "meet their needs and live their aspirations with minimal impacts on the planet and the people around them" (UNEP, 2019), as illustrated in. However, in practice, these options may not be desirable, convenient, or possible for all consumers due to numerous reasons (e.g., wealth, geographic location, family structures, policies, infrastructure) that are further detailed below when considering drivers, barriers, and lock-ins (§ 3.2).

The principles of circularity outlined above should be considered at every stage of a product's life cycle, or at every stage of the consumer decision-making journey. Circularity entails that decisions made at the point of purchase also have consequences for the use and disposal stages, which are further described below. They also help delay further purchases, thereby reinforcing the "sufficiency" principles.

3.1.3   Consumer decisions upon use

Circular behaviour at the use stage can be described as **extending a product's lifespan or enhancing its durability**, thereby adopting a strategy of "slowing resource flows" (Konietzko, Bocken, & Hultink, 2020). This means maintaining, repairing, refurbishing, or upgrading products, such that resources are kept in use for as long as possible (if options are available and accessible to consumers). Figure 3-3 provides examples of consumer decisions and choices that align with circularity at the use stage (as described in this chapter).

Figure 3-3 Consumer decisions upon use in a circular model (own development)
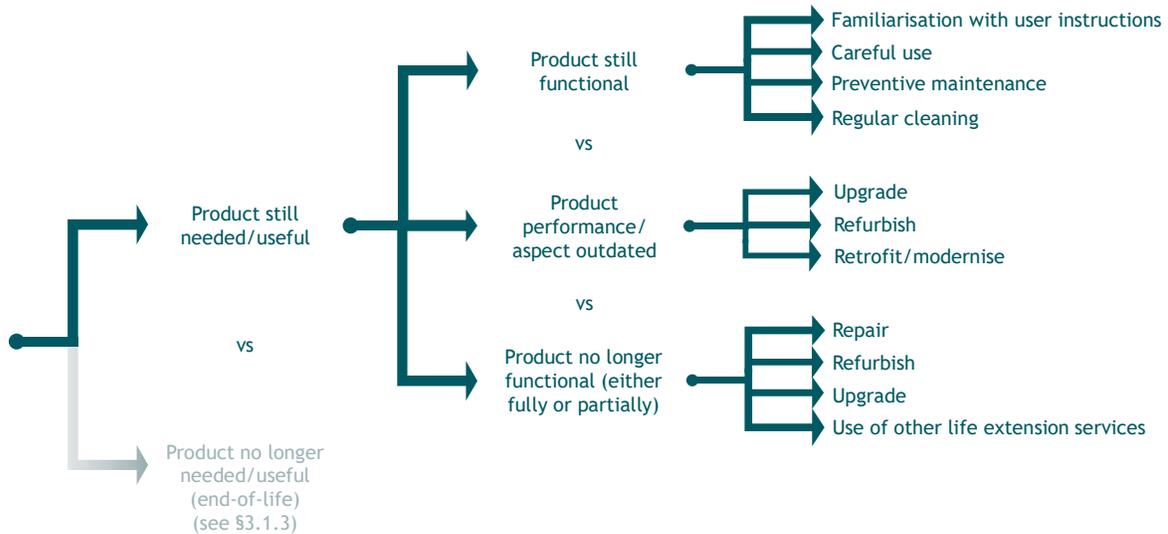
As Bocken et al. (2016) explain, the principles of longer use and repair are aligned with the principles of a closed loop economy. In slowing material flows, product lifespans are extended and the creation of new products is postponed (Bäunker, 2020). This is also illustrated in UNEP's circularity approach (UNEP, 2019).

Consumers can support slow resource loops by using their products for a longer time, which can be achieved through treating products carefully (i.e., product care) and mending or refurbishing them if necessary (Bäunker, 2020). Product care is an umbrella term, covering treating a product carefully, following user instructions (e.g., to increase the lifetime of a product, to control the energy use or the use of other resources), cleaning it, or performing other preventative maintenance (Wastling, Charnley, & Moreno, 2018). Repair refers to the fixing of a specified fault in an object or replacing defective components, such that the object becomes fully functional. Similarly, refurbishing refers to modifying a product to increase or restore its performance and/or functionality. The resulting product should be used for a purpose that is at least the one that was originally intended (UNEP, 2019). it should be noted, however, that, for many consumers, these choices are not available.

Users can maintain or repair their own belongings, or they can make use of professional life extension services. In some cases, users can go to repair cafés and learn more about the repairability of their products (Van der Velden, 2021), if this option and the necessary infrastructure is available to them (which is not the case for a large share of the population). Albeit more difficult than repairing products, users can, theoretically, upgrade their products by replacing specific components with higher-performing ones, keeping the greatest part of the product unchanged. This is particularly valid for electronic products which can be discarded if their performance no longer matches that of new products. As Bäunker (2020) explains, the mindset needs to shift "from quick product releases to [hassle-free] upgrades".

The behaviour of users plays a key role in determining how products are managed at the end-of-life phase, which should be delayed as much as possible through re-use, longer use, preventive maintenance, repair, refurbishment (as exposed in the present chapter), and better-quality products (as explained in Chapter 3.1.1). It is the user who decides which product to use for a certain need, for how long to use it, how often it is replaced, whether it is repaired when it breaks down, and if it will be re-used afterwards (ETC/WMGE, 2021). However, producers (enabled by policymakers) hold a very prominent role in establishing the quality of products and the options available to consumers. Most modern business models are not circular, and consumers still face limited circular options. Moreover, various obstacles or external influencers (e.g., advertisements) can hinder lifetime extension. Consequently, the importance of consumer decisions, in conjunction with business model innovation and social innovation, to increase circularity cannot be underestimated. Circular behaviour cannot be applied if circular options are not supported by policymakers and businesses.

3.1.4   Consumer decisions when a product is no longer needed

When a user no longer needs or desires a belonging, the item reaches its end-of-life (in relation to its owner). At this stage, the item can be given a **new life, collected for re-purposing or recycling, or discarded (incinerated or landfilled)**. In a circular system, landfilling is the last option, at the very bottom of the waste hierarchy. Even once a product is broken and/or no longer needed, there are several options that can extend its life, in line with CE principles of "slowing" and "closing" resource loops. Consumer choices at the end-of-life stage, as outlined in this section, are summarised in Figure 3-4 below.

Figure 3-4 Consumer decisions at the end-of-life stage in a circular model (own development)
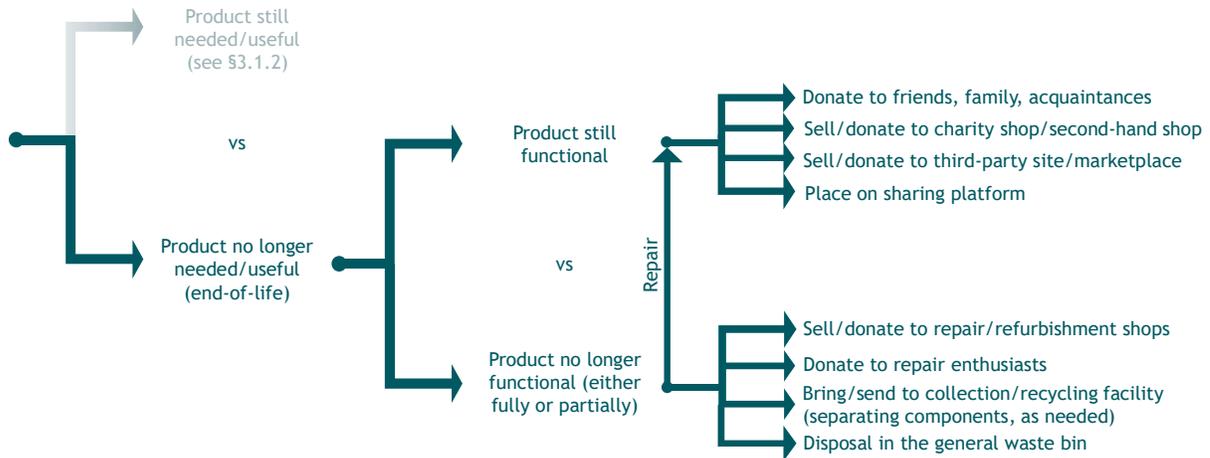
When products are out of service or no longer needed, users can extend their lifetime by offering them to other users (provided they are still functional or other users have the technical capacity and aspiration to repair or refurbish them). Ensuring the item stays as a working product means that it retains its highest level of value (Wastling, Charnley, & Moreno, 2018). In a CE, users have the option to sell their used items online via third-party sites or through second-hand shops (online or offline), or to place them on sharing platforms (provided such platforms are available and accessible). Used items can also be donated to charity shops or to friends and family. Products that are not fully operational can be further repaired, refurbished, or repurposed (upcycled) by the new (or intermediate) owners (ETC/WMGE, 2021). In practice, products are sometimes too outdated or unrepairable, and cannot be passed on to new owners, even if repair or refurbishment services can be accessed. This is particularly the case for very old electronics, which provide few advantages in comparison to new products.

Material recycling represents a lower level of preserving value in a CE, but it may be relevant in some product categories or circumstances (Wastling, Charnley, & Moreno, 2018). This may involve separating materials for recycling, following sorting instructions, taking products to designated collection and/or recycling centres, and avoiding the general waste bin. Recycling permits the closing of resource loops, namely between post-use and production, as shown in the figure above (Bocken, de Pauw, Bakker, & van der Grinten, 2016). Supplying products at end of life for recycling is a necessary condition for products to be manufactured from (totally or partially) recycled materials. Even though industrial recycling processes often take place out of consumers' sight, consumers are important suppliers of the waste products, components, and materials that these processes require (Bäunker, 2020). Therefore, consumers need to recognise the **value** of what is nowadays referred to as waste, and feed it back into the cycle, as exemplified in UNEP's circularity approach (UNEP, 2019). It is worth noting that recycling infrastructure varies from city to city and country to country, and the option to recycle is currently not available or convenient for everyone.

3.2 Drivers, barriers, and lock-ins

This chapter describes examples of drivers, barriers, and lock-ins that encourage, prevent, or hinder consumers from making circular choices.

3.2.1   Introduction to drivers, barriers, and lock-ins

While there is no universally accepted set of factors that influence consumer behaviour, many authors often coincide on the list of common factors. In refence to CE behaviour, the literature identifies the following five key groups:

- **Economic factors** include price and other associated costs (for example, running costs, maintenance costs, disposal costs, upgrade costs, time investment and emotional costs), but also include income and how the individual values future costs and benefits in comparison to the costs and benefits in the present.
  Moreover, the perception of risks and uncertainties also form part of this group of factors. Many studies and consumer surveys identify this group of factors as the most important ones for the consumers. Often, CE solutions do not see high demand, as they are or are at least perceived to be, more expensive that LE solutions.
- **Fit between needs and offering** refer to the extent to which the product can meet the consumer's needs. It embraces the dimension of product availability, product quality and characteristics. These factors need to be analysed in conjunction with the consumer's needs and preferences, covered below. Although CE solutions are largely known, the supply of them or at least perceived supply is often limited. Availability and costs of access are often related, in case of CE solutions.
- **Information used for choice** refers to the availability and comprehension of the inputs for consumer decision-making. Only if consumers fully understand distinctive characteristics of CE solutions, have information on their availability and likely impact, they will be able to make informed decisions.
- **Social factors** refer to the social norms in respective communities, common practice and examples given by role models and reference groups.
- **Preferences and beliefs** reflect all dimensions of consumer needs, such as comfort (convenience), prestige, value assigned by the consumer to environmental characteristics, brand loyalty, as well as other personal values (e.g., materialism). This makes some individuals and groups more prone to use or adopt CE solutions than the other ones. While we can make use of descriptive analysis, these factors are difficult to shift without changing cultural norms, which happens gradually.

Somewhere in between social factors and preferences and beliefs, one can find more personal and psychological factors such as habits and familiarity certain linear solutions. These kinds of factors form lock-ins based on heuristics and behavioural biases that affect judgemental operations. For examples, habits and familiarity with linear solutions lead to a "status quo bias", hindering behavioural change. The topic of behavioural insights and biases (i.e., the underlying psychological dimension of consumer decisions affecting circular behaviour and the factors that drive and/or hinder circular behaviour) are discussed in more depth in Chapter 3.3.

It should be noted that these categories are not entirely independent from each other, they often interact and influence one another. In our analysis, for clarity, we consider them separately, and introduce comments on possible interactions, when relevant.

There is a consensus on the fact that economic factors are most important for consumer decisions, while the ranking of the rest is less clear. Although there are no objective statistics to rank the factors, we believe that the list above reflects well the order under which the different factors affecting consumer behaviour are effective in modifying consumer behaviour and amenable to public policies (the most effective and amenable to public policies first). The ranking is based on findings in literature as well as the authors' judgement, under the following reasoning:

1. Economic factors can be modified by the existing and well-proven incentive tools that modify the relative prices of goods and services;

2. Fit between need and offering are a material pre-condition for CE choices to be made available to consumers, and hence for circular choices to be possible. This set of factors can be modified by public product policy regarding ecodesign, minimum requirements for performance, etc.;

3. Information used for choice can be modified by mandating or affecting the labelling of the product and other sources of information on it;

4. Social norms are collective phenomena evolving at slow speed, under the influence of factors largely out of the control of public authorities in democratic societies (media, culture);

5. Preferences and beliefs are individual features, which are rooted in personal / family history and in personal capacities, and hence very stable and difficult to influence from the outside.

3.2.2 Economic factors

Prices, costs, and benefits

Price is often indicated to be one of the most important drivers in consumers' decisions when choosing a product or service (WRAP, 2019; LE Europe et al., 2018, Joshi & Rahman, 2015). Price, together with product and service attributes such as product quality, durability and repairability are the main factors that consumers take into account when estimating the cost of ownership or of engaging in a circular solution. Even though in the long-term the total cost of ownership might be lower for more durable and expensive products (compared to low-quality, cheap products), their high upfront costs may reduce their affordability for a wide range of consumers (ETC/WMGE, 2021). In instances where the lack of economic resources of consumers magnifies the effect of price, price can act as a barrier for circular behavioural patterns (Joshi & Rahman, 2015).

The reasons why the upfront price of products designed for circularity tends to be higher than that of linear products are exposed in Box 3-1 below.

Box 3-1 Reasons why the upfront price of products designed for circularity tends to be higher than that of their linear alternatives

The reasons why the upfront price of a more circular product tends to be higher than that of its linear alternative can be traced back to two fundamental reasons regarding (1) the process of designing products and (2) the irreversible deterioration of products over time.

The process of designing a product

A product (e.g., a coffee machine) can be described as an object performing certain functions (brewing coffee) and satisfying a set of requirements (e.g., on technical performance, on electrical safety). The process of designing a product consists in selecting, for each of the functions that need to be performed, the technical solution at the lowest cost, among the solutions allowed by the laws of Physics, by the performance of the known technologies and by the requirements placed on the product. It happens that this space meeting all these conditions is void: there is then no technical solution to the requirements placed on the product.

As a general rule, if the state of technology and of the production system remains constant, then any additional requirement placed on the product reduces the number of technical solutions available for the design and for the cost optimisation, and hence tends to increase the cost of the product. This general rule can be illustrated by the following examples:

- Stainless steel fulfils one additional technical requirement compared to conventional (carbon) steel, namely to be immune to rust. Whereas the world average price of carbon steel was 614 USD/tonne in November 2019 (i.e., before the Covid-19 crisis), the world average price of stainless steel at the same date was above 2,598 USD/tonne, i.e., more than 4 times higher[9];
- Organic cotton fulfils one additional requirement compared to conventional cotton, namely to be grown with no use of pesticides nor of artificial fertilisers. In 2018/19, according to the NGO Textile Exchange[10] promoting sustainable textile materials, organic cotton fibre prices ranged from USD/kg 1.6-3.43 (average of 2.19) compared to the Cotlook Index that ranged from 1.61- 2.19 (average of 1.85) over the same time period[11], an average price supplement of 18%;

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[9] https://worldsteelprices.com/
[10] https://textileexchange.org/about-us/
[11] Textile Exchange – Organic Cotton Market Report 2020. https://textileexchange.org/wp-content/uploads/2020/08/Textile-Exchange_Organic-Cotton-Market-Report_2020-20200810.pdf

- The microprocessor for integration in domestic appliances (aka a "microcontroller") of the company Texas Instruments with reference CC2640R2L for office environment is priced at 0.85 USD/unit[12], whereas its counterpart qualified for an automotive environment, i.e., satisfying the additional requirements of withstanding a broader range of temperatures, additional vibrations and shocks, called CC2642R-Q1, is priced at 2.69 USD/unit[13], i.e., ca. 3 times more;
- The domestic washing machine of standard capacity WWD 660 TwinDos of the company Miele is sold 1,299 EUR in an on-line retail store[14], whereas the semi-professional machine PWM 300 SmartBiz of the same capacity and of the same company, satisfying the additional requirements of heavy-duty usage (3 cycles per day) and of longevity (15 years guarantee), is sold by the same on-line retailer at a price of 2,299 EUR, i.e., 77% more.

Circular products are those which comply with circularity requirements (e.g., longer lifetime, maintainability, repairability, recycled content), which add to all requirements placed upon them regarding performance, reliability and functionality and that they share with unsustainable products. Because they comply with more requirements, their cost optimisation is made over a smaller space, and hence they are more costly.

The irreversible deterioration of products over time

It is a general law of Physics (known as the Second Law of Thermodynamics) that the universe evolves irreversibly over time towards more disorder, dispersion, and chaos, all of these terms being subsumed in the concept of "entropy".

Consequently, physical objects and products deteriorate spontaneously and irreversibly over time:

- Materials deteriorate chemically (e.g., because of oxidation of metals, de-polymerisation of plastics, ...);
- Materials deteriorate mechanically (e.g., because of the accumulation of micro-dislocations and cracks in the process called fatigue, or simply because they break as the result of shocks or of fatigue);
- Materials get dispersed (e.g., because of wear);
- Materials are mixed (in metallic alloys, in liquid mixtures, in mixed textile fibres, in composite materials, as additives in plastics);
- Materials are assembled at the very small scale of a few atomic layers (in electronic components, in optical, electrical and aesthetic coatings, in paint, tainting, varnishes and ink);
- Materials are loaded with impurities or contaminated with hazardous chemicals;
- Pieces are subject to plastic deformation;
- Information is lost during the process of design, manufacturing or maintenance.

Consequences on the upfront cost of circular products

In the short term, or in the absence of technical innovation or of investment in industrial capacity, additional requirements placed on products, such as requirements bearing on circular features (such as longevity, maintainability, repairability, recyclability), thus tend to induce higher costs for the manufacturer:

- **increasing product longevity**, i.e., counteracting and delaying the naturally occurring irreversible deterioration processes listed above, requires:
  - a more robust design. This in turn requires a deep understanding of the physics and chemistry of each material being used, as well as technical testing tools for the accelerated ageing of these materials (e.g., via thermal cycling), resulting in additional (one-off) design costs (more, and better qualified, engineers and technicians, more testing equipment). The resulting product generally uses more materials, of better quality – resulting in higher recurring costs for each unit being produced;
  - a more precise and robust shaping of materials and assembly of pieces, in order to resist the multiple events and sources of mechanical, chemical and thermal deterioration of the product over its extended lifetime, again resulting in higher recurring costs;
- facilitating **maintenance**, **repair** and **end-of-life disassembly** into individually recoverable or recyclable parts often implies reversible assembly methods (e.g., screws), which are more labour-intensive than their irreversible alternatives (e.g., glue, clipping);
- using **recycled materials** instead of virgin ones. The costs of recycled materials tend to be constant, because the underlying processes are stable. Virgin materials, being traded on global commodities markets, tend to have more volatile prices, which often are lower than those of recycled materials.

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[12] https://www.ti.com/product/CC2640R2L

[13] https://www.ti.com/product/CC2642R-Q1

[14] https://www.boulanger.com/ref/1150546

Notes:

1. These trends only are valid in the absence of technical innovation or of investment in production capacity. It is one of the purposes of environmentally-oriented innovation to provide technical solutions that enable a product to improve its circularity features – and yet remain at a competitive upfront price in comparison to its more linear competitor;
2. Neither the existence of such technical innovation, nor the profitability of investment in production capacity of more circular products, can be taken for granted. They are costly and risky – hence with no guarantee of success.

In some cases, the upfront cost of ownership may exceed the cost of leasing or renting products through product-service systems or sharing models. This depends on the type of product, the consumer's frequency of use, and (high) maintenance costs. For example, tools, furniture, gaming systems, jewellery, clothing for formal events, and accessories may be used only periodically by some consumers, while products like cars have high maintenance costs. In cases such as these, the non-ownership models might look more economically attractive for consumers.

Box 3-2 Knowledge and its influence on the relative importance of price (LE Europe, VVA Europe, Ipsos, ConPolicy, Trinomics, 2018)

LE Europe et al. (2018) conducted a behavioural experiment testing different forms of durability and repairability information and their effects on consumers' choices when purchasing a product. The study also tested the effects of behaviourally informed nudges via claims such as "*Products that last longer may save you money over time*" and "*A majority of people choose products that last longer and are easier to repair*".

The study concluded that when providing consumers with information about products' durability at the point of sale (e.g., on a product label), and the use of behaviourally informed nudges can potentially encourage the preference and selection of more durable products. Better information on the durability and quality of a product can increase the value of a product in the long term, or the relative weight of the products' environmental characteristics on the customers' purchasing decision.

The willingness to engage in CE activities differs with the nature of the product. Consumers are more likely to buy a durable product, repair or lease a product for expensive and less 'fashion dependent' items. In LE Europe et al., (2018) a survey found that both quality and price remained very important factors for all product categories within the consumer electronic segment.

With regards to environmental and social benefits, the perception of the consequences of a green purchase can positively influence a green purchase (Joshi & Rahman, 2015). The literature suggests that in some instances consumers may be willing to pay a premium for environmental and socially friendly products, such as those with eco-labels and fair-trade certifications (WRAP,2019; LE Europe et al., 2018). When presented with the option of engaging with a circular behavioural pattern, consumers' sensitivity of environmental and social benefits is strongly linked to their level of understanding of the relevance of well-functioning ecological cycles, as well as the effect of material consumption and the production phase in the environment and the well-being of people involved in this process. To support this understanding business and governments can educate consumers on the necessity and the benefits of becoming more circular (Bäunker, 2020).

However, it should be recognised that **economic benefits generally outweigh environmental or social concerns and widen the attitude-behaviour gap in the case of green purchases**. This becomes more evident depending on consumers' sensitivity to prices: a high price sensitivity negatively influences green purchase intension and behaviour (Joshi & Rahman, 2015).

Risk and uncertainty (about costs and benefits)

There are several apparent barriers in customer behaviour which relate to risk and uncertainty that can make a transition to more circular models difficult. Risks and uncertainty associated with circular solutions such as reused products and access-based consumption, affect consumers' perception and the intention to pay for them. The associated aspects include trust, risks, newness, and disgust, as well as concerns about the lack of ownership.

Trust concerns might refer to the confidence that the provider is offering a quality solution and that they will solve problems in case of damage. In the context of the purchase of green products, trust can also be determined by the beliefs or expectations about the environmental performance of said products. A lack of consumer trust and confidence in green claims or the characteristics of green products can be a significant barrier towards purchase of such products (Shen, 2014). These concerns justify the current efforts by the EU institutions to substantiate green claims (European Commission, n.d.). A lack of trust can also be a barrier for engaging in reparation of products. Consumers might question if the product will work again properly after a reparation, and for how long it will work again (LE Europe, 2018).

Risks refer to the possibility of a product not working properly, that it will break down without repair solutions, or that it will work properly after being repaired, and consequently the consumer will face the burden of extra costs.

Uncertainty about costs and benefits of circular solutions are also connected to the concept of **newness or lack of thereof and disgust**, for example consumers tend to think that a new product will function better than a refurbished/upcycled or second-hand product. They are also concerned about hygiene issues, the presence of hazardous substances, or safety concerns in used products. In general, consumers' disgust or negative attitudes towards the lack of newness hamper their participation in circular solutions that involve the purchase or ownership of pre-owned items.

While for non-ownership solutions, risk and uncertainty barriers also include a lack of trust in new business models and a need for ownership (Wastling et al., 2018). In the case of shared or rental services, consumers also express concerns about the **lack of ownership** of products, such as not having the product readily available if they needed unexpectedly. However, as described above, personal characteristics such as the need for uniqueness or desire for change can support access-based services.

3.2.3   Fit between needs and offering

Product and service offering focuses on the availability of products and services that align with CE principles. This includes product and service characteristics such as **product quality, product durability and longevity, product-need fit**. Product and service offering is thus dependent on business innovation, product design, and **available infrastructure to deliver circular solutions** (e.g., in the case of maintenance, repair, recycling or end of life disposal).

Product durability and longevity are usually associated with product quality, which can significantly influence consumer green purchase behaviour. For example, consumers perceived clothes produced in the past to be of much better quality than those produced today, which motivates them to choose second-hand clothes (LE Europe, 2018). Similarly, in the green food products market, consumer find product quality and characteristics indicating its healthiness to be important attributes (Joshi & Rahman, 2015). Joshi & Rahman (2015) also indicated that consumers prefer functional attributes of the product that fulfil personal needs and desires (i.e., product-need fit), and product quality over its credentials of environmental and social benefits.

Another product characteristic is the possibility to be repaired, which is very often associated with the availability of spare parts. When comparing product durability against product repairability, the study conducted by LE Europe (2018) concluded that consumers found repairability to be less important than durability. This might be explained by the trust consumers have on manufacturer warranties, not expecting durable products to break.

The existence of the required infrastructure to deliver circular solutions is necessary for consumers to be able to adopt circular behavioural patterns. For example, a company providing sharing services (e.g., cars, bicycles, scooters) may not succeed in engaging consumers without the proper infrastructure (ETC/WMGE, 2021). This is also evident when dealing with end-of-life disposal: consumers are dependent on businesses and governments to provide them with access to a structured recycling programme (Bäunker, 2020).

Another important aspect that influences user experience and assessment of offering is **convenience.** The **level of ease** of implementing circular practices will determine the acceptance or adoption of circular practices, because actions that require a lot of effort act as a barrier to circular behaviour

(Chapter 3.3 explains this in more detail). As described in Chapter 3.1, implementing circular practices ranges from choosing to purchase "circular" products to repairing or maintaining existing products, to re-introducing old products into the economy or adopting correct disposal practices.

In the absence of supporting infrastructure, **circular practices** will tend to require **more time**, **effort** and **competence** than a more linear one, as illustrated in Table 3-2 below.

Table 3-2 Additional time, effort and competence needed by circular practices vs. linear ones, and means to overcome this gap

Stage the decision process	Time, effort, and competence needed for a circular practice	Time, effort, and competence needed for the corresponding linear practice	Infrastructure needed to overcome the time, effort, and competence gap between linear and circular practices
Purchase	Compute the **Life-Cycle Cost**, based on upfront price and an estimation of longevity based on the technical features of the product that are visible before purchase	Consider upfront price only	• Provide reliable and easily understandable data on product longevity • Display Life-Cycle Cost
Purchase	Estimate the **ease of repair**, based on the technical features of the product that are visible before purchase	*No consideration of repair*	Provide a repairability index, displayed under a simple label, with straightforward meaning
Purchase	Estimate the **reliability**, based on the technical features of the product that are visible before purchase	*No consideration of reliability*	Provide reliable and easily understandable data on product reliability (such as a Mean Time Between Failures)
Purchase	Estimate the **recyclability**, based on the technical features of the product that are visible before purchase	*No consideration of recyclability*	Provide a recyclability index, displayed under a simple label, with straightforward meaning
Purchase	Evaluate the quality of **second-hand** product	*Only new products purchased*	Provide a register of all maintenance and repair operations performed on the product over its lifetime
Use	• Perform the appropriate **user's preventive maintenance** operations on time • Find and purchase **spare parts** needed for user's maintenance operations	*No preventive maintenance action performed*	• Provide understandable maintenance manuals and maintenance services • Make certified spare parts easily available
Use	Find a competent **repairer**	*No repair performed*	• Certify repairers per category of products, with a reliable and

Stage the decision process	Time, effort, and competence needed for a circular practice	Time, effort, and competence needed for the corresponding linear practice	Infrastructure needed to overcome the time, effort, and competence gap between linear and circular practices
			• easily understandable labelling • Ensure a dense network of competent repairers
Use	**Waiting time** for the repair to be performed	*No repair performed*	Provide for a courtesy replacement of the product during the repair
End of use	Make the used product available for **re-use** in second-hand shops or websites	Throw the product away	Reduce frictions in the second-hand market (secure payments, trust-building systems)
End of use	Make the product available for appropriate **recycling** in the right waste processing value chain	Throw the product in the unsorted waste dustbin	• Make recycling points easier to find, with a high-density network • Make manufacturers responsible for taking back used products at end of life

Ensuring that these practices are convenient for individuals entails a wide range of considerations. Repair services, for example, must be easy to access. Le Europe et al (2018) explain that any frictions in the accessibility of repair services significantly lower the attractiveness of repair. Effort is seen as an important cost for consumers, which may tip the scale in favour of replacement, especially for consumers that desire change or that follow trends. Accessibility should, therefore, be considered together with other factors influencing consumer behaviour such as product and service offering (Chapter 3.2.2). Limited availability and inconvenience in procuring circular products or services act as barriers that widen the gap between a consumer's intention to adopt circular practices and actual behaviour (Joshi & Rahman, 2015). Governments can encourage circular behaviour or interaction with circular business models through various policy instruments, thereby making such products or services more accessible and convenient (Bäunker, 2020).

Meeting CE goals requires a systemic shift in how we create, provide, add, and obtain value, and businesses and governments are responsible for creating the conditions that can facilitate circular behaviour (Bäunker, 2020). Wastling et al (2018) describe **"design for behavioural change"** strategies as having the potential to assist the transition to more circular business models. The latter encourage consumers to engage with products in a way that aligns with CE principles. Bocken et al. (2016) group circular design strategies that aim to slow resource loops such as "design for ease of maintenance and repair", "design for upgradability and adaptability", as well as strategies that aim to close resource loops, such as "design for a technological cycle" and "design for a biological cycle". However, design decisions are, ultimately, driven by market and user requirements, and by the lack of internalisation of external costs (ETC/WMGE, 2021). A combination of functional attributes and product quality will influence success and consumer retention; environmental and social responsibility alone cannot guarantee success (Joshi & Rahman, 2015).

3.2.4 Information used for choice

Consumers are often unaware, or do not fully understand the circular model behind products and services (ETC/WMGE, 2021). The factors grouped under **information used for choice** relate to the provision of information about the products or services, which influence the perceptions of customers when purchasing or participating in a circular solution (e.g., when purchasing or repairing an item). These include **public awareness**, **product knowledge** (i.e., the information that the costumer has to assess the quality of the product and the potential benefits it would yield), **competence** (e.g., on how to use and maintain the product in order to maximise longevity, or on how to use the product longer in a satisfactory manner – typically keeping the usage of a product despite changes in fashion) and **knowledge about the quality of the product, the environmental benefits, and the costs**.

Eco-labelling or eco-certification can be used to inform consumers about the green characteristics of the product and motivate them to purchase green products. Another example is energy consumption information such as the EU Energy Label. Reliable information should be provided in a simple and user-friendly way through product labels. There is some evidence that labelled products may be preferred over unlabelled products, with consumers having a higher willingness to pay for the labelled products (WRAP, 2019). However, labelling might not have any impact on consumer green purchase behaviour if they do not understand what the label means, they do not trust the information provided, or if the multiplicity of competing labels of very diverse reliability lowers the trustworthiness of all labels (WRAP, 2019; Jacobs, Petersen, Hörisch, & Battenfeld, 2018). A behavioural study on consumers' engagement in the Circular Economy in the European Union (LE Europe, VVA Europe, Ipsos, ConPolicy, Trinomics, 2018) identified the difficulty to pinpoint the durability of products as a key barrier, together with a sense that newer generation of products are less durable than products manufactured some years ago. The findings of a consumer survey revealed that in general, consumers desire receiving better information because they experienced difficulties to find information regarding how long products would last, and how easy it would be to repair them. This implies that the current state of information provision regarding product durability and repairability might be a potential barrier for engaging in the Circular Economy.

Consumers' knowledge and understanding is also relevant while using a product or service, for example, when maintaining or repairing products. In the past, repairing products was a common economic activity. This is still the case for some valuable goods (e.g., expensive electronics or vehicles), where repair services provide cost savings for consumers. However, maintaining and repairing products is no longer a mainstream practice, largely because of the high costs of repair involved, which can often be higher than those of purchasing a new product. Repair services are done locally, while production is often done in low-income countries, where wages are considerably lower in comparison to those in the EU countries. There is also a lack of knowledge and public awareness of the environmental costs of production, and the environmental benefits of reuse and repair activities (ETC/WMGE, 2021). With the increased availability of information and technologies consumers can become more active and be involved in more sustainable consumption and use patterns. For example, for some products consumers can engage directly with customising and repairing their products through the concept of do it yourself (DIY) (ETC/WMGE, 2021). However, to do so, consumers require competences (e.g., technical skills) to do so, and the complexity of the product and the reparation required will determine how feasible it is to DIY.

Educating the society about various recycling options is one driver to encourage recycling behaviours. Consumers might also consider modifying their disposal behaviour if they had a good understanding of disposal options and waste recycling (how and where to dispose items), and if they were more aware of the social and environmental consequences of disposing options, or even of how products were made (Grębosz-Krawczyk & Siuda, 2019). Public awareness can place a big role in improving consumers' understanding of correct disposal practices through education and campaigns. One example of public awareness campaigns is the 'Shop with your waste' campaign launched by the municipality of Panaji, Goa's capital in India, which invites citizens and tourists to exchange dry waste such as PET bottles or cardboard through a barter system against daily use items like groceries (Bäunker, 2020).

3.2.5 Social factors

This category relates to how consumers **experience** circular solutions and how they perceive them because of their experiences. **Emotional and affective** aspects such as enjoyment and excitement are related to consumer experiences, as well as the level of ease and convenience when it comes to accepting and adopting circular solutions (Camacho-Otero, Boks, & Pettersen, 2018).

Testing new products and novel practices can fulfil consumers' desire for change or variety (as described in Chapter 3.2.1), and to engage with a new lifestyle. Lang and Armstrong (2018) demonstrate that individuals who have had more experience participating in sustainable consumption practices are more likely to adopt circular practices such as renting or swapping clothes. Not all consumers desire constant novelty, so adopting new practices takes effort (see Chapter 3.3). When new practices become familiar, people's perception of risks and the uncertainty of something novel decreases. Furthermore, consumers are likely to repeat "positive" experiences. Decrop, Del Chiappa, Mallargé, and Zidda (2016) found that users of Couchsurfing.com (an icon of the sharing economy) described their experience as "transformative", whereby their couchsurfing experience paved the way for personal and societal change. The authors also highlight the users' engagement with the couchsurfing community, an aspect that is reflected in other research on sharing platforms or repair cafés (Lang & Armstrong, 2018; Van der Velden, 2021). The **social interactions and community feel** of circular practices and services, thus, play a role in driving positive user experiences. Likewise, social contexts where the majority leans towards linear practices, and/or express negative opinions towards circular solutions can be a deterrent for consumers into trying or maintaining circular behaviours. Examples of this can include cultural perceptions and social status related with ownership and new products.

The relationship between repair activities and positive emotions can be observed through product attachment. Users can develop a strong emotional connection to their belongings, which is why they are willing to repair them. This allows them to retain both the physical and the emotional value of goods, and even raises the user's emotional bond with the item in question. Research on product attachment shows that attachment is at its lowest after one to three years of purchase but increases over time (especially after five years of ownership) (Van der Velden, 2021). Product attachment also has a positive influence on product care and maintenance (Bocken, de Pauw, Bakker, & van der Grinten, 2016; Wastling, Charnley, & Moreno, 2018). This discussion is, for obvious reasons, only valid for long-lived products.

Humans are also influenced by social cues. As such, personal characteristics include factors such as sense of **status** and **community**, in which the behaviour of peers or status symbols will influence consumer behaviour (see Box 3-3). Consequently, circular behaviour can be promoted by society, and people's desire to "belong" to a community (more information on social norms can be found in Chapter 3.3). As Borusiak et al. (2020) explain, if social norms do not align with CE principles, they can be realigned by showing that circular practices are popular and practiced by many. Lang and Armstrong (2018) also explain that "fashion leaders" (i.e., early adopters of new trends) are more likely to engage with circular practices that are perceived as new or trending. Retailers can develop marketing strategies based on this premise, by, for example, organising swapping events that show a "new kind of lifestyle". Thus, engaging fashion leaders has the potential to influence others to adopt circular practices.

Box 3-3 Changes in perception about second-hand products in Poland (own development based on information in Borusiak et al (2020))

> The trade of second-hand products flourished until the Industrial Revolution. At that time, due to fast-growing production, new products become more accessible, and used products were perceived as "products for the poor" due to their lower prices. Even after the fall of Communism in Poland, as the number of second-hand shops started to grow, the use of second-hand products was associated with "low social status".
>
> Since the 2000s, second-hand consumption has experienced some de-stigmatisation, partly due to environmental concern. Borusiak et al. (2020) find that, over the last decade, younger consumers have become more conscious about environmental problems, and they are willing to take action against overproduction. Nonetheless, Poland remains a highly "masculine" country, meaning that its society is oriented more towards material success than the quality of relationships. Buying "new" is a way to demonstrate high material status.

> To counter society's reluctance and avoidance to use second-hand products, Borusiak et al. (2020) make the point that social norms need to be re-directed. This can be achieved by showing that second-hand purchasing is popular and practiced by many (including celebrities and influential bloggers). Other advantages of second-hand purchasing that could be underlined are: sustainability protection, unique and authentic products, economic benefits, hunting pleasure, and ethical advantages when shopping in charity stores. These advantages may resonate more with some consumers than others, depending on their personal characteristics and values.

3.2.6 Preferences and beliefs

Personal characteristics can drive or hinder the adoption of circular solutions. These characteristics are intrinsic to consumers, and they include personality traits, values (i.e., personal norms), and ideologies that may influence their perceptions (Camacho-Otero, Boks, & Pettersen, 2018; Joshi & Rahman, 2015). **Materialism**, i.e., attaching high value to material possessions, is a value that comes up numerous times in literature. It is often compared to moral or altruistic motives, and sociability (Bucher, Fieseler, & Lutz, 2016). Valuing material possessions may clash with circular solutions that question ownership such as sharing platforms and other access-based services (Lang & Armstrong, 2018). However, material motives should be considered in conjunction with **pro-environmental beliefs (or awareness)**. Borusiak et al. (2020) explain that awareness of consequences (on the environment) and ascription of responsibility can influence personal norms.

Literature suggests that pro-environmental behaviour is more likely to occur when individuals value the collective wellbeing over personal interest, or when they are more altruistic (Parajuly, Fitzpatrick, Muldoon, & Kuehr, 2020); but, Lawson, Gleim, Perren, and Hwang (2016) find evidence for "Conscious Materialists". The latter are defined as consumers that value material possessions, while simultaneously seeking to be economically and environmentally conscious. Materialism can, thus, be associated with individualism, but, equally, to self-transcendence values. Pro-environmental behaviour can itself be associated with individualistic motives, whereby pro-environmental behaviour represents the "private provision of public goods" (Saphores, Ogunseitan, & Shapiro, 2012).

According to Workman and Kidd (2000), fashion leadership can also be associated with a **need for uniqueness**; that is, a desire to possess a unique/separate personal identity. This desire can drive consumer decisions that make consumers stand out from the crowd, and can be manifested through the acquisition, use, and disposition of certain goods that are deemed as "different" (Lang & Armstrong, 2018). Circular business models or products may appeal to this group of consumers if they consider them new and a means through which they can show their individuality. For example, Borusiak et al. (2020) describe second-hand purchasing as a way to access unique and authentic products.

Another aspect that can drive consumer behaviour is their **desire for change**. This motivates consumers to seek novelty, variety, and fun. Lawson et al. (2016) describe "Change Seekers" as consumers that seek variety, are not particularly interested in material possessions, and are relatively conscious of the economic and environmental impact of their purchases. Access-based consumption and collaborative business models allow these individuals to experience new products without the burden of ownership and to experiment with something outside of their comfort zone (Lawson, Gleim, Perren, & Hwang, 2016). Furthermore, Armstrong, Niinimäki, Lang, and Kujala (2015) find that rental services allow consumers to satisfy their desire for change without the guilt or risk of investing in something new.

These examples of personal characteristics show that individual traits, values, or beliefs can drive consumer behaviour, and that the way the characteristics interact with one another or the relative strength of each can determine the level of adoption (or lack thereof) of certain CE practices over others.

3.3 Behavioural insights and biases

3.3.1 Introduction to behavioural aspects

Throughout the years, behavioural insights have been recognised as an important part of the development and implementation of CE practices, and, more generally, of sustainable behaviour (ETC/WMGE, 2021; OECD, 2017; The World Bank, 2015; The Behavioural Insights Team, 2020). Behavioural insights can help us better understand and frame problems that arise at consumer level

when attempting to adopt and implement CE practices. They can also help us find consumer-friendly and effective solutions to CE challenges. This chapter focuses on the features of human behaviour that may influence circular behaviour, and, in particular, the drivers and barriers described above. The information in this chapter is meant to complement the information described in earlier sections of the report, providing insights into the psychological factors that may play a role in driving or hindering circular behaviour. This overview provides the psychological underpinning to the drivers, barriers, and lock-ins identified in the previous section, and explains how behavioural theory can enhance our understanding of circular behaviour. Many of the insights described below are examples of how our limited cognitive abilities and the resulting shortcuts that we use can prevent us from acting 'circular'. The same shortcuts can sometimes be used to stimulate circular behaviour through "nudges"[15].

As explained above, many personal characteristics can drive or hinder circular decisions, such as environmental attitude and values. However, one of the very pertinent phenomena described in literature is the discrepancy between consumers' favourable attitude towards green products and actual purchasing behaviour of green products, otherwise called the **"attitude-behaviour gap"** (De Perlsmacker, Driesen, & Rayp, 2005; Jacobs, Petersen, Hörisch, & Battenfeld, 2018; Joshi & Rahman, 2015; Parajuly, Fitzpatrick, Muldoon, & Kuehr, 2020)**.** This inconsistency can be the result of many factors (including socio-economic factors), but this section focuses on the underlying psychological or human factors that may lead to a misalignment between willingness to act and observed behaviour.

Human behaviour is understood to be linked to both **intrinsic and extrinsic attributes**. When it comes to sustainable consumption, behaviour is influenced by intrinsic attributes such as knowledge, motivation, beliefs, habits, values, attitudes, intensions, and other psychological variables, whereas extrinsic attributes include social and cultural norms, monetary implications, and contextual variables (e.g., infrastructure, institutional constraints) (Parajuly, Fitzpatrick, Muldoon, & Kuehr, 2020). Some of these factors may explain the "attitude-behaviour gap". In the context of green purchasing behaviour, Joshi and Rahman (2015) provide some examples of intrinsic and extrinsic determinants of green purchasing behaviour (Figure 3-5)[16]. This entails that, for example, consumers may intend to make more circular choices, but their habits and past routines may make it difficult to adopt new practices. Furthermore, consumers may believe that their change in behaviour will not make enough of a difference to successfully deliver on CE goals (and may not be worth the effort). Absence of involvement in environmental activities or exposure to environmental messages may also reduce circular behaviour. The latter effect depends on the type of environmental issues consumers are exposed to in their surrounding environment and how they relate to the production processes of the products they are purchasing (Koszewska, Rahman, & Dyczewski, 2020).

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[15] According to Thaler and Sunstein (2008), nudges are defined as aspects or alterations of the choice architecture that influences people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. Thaler and Sunstein (2008) specify, "Putting the fruit at eye level counts as a nudge. Banning junk food does not." (p.6 of *Nudge*).

[16] Note that Joshi and Rahman (2015) provide a more comprehensive framework of factors influencing sustainable behaviour, and only a few examples (most pertinent to this section of the report) are listed in Figure 3-5.

Figure 3-5 Examples of intrinsic and extrinsic attributes affecting green purchasing behaviour (own development based on Joshi and Rahman (2015))

Intrinsic (individual) factors	Extrinsic (situational) factors
Habits & past behaviour	Subjective/social norms & reference groups
Perceived effectiveness (i.e., the extent to which consumption can make a difference in the overall problem)	Environmental structures and services
	Local environmental involvement and consumer exposure to environmental messages
Perceived behavioural control (i.e., perceived capacity to perform a behaviour)	Regulatory laws

These intrinsic and extrinsic factors and their influence on circular behaviour can be further explained by behavioural theory. The latter assumes that humans are not exclusively rational beings and do not always act based on their knowledge and intentions. Their decision-making is often not mindful and can be blurred by **heuristics and biases** (Thaler & Sunstein, 2008). Heuristics are rules or shortcuts that people use to reduce complex tasks to simpler judgemental operations (Tversky & Kahneman, 1974). These heuristics lead to many biases, i.e., deviations from rational decision-making (OECD, 2017)[17]. The use of heuristics has to do with the way our brain functions, being able to switch between automatic (intuitive) and reflective (analytical) processing systems, as needed. Dual-process theory explains how the human mind runs on two parallel tracks: one that is fast, intuitive, and rule-based, and one that is slow, reflective, and analytical (Kahneman, 2011; Thaler & Sunstein, 2008). This theory helps explain heuristics, biases, and judgement errors, as well as the ability to make quick decisions to use the mind's limited cognitive resources efficiently. Heuristics, thus, allow our brain to make decisions intuitively and preserve energy.

The lack of behavioural change to tackle global sustainability challenges is sometimes associated with "apathy", which may be explained by dual-process theory. The feeling of apathy is likely to stem from our inability to deal with the demands of our daily lives in conjunction with the rumbling of news about various overwhelming environmental and societal problems (Swim, et al., 2009). Denial and splitting (i.e., retaining intellectual knowledge of the reality, but divesting it from emotional meaning) are psychological defence mechanisms that can arise in the face of climate change, leading to apathetic responses or **"paralysis"** (Swim, et al., 2009). The latter can influence consumers' views on the perceived effectiveness of their actions (as described in Figure 3-5). If consumers believe that their actions will not have a significant impact on the overall societal problem, they will not feel motivated to take any costly or effortful action.

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[17] Behavioural biases can be described along the lines of three categories: bounded rationality, capturing the limited cognitive abilities that affect human problem-solving; bounded willpower, reflecting the fact that people sometimes make choices that are not in their long-term interest (or that differ from their initial intention); and, bounded self-interest, meaning that humans are willing to sacrifice their own interest to help others (Mullainathan & Thaler, 2000). Behavioural biases are described in relation to the classical economic actor that is able to make an infinite amount of rational decisions. This theoretical archetype is called "homo economicus" in neoclassical economic theory.

3.3.2 Behavioural biases applicable to the circular economy

Among the many behavioural biases that have been researched, a few key concepts are likely to be of relevance to this study, namely[18]:

- The **status quo bias** is a cognitive bias that involves people preferring that the current state of affairs remains the same (i.e., people tend to prefer behaviours, items, and settings that are familiar to them). This means that when comparing features of alternative options to those of the status quo, their disadvantages appear larger than their advantages, leading to inertia (OECD, 2017). This can help explain why habits and past behaviour can stand in the way of circular behaviour (Figure 3-5) (Joshi & Rahman, 2015);

- The **availability heuristic** describes the human tendency to use information that comes to mind quickly and easily when making decisions about the future (Tversky & Kahneman, 1973);

- **Ambiguity aversion** characterises people's dislike for uncertainty and ambiguity (Kahneman, 2011). If people feel that a situation or problem is too ambiguous or they lack the necessary information to process it, they may feel inclined to avoid it. Circular practices may sometimes be construed as ambiguous if people lack knowledge about them or if they believe that there is no consensus about what actions they should take;

- The **licensing effect** explains that purchasing a "green" product may lower intentions to engage in subsequent environmentally friendly behaviour, because it provides them with (moral) credits to behave less environmentally friendly (often involving more efforts) (Meijers, Noordewier, Verlegh, Willems, & Smit, 2019). Post-purchase behaviour can, therefore, strongly impede circular efforts. This risk is especially present when consumers have a weak environmental identity or when they are exposed to greenwashing claims;

- The **endowment effect** describes how people tend to value items that they own (i.e., that could be lost or given up) more highly than they would if they did not belong to them (i.e., if they were framed as a gain) (OECD, 2017; The Decision Lab, n.d.). This effect can help explain why people hold on to their belongings even if they are not using them and why "product attachment" may incentivise repair (Van der Velden, 2021);

- Similar to the endowment effect, the **IKEA effect** describes a situation where people value an object more if they make (or assemble) it themselves, rather than if they buy it already made (or assembled) (The Decision Lab, n.d.). The "do it yourself" culture encourages this effect, meaning that people are more likely to take better care of the products they help create, thereby extending their use;

- **Future discounting (or myopia)** represents our perception that the present is more important than the future, impeding our ability to take action to address more "distant-feeling, slower and complex challenges" such as climate change or resource depletion (Wilburn King, 2019). The intention-behaviour gap (described above) may, thus, be more prevalent for people who are more present biased (Laffan, 2021). Research shows that discounting increases with the level of uncertainty a person has about their future, in particular about their future income (Bertola, Guiso, & Pistaferri, 2005; Gourinchas & Parker, 2002);

- **Decision fatigue** occurs when our cognitive abilities are worn out or when we are overwhelmed by too many choices or information (also known as choice or information overload) (The Decision Lab, n.d.). This limits our self-control (i.e., one of the factors outlined in Figure 3-5) and our ability to make informed decisions; so, if circular behaviour requires more efforts than non-circular behaviour, it is likely that a consumer will opt for the latter; and,

- **Social norms** describe collectively held beliefs about what kind of behaviour is appropriate in a given situation, which guides human behaviour (The Decision Lab, n.d.). In other words, people are more likely to follow what others do (or what they think others do). This is reflected in the bandwagon effect, i.e., adopting certain behaviours or beliefs because many other people do the same. These biases can both help or hinder circular behaviour depending on each person's social surroundings. For example, social concern for status may drive less environmentally friendly behaviour (Parajuly, Fitzpatrick, Muldoon, & Kuehr, 2020); but, if

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[18] Please note that this list is non-exhaustive, and many psychological factors play a role in human decision-making.

consumers have friends who purchase second-hand clothing, their acceptance of used clothing could increase (Paço A. , Leal Filho, Ávila, & Dennis, 2020).

It is important to note that behavioural insights are useful not only for identifying barriers and lock-ins, but also for policy design, where these insights are used to "nudge" the consumers to the right solution. Behavioural insights are cross-cutting tool that is being used throughout the analysis.

3.4 Framework to analyse circular economy behaviour

In what follows, we present a framework to analyse CE behaviour in a systematic way. We consider two dimensions: decisions and factors that affect these decisions. In the table below, we organise the drivers, barriers, and lock-ins for each consumer decision in the decision tree of § 3.1, also specifying behavioural mechanisms (outlined in Chapter 3.3) behind these drivers using behavioural insights. For example, in the category of "information and knowledge", we make note of the fact that ownership is more readily available in people's minds based on the information that is available to them (information that is more predominant in social circles). This is also defined as an availability heuristic (i.e., using information that comes to mind quickly and easily to make decisions).

The table has been developed as the result of systematisation of the findings of the literature review covered in this chapter and own analysis by Trinomics and Ricardo experts.

Table 3-3 Analysis of objective factors and behavioural insights and biases (own development)

Choice	Economic factors	Needs, offering and availability	Information and knowledge	Social factors	Personal preferences
Purchase stage					
[P] Should I buy/ own the product or not?	• Underestimate the cost of ownership/ overestimate the cost of rent/lease – *"I will pay more if I rent/lease"* • Lack of confidence in the quality of rented/ leased/ second-hand products • Lease takes time – *"I will be paying for this for a long time"* • Convenience of leasing/renting – *"Leasing/renting is easier as there is programmed maintenance included in the price"* • Leasing perceived as *"another credit"*	• Overestimating frequency of use – *"if I rent/lease this, I won't be able to use it whenever I want"* • Ease of access to new products – *"it's easier to buy a new product than to rent/lease"* • Availability of new products – *"there is more diversity when buying new"* • Access-based services as a solution to high upfront investment costs – *"I can use the product even if I cannot afford to buy it"* • Unclear needs – *"I need it because I've always had one"* (status quo bias) • Rental/leasing services are not available for all products	• Difficulty to understand rental/lease contracts – *"rental/lease contracts are complicated"* (information overload) • Unclear environmental benefits of alternatives to ownership • Lack of knowledge of alternatives to ownership and their benefits • Sunk cost fallacy (for advanced stages of purchase) – *"I've invested a lot of time in finding the right product to buy"* • Ownership is often perceived as a default choice (status quo effect); ownership is more available in people's minds (availability heuristic)	• Negative and positive emotions affecting behaviour – *"I had a bad experience using the rental platform, so I don't think renting for me"* • Lack of examples from peers – *"I don't know anyone who rents/ leases"* (availability heuristic) • Needs assessment based on example from peers – *"everyone has it, so I need it"* (availability heuristic) • Community feel of access-based platforms – *"on this platform, I can get tips and tricks from other users"* • Reputational considerations – *"renting/leasing is for the poor"*	• Status attribute • Values-based consumption – *"ownership/ material possessions make(s) me feel good"* • Self-expression – *"I want unique items"* • Need for change – *"I get bored of things quickly, I like change"* • Propensity to trust "new" lifestyles/technologies such as sharing platforms • Preference for "new" • Leasing/renting limits personalisation – *"I cannot modify the product if I lease/rent it"*
[P1] If decided to buy, should I buy a new or a used one?	• High perceived cost of used products • Uncertainty about quality/durability of used products – *"used products might cost me more in repair and maintenance"* • Disgust or negative attitudes (perceived risk) towards pre-owned/ shared products – *"what if other users don't take good care of the products?"*	• Low perceived offering of used products – *"used products don't have the functions I need"* • Low accessibility of second-hand shops – *"there are no second-hand shops near me"* • Uncertainty over product offering in second-hand shops – *"I don't know if I will find what I need"*	• Unclear environmental benefits of pre-owned/ refurbished products • Lack of confidence in new products – *"products today are no longer as durable as products made in the past"* • Misperceptions about useful life of products/ underestimating remaining life of used products • Difficult to quantify and compare costs and benefits	• Social cues determining what is socially acceptable – *"old is not cool"* or *"renting/leasing is modern"*	• Belief that preferences/ taste will not change in the future (projection bias) • Difficulty to try something new (status quo bias)

Choice	Economic factors	Needs, offering and availability	Information and knowledge	Social factors	Personal preferences
	• No guarantee for used products (loss/risk aversion) • Belief that new products are safer (risk aversion) • Uncertainty over quality of used products (pessimism/ optimism bias) • Lower upfront costs for second-hand items (future discounting can work in the favour of second-hand items vs new (quality) items that may cost more)		of two products (anchoring bias/information overload) • Lack of confidence in guarantee for used products • Fear of asymmetric information – *"if it is of good quality, why is the seller getting rid of it?"* • Lack of experience buying used products and uncertainty over the success of it – *"buying old is new for me, so I don't know if it's for me"*		
[P2] If decided to buy a new product, which one?)	• Uncertainty about future costs/benefits • Uncertainty about price vs quality trade-offs • Underestimating the long-term (economic) benefits of quality products – future savings not taken into account (future discounting/ hyperbolic discounting/ present bias) • High upfront costs for quality products compared to income – leading to short-term trade-offs between different needs – *"if I pay more for this product now, I will have to limit my expenses this month"* • Focusing on what someone else gains (no evaluation of benefits to third parties) – *"what I pay for the good is*	• Low availability of products with appropriate circularity features • Underestimating the benefits of repairability as a product characteristic • Underestimating the benefits of eco-design as a product characteristic • Overconsumption due to consumption of "green" products (licensing effect) – *"I bought something sustainable, so I can buy as many as I want"*	• Lack of understanding of material content and its environmental footprint – *"I don't know whether the materials/substances in my product are recyclable"* • Misperceptions about useful life of products/ underestimating remaining life of used products • Difficult to quantify and compare costs and benefits of two products (anchoring bias/information overload) • Anchoring to just one particular attribute and not considering the product as a whole (salience bias) • Influence of how products are presented (framing effect) • (Lack of) confidence in green claims (confirmation bias/ illusory truth effect)	• Desires influenced by social circle – *"my friend has this, so I also want it"*	• Belief that preferences will not change in the future or acknowledging that preferences were different in the past (projection bias/ consistency bias) • Stating preferences that align with what is socially desirable (social desirability bias)

Choice	Economic factors	Needs, offering and availability	Information and knowledge	Social factors	Personal preferences
	what the other person gains" (zero-sum bias) • Lack of confidence in green claims and perceived price premium for "green" products		• Uncertainty about the actual quality of new products (pessimism/optimism/ outcome bias) – *"the last product I bought of this kind was not satisfactory"* • Uncertainty about the actual quality of second-hand products (cf. Akerlof's "market for lemons") • Uncertainty regarding the durability/repairability/ reliability/recyclability of the product • Decision fatigue: information overload, different formats		
Use stage (product is functional)					
[U] Shall I keep using my product or should I stop using it?	• Overestimating the probability of damage once the product has already been damaged, leading to a disincentive to repair (Gambler's fallacy) • High perceived costs of repair – *"repair services are too expensive"* • Perception of prices of new products going down – *"I can get a new one cheaper"* • Attachment to products assembled/repaired by users (IKEA effect)	• Overestimating frequency of use		• Needs assessment based on example from peers – *"everyone has it, so I need it"* (availability heuristic)	
[U1] If the product is kept in use, how should I take care of it?	• Product attachment – *"I care about this product, so I want to maintain it for as long as possible"*	• Uncertainty regarding consumers' ability to replace an item (e.g., if it is novel, original or tailored) will strongly influence how	• Lack of knowledge on how to maintain/care for products • Lack of skills on how to maintain/care for products –	• Social norms will strongly influence whether people continue using an item (e.g., fashion trends strongly dictate whether or	

Ricardo

Choice	Economic factors	Needs, offering and availability	Information and knowledge	Social factors	Personal preferences
	• Uncertainty over the costs of maintenance/ care • Ambiguity aversion could have varying impacts on consumers decisions relating to use patterns. For example, where there is a uncertainty over the costs of maintenance and care, people may be more careful regarding use. By contrast, where consumers are more familiar with the costs of maintenance and repair people will make decisions based on those costs – which could lead to increased or decreased use	people intend to use an item; items which are unlikely to be easily replaced will not be used regularly • Low availability of spare parts / consumables for the preventive maintenance / care of the product • Low availability of an easily accessible and competent repairer • Long waiting time before receiving the repaired product	*"I don't have time to read the user instructions"* • Status quo bias is likely to orient consumers' personal preferences towards maintaining patterns or approaches to using the item	not fashion-conscious consumers continue using an item of clothing)	
[U2] If the product is no longer used, what to do next?	• Overestimating the utility of a product – *"if I need this again, I will have to pay for a new one"* • Unwillingness to sell (endowment effect/loss aversion/disposition effect) – *"I won't sell now, the price is too low for what it's worth"*	• Availability and ease of access to opportunities to sell the item second-hand • Whether or not the item is original, novel or tailored will influence whether or not the consumer will keep the item regardless of use	• Lack of awareness about the options available • Ambiguity aversion will slow down people to sell the item where they do not know what is market value is, and the market value is difficult to ascertain	• Social norms prevalent in society, such as having a tidy or minimalist environments, will strongly influence whether or not people decide to remove or keep an item once they have stopped using it • Social norms could dictate how easy it is for people to sell an item second-hand	• Personal preferences towards the item in question, or the effect of keeping items past their use will strongly influence people's decision on what to with an item after its usefulness has expired
End-of-use stage (product is not functional)					
[D] Shall I keep it for a while, or shall I get rid of it?			• Uncertainty about product lifespan if repaired		• Values related to ownership and material possessions (leading to hoarding)
[D1] If the product is kept, is it stored or repaired?	• High perceived costs of repair • Endowment effect is likely to encourage people to repair items	• Inconvenience of taking a product to a repair/ second-hand shop – *"the shop is far away"*	• Lack of skills on how to repair products (DIY skills) • Overestimating own willingness to repair – *"I will repair it one day, so I will*	• Social norms surrounding repairs – in high consumption societies, repairing items is abnormal; repair is relatively niche	

Choice	Economic factors	Needs, offering and availability	Information and knowledge	Social factors	Personal preferences
			keep storing it" (status quo bias)	even In cities where there is a drive towards more eco-friendly living	
[D2] If the product is not being kept, how to get rid of it?	• Perceived costs and effort to take products to the appropriate collection facility/location	• Inconvenience of taking a product to a collection facility/ location if it is not needed – *"the collection point is far away"* • Inadequate infrastructure creating inconvenience – *"the collection point is always overflowing"*	• Lack of knowledge of how to properly dispose a product – *"I don't know how to recycle this specific product"*		

3.5 Circular behaviour in key sectors

This chapter will reflect on the findings from the previous sections, focusing on consumer behaviour in the context of products related to the clothing and household textile and consumer electronics sectors. The literature review addressed sustainable consumer behaviour and attitudes regarding the purchase, use, reuse, upcycling/refurbishing, recycling, and disposal of clothing and household textiles and electronic products waste. The studies also disclosed perceived advantages and disadvantages, as well as the weight of product attributes.

This chapter presents the results of an analysis of the key drivers and lock-ins described in the previous section in the context of the textiles and consumer electronics sectors, considering circular behaviour means divided by the phases: purchasing, using, and discarding products.

3.5.1 Household textiles

Household textiles and clothing are one of the most basic groups of consumption goods, accompanying people throughout their lives and influencing their well-being and health (Koszewska M., 2019). Durable, long-lasting products used to be the norm in the past, however a shift towards a more consumerist lifestyle has led to fast fashion trends, rising demand for relatively cheap and semi-disposable products (ETC/WMGE, 2021; Koszewska M., 2019) increased production of cheap clothes results in a growing demand for cheap textile materials, together with growing volumes of textile waste (Koszewska M. , 2019),

The textile and clothing manufacturing sector plays an important role in the EU, employing 1.5 million people and generating a turnover of EUR 162 billion in 2019 (EURATEX, 2020). The 2020 CEAP has recognised the textiles sector as one of the prioritized value chains due to its high use of resources, greenhouse gas emissions and waste generation (European Commission, 2020). However, the industry is characterized by a predominantly long and global supply chain, increasing the challenge of transitioning to Circular Economy models. (Koszewska M. , 2019). Moreover, the textile materials and clothing production are often located in developing countries, under low investment and operation costs, where the exploitation of employees, corruption, and absence of respect for human rights are commonly present (Nencková, Pecáková, & Šauer, 2020). Encouraging consumers to engage in more sustainable lifestyles, including the extension of textile products life cycle, embracing repair and reuse, and reducing waste has a potential to mitigate environmental and social impacts of textile and clothing products (ETC/WMGE, 2021; Nencková et al., 2020).

Box 3-4 Macrotrends affecting consumer behaviour in clothing and household textiles (own development based on information in Gazzola et al., 2020; Koszewska M., 2019; Henninger et al., 2019; and Koszewska et al., 2018)

The trends affecting consumer behaviour are a consequence of dynamic changes occurring both in production and consumption. The most important macrotrends affecting consumer demand of household textiles and clothing products can be summarised as follows:

- **The rise of fast fashion:** In the past few decades the speed at which fashion collections are introduced has increased, with new collections brought to the market about every three weeks. Consumers now see different products every month or even every week in their favourite stores. This has induced consumers to act with a new behaviour called "see now – buy now", and people becoming used to buy more clothes at low prices, often at the expense of garment quality (Gazzola et al., 2020; Koszewska, M., 2019; Koszewska et al., 2018).

- **Online shopping/ online platform:** E-commerce has experienced a continued growth in recent years, becoming increasingly relevant in the fashion industry. Platforms like Zalando, Amazon and Myntra (to name a few) operate in the fashion industry with their own private label fashion offerings (Gazzola et al., 2020).

- **Social media and influencers:** A main trend in developing e-commerce is social commerce – i.e., the use of social media (e.g., Facebook, Instagram, Youtube, TikTok and other social platforms), and the contribution of users to assist the sale and purchase of online products and services. The fashion industry is experiencing the importance of the role of influencers, which consumers perceive to have more authentic and attractive lifestyles than traditional advertisement, despite them very often being paid by the brands that they advertise for (Gazzola et al., 2020).

- **Personalisation:** Consumers now have higher expectations for customisation experiences and instant assistance available at low prices (Gazzola et al., 2020).
- There is **less importance attached to ownership:** Contemporary consumers express a desire to benefit from a variety of items and models, with more people turning to rent or share clothes rather than buy them (Gazzola, Pavione, Pezzetti, & Grechi, 2020).
- **Sustainability concerns:** The fashion industry has historically been associated with consumerism, elitism or guilty pleasures. However, in recent years sustainability has become an important new driver in consumers' purchasing decisions, becoming one of the most important trends affecting the industry. Although still a niche trend, consumers are increasingly expecting transparency across the entire value chain, expecting brands to disclose information such as costs of materials, conditions of work, costs of labour, transport, etc. (Gazzola et al., 2020; Henninger et al., 2019; Koszewska et al., 2018).

The phases of the clothing and household textiles value chains where consumer behaviour has a direct impact towards the adaptation for the CE models are:

- Decisions upon purchase: the acquisition of clothes and textiles considering monetary (purchase), non-monetary (swapping) and non-ownership options (renting and lending).
- Decisions upon use: engaging in product care, repair and upcycling while in ownership of the clothes and textiles.
- Decisions when a product is no longer needed: disposal of clothing and textile products, for example, via donation to charity, passing it to family or friends, selling through second-hand shops, markets or internet, taking them to take-back schemes or supplying them to recycling schemes dedicated to textile products.

In the following sections, we discuss the key drivers and barriers for circular behavioural patterns in the textile value chain, according to the decisions consumers face upon purchase, use and once a product is no longer needed.

3.5.1.1   Upon purchase

The factors of special importance for shaping the current and future situation for transforming the household textile and clothing industry towards circular economy are strongly related to consumers purchasing behaviour. (Koszewska, Rahman, & Dyczewski, 2018). As mentioned above, consumers are increasingly purchasing clothes not merely based on functional and aesthetic attributes such as fashion and practical value, but also based on ecological and social factors, including those of relevance for the circular economy. This is trend is unfortunately not yet comparable in order of magnitude to how often consumers engage in fast fashion purchasing trends.

Purchase of new products

Consumers, through their purchasing power, have the option to choose products made from more environmentally friendly and higher quality materials (e.g., lyocell fibres such as Tencel), as well as decide when new clothes are needed and how many to purchase (Gwozdz, Nielsen, & Müller, 2017). Consumers decisions regarding the purchase of new sustainable products can be driven by product attributes and consumer awareness:

- **Economic factors:** An important barrier for circular behavioural patterns when choosing which products to buy is the lack of consideration for the total cost of ownership, focusing mostly on the upfront costs of a garment. Currently, consumers engage in linear patterns of behaviour by focusing mostly on the price of a garment, without considering the quality of its materials and construction. The prices of garments designed and produced by linear business model do not reflect their 'real' cost, they are often made of lower materials and less attention is paid to their construction, rendering cheaper than circular solutions. But these products are not made to last, and ultimately, they will need to be replaced faster by the consumer. Purchase criteria that could become drivers for circular economy are related to clear economic and utility benefits, such as durability and garment life, paired with consumer awareness of environmental, ethical, and social aspects of the products offered, and concern about brands' social responsibility – no child labour, fair wages, worker safety, air quality, recycling, energy, and water use, etc. (Koszewska et al., 2018).

- **Fit between needs and offering:** Product attributes such as country of origin, brand, environmental or ethical labels, garment lifespan, the ability to recycle/reuse/dispose a garment, the material, quality workmanship, fit and comfort are important drivers for conscious consumers (Koszewska et al., 2018). However, in order to engage in circular purchasing behaviours, consumers require that there are enough circular products offered, that they are easily accessible to them, and with enough product variety to fit the different needs of consumers. Currently the dominant linear business models produce a vast number of options for consumers to choose from with regards of style, and they are easily available in most places. In comparison, the style options for circular textiles and clothes are more limited, as there are fewer brands and stores offering them and production is done in lower numbers.

- **Information used for choice**: The practice of sustainability fluctuates and is subject to the availability of information and support. Consumers might express preference and confidence in recycling and recycled textiles but be less familiar with concepts such as chemical usage and exploitation. (Wagner & Heinzel, 2020). Often this information is not available or easy to understand.

Purchase/ownership of second-hand products and product-service systems

Another option for consumers is acquiring products that are not new, for example via second-hand shopping or attending swapping events (where ownership of clothes is transferred without monetary exchange). However, in Western countries the "second-hand fashion market" is still a niche market, in which customers are predominantly poor, with only a very small share of customers buying items there because they believe in circular economy as a real sustainable practice (Gazzola et al., 2020).

A number of alternatives are starting to emerge for consumers who want to avoid purchasing products. Technology and digital platforms are slowly starting to foster the sharing economy and the collaborative consumption phenomenon, allowing service business models and peer-to-peer sharing to emerge, for example via rental companies, clothing libraries, and swapping events (Henninger, Bürklin, & Niinimäki, 2019). Well-known examples of new rental-companies include Moss Bros (UK), Rent the Runway (the USA) and Lena the Fashion Library (the Netherlands). These niche organisations are based on non-ownership transfer, with garments being returned to the company after they have been used. (Henninger, Bürklin, & Niinimäki, 2019). Peer-to-peer sharing models also exist in different textile markets, for example sharing clothes, accessories and camping gear through online platforms or swapping events (ETC/WMGE, 2021).

The findings from the literature review indicate that most of the drivers and barriers for the purchase of second-hand products are similar to those for engaging in swapping events or product-service systems, since they are mostly related to the use of pre-worn clothes and textiles. The key drivers and barriers for owning, renting or sharing second-hand clothes and textile products are:

- **Economic Factors**: The economic benefits of buying second-hand, renting and sharing clothes is a strong driver for consumers, which via these options have access buying cheaper products or, in the case of renting, to be able to use products that they won't use many times (e.g., special ocasions) or that they might not be able to afford otherwise. One recurrent argument against the sustainability of second-hand shopping is the rebound effect that can be caused by its lower cost, assuming people will buy more clothes because their products were cheaper. This argument is unfair when considering that the same can be said about linear business models and cheap fast fashion, in which the rebound effect is evident. Consumers that purchase cheap new clothes from fast fashion brands tend to buy larger quantities of clothes precisely because they are cheaper. The same happens with seasonal discounts (e.g., during Black Friday), when consumers are attracted by the cheaper prices of clothes and are thus tempted to buy more than they actually need.

- **Fit between needs and offering:** The rental, sharing and second-hand shopping models offer consumers alternatives to buying a new product, however consumers might face negative experiences with regards of availability and quality that might lead to abandoning collaborative consumption and returning to "non-alternatives", such as fast fashion houses (Henninger et al., 2019).

- o The **reduced availability** of garments and accessories in terms of size, fashion styles and quantity seem to be a key barrier to these models (Paço et al., 2020; Henninger et al., 2019). The lack of availability can also refer to the number and location of shops or events available (Wagner & Heinzel, 2020; Henninger et al., 2019).
  - o The **quality** of the offered products is positively related to the trust relationship between the organisations and the consumers (Henninger et al., 2019).
- **Social factors:** If consumers already purchase or own second-hand clothing or have friends who do so, the acceptance of used and recycled clothing could lead to an interest in purchasing redesigned, recycled and upcycled clothing (Paço et al., 2020). The feeling of specialness and past identity through storytelling results in positive consumer responses and drives demand for past identity products (e.g., upcycled and recycled products). However, the purchase intention can vary between product types (e.g., running shoes vs sweaters both made of ocean plastic (Wagner & Heinzel, 2020). Consumers were found to perceive recycled materials to have a lower quality than conventional materials and depending on the type of product it can instigate disgust. For example, consumers from Poland, France and Spain were found to perceive a T-shirt made from recycled plastic bottles as contaminated, while carrying a bag from the same material was not negatively perceived (Wagner & Heinzel, 2020).
- **Preferences and beliefs:** A desire for being fashionable and stylish, uniqueness and the ability to express one's individuality can also be drivers for acquiring second-hand items. Some consumers engage with swapping events or second-hand options in order to gain classic and/or traditional pieces of clothing or accessories that are seen as part of the "retro" or "vintage" trend and do no go in and out of fashion easily (Henninger et al., 2019). Personal and culture values such as responsibility, idealism and environmentalism can positively impact consumers' attitudes toward collaborative consumption and second-hand shopping (Wagner & Heinzel, 2020; Henninger et al., 2019). Consumers also find online rental clothing platforms desirable, environmentally sustainable, trending and favourable, which influences the behavioural intention. (Wagner & Heinzel, 2020). However, a perceived lack of cleanliness and contamination related to previous ownership, considering new items as being more durable, and or associating used items with poverty or culturally not acceptable can hinder consumers' perceptions of purchasing or renting pre-owned items (Wagner & Heinzel, 2020; Gazzola et al., 2020; and Paço et al., 2020).

Box 3-5 The green purchase gap in sustainable and circular clothing

Consumers might have become more reactive, showing awareness and concerns, as well as willingness to change behaviour and use alternatives. However, it should be noted that this is still not the case for the average consumer, for which price, style, fit and comfort are still the top priorities (Koszewska et al., 2018).

Generally, consumer attitudes are positive toward sustainable and circular clothing, however this attitude does not influence green buying behaviour, which is often referred to as the green purchase gap (Wagner & Heinzel, 2020). A positive attitude towards sustainable clothing and self-transcendence values enhance sustainable clothing purchase, however self-enhancement values could act as barriers (Jacobs et al., 2018).

Despite the identified attitude-behaviour inconsistency, reviewed studies emphasise the high importance of a positive attitude towards social and ecological clothing standards, as well as environmental and altruistic values of sustainable clothing buyers (Jacobs et al., 2018).

3.5.1.2   Upon use

Once consumers own a garment, consumers can prevent textile waste by extending the lifetime of garments via product care and preventive maintenance when it is still functional, or to repair and/or upcycle the item once it is no longer functional (fully or partially). It should be noted that the quality of the garments (e.g., in terms of materials used and construction) will ultimately determine how feasible it is to extend its lifetime during the use phase. Some textiles are manufactured to sustain only a limited number of washes, after which they will get deformed, their fibres will get damaged, break, or lose their technical properties. This is not to say that it impossible to repair garments of low quality, but it becomes more challenging to do so, the result is likely to be disappointing and the repair might not last for long.

Product care and preventive maintenance

The frequency of how often clothing is washed has implications for product life because laundering contributes to wear and tear. Moreover, washing clothes involves the use of energy, water and detergent use, and if laundering habits include tumble drying and ironing increase their environmental burden due to energy consumption involved (Grębosz-Krawczyk & Siuda, 2019).

- **Information used for choice**: In order to engage with proper care of their clothes, customers need a clear understanding of care labels, the cleaning demands of different materials, and effect of different care options in their clothes longevity. The more clothes are washed, the quicker they wear out, a process that is sped up if a dryer is used during each wash. Consumers need to know about alternatives to washing when a garment needs cleaning or refreshment (e.g., steaming clothes and spot cleaning techniques). Depending on the material there might not be a need for washing to clean a garment, e.g., a man's suit made from good quality wool is designed to be brushed clean, not washed (The Guardian, 2021).
- **Social factors**: Most clothing maintenance practices are strongly influenced by social norms of high hygiene and cleanliness, therefore, washing clothes after several wears, reducing the water temperature or foregoing ironing could be perceived by consumers as non-hygienic practices (Grębosz-Krawczyk & Siuda, 2019).

Product repair, upcycling, and collaborative redesign

As a consequence of purchasing products at low prices, of higher labour intensity of repair over manufacture of new goods performed with a high level of division of labour (and hence of efficiency in the application of already cheap labour), and of repair taking place in higher-wage environment (in Europe) than manufacturing of new goods (deliberately placed in low-wage countries at global scale) and fashion tendencies changing at fast pace, consumers are less inclined to repair clothes or reinvent them (Gazzola et al., 2020). To counteract this, fashion activism promotes more meaningful interactions between people and their garments, to discourage the use of clothes as if it were disposable (Maldini, 2019).

- **Economic benefits:** Repairing and upcycling items are perceived as having economic and environmental benefits. However, consumers perceive repairing/upcycling as costing time, energy and skills, and if done incorrectly, they can result in more waste (Wagner & Heinzel, 2020). Depending on the severity of the garment damage, the process of repairing or upcycling could cause the garment to become unusable and to become waste (Wagner & Heinzel, 2020). This can be an important barrier for consumers, who might perceive this risk as too great, choosing instead to avoid the effort and dispose their garment instead. Slow fashion advocates advice to leave upcycling to experts (e.g., local tailors) unless consumers already have the necessary skills, or are comfortable with making mistakes and wearing the resulting garment (The Guardian, 2021). Barriers for consumers choosing to use redesign services, or collaborative redesign options include the uncertainty with co-design, as there is no guarantee that the redesigned garment will ultimately meet the expectations of the consumer in terms of design and fit. The engagement of customers in the ideation stage of the redesign process could reduce the uncertainty of the resulting garment and lower their perceived risks by being able to provide their inputs before the redesign is finalised.
- **Fit between needs and offering / Information used for choice:** The lack of available repair services or the lack of technical skills to repair it by themselves might stop consumers from repairing their clothes (Gazzola et al., 2020). Some companies are integrating repair services into their company operations, extending the responsibility for their products even after the consumption point (Ecotextile, 2020). Examples include Swedish company Nudie Jeans offer "free" repairs of their products instore (NudieJeans, n.d.).
- **Social factors:** Positive attitudes of repairing and upcycling items include product personalisation, learning experience, the feeling of enjoyment and having fun in the creative process, as well as recognition and appreciation. Collaborative redesign or redesign services are good options for consumers that prefer clothing reuse instead of disposal, but ultimately, their convenience (e.g., the required time, the garment type) is more relevant. If successful, these unique consumer experiences can result in positive experiences for customers (Wagner & Heinzel, 2020).

3.5.1.3   Disposal

Once the owner no longer wants a textile product and decides to dispose of it, this is considered post-consumer textile waste. Methods by which consumers dispose of their clothing to prevent textile from becoming a household waste are reusing of worn clothing by re-selling through second-hand shops or online, exchanging them in swap-shops or swapping events, giving away to family or friends as hand-me-downs, or donating to charity. When clothes are damaged or beyond repair, consumers can also engage in take-back schemes for material recycling (e.g., H&M), upcycling or recycling garments (Henninger et al., 2020). If clothes are not properly discarded, waste ends up in the municipal solid waste streams and mainly incinerated or landfilled without any possibility of effective utilisation (Nencková, Pecáková, & Šauer, 2020)[19]. The main drivers and barriers found in literature for this phase are:

- **Economic factors:** Consumers that engage in swapping events reported economic benefits as one of their main drivers for engaging in such schemes; they want to get rid of their unused clothes while having the opportunity of acquiring pre-worn clothes themselves without the need of spending money (Henninger, Bürklin, & Niinimäki, 2019). In some countries, disposal of unsorted (or residual) municipal waste is subject to high fees (particularly in the case of pay-as-you-throw schemes), so that donating or recycling clothes instead of disposing of them can be economically advantageous.
- **Fit needs and offering:** As pointed out in chapter 3.2, consumers need access to a structured recycling programme and recycling infrastructure in order to engage in circular behavioural patterns at the disposal phase (Bäunker, 2020). Moreover, businesses and governments need to ensure that recycling infrastructure is easy to access for customers, otherwise this could become a barrier for the correct disposal of clothing and textiles.
- **Information used for choice:** Another influence for recycling and donating, clothes is the positive impact on the environment by reducing waste and preventing resource depletion (Wagner & Heinzel, 2020). One of the strongest drivers of consumer donating behaviour is **attitude towards recycling**, for example, via increased consumer interest towards recycling of textile waste, together with more **visible and concrete information** such as the environmental impacts of textile production (Grębosz-Krawczyk & Siuda, 2019; and Vehmas et al., 2018).
    - With respect to donating used items to charities for reuse, a barrier that was found in literature was the lack of transparency about what happens to the clothing consumers have donated, paired with lack of sufficient knowledge to differentiate between re-usable and non-reusable textiles (ETC/WMGE, 2021). Grębosz-Krawczyk & Siuda (2019) found that young consumers in Poland, France and Spain have a minor engagement in recycling campaigns organised by clothing companies (e.g., H&M) the exchange of old clothes for discount vouchers, even though they declared high willingness to participate in such campaigns. These results might indicate that clothing recycling possibilities are not sufficiently publicised.
- **Social factors:** Consumers with strong positive attitudes towards recycling, donating and reusing clothes such as in second-hand buying behaviour are influenced by emotional satisfaction during and after recycling practice (Wagner & Heinzel, 2020; and Paço et al., 2020).

3.5.1.4   Findings from the clothing and household textiles sector

The speed at which fashion collections are introduced has increased in the past decades, with new collections brought to the market about every three weeks. The rise of fast fashion affects consumers behaviours when purchasing, using and ultimately discarding clothing and household textiles. Consumers are more prone to act with a sense of immediacy (the new behaviour called "see now – buy now"), becoming used to buy more clothes at low prices, often at the expense of garment quality. The key findings from the case study on the clothing and household textiles sector are summarised below.

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[19] This situation is likely to change positively with the entry into force of the Art.11(1) of the Waste Framework Directive (Directive 2008/98/EC on waste) that mandates the separate collection of textile waste as of 01 January 2025 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705.

Price is still the main economic factor determining whether a consumer is willing to engage in purchases of circular products. When compared to purchasing new, linear products, circular textiles and clothes have higher upfront costs, putting them at as a disadvantage in the eyes of consumers.

- Quality and garment durability are also important factors for consumers, but more often than not they do not have access to this information, or it this information not easy enough to understand for it to influence the consumer's purchasing decision.

- Despite the economic benefit involved, purchasing second-hand clothes, or engaging in leasing/sharing models is still not a widespread practice. This can be mainly attributed to social factors and to negative perceptions regarding the use of pre-worn clothes and textiles (e.g., hygiene considerations).

In the case of clothing and household textiles, circular products and services are still at a disadvantage in terms of fits between needs and offering. Consumers require that the circular products offered are easily accessible, and with enough product variety (e.g., in terms of fashion styles, sizes and quantities) to fit their needs.

- The dominant linear business models produce a large number of options for consumers to choose from with regards of style, quantity and they are easily available in most places. In comparison, offerings of circular textiles and clothes are much more limited, as there are fewer brands and stores offering them, their production is done in lower numbers and the variety of styles is rather limited.
- This is also the case for the use phase of clothes and textiles when a consumer is required to invest extra time and effort to find repair services or to learn and try to repair the garments themselves. The uncertainties about the result of the repair or redesign process often outweigh the potential economic benefits of extending the garments lifetime, and consumers choose to instead discard them.

The main drivers for proper disposal of clothing and household textiles are related to fit needs and offering: consumers need access to a straightforward structured recycling programme in order to engage in circular behavioural patterns at the disposal phase. Recycling infrastructure should be easy to access for consumers, otherwise it becomes a barrier for the correct disposal of clothing and textiles.

Finally, a key takeaway from the case study on clothing and household textiles is that it is much cheaper, convenient, and less time intensive for consumers to buy new clothes and discard them once they are not considered useful, than it is for them to buy circular textile products, engage with circular services and extend the life of their clothes and textiles.

3.5.2 Consumer electronics

Like fast fashion, consumer electronics such as smartphones, laptops, televisions, and household appliances, can involve a rapid turnover in style trends and technological evolutions, with revenues dependent on selling the latest products, which are increasingly affordable at ever-increasing performance levels (due to the historical development known as "Moore's law" regarding the density of transistors placed on microelectronic chips). Their growing demand, short lifecycles, fast obsolescence, and low availability of repair options generate large amounts of waste (see Box 3-6 for a summary of the key trends affecting consumption of electronic products).

Box 3-6 Macrotrends affecting consumer behaviour regarding consumer electronics products. (own development based on information in Parajuly et al., 2020; World Economic Forum, 2019; LE Europe et al., 2018, and ETC/WMGE, 2021.)

The most important production and consumption trends affecting consumer behaviour in this segment are summarised below:

- **Rising technology adoption rates:** Smartphone adoption rates are fuelling global demand. There is also a major trend towards flat panel TV screens in developed markets and adoption of 3G and 4G in developing economies. More clothes, furniture, toys, sports equipment, and toothbrushes have complex electronic components (World Economic Forum, 2019).

- **Technological progress discourages people from seeking more durable products.** Products with technology considered innovative today can be considered old or obsolete five years from now. This applies not only to hardware, but also software. For example, in the case of smartphones, phones of older generations might still function but cannot support the latest software updates or phone apps, which forces consumers to buy a new device (LE Europe et al., 2018).
- **The structure of business models in the electronics sector:** the main value proposed to customers is the ability to have the newest and most advanced electronic tools. The value is captured by selling products at a price far higher than the cost of producing them, and convincing customers to replace their old devices with newest models regularly. This model does not reward the introduction of measures to increase product life. Even worse, this goes against the value capture logic, as consumers would be less tempted to buy a new model if their old one remains functional for longer (ETC/WMGE, 2021).
- **The complexity of e-waste recycling.** Due to the complex material composition and design, many electronic products are not compatible with material recycling processes, or these are very complex and expensive (Parajuly et al., 2020; World Economic Forum, 2019). There is a lack of awareness amongst consumers about how to recycle, together with worries about data security, which result in residual electronics sitting in consumer's homes and offices, waiting to be dealt with. As devices become more numerous, smaller, and more complex, the issue escalates (World Economic Forum, 2019).

Consumer electronic waste, also called e-waste, is a mix of complex components which include toxic materials (such as heavy metals) that require proper disposal to avoid environmental and health risks. However, proper handling of e-waste also presents economic opportunities, since it includes valuable raw materials such as plastics, metals (e.g., aluminium, iron, and tin), precious metals (e.g., gold, silver, copper and nickel), as well as rare earth and critical raw materials (e.g., cobalt, indium and palladium). Europe and the US are the main responsible regions for global e-waste generation, contributing to almost half of the yearly generation (Rizos et al., 2021). Despite all the above, recycling rates of e-waste in Europe are still low, reaching roughly 35% to 40% (Rizos et al., 2021, Parajuly et al., 2020).

A circular economy for consumer electronics can reduce or avoid the consumption of natural resources needed for manufacturing new products, and the environmental impacts associated with them. It can also increase the recovery of valuable materials and extend the lifetime of devices and components through the adoption different business models, engaging in product life extension and finally, recycling. To successfully build such system, consumers need to be willing to engage with these new business models, participate in life extension measures while using them, and to properly dispose of their products once they have reached their end of life.

The majority of European are aware of the environmental issues linked to the linear model of consumption but, while many claim to be willing to engage in circular economy solutions for consumer electronics products, an attitude-behavioural gap can be observed in practice (Parajuly et al., 2020; LE Europe et al., 2018). Figure 3-6 below for examples of these attitude-behavioural gaps during the different phases of the products lifecycle.

Figure 3-6 Examples of attitude-behavioural gap between people's claims and actual practices during purchase, use and end-of-life disposal of electronic products. Adapted from Parajuly et al. (2020)
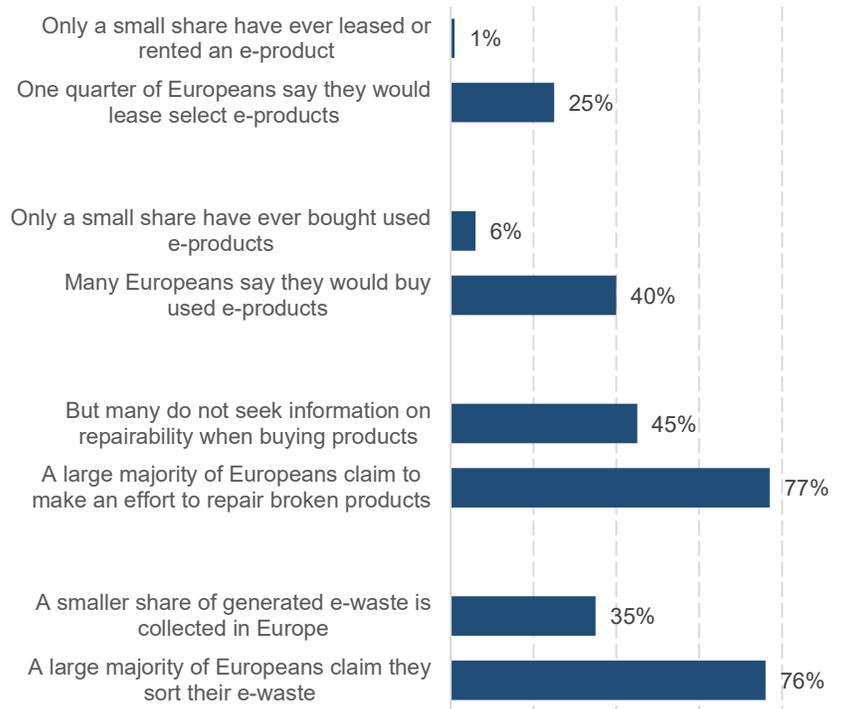
In the following sections, we discuss the key drivers and barriers for engaging in circular behavioural patterns in the consumer electronics value chain, organised by the decisions consumers face upon purchase, use and once a product is no longer needed.

3.5.2.1   Upon purchase

When compared to the linear model of purchasing new products with shorter lifespans, the drivers and barriers consumers face when engaging in circular behavioural patterns upon purchase vary depending on the choices available. Before purchasing an electronic product, consumers could first question whether the purchase is necessary, in order to avoid unnecessary consumption. As mentioned before, fast technology changes drive European consumers to exchange their devices regularly and more frequently before they break, a phenomenon often referred to as technical obsolescence. Consumers are exposed to unregulated marketing and advertising campaigns of distributors, motivating them to engage in unnecessary purchases and accelerated consumption (Cordova-Pizarro et al., 2020). For example, in the case of smartphones, mobile companies incentivise users to change data plans in less than two years, often paired with an offer to change their old device for a new model.

Once consumers decide to acquire an electronic product, there are several consumption options available to them that are aligned with the circular economy, for instance, they can choose to purchase a brand-new product that is durable and repairable, purchasing a refurbished, remanufactured, or second-hand product that fulfils their needs, or in specific cases, to engage in leasing or product as a service system. The drivers and barriers for engaging in each of these options are summarised below.

Purchase of new products

- **Economic factors:** One economic factor which concerns consumers purchasing new consumer electronic products is **durability** of the products. As with most products, durability information is not usually made available to consumers. Therefore, in the case of electronics, consumers often measure durability as the expected lifetime of the product. Consumers have different expectations regarding the durability of consumer electronics depending on the type of product. White goods (e.g., washing machines, dishwashers,

vacuum cleaners) are generally expected to last between five and ten years. For products such as televisions, expectations can vary greatly amongst consumers, for some the expected lifetime of a television should be between two and five years, while for others it should last between 10 and 20 years. In the case of smartphones, a survey found that consumers expect their products to last between three and five years (LE Europe et al., 2018). Even though in practice they replace their smartphones sooner than that. It should be noted that the risks associated with **high-priced products** are an important barrier for low-income consumer groups, who are often concerned that planned obsolescence is a widespread phenomenon (ETC/WMGE, 2020). In such cases, consumers are less inclined to factor in the total-cost of ownership because they already assume their product will not last for long, instead leaning towards products with lower upfront costs.

- **Fits between needs and offering:** An important barrier for circular behavioural patterns in the purchase phase of electronic products is the vast number of newer models offered, which are updated rapidly. Consumers can be driven to purchase a new electronic product based on the latest technological models available, seeking upgrades or better performing products. The magnitude of this barrier depends largely on the type of product. For example, in the case of smartphones, cameras, laptops and televisions, consumers are motivated to seek products with higher resolution pictures, better sound systems, thinner/lighter products, faster reaction time, etc. This is however less common in the case of large household appliances (e.g., washing machines, drying machines, refrigerators), for which consumers are less influenced by technological advances and tend to wait to replace them until they malfunction.

- **Information used for choice:** according to the ETC/WMGE (2020) study, there have been studies that contradict the widespread belief that consumers have a throwaway mentality regarding consumer electronics, indicating that consumers are willing to invest in products which have labelling information on their lifespans. This also indicates that consumers are willing to keep their equipment for longer (avoiding unnecessary purchases) if the conditions are appropriate.

Purchase of refurbished, remanufactured, or second-hand products

Refurbishing (or refurbishment) of an electronic device is the process of returning a used product into a good working condition, by cleaning, replacing and/or repairing major components (such as a smartphone's screen or battery) that are faulty, damaged, or close to failure and making cosmetic changes to update the appearance of a product (Mugge et al., 2017, p. 284). In the case of remanufactured products, the products are expected to be restored to a 'like new' or even better than new condition.

The main barriers consumer face when choosing whether to purchase a refurbished or second-hand product instead of a new one, social factors seem to play a bigger role than e.g., economic or information factors used for choice.

- **Economic factors:** Refurbished/remanufactured or second-hand electronic products have lower prices than equivalent first hand products. However, there is a perceived risk amongst consumers that these devices have inferior performance or lower quality than new products, together with the idea that new products ensure better value for money (Rizos et al., 2021).

- **Fit between needs and offering**: Mugge et al. (2017) concluded that the key drivers for consumers intention to purchase refurbished smartphones were product-related, including improvements in battery life, guaranteed software updates and upgraded performance, indicating a need for continued performance. However, this applies only to those cases where consumers can obtain a guarantee on the performance of the product (e.g., from reputable stores).

- **Information used for choice**: A key barrier for shopping second-hand electronics is a common concern from consumers that used electronics may break down faster than a new product, causing a general lack of trust in the second-hand electronic market (LE Europe et al., 2018; Mugge et al., 2017). This is particularly true when purchasing directly from another consumer in online platforms for second-hand products (e.g., Facebook Marketplace, Markplaats, etc.), where the consumer is not able to interact with the product prior to the purchase. Therefore,

Pérez-Belis et al. (2017) found that consumers are more willing to buy second-hand products directly from friends or acquaintances, since they can personally check the electronic product's status and operation.

- **Social factors**: Mugge et al., (2017) found that perceived environmental benefits and environmental awareness of refurbishing have a positive impact in the purchase intention of consumers towards refurbished smartphones.
- **Preferences and beliefs:** Unfortunately, one of the main reasons deterring consumers from buying second-hand products is their simple preference for new models over old ones (Rizos et al., 2021)

Leasing and engaging in product-service systems

New business models also offer consumers the option to obtain a product under a leasing agreement, or to purchase the product as a service instead of owning it (product-service systems). In these models, consumers fulfil their needs by gaining access to the electronic product and return them to the service provider once the product is no longer needed or functional. Depending on the type of product, and the frequency of how often upgrades are offered/requested, Leasing *per se* is not necessarily the most sustainable option leading to a more circular behaviour, as the leasing companies might choose not to repair damaged or defective products being leased, choosing to instead replace it for a new one instead if it makes economic sense for them. This is particularly relevant for most electronic products, which are cheap to manufacture, expensive to repair, and subject to fast technical progress. Alternatively, these business models can be effective in reducing e-waste as they incentivise providers to ensure the products are used optimally during their lifecycle, choosing the most durable products available, repairing and remanufacturing them when necessary, in order to make them available for as long as possible (Rizos et al., 2021).

Taking this into consideration, leasing could facilitate more circularity, as the manufacturer has direct access to the product in the use phase and can (but is not obliged to) take steps to maintain, repair, upgrade or resell it. Leasing can on the opposite, lead to even faster replacement of products than what the consumer intended.

For the purposes of this case study, we include leasing as a circular behavioural pattern for electronic products that will not be heavily used by the consumer, or for situations where consumers are not certain if it makes economic sense to own them because they are not sure if they will get enough use. Examples of these products are those intended for niche entertainment and hobbies, such as gaming consoles, virtual reality sets, audio systems, cameras, drones, as well as smart appliances, Leasing is less likely to count as a circular behavioural pattern for products such as smartphones and laptops, etc. that are expected to have a heavy use, and the user continues to engage in linear behaviours of upgrading their devices once a newer model becomes available, even before the current model leased is still in good working condition. Leasing and product-service systems have already proven to be effective for the business-to-business markets (see Box 3-7 below for an example). However, despite the potential economic and environmental benefits of implementing these new business models in the consumer market, their adoption is not widespread (Parajuly et al., 2020).

Box 3-7 Lock-in examples of products and service offering (ETC/WMGE, 2021)

The consumer printer and copier market is an example of a business model that sells the main product (printer/copier) at a very cheap price, while the secondary product needed for its continued use (ink) is sold at very high prices. Consumers are locked-in to the printer brand they own, and often producers deliberately create technical barriers that block third party ink cartridges.

The cheap price for the printer is a reflection of the use of low-quality materials and components, which lead to short product lifetimes. Technically, it is possible to extend the lifetime of printers. However, implementing these design changes would increase the resulting printer's price, which would make such printer less attractive for consumers, as in the current printer market consumers do not tend to consider the total cost of ownership during the purchase.

Contrary to the consumer printer market, in the business-to-business printer market design for disassembly is common. Producers use leasing products, such as pay-per-copy, capturing the value of a copier that can be repaired, reused, or resold. A leasing business model could also be implemented in the consumer market, provided that companies are willing to adopt such novel models.

The drivers and barriers for leasing and using product-service systems specific to electronic products have not been largely explored by literature. However, we find that the main barriers for consumers engaging with these business models are related to **fit between needs and offering** (namely the limited number of companies offering the service), and to **preferences and beliefs** (since owning products is still culturally preferred by consumers).

3.5.2.2   Upon use

While the designed lifetimes of electronic products are determined by the manufacturer's decisions such as product design, materials used, designed quality, and considerations regarding the product's repairability, upgradability and the quality of manufacturing process, the useful lifetime of an electronic product can be strongly influenced by the consumers' behaviour, such as how it is used, repaired and reused (ETC/ WMGE, 2020).

Electronic products rarely reach their designed lifetime, and the time that consumers want their products to last – their desired lifetime – is also considerably longer than the time they are actually used. In practice, a product becomes obsolete once it is no longer wanted and/or its useful lifetime ends. Figure 3-7 compares the actual, designed and desired lifetimes of a selection of electronic products (smartphones, televisions, washing machines and vacuum cleaners). The graph shows how in the case of smartphones, consumers would like their products to last up to 5 years, however these products are designed to last only two years (and in practice, they get replaced by consumers even sooner). By contrast, even though televisions are designed to last around 25 years their actual lifetime is over 7 years only. With washing machines and vacuum cleaners, the disparity between actual and desired lifetime is less evident.

The main reasons behind obsolescence vary depending on the electronic product. In the case of smartphones, and televisions, the main drivers for consumers to replace their devices are the desire for a better product and upgrades. Hence. The replacement of phones and televisions due to mechanical defects is less common. In the contrary, washing machines are replaced mainly due to product failure or dysfunction (ETC/WMGE, 2020).

Figure 3-7 Comparison of actual, designed, and desired lifetimes of selected electronic products. Adapted from EEA, (2020)[20]

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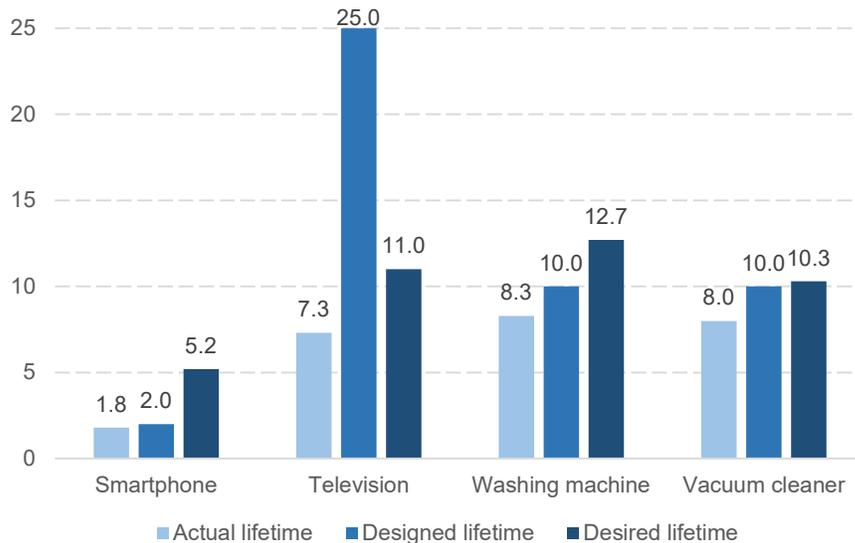
[20] The original source listed by the EEA (2020) briefing is the ETC/WMGE (2020), which is based on Cordella et al., 2019 and Wieser et al., 2015 for smartphones; Kalyani et al., 2017, King County, 2008 and Wieser et al., 2015 for televisions; Wieser et al., 2015 for washing machines; Rames et al., 2019, EC, 2019 and Wieser et al., 2015 for vacuum cleaners.

The key drivers and barriers for consumers engagement in product repair and refurbishing in order to extend their products lifetimes are summarised below.

Product repair and refurbishing

The main barriers for repairing and refurbishing electronic products are related to the higher costs of reparation services as well as the lack of availability of repair services. To a lesser extent, a few social factors, preferences and beliefs might deter consumers from choosing to repair or refurbish their products.

- **Economic factors**: the **high costs of repairing services**, which can make the repair of these products uneconomic. The repair costs can be triggered by the prices of spare parts, either because the product manufacturer sells it purposefully at a higher price than their real cost, or because the parts are old or not produced anymore, which makes them rare and increase their price. Knowing that manufacturers can produce and sell spare parts at a reasonable price would reduce the economic risks when deciding to repair or refurbish a product (LE Europe et al., 2018).
- **Fit between needs and offering:** Having the possibility to repair a product (i.e., the product itself being repairable) is the most important driver for consumers in order to repair. There is a tendency of producing bigger and more complex machines which are highly integrated and hard to repair. As a result, consumer face many practical problems when choosing whether or not to repair or refurbish their electronic products.
  - Manufacturers and producers have most of the know-how about products and there is not much knowledge available otherwise, making for an **unbalanced relationship with consumers.** In the case of guaranty claims, manufacturers or stores can choose to automatically replace products rather than have them repaired, without giving customers a choice.
  - There are also cases in which there are **no repair services available** to consumers, for example in cases where products were purchased from foreign brands, shops or from brands that no longer exist.
  - On top of this, having products repaired requires **time and effort,** which are particularly important for products such as dishwashers, washing machines and other household appliances that are needed on a daily basis. Consumers need to spend time on finding a technician, arranging a visit to their homes or transport them to where the product will be repaired. Being able to have products repaired in a short time and/ or being able to receive and use a courtesy replacement product while waiting for their own product (e.g., in the case of smartphones or laptops) would encourage people to engage in this activity.
- **Social factors:** Previous **negative experiences** when trying to have products repaired deter consumers from seeking reparations of their products instead of replacing them. There is also the belief that certain types of products (e.g., smartphones) are not made to be repairable, or that products are designed in such a way that the whole product will stop functioning when a small component breaks down (LE Europe et al., 2018).
  - In the case of self-repair behaviour, a research conducted in the UK found that consumers can experience personal satisfaction and a sense of reward related to the technical challenges related to self-repair of small household equipment (Lilley, Bailey, & Charnley, 2013).
- **Preferences and beliefs**: ETC/WMGE (2020) found that consumers that have low expectations regarding product lifetimes will be more likely to choose replacing rather than repairing such products. This negatively impacts the products use time, as consumers generally assume that electronic products will only last for short periods.

Box 3-8 Example of new business models encouraging consumers to engage in repairs.

Fairphone is often used as an example of a company based on a circular business model, allowing its consumers to easily repair and replace broken parts (Bocken, de Pauw, Bakker, & van der Grinten, 2016). The smartphone is designed to be as durable as possible, and it is manufactured with fairness, social and ecological dimensions in mind.

The parts of the mobile are made available by Fairphone, and they are designed to be easily replaced by the user in case of a malfunction. The repairability of the product is based on a 'do-it-yourself' logic, which extends the product's life cycle and aims to avoid obsolescence. To combat electronic waste, the company also offers take back schemes to users of old smartphones when purchasing a Fairphone, including the return shipping costs. The company has partnered up with a recycling company located in Ghana (Recell Ghana), which specialises in the recycling of this type of waste.

3.5.2.3   Disposal

Once a user no longer needs an electronic product, either because the product has stop functioning or to change it to a new model, circular behavioural patterns would be to sell it, give it away, or engage in the recycling solutions suitable for the specific product (e.g., return it to a store, bring it to recycling centres or other dedicated recycling infrastructure made available in their location). If consumers throw their product away together with general waste, or stockpiles it at home, the recoverable materials become unavailable to the system (Cordova-Pizarro et al., 2020).

The attitude-behavioural gap observed in European consumers when engaging with recycling solutions is the outcome of not only their own choices, but also of the availability of collection infrastructure (waste disposal options and collection systems), which are often beyond their control (ETC/WMGE, 2021). For instance, only 35% of the generated e-waste is collected under official collection systems in the EU, while 76% of Europeans claim they sort their e-waste, implying that part of the sorted e-waste is stored at homes or collected through unofficial channels (ibid). In the focus group carried out by the LE Europe et al. (2018) participants mentioned the following drivers and barriers as the key factors that motivate or discourage them from recycling:

- **Economic factors**: the possibility of saving or earning money when returning products to a manufacturer was listed as a motivation for recycling (e.g., when purchasing a new washing machine or dishwasher).
- **Fit between needs and offering:** The main aspects listed as factors that discourage consumers from recycling were the complexity of the activity, and how time-consuming it can be, all depending on the existing recycling and collection infrastructure. Consumers need to devote time to it in order to properly dispose of the product, particularly when having to dispose of large electronics which require effort as well as having a car. Participants of a focus group carried out by LE Europe et al. (2018) expressed their desire for manufacturers and stores to assume the responsibility for undertaking some of the recycling tasks, which would make it easier for consumers.
- **Information used for choice:** a lack of awareness amongst consumers was another factor listed by LE Europe et al., (2018). Participants of the focus group expressed not knowing where to recycle old electronic products, or who to contact. In the case of some electronics (e.g., laptops and smartphones) there is also a lack of awareness regarding what happens to the personal data stored on the devices, making consumers sceptical about recycling possibilities.
- **Preferences and beliefs:** there are also a lack of trust and of credibility in the recycling process reported, caused by a perception of lack of transparency, since consumers do not know who is collecting the products at their end of life, what is done with the products and where do they end up, which makes them question whether they are actually being recycled (ibid).

3.5.2.4   Findings from the consumer electronics sector

Fast technology changes drive European consumers to exchange their devices regularly and more frequently before they break, a phenomenon often referred to as technical obsolescence. Consumers are exposed to unregulated marketing and advertising campaigns of distributors, motivating them to engage in unnecessary purchases and accelerated consumption. This macrotrend affects consumer decisions across all the use phases of consumer electronics' lifecycles. The key lessons learned from the case study can be summarised as follows:

Economic factors play the most important role during the purchase of new products: due to a lack of information regarding a product's durability, paired with concerns about planned obsolescence consumers are less prone to consider the total cost of ownership when making purchase decisions.

Perceived risks and social factors play a big role when consumers choose whether to purchase a refurbished, remanufactured, or second-hand product instead of a new one.

- Perceived environmental benefits and environmental awareness of refurbishing have a positive impact in the purchase intention of consumers towards refurbished smartphones. However, there is a perceived risk amongst consumers that these second-hand or refurbished devices have inferior performance or lower quality than new products, together with the idea that new products ensure better value for money.
- The perceived risk is lower when consumers can obtain a guarantee of the performance of these products, or when they buy directly from acquaintances and can personally check the state of the product.

Leasing is not always the most sustainable choice in the case of consumer electronics. Leasing can be considered a circular behavioural pattern for situations where consumers are not certain if it makes economic sense to own them because they are not sure if they will get enough use. This is not the case for products such as smartphones and laptops, etc. which are expected to have a heavy use, and the user continues to engage in linear behaviours of upgrading their devices once a newer model becomes available, even before the current model leased is still in good working conditions. The high costs of repairing services and the time and effort required for them make the repair of these products unattractive for consumers.

- The repair costs can be triggered by the prices of spare parts, either because the product manufacturer sells it purposefully at a higher price than their real cost, or because the parts are old or not produced anymore, which makes them rare and increase their price.
- Having the possibility to repair a product (i.e., the product itself being repairable) is the most important driver for consumers to repair. However, there are often cases in which there are no repair services available to consumers, and having products repaired requires additional time and effort from consumers. Consumers need to spend time in finding a technician, arranging a visit to their homes or transport them to where the product will be repaired. Being able to have products repaired in a short time and/ or being able to receive and use a courtesy replacement product while waiting for their own product would encourage people to engage in this activity.

In the disposal phase, the main factors influencing consumer behaviour are those related to the complexity of the activity, and how time-consuming it can be. Consumers need to devote time to it to properly dispose of the product, particularly when having to dispose of large electronics which require effort as well as having a car.

4 Good practices from national experiences

This chapter summarises national initiatives aimed at stimulating circular behaviour and covers several good practices in-depth. The latter have been selected based on what was considered less common but potentially interesting for other countries. The examples come from the stakeholder consultation activities organised throughout the course of the project, namely a survey and an expert meeting. The results of the latter are presented in Annex A2. Additional research was conducted to dig deeper into the policy examples that can serve as good practices or inspiration for other countries, and, potentially, for the EU.

4.1 Introduction to good practices from national experiences

Table 4-1 below uses the framework developed in Chapter 3.4 to map the frequency with which policy measures target different points of influence in the decision-making journey. An additional category "other or cross-cutting measures" was created, primarily to encompass policy measures that target the CE as a whole (thereby not fitting into other categories). A large share (45%) of policy measures shared through the consultation (Q2.1) fall under this broad category.

In terms of the decision-making journey, many policies aim to help facilitate consumer choices when they are purchasing new items (P2). This is often done by passing on information about the sustainability of products to the consumer through labelling schemes. Policies also target correct disposal (D2) through waste management initiatives or better communication on sorting practices (e.g., see example in Table 4-6 below).

When it comes to drivers and barriers, many of the policies in the sample addressed "needs, offering, availability" or "information and knowledge". Many examples of policies aimed at improving information and knowledge were awareness-raising campaigns and educational programmes. It is to be noted that a large majority of policies that were categorised under "needs, offering, availability" were policies targeting businesses (e.g., funds for entrepreneurs and circular solutions). These policies are considered to indirectly improve product/service offering for consumers. However, the importance of these measures is uncertain. It is unclear how much of the benefits from these measures will actually be passed on to the consumer in the future.[21]

There is a clear opportunity to diversify policies and to target new (less explored) areas of a consumer's decision-making journey, as well as different drivers and barriers. Surprisingly, except for some tax incentives (e.g., see example in Table 4-3 below), few policies target economic factors. Since this is an important driver for consumers, policies can be more creative in tackling this factor.

Table 4-1 Categorisation of policy measures from Q2.1 of the survey according to the framework for analysing circular behaviour (n=133) (source: own development based on survey results)

Stage in the decision tree of the consumer	Economic factors	Needs, offering, availability	Information and knowledge	Social factors	Personal preferences
[P] Should I buy/ own the product or not?	2	3	2	-	-
[P1] If decided to buy, should I buy a new or a used one?	-	2	-	-	-
[P2] If decided to buy a new product, which one?)	4	8	20	-	-
[U] Shall I keep using my product or should I stop using it?	-	-	-	-	-
[U1] If the product is kept in use, there is a set of choices on how the products is used?	-	-	-	-	-

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[21] This observation was also made during the expert meeting.

Stage in the decision tree of the consumer	Economic factors	Needs, offering, availability	Information and knowledge	Social factors	Personal preferences
[U2] If the product is no longer used, what to do next?	-	-	-	-	-
[D] Shall I keep it for a while, or shall I get rid of it?	-	-	-	-	-
[D1] If the product is kept, is it stored or repaired?	2	-	-	-	-
[D2] If the product is not being kept, how to get rid of it?	6	13	11	-	-
Other or cross-cutting measures (covering the CE more broadly)	1	25	33	1	-

Note: Certain measures were mentioned more than once or covered very broad policies (e.g., national environmental strategies) that were difficult to link to circular behaviour. They have been excluded from this analysis. Furthermore, policies are categorised according to their impact on consumers. Economic measures targeting companies were grouped under "needs, offering, availability", leaving few economic measures targeting consumers directly.

4.2 Policy examples

Several examples from the stakeholder consultation were selected as interesting or inspiring examples of policy options stimulating circular behaviour. Criteria that was used to select the examples is as follows:

- Selection by the project team (based on expert judgment) of interesting or innovative examples that could provide lessons learned for other countries. The examples were drawn from the survey data;
- Selection further refined based on discussions in the webinar, distilling what policies were most talked about and considered relevant and meaningful by participants;
- Availability of information (both via relevant documents and links shared through the survey and information found through desk research);
- Range of geographic coverage such that examples originate from different countries;
- Range of policy types such that there is a wider variety of examples; and,
- Range of points/stages of the consumer decision-making journey targeted by policies – ensuring at least a coverage of the three main stages (acquisition, use, disposal) and a variety of sub-stages, to the extent possible.

The examples are described in the tables below.

Table 4-2 Policy example #1: the repairability index for electrical and electronic goods

Policy measure	The repairability index for electrical and electronic goods
Country	France
Geographical scope	National
Sector coverage	Electrical and electronic goods (currently piloting five product categories: front-loading washing machines, televisions, smartphones, laptops, and electric lawnmowers)
Governing body	Ministry of the Ecological Transition (Ministère de la Transition écologique)
Policy objective	The objective of the repairability index is to inform consumers about the repairability of their products, thereby orienting purchasing behaviour towards products that are more easily repairable (Ministry of the Ecological Transition, 2021). The display also aims to raise awareness about the possibility of extending the lifespan and use of one's products, encouraging consumers to resort to repair as opposed to new purchases. The index is a tool to fight

	against obsolescence and to avoid premature scrapping of electrical and electronic goods.
Entry into force	The mandatory display of the repairability index came into force on January 1st, 2021. This requirement was introduced through Art. 16 of France's anti-waste law for a circular economy (2020-105) (Ministry of the Ecological Transition, 2021).
Description of the measure	The measure makes it an obligation to display the degree of repairability of a product at the point of sale. By displaying a repairability score out of 10, consumers are informed about the degree of repairability of the products they intend to purchase. The degree of repairability is, thus, shown through an infographic placed near the product (e.g., next to the price display), as shown below. *Source: Ministry of the Ecological Transition (2021)* This information makes consumers aware of the possibility of extending the lifespan and use of their electrical or electronic products in the event of damage or breakdown. The repairability score is calculated based on a set of criteria grouped into five categories, namely (Ministry of the Ecological Transition, 2021): • Documentation: score determined by the producer's commitment to make technical documents available free of charge to repairers and consumers; • Disassembly, and access, tools, fasteners: score determined by the ease of disassembly of the product, the type of tools required and the characteristics of the fasteners; • Availability of spare parts: score determined by the period of availability of spare parts (based on the producer's commitment) and their time of delivery; • Price of spare parts: score determined by the ratio between the selling price of spare parts and the price of the product; as well as • Criteria specific to each product category concerned. The details of the score must be made available to the consumer by the seller or the manufacturer upon request (Ministry of the Ecological Transition, 2021).[22] Consumers are able to learn more about the index through the French Agency for the Ecological Transition, as well as through a dedicated web-based platform set up by Spareka, an entreprise with a mission to teach people about repair. The anti-waste law for a circular economy stipulates that this index will become a sustainability index covering a wider range of products and incorporating new criteria by 2024. More details on the index can be found in a Q&A by the Right to Repair organisation (Right to Repair, 2021).
Point(s) of action in the consumer decision-making journey	➤ Purchase stage (P1a): informing consumers about the repairability of new products; and ➤ Disposal stage (D1): encourage repair of damaged products (through the educational aspect of the index).
Drivers, barriers, or lock-ins targeted	This measure reduces barriers related to the asymmetry of information between the producer and the consumer in terms of product repairability. It helps consumers make choices based on enhanced knowledge about the quality of the product. This also means that interested consumers do not have to spend resources searching for information related to repairability, and forces sellers or manufacturers to make this information available. It is plausible that this action can incentivise manufacturers to improve the repairability of their products and diminish technical obsolescence to remain competitive against products that have better scores. As such, in the long term, consumers may have more sustainable options to choose from.

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[22] The grid used to calculate the score is available in French and English.

Anticipated effectiveness of the policy measure in stimulating consumer behaviour (according to the EAST principles) (BIT, 2014)	☒ Easy
	☒ Attractive
	☐ Social
	☐ Timely
	Explanation:
	The measure reduces the "hassle factor" associated with gathering information on product repairability and making comparisons between products, by providing a single index used for all products in scope. The index is also easy to understand and stands out through a colourful infographic that illustrates repairability. The colour coding is based on a scale that matches the degree of repairability, red representing very low repairability and green representing very high repairability.
	As such, the key takeaway behind the index is clear and immediate (immediately informing consumers whether a score is good or bad) and makes benefits to the individual salient – both in terms of durability and potential savings (BIT, 2020).
Empirical evidence of ex-ante effectiveness	The French government worked with the Behavioural Insights Team (BIT) in France to develop the repairability index display, building on a repairability index for laptops designed and validated by Fnac Darty (Renouard, 2018). In partnership with the company, the BIT tested the impact of different index displays through a randomised control trial (RCT) on Darty's website in which over 140,000 customers took part. This was complemented by a qualitative study in Darty stores.
	This experiment was one of the largest ever conducted in this field, according to the BIT, and provided some interesting insights that were taken on board by the French government (BIT, 2020). By exploring the journey of a customer considering a laptop purchase, the BIT found consumers find it difficult to understand the concept of repairability, and they do not see the advantages of making a repairable purchase. These insights were used to develop the index display.
	Results showed that making the display visible can attract more attention, however, customers were less likely to go ahead with a purchase once they had seen the repairability score (Ministry of the Ecological Transition, 2020). Customers seemed to be more likely to make no purchase or to purchase a laptop that did not carry a repairability score. Overall, the results showed the index did not impact the average repairability score of the laptops purchased. However, the index has potential to contribute to circular economy goals if consumers become more aware of the index.
	The conclusions of the study specify that it is important for the index to be made mandatory, otherwise manufacturers and distributors can choose to only display good scores, thus stripping the index of its comparative value. The display also needs to be "front-and-centre" to avoid customers having to search for the information. Ultimately, more needs to be done to familiarise consumers with the concept of repairability.
	In addition to the design of the display, the French government also asked the stakeholders involved in the development of the Circular Economy Roadmap (published in 2018) to participate in working groups that developed the criteria for the repairability index.[23]
Empirical evidence of ex-post effectiveness	Since this is a very recent measure, no formal ex-post evaluation has been conducted by the French government; however, a survey by OpinionWay for Samsung shows strong support for the measure by a representative sample of consumers (n=1,011) (Samsung, 2021). The study finds that 83% of respondents want to repair their electrical and electronic appliances and 71% have heard about the repairability index. The index is judged as "useful" in guiding consumer choices.
Transferability of the measure to other countries and regions	☒ Very easy
	☐ Easy

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[23] Based on information collected during the stakeholder consultation.

	☐ Moderate
	☐ Difficult
	☐ Very difficult
	Justification:
	The index comes with a set of criteria to help calculate the repairability score of electrical and electronic products, which can be used by other countries. Countries would need to establish a regulation to make the display of the index a mandatory requirement in places where electrical and electronic goods are sold. The design of the display should be understood in the same way by consumers across Europe since it only consists of numbers and images, there is no need for translation. The range of colours from red to green should also be understood by all Europeans since it resembles the traffic light and energy efficiency systems, common across all European countries.
Relevance of EU-level legislation	This measure could be implemented at EU level through EU-level legislation. The measure pertains to a shared European competence related to the Internal Market. Implementing the measure in only one or a few EU Member States can lead to a fragmentation of the market, while there are benefits to be reaped from the implementation of the measure at EU level (e.g., considerable cost savings for manufacturers, because most of the main manufacturers of electrical and electronic appliances selling products in France also sell similar products in all EU countries). Manufacturers have already done the work to familiarise themselves with the measure in France and can share their lessons learned. Our recommendations for generalisation at EU scale are described in § 5.2.3.

Table 4-3 Policy example #2: reduced tax rate for the repair of certain goods

Policy measure	Reduced tax rate for the repair of certain goods
Country	Sweden
Geographical scope	National
Sector coverage	Specific items, for example, bicycles, shoes, leather goods, clothing, and household textiles
Governing body	Ministry of Finance, Swedish Tax Agency (Skatteverket)
Policy objective	The objective of the measure is to incentivise reuse and repair through lower taxes on repair services (12% VAT compared to 25% previously). Consequently, the measure aims to revive the repair industry and reduce carbon emissions from consumption (Knowledge Hub, 2021; Starritt, 2016).
Entry into force	Following a government proposal to cut the VAT rate on repairs in 2016 (Proposal 2016/17:1), the measure was introduced on January 1st, 2017 (Swedish Tax Agency, 2016).
Description of the measure	The VAT on repair services was cut from 25% to 12% in 2017. The hope is to get more people to repair their goods rather than making new purchases. The Swedish Tax Agency assessed which goods could benefit from this tax regime, and concluded on five product categories (Swedish Tax Agency, 2017): • Conventional bicycles and to bicycles with smaller electric auxiliary motors (corresponding to Categories 1 and 2 of the Road Traffic Definitions Act); • Shoes, irrespective of what material they are made of (including slippers, boots, safety shoes, skates, slalom boots, soccer shoes, etc.); • Leather goods (i.e., goods predominantly made of processed animal skin), including bags, wallets, belts, dog leashes, footballs, riding saddles, and harnesses; • Clothing, understood as products that people wear on the body to protect themselves from cold, moisture or heat, or as body

	ornaments. Gloves, headgear, artist clothing, and protective clothing are also included; and, • Household textiles, referring to different types of sheets, pillowcases, towels, napkins, and tablecloths in fabric. All kinds of repairs of the goods in question are covered by the reduced tax rate. Preventive measures and improvements to the goods are also covered (e.g., oiling a bicycle chain) (Swedish Tax Agency, 2021). Measures that involve a significant change in the goods do not count as a repair (e.g., the manufacture of a garment consisting of parts from other garments). Furthermore, consumables such as thread and glue used during repair is seen as a subordinate part of the repair service. The same applies to supplementary materials such as pieces of leather or fabric that are added to the product during the repair. More tax breaks supporting sustainable behaviour are expected in the short term, potentially broadening their scope to rental services, as explained by a Swedish expert during a stakeholder interview. According to one stakeholder interviewed, the VAT cut on repair may also be further reduced to 6%.
Point(s) of action in the consumer decision-making journey	➢ Use stage (U1): using products carefully and maintaining them (for longer use); ➢ Disposal stage (D1): repairing or refurbishing damaged products (extending product lifespan).
Drivers, barriers, or lock-ins targeted	This measure tackles economic barriers related to the repair of used and/or damaged products – price being one of the most important drivers influencing consumer decision-making. Although the initiative has the potential to incentivise consumers to opt for repair, experience shows that prices do not change significantly.[24] This could be due to the incentive being too small. However, the measure can stimulate the repair industry (through extra profits), making it more attractive to enter the market.[25] This could mean more repair options for consumers (e.g., in terms of availability, access).
Anticipated effectiveness of the policy measure in stimulating consumer behaviour (according to the EAST principles) (BIT, 2014)	☒ Easy ☐ Attractive ☐ Social ☐ Timely Explanation: A tax break that is automatically deducted from the price consumers pay does not involve any hassle for them. In principle, the tax break could automatically result in lower prices for consumers. However, in practice, this does not seem to be the case – as reported several times in the stakeholder consultation. Furthermore, if the price difference is not significant, consumers may not even be aware of the change. Although the economic incentive is designed to lower prices without consumers making any efforts, the effectiveness of the policy measure can be questioned.
Empirical evidence of ex-ante effectiveness	No such evidence was found. One stakeholder explained that no impact assessment was conducted because the measure was placed very high on the political agenda of the governing coalition. However, an interview with the Deputy Finance Minister in 2016 showed that the tax break was anticipated to make repair easier for people (Starritt, 2016).
Empirical evidence of ex-post effectiveness	No official evaluation exists yet. Little or no effect on prices has been observed until now, so it is difficult to assess the effectiveness of the measure.[26]
Transferability of the measure to other countries and regions	☐ Very easy ☐ Easy

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[24] This was highlighted during the expert meeting by several stakeholders, as well as in empirical research (VATT Institute for Economic Research, 2020)
[25] Based on information collected during the stakeholder consultation.
[26] Based on information collected during the stakeholder consultation.

	☐ Moderate
	☒ Difficult
	☐ Very difficult
	Justification:
	During the stakeholder consultation, several participants noted that tax breaks are politically sensitive. In some countries, cutting VAT would require strong supporting evidence for the measure. However, it is a measure that can be implemented in almost any country, as it does not rely on cultural or geographical characteristics.
Relevance of EU-level legislation	In line with independent fiscal regimes across EU countries, this measure could be considered by each Member State separately. The EU has the competence to legislate indirect taxes, e.g., by setting minimum values for VAT. It could hence take initiatives in this direction. EU Regulation of taxation however is subject to unanimity rules in the Council and is hence notoriously difficult to regulate at EU level.

Table 4-4 Policy example #3: government support for the development of craft centres

Policy measure	Government support for the development of craft centres
Country	The Netherlands
Geographical scope	National (but implemented at municipal level)
Sector coverage	All goods (or parts thereof) that can be reused, repaired, or refurbished
Governing body	Ministry of Infrastructure and Water Management (Rijkswaterstaat)
Policy objective	The aim of the programme is to have a nationwide network of circular craft centres in the Netherlands by 2030, thereby promoting reuse and repair (Circulair Ambachtscentrum, n.d.). The craft centres can enable municipalities to develop a spatial policy that cleverly situates various CE initiatives with respect to one another, for example, recycling points, second-hand shops, and repair shops. It is also the aim to train people to extend the lifespan of products (Ministry of Infrastructure and Water Management, 2019).
Entry into force	Subsidies were granted for the first time in 2019
Description of the measure	The programme is a featured part of the Circular Economy Implementation Programme 2019-2023, which targets five key priority areas, including consumer goods. The programme is featured part of the Dutch Circular Economy Implementation Programme 2019-2023, which targets five key priority areas (Ministry of Infrastructure and Water Management, 2019). The circular craft centre programme consists of a subsidy made available to circular craft centres around the Netherlands. Circular craft centres combine multiple functionalities such as recycling (or collection for recycling), thrift shop, repair, and education, so that items and materials remain in use longer and unnecessary dumping and incineration is prevented (Circulair Ambachtscentrum, n.d.). For example, bulky household waste can be brought to a recycling centre, and, after sorting, the waste can be reused, refurbished, or certain parts or materials can be used to make other products (Circulair Ambachtscentrum, 2021).
	The Ministry of Infrastructure and Water Management works together with various parties to implement the programme. This includes the Dutch Recycling Industry Association (BKN), the Association of Dutch Municipalities (VNG), the Dutch Association for Waste and Cleaning Management (NVRD), and the Repair Café Foundation.
	In 2020, the Ministry of Infrastructure and Water Management made available a subsidy amounting to €50,000/centre for 22 centres, reaching 44 municipalities (NVRD, 2020).
Point(s) of action in the consumer decision-making journey	➢ Purchase stage (P1): purchasing refurbished, remanufactured, or second-hand products or materials; ➢ Use stage (U1): maintaining products for longer use; ➢ Use stage (U2): donate or share products no longer used with those who may use them more;

	➢ Disposal stage (D1): repairing or refurbishing damaged products (extending product lifespan); and, ➢ Disposal stage (D2): proper disposal, donation, or selling for parts.
Drivers, barriers, or lock-ins targeted	This policy measure stimulates and supports the development of circular craft centres, which combine various functions that contribute to the CE. This enables synergies between different businesses and circular activities, which helps business owners (or NGOs), as well as consumers. It tackles drivers and barriers related to the fit between needs and offering, namely making available infrastructure that can deliver circular solutions. It also offers consumers the opportunity to learn about maintenance, repair, refurbishment, as well as alternatives to landfilling and purchasing new items. Finally, it creates real-life interactions between people, exchanging ideas and services. This community aspect can drive behaviour and can elicit positive emotions associated with circular behaviour.
Anticipated effectiveness of the policy measure in stimulating consumer behaviour (according to the EAST principles) (BIT, 2014)	☒ Easy ☒ Attractive ☒ Social ☐ Timely Explanation: The concept of circular craft centres creates a synergy between various circular activities, thus, making it easier for consumers to get the most out of their visit to a particular centre. This multiplies the benefits that visitors obtain from taking part in circular activities, and can appeal more to them in the future, thereby making the centres more attractive. As the chair of the Consumer Goods Transition Agenda states when talking about La Poubelle, a registered apprenticeship company with a second-hand shop, "once you've been to La Poubelle, you'll never buy something new again" (Ministry of Infrastructure and Water Management, 2019). Furthermore, the circular craft centres create a community of people willing to share experiences and practices and promote social cohesion (Circulair Ambachtscentrum, n.d.; Panteia, 2019). • A 'community of practices' for sharing experiences
Empirical evidence of ex-ante effectiveness	The Ministry of Infrastructure and Water Management has explored the potential of circular craft centres through a series of studies, which can be found on the programme's website. This includes exploring the social dimension of circular craft centres and their potential to stimulate circular behaviour and generate employment (Panteia, 2019). The Circular Economy Implementation Programme 2019-2023 mentions that circular craft centres are expected to become "lively places" with a lot of activity (Ministry of Infrastructure and Water Management, 2019). The latter also highlights the initiative's complementarity with other policies such as the "From Waste to Resources" initiative (VANG) and broader climate objectives. An example of a prize winner is Mooi Werk Nijmegen, where various parties work together exploring and testing what is and what is not possible in terms re-using and upcycling materials such as wood. The project started by looking at the sorting stream of (residual) wood going to recycling. Together with local woodworkers and students, the team examined what the residual "waste" can be used for (especially hardwood, spruce, and various panel materials. They looked into what is required in terms of treatment, processing, and logistics, and whether a feasible business model can be made out of it.
Empirical evidence of ex-post effectiveness	Various studies can be found on the programme's website. For example, at the end of 2019 (the first year of implementation), the Ministry of Infrastructure and Water Management commissioned a study looking into the effects of the circular craft centres. Results show that circular craft centres are able to raise awareness about circularity and closing material loops (Antea, 2020). They offer numerous professional and didactic options for different target groups, including university students carrying out practice-oriented assignments; and, they create employment opportunities.

	In total, the Ministry supports 32 initiatives in 59 municipalities, with a total of 4.8 million inhabitants (NVRD, 2020).[27]
Transferability of the measure to other countries and regions	☐ Very easy ☐ Easy ☒ Moderate ☐ Difficult ☐ Very difficult <u>Justification:</u> The measure can be transferred to other countries, but its success may be dependent on the existence or availability of recycling centres, second-hand shops, repair professionals, etc. that can work together. Furthermore, cultural barriers and safety concerns may be stronger in other European countries. For example, during the consultation, experts from Lithuania and Ireland raised concerns about the safety of products (waste) that comes into craft centres and that need to be handled by staff. However, there is scope for countries to share experiences on this front.
Relevance of EU-level legislation	Similar subsidies can be made available at EU level (e.g., through EU funding instruments). Moreover, the EU could, for the sake of preserving the integrity of the internal market in repair services (prevention of State Aid), place conditions on public support to craft centres, such as conditions on the nature of the activities (e.g., inclusion of the knowledge, competence transfer), on the qualification of personnel or on the sharing of experience and know-how.

Table 4-5 Policy example #4: circular economy teaching for all levels of education

Policy measure	Circular economy teaching for all levels of education
Country	Finland
Geographical scope	National
Sector coverage	Education
Governing body	The Finnish Innovation Fund (Sitra)
Policy objective	The measure aimed to challenge the educational sector to think about the future through a CE lens and to build a knowledge base around the CE. Sitra explains that efforts must be made to ensure that every sector has experts in the CE, trained in lifecycle thinking, extensive cooperation, and who understand that economic growth in a CE is not dependent on the consumption of natural resources (Sitra, n.d.). Future experts could be able to combine CE expertise with their own competences.
Entry into force	The project began in 2017 and ended in 2019
Description of the measure	Sitra funded a variety of learning material, tools, and training programmes together with over 50 schools, universities, educational organisations, and companies. The projects were funded between 2017 and 2019. For example, the University of Helsinki developed a six-week course on the "temporary use of empty spaces in regional development" that was part of the bachelor's degree in geography and the working life studies programme. The course was open to all undergraduate students at the University of Helsinki and Aalto University (Sitra, n.d.). Another example is a guide and toolkit on methods for teaching CE, developed by Turku University of Applied Sciences (Turku University of Applied Sciences, 2020). The material introduces three methods for teaching circular economics, suitable for anyone working with students in higher or secondary education. The material is open to the public and available here. Sitra's website presents an overview and description of all projects that received funding.

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[27] This is based on the prize winners from 2019 and 2020.

Point(s) of action in the consumer decision-making journey	This measure tackles all points of action in the consumer decision-making journey, as it provides education and training on the CE thinking, more generally, as well as tailored to different domains (depending on the profile of the educational organisation).
Drivers, barriers, or lock-ins targeted	The funding programme encourages knowledge creation and dissemination, targeted at the educational sector. The latter has the ability to reach an important share of the population and can improve the availability and accessibility of information used for choice, which is often a barrier for consumers. Education also brings people together, making learning about the CE a social activity. This can impact social drivers or barriers of circular choices by creating a community of trained members. Over the long-term, Sitra hopes that when today's school pupils are ready to enter employment, they will have a circular mindset and the CE will be the only way of operating (Sitra, n.d.). As such, education has the ability to change preferences and beliefs in the long run.
Anticipated effectiveness of the policy measure in stimulating consumer behaviour (according to the EAST principles) (BIT, 2014)	☒ Easy ☐ Attractive ☒ Social ☒ Timely Explanation: Sitra's programme stimulates the development of learning and teaching material, making it easier for the educational sector to disseminate information and knowledge. It equips teachers, professors, as well as students to develop circular thinking, making it easier to understand and apply circular behaviour. Given the setting of educational organisations, most (or all) projects funded involved a social dimension, thereby enabling collective action and encouraging behaviour to spread peer-to-peer. Furthermore, providing learning and teaching material to students already part of the educational system and likely to be receptive to acquiring more information is a timely prompt.
Empirical evidence of ex-ante effectiveness	No evidence was found.
Empirical evidence of ex-post effectiveness	Sitra's website provides some numbers on the reach of their programme. Overall, the learning material and courses developed reached over 70,000 students all around Finland. Sitra also collaborated with a wide variety of educational organisations (+50) throughout the funding period, meaning that students at all levels of education were impacted by the measure.
Transferability of the measure to other countries and regions	☒ Very easy ☐ Easy ☐ Moderate ☐ Difficult ☐ Very difficult Justification: Funding knowledge development and sharing can be implemented in other European countries, provided funds are available for this type of activity. The actual work around creating learning/teaching material lies with the educational organisations in each country. Cross-country learning can also help boost this type of initiative, as material that has already been developed in one country can be used by practitioners in other countries.
Relevance of EU-level legislation	Although this measure can be stimulated at EU level (e.g., by providing funds or learning material that all EU countries can use), there is no legal possibility to make it a mandatory legislation, because education is an exclusive responsibility of Member States (and even of Regions in some of them such as Germany). However, in the long-term, the EU could benefit from having a common and well-distributed understanding of the CE.

Table 4-6 Policy example #5: improved waste labelling based on the Danish national waste pictogram system

Policy measure	Improved waste labelling based on the Danish national waste pictogram system ♻
Country	Lithuania
Geographical scope	National
Sector coverage	Municipal waste
Governing body	The Nordic Council of Ministers in Lithuania and the public institution "Mes Darom", in partnership with the Ministry of Environment
Policy objective	The objective of the initiative is to implement the Danish national pictogram system for sorting household waste, currently used in most Danish municipalities, in Lithuania. This should promote better waste disposal and sorting amongst Lithuanian consumers.
Entry into force	Forthcoming
Description of the measure	Mes Darom partnered with the Nordic Council of Ministers and the Lithuanian Ministry of Environment with the aim to implement a uniform marking system on waste bins, using the same pictograms that are used in Denmark (see examples in the image below). *Source : Mes Darom (n.d.)* The Danish national waste pictogram system was developed in 2016, and is currently used in most Danish municipalities, as well as in Sweden (Mes Darom, n.d.). The system will also become operational in Finland, Norway, and Iceland in the near future. Latvia and Estonia are exploring the possibility of introducing a Danish waste labeling system in their countries (Nordic Council of Ministers Office in Lithuania, 2021). The basic principle of the system is that both the packaging and the container to which the packaging must be sorted should be marked with the same symbol. The symbol on the packaging ensures a visual connection between the item of waste (i.e., the empty packaging) and the waste container, making it easier for the consumer to sort waste. The system, thus, requires the participation of producers, importers, municipalities, waste managers, and the public alike. Each icon consists of three recognisable elements: a colour, a symbol, and the name of a specific waste category at the bottom. Different icons can be paired together to describe a specific part of the waste – this is called the Lego concept (Mes Darom, n.d.). It provides flexibility for the system, taking into account different local options like the possibility to dispose of different waste categories in one container. Based on a survey of experts and Lithuanian residents, about 30 icons have been selected for implementation in Lithuania. Lithuanian adaptations of these icons are being prepared and will be sent to Denmark and Sweden for final approval, ensuring system coherence and global icon recognition (Nordic Council of Ministers Office in Lithuania, 2021). Once the selected pictograms have been approved, Lithuania will organise a publicity campaign and set up a website to inform residents about the new labelling system.
Point(s) of action in the consumer decision-making journey	➢ Disposal stage (D2): proper disposal of household waste.

Drivers, barriers, or lock-ins targeted	The measure should reduce barriers related to information and knowledge, as well as the availability of infrastructure that can deliver circular solutions (in a more effective way than the status quo). According to the Nordic Council of Ministers Office in Lithuania (2021), surveys show that about half of the country's population does not sort household waste because people are not sure where to throw waste and the system seems too complicated. Moreover, sorting systems between municipalities differ greatly.
	The Ministry of Environment expects that the pictogram system will provide more clarity to the population and will unify the way waste management is communicated across the country (Nordic Council of Ministers Office in Lithuania, 2021). This is expected to make information and education on proper waste sorting more convenient and efficient.
Anticipated effectiveness of the policy measure in stimulating consumer behaviour (according to the EAST principles) (BIT, 2014)	☒ Easy ☐ Attractive ☐ Social ☐ Timely Explanation: The pictogram system will facilitate waste sorting for households and consumers by making it easier to identify where to throw their waste. The colour icons placed on packaging match the icons on the containers, making sorting simpler, more intuitive, and less knowledge-intensive (Nordic Council of Ministers Office in Lithuania, 2021).
Empirical evidence of ex-ante effectiveness	The project of adapting the Danish labelling system to the Lithuanian context began in February 2021, with a series of consultations, workshops, surveys, and visual design exercises (Mes Darom, n.d.). Surveys showed that a large share of the Lithuanian population does not know how to dispose of waste correctly, and finds the current sorting system confusing. After consulting with waste-sector experts and the Regional Waste Management Centres, a survey was presented to municipalities and residents. The majority of respondents (90%), both professionals and residents, welcomed the new system (Nordic Council of Ministers Office in Lithuania, 2021). In congruence with the results of the survey, the Ministry of Environment believes the new system will encourage the population to properly sort waste.
Empirical evidence of ex-post effectiveness	The measure has not yet been implemented in Lithuania, but has been successful in Denmark and Sweden. Starting out as a voluntary initiative, 91 out of 98 municipalities in Denmark adopted the system by 2020, making it the national sorting system (Nordic Council of Ministers Office in Lithuania, 2021). The system is based on broad public involvement and on the best practices of previous pictograms used by municipalities, as such, it is expected to be successful in Lithuania as well.
	Similar to Denmark, the use of the system will be voluntary in Lithuania, so one of the key indicators of the success of the project will be the active and voluntary involvement of all relevant stakeholders (Nordic Council of Ministers Office in Lithuania, 2021).
Transferability of the measure to other countries and regions	☐ Very easy ☐ Easy ☐ Moderate ☒ Difficult ☐ Very difficult Justification: According to Mes Darom (n.d.), many of the municipalities consulted saw the benefits of the pictogram system, but considered there are many challenges to implementation in the short-term. The system requires sufficient engagement of all stakeholders involved (e.g., producers, municipalities, waste managers, consumers). Different interests need to be considered as well – for example, it might be costly to implement a new system if recent investments have been made in the sorting and collection system in certain municipalities. More generally, costs (e.g., of placing icons on packaging and containers) can be seen as a barrier to implementation in some countries. As

	such, there needs to be a general willingness of stakeholders to adopt such a system.
	However, the system in itself is designed to be flexible and adaptable to different circumstances and recycling abilities, as demonstrated by the Lego concept described above.
Relevance of EU-level legislation	The pictogram system has already been implemented in several Nordic countries, and will be partly implemented in the Baltic region. Lithuania wishes to set an example for the rest of Europe and considers that the system could be applied throughout the EU (Nordic Council of Ministers Office in Lithuania, 2021). This would establish a common and uniform understanding of waste sorting in all EU countries.

4.3 Lessons learned

The stakeholder consultation and subsequent analysis show that many policies today lean on information- or awareness raising initiatives to encourage behavioural change. This was the main type of initiative that resulted from the targeted consultation, followed by education and training, and labelling initiatives or indices. Together these policies made up over half of the policy examples shared by participants. These categories of policies aim to provide more and/or better information to consumers, and particularly when purchasing new products (e.g., on product sustainability) or discarding old products (e.g., on sorting practices).

In addition to policies aimed at improving information and knowledge of circular practices, another important group of policies provide financial incentives or resources to businesses to improve the "needs, offering, and availability" of circular options in the long-term. As noted above, these policies are considered to indirectly impact consumers by improving product/service offering. However, it remains unclear how much of the benefits from these measures will actually be passed on to the consumer in the future.

As behavioural policies can be distinguished by the level of intervention in people's lives, it can be argued that most policies aiming to influence circular behaviour are not very imposing. Only 13% of measures shared through the targeted consultation referred to "legal targets, standards, restrictions" (see Annex A2), with an even smaller percentage focused strictly on restrictions. In fact, many of the examples in this category indirectly target consumers by e.g., regulating aspects of food shelf life to reduce food waste or altering hygiene requirements to promote the re-use of packaging. Other examples include recycling and collection targets and bans on single-use plastics (derived from the EU's Single-Use Plastics Directive). As such, it can be observed that influencing consumer behaviour through a high degree of 'interventionism' (i.e., bans on specific products) is less common in the CE sphere.

Moreover, there is a clear opportunity to diversify policies and to target new (less explored) areas of a consumer's decision-making journey, as well as different drivers and barriers. For example, with the exception of a few tax incentives, few policies directly target economic factors. Sweden's example of a tax break on repair services (Table 4-3) illustrated an attempt at driving the price of repair down, but experts doubt the effectiveness of such a measure. In an attempt to stimulate repair by targeting economic factors, Austria is planning to provide vouchers for repair services (see notes from the webinar in Annex A2). This measure has the potential to tackle the issue of expensive labour in Europe more than tax cuts currently do. However, it is yet to be seen how effective the measure will be.

Beyond the observations described above, some lessons learned that can be drawn from the targeted stakeholder consultation are:

- Policy-makers seems to be less familiar with certain factors, consumer features or areas of the decision-making journey (e.g., knowledge about product maintenance, personal values, social norms, access to infrastructure). More evidence can be collected on these with the aim to develop a more diverse range of policy initiatives, grounded on targeted research. For example, Ireland is experimenting with tailored communications with the help of behavioural pilots.

- The repair sector could use more stimulation, either through economic incentives (vouchers) provided to consumers or subsidies provided to repair centres and professionals. Examples of these type of initiatives were provided during the consultation.
- In terms of innovative policies, some countries are experimenting with making festivals and large events more sustainable (e.g., by encouraging the use of reusable cups and cutlery). Events can also be used as a way to divert attention away from consumption, towards other means of getting satisfaction out of everyday life.

These lessons have been considered in Chapter 5.

5 Options for promoting circular behaviour

5.1 Policy objectives

In 2015, the EU introduced its first Circular Economy Action Plan (CEAP), whose mission was to **"close the loop"** in the EU's economy. In this document, the CE is described as a system in which "the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised" (European Commission, 2015). In the new CEAP, the EU's CE ambitions are described as a "transition towards a regenerative growth model that gives back to the planet more than it takes, advance towards keeping its resource consumption within planetary boundaries, and therefore strive to reduce its consumption footprint and double its circular material use" (European Commission, 2020). As far as consumers are concerned, the CEAP acknowledges that choices made by consumers can support or hamper the CE, and outlines the bottlenecks that may stand in the way of circular behaviour, namely, access to information, range of circular products, and prices (European Commission, 2015).

Consumer empowerment is seen as having significant value in the transition to a CE. To encourage repair and restoration, the Commission is working towards establishing citizens' "right to repair", including new horizontal material rights for consumers (e.g., availability of spare parts, access to repair, upgrading services) (European Commission, 2020). Both the CEAP and the European Green Deal recognise repair as a circular activity critical to improving overall material savings. Efficiency approaches that only consider narrowing resource loops without addressing the time dimension can easily lead to further speeding up linear resource flows (e.g., by selling more of more efficient products) (Bocken, de Pauw, Bakker, & van der Grinten, 2016).

To enhance the **participation of consumers** in the CE, future legislative plans aim to ensure that the EU consumers receive trustworthy and relevant information on products, including on their lifespan, repairability, re-usability and recyclability, and on the availability of repair services, spare parts and repair manuals (European Commission, 2020). Consumers will also be protected against greenwashing and premature obsolescence (European Commission, n.d.).

5.2 Potential policy options

In this chapter, we will consider each of the categories of factors that influence the decisions of consumers, as identified in § 3.2. They will be approached in this order, as this order also is that decreasing susceptibility to public policies:

1. Economic factors;
2. Fit between needs and offering;
3. Information used for choice;
4. Social factors;
5. Preferences and beliefs.

Based on the results of this study and the feedback obtained from Member States experts, we will provide and justify, for each category of factor, the set of public policies that we consider as potentially the most effective and efficient to drive the behaviour of consumers towards more circular choices.

5.2.1 Economic factors

The main barriers that we identified as amenable to public policy are:

- [P]: [Perceived] high upfront price of products with circularity features, uncertainty about lifetime costs;
- [U]: [Perceived] cost of repair.

Potential policies best placed to address these barriers are discussed below.

Policies affecting the [perceived] upfront price

Here we consider the policies aimed at decreasing the price of circular alternatives and/or increasing the price of linear alternatives. Circular solutions tend to be more expensive than linear ones, at two

key stages in the decision-making process of consumers: upon purchase [P]; when the choice is to be made between repairing a product and replacing it with a new one [D1], as exposed in Box 3.2 above.

Policies to address this barrier can include taxes on resource intensive materials and products (e.g., carbon pricing), increases in the price of virgin and carbon-intensive products, turning items that are produced with secondary materials or less carbon intensive processes more economically attractive for consumers (Bäunker, 2020), subsidies for certain activities and loan programmes.

Upon **purchase [P]**, public policies have a limited scope available for reducing the price of circular goods, as they can only act on consumption taxes (such as VAT), which remain a rather low share of the total price, often too small to compensate for the often large price gap between circular and linear products. On the other hand, we recommend that they use the free hand they have regarding **increasing the price of linear goods**, by applying specific taxes to them. An example of such taxes on linear goods is the tax introduced in June 2021 by the UK government (of GBP 200 / tonne) on plastic packaging containing less than 30% recycled content[28].

Table 5-1 Taxation favouring circular alternatives

Policy measure	Taxation favouring circular alternatives
Policy objective	Favour purchase of circular products and of repair
Description of the measure	This family of measures can aim to reduce taxes for circular alternatives (e.g., VAT exemptions or reductions for repair services) or impose additional taxes/levies to linear alternatives (e.g., tax on non-recycled plastic packaging, or on virgin materials).
How the measure stimulates behavioural change	This family of measures can impact consumer decisions directly, through the reduction of the perceived differences in prices between circular and linear alternatives. It can be implemented at purchase stage (when comparing two products) and use stage (when comparing repair to acquiring new product).
Anticipated effectiveness	Potentially limited, due to (i) the restricted domain of action (e.g., if VAT is 10%, the impact on final prices may not be visible) and (ii) if businesses adjust the prices in response to this measure (e.g., repair shops charge a higher margin, with no impact on final price for consumers). ☒ Easy ☒ Attractive ☐ Social ☐ Timely
Ease of implementation	Can be challenging from administrative point of view. The imposition of taxes on virgin materials / on products with insufficient recycled content requires some EU-wide coordination to prevent tax avoidance, as well as border adjustment measures (analogous to those envisaged for GHG emissions).
Implementation across countries/ regions/ EU	This measure could be implemented by each MS/region, according to own fiscal policy.

When **choosing between repair and new products [D1]**, the tax break approach appears insufficient to reduce the price of repair sufficiently to compensate the price difference. Another alternative is depicted by the approach taken by the Austrian and the regional Thuringia governments, or in France to repair bicycles[29], namely, to **subsidise repair activities**, for a given share of the repair costs, and up to a fixed limit per person and per year. Similarly, a targeted **environmental subsidy** approach can be taken to support the **purchase** of circular products, in a way analogous to subsidies for the purchase of electric (or, more generally, low-emissions) cars.

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[28] Finance Act 2021, chapter 26, of the United Kingdom, https://www.legislation.gov.uk/ukpga/2021/26/enacted
[29] Conclusions of the operation "Coup de pouce vélo" of 2020 – 2021, leading to the repair of 1.7 million bicycles https://www.coupdepoucevelo.fr/Bilan%20CDPV.pdf

Table 5-2 Subsidies for circular alternatives

Policy measure	Subsidies for circular alternatives
Policy objective	Favour purchase of circular products and of repair
Description of the measure	This family of measures aim to reduce the purchasing price for the consumer of circular alternatives (products or services such as repair) by having a public body directly bearing a fraction of the cost of the operation, e.g., in the form of vouchers for a fixed amount, or of reimbursement of a fraction of the price (up to an upper limit)
How the measure stimulates behavioural change	This family of measures can impact consumer decisions directly, through the reduction of the perceived differences in prices between circular and linear alternatives. It can be implemented at purchase stage (when comparing two products) and use stage (when comparing repair to acquiring new product).
Anticipated effectiveness	Potentially strong, as public subsidies generally get important media attention, and as consumers are strongly influenced by short-term price bargains. ☐ Easy ☒ Attractive ☐ Social ☒ Timely
Ease of implementation	The main challenges lie in: • The financial burden for public bodies' budgets; • The risk of market distortion.
Implementation across countries/ regions/ EU	This measure could be implemented by each MS/region, according to own budget policy.

Another potential way to reduce the perceived price of circular alternatives is to target upfront price via loan programs at reduced (or even zero) interest rate, especially effective for products with high upfront prices as electronics or household equipment. This could remove the need to mobilise the finance at the purchase stage, and would potentially help consumers to smooth their spending. This is especially relevant when the total cost of ownership (TCO) of circular alternatives is lower than the TCO of linear ones, but the high initial purchase price puts consumers off.

Table 5-3 Loan programmes at reduced interest rates for circular products

Policy measure	Loan programmes at reduced interest rates for circular products
Policy objective	Reduce the upfront cost of circular solutions, specifically for low-income households
Description of the measure	Banks provide loans at a reduced (or even zero) interest rate for the purchase of a product with certified circularity features. The difference in interest rates between the one provided to the consumer and the market value is borne by the public budget.
How the measure stimulates behavioural change	The measure makes circular products more affordable to low-income households, by enabling them to overcome the hurdle of a higher upfront price.
Anticipated effectiveness	☐ Easy ☒ Attractive ☐ Social ☒ Timely
Ease of implementation	This measure depends upon the willingness of commercial banks to distribute such subsidised loans, specifically considering that low-income households often are considered by them as a market segment with limited attractiveness.
Implementation across countries/ regions/ EU	This measure could be implemented by each MS/region, according to own budget policy.

Policies affecting the uncertainty about lifetime costs

Consumers often choose an alternative in favour of other based on erroneous assumptions. Providing clarity on what these assumptions could be helpful for decision-making. Such policies include provision of lifetime or life-cycle costs.

Another means to reducing the difference between the high upfront costs of long-lasting circular goods with those of short-lived linear ones could be to **mandate the display of the life-cycle cost of durable goods**, e.g., the price per cycle of a washing machine, or that of 10,000 hours of lighting (not including the price of energy, which is the purpose of the energy labelling). Just as the display of the price per kg or per litre of consumable goods is currently mandated so as to enable a fair comparison between large and small packages, such a display enables a fair comparison between longer-life products, which have a higher up-front cost because they are better designed and made of higher-quality materials, and shorter-lived ones. By displaying such information, consumers may be 'nudged' to pay attention to it, which also includes the likelihood of them using it in their purchase decisions.

Table 5-4 Display of Life-Cycle Cost

Policy measure	Display of Life-Cycle Cost
Policy objective	Enable a fair comparison between longer-life, circular products, which are often with a higher upfront cost, and shorter-life, linear products.
Description of the measure	The price tag of the product shall contain, in addition to the upfront price: • The lifetime of the product, in units relevant for the product use (e.g., number of cycles of a washing machine, number of hours of light for a lamp); • The cost of the product per unit of usage, based on the upfront price and this lifetime.
How the measure stimulates behavioural change	This measure enables the consumer to have a more complete, and more long-term appreciation of the economic cost of owning the product, over its whole life-cycle.
Anticipated effectiveness	☒ Easy ☒ Attractive ☐ Social ☐ Timely
Ease of implementation	This measure requires the reliable computation of the product lifetime, according to standardised metrics and procedures. This is technically demanding, but yet routinely performed by whole industrial sectors manufacturing equipment goods, so that a form of transfer of competences would be needed towards the sectors manufacturing consumer goods.
Implementation across countries/ regions/ EU	This measure could be implemented at the scale of the whole European Union, as it addresses the labelling of products that circulate freely within the EU internal market. Initiatives at Member State level are also possible.

5.2.2   Fit between needs and offering

The main barriers that we identified as amenable to public policy are:

- [P]: [Perceived] low availability of products with appropriate circularity features;
- [U]: [Perceived] Low availability of spare parts / consumables for the preventive maintenance/care of the product; Low availability of an easily accessible and competent repairer; Long waiting time before receiving the repaired product;
- [D]: [Perceived] inconvenience of taking the product to a second-hand shop/waste disposal facility.

Potential policies to address these barriers are discussed below.

The availability of circular options to consumers, at all stages of the lifecycle of a product, is a key constituent of behavioural change. The policies that can help overcome these barriers are eco-design requirements, increase of offering for quality repair, making available a replacement product for the duration of repair, obligations to take back for retailers/ producers,.

Policies aimed at producers

In this respect, the imposition of eco-design requirements for the durability, maintainability, repairability, upgradability and recyclability of goods, as foreseen in the **Sustainable Product Initiative (SPI)**, is seen as a good option.

Table 5-5 Eco-design requirements

Policy measure	Eco-design requirements
Policy objective	Make products with high circularity features available on the EU internal market as the norm
Description of the measure	Impose requirements on the durability, maintainability, repairability, upgradability and recyclability of goods, and on the availability of spare parts/consumable for the maintenance/care/repair of the products.
How the measure stimulates behavioural change	The measure imposes that only products with levels of durability, maintainability, repairability, upgradability and recyclability above a given threshold are available on the EU internal market, and hence forces consumption to adapt to purchasing these products. It also imposes that the means are made available to the public and to professional maintainers/repairers of products for them to maintain and repair products efficiently and at the right level of quality.
Anticipated effectiveness	☒ Easy ☐ Attractive ☐ Social ☐ Timely
Ease of implementation	Requires the definition of technical specifications for each of the circularity features foreseen (durability, maintainability, repairability, upgradability and recyclability), for each product group. This is a considerable technical, normative and legislative effort.
Implementation across countries/ regions/ EU	This measure is preferentially implemented at the level of the EU, as part of the Sustainable Product Initiative (SPI).

The economic players having the largest capacity and competence to make productive use of end of life products (preparing for re-use, upgrading, re-manufacturing, re-use of parts, recycling of materials) are the manufacturers themselves, as they know how products have been manufactured, the purpose of each part, the materials used and the reasons why they are used. They are conveniently present at the point of sale where the consumer is purchasing their new product following the end of life of the previous one. They are, thus, best placed to take back the product at the end of its life. However, take-back obligations alone do not guarantee proper management. Complementary targets and minimum requirements for recycling and handling can make take-back schemes more successful.

Table 5-6 Take-back obligation for producers and sellers and requirements for end-of-life management

Policy measure	Take-back obligation for producers and sellers and requirements for end-of-life management
Policy objective	Ensure that consumers can dispose of their end-of-life product easily, at a place where it will be processed in a technically and environmentally sound way
Description of the measure	Create the obligation for producers and sellers of products to take back their products at the end of life, specifically in the points of sale of new products. This obligation can be performed by a pool of producers and sellers, under a dedicated legal entity, under the model of Extended Producer Responsibility (EPR) schemes. These take-back obligations are complemented by requirements placed on the handling of the end-of-life products by the producer/seller, to ensure proper re-use of components and of materials.
How the measure stimulates behavioural change	This measure ensures that consumers have an easy and convenient means to dispose of end-of-life products, with an assurance that these products will be processed in a technically and environmentally sound way
Anticipated effectiveness	☒ Easy ☐ Attractive ☐ Social ☒ Timely
Ease of implementation	This requires manufacturers in a given sector to organise themselves to collect the end-of-life products and to set up the infrastructure to process them appropriately, either at centralised units or after sorting and distribution of products back to their original manufacturer.
Implementation across countries/ regions/ EU	This measure can be implemented at national level, as a generalisation of Extended Producer Responsibility (EPR) schemes.

Increasing the availability of maintenance and repair options

To increase the availability of maintenance and repair options, the Dutch model provides an example of **public support** for **integrated Circular Crafts Centres**. Thereby, each consumer is provided with a high-quality offering for repair, re-use and upgrade of their products in their vicinity. The approach taken of a national network (which can be extended at the scale of the EU) has the additional benefit of mutual learning and of collective increase in the competence level.

Table 5-7 Subsidy for a regional / national network of Integrated Circular Crafts Centres

Policy measure	Subsidy for a regional / national network of Integrated Circular Crafts Centres
Policy objective	Making high-quality maintenance and repair options available to all citizens
Description of the measure	Subsidise the start-up phase or the running costs of Integrated Circular Crafts Centres (ICCCs) of certified quality providing the public with services of maintenance and repair of goods, of training in these crafts and of research and innovation in maintenance and repair methods. In this case, only centres of appropriate quality and professional capacity, as measured by the compliance with a pre-defined quality and skills referential, would be subsidised. Subsidies would only be granted if the density of such ICCCs per inhabitant or per unit of surface is below a given threshold. Subsidies could be higher or be sustained longer (beyond the start-up phase) in areas of low population density. This public support can take the form of a public monetary subsidy, or of a non-monetary support, such as the low-priced provision by a local authority of spaces in publicly-owned buildings.
How the measure stimulates behavioural change	The measure stimulate the appearing of a dense network of places where consumer find all the resources they need to have their products maintained and repaired by professionals, or where they can learn the skills necessary to maintain / repair their products themselves.
Anticipated effectiveness	☒ Easy ☒ Attractive ☒ Social ☒ Timely
Ease of implementation	This measure constitutes a cost for public budgets at regional or national level. It also requires the set-up of a referential defining the quality features of an ICCC and the skills necessary to operate in it.
Implementation across countries/ regions/ EU	This measure can be replicated from the Dutch model, provided that the quality reference materials are made available to other countries.

In addition to the availability of maintenance and repair options, an additional obstacle to repair is that the product is no longer available to the consumer for the duration of the maintenance/repair operation. This period can be long and can entail a deterrent for engaging in maintenance/repair if the purchase of a new product is shorter. Making available a replacement product for the duration of maintenance/repair can overcome this issue.

Table 5-8 Obligation for making available a replacement product for the duration of maintenance / repair

Policy measure	Obligation for making available a replacement product for the duration of maintenance/repair
Policy objective	Ensure that the consumer is not deprived of the usage of their product over the duration of its maintenance/repair
Description of the measure	Producers/retailers or the maintainers/repairers would have the obligation of holding a stock of replacement products available for short-term use by the consumer in case of maintenance/repair. These replacement products would belong to the most simple models within each product category, so as to limit the diversity, and reduce the cost, of products to keep a stock of. In the case of the stock being held by the producer/retailer, this producer / retailer would have the obligation to make these products available to qualified maintainers / repairers with a certified professional capacity, potentially against a fee per unit of time. The maintainer / repairer would have the obligation to charge the consumer a fixed price for the maintenance / repair, independently from its actual duration.

Policy measure	Obligation for making available a replacement product for the duration of maintenance/repair
	This measure is inspired by the "courtesy vehicle" that some automotive repair companies make available to their customers for the duration of the repair.
How the measure stimulates behavioural change	Consumers would be more inclined to have their products maintained/repaired by qualified professionals, as they would have a full continuity of the availability of their product over the duration of the maintenance/repair. This continuity would be better than in the case of the purchase of a new product. The maintainer/repairer would be incentivised to perform its work in a short time frame, as the costs of rental of the replacement product or the cost of holding a larger stock of replacement products would be directly deducted from its profit & loss statement for the operation.
Anticipated effectiveness	☒ Easy ☒ Attractive ☐ Social ☒ Timely
Ease of implementation	The upkeep of a stock of replacement products per category is costly for the economic entity in charge of it, which is likely to cause opposition by these stakeholders. The provision of such a replacement product constitutes on the other hand a significant improvement in the quality of the maintenance / repair service, which may deserve being remunerated, and thus be considered as an opportunity by the sector. The overall balance is uncertain.
Implementation across countries/ regions/ EU	This measure could be implemented at national level, or at the scale of the whole EU.

5.2.3 Information used for choice

The main barriers that we identified as amenable to public policy are:

- [P]: Uncertainty regarding the durability/repairability/reliability/recyclability of a new product; uncertainty about the quality of a second-hand product.

Potential policies best placed to address these barriers are discussed below.

This area of public policy is the one in which most existing initiatives have concentrated, specifically regarding environmental labels, with an effectiveness that was questioned by the participants in the webinar. Policy options proposed include targeted communication campaigns and information provision for new and second-hand products).

Policies aimed at targeted communication

The current jungle of hundreds of competing labels of very contrasted environmental trustworthiness[30] is likely to be significantly reduced by the current initiative by the Commission on "substantiating green claims"[31].

As elicited in the stakeholder consultation, the Irish government has implemented **targeted communication campaigns**, aimed at specific consumer groups, with arguments that are relevant for them, such as long-term thrift for price-conscious households, image to younger, climate-conscious women or young men, or tradition and craftsmanship for elderly people. This has the potential to improve the effectiveness of awareness-raising activities.

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[30]The website www.ecolabelindex.com identifies 232 active environmental labels in the EU, among more than 450 world-wide.
Additional evidence on the reliability and comparability of labels can be found in: Milieu Consulting SPRL, IPSOS NV, (2021) "Environmental claims in the EU – inventory and reliability assessment" Report for DG ENV (unpublished)
[31] https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm

Table 5-9 Targeted communication campaigns

Policy measure	Targeted communication campaigns
Policy objective	Increase awareness of the existence of options for higher circularity among specific sub-populations of consumers
Description of the measure	Targeted communication campaigns, aimed at specific consumer groups, on the options for more circular consumption at all stages of the product lifecycle, with arguments that are relevant for them, such as long-term thrift for price-conscious households, image to younger, climate-conscious women or young men, or tradition and craftsmanship for elderly people.
How the measure stimulates behavioural change	The measure provides arguments for more circular consumption options to each category of consumers. These arguments are likely to have a double effect: (1) a direct effect of convincing the members of the targeted community; (2) an indirect effect of enhancing the social support received by a consumer of this community engaging in more circular practice, as it provides arguments that justify this practice in the eyes of their social environment (which generally belongs to the same segment of consumers). The consumer engaged in this circular practice is thus less likely to be isolated/segregated against because of their circular practice in their community, and more likely to be supported.
Anticipated effectiveness	☐ Easy ☒ Attractive ☒ Social ☐ Timely
Ease of implementation	This measure requires only limited resources from public budgets. It requires, however, a deeply thought-out design, with excellent knowledge of each targeted consumer group.
Implementation across countries/ regions/ EU	This measure can be implemented at regional or national level.

Policies aimed at information provision

The **mandatory display** of information on the **circularity performance of products**, such as repairability or durability, can help provide clear and unambiguous information. A positive example of this policy is the French repairability index. For the sake of the coherence of the EU internal market, the **metrics**, the **measurement methods** and the **labels** can be **unified** if a similar measure should ever be implemented at EU level, as is foreseen in the SPI.

Table 5-10 Display of circularity performance of products

Policy measure	Display of circularity performance of products
Policy objective	Ensure that consumers have a clear and trustworthy information on the circularity features of products
Description of the measure	Manufacturers and importers have the obligation to display on the product or on a label attached to the product the information relevant to its circularity performance (durability, maintainability, repairability, ease of reversible dis-assembly and re-assembly, upgradability, recyclability), measured long standard metrics and methods, and displayed under a standard format that is easy to understand
How the measure stimulates behavioural change	Consumers have access to a trustworthy and easy to understand information on the circularity benefits of the product, and can hence orient their purchase towards the most circular options. Studies with field tests show that consumers are willing to pay a price premium for longer-life or more repairable products, provided they are given reliable and easy-to-understand information[32]
Anticipated effectiveness	☒ Easy ☐ Attractive

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[32] LE Europe, VVA Europe, Ipsos, ConPolicy, Trinomics (2018) "Behavioural Study on Consumers' Engagement in the Circular Economy - Final Report", Specific contract No 2016 85 06 for the European Commission, DG JUST   https://op.europa.eu/en/publication-detail/-/publication/5de64de7-f9d3-11e8-a96d-01aa75ed71a1/language-en

Policy measure	Display of circularity performance of products
	☐ Social
	☐ Timely
Ease of implementation	This measure requires the definition of standard metrics, measurement methods and labels, for each of the circularity features considered (durability, maintainability, repairability, ease of reversible dis-assembly and re-assembly, upgradability, recyclability). This is a long process.
Implementation across countries/ regions/ EU	This measure can be implemented at national level (e.g., the French repairability index and label), but is preferably implemented at the scale of the whole EU Internal Market, as is currently foreseen in the Sustainable Product Initiative of the European Commission.

In case of second-hand purchases, receiving the product with an indication of expected remaining lifetime could be beneficial, as it alleviates the information asymmetry problem[33]. By enabling the seller to demonstrate a higher quality level, it also enables him/her to ask for a higher price, making the option of re-selling the product for re-use comparatively more attractive compared to discarding.

Table 5-11 Objective information on the quality and usability of used products

Policy measure	Objective information on the quality and usability of used products
Policy objective	Reduce the uncertainty of consumers purchasing used / second-hand products Increase the potential selling price of used products, and hence increase the attractiveness for the owners of used goods of making them available for re-use
Description of the measure	The measure includes three aspects: • The mandatory display of the total anticipated lifetime of the product, as per the measure described in Table 5-4 above; • The mandatory inclusion of a use-meter on the product, measuring its usage in the relevant units; • The mandatory attachment of a register of the maintenance and repair operations performed on the product.
How the measure stimulates behavioural change	The potential purchaser of the product has access to reliable information on the remaining lifetime expectancy of the product, and on its quality, so that they can afford to pay a higher price, instead of aligning on the price of the product with the lowest possible quality, as it would do in absence of information[34]. The owner of a product is incentivised towards performing the appropriate preventive maintenance operations on time, hence increasing its use lifetime, as this preserves the selling value of the product once no longer needed / wanted. The owner of a used product is stimulated to offer it as a used product on the second-hand market, as it can extract a higher price for it on the second-hand market.
Anticipated effectiveness	☒ Easy ☐ Attractive ☐ Social ☐ Timely
Ease of implementation	This measure requires the implementation of the Digital Product Passport foreseen in the Sustainable Product Initiative.
Implementation across countries/ regions/ EU	This measure is preferably implemented at the scale of the whole European Union, as it addresses technical features of, and information requirements for, products that circulate freely within the EU internal market. Initiatives at national level are also possible.

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[33] Akerlof, George A. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." The Quarterly Journal of Economics 84, no. 3 (1970): 488–500. https://doi.org/10.2307/1879431 .
[34] Akerlof, George A. Ibid.

5.2.4 Social factors, preferences and beliefs

Social factors, personal preferences and beliefs have hardly been addressed by public policies, because they are more difficult to change from the outside, as they appear to be essentially spontaneous.

The areas where we consider that public policy can play a role in supporting changes in preferences and beliefs are the following:

- Enhancement of attachment to products;
- Definition of social norms and examples;
- Positive feedback on achievements.

Policies enhancing the attachment to products

These policies increase the availability of products that need to be assembled at home, so as to encourage an emotional attachment of the consumer to the product (cf. "IKEA effect"). Home assembly options are likely to have the additional benefit of reducing price, as they suppress the final assembly operation in manufacturing, hence, saving costs. Even if the home assembly of products currently is most customary with furniture, this measure can be extended to many other categories of products, as it is based on the emotional attachment to products when the consumer has spent time assembling or repairing it.

Table 5-12 Enhancing the home assembly of products

Policy measure	Enhancing the home assembly of products
Policy objective	Increase the attachment of consumers to products by enhancing the share of products that the consumer assembles him/herself
Description of the measure	For some categories of products, mandate that they be delivered to the consumer dis-assembled into a limited number of parts, and requiring the consumer to perform the last assembly operations. This final assembly may use only reversible methods (such as screws). This would in addition have the benefits of: (1) forcing a modular design and hence an ease of repair by simple replacement of the faulty part, (2) proving that the product is indeed easy to assemble and dis-assemble reversibly, and (3) training the consumer to dis-assemble the product for maintenance / repair purposes.
How the measure stimulates behavioural change	The consumer has made a personal effort to assemble his/her product, and hence develops a sense of greater ownership of the product. S/he is less likely to dispose of it prematurely. The consumer has learnt how to assemble the product. S/he is more aware of how it is made, and of how to maintain / repair it.
Anticipated effectiveness	☐ Easy ☒ Attractive ☐ Social ☐ Timely
Ease of implementation	The price of the dis-assembled product is likely to be lower than that of the fully assembled one, because this last operation is not being paid for, so that the consumer may be more inclined to accept this policy.
Implementation across countries/ regions/ EU	This is a form of eco-design requirement that can be implemented at national level, but which would benefit from an implementation at the scale of the whole EU internal market.

Policies aimed at social norms and advertisement

Social norms are generally shaped by role models. Role models in society however are not created at random. They often are the outcome of publicity made around them in the media (including social media) and in massively consumed cultural goods, such as films. These role models in turn shape personal preferences, as they orient the aspirations and desires of consumers. The current role models are wealthy and rich individuals, whose consumption patterns are obscenely wasteful, and in no way

compatible with a generalisation in the current and future world where ecological constraints limit consumption.

Public policy in these fields touches very sensitive ground, as any intervention in the media or in the arts can easily be criticised as censorship. It is also very difficult politically, as the press and the media (including social media), play a determinant role in the fate of politicians in a democratic society.

Nevertheless, it may be possible to attempt some action in the direction of **regulating the share of advertising in the business models of the media**, including social media. When the business model of a media depends upon advertising, its real customers are those companies that sell products and services, and hence strive to increase the consumption of goods. The interests of the media, whatever the political position it claims to have, may, thus, be linked to increasing consumption, and cannot, structurally, support a behavioural model of frugality. The observation of the contrast in content and approach between the standard media and the minority (nearly) ad-free ones[35] is very revealing for this. For role models of frugal persons to be promoted and valued in the media, the economic interests of these media must be disconnected from those of companies and organisations that strive at increasing consumption.

This type of measure can be seen as radical, but it sheds lights on the root of the problem, namely the fact that our societies are "consumer societies", which are, since the 1950s at least, driven by an ever-increasing volume of material consumption – a trend that is questioned by the transition to CE.

Table 5-13 Regulating the share of advertising in the business models of the media and of entertainment

Policy measure	Regulating the share of advertising in the business models of the media and of entertainment
Policy objective	Facilitate the dissemination of role models of consumption sobriety in the media and in entertainment
Description of the measure	Place a cap on the share of the revenues of any media company (including social media), and of entertainment events (sports, concerts, movies, festivals) stemming from advertising under all its forms (explicit, corporate sponsoring, product placement, etc...).
How the measure stimulates behavioural change	The measure relieves the conflict of interest of media and entertainment companies (including social media) when reporting on or displaying role models that limit their consumption of new goods. It hence makes such role models more visible and more attractive to the general public.
	The measure also limits the cognitive dissonance of consumers between (1) cultural messages that claim to promote environmentally-grounded frugality in consumption and (2) the surrounding landscape promoting such a consumption.
Anticipated effectiveness	☐ Easy
	☐ Attractive
	☒ Social
	☒ Timely
Ease of implementation	This measure aims at the root of the contemporary consumption society, and at the business model of some of the most powerful media companies globally (specifically: of social media). It is thus likely to encounter harsh resistance.
	One argument in favour of this measure is that there is no such thing as a "right to life" for business models, only for humans.
Implementation across countries/ regions/ EU	Considering the foreseeable power of the opposition to this measure, it is probable that implementation at the level of the EU be most appropriate. However, restrictions on advertising for harmful goods have also been implemented at national level (e.g., on tobacco / alcohol).

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[35] Such as the German Tageszeitung https://taz.de/ or the French Mediapart
https://www.mediapart.fr/en/english

Policies aimed at feedback

Humans have an emotional need for encouragement and positive feedback when engaged in difficult endeavours. Public institutions can provide such encouragement, by measuring the collective progress of a population towards a goal related to circular economy, and making the results of this measurement visible to the population, accompanied by emotionally supportive messages, along the model of the Municipality of Copenhagen encouraging its population in its recycling efforts.

Table 5-14 Providing positive feedback on achievements towards circularity

Policy measure	Providing positive feedback on achievements towards circularity
Policy objective	Encourage the population in its efforts towards circular behaviours
Description of the measure	1. Measure the collective progress of the population under the responsibility of a public authority towards circularity targets (e.g., recycling rate, use of second-hand products) 2. Communicate publicly the achievements towards these targets, accompanied by emotionally encouraging messages
How the measure stimulates behavioural change	The measure creates a positive emotional atmosphere around the behavioural change of consumers towards circularity, and provides social support to that end
Anticipated effectiveness	☐ Easy ☒ Attractive ☒ Social ☐ Timely
Ease of implementation	This measure requires to set up a fast and accurate statistical measurement of indicators of the progress towards circularity targets. Beyond this statistical infrastructure, the measure requires only a limited public communication budget.
Implementation across countries/ regions/ EU	This measure can be implemented at local / municipal level and upwards.

5.2.5 Horizontal policy considerations

In all cases of policies being investigated, some common methodological aspects were underlined as contributing positively to success:

- Get evidence on effectiveness of policy options;
- Test interventions before implementation;
- Measure effectiveness after implementation.

6 Conclusions and perspectives

This report has performed a comprehensive overview of the **state of the art** regarding the **circular economy behaviour of consumers**, and of the **drivers**, **barriers** and **lock-ins** that affect the change of this behaviour towards more circular patterns (§ 3). It has resulted in several innovative concepts:

- A **decision tree** of the consumer along the lifecycle of the product, which identifies the loci where the decision should be oriented towards a more circular option (§ 3.1.0) – provided that this more circular option is indeed made available by the production system;
- A novel **framework to analyse the circular economy behaviour** of consumers (§ 3.4), which classifies these behaviours according to

    (1) The **category** of the driver, barrier or lock-in being considered, among the following:

    (a) Economic factors;

    (b) Fit between needs and offering;

    (c) Information used for choice;

    (d) Social factors, preferences and beliefs; and to

    (2) The **stage in the decision tree** (and hence: in the lifecycle) where this barrier, driver or lock-in takes place.

This report analysed circular behaviour in greater detail in two high-volume and high-impact sectors of mass consumption:

- **Clothing and household textiles** (§ 3.5.1) and
- **Consumer electronics** (§ 3.5.2).

This report also investigated the **good practices** from **national experiences** (§ 4), as collected via a survey of national circular economy experts within the Eionet and during a webinar with national practitioners. This exercise enabled to have an overview of existing policies, of those under development and of more forward-looking options, and to classify them. We identified that many policies tend to belong to one category, namely that of providing information to the consumer. However, some initiatives stood out as having a large potential for broader dissemination and are provided as more detailed examples (§ 4.2).

The report concluded with **14 policy options**, mainly but not exclusively based on the previous investigation, that address the four identified categories of drivers, barriers or lock-ins:

- Economic factors (§ 5.2.1):
    a. Taxation favouring circular alternatives;
    b. Subsidies for circular alternatives;
    c. Loan programmes at reduced interest rates for circular products;
    d. Display of Life-Cycle Cost;
- Fit between needs and offering (§ 5.2.2):
    a. Eco-design requirements;
    b. Take-back obligation for manufacturers;
    c. Subsidy for a regional / national network of Integrated Circular Crafts Centres;
    d. Making available a replacement product for the duration of maintenance / repair;
- Information used for choice (§ 5.2.3):
    a. Targeted communication campaigns;
    b. Display of circularity performance of products;
    c. Objective information on the quality and usability of used product;
- Social factors, preferences and beliefs (§ 5.2.4):
    a. Enhancing the home assembly of products;
    b. Regulating the share of advertising in the business models of the media and of entertainment;
    c. Providing positive feedback on achievements towards circularity.

This report is likely to contribute to the policy debate on the collective transitions of European societies towards more circular models, by considering the key role that **consumers** play. However, our key message is that, in order for consumers to choose the most circular option at each node of the "decision tree" that we developed, this option needs to exist in the first place, which is the responsibility of producers, and of public authorities, and it must be affordable, attractive, and convenient.

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Appendices

A1   Questionnaire

A1.1 Introduction

A **circular economy (CE)** is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems[36]. The **EU's Circular Economy Action Plan (CEAP)**, launched in 2020, aims to facilitate the EU's transition to a circular economy by establishing a new, regenerative growth model that gives back to the planet more than it takes, maintaining resource consumption within planetary boundaries, and minimising waste and pollution[37]. Europe's circular economy ambition provides a policy framework that aims to transform environmental policy in a comprehensive and systemic manner, in line with CE principles.

In this context, the **role of consumers** in enabling the transition has become more prominent. Consumer choices and feedback have the potential to affect decisions both upstream (e.g., in terms of material use or product design) and downstream (e.g., in terms of recycling or re-use).

The table below summarises the intervention points in the lifecycle of the product where the consumer behaviour has a prominent role.

Consumer choices during three different product life cycle phases
Upon purchase:
• Rent a product rather than purchasing it for a short period of use;
• Purchase second-hand products;
• Purchase re-manufactured products or products including re-used components;
• Purchase products using recycled materials;
• Consider the environmental impact of products, via relevant, trustworthy and comparable information such as labels;
• Follow an economic incentive (such as tax breaks) to purchase products that are more sustainable;
During the use phase:
• Follow the user instructions (maintenance) to increase the lifetime of the product;
• Follow the user instructions to reduce the energy use of the product (or the use of other resources);
• Perform regular maintenance operations on the product (or have them performed by a professional);
• Repair the product when out of service (or have it repaired by a professional);
• Upgrade the product when new technological developments arise;
When the product is not needed any longer:
• Sell or donate the product as second-hand item (on-line or off-line);
• Bring the product to a dedicated waste collection point, so that it can be managed to maintain its value (re-use, re-manufacture, high-quality recycling).

Consumption is strongly influenced by and embedded in certain prevailing systems, i.e., infrastructure, product availability, product information, economic incentives, societal norms and habits, and consumer perceptions and values. However, research on this topic is growing and more can be learned on consumer behaviour in relation to CE practices.

The EU CEAP foresees a number of EU-wide initiatives to empower consumers to fully exploit their enabling potential, however, we are interested in learning more about **innovative public policies** (i.e., including policies beyond labelling) that can stimulate circular behaviour at national or sub-national levels.

This survey has been designed to collect evidence for an EEA study on the role of consumers in the CE and how public policies can stimulate circular behaviour. We invite you to please share your views on this topic, regardless of your level of expertise.

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[36] https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy
[37] https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

Please note that your responses will be handled with confidentiality, and in line with the EU's General Data Protection Regulation (GDPR) rules[38]. The individual responses to the survey **will be used internally by the project team**, and will not be published. We will publish a summary of the findings in the report, which will consider the aggregated responses.

The survey will be open from **July 9th, 2021** to **August 27th, 2021**.

On behalf of the project team, we thank you very much for taking the time to complete this survey!

A1.2 Section I: General information about the respondent

Q1.4. Please specify your first name and your last name:

Q1.5. Please specify your email address:

Q1.6. Please specify your organisation's name:

Q1.3. Please indicate your degree of familiarity with the following topics or sectors, as a private individual or as an organisation. Please rate the following items on a scale of 1 to 5, 5 being "very familiar" (mark with an "x"):

	Not at all familiar				Very familiar
	1	2	3	4	5
Consumer behaviour or behavioural sciences					
Circular economy and circular economy practices					

A1.3 Section II: Public policies aimed at stimulating circular behaviour

Q2.1. Thinking about **public policies** that aim to stimulate circular behaviour **in general**, what are some examples of public policies in your country? Please provide examples in the table below (including name, reference, and link to the policy measure, as applicable). Do you have any supporting evidence to accompany the policy measure(s) you cited above (e.g., studies, evaluations, impact assessments, brochures)?

Consider the categories listed below, or provide additional examples (not falling into any of the existing categories) in the "Other" category. If you think of relevant examples in other countries (worldwide), please include these examples as well (specifying the country). **You can share supporting evidence in any EEA language** but if English versions/summaries are available, we would be grateful to receive them.

We are primarily interested in policies implemented at **national** level, but if you are aware of **regional** examples that have a potential for replication, please share those with us too.

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[38] https://ec.europa.eu/info/law/law-topic/data-protection_en

You are welcome to fill in many examples in each cell of the table below, using bullet points. These examples might, for instance, be addressing behaviours related to different products, such as clothing or electronics.

Type of public policy	Public policy (name, reference, link to official text)	Supporting evidence (please include link or reference details), if applicable, and description of the public policy in relation to the circular economy
Labelling initiatives or indices		
Economic incentives aimed at promoting circular behaviour (including performance-based incentives)		
Taxation		
Education, training, and skills development		
Information- or awareness-raising initiatives (including provision of feedback and reminders)		
Investments in supporting infrastructure or its accessibility		
Policies using social modelling or norm appeals (i.e., stimulating behaviour through social norms)		
Legal targets, standards, or restrictions		
Nudges (e.g., adjusting default settings)		

Q2.2 Some consumer features (e.g., traits, defining characteristics) or external factors of the consumers' environment (e.g., availability of repair infrastructure) can affect the **adoption of circular behaviour** (some examples are listed in the table below). It is thus possible that some public policies aim at modifying these features, with the purpose of increasing the adoption by consumers of circular behaviour. Please indicate whether you are aware of any **public policies** targeting **specific aspects that determine consumer behaviour**, such as the examples listed below.

For each item where you identify a relevant public policy, please specify the name of the policy (including a reference and link, where possible) and describe its working mechanisms in relation to the circular economy. **You can share supporting evidence in any EEA language** but if English versions/summaries are available, we would be grateful to receive them.

Features/factors affecting the adoption of circular behaviour	Public policy (name, reference, link to official text)	Supporting evidence (please include link or reference details), if applicable, and description of the policy and of its relation to the adoption of circular behaviours by the consumers bearing these features
Awareness of environmental problems		
Knowledge about the environmental benefits of circular behaviour	*(e.g., awareness-raising campaigns on waste sorting or material footprints)*	
Knowledge about circularity		
Understanding of what makes products 'circular' (e.g., repairability, recycled content)	*(e.g., classes within the school curriculum on circularity)*	
Knowledge or information about product maintenance	*(e.g., guidelines or standards informing consumers about product-specific maintenance)*	
Knowledge or information about circular action at the end of a product's life	*(e.g., information on end-of-life treatment or disposal options, including location of recycling/collection facilities and/or repair shops)*	
Other (please specify)		
Socio-economic factors		
Level of income	*(e.g., targeted subsidies for the purchase of longer-life products by lower-income households, low-interest loans to households purchasing longer-life products)*	
Security of income	*(e.g., low-interest loans to companies renting longer-life products)*	
Other (please specify)		
Psychological factors		
Long-term vision (i.e., intertemporal trade-offs)	*(e.g., government communications making future risks (costs) more apparent)*	
Habits or lifestyle	*(e.g., bonus-malus systems encouraging product reuse)*	
Personal values (e.g., altruistic values, caring for the environment)	*(e.g., school trips to recycling plants)*	

Features/factors affecting the adoption of circular behaviour	Public policy (name, reference, link to official text)	Supporting evidence (please include link or reference details), if applicable, and description of the policy and of its relation to the adoption of circular behaviours by the consumers bearing these features
Social influence or community values	*(e.g., neighbourhood 'squads' ensuring communal recycling and information sharing)*	
Other (please specify)		
External factors (i.e., factors in one's environment)		
Availability of supporting infrastructure (e.g., repair/maintenance shops, separate waste collection infrastructure)	*(e.g., promoting repair cafes)*	
Proximity (or ease-of-access) to supporting infrastructure (e.g., repair/maintenance shops, waste separation infrastructure)	*(e.g., incentives to attract repair shops within a certain radius of every home)*	
Availability of circular products	*(e.g., targets for market uptake of circular products)*	
Other (please specify)		
Other factors or features		
Other (please specify)		

Q2.2.2. Thinking of the above factors and consumer features, are there any other 'consumer segments' that public policies in your country have targeted, with the aim to increase the uptake of circular practices? If yes, please describe them in the textbox below.

A1.4 Section III: Final remarks

Q3.1. Do you wish to add any **further reflections** that may be relevant to this study?

Q3.2. Do you wish to share any relevant document(s) (e.g., studies, reports, policy documents) that could be useful to this study? Please add links or references in the textbox below, or send your document(s) as an attachment to your response (describing the relevance of the document(s) in the textbox below). **You can share supporting evidence in any EEA language** but if English versions/summaries are available, we would be grateful to receive them.

A2   Consultation results

The consultation activities consisted of a survey that was shared with Eionet stakeholders and other stakeholders identified as relevant in the context of this project. The survey was drafted in a Word document and shared with the stakeholders through email (see Annex A1). 20 respondents filled in the Word document providing policy examples and factors or features targeted by the policy measures in 16 different countries or regions (an overview of the results is presented below). In addition to the survey, stakeholders were invited to attend an expert meeting (webinar) organised by the EEA. Participants were asked to reflect on the following questions:

1. *What is your past experience with circular behaviour measures? What has worked well and what has not?*
2. *What are your plans to further stimulate circular consumer behaviour in your country?*
3. *Based on your experience, can you propose innovative and experimental ideas to support circular behaviour?*

The views and experiences shared during the webinar were used to further reflect on the policy examples collected through the survey and on options for promoting circular behaviour (see Chapter 5). A summary of the results of the expert meeting are presented below.

A2.1 Survey results

As part of the survey, policies were grouped into pre-defined categories, as shown below. The results clearly showed a tendency to lean on **information- or awareness-raising initiatives** to encourage behavioural change (19% or n=29) (Figure 7-1). This was followed by education, training, and skills development (16% or n=25), labelling initiatives or indices (16% or n=24), and economic incentives (14% or n=22). Furthermore, the top factors or consumer features targeted by the policy initiatives were: **knowledge about the environmental benefits of circular behaviour** (18% or n=20), knowledge or information about circular action at the end of a product's life (14% or n=15), and understanding what makes products 'circular' (11% or n=12) (Table 7-1).

Figure 7-1 Examples of policies aimed at stimulating circular behaviour (n=152) (source: own development based on survey results)

Examples of public policies from the stakeholder survey [Q2.1]

| Policy category	% , n
Information- or awareness-raising initiatives (including provision of feedback and reminders)	19%, 29
Education, training, and skills development	16%, 25
Labelling initiatives or indices	16%, 24
Economic incentives aimed at promoting circular behaviour (including performance-based incentives)	14%, 22
Legal targets, standards, or restrictions	13%, 19
Taxation	8%, 12
Investments in supporting infrastructure or its accessibility	5%, 8
Policies using social modelling or norm appeals (i.e., stimulating behaviour through social norms)	5%, 8
Nudges (e.g., adjusting default settings)	3%, 5

Table 7-1 Examples of consumer features or driving factors targeted by policy measures (source: own development based on survey results)

Features/factors affecting the adoption of circular behaviour	N	%
Awareness of environmental problems		
Knowledge about the environmental benefits of circular behaviour	20	18%
Knowledge about circularity		
Understanding of what makes products 'circular' (e.g., repairability, recycled content)	12	11%
Knowledge or information about product maintenance	5	5%
Knowledge or information about circular action at the end of a product's life	15	14%
Other (please specify)	6	5%
Socio-economic factors		
Level of income	4	4%
Security of income	3	3%
Other (please specify)	1	1%
Psychological factors		
Long-term vision (i.e., intertemporal trade-offs)	3	3%
Habits or lifestyle	10	9%
Personal values (e.g., altruistic values, caring for the environment)	8	7%
Social influence or community values	7	6%
Other (please specify)	1	1%
External factors (i.e., factors in one's environment)		
Availability of supporting infrastructure (e.g., repair/maintenance shops, separate waste collection infrastructure)	8	7%
Proximity (or ease-of-access) to supporting infrastructure (e.g., repair/maintenance shops, waste separation infrastructure)	4	4%
Availability of circular products	3	3%
Other (please specify)	-	0%
Other factors or features		
Other (please specify)	1	1%
Total	**111**	**100%**

Note: The numbers in the table represent the frequency with which certain features/factors are addressed by policies. Certain policies may cover multiple features/factors.

A2.2 Summary notes from the expert meeting

The expert meeting took place on 22 September 2021, and was organised to collect evidence on policies supporting circular consumer behaviour and reflect on national experiences. The team was also curious to learn about innovative approaches to encouraging circular behaviour. Over 50 participants attended the meeting, which was moderated by Ioannis Bakas (EEA) and Laurent Zibell (Trinomics). Lars Mortensen (EEA) and Shane Colgan (EEA) also chaired two of the four break-out rooms.

As noted above, the participants were asked to reflect on three questions. A summary of the reflections is provided below.

A2.2.1 Past experiences with measures targeting circular behaviour

The Netherlands has experience taking a behavioural approach to CE questions, and highlights that it is important to **change the context or environment for consumers** – to make it easier for them to act circular. **Craft centres** have worked well in the Netherlands, and they are seen as a successful example of policies aiming to incentivise circular behaviour (see Table 4-4). The Dutch government wanted to make it easier for consumers to take circular actions when they no longer needed their goods – bringing used items to second-hand shops was seen as a hassle for consumers and a lot of (still valuable) goods ended up in incineration plants. Now, the 'circular' craft centres combine the function of a recycling

centre (where people bring their goods when they no longer need/use them), thrift shop, and repair café[39]. In contrast, the Netherlands found that **awareness-raising efforts** seldom work.

Countries have different experiences with craft centres. **Lithuania** raised concerns about the **safety** of products (waste) that comes into craft centres. Certain craft centres (e.g., in Dublin, Ireland) only work with specific products that are considered 'safe' – the craft centre in Dublin does not work with electronics. **Ireland** tracks progress based on metric tonnes of waste, jobs, reskilling, and there is a **90% success rate** in its craft centres.

Flanders (Belgium) funded almost 300 projects in 2017-2019 with the aim to make circular innovation a reality. In textiles, success stories were bottom-up approaches of, for example, renting baby clothes.

In **Ireland**, the plastic bag levy was very successful and new **levies** have been introduced since September 2020 – e.g., the latte levy for plastic cups. This is combined with public policy support for social enterprises like refill.ie[40]. The revenue from the levies go into an Environment Fund.

Iceland is still dealing with recycling and recyclability issues – for example, the country is trying to improve the **labelling of waste bins** so they are consistent across municipalities. The labelling of products could also match the labels on waste bins, but this will not be implemented in the near future. Similar to the Netherlands, Iceland found that awareness-raising campaigns are not very effective in general, but information-sharing about new laws can be helpful at company/producer level. Other attendees agreed that some awareness-raising is still needed.

In terms of labelling, **Germany** is planning to introduce a new **label** on products, which would include greenhouse gas emissions and raw-material consumption over the full lifecycle of products. Prior to introducing the repairability index on five product categories, **France** experimented with product information on the lifetime of products, based on manufacturers' willingness to participate on a voluntary basis, but manufacturers were not keen to pick up on this. The **repairability index** is a more pragmatic way forward (see Table 4-2).

France introduced a **repairability index**, which has entered into force in January 2021. The index must be clearly displayed on the label of 5 product groups: washing machines with windows, smartphones, laptops, televisions and electric lawnmowers. The principle of this index was adopted in a Roadmap for Circular Economy published in 2018, with a broad participation of stakeholders. The stakeholders involved in the development of the roadmap were then asked to participate in the Working Group that developed the criteria for the repairability index. Considering this previous involvement in the Roadmap, but also the prospect of a legislation, these stakeholders accepted and participated actively in the Working Group. The stakeholders were also consulted at the end of the process on the draft decree implementing this index. An early follow-on survey by OpinionWay for Samsung, dated April 2021, showed a strong support for the measure by a representative sample of consumers.

Some participants highlighted that the circular economy agenda is not very advanced in their countries – they are still discussing recyclability/recycling issues, or have simply inherited circular practices from past traditions. Countries are, thus, keen to learn from the EU and other countries.

A2.2.2 Future plans to further stimulate circular behaviour

Tax breaks for private consumers have been used in **Sweden** (see Table 4-3), and the trend is expected to continue (the VAT has been reduced from 25% to 12%, and now 6%). Little effect has been observed as of now, so it is difficult to evaluate the effectiveness of the measure. **Denmark** and **Iceland** are also interested in introducing such tax breaks. Denmark is waiting to see evaluations/evidence on the effectiveness of such measures. Several participants noted the risk that tax breaks can benefit service providers more than consumers, and thereby be more stimulative for businesses.

Austria already has a tax break on repair (VAT is only 10% for such products), but plans to introduce a **subsidy** to further encourage repair. As of 2022, Austria will subsidise 50% of repair expenses

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[39] https://circulairambachtscentrum.nl/programma/
[40] https://refill.ie/

through a bonus system. A similar measure exists in **Thuringia, Germany,** offering a bonus of 50% of the costs of repairing electronic devices (or up to €100/year per person).

In **Belgium**, bootcamps were organised for students, but they lost attachment over time. Through an EU-funded programme, Belgium wanted to focus on **educators** rather than students. Equipping educators with the right skills and knowledge to understand and promote the circular economy amongst the student population can create a community and impact at scale. This teaching programme will begin next year, and is expected to move to international level in 2023. In **Portugal**, there are already programmes in place to educate students about the circular economy and to enhance the re-use of school books.

Slovakia is still in the early stages of developing a circular economy agenda – it has recently asked the OECD to give recommendations in this regard. Together with the EU and the OECD, Slovakia will produce a **circular economy roadmap**, focusing on, inter alia, sustainable consumption and production. The Ministry of Environment is responsible for consumers, but more from a consumer-rights perspective as opposed to consumer behaviour. Meanwhile, the Ministry of Finance is interested in economic instruments, but is reluctant to introduce tax breaks. Other (economic) instruments are of interest because **price** is considered an important driver of consumer behaviour. At the moment, the difference between buying new and repairing is not significant. The government plans to build re-use centres with EU funds to stimulate circular thinking.

Lithuania is working on its circular strategy and roadmap, which will give a better overview of future measures to promote circularity. There are many ad-hoc examples of private initiatives that promote circularity (e.g., Vinted) but the Ministry can have an influence at a higher level – for example, Lithuania will support farmers and businesses that will implement circular solutions as part of the future strategic plan for rural development. Lithuania is recipient country of (unsorted) used textiles such as second-hand clothes, which could be an opportunity for the circular economy.

The **European Commission** is reviewing the Waste Framework Directive to incorporate waste prevention measures and targets, in line with the priorities of the Circular Economy Action Plan. A study on best practices in EU Member States and recommendations for measures that can be shared and implemented at EU level is underway. However, it is challenging to assess how effective/successful best-practice measures have been – evidence on this is important for policy recommendations.

Questions were raised about whether countries are implementing stronger measures such as banning harmful products, as well as how to integrate the bioeconomy into circular economy discussions and targets (creating a 'circular bioeconomy').

A2.2.3 Proposals of innovative and experimental ideas to support circular behaviour

To motivate consumers to make use of craft centres, **the Netherlands** is experimenting with **behavioural pilots** targeting specific groups of consumers. Similarly, **Ireland** is carrying out behaviour and attitude studies to tailor their awareness-raising campaigns and improve their effectiveness. Certain behaviours and groups of the population that exhibit those behaviours are, thus, identified (e.g., young men who eat "on-the-go" vs young families vs savvy consumers seen as 'advocates'), allowing campaigns to be targeted towards specific segments of the population.

More generally, Ireland is doing market research to **benchmark** what consumers understand about the circular economy, repair, etc. This qualitative and quantitative research will be used as a baseline for future policies. This will be shared once it is done, in the hopes of informing policy-makers.

Flanders, Belgium, is experimenting with using **re-usable cutlery/cups/etc.** at big festivals and public events. To lead by example, the Flemish government is working with event organisers to coach them on how to be more circular. **Slovakia** is also experimenting with this. In **Iceland**, funding for companies that provide multiple-use packaging is being considered – there are many companies that can provide these options but perhaps their product offering is not cost-effective yet. There are multiple systems like that in **the Netherlands** and **Lithuania** as well. In **Estonia**, there are plans to provide more information to consumers on the economic advantages of using long-lasting packaging vs single-use packaging (for food stores, supermarkets, etc.).

Finland gathered positive feedback from companies experimenting with circular business models, stating that the key to their success were partnerships. Several other attendees reflected on the challenges faced by circular business models, namely the transaction costs faced when moving from a B2B to a B2C model, the issue of trust in C2C models, and the marketing power needed to capture consumer attention and to wait the time needed for consumer behaviour to change.

In **France**, new policy measures will oblige internet providers to inform consumers on available **updates** for the good functioning of digital devices and on the **carbon footprint** of their data use.

Estonia shared some reflections on the need to change the perception that **satisfaction** in life would come from consumption, and on its aim of showing that this satisfaction could come from other sources, such as (cultural) experiences.

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