



GA NUMBER: 776714

Deliverable 1.2. Guidelines for circular economic models in the E&E sector

Acronym:	C-SERVEES
Project title:	Activating Circular Services in the Electric and Electronic Sector
Contract №:	776714
Start date:	1 st May 2018
Duration:	48 months

Deliverable number	D1.2
Deliverable title	Guidelines for circular economic models in the
	E&E sector
Submission due date	30/06/2019
Actual submission date	27/06/2019
Work Package	WP1
WP Leader	WEEE Forum
Dissemination Level	Public
Version	02
Deliverable Lead Beneficiary	WEEE Forum



DOCUMENT CONTROL PAGE

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		WEEE	Document creation					
	00	Forum						
Version	01	All authors	Edits made based on comments					
history	02	WEEE	Final version					
-	02	Forum						



1. Executive Summary

This report forms part of WP1 of the C-SERVEES project, the main objective of which is to provide guidance for the successful implementation of circularity in the E&E sector. The research enabled the C-SERVEES project to engage extensively with stakeholders in the EEE value chain that could provide valuable input to the development of CEBMs. This was performed via seven different stakeholder surveys and at two conference workshops aimed at the following groups in the EEE value chain:

- Designers of EEE
- Suppliers to manufacturers of EEE
- Manufacturers of EEE
- EEE Retailers
- Business users of EEE
- Household users of EEE
- WEEE handlers

The survey received over 1,300 responses and, although the results provided several surprises, there were many commonalities between the stakeholder groups, particularly those in the EEE supply chain, that have allowed recommendations to be made with some confidence. Results were discussed extensively with partners, especially from the manufacturing sector, and their appraisal and feedback on the results are incorporated into this report.

The recommendations provided are aimed at giving guidance for the next steps in the C-SERVEES project, which focus on the development and adoption of the CEBMs. The comments within each recommendation reflect the results of the consultation of stakeholders and subsequent discussion of the results. These are listed in a loose order of priority, though it should be stressed that there is very little difference in the level of priority between one and nine.

1. Make the business case to industry

Industry appears unconvinced that there is a solid business and financial case for CEBMs. They rate softer opportunities like building trust and enhanced CSR above harder opportunities such as increased revenue. The advancement of circular economy requires a demonstration to business actors of the sustainability of CE practices as well as incentives to improve the financial viability, i.e. reduce costs and improve profit margins.

2. Convince stakeholders of the benefits of the leasing model

Leasing of products ranked low with all stakeholder groups. Previous research and examples suggest that leasing is a strong option for inclusion in CEBMs. The challenge is to shift the mindset of all stakeholders so that leasing of products is embraced.



3. Create incentives

Incentives geared towards return of products and improving ease of maintenance and repair are required to encourage the adoption and implementation of circularity. These should include fiscal incentives if the cost of repair, refurbishment and remanufacture continue to be of concern to stakeholders. In addition, certificates and guarantees should be used to help sell products.

4. Engage in partnerships

The actors in the value chain need to engage in partnerships. Manufacturers need to be made aware of the technical and operational requirements of WEEE treatment and WEEE handlers need to be informed of which materials are used to manufacture products. Furthermore, the cost and responsibility for implementing CEBMs needs to be shared by all stakeholders.

5. Use ICT tools to share product information

Knowledge of where products are and what they contain is essential for dealing with them at the end of their life.

6. Provide training & education

The adoption of circularity requires training around the basic principles of CE and the development of supporting tools so that all stakeholders understand and appreciate the concept.

7. Harmonise and enforce legislation

Authorities must be called on to harmonise legislation, regulation and enforcement in order to create equivalent market conditions and a level playing field at a global level. Different pieces of legislation in different countries should not contradict each other. Definitions and responsibilities need to be clear.

8. Promote trust and enhanced CSR

Considering that a vast majority of designers, suppliers, manufacturers and retailers identify building trust and enhancing corporate responsibility reputation as distinct economic opportunities, these should be built on and nurtured so that they strengthen and support CEBMs.

9. Stimulate demand or supply

The solution to the chicken and egg problem, i.e. circularity is not offered due to lack of demand, while demand for circular products and services fails to pick up due to lack of supply, is that the one or the other needs to be stimulated. More demand will call for its own supply, while more offering of CE products and services will create its own demand. The other recommendations should help to stimulate at least one of the two and this recommendation acts as reminder that this is key.



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2. Acronyms and abbreviations

AB	Advisory Board
CE	Circular economy
CEBM	Circular Economy Business Model
CSR	Corporate Social Responsibility
E&E	Electrical & electronic
EEE	Electrical & electronic equipment
ICT	Information & Communications Technology
WEEE	Waste electrical & electronic equipment
WP	Work Package
WPL	Work Package Leader



3. Introduction

This report forms part of WP1 of the C-SERVEES project, the main objective of which is to provide guidance for the successful implementation of circularity in the E&E sector, based on consultation with stakeholders. The specific objectives of WP1 are:

- Engagement and consultation of relevant stakeholders throughout the entire EEE value chain.
- Analysis of technical, economic, socio-cultural, regulatory and environmental barriers and opportunities for the eco-innovative solutions proposed in the project.
- Identification of the requirements of stakeholders regarding circular economic models.

WP1 is divided into three different tasks that outline the working steps:

- Task 1.1 identified and defined the information that needed to be collected and produced the surveys that were used to collect this information.
- Task 1.2, the longest in duration, used surveys, as well as workshops, to collect quantitative and qualitative data from the different stakeholders.
- Task 1.3 is the analysis of the results of the consultation and a summary of these along with conclusions and recommendations are presented here.

4. Methodology

4.1. Developing the survey

The survey was developed during T1.1 and is the subject of a separate deliverable report¹. For convenience a brief summary of this process is provided, and the surveys are contained in Annex A.

The initial stage in the development of the surveys set out to capture WPLs' requirements for the questionnaire surveys and supplemented these with a literature review. The next stage was to cluster the captured data and information into topics, which were then organised into the categories of:

- Circular economy awareness;
- Current practices relating to circular economy; and
- Circular economy opportunities, barriers and enablers.

The final survey structure was converted into a master survey draft, which was subsequently reviewed by WPLs.

Based on the initial stakeholder list (provided through Task 8.1), eight specific stakeholder groups were chosen, representing the key E&E supply chain actors and eight different

¹ D1.1 Survey Design and Planning



surveys were developed each focusing on one of these eight groups. These eight stakeholder specific surveys were reviewed by project partners and the AB. The final stage of survey development involved incorporating relevant feedback from partners and the AB in the creation of the final stakeholder surveys.

The eight stakeholder groups representing the key E&E value chain actors were:

- 1. Designers of EEE
- 2. Suppliers to manufacturers of EEE
- 3. Manufacturers of EEE
- 4. EEE Retailers
- 5. Business users of EEE
- 6. Household users of EEE
- 7. WEEE handlers
- 8. Consumer organisations

During follow-up discussion between partners, the eighth stakeholder group, consumer organisations, was dropped from the survey in favour of asking these groups to target their members with the relevant survey from the other seven groups.

4.2. Delivering the survey

The WEEE Forum was the lead partner for T1.2, which focused on delivering the survey, and all other partners in the project had time assigned to this task.

The final surveys were entered on Google Forms to allow participants to respond easily online and for answers to be drawn together quickly for analysis. The uploaded surveys were in English, Italian, Spanish and Turkish which enabled the project partners to optimise the targeting of their networks.

Targets for survey returns were set for each of the seven stakeholder groups as shown below. These targets did not represent a statistically significant sample apart from for household users which was significant at European Union member state level. However, the target did represent a realistic expectation, based on experience of similar surveys, and would give the project enough evidence to be able to draw conclusions. The targets are shown in Table 4.2.a below.

Designers	Suppliers	Manufa cturers	Retailers	Business Users	Household Users	WEEE Handlers	TOTAL
50	100	100	100	200	700	100	1,350

Table 4.2.a: Survey targets	per stakeholder group
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Each partner was also given a target for the number of surveys it had to collect per sector. The quantity for each partner per sector was based on the position in the value chain of that partner. For example, the product manufacturers were set higher targets in the



designers and suppliers stakeholder groups and the recyclers were set higher targets in the WEEE handlers' group because they had direct contact with these groups.

The survey was promoted through social media channels, newsletters, during presentations at events and through websites. This was done at project-wide level using the project social media accounts and website and individually by each partner and by members of the AB. In addition, partners contacted their networks via email and by telephone, making personal requests for participation in the survey. The survey was also sent to the C-SERVEES network, a group of individuals that had registered an interest, through an electronic form on the project website, in being kept up to date on project progress and being involved in the research.

Newsletter articles, a covering email and Tweets were created by the project and distributed to partners and the AB for their use in order to reduce the effort required to promote the survey. An example of the generic article – this is taken from the WEEE Forum newsletter - is shown in Figure 4.2.1 below, along with an example Tweet from the C-SERVEES Twitter account.





The survey was undertaken between early November 2018 and the end of March 2019.

4.3. Workshops

In addition to the survey, Task 1.2 also sought to solicit stakeholder feedback through workshops. Two of these were held, the first at the CARE Innovation Conference in Vienna on 28 November 2018 and the other at the IMPEL (EU Network for the Implementation and Enforcement of Environmental Law) Making the Circular Economy Work conference in Rome on 21 March 2019. At the former, attendees debated the question 'Is circularity possible in the EEE sector?' after being provided with an overview of the project and presentations giving, firstly, a cynical view of circularity in the E&E sector and, secondly, a more positive view providing successful examples of circularity on the E&E sector. At



the latter conference a presentation of interim results was given and discussed by the audience; the audience also gave their wider views on the question of circularity in the E&E sector. All stakeholder groups apart from suppliers were represented across the two events with around 120 people attending in total. The results of these discussions are provided below in Section 5.

5. Results

This section discusses the results of the survey and of discussions at the workshops. It provides information on response rates, general comments on the results, discussion of specific aspects of the results and an overview of correlation analysis.

The results were analysed by C-SERVEES partner Exergy. This analysis was performed on each question in each stakeholder survey and on questions common to the different stakeholder groups to enable answers to be compared. All charts showing the results of the survey are contained in Annex B.

5.1. Survey returns

The number of surveys returned is shown below. The targets are also shown in this table alongside the proportion of surveys returned against targets.

	Designers	Suppliers	Manuf- acturers	Retailers	Business Users	Household Users	WEEE Handlers	TOTAL
Survey returns	92	41	93	30	102	857	88	1,303
Target	50	100	100	100	200	700	100	1,350
% of target achieved	184%	41%	93%	30%	51%	122%	88%	97%

Table 5.1.a: Survey returns versus targets

As can be observed, the targets for the surveys for designers and household end users were exceeded. For manufacturers and WEEE handlers the returns were also good, although slightly below target. Only 51% of target was reached for business users but the quantity returned (102) was enough for the statisticians analysing the data to do so with some confidence in the conclusions (based on their past experience of similar analysis). For suppliers and retailers, the returns were well below target. With both these stakeholder groups the engagement process proved difficult. For suppliers it was affected slightly by the ban on Google in China where numerous suppliers were based; Word versions of the survey helped to partially overcome this. For the retailers, the survey proved to take too long to complete in the time available to contacts.



The level of returns for household end users means that conclusions can be drawn at Europe Union member state level but for the other groups the answers can only be claimed to represent the respondents to the survey and not a wider group.

Overall, there was a return of 1,303 surveys against a target of 1,350, which is 97% of the overall target.

5.2. Geographic coverage of responses

As C-SERVEES is funded through the EU's Horizon 2020 programme, it is, in essence, Europe-centric, so the majority of responses to each of the surveys were from Europe. At sub-European level, the responses tended to come from those countries in which the C-SERVEES partners are based because this is where the networks of project partners are also based, these being:

- Austria
- Belgium
- Croatia
- France
- Germany
- Italy
- Netherlands
- Norway
- Portugal
- Romania
- Spain
- Turkey
- United Kingdom

Another factor in response rates per country is language; more responses were received from countries into whose primary language a survey had been translated. However, this is not to say that there was not a good geographic spread of responses as Figure 5.2.1 shows.





Figure 5.2.1: Distribution of responses per country for all stakeholder groups

This good geographic spread was also generally present in the other stakeholder groups but was less favourable in the designers' survey where 41% of the 92 respondents were from Turkey.

5.3. General comments on the results

The complete set of analysed results was shared with those partners contributing to T1.3 (Circularise, Ecodom, Electrão, Loughborough University, Remedia and SAT), those WPLs not involved in T1.3 (Aimplas, Gaiker, RINA-C and Vertech), the partners that are E&E manufacturers (ADVA, Arcelik and Lexmark) and the AB (18 industry experts). General comments from these organisations and individuals on the results are noted here and more specific observations and conclusions are shared in Section 5.4.

5.3.2. Spread of responses

One important point to note at the outset is that the responses stakeholders provide differ, but less significantly than one might expect. For example, most manufacturers seem to see opportunities in all areas. However, most also seem to think that there are significant challenges everywhere at the same time meaning there appear to be big opportunities as well as big challenges. This occurs across most questions for all stakeholder groups. This might suggest that, while discussion on CE has been ongoing for many years, individuals' thinking is not, on the whole, so advanced. Intriguingly, however, there is quite a lot of consensus on what the biggest challenges and opportunities are. The 'top' and 'bottom' answers are consistently common across numerous groups.

This situation makes the results less easy to draw conclusions from because it could be argued that all options are important given that it is generally the majority of respondents



that note agreement or significance with each answer. In order to overcome this challenge and draw reasonable conclusions, the authors have looked at the degree of agreement or significance against each statement for each question and ranked them from highest to lowest. As a result, where 'rank' is talked about in the discussion of the results, this refers to the relative degree of agreement or significance attached to a statement. Consequently, in the chart shown in Figure 5.2 below, 'design and manufacturing for product reuse, maintenance etc.' would be considered the highest ranked and most significant opportunity and blockchain the lowest ranked and least significant opportunity (although the level of 'don't know' answers should also be taken into consideration in the latter, which is discussed below).



Figure 5.2.1: Manufacturers' assessment of the technical opportunities for enhancing their business through the adoption of CEBMs

5.3.3. Revealed preferences

The question in the business end users' and household end users' surveys, 'Please rate your level of agreement that the following factors influence your decision to purchase electrical and electronic products' seeks to obtain information on purchasing intent and does not show consumers' revealed preferences. It was commented by a member of the AB that EEE manufacturers and retailers often survey consumers after their purchase to see why they decided to buy a certain product. In almost all cases the primary reasons are still price, functionality, features, brand and design, but rarely sustainability, which typically shows up as a reason lower down the list, usually ranked six to eight. The project needs to consider this in its subsequent phases.

5.3.4. Bias

Some of the responses seem to be dominated by respondents from just a few countries whereas other sets of responses are such that, if one adds up 'major' and 'significant' challenges, the result is (almost) always higher than 75%. The former might possibly indicate that the results have been biased by nationality or geographic conditions, whilst



the latter might be interpreted to mean that those respondents were 'locked into' the major/significant options.

5.3.5. Surprising results

A comparison of designers, suppliers, manufacturers and WEEE handlers reveals some results that are counterintuitive. Manufacturers care about "insufficient interest from customers" less than other stakeholder groups, and for "negative perception of recycled content in new products", manufacturers are less worried than the others. In addition, it would not be anticipated that "ensuring financial viability of takeback schemes" is more important for designers than for manufacturers.

Further to this, retailers strongly favour "Reuse and easy maintenance and repair of products" where it might be assumed that they still consider selling products as their main source of income. Indeed, it was commented in one of the workshops that the sales team of a large manufacturer had made very negative comments regarding moving from selling to leasing and the affect this would have on revenue streams.

Blockchain and 3D printing are not considered strong enablers for circular economy as they consistently rank in the lowest two answers for 'strongly agree' and 'agree'. Blockchain may not have been fully understood by respondents as it was generally the case that a significant proportion of respondents answered, 'don't know' when asked if they saw it as a technical challenge – this was 33% of respondents to the WEEE handlers' survey and 32% for the manufacturers' survey. Moreover, some stakeholder groups cite tracking of products as a significant technical challenge (designers, suppliers and retailers) and others, knowledge of the content of products as a technical challenge (suppliers and, unsurprisingly, WEEE handlers). Tracking and content information are both things that blockchain can offer.

It was anticipated that 3D printing would be considered a strong enabler as suppliers do not have to produce spare parts in advance, store them in a warehouse and ship them to the customer when needed, or, if nobody needs them, dispose of them. With 3D printing the supplier can simply store a digital file and print it on demand where it is required. It is possible that the results of the survey indicate that 3D printing is seen as useful in the repair of products produced in smaller quantities and may not be so applicable to mass market products.

Data security is much less of an issue than previous surveys have suggested although it is still the majority of respondents that see it as an issue (53%-66%) as Figure 5.3.2 shows. A survey conducted in 2003 by SAT² revealed that at that time it was the biggest concern of users with more than 90% highlighting this.

² "IT on demand" project, SAT (funded by the City of Vienna), 2003



Major challenge S	ignificant challe	nge 📃 I	Insignificant challenge	e 📕 Not	a challenge	e 🗾 Don't	t know
DESIGNERS	27%		26%	25%		14%	9%
WEEE HANDLERS	23%	375	%	23	1%	8%	9%
HOUSEHOLD END-USERS	22%	38%	,	23	%	9%	10%
BUSINESS END-USERS	21%	45%			23%		5% 6%
SUPPLIERS	20%	45%			15%	10%	10%
MANUFACTURERS	17%	37%		23%		15%	9%

Figure 5.3.2: Responses to statement that 'concerns over personal and/or organisational data security' is a challenge

5.3.6. Variance between stakeholder groups

Unsurprisingly, the different stakeholder groups view the main challenges differently. Suppliers, for example, see everything as less of a challenge than all the other stakeholder groups. Retailers see the social aspects as the most difficult challenges; in the five areas they were questioned, of all the stakeholder groups they had the highest level of agreement for four of them. WEEE handlers score many of the business and management challenges more highly than the other stakeholder groups.

5.4. Main observations from the survey

5.4.1 Renting and leasing

There seems to be broad discomfort with renting and leasing products as this consistently ranks lowest, or among the lowest, across the different questions and stakeholder groups. Surprisingly, for both businesses and households, affordable and reliable leasing services appear to present insignificant opportunities and are not perceived as social enablers. The fact that products are associated with leasing services does not influence end users' decision to purchase electrical and electronic products. Possibly as a result of that fact, manufacturers do not rank highly the absence of renting and leasing services on offer as economic or social challenge (see Figure 5.4.1.4.1 below) and all respondents, except WEEE handlers and suppliers, say that renting and leasing offer no CEBM adoption opportunities.





📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

Figure 5.4.1: Manufacturers' assessment of the economic challenges that could impede implementation of CE practices

Overall, looking at the comparisons between how stakeholders responded with the highest level of agreement/disagreement there seems to be a lack of understanding about leasing and renting and its connections to the circular economy. For example, five of seven stakeholder groups that were asked had the highest level of disagreement that renting or leasing is a CE opportunity, three out of five stakeholder groups the highest level of disagreement that limited leasing services is a social challenge, six of seven the highest level of disagreement that affordable and reliable leasing services are a social enabler to CE and four of four the highest level of disagreement that disseminating the benefits of renting and leasing is a CEBM enabler.

These findings are prima facie contradictory to the literature on CE which says that leasing leads to more durable products which have longer use phases and are therefore more circular. The findings suggest that stakeholders need to be convinced of the actual business opportunities they are currently overlooking, leasing services need to be better marketed with the public at large, which should include incentives to influence the supply of leasing services, and a shift of mindset is required by the public; all things for the wider C-SERVEES project to investigate further.

5.4.2. Longevity of products

The flip side of leasing being viewed as not having such importance is that businesses and households single out ownership of products as the most interesting business model. Furthermore, design and manufacturing for reuse, repair, remanufacture, refurbishment and upgrade have the most relevance attached to them by designers, manufacturers, retailers and WEEE handlers as major technical opportunities.



Both businesses and household users indicate that durability and extension of lifetime (repairability) have a major influence in purchase decisions (see Figure below). However, the fact remains that consumers currently tend to replace products rather than have them repaired and the costs associated with repair, refurbishment, remanufacturing and recycling are most frequently singled out in the survey by suppliers, end users and WEEE handlers as the biggest challenge.



Figure 5.4.2: Household end users' level of agreement that different factors affect their decision to purchase EEE

Business and household users also rank the presence of product certificates and guarantees highly, both of which provide comfort that the product will be durable or be replaced. The other stakeholder groups do not attach as much significance to this.

Designers, manufacturers and retailers highlight lack of knowledge of circular products and practices as a key social challenge. Unsurprisingly, ensuring financial viability of circular products and fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale are the economic enablers that rank higher than most. Consequently, it seems that incentives geared towards return of products and improving ease of maintenance and repair are required to encourage the adoption and implementation of circularity.

5.4.3. Recycling and recovery

Alongside design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacturing or recycling, recovery of useful materials from end-oflife products – which is the most prevalent (traditional) business model – is the element that has been named most frequently by designers, suppliers and manufacturers as presenting considerable opportunities.

In addition, retailers rank improvements in recycling and recovery technologies as the highest technical opportunity. Similarly, manufacturers are demonstrably aware that innovative resource efficient recycling and recovery processes and design and manufacturing for re-use and circularity are technical enablers. Suppliers, manufacturers and WEEE handlers also say that viable WEEE recycling technologies are key supply chain enablers.



Figure illustrates the importance attached by WEEE handlers to design and manufacturing for reuse, maintenance, repair, refurbishment, remanufacture and recycling, and the development of improved technologies for recycling and recovery. This is typical of the responses across the stakeholder groups. The chart also reiterates the low ranking, and low understanding – 'don't know' responses - of blockchain and 3D printing noted earlier.



Figure 5.4.3: WEEE handlers' assessment of technical opportunities for enhancing their business through the adoption of CEBMs

5.4.4. Supply chain

Both suppliers and WEEE handlers indicate that partners in the supply chain insufficiently collaborate with each other; most WEEE handlers indicate that this is a major CEBM implementation challenge. This seems to suggest that the different actors in the value chain need to engage in partnerships, for example manufacturers need to be made aware of the technical and operational requirements of WEEE treatment.

Furthermore, the consistent shifting of supply chain challenges into other parts of the supply chain is interesting. As one of the manufacturing partners in the project notes, this indicates a dangerous trend of overly shifting responsibility to other organisations in the supply chain, a trend generally seen in the context of sustainability and related transparency reporting and assessments. It is dangerous because, at least for some manufacturers, it can easily produce unacceptable amounts of effort in supply chain management. In addition, nobody is willing to pay the higher cost of this effort further down the value chain. Together, this means that the complete value chain must cooperate and share benefits and cost in a fair way.

5.4.5. CE knowledge and training

One element that the survey highlights as seeming to be slowing down the adoption of CE principles in businesses and among WEEE handlers is the lack of awareness, skills and



technical knowledge regarding CE issues. Similarly, suppliers (see Figure 5.4.4), manufacturers and WEEE handlers single out the enhancement of CE knowledge and skills as distinct social opportunities and retailers note insufficient customer interest in CE as the most relevant business and management challenge.



Figure 5.4.4: Suppliers' assessment of social opportunities for enhancing their business through the adoption of CEBMs

Training around CE requirements and the development of supporting tools are, therefore, required to advance the adoption of circularity. Indeed, this is already a focus of the C-SERVEES project, following consultation with the project's AB, and is being integrated in the work on the key enablers for replicability and transferability of the CEBMs. It should be noted, however, that both businesses and households indicate that they disagree that limited best practice CE demonstration projects constitute a major technical challenge and a vast majority of respondents, across the board, indicate that additional government funding for CE skills training is not an economic enabler.

5.4.6. Regulation and legislation

Most stakeholders single out lack of regulatory consensus and varying levels of enforcement of legislation as the biggest legislative challenge (see Figure). They consider it important to operate in various markets under equivalent conditions. Similarly, any initiative that fosters global regulatory consensus is seen by both manufacturers and WEEE handlers as the biggest legislative enabler. Authorities need to consider harmonising their legislation and improve enforcement of the legislation they adopt.





Figure 5.4.5: WEEE handlers' assessment of legislative enablers that could drive the implementation of CE practices

Taxing virgin raw materials is viewed as the most significant legislative enabler by retailers although this is not ranked highly by designers, suppliers or manufacturers.

5.4.7. Business case

The majority of WEEE handlers indicate that the business case for circular economy is insufficiently clear, while most manufacturers say that the added value of adopting circular economy business models and the costs associated with their adoption and implementation also remains unclear. Presumably this is due, among other things, to the high costs associated with repair, refurbishment, remanufacturing and recycling of end-of-life products and unclear quality of materials from recycling. This seems to indicate that a demonstration to business actors of the sustainability of circular economy practices as well as incentives to improve the financial viability, i.e. reduce costs and improve profit margins, is required.

One of the manufacturing partners in the project made further comments on the business case based on their own experience. They noted that recycling and reusing material is not a technical challenge and they have not experienced customer perception issues regarding this. The main issue they face here is the availability, quality and high cost of such material. The results of the surveys of suppliers and manufacturers concur with the issue of high price of secondary raw materials, whereas the designers and retailers do not rank this highly. This high price is certainly judged in comparison with its alternative, i.e. primary raw materials, but, interestingly and as noted earlier, the introduction of a tax on primary raw materials is not a great priority across all stakeholder groups.

The greater challenge is in remanufacturing and refurbishing and principally this is in getting the product back at its end of life stage. This challenge centres on the cost of



collection, on identifying where the product is and establishing if the product is of sufficient quality to make it available for refurbishment.

Furthermore, in most instances, assuming the consumer wants a product that is equivalent to new, remanufacturing is not less expensive than producing a brand-new item. Here there is a major end user perception issue; they believe a remanufactured product should be less expensive as it is viewed as being of potentially lower quality.

5.4.8. Demand and supply

The demand for and supply of circular products is linked to the business case discussed above. Most suppliers and manufacturers indicate that the limited offering of circular products is a major supply chain challenge. Conversely, most respondents, across the board, say that the availability and accessibility of product repair and replacement services are key social enablers (see Figure 5.4.6). This, however, raises the chicken and egg problem: circularity is not offered due to lack of demand, whilst demand for circular products and services fails to pick up due to lack of supply. The one or the other needs to be stimulated for this issue to be addressed.

SOCIAL ENABLERS



Figure 5.4.6: Business end users' assessment of social enablers that could drive the implementation of CE practices

5.4.9. Trust and corporate social responsibility reputation

All of designers, suppliers, manufacturers and retailers identify building trust and enhancing CSR reputation as distinct economic opportunities, these are usually ranked in the top two of ten statements on economic opportunities and always in the top three (Figure 3 shows the results for manufacturers). Only WEEE handlers do not place such a significance on it, viewing new markets and new revenue streams as more important. This could illustrate that industry does not identify CEBMs as being directly associated with new business, but that new business only comes through enhanced reputation and increased trust. It also confirms the results relating to the business case, where industry does not see a strong case for circularity and places emphasis on fiscal incentives as ways to stimulate the market for circular products.





Figure 3: Manufacturers' assessment of economic opportunities for developing CEBMs

5.4.10. Other

Limitations A vast majority of respondents, except in the household end user survey, seem to agree that the technical limitations in different circular economy loops are major technical challenges.

Management Most designers, manufacturers, suppliers and WEEE handlers agree that a long-term management approach to circular economy is the most important business and management enabler.

End-users Business end-users and household end-users often evaluate challenges and opportunities similarly.

5.5. Items of note arising from the workshops

Numerous themes came out in the discussion at the CARE Innovation conference on 28th November 2018 and at the IMPEL, Making the Circular Economy Work conference on 21st March 2019, which corroborate the conclusions arising from the survey. The ideas noted below came out in these workshops.

5.5.1. Price

Electronics are one of the few consumer items that are becoming less expensive, they are no longer items for life. The low-price works against a leasing model and against consumers considering the items as long-term purchases. It was noted that the fact consumers are generally happy with less expensive items means the sector is wary of delivering higher priced goods even if these are better quality and longer lasting. Consumers do not understand the difference between total lifetime costs and one-off



costs, and they are still buying items for the prestige of ownership as well as for the service provided.

Furthermore, price is absolutely key in the sector. Only one-quarter of the cost to the consumer is in production, the rest is in logistics and marketing etc. Higher priced items, such as MRI scanners, are more likely to be recycled or reused because it is financially viable. However, contrary to this, there are numerous service models in B2B for which the items are not designed differently, there is only a different finance model. Items that are leased need to be declared on the balance sheet. In other words, in some cases all it takes is an adjustment of the finance model rather than the type of products or services.

One metal recycler present during the CARE Innovation workshop has worked extensively with the car industry and notes that this sector is talking a lot more about CE than the electronics sector. Part of the reason noted for this is cost because cars are expensive and EEE is generally not expensive. This means that EEE is easily bought and replaced, whereas cars are less accessible, leading to the increased popularity of non-purchase finance options, such as leasing, where the car is never owned by the user.

5.5.2. CEBM

There are some businesses already implementing CEBMs that do not necessarily broadcast this. For example, there are some leasing models developed in asset management teams and in consumer goods that are well established and accepted by the consumer. Satellite TV boxes and routers for home internet are two instances where both remain the property of the company supplying the service of TV channels or internet access.

A neat illustration of this is a telecoms provider in France that each year has returned to it a few million home TV boxes. It largely reuses the inner components but discards and replaces the outer casing. It does not redistribute or market the boxes as brand-new items but has found that the customer prefers them to appear new, which is why the outer casing is replaced giving the impression of a new product.

One manufacturer present at the discussion is focussing on design for circularity and beginning to look at business models. It noted that CEBMs always make the process more expensive. If a company spends €1-2m on product development, the business model must be very solid. It is not easy to have a solid business model that is also circular. Another of the manufacturers present is working on service business models adding further evidence that the sector is advancing its thinking in this area.

5.5.3. Benefits and costs

Manufacturers should look at the benefits of moving to CEBMs as well as the costs. There is an example of a Dutch washing machine manufacturer that moved to offer a lease and servicing package for its machines. This gave them a valuable insight into the technical weaknesses of their product because they were responsible for repairing faults and



receiving broken machines. This enabled them to work on these weaknesses and reduce the number of faulty items returned.

5.5.4. Policy, legislation & regulation

There is a need for stronger policy to drive the adoption of CEBMs. Legislation should not only be placed on design but on reuse and recycling as well as raw materials – tax is still on labour and not on raw materials, which works against the circular economy because it does not discourage the use of raw materials. Some discussions have taken place in Nordic countries where legislators urged the EEE sector not to push for new legislation, because this is already prevalent for EEE, but to get agreement amongst stakeholders on an approach they should take. However, it proved difficult to get all stakeholders to agree and be bound by a single approach; one reason was the ability to audit adherence to agreements, for example testing for recycled content in products is difficult.

The WEEE sector is hugely affected by illegal handling of waste, with just one third of WEEE in the EU being treated through official routes. Increased regulation is required to improve this situation and, in some countries, such as the Netherlands and Ireland, the WEEE sector funds regulators to try and decrease the amount of WEEE being illegal treated.

Legislation on waste can work against recycling and reuse. For example, one telecoms company has 50,000 waste components originating in the UK. It wishes to recycle these in Germany but if they are classed as 'waste' this causes a lot of issues in the journey from the UK to Germany. The same applies to any cross-border movement of items classed as waste even if they are destined for a better facility. The cost to the manufacturer of getting products or components returned to them is a barrier to CE.

Some legislation works against other legislation because directorates in the Commission do not always communicate, resulting in items of legislation that inadvertently clash. There is useful legislation in existence e.g. the reuse levy in France, but it is a challenge deciding if one product is more useful than another and enforcement can be difficult.

5.5.5. Other

Product lifespan A short product lifespan is a good argument for leasing EEE. The lifetime of software can often cause this short lifespan, where it stops working before the hardware stops working.

Design Durability should be an aspect of any CEBM Design is one of the main reasons for lack of CE in the EEE sector. Design changes are important as design affects when repair becomes too expensive or impractical, so also affects obsolescence.

Consumer confidence in repaired and refurbished products Consumers need to have confidence that repaired and refurbished products represent a worthwhile and durable purchase. Standards in repair would help instil this confidence as would the availability of warranties and guarantees.



Consumers Any CE model must revolve around the consumer and what the consumer wants. It is too easy to blame low demand for the lack of CEBMs and companies need to accept the responsibility for marketing items that fit with CEBMs.

5.6. Correlation analysis

Analysis was performed to test if there is correlation between the answers supplied and certain attributes of the respondent. This was undertaken to establish if there were different attitudes to E&E and the circular economy depending on these different attributes. The attributes that were tested were:

- Age range;
- Education level;
- Country;
- Europe vs. rest of the world;
- Years of industry experience;
- Size of company.

This information was not collected for all stakeholder groups but at least two of the attributes were available for each group, thus enabling some analysis to be performed for each stakeholder.

The analysis found that there was no correlation between the attributes and the answers given in any of the stakeholder groups. This means that attitudes towards E&E in relation to the circular economy are not necessarily affected by the attributes noted above. Furthermore, that different approaches do not have to be made to different groups of people depending on these attributes. For example, different approaches do not need to be made in different countries.

6. Conclusion and recommendations

6.1. Conclusion

This research enabled the C-SERVEES project to engage extensively with stakeholders that are relevant to the project and can provide valuable input to the development of CEBMs. The receipt of over 1,300 survey responses is considered a success, although two groups, suppliers and retailers, are under-represented.

Although the results provided several surprises, there were many commonalities between the stakeholder groups, particularly those in the EEE supply chain, that have allowed recommendations to be made with some confidence.



6.2 Recommendations

The recommendations provided here are based on the analysis of the results of the survey and the discussions held at the two workshops. They are aimed at providing guidance for the next steps in the project which focus on the development and adoption of the CEBMs. These are listed in a loose order of priority, though it should be stressed that there is very little difference in the level of priority between one and nine.

1. Make the business case to industry

Industry appears unconvinced that there is a solid business and financial case for CEBMs. They rate softer opportunities like building trust and enhanced CSR above harder opportunities such as increased revenue. The advancement of circular economy requires a demonstration to business actors of the sustainability of CE practices as well as incentives to improve the financial viability, i.e. reduce costs and improve profit margins.

2. Convince stakeholders of the benefits of the leasing model

Leasing of products ranked low with all stakeholder groups. Previous research and examples suggest that leasing is a strong option for inclusion in CEBMs. The challenge is to shift the mindset of all stakeholders so that leasing of products is embraced.

3. Create incentives

Incentives geared towards return of products and improving ease of maintenance and repair are required to encourage the adoption and implementation of circularity. These should include fiscal incentives if the cost of repair, refurbishment and remanufacture continue to be of concern to stakeholders. In addition, certificates and guarantees should be used to help sell products.

4. Engage in partnerships

The actors in the value chain need to engage in partnerships. Manufacturers need to be made aware of the technical and operational requirements of WEEE treatment and WEEE handlers need to be informed of which materials are used to manufacture products. Furthermore, the cost and responsibility for implementing CEBMs needs to be shared by all stakeholders.

5. Use ICT tools to share product information

Knowledge of where products are and what they contain is essential for dealing with them at the end of their life.

6. Provide training & education

The adoption of circularity requires training around the basic principles of CE and the development of supporting tools so that all stakeholders understand and appreciate the concept.



7. Harmonise and enforce legislation

Authorities must be called on to harmonise legislation, regulation and enforcement in order to create equivalent market conditions and a level playing field at a global level. Different pieces of legislation in different countries should not contradict each other. Definitions and responsibilities need to be clear.

8. Promote trust and enhanced CSR

Considering that a vast majority of designers, suppliers, manufacturers and retailers identify building trust and enhancing corporate responsibility reputation as distinct economic opportunities, these should be built on and nurtured so that they strengthen and support CEBMs.

9. Stimulate demand or supply

The solution to the chicken and egg problem, i.e. circularity is not offered due to lack of demand, while demand for circular products and services fails to pick up due to lack of supply, is that the one or the other needs to be stimulated. More demand will call for its own supply, while more offering of CE products and services will create its own demand. The other recommendations should help to stimulate at least one of the two and this recommendation acts as reminder that this is key.



Annex A – Survey Questions

Designers – survey

1. CIRCULAR ECONOMY OPPORTUNITIES

Please rate your level of agreement that the following **circular economy opportunities** could add value to your work in designing E&E products (1=mostly agree; 2=agree; 3=mostly disagree; 4= disagree; 5=Don't know).

1.1 ECONOMIC OPPORTUNITIES

- Capturing new markets
- Generating new revenue streams
- Increasing market share
- Enhancing Corporate Social Responsibility reputation
- Building trust
- Reducing production process cost
- Reducing raw material cost
- Reducing energy cost
- Reducing water cost
- Reducing waste related costs
- 1.1.1 If you wish to note any other economic opportunities please do so below.

1.2 SOCIAL OPPORTUNITIES

- Improve customer loyalty
- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers
- 1.2.1 If you wish to note any other social opportunities please do so below.

1.3 TECHNICAL OPPORTUNITIES

- Incorporating labelling and ICT-enabled dematerialization into products
- Using more efficient manufacturing processes
- Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling
- Disruptive development (improvements) in recycling and recovering technologies
- Using 3D printing



- Using blockchain to support and accelerate circular supply chains
- 1.3.1 If you wish to note any other technical opportunities please do so below.

1.4 CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

- Increased recycled content in products
- Realising in house repair, remanufacture, refurbishment and upgrade
- Realising third party repair, remanufacture, refurbishment, upgrade and resale
- Acquiring new customers and business through shared access and use
- Renting or leasing products
- Recovering useful materials from end of life products
- Incentivising return of products

1.4.1 If you wish to note any other business models adoption opportunities please do so below.

2. CIRCULAR ECONOMY CHALLENGES

How would you assess the severity of the following **challenges that could impede the implementation of circular economy practices** in your work in designing E&E products (1=Not a challenge; 2= Insignificant challenge; 3= Significant challenge; 4= Major challenge; 5=Don't know)?

2.1 LEGISLATIVE CHALLENGES

- Lack of awareness of legislative requirements
- Lack of understanding of legislative requirements
- Overregulation
- Inconsistent level of compliance with legislative requirements
- Varying level of enforcement of legislative requirements
- Not enough compliance checks at Member States level
- Unregulated circular economy competition
- Undecided national circular economy legislative requirements
- Lack of global regulatory consensus
- 2.1.1 If you wish to note any other legislative challenges please do so below.

2.2 BUSINESS AND MANAGEMENT CHALLENGES

- Unclear circular economy business case
- No organisational circular economy policy/strategy
- Undeveloped circular economy skills and training
- Insufficient interest from customers



- Lack of collaboration between supply chain parties
- Shift from short-life products to extended life cycle of products
- Insufficient incentives for designing and manufacturing products for end of life circularity

2.2.1 If you wish to note any other business and management challenges please do so below.

2.3 ECONOMIC CHALLENGES

- Low primary raw material prices
- High secondary raw material prices
- Low value and low profit margin of recycled products
- Repairs, refurbishment, remanufacture and recycling costs
- Reverse Logistics costs
- Limited market infrastructure and mechanisms for recovery
- Unclear cost implications to adopt and implement circular economy business models
- Limited maintenance and repair services
- Limited leasing services
- Regional differences (e.g. USA versus China)
- 2.3.1 If you wish to note any other economic challenges please do so below.

2.4 SOCIAL CHALLENGES

- Social trend of replacing rather than repairing products
- Limited social acceptance of reused and refurbished products
- Negative perception of recycled content in new products
- Lack of promotion for sustainable consumption
- Lack of knowledge and understanding of circular products and practices
- Limited maintenance and repair services
- Limited leasing services
- 2.4.1 If you wish to note any other social challenges please do so below.

2.5 TECHNICAL CHALLENGES

- Limited circular economy technical knowledge and supporting tools
- Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)
- Limited circular economy exchange between designers of different industry sectors
- Lack of transparency about products' content



- Limited information for tracking products
- Lack of circular economy metrics and indicators
- Limited circular components capability
- Concerns over personal and/or organisational data security

2.5.1 If you wish to note any other technical challenges please do so below.

2.6 SUPPLY CHAIN CHALLENGES

- Lack of interest from supply chain
- Competing/conflicting priorities among parties in the supply chain
- Concerns over confidentiality among parties in the supply chain
- Limited suppliers offering circular products
- Lack of takeback schemes
- Lack of information on product and material traceability
- Undeveloped infrastructure and technologies for WEEE recovery and circularity

2.6.1 If you wish to note any other supply chain challenges please do so below.

2.7 CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

- Limited understanding of circular economy business models
- Unclear added value in adopting circular economy business models
- Inconsistent supply of secondary raw materials
- End-user unwillingness to accept shared access and use
- End-user reluctance to rent or lease products

2.7.1 If you wish to note any other circular economy business models implementation challenges please do so below.

3. CIRCULAR ECONOMY ENABLERS

How would you assess the viability of the following **enablers for driving the implementation of circular economy practices** in your work in designing E&E products (1=Not an enabler; 2= Insignificant enabler; 3= Significant enabler; 4= Major enabler; 5=Don't know)?

3.1 LEGISLATIVE ENABLERS

- Taxing virgin materials more than recycled feedstock
- Regulated competition
- Campaigns for WEEE legislation awareness, understanding and compliance
- Development of organisational and supply chain tools for compliance monitoring and enforcement



- Mandatory National circular economy legislative requirements
- Global regulatory consensus

3.1.1 If you wish to note any other legislative enabler please do so below.

3.2 BUSINESS AND MANAGEMENT ENABLERS

- Clear circular economy business case
- Circular economy training programmes
- Developing new circular procurement
- Long-term management approach to circular economy
- Considering customer preferences in circular economy business models
- Research and development initiatives to devise strategies and methods to extend the lifecycle of products
- Viable financial feasibility studies for circular economy related capital and operational investments

3.2.1 If you wish to note any other business and management enablers please do so below.

3.3 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Ensuring financial viability of takeback schemes
- Producing secondary raw materials cheaper than primary raw materials
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement
- 3.3.1 If you wish to note any other economic enablers please do so below.

3.4 SOCIAL ENABLERS

- Campaigns to promote circular economy consumption and practices
- Making products' repair and replacement services available
- Increasing accessibility to products' repair and replacement services
- Affordable and reliable leasing services
- 3.4.1 If you wish to note any other social enablers please do so below.

3.5 TECHNICAL ENABLERS

- Enhancing circular economy technical knowledge and skills through training
- Innovative resource efficient recycling and recovery processes



- Availability of information for tracking products
- Development of circular economy metrics
- Development of circular economy key performance indicators
- Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products
- Designing out waste
- Designing and manufacturing for end of life reuse and circularity
- Dissemination of best practice circular economy demonstration projects

3.5.1 If you wish to note any other technical enablers please do so below.

3.6 SUPPLY CHAIN ENABLERS

- Improved circular economy awareness across supply chain
- Enhanced circular economy knowledge and skills through training
- Available information on materials', products and components' traceability
- Suppliers offering circular products
- Accepted assurance schemes for reuse of secondary materials
- Viable takeback schemes
- Viable and cost effective technologies for WEEE recovery

3.6.1 If you wish to note any other supply chain enablers please do so below.

3.7 BUSINESS MODELS' IMPLEMENTATION ENABLERS

- Disseminating the benefits of renting and leasing products
- Developing new circular procurement systems
- Developing innovative design and manufacturing for circular products
- Incentivised return of products e.g. deposits

3.7.1 If you wish to note any other business models' implementation enablers please do so below.

4.1 Please indicate your position in your organisation.*

.....

4.2 Please indicate your years of experience in the industry.*

- <1 year
- 1-5 years
- 5-10 years
- 10-15 years
- >15 years

4.3 Please indicate the number of people employed in the organisation.*



- <10
- 10-49
- 50-249
- >250
- Don't know

4.4 Please indicate the annual turnover of organisation.*

- €0-€2m
- >€2m €10m
- >€10m €50m
- >€50m
- Don't know

4.5 Please indicate the size of your company according to the EU definition:

- Micro
- Small
- Medium
- Large
- Don't know

4.6 Please indicate the country you live in.*

.....

4.6.1 In case you live outside of Europe please specify country.

.....

4.7 Please indicate the city you live in.*

.....

4.8 Please indicate the company you received the invite from to fill in this survey.*

.....

4.9 We may wish to discuss your answers or follow up with you on further questions. If you are happy for us to do so, please provide your e-mail address.

.....

Suppliers – survey

1. CIRCULAR ECONOMY OPPORTUNITIES



Please rate your level of agreement that the following **circular economy opportunities** could add value to the way your organisation trades (1= agree; 2=mostly agree; 3=mostly disagree; 4= disagree; 5=Don't know).

1.1 ECONOMIC OPPORTUNITIES

- Capturing new markets
- Generating new revenue streams
- Increasing market share
- Enhancing Corporate Social Responsibility reputation
- Building trust
- Reducing production process cost
- Reducing raw material cost
- Reducing energy cost
- Reducing water cost
- Reducing waste related costs
- 1.1.1 If you wish to note any other economic opportunities please do so below.

1.2 SOCIAL OPPORTUNITIES

- Improve customer loyalty
- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers
- 1.2.1 If you wish to note any other social opportunities please do so below.

1.3 TECHNICAL OPPORTUNITIES

- Incorporating labelling and ICT-enabled dematerialization into products
- Using more efficient manufacturing processes
- Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling
- Disruptive development (improvements) in recycling and recovering technologies
- Using 3D printing
- Using blockchain to support and accelerate circular supply chains
- 1.3.1 If you wish to note any other technical opportunities please do so below.

1.4 CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

- Increased recycled content in products
- Realising in house repair, remanufacture, refurbishment, upgrade and resale


- Realising third party repair, remanufacture, refurbishment, upgrade and resale
- Acquiring new customers and business through shared access and use
- Renting or leasing products
- Recovering useful materials from end of life products
- Incentivising return of products

1.4.1 If you wish to note any other business models adoption opportunities please do so below.

2. CIRCULAR ECONOMY CHALLENGES

2. How would you assess the severity of the following **challenges that could impede the implementation of circular economy practices** in your processes and products (1=not a challenge; 2= insignificant challenge; 3= significant challenge; 4= major challenge; 5= Don't know)?

2.1 LEGISLATIVE CHALLENGES

- Lack of awareness of legislative requirements
- Lack of understanding of legislative requirements
- Overregulation
- Inconsistent level of compliance with legislative requirements
- Varying level of enforcement of legislative requirements
- Not enough compliance checks at Member States level
- Unregulated circular economy competition
- Undecided national circular economy legislative requirements
- Lack of global regulatory consensus
- 2.1.1 If you wish to note any other legislative challenges please do so below.

2.2 BUSINESS AND MANAGEMENT CHALLENGES

- Unclear circular economy business case
- No organisational circular economy policy/strategy
- Undeveloped circular economy skills and training
- Insufficient interest from customers
- Lack of collaboration between supply chain parties
- Shift from short-life products to extended life cycle of products
- Insufficient incentives for designing and manufacturing products for end of life circularity

2.2.1 If you wish to note any other business and management challenges please do so below.



2.3 ECONOMIC CHALLENGES

- Low primary raw material prices
- High secondary raw material prices
- Low value and low profit margin of recycled products
- repairs, refurbishment, remanufacture and recycling costs
- Reverse Logistics costs
- Limited market infrastructure and mechanisms for recovery
- Unclear cost implications to adopt and implement circular economy business models
- Limited maintenance and repair services
- Limited leasing services
- Regional differences (e.g. USA versus China)
- 2.3.1 If you wish to note any other economic challenges please do so below.

2.4 SOCIAL CHALLENGES

- Social trend of replacing rather than repairing products
- Limited social acceptance of reused and refurbished products
- Negative perception of recycled content in new products
- Lack of promotion for sustainable consumption
- Lack of knowledge and understanding of circular products and practices
- 2.4.1 If you wish to note any other social challenges please do so below.

2.5 TECHNICAL CHALLENGES

- Limited circular economy technical knowledge and supporting tools
- Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)
- Lack of transparency about products' content
- Limited information for tracking products
- Lack of circular economy metrics and indicators
- Limited circular components capability
- Concerns over personal and/or organisational data security
- 2.5.1 If you wish to note any other technical challenges please do so below.

2.6 SUPPLY CHAIN CHALLENGES

- Lack of interest from supply chain
- Competing/conflicting priorities among parties in the supply chain
- Concerns over confidentiality among parties in the supply chain
- Limited suppliers offering circular products



- Lack of takeback schemes
- Lack of information on product and material traceability
- Undeveloped infrastructure and technologies for WEEE recovery and circularity

2.6.1 If you wish to note any other supply chain challenges please do so below.

2.7 CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

- Limited understanding of circular economy business models
- Unclear added value in adopting circular economy business models
- Inconsistent supply of secondary raw materials
- End-user unwillingness to accept shared access and use
- End-user reluctance for renting or leasing products

2.7.1 If you wish to note any other circular economy business models implementation challenges please do so below.

3. CIRCULAR ECONOMY ENABLERS

3. How would you assess the viability of the following **enablers that could drive the implementation of circular economy practices** in processes and products (1=not an enabler; 2= insignificant enabler; 3= significant enabler; 4= major enabler; 5= Don't know)?

3.1 LEGISLATIVE ENABLERS

- Taxing virgin materials more than recycled feedstock
- Regulated competition
- Campaigns for WEEE legislation awareness, understanding and compliance
- Development of organisational and supply chain tools for compliance monitoring and enforcement
- Mandatory National circular economy legislative requirements
- Global regulatory consensus
- 3.1.1 If you wish to note any other legislative enabler please do so below.

3.2 BUSINESS AND MANAGEMENT ENABLERS

- Clear circular economy business case
- Circular economy training programmes
- Developing new circular procurement
- Long-term management approach to circular economy
- Considering customer preferences in circular economy business models



- Research and development initiatives to devise strategies and methods to extend the lifecycle of products
- Viable financial feasibility studies for circular economy related capital and operational investments

3.2.1 If you wish to note any other business and management enablers please do so below.

3.3 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Ensuring financial viability of takeback schemes
- Producing secondary raw materials cheaper than primary raw materials
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement
- 3.3.1 If you wish to note any other economic enablers please do so below.

3.4 SOCIAL ENABLERS

- Campaigns to promote circular economy consumption and practices
- Making products' repair and replacement services available
- Increasing accessibility to products' repair and replacement services
- Affordable and reliable leasing services
- 3.4.1 If you wish to note any other social enablers please do so below.

3.5 TECHNICAL ENABLERS

- Enhancing circular economy technical knowledge and skills through training
- Innovative resource efficient recycling and recovery processes
- Availability of information for tracking products
- Development of circular economy metrics
- Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products
- Designing and manufacturing for end of life reuse and circularity
- Dissemination of best practice circular economy demonstration projects

3.5.1 If you wish to note any other technical enablers please do so below.

3.6 SUPPLY CHAIN ENABLERS

• Improved circular economy awareness across supply chain



- Enhanced circular economy knowledge and skills through training
- Available information on materials', products and components' traceability
- Suppliers offering circular products
- Accepted assurance schemes for reuse of secondary materials
- Viable takeback schemes
- Viable and cost effective technologies for WEEE recovery

3.6.1 If you wish to note any other supply chain enablers please do so below.

3.7 BUSINESS MODELS' IMPLEMENTATION ENABLERS

- Disseminating the benefits of renting and leasing products
- Developing new circular procurement systems
- Developing innovative design and manufacturing for circular products
- Incentivised return of products e.g. deposits

3.7.1 If you wish to note any business models' implementation enablers please do so below.

4.1 Please indicate your position in your organisation.

.....

4.2 Please indicate your years of experience in the industry.*

- <1 year
- 1-5 years
- 5-10 years
- 10-15 years
- >15 years

4.3 Please indicate the number of people employed in the organisation.*

- <10
- 10-49
- 50-249
- >250
- Don't know

4.4 Please indicate the annual turnover of organisation.*

- €0-€2m
- >€2m €10m
- >€10m €50m



- >€50m
- Don't know

4.5 Please indicate the size of your company according to the EU definition:

- Micro
- Small
- Medium
- Large
- Don't know

4.6 Please indicate the country you live in.*

.....

4.6.1 In case you live outside of Europe please specify country.

.....

4.7 Please indicate the city you live in.*

.....

4.8 Please indicate the company you received the invite from to fill in this survey.*

.....

4.9 We may wish to discuss your answers or follow up with you on further questions. If you are happy for us to do so, please provide your e-mail address.

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Your response has been recorded. Thank you for answering the C-SERVEES project survey. If you wish to receive further updates on the C-SERVEES project, attend our events or be involved in future consultation exercises, please go to the project website www.c-serveesproject.eu/and click on the 'Join the Network' menu to register.

Manufacturers – survey

1. CIRCULAR ECONOMY OPPORTUNITIES

1. Please rate your level of agreement that the following **circular economy opportunities** could add value to your organisation (1=agree; 2=mostly agree; 3=mostly disagree; 4= disagree; 5= Don't know).

1.1 ECONOMIC OPPORTUNITIES

• Capturing new markets



- Generating new revenue streams
- Increasing market share
- Enhancing Corporate Social Responsibility reputation
- Building trust
- Reducing production process cost
- Reducing raw material cost
- Reducing energy cost
- Reducing water cost
- Reducing waste related costs
- 1.1.1 If you wish to note any other economic opportunities please do so below.

1.2 SOCIAL OPPORTUNITIES

- Improve customer loyalty
- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers
- 1.2.1 If you wish to note any other social opportunities please do so below.

1.3 TECHNICAL OPPORTUNITIES

- Incorporating labelling and ICT-enabled dematerialization into products
- Using more efficient manufacturing processes
- Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling
- Disruptive development (improvements) in recycling and recovering technologies
- Using 3D printing
- Using blockchain to support and accelerate circular supply chains
- 1.3.1 If you wish to note any other technical opportunities please do so below.

1.4 CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

- Increased recycled content in products
- Realising in house repair, remanufacture, refurbishment, upgrade and resale
- Realising third party repair, remanufacture, refurbishment, upgrade and resale
- Acquiring new customers and business through shared access and use
- Renting or leasing products
- Recovering useful materials from end of life products



• Incentivising return of products

1.4.1 If you wish to note any other business models adoption opportunities please do so below.

2. CIRCULAR ECONOMY CHALLENGES

2. How would you assess the severity of the following **challenges that could impede the implementation of circular economy practices** in your manufacturing processes and products (1=not a challenge; 2= insignificant challenge; 3= significant challenge; 4= major challenge)?

2.1 LEGISLATIVE CHALLENGES

- Lack of awareness of legislative requirements
- Lack of understanding of legislative requirements
- Overregulation
- Inconsistent level of compliance with legislative requirements
- Varying level of enforcement of legislative requirements
- Not enough compliance checks at Member States level
- Unregulated circular economy competition
- Undecided national circular economy legislative requirements
- Lack of global regulatory consensus
- 2.2.1 If you wish to note any other legislative challenges please do so below.

2.2 BUSINESS AND MANAGEMENT CHALLENGES

- Unclear circular economy business case
- No organisational circular economy policy/strategy
- Undeveloped circular economy skills and training
- Insufficient interest from customers
- Lack of collaboration between supply chain parties
- Shift from short-life products to extended life cycle of products
- Insufficient incentives for designing and manufacturing products for end of life circularity

2.2.1 If you wish to note any other business and management challenges please do so below.

2.3 ECONOMIC CHALLENGES

- Low primary raw material prices
- High secondary raw material prices
- Low value and low profit margin of recycled products



- Repairs, refurbishment, remanufacture and recycling costs
- Reverse Logistics costs
- Limited market infrastructure and mechanisms for recovery
- Unclear cost implications to adopt and implement circular economy business models
- Limited maintenance and repair services
- Limited leasing services
- Regional differences (e.g. USA versus China)
- 2.3.1 If you wish to note any other economic challenges please do so below.

2.4 SOCIAL CHALLENGES

- Social trend of replacing rather than repairing products
- Limited social acceptance of reused and refurbished and recycled products
- Negative perception of recycled content in new products
- Lack of promotion for sustainable consumption
- Lack of knowledge and understanding of circular products and practices
- 2.4.1 If you wish to note any other social challenges please do so below.

2.5 TECHNICAL CHALLENGES

- Limited circular economy technical knowledge and supporting tools
- Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)
- Lack of transparency about products' content
- Limited information for tracking products
- Lack of circular economy metrics and indicators
- Limited circular components capability
- Concerns over personal and/or organisational data security
- 2.5.1 If you wish to note any other technical challenges please do so below.

2.6 SUPPLY CHAIN CHALLENGES

- Lack of interest from supply chain
- Competing/conflicting priorities among parties in the supply chain
- Concerns over confidentiality among parties in the supply chain
- Limited suppliers offering circular products
- Lack of takeback schemes
- Lack of information on product and material traceability
- Undeveloped infrastructure and technologies for WEEE recovery and circularity



2.6.1 If you wish to note any other supply chain challenges please do so below.

2.7 CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

- Limited understanding of circular economy business models
- Unclear added value in adopting circular economy business models
- Inconsistent supply of secondary raw materials
- End-user unwillingness to accept shared access and use
- End-user reluctance to rent or lease products

2.7.1 If you wish to note any other circular economy business models implementation challenges please do so below.

3. CIRCULAR ECONOMY ENABLERS

3. How would you assess the viability of the following **enablers that could drive the implementation of circular economy practices** in your manufacturing processes and products (1=not an enabler; 2= insignificant enabler; 3= significant enabler; 4= major enabler; 5=Don't know)?

3.1 LEGISLATIVE ENABLERS

- Taxing virgin materials more than recycled feedstock
- Regulated competition
- Campaigns for WEEE legislation awareness, understanding and compliance
- Development of organisational and supply chain tools for compliance monitoring and enforcement
- Mandatory National circular economy legislative requirements
- Global regulatory consensus
- 3.1.1 If you wish to note any other legislative enabler please do so below.

3.2 BUSINESS AND MANAGEMENT ENABLERS

- Clear circular economy business case
- Circular economy training programmes
- Developing new circular procurement
- Long-term management approach to circular economy
- Considering customer preferences in circular economy business models
- Research and development initiatives to devise strategies and methods to extend the lifecycle of products
- Viable financial feasibility studies for circular economy related capital and operational investments

3.2.1 If you wish to note any other business and management enablers please do so below.



3.3 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Ensuring financial viability of takeback schemes
- Producing secondary raw materials cheaper than primary raw materials
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement
- 3.3.1 If you wish to note any other economic enablers please do so below.

3.4 SOCIAL ENABLERS

- Campaigns to promote circular economy consumption and practices
- Making products' repair and replacement services available
- Increasing accessibility to products' repair and replacement services
- Affordable and reliable leasing services
- 3.4.1 If you wish to note any other social enablers please do so below.

3.5 TECHNICAL ENABLERS

- Enhancing circular economy technical knowledge and skills through training
- Innovative resource efficient recycling and recovery processes
- Availability of information for tracking products
- Development of circular economy metrics
- Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products
- Designing and manufacturing for end of life reuse and circularity
- Dissemination of best practice circular economy demonstration projects

3.5.1 If you wish to note any other technical enablers please do so below.

3.6 SUPPLY CHAIN ENABLERS

- Improved circular economy awareness across supply chain
- Enhanced circular economy knowledge and skills through training
- Available information on materials', products and components' traceability
- Suppliers offering circular products
- Accepted assurance schemes for reuse of secondary materials
- Viable takeback schemes
- Viable and cost effective technologies for WEEE recovery



3.6.1 If you wish to note any other supply chain enablers please do so below.

3.7 BUSINESS MODELS' IMPLEMENTATION ENABLERS

- Disseminating the benefits of renting and leasing products
- Developing new circular procurement systems
- Developing innovative design and manufacturing for circular products
- Incentivised return of products e.g. deposits

3.7.1 If you wish to note any other business models' implementation enablers please do so below.

4.1 Please indicate your position in your organisation.*

.....

4.2 Please indicate your years of experience in the industry.*

- <1 year
- 1-5 years
- 5-10 years
- 10-15 years
- >15 years

4.3 Please indicate the number of people employed in the organisation.*

- <10
- 10-49
- 50-249
- >250
- Don't know

4.4 Please indicate the annual turnover of organisation.*

- €0-€2m
- >€2m €10m
- >€10m €50m
- >€50m
- Don't know

4.5 Please indicate the size of your company according to the EU definition:

- Micro
- Small
- Medium



- Large
- Don't know

4.6 Please indicate the country you live in.*

.....

4.6.1 In case you live outside of Europe please specify country.

.....

4.7 Please indicate the city you live in.*

.....

4.8 Please indicate the company you received the invite from to fill in this survey.*

.....

4.9 We may wish to discuss your answers or follow up with further questions. If you are happy for us to do so, please provide your e-mail address.

.....

Retailers – survey

1. CIRCULAR ECONOMY OPPORTUNITIES

 Please rate your level of agreement that the following circular economy opportunities could add value to your retail operations in the E&E sector (1= agree; 2=mostly agree; 3=mostly disagree; 4= disagree; 5=Don't know).

1.1 ECONOMIC OPPORTUNITIES

- Capturing new markets
- Generating new revenue streams
- Increasing market share
- Enhancing Corporate Social Responsibility reputation
- Building trust
- Reducing production process cost
- Reducing raw material cost
- Reducing energy cost
- Reducing water cost
- Reducing waste related costs
- 1.1.1 If you wish to note any other economic opportunities please do so below.



1.2 SOCIAL OPPORTUNITIES

- Improve customer loyalty
- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers

1.2.1 If you wish to note any other social opportunities please do so below.

1.3 TECHNICAL OPPORTUNITIES

- Incorporating labelling and ICT-enabled dematerialization into products
- Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling
- Disruptive development (improvements) in recycling and recovering technologies
- Using 3D printing
- Using blockchain to support and accelerate circular supply chains
- 1.3.1 If you wish to note any other technical opportunities please do so below.

1.4 CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

- Increased recycled content in products
- Realising in house repair, remanufacture, refurbishment, upgrade and resale
- Realising third party repair, remanufacture, refurbishment, upgrade and resale
- Acquiring new customers and business through shared access and use
- Renting or leasing products
- Recovering useful materials from end of life products
- Incentivising return of products

1.4.1 If you wish to note any other business models adoption opportunities please do so below.

2. CIRCULAR ECONOMY CHALLENGES

2. How would you assess the severity of the following **challenges that could impede the implementation of circular economy practices** in your retail operations with the electrical and electronic products you sell (1=not a challenge; 2= insignificant challenge; 3= significant challenge; 4= major challenge; 5= Don't know)?

2.1 LEGISLATIVE CHALLENGES

• Lack of awareness of legislative requirements



- Lack of understanding of legislative requirements
- Overregulation
- Inconsistent level of compliance with legislative requirements
- Varying level of enforcement of legislative requirements
- Not enough compliance checks at Member States level
- Unregulated circular economy competition
- Undecided national circular economy legislative requirements
- Lack of global regulatory consensus

2.1.1 If you wish to note any other legislative challenges please do so below.

2.2 BUSINESS AND MANAGEMENT CHALLENGES

- Unclear circular economy business case
- No organisational circular economy policy/strategy
- Undeveloped circular economy skills and training
- Insufficient interest from customers
- Lack of collaboration between organisation and supply chain

2.2.1 If you wish to note any other business and management challenges please do so below.

2.3 ECONOMIC CHALLENGES

- Low value and low profit margin of recycled products
- Repairs, refurbishment, remanufacture and recycling costs
- Limited market infrastructure and mechanisms for recovery
- Limited maintenance and repair services
- Limited leasing services
- Regional differences (e.g. USA versus China)
- 2.3.1 If you wish to note any other economic challenges please do so below.

2.4 SOCIAL CHALLENGES

- Social trend of replacing rather than repairing products
- Limited social acceptance of reused and refurbished products
- Negative perception of recycled content in new products
- Lack of promotion for sustainable consumption
- Lack of knowledge and understanding of circular products and practices

2.4.1 If you wish to note any other social challenges please do so below.

2.5 TECHNICAL CHALLENGES

• Limited circular economy technical knowledge and supporting tools



- Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)
- Lack of transparency about products' content
- Limited information for tracking products
- Limited circular components capability
- Concerns over personal and/or organisational data security

2.5.1 If you wish to note any other technical challenges please do so below.

2.6 SUPPLY CHAIN CHALLENGES

- Lack of interest from supply chain
- Competing/conflicting priorities among parties in the supply chain
- Concerns over confidentiality among parties in the supply chain
- Limited suppliers offering circular products
- Lack of takeback schemes
- Lack of information on product and material traceability
- Undeveloped infrastructure and technologies for WEEE recovery and circularity

2.6.1 If you wish to note any other supply chain challenges please do so below.

2.7 CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

- Limited understanding of circular economy business models
- Unclear added value in adopting circular economy business models
- Inconsistent supply of secondary raw materials
- End-user unwillingness to accept shared access and use
- End-user reluctance to rent or lease products

2.7.1 If you wish to note any other circular economy business models implementation challenges please do so below.

3. CIRCULAR ECONOMY ENABLERS

3. How would you assess the viability of the following **enablers that could drive the implementation of circular economy practices** in your e-sector retail operations (1=not an enabler; 2= insignificant enabler; 3= significant enabler; 4= major enabler; 5= Don't know)?

3.1 LEGISLATIVE ENABLERS

- Taxing virgin materials more than recycled feedstock
- Regulated competition
- Campaigns for WEEE legislation awareness, understanding and compliance
- Mandatory National circular economy legislative requirements



- Global regulatory consensus
- 3.1.1 If you wish to note any other legislative enabler please do so below.

3.2 BUSINESS AND MANAGEMENT ENABLERS

- Clear circular economy business case
- Circular economy training programmes
- Developing new circular procurement
- Long-term management approach to circular economy
- Considering customer preferences in circular economy business models
- Research and development initiatives to devise strategies and methods to extend the lifecycle of products
- Viable financial feasibility studies for circular economy related capital and operational investments

3.2.1 If you wish to note any other business and management enablers please do so below.

• 3.3 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Ensuring financial viability of takeback schemes
- Producing secondary raw materials cheaper than primary raw materials
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement
- 3.3.1 If you wish to note any other economic enablers please do so below.
 - 3.4 SOCIAL ENABLERS
 - Campaigns to promote circular economy consumption and practices
 - Making products' repair and replacement services available
 - Increasing accessibility to products' repair and replacement services
 - Affordable and reliable leasing services
- 3.4.1 If you wish to note any other social enablers please do so below.

3.5 TECHNICAL ENABLERS

- Enhancing circular economy technical knowledge and skills through training
- Innovative resource efficient recycling and recovery processes
- Availability of information for tracking products



- Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products
- Dissemination of best practice circular economy demonstration projects

3.5.1 If you wish to note any other technical enablers please do so below.

3.6 SUPPLY CHAIN ENABLERS

- Improved circular economy awareness across supply chain
- Enhanced circular economy knowledge and skills through training
- Available information on materials', products and components' traceability
- Suppliers offering circular products
- Accepted assurance schemes for reuse of secondary materials
- Viable takeback schemes
- Viable and cost effective technologies for WEEE recovery

3.6.1 If you wish to note any other supply chain enablers please do so below.

4.1 Please indicate your position in your organisation.*

.....

4.2 Please indicate your years of experience in the industry.*

- <1 year
- 1-5 years
- 5-10 years
- 10-15 years
- >15 years

4.3 Please indicate the number of people employed in the organisation.*

- <10
- 10-49
- 50-249
- >250
- Don't know

4.4 Please indicate the annual turnover of organisation.*

- €0-€2m
- >€2m €10m
- >€10m €50m
- >€50m



• Don't know

4.5 Please indicate the size of your company according to the EU definition:

- Micro
- Small
- Medium
- Large
- Don't know

4.6 Please indicate the country you live in.*

.....

4.6.1 In case you live outside of Europe please specify country.

.....

4.7 Please indicate the city you live in.*

.....

4.8 Please indicate the company you received the invite from to fill in this survey.*

.....

4.9 We may wish to discuss your answers or follow up with further questions. If you are happy for us to do so, please provide your e-mail address.

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Business End Users – survey

1. DECISION FACTORS TO PURCHASE E&E PRODUCTS

Please rate your level of agreement that the following **factors influence your decision to purchase electrical and electronic products** (1= agree; 2= mostly agree; 3= no influence 4= mostly disagree; 5= disagree)

- Responsibly sourced products
- Energy and/or water efficient products
- Durable products
- Low maintenance and easily repairable products
- Availability of repair shops
- Products associated with leasing services

1.2 If you wish to note any other influencing factor please do so below.

2. CIRCULAR ECONOMY OPPORTUNITIES



2. Please rate your level of agreement that the following **circular economy opportunities would be of benefit to business users of electrical and electronic equipment** (1= agree; 2= mostly agree; 3= mostly disagree; 4= disagree 5=Don't know)?

2.1 SOCIAL OPPORTUNITIES

- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers
- 2.1.1 If you wish to note any other social opportunities please do so below.

2.2 TECHNICAL OPPORTUNITIES

- Reuse and easy maintenance and repair of products
- Improving WEEE collection methods
- Optimization/improvements in WEEE recycling methods
- 2.2.1 If you wish to note any other technical opportunities please do so below.

2.3 CIRCULAR ECONOMY BUSINESS MODELS OPPORTUNITIES

- Renting or leasing products
- Incentivising return of products

2.3.1 If you wish to note any other business models adoption opportunities please do so below.

3. CIRCULAR ECONOMY CHALLENGES

3. How would you assess the severity of the following **challenges to users' circular consumption of electrical and electronic products** (1=not a challenge; 2= insignificant challenge; 3= significant challenge; 4= major challenge; 5= Don't know)?

3.1 SOCIAL CHALLENGES

- Lack of knowledge and understanding of circular products and practices
- Lack of awareness on circular economy benefits
- Social trend of replacing rather than repairing products
- Limited social acceptance of reused, refurbished and recycled products
- Limited maintenance and repair services
- Limited leasing services

3.1.1 If you wish to note any other social challenges please do so below.

3.2 TECHNICAL CHALLENGES



- Concerns over personal and/or organisational data security
- Limited best practice circular economy demonstration projects
- Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)

3.2.1 If you wish to note any other technical challenges please do so below.

4. CIRCULAR ECONOMY ENABLERS

4. How would you assess the viability of the following **enablers that could drive users' circular consumption of electrical and electronic products** (1=not an enabler; 2= insignificant enabler; 3= significant enabler; 4= major enabler; 5=Don't know)?

4.1 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement
- 4.1.1 If you wish to note any other economic enabler please do so below.

4.2 SOCIAL ENABLERS

- Campaigns to promote circular economy consumption and practices
- Making products' repair and replacement services available
- Increasing accessibility to products' repair and replacement services
- Affordable and reliable leasing services
- 4.2.1 If you wish to note any other social enabler please do so below.

4.3 TECHNICAL ENABLERS

- Availability of information for tracking products
- Mechanisms to avoid exposure of stored personal data in E&E products
- Designing and manufacturing for end of life reuse and circularity
- Dissemination of best practice circular economy demonstration projects
- 4.3.1 If you wish to note any other technical enabler please do so below.

5.1 Please indicate your position in your organisation.*

.....



5.2 Please indicate your years of experience in the industry.*

- <1 year
- 1-5 years
- 5-10 years
- 10-15 years
- >15 years

5.3 Please indicate the number of people employed in the organisation.*

- <10
- 10-49
- 50-249
- >250
- Don't know

5.4 Please indicate the annual turnover of organisation.*

- €0-€2m
- >€2m €10m
- >€10m €50m
- >€50m
- Don't know

5.5 Please indicate the size of your company according to the EU definition:

- Micro
- Small
- Medium
- Large
- Don't know

5.6 Please indicate the country you live in.*

.....

5.6.1 In case you live outside of Europe please specify country.

.....

5.7 Please indicate the city you live in.*

.....

5.8 Please indicate the company you received the invite from to fill in this survey.*

.....



5.9 We may wish to discuss your answers or follow up with you on further questions. If you are happy for us to do so, please provide your e-mail address.

.....

Household End Users – survey

1. DECISION FACTORS TO PURCHASE E&E PRODUCTS

1. Please rate your level of agreement that the following **factors influence your decision to purchase electrical and electronic products** (1= strongly disagree; 2=disagree; 3=No influence 4= agree; 5= strongly agree).

- Responsible sourced products
- Energy and/or water efficient products
- Durable products
- Low maintenance and easily repairable products
- Availability of repair shops
- Products associated with leasing services

1.2 If you wish to note any other factor please do so below.

2. CIRCULAR ECONOMY OPPORTUNITIES

2. Please rate your level of agreement that the following **circular economy opportunities could add value to electrical and electronic equipment users/customers** (1=strongly disagree; 2=disagree; 3=agree; 4= strongly agree; 5= I don't know).

2.1 SOCIAL OPPORTUNITIES

- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers
- 2.1.1 If you wish to note any other social opportunities please do so below.

2.2 TECHNICAL OPPORTUNITIES

- Reuse and easy maintenance and repair of products
- Improving WEEE collection methods
- Optimization/improvements in WEEE recycling methods
- 2.2.1 If you wish to note any other technical opportunities please do so below.



2.3 CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

- Renting or leasing products
- Incentivising return of products

2.3.1 If you wish to note any other business models adoption opportunities please do so below.

3. CIRCULAR ECONOMY CHALLENGES

How would you assess the severity of the following **challenges to users' circular consumption of electrical and electronic products** (1=not a challenge; 2= insignificant challenge; 3= significant challenge; 4= major challenge; 5= I don't know)?

SOCIAL CHALLENGES

- Lack of knowledge and understanding of circular products and practices
- Lack of awareness on circular economy benefits
- Social trend of replacing rather than repairing products
- Limited social acceptance of reused, refurbished and recycled products
- Limited maintenance and repair services
- Limited leasing services

3.1.1 If you wish to note any other social challenges please do so below.

TECHNICAL CHALLENGES

- Concerns over personal and/or organisational data security
- Limited best practice circular economy demonstration projects

3.2.1 If you wish to note any other technical challenges please do so below.

4. CIRCULAR ECONOMY ENABLERS

4. How would you assess the viability of the following **enablers that could drive users' circular consumption of electrical and electronic products** (1=not an enabler; 2= insignificant enabler; 3= significant enabler; 4= major enabler; 5= Don't know)?

4.1 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement



4.1.1 If you wish to note any other economic enabler please do so below.

4.2 SOCIAL ENABLERS

- Campaigns to promote circular economy consumption and practices
- Making products' repair and replacement services available
- Increasing accessibility to products' repair and replacement services
- Affordable and reliable leasing services
- 4.2.1 If you wish to note any other social enabler please do so below.

4.3 TECHNICAL ENABLERS

- Mechanisms to avoid exposure of stored personal data in E&E products
- Designing and manufacturing for end of life reuse and circularity
- Dissemination of best practice circular economy demonstration projects
- **5.3.1** If you wish to note any other technical enabler please do so below.

5.1 Please indicate your age. *

- < 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75 or older
- Prefer not to say

5.2 Please indicate your gender.*

- Male
- Female
- Prefer not to say
- 5.3 Please indicate your education level.*
- High School
- College no degree
- Bachelor's degree
- Master's degree
- Professional degree
- Doctorate degree
- Prefer not to say

5.4 Please indicate the country you live in.*



.....

5.5 Please indicate the city you live in.*

.....

5.6 We may wish to discuss your answers or follow up with further questions. If you are happy for us to do so, please provide your e-mail address.

.....

WEEE Handlers – survey

1. CIRCULAR ECONOMY OPPORTUNITIES

1. Please rate your level of agreement that the following **circular economy opportunities** could add value to your company (1=Agree; 2=mostly agree; 3=mostly disagree; 4= Disagree; 5=Don't know).

1.1 ECONOMIC OPPORTUNITIES

- Capturing new markets
- Generating new revenue streams
- Increasing market share
- Enhancing Corporate Social Responsibility reputation
- Building trust

1.1.1 If you wish to note any other economic opportunities please do so below.

1.2 SOCIAL OPPORTUNITIES

- Improve customer loyalty
- Presence of product certifications and guarantees
- Reuse and easy maintenance and repair of products
- Enhance circular economy knowledge and skills
- Overcome gender, age and social barriers
- 1.2.1 If you wish to note any other social opportunities please do so below.

1.3 TECHNICAL OPPORTUNITIES

- Incorporating labelling and ICT-enabled dematerialization into products
- Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling



- Disruptive development (improvements) in recycling and recovering technologies
- Using 3D printing
- Using blockchain to support and accelerate circular supply chains

1.3.1 If you wish to note any other technical opportunities please do so below.

1.4 CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

- Realising in house repair, remanufacture, refurbishment, upgrade and resale
- Realising third party repair, remanufacture, refurbishment, upgrade and resale
- Recovering useful materials from end of life products

1.4.1 If you wish to note any other business models adoption opportunities please do so below.

2. CIRCULAR ECONOMY CHALLENGES

2. How would you assess the severity of the following **challenges that could impede the implementation of circular economy practices** in your processes and products (1=not a challenge; 2= insignificant challenge; 3= significant challenge; 4= major challenge; 5=Don't know)?

2.1 LEGISLATIVE CHALLENGES

- Overregulation
- Inconsistent level of compliance with legislative requirements
- Varying level of enforcement of legislative requirements
- Not enough compliance checks at Member States level
- Unregulated circular economy competition
- Undecided national circular economy legislative requirements
- Lack of global regulatory consensus

2.1.1 If you wish to note any other legislative challenges please do so below.

- 2.2 BUSINESS AND MANAGEMENT CHALLENGES
- Unclear circular economy business case
- No organisational circular economy policy/strategy
- Undeveloped circular economy skills and training
- Limited interest from senior management
- Insufficient interest from customers
- Lack of collaboration between supply chain parties
- Insufficient incentives for designing and manufacturing products for end of life circularity
- Shift from short-life products to extended life cycle of products



•

2.2.1 If you wish to note any other business and management challenges please do so below.

2.3 ECONOMIC CHALLENGES

- Low primary raw material prices
- High secondary raw material prices
- Low value and low profit margin of recycled products
- Repairs, refurbishment, remanufacture and recycling costs
- Reverse Logistics costs
- Limited market infrastructure and mechanisms for recovery
- Unclear cost implications to adopt and implement circular economy business models
- Limited maintenance and repair services

2.3.1 If you wish to note any other economic challenges please do so below.

2.4 SOCIAL CHALLENGES

- Social trend of replacing rather than repairing products
- Limited social acceptance of reused and refurbished products
- Negative perception of recycled content in new products
- Lack of promotion for sustainable consumption
- Lack of knowledge and understanding of circular products and practices
- 2.4.1 If you wish to note any other social challenges please do so below.

2.5 TECHNICAL CHALLENGES

- Limited circular economy technical knowledge and supporting tools
- Lack of transparency about products' content
- Limited information for tracking products
- Concerns over personal and/or organisational data security
- Limited best practice circular economy demonstration projects
- 2.5.1 If you wish to note any other technical challenges please do so below.

2.67 SUPPLY CHAIN CHALLENGES

- Lack of interest from supply chain
- Competing/conflicting priorities among parties in the supply chain
- Concerns over confidentiality among parties in the supply chain
- Limited suppliers offering circular products
- Lack of takeback schemes



- Lack of information on product and material traceability
- Undeveloped infrastructure and technologies for WEEE recovery and circularity

2.6.1 If you wish to note any other supply chain challenges please do so below.

2.7 CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

- Unclear circular economy business case
- No organisational circular economy policy/strategy
- Undeveloped circular economy skills and training
- Insufficient interest from customers
- Lack of collaboration between supply chain parties
- Shift from short-life products to extended life cycle of products
- Insufficient incentives for designing and manufacturing products for end of life circularity

2.7.1 If you wish to note any other circular economy business models implementation challenges please do so below.

3. CIRCULAR ECONOMY ENABLERS

3. How would you assess the viability of the following **enablers that could drive the implementation of circular economy practices** in your processes and products (1=not an enabler; 2= insignificant enabler; 3= significant enabler; 4= major enabler; 5=Don't know)?

3.1 LEGISLATIVE ENABLERS

- Taxing virgin materials more than recycled feedstock
- Regulated competition
- Campaigns for WEEE legislation awareness, understanding and compliance
- Development of organisational and supply chain tools for compliance monitoring and enforcement
- Mandatory National circular economy legislative requirements
- Global regulatory consensus

3.1.1 If you wish to note any other legislative enablers please do so below.

3.2 BUSINESS AND MANAGEMENT ENABLERS

- Clear circular economy business case
- Circular economy training programmes
- Developing new circular procurement
- Long-term management approach to circular economy
- Considering customer preferences in circular economy business models



- Research and development initiatives to devise strategies and methods to extend the lifecycle of products
- Viable financial feasibility studies for circular economy related capital and operational investments

3.2.1 If you wish to note any other business and management enablers please do so below.

3.3 ECONOMIC ENABLERS

- Additional government funding for circular economy skills training of people
- Funding research to optimise circular products
- Ensuring financial viability of circular products
- Ensuring financial viability of takeback schemes
- Producing secondary raw materials cheaper than primary raw materials
- Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT
- Green Public Procurement

3.3.1 If you wish to note any other economic enablers please do so below.

3.4 SOCIAL ENABLERS

- Campaigns to promote circular economy consumption and practices
- Making products' repair and replacement services available
- Increasing accessibility to products' repair and replacement services
- Affordable and reliable leasing services
- 3.4.1 If you wish to note any other social enablers please do so below.

3.5 TECHNICAL ENABLERS

- Enhancing circular economy technical knowledge and skills through training
- Innovative resource efficient recycling and recovery processes
- Availability of information for tracking products
- Development of circular economy metrics
- Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products
- Designing and manufacturing for end of life reuse and circularity
- Dissemination of best practice circular economy demonstration projects

3.5.1 If you wish to note any other technical enablers please do so below.

3.6 SUPPLY CHAIN ENABLERS



- Improved circular economy awareness across supply chain
- Enhanced circular economy knowledge and skills through training
- Available information on materials', products and components' traceability
- Suppliers offering circular products
- Accepted assurance schemes for reuse of secondary materials
- Viable takeback schemes
- Viable and cost effective technologies for WEEE recovery
- 3.6.1 If you wish to note any other supply chain enablers please do so below.

3.7 BUSINESS MODELS' IMPLEMENTATION ENABLERS

- Disseminating the benefits of renting and leasing products
- Developing new circular procurement systems
- Developing innovative recycling and recovery technologies for circular products3.7.1 If you wish to note any other business models' implementation enablers please do so below.

4.1 Please indicate your position in your organisation.*

.....

4.2 Please indicate your years of experience in the industry.*

- <1 year
- 1-5 years
- 5-10 years
- 10-15 years
- >15 years

4.3 Please indicate the number of people employed in the organisation.*

- <10
- 10-49
- 50-249
- >250
- Don't know

4.4 Please indicate the annual turnover of organisation.*

- €0-€2m
- >€2m €10m
- >€10m €50m
- >€50m
- Don't know



4.5 Please indicate the size of your company according to the EU definition:

- Micro
- Small
- Medium
- Large
- Don't know

4.6 Please indicate the country you live in.*

.....

4.6.1 In case you live outside of Europe please specify country.

.....

4.7 Please indicate the city you live in.*

.....

4.8 Please indicate the company you received the invite from to fill in this survey.*

.....

4.9 We may wish to discuss your answers or follow up with you on further questions. If you are happy for us to do so, please provide your e-mail address.

.....



Annex B – Charts showing all results

Designers – results charts

Survey Responeses = 92

Participation of each country in the survey Acros the world

Analysis to Designers



Participation of each country in the survey - Europe

Analysis to Designers







Participation of each country in the survey - Europe

Percentage
52,9%
8,6%
8,6%
7,1%
7,1%
5,7%
2,9%
2,9%
1,4%
1,4%
1,4%



Participation of each country in the survey - Europe Vs rest of the world

Analysis to Designers



No answers from French Guiana

Participation of each country in the survey - Europe Vs rest of the world

Analysis to Designers





Country (world)	Percentage
Turkey	41,6%
United States	13,5%
Italy	6,7%
United Kingdom	6,7%
Germany	5,6%
Spain	5,6%
Romania	4,5%
Russia	4,5%
Netherlands	2,2%
China	2,2%
France	1,1%
Ireland	1,1%
Slovakia	1,1%
Switzerland	1,1%
Malaysia	1,1%
Japan	1,1%

Size of the company

Analysis to Designers




ECONOMIC OPPORTUNITIES

Agree Mostly Agree Mostly Disa	agree 📕 Disagree 📕	Don't know			
	0% 25	5% 50)% 7	5%	100%
Enhancing Corporate Social Responsibility reputation	50%		35%	8%	6%
Building trust	46%	46	%		
Increasing market share	45%	36%		11%	8%
Reducing production process cost	44%	26%	17%	7%	7%
Reducing raw material cost	44%	28%	18	3%	6%
Reducing waste related costs	44%	34%		11% 6%	6%
Reducing energy cost	43%	33%		10% 8%	7%
Generating new revenue streams	42%	44%		8%	6%
Reducing water cost	39%	28%	15%	6% 12%	5
Capturing new markets	38%	43%		9% 9	1%

SOCIAL OPPORTUNITIES

📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

	0%	25%	5	0%	75	%		100%
Enhance circular economy knowledge and skills	49%			38%				7%
Improve customer loyalty	47%		4	6%				
Reuse and easy maintenance and repair of products	46%		42	%				6%
Presence of product certifications and guarantees	31%		53%				6%	7%
Overcome gender, age and social barriers	30%	3	33%		13%	8%	16%	



TECHNICAL OPPORTUNITIES

Agree Mostly Agree Mostly Disagree	Disagree	Don't know			
Design and manufacturing for product reuse.	0%	25%	50%	75%	100%
maintenance, repair, refurbishment, remanufacture and recycling	58%		369	%	
Using more efficient manufacturing processes	48%		39%		7%
Disruptive development (improvements) in recycling and recovering technologies	47%		37%		8%
Incorporating labelling and ICT-enabled dematerialization into products	36%	33%	6	8% 69	% 18%
Using 3D printing	36%	319	%	10%	18%
Using blockchain to support and accelerate circular supply chains	26%	31%	109	% 29%	

CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

	0%	25% 50	0% 75	100%
Increased recycled content in products	61%		33%	
Recovering useful materials from end of life products	60%		36%	
Incentivising return of products	52%		36%	7%
Realising in house repair, remanufacture, refurbishment and upgrade	43%	39%		9% 8%
Realising third party repair, remanufacture, refurbishment, upgrade and resale	42%	35%		10% 7% 7%
Acquiring new customers and business through shared access and use	39%	39%		8% 12%
Renting or leasing products	33%	31%	21%	12%

📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

LEGISLATIVE CHALLENGES

Major challenge Significant challenge Insignificant challenge Not a challenge Don't know

	0%	25%	50%	75	5%	100%
Lack of global regulatory consensus	39%		35%		11% 89	% 7%
Overregulation	30%	36%		17%	7%	10%
Undecided national circular economy legislative requirements	28%	38%		17%	9%	8%
Unregulated circular economy competition	26%	42%		13%	10%	9%
Lack of understanding of legislative requirements	22%	48%		19	%	9%
Inconsistent level of compliance with legislative requirements	22%	45%		22%		8%
Lack of awareness of legislative requirements	19%	55%			12% 1	1%
Varying level of enforcement of legislative requirements	16%	47%		24%		11%
Not enough compliance checks at Member States level	16%	39%		22%	10%	12%



BUSINESS AND MANAGEMENT CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know



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ECONOMIC CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%		50%	75	5%	100%
Regional differences (e.g. USA versus China)	35%		42%			11%	7% <mark>6</mark> %
Repairs, refurbishment, remanufacture and recycling costs	33%		47%			139	%
Limited market infrastructure and mechanisms for recovery	33%		43%			15%	7%
Low value and low profit margin of recycled products	28%		46%			17%	6%
High secondary raw material prices	24%	49	1%			13%	8% 6%
Unclear cost implications to adopt and implement circular economy business models	22%	54%	,			16%	6%
Low primary raw material prices	19%	42%			19%	15%	6%
Limited maintenance and repair services	17%	47%			25%		7%
Reverse Logistics costs	13%	54%			12%	8%	13%
Limited leasing services	11%	35%		33%		7%	15%



SOCIAL CHALLENGES

	0%	25	5%	50	0%	75	%	1	00%
Social trend of replacing rather than repairing products	40%			31%		17	'%	11%	
Lack of knowledge and understanding of circular products and practices	27%		45%			20)%	7	%
Limited social acceptance of reused, refurbished and recycled products	26%		46%			18	3%	8%	
Lack of promotion for sustainable consumption	25%		46%			19	%	6%	
Negative perception of recycled content in new products	22%	3	7%		27%	%		11%	
Limited maintenance and repair services	20%	459	%			21%		8%	6%
Limited leasing services	10%	30%		33%		9	%	18%	

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

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TECHNICAL CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%	50%	75%	100%
Lack of transparency about products' content	29%	38%		21%	7%
Concerns over personal and/or organisational data security	27%	26%	25%	13%	9%
Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)	26%	46%		16%	9%
Limited circular economy technical knowledge and supporting tools	25%	46%		18%	9%
Limited circular economy exchange between designers of different industry sectors	25%	43%		25%	
Lack of circular economy metrics and indicators	25%	44%		20%	7%
Limited information for tracking products	22%	46%		24%	6%
Limited circular components capability	19% 49	9%		16% 99	% 7%



SUPPLY CHAIN CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

Lack of information on product and material	0% 2	25%	50%	75%	100%
Lack of information on product and material traceability	33%	40%		12%	9% 6%
Undeveloped infrastructure and technologies for WEEE recovery and circularity	31%	29%	17%	7%	16%
Limited suppliers offering circular products	29%	39%		17%	7% 8%
Lack of interest from supply chain	28%	42%		17%	9%
Competing/conflicting priorities among parties in the supply chain	28%	42%		15%	7% 9%
Concerns over confidentiality among parties in the supply chain	25%	37%	21%		7% 10%
Lack of takeback schemes	21%	39%	20%	79	% 12%

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CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

Major challenge 📕 Significant challenge 📕 Insig	nificant challenge	Not a challeng	e 📕 Don't know		
	0% 2	25%	50%	75%	100%
End-user unwillingness to accept shared access and use	36%	42%		12%	6%
End-user reluctance to rent or lease products	36%	36%		12%	13%
Limited understanding of circular economy business models	27%	36%	22%		11%
Inconsistent supply of secondary raw materials	26%	54%		11%	6%
Unclear added value in adopting circular economy business models	25%	45%		19%	8%



LEGISLATIVE ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know



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BUSINESS AND MANAGEMENT ENABLERS

Major enabler Significant enabler Insign	ificant enabler	Not an enabler	Don't know		
	0%	25%	50%	75%	100%
Research and development initiatives to devise strategies and methods to extend the lifecycle of products	37%	42%		10%	9%
Clear circular economy business case	30%	48%		10%	8%
Considering customer preferences in circular economy business models	30%	47%		7% 6%	10%
Viable financial feasibility studies for circular economy related capital and operational investments	27%	54%		8%	8%
Long-term management approach to circular economy	26%	58%		9%	
Circular economy training programmes	24%	46%		20%	6%
Developing new circular procurement	20%	56%		13%	8%



ECONOMIC ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know



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SOCIAL ENABLERS

Major enabler 🔜 Significant enabler 🔜 Insignif	ficant enabler 📕	Not an enabl	ler 📃 Don't know		
	0%	25%	50%	75%	100%
Increasing accessibility to products' repair and replacement services	38%		44%		11%
Making products' repair and replacement services available	36%		44%		13%
Affordable and reliable leasing services	33%	3	0%	20%	13%
Campaigns to promote circular economy consumption and practices	27%	46%		21%	6



TECHNICAL ENABLERS

	0% 2	5%	50%	75%		100%
Designing and manufacturing for end of life reuse and circularity	43%		46%			6%
Designing out waste	40%		39%		14%	5%
Innovative resource efficient recycling and recovery processes	36%	4	7%		10%	
Dissemination of best practice circular economy demonstration projects	36%	43	3%		15%	
Enhancing circular economy technical knowledge and skills through training	33%	46%			13%	
Development of circular economy metrics	28%	52%			11%	8%
Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products	25%	43%		17%	6%	10%
Availability of information for tracking products	24%	59%			13%	
Development of circular economy key performance indicators	24%	52%		1	2%	8%
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📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

SUPPLY CHAIN ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	25%	50%	75%		100%
Suppliers offering circular products	42%		40%		11%	6%
Viable and cost effective technologies for WEEE recovery	37%	40%	6	89	6 1	2%
Enhanced circular economy knowledge and skills through training	34%	44%		1:	3%	7%
Accepted assurance schemes for reuse of secondary materials	31%	49%			6%	11%
Viable takeback schemes	30%	45%		11%		11%
Improved circular economy awareness across supply chain	27%	54%			8%	10%
Available information on materials', products and components' traceability	27%	47%		11%	6%	9%



BUSINESS MODELS' IMPLEMENTATION ENABLERS

Major enabler 📕 Significant enabler 📕 Insignific	ant enabler	Not an enabler	Don't know		
	0%	25%	50%	75%	100%
Incentivised return of products e.g. deposits	42%		36%	13%	6
Developing innovative design and manufacturing for circular products	37%	4	6%		10%
Disseminating the benefits of renting and leasing products	26%	40%		19%	12%
Developing new circular procurement systems	26%	46%		17%	9%



Suppliers – results charts

Survey responses = 41



Participation of each country in the survey Acros the world

Participation of each country in the survey - Europe



Map: Exergy • Get the data • Created with Datawrapper





Participation of each country in the survey - Europe

Chart: Exergy • Get the data • Created with Datawrapper

Country (Europe)	Percentage
Spain	27,3%
Turkey	27,3%
Italy	12,1%
Germany	9,1%
Belgium	3,0%
Cyprus	3,0%
Czech Republic	3,0%
Hungary	3,0%
Poland	3,0%
Romania	3,0%
Sweden	3,0%
United Kingdom	3,0%



Participation of each country in the survey - Europe Vs rest of the world

Analysis to Suppliers



No answers from French Guiana Map: Exergy • Get the data • Created with Datawrapper

Participation of each country in the survey - Europe Vs rest of the world

Analysis to Suppliers



Chart: Exergy • Get the data • Created with Datawrapper



Country (world)	Percentage
Spain	22,5%
Turkey	22,5%
Italy	10,0%
United States	10,0%
Germany	7,5%
China	5,0%
Belgium	2,5%
Cyprus	2,5%
Czech Republic	2,5%
Hungary	2,5%
Poland	2,5%
Romania	2,5%
Sweden	2,5%
United Kingdom	2,5%
Taiwan	2,5%



Agree Mostly Agree Mostly Disa	agree	Disagree	Don't know			
	0%	25%	50%	6 7	5%	100%
Building trust	57%			38%		
Enhancing Corporate Social Responsibility reputation	47%		379	%	8%	8%
Reducing waste related costs	45%		43%			8%
Capturing new markets	40%		40%		18%	
Generating new revenue streams	40%		40%		1	3%
Reducing production process cost	40%		38%		13%	10%
Reducing raw material cost	40%		38%		10%	10%
Reducing energy cost	40%		40%		10%	10%
Increasing market share	30%	45	5%		13%	10%
Reducing water cost	30%	4	0%	10	% 20%	

ECONOMIC OPPORTUNITIES

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SOCIAL OPPORTUNITIES

📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

Enhance circular economy knowledge and skills	0%	25% 5	0% 75% 50%	100%
Improve customer loyalty	43%	48%	,	10%
Reuse and easy maintenance and repair of products	35%	50%		10%
Presence of product certifications and guarantees	33%	50%		18%
Overcome gender, age and social barriers	25%	43%		23%



TECHNICAL OPPORTUNITIES



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CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

📕 Agree 📕 Mostly Agree 📕 Mostly Disag	gree 📕 Di	sagree 📃 I	Don't know			
	0%	25%	50)% 75	5%	100%
Realising third party repair, remanufacture, refurbishment, upgrade and resale	50%			28%	8%	10%
Recovering useful materials from end of life products	50%			43%		
Incentivising return of products	45%		339	%	10%	8%
Realising in house repair, remanufacture, refurbishment, upgrade	39%		42%		8%	8%
Increased recycled content in products	38%		54%			
Acquiring new customers and business through shared access and use	37%		42%		8%	8%
Renting or leasing products	32%		32%	10%	23%	



LEGISLATIVE CHALLENGES



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BUSINESS AND MANAGEMENT CHALLENGES

Major challenge 📕 Significant challenge	Ins	significant challenge 📕 No	ot a challenge	Don't know
	0%	25% 5	0%	75% 100%
No organisational circular economy policy/strategy	25%	40%	15%	8% 13%
Unclear circular economy business case	20%	40%	18%	18%
Undeveloped circular economy skills and training	20%	50%		18% 10%
Insufficient incentives for designing and manufacturing products for end of life circularity	20%	45%	13%	6 13% 10%
Lack of collaboration between supply chain parties	18%	57%		13% 8%
Insufficient interest from customers	15%	47%	18%	8% 13%
Shift from short-life products to extended life cycle of products	10%	50%	15%	10% 15%



ECONOMIC CHALLENGES

Major challenge Significant challenge	Ins	ignificant	challer	nge	Not a cl	hallenge	e 📃 D	on't kn	IOW
	0%	25	5%		50%		75%		100%
High secondary raw material prices	37%			32%			15%		13%
Low primary raw material prices	32%			23%		25%		8%	13%
Regional differences (e.g. USA versus China)	27%		42%	6			13%		13%
Limited market infrastructure and mechanisms for recovery	25%		40%			2	20%		10%
Low value and low profit margin of recycled products	23%		50%					10%	13%
Unclear cost implications to adopt and implement circular economy business models	18%	47%				1	5%	8%	13%
Repairs, refurbishment, remanufacture and recycling costs	15%	52%					15%		13%
Reverse Logistics costs	15%	43%				18%		20%	5
Limited maintenance and repair services	8%	37%			23%		18%		15%
Limited leasing services	30%	6		40%			10	% 18	%

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SOCIAL CHALLENGES

Major challenge Significant challenge	e Insig	nificant challenge	Not a cha	llenge 🔛 Don't ki	าดพ
	0%	25%	50%	75%	100%
Social trend of replacing rather than repairing products	34%	425	%	13%	8%
Negative perception of recycled content in new products	30%	35%		8% 15%	13%
Lack of promotion for sustainable consumption	20%	45%		18% 10)% 8%
Lack of knowledge and understanding of circular products and practices	20%	52%		15%	8%
Limited social acceptance of reused, refurbished and recycled products	15%	54%		15 <mark>% -</mark>	13%



TECHNICAL CHALLENGES



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SUPPLY CHAIN CHALLENGES

Major challenge	Significant challenge	e 📃 Insignificant challenge		Not a challenge		Don't l	know	
		0%	25%	50%	7	5%	100%	
Lack of int	erest from supply chain	20%	40%		20%	8%	13%	
Undevel technologies	oped infrastructure and for WEEE recovery and circularity	20%	47%		13%	8%	13%	
Competing/conf pai	flicting priorities among rties in the supply chain	18%	45%		23%		10%	
Concerns ove pai	er confidentiality among rties in the supply chain	18%	40%		25%		13%	
Limited suppliers of	fering circular products	18%	52%		15	5%	13%	
Lack of info	rmation on product and material traceability	13%	49%		18%		15%	
Lac	k of takeback schemes	10%	47%		18%	8%	8%	



CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES



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LEGISLATIVE ENABLERS

Major enabler 📕 Significant enabler 📒	Insignificant	enabler	Not an enabler	Don't know	
	0%	25%	50%	75%	100%
Mandatory National circular economy legislative requirements	40%		43%		8%
Campaigns for WEEE legislation awareness, understanding and compliance	37%		39%	8%	13%
Global regulatory consensus	35%		52%		
Taxing virgin materials more than recycled feedstock	27%	42%		8% 10%	13%
Regulated competition	20%	47%		13% 8%	13%
Development of organisational and supply chain tools for compliance monitoring and enforcement	20%	45%		20%	10%



BUSINESS AND MANAGEMENT ENABLERS

Major enabler Significant enabler	Insignifican	t enabler 🗾 N	ot an enabler 📃	Don't know	
	0%	25%	50%	75%	100%
Research and development initiatives to devise strategies and methods to extend the lifecycle of products	27%	47%		10%	13%
Developing new circular procurement	25%	50%		10%	13%
Long-term management approach to circular economy	25%	57%			13%
Considering customer preferences in circular economy business models	23%	49%		13%	13%
Viable financial feasibility studies for circular economy related capital and operational investments	23%	54%		8%	10%
Circular economy training programmes	20%	52%		15%	10%
Clear circular economy business case	18%	50%		15%	13%

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ECONOMIC ENABLERS

Major enabler 🔛 Significant enabler 📃 I	nsignificant e	nabler 🗾 No	t an enabler	Don't know	
	0%	25%	50%	75%	100%
Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT	43%		40%		8%
Funding research to optimise circular products	35%	48	3%		10%
Producing secondary raw materials cheaper than primary raw materials	35%	45	5%		15%
Green Public Procurement	33%	45%	6	10%	10%
Ensuring financial viability of circular products	28%	50%		8%	10%
Additional government funding for circular economy skills training of people	25%	43%		20%	10%
Ensuring financial viability of takeback schemes	15% 6	2%			13%



SOCIAL ENABLERS





SUPPLY CHAIN ENABLERS

Major enabler	Significant enabler	Insignific	ant enabler	Not an enabler	Don't know	
		0%	25%	50%	75%	100%
١	/iable takeback schemes	25%	52%		8%	13%
Viable and cost e	effective technologies for WEEE recovery	25%	57%			13%
Improved circ	ular economy awareness across supply chair	23%	57%		8%	10%
Enhanced circular	economy knowledge and skills through training	23%	54%		13%	8%
Suppliers	offering circular products	23%	57%		8%	8%
Accepted assurar	nce schemes for reuse of secondary materials	23%	57%			15%
Available i products and	nformation on materials' components' traceability	20%	55%		10%	10%

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BUSINESS MODELS' IMPLEMENTATION ENABLERS

Major enabler 📕 Significant enabler 📕 I	nsignifi	cant enabler	Not an ena	bler 📃 Don't knov	W
	0%	25%	50%	% 75%	100%
Incentivised return of products e.g. deposits	37%		47%		8%
Developing innovative design and manufacturing for circular products	27%		57%		8%
Developing new circular procurement systems	23%	47%	6	13%	15%
Disseminating the benefits of renting and leasing products	10%	50%		20%	15%



Manufacturers - results charts

Survey responses = 93



Participation of each country in the survey Acros the world



Participation of each country in the survey - Europe

Analysis to Manufacturers



Map: Exergy • Get the data • Created with Datawrapper





Participation of each country in the survey - Europe

Analysis to Manufacturers

Chart: Exergy • Get the data • Created with Datawrapper

Country (Europe)	Percentage
Italy	23,5%
Turkey	19,8%
Germany	6,2%
Switzerland	6,2%
Belgium	4,9%
Croatia	4,9%
Poland	4,9%
Spain	4,9%
United Kingdom	4,9%
Austria	3,7%
Denmark	2,5%
Ireland	2,5%
Portugal	2,5%
Slovenia	2,5%
Sweden	2,5%
France	1,2%
Netherlands	1,2%
Slovakia	1,2%



Participation of each country in the survey - Europe Vs rest of the world

Analysis to Manufacturers



No answers from French Guiana Map: Exergy • Get the data • Created with Datawrapper

Participation of each country in the survey - Europe Vs rest of the world

Analysis to Manufacturers



Chart: Exergy • Get the data • Created with Datawrapper



Country (World)	Percentage
Italy	20,4%
Turkey	17,2%
Germany	5,4%
Switzerland	5,4%
Belgium	4,3%
Croatia	4,3%
Poland	4,3%
Spain	4,3%
United Kingdom	4,3%
Russia	4,3%
Austria	3,2%
United States	3,2%
Denmark	2,2%
Ireland	2,2%
Portugal	2,2%
Slovenia	2,2%
Sweden	2,2%
Canada	2,2%
France	1,1%
Netherlands	1,1%
Slovakia	1,1%
India	1,1%
Mexico	1,1%
Australia	1,1%



Size of the company

Analysis to Manufacturers

	0%	10%	20%	30%	40%	50%	60%
Large	63%						
Medium	12%						
Small	12%						
Micro	4%						
Don't know	9%						

Chart: Exergy • Get the data • Created with Datawrapper

ECONOMIC OPPORTUNITIES

📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

	0% 25	5% 50)% 7	5% 100	%
Enhancing Corporate Social Responsibility reputation	58%		34%	6%	
Building trust	55%		35%	6%	
Generating new revenue streams	48%	3	31%	11% 5%	5
Capturing new markets	44%	31%		11% 10%	
Reducing production process cost	41%	26%	15%	15%	
Reducing waste related costs	40%	39%		8% 11%	
Reducing raw material cost	39%	35%		14% 11%	
Reducing energy cost	38%	31%	17%	12%	
Increasing market share	37%	41%		9% 10%	
Reducing water cost	35%	28%	14%	5% 17%	



SOCIAL OPPORTUNITIES



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TECHNICAL OPPORTUNITIES



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CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

	0%	25%	50%	75%	100%
Recovering useful materials from end of life products	55%		39%		
Increased recycled content in products	47%		44%		
Acquiring new customers and business through shared access and use	43%	329	6	11%	11%
Incentivising return of products	40%	40%		6%	5% 9%
Realising third party repair, remanufacture, refurbishment, upgrade and resale	37%	33%		13%	5% 12%
Renting or leasing products	33%	30%	11%	12%	14%
Realising in house repair, remanufacture, refurbishment and upgrade and resale	30%	41%		11% 5	% 13%



LEGISLATIVE CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%	50%	759	% 100%
Lack of global regulatory consensus	39%		35%		17%
Unregulated circular economy competition	29%	34%		19%	6% 11%
Overregulation	23%	35%	2	.4%	14%
Undecided national circular economy legislative requirements	23%	44%		18%	11%
Not enough compliance checks at Member States level	18%	41%		19%	17%
Inconsistent level of compliance with legislative requirements	16%	49%		19%	6% 9%
Varying level of enforcement of legislative requirements	16%	49%		14%	10% 11%
Lack of awareness of legislative requirements	14%	54%		20%	9%
Lack of understanding of legislative requirements	14%	52%		24%	6%

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BUSINESS AND MANAGEMENT CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25	% 50	1%	75	%	100%
Insufficient incentives for designing and manufacturing products for end of life circularity	26%		44%		15%	6 6	5% 9%
Unclear circular economy business case	22%	4	9%		17	%	8%
Insufficient interest from customers	22%	39	9%	20	5%		5% <mark>9%</mark>
Lack of collaboration between supply chain parties	22%	4	8%		19	%	5% 5%
Shift from short-life products to extended life cycle of products	17%	42%		199	%	14%	8%
No organisational circular economy policy/strategy	14%	46%		19	9%	17%	
Undeveloped circular economy skills and training	14%	50%			23%		9%



ECONOMIC CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%		50%		75%	100%
Regional differences (e.g. USA versus China)	32%		31%		16	%	9% 12%
Low value and low profit margin of recycled products	26%	39)%		1	7%	6% 12%
Reverse Logistics costs	26%	28	3%		27%		16%
Limited market infrastructure and mechanisms for recovery	24%	40%	,		23	%	5% 9%
High secondary raw material prices	23%	42%			2	.0%	12%
Repairs, refurbishment, remanufacture and recycling costs	23%	46%				18%	10%
Unclear cost implications to adopt and implement circular economy business models	23%	48%				17%	9%
Low primary raw material prices	20%	32%			20%	13%	14%
Limited maintenance and repair services	12%	30%	3	81%		15%	5 12%
Limited leasing services	27%		42%			11%	16%

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SOCIAL CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%	50%	75%	100%
Social trend of replacing rather than repairing products	23%	47%		12%	14%
Lack of promotion for sustainable consumption	23%	41%		23%	10%
Lack of knowledge and understanding of circular products and practices	23%	48%		17%	10%
Negative perception of recycled content in new products	22%	28%	31%		15%
Limited social acceptance of reused, refurbished and recycled products	20%	49%		13%	14%



TECHNICAL CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%	50%	75	5%	100%
Limited information for tracking products	18%	34%	29	9%	12%	6%
Lack of circular economy metrics and indicators	18%	34%	24	1%	13%	11%
Concerns over personal and/or organisational data security	17%	37%	2	23%	15%	9%
Lack of transparency about products' content	16%	31%	30%		15%	8%
Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)	15%	51%		16%	9%	9%
Limited circular economy technical knowledge and supporting tools	14%	49%		27%		8%
Limited circular components capability	13%	35%	27%		10% 1	5%

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SUPPLY CHAIN CHALLENGES

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

	0%	25%	50%	75%	100%
Limited suppliers offering circular products	22%	52%		15%	8%
Competing/conflicting priorities among parties in the supply chain	18%	41%	25%	5	% 11%
Undeveloped infrastructure and technologies for WEEE recovery and circularity	18%	40%	29%		6% 6%
Lack of interest from supply chain	17%	33%	32%	9%	9%
Lack of takeback schemes	17%	35%	26%	13%	9%
Lack of information on product and material traceability	17%	44%	27%		6% 5%
Concerns over confidentiality among parties in the supply chain	11%	42%	31%	5	<mark>%</mark> 11%

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CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES





LEGISLATIVE ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	259	%	50%	75	5%	100%
Global regulatory consensus	43%			33%		12%	6% <mark>5</mark> %
Mandatory National circular economy legislative requirements	38%		329	%	12%	6 10%	9%
Taxing virgin materials more than recycled feedstock	28%		40%		13%	9%	11%
Regulated competition	26%		34%		22%	6%	12%
Campaigns for WEEE legislation awareness, understanding and compliance	18%	44%			27%		6%
Development of organisational and supply chain tools for compliance monitoring and enforcement	15%	48%			23%	ł	5% 9%

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BUSINESS AND MANAGEMENT ENABLERS

📕 Major enabler 📕 Significant enabler 📒 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	25%	50%	75%	100%
Long-term management approach to circular economy	35%	45%		11%	8%
Clear circular economy business case	33%	45%		15%	
Viable financial feasibility studies for circular economy related capital and operational investments	29%	47%		12%	10%
Considering customer preferences in circular economy business models	27%	42%		17%	13%
Developing new circular procurement	26%	51%		17%	
Research and development initiatives to devise strategies and methods to extend the lifecycle of products	26%	44%		23%	5%
Circular economy training programmes	17% 55	5%		19%	5%



ECONOMIC ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know



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SOCIAL ENABLERS

Major enabler Significant enabler Insigni	ficant enabler	Not an enabler	Don't know		
	0%	25%	50%	75%	100%
Increasing accessibility to products' repair and replacement services	30%	39%		18%	5% 8%
Campaigns to promote circular economy consumption and practices	27%	46%		19%	5%
Affordable and reliable leasing services	24%	40%		24%	11%
Making products' repair and replacement services available	22%	49%		18%	6%

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TECHNICAL ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	25%	50%	7	5%	100%
Innovative resource efficient recycling and recovery processes	31%		54%		10%	
Designing and manufacturing for end of life reuse and circularity	30%		52%		11%	5%
Dissemination of best practice circular economy demonstration projects	25%	51%			15%	6%
Mechanisms to avoid exposure of stored personal and/or organisational data in E&E products	24%	31%		25%	5% 15%	
Enhancing circular economy technical knowledge and skills through training	20%	47%		25%		
Availability of information for tracking products	18%	48%		23%		6%
Development of circular economy metrics	18%	48%		18%	6%	9%



SUPPLY CHAIN ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know



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BUSINESS MODELS' IMPLEMENTATION ENABLERS

Major enabler Sigr	nificant enabler 📃	Insignificant enabler	Not an enabler	Don't know
--------------------	--------------------	-----------------------	----------------	------------

	0% 2	25%	50% 7	5% 1	00%
Incentivised return of products e.g. deposits	33%	46%		11%	5%
Developing innovative design and manufacturing for circular products	29%	45%		19%	
Developing new circular procurement systems	23%	56%		14%	
Disseminating the benefits of renting and leasing products	22%	45%	22%	10	1%



Retailers – results charts

Survey responses = 30

Participation of each country in the survey Acros the world



Analysis to WEEE Handlers


Participation of each country in the survey - Europe

Analysis to Retailers



Map: Exergy • Get the data • Created with Datawrapper

Participation of each country in the survey - Europe



Analysis to Retailers

Country (Europe)	Percentage
Turkey	23,3%
Germany	20,0%

Chart: Exergy • Get the data • Created with Datawrapper



Italy	13,3%
Hungary	6,7%
Romania	6,7%
Spain	6,7%
Austria	3,3%
Belgium	3,3%
Norway	3,3%
Netherlands	3,3%
Finland	3,3%
Sweden	3,3%
United Kingdom	3,3%



Analysis to Retailers



Deliverable 1.2. Guidelines for circular economic models in the E&E sector Page **111** of **154**



Analysis to Retailers



Chart: Exergy • Get the data • Created with Datawrapper



ECONOMIC OPPORTUNITIES

Agree Mostly Agree Mostly Disa	agree 📕 Disagree	Don't know	W					
	0%	25%	5	0%	7	5%		100%
Enhancing Corporate Social Responsibility reputation	64%				30%			
Building trust	64%				30%			
Generating new revenue streams	60%			2	7%		10%	
Increasing market share	57%			33%			7	7%
Reducing waste related costs	56%			30%			7% 7	7%
Capturing new markets	53%			37%			7	7%
Reducing production process cost	40%		23%		17%	20%		
Reducing raw material cost	40%		30%		10%	6 20%		
Reducing energy cost	37%		17%	17%	30%	%		
Reducing water cost	33%	17	%	13%	37%			

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SOCIAL OPPORTUNITIES

📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

	0%	25%	50%	75	i%	100%
Reuse and easy maintenance and repair of products	63%			37%		
Enhance circular economy knowledge and skills	63%			27%		10%
Improve customer loyalty	60%			37%		
Presence of product certifications and guarantees	47%		40%			10%
Overcome gender, age and social barriers	37%	20%	209	%	10%	13%



TECHNICAL OPPORTUNITIES



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📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know

CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

	0%	25%	50)%	75%	6		100%
Increased recycled content in products	60%				40%			
Realising third party repair, remanufacture, refurbishment, upgrade and resale	54%			37%				
Recovering useful materials from end of life products	53%			37%			7%	, b
Realising in house repair, remanufacture, refurbishment, upgrade and resale	50%			33%		79	% 7%	ó
Acquiring new customers and business through shared access and use	50%			30%		7%	13%	
Incentivising return of products	43%		43%				13%	
Renting or leasing products	40%		33%		13	%	7%	7%



LEGISLATIVE CHALLENGES

Major challenge 📕 Significant challenge	Insignifican	t challenge 📕 No	ot a challenge	Don't k	now
	0% 2	.5% 5	0% 7	5%	100%
Lack of global regulatory consensus	40%	30%	1	7%	13%
Overregulation	37%	43%		10	% 7%
Varying level of enforcement of legislative requirements	33%	43%		10%	13%
Not enough compliance checks at Member States level	30%	40%	1	0% 1	17%
Lack of awareness of legislative requirements	27%	43%	1	3%	13%
Undecided national circular economy legislative requirements	27%	43%	1	3%	13%
Lack of understanding of legislative requirements	23%	50%		13%	7% 7%
Inconsistent level of compliance with legislative requirements	23%	47%	1	0% 20	%
Unregulated circular economy competition	20% 3	0%	23%	27%	

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BUSINESS AND MANAGEMENT CHALLENGES

Major challenge Significant challenge	Insignifi	cant challenge	Not a challenge	Don't know	
	0%	25%	50%	75% 1	00%
Insufficient interest from customers	53%		37%	7	%
Unclear circular economy business case	27%	50%		17%	
Lack of collaboration between supply chain parties	27%	30%	27%	7% 1	0%
No organisational circular economy policy/strategy	20%	57%		13% 7	%
Undeveloped circular economy skills and training	17%	60%		20%	



ECONOMIC CHALLENGES

Major challenge Significant challenge	Ins	significant chall	enge 🗾 N	lot a cha	llenge	Don't ki	now
	0%	25%		50%	75	5%	100%
Repairs, refurbishment, remanufacture and recycling costs	33%		47%			20%	%
Regional differences (e.g. USA versus China)	23%	33%		1	7%	7% 20%	%
Low value and low profit margin of recycled products	20%	50%			20	1%	7%
Limited market infrastructure and mechanisms for recovery	17%	50%			27%		7%
Limited maintenance and repair services	13%	37%		30%		13%	% 7%
Limited leasing services	10%	37%		27%		7% 20%	%
Get the data · Created with Datawrapper							
Major challenge 📕 Significant challenge	Ins	significant chall	enge 🗾 N	lot a cha	Illenge	Don't ki	now
	0%	25%	ł	50%	75	%	100%
Lack of knowledge and understanding of circular products and practices	53%			33%	,		7% 7%
Social trend of replacing rather than repairing products	43%		33	3%		13%	10%
Limited social acceptance of reused, refurbished and recycled products	43%		33	3%		23%	
Negative perception of recycled content in new products	40%		27%		23%		7%
Lack of promotion for sustainable consumption	40%		37%			17%	7%



TECHNICAL CHALLENGES

📕 Major challenge 📕 Significant challeng	ge 📃 I	Insignifican	t challen	ige 🗾 N	lot a d	challenge	Dor	't know
Concerns over personal and/or organisational data security	0% 37%	25	5%	5 20%	0%	23%	75%	100% 17%
Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)	27%		30%			27%		17%
Limited circular components capability	23%		30%		2	3%		20%
Lack of transparency about products' content	20%	37	%			30%		13%
Limited information for tracking products	13%	37%			27%	, D	23	%
Limited circular economy technical knowledge and supporting tools	7%	43%			23%	, 5	10%	17%

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SUPPLY CHAIN CHALLENGES

Major challenge Significant challenge	ln:	significant challeng	Don't	know		
	0%	25%	50%		75%	100%
Limited suppliers offering circular products	37%		40%		17%	5 7%
Undeveloped infrastructure and technologies for WEEE recovery and circularity	27%	33%		10%	17%	13%
Lack of interest from supply chain	23%	30%		30%		7% 10%
Lack of information on product and material traceability	23%	47%		:	20%	10%
Competing/conflicting priorities among parties in the supply chain	20%	47%		23	%	10%
Lack of takeback schemes	17%	23%	30%		13%	17%
Concerns over confidentiality among parties in the supply chain	10%	33%	33%		2	0%



CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES



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LEGISLATIVE ENABLERS

Major enabler 📕 Significant enabler 📕 I	nsignificant enal	oler 📕 Not an e	enabler 📃 Don't k	know
	0% 2	.5%	50% 7	' 5% 100%
Taxing virgin materials more than recycled feedstock	47%		27%	10% 7% 10%
Campaigns for WEEE legislation awareness, understanding and compliance	43%	3	0%	13% 7% 7%
Mandatory National circular economy legislative requirements	43%	2	3% 20%	6 10%
Global regulatory consensus	43%	2	7% 1	3% <mark>7%</mark> 10%
Regulated competition	23%	37%	17%	10% 13%



BUSINESS AND MANAGEMENT ENABLERS



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ECONOMIC ENABLERS

Major enabler	Significant enabler	Insignifica	nt enabler	Not an en	abler	Don't kr	IOW	
Figure incontinuos	for ropoir romonufactu	0%	25%	50	0%	75	9%	100%
refurbishmen	it, upgrade and resale e. reduced VA	.g. 67% AT				20%		10%
Producing seconda th	ary raw materials cheap nan primary raw materia	er 57%			30	%		7%
Ensuring fin	nancial viability of circul produc	ar 50%			37%			7% 7%
G	Green Public Procureme	nt 50%			33%		10	% 7%
Funding res	earch to optimise circul produc	ar 40%		50%				7%
Additional goverr econom	nment funding for circul ny skills training of peop	ar 37%		27%		33%		
Ensuring fina	ncial viability of takeba scheme	ck es 33%		43%			17%	7%



SOCIAL ENABLERS





SUPPLY CHAIN ENABLERS

Major enabler 📕 Significant enabler 📃 I	nsignificant enable	er 📕 Not an ena	abler 📃 Don't ki	างพ	
Suppliers offering circular products	0% 25 [°] 53%	% 50	% 75 40%	5%	100% 7%
Accepted assurance schemes for reuse of secondary materials	43%	40%		17%	
Viable and cost effective technologies for WEEE recovery	40%	43%		13%	
Improved circular economy awareness across supply chain	33%	47%		17%	
Enhanced circular economy knowledge and skills through training	30%	40%	20	1%	7%
Available information on materials', products and components' traceability	27%	50%		13%	10%
Viable takeback schemes	27%	56%		10%	7%



Business End Users – results charts

Survey Responses = 102

Participation of each country in the survey Acros the world



Analysis to Business End-Users

Participation of each country in the survey - Europe

Analysis to Business End-Users







Participation of each country in the survey - Europe

Analysis to Business End-Users

Country (Europe)	Percentage
Spain	35,0%
Italy	16,0%
France	7,0%
Hungary	7,0%
United Kingdom	7,0%
Romania	6,0%
Croatia	4,0%
Germany	4,0%
Netherlands	3,0%
Belgium	2,0%
Denmark	2,0%
Turkey	2,0%
Austria	1,0%
Portugal	1,0%
Greece	1.0%



Sweden	1,0%
Norway	1,0%

Analysis to Business End-Users



Country (world)	Percentage
Spain	35,0%
Italy	15,5%
France	6,8%
Hungary	6,8%
United Kingdom	6,8%
Romania	5,8%
Croatia	3,9%
Germany	3,9%
Netherlands	2,9%
Belgium	1,9%
Denmark	1,9%
Turkey	1,9%
United States	1,9%
Austria	1,0%
Portugal	1,0%
Greece	1,0%
Sweden	1,0%



Norway	1,0%
Ghana	1,0%





Size of the company

Analysis to Business End-Users



Please rate your level of agreement that the following factors influence your decision to purchase electrical and electronic products

Agree Mostly Agree No Influence	Mostly Disagree	Disagree			
	0%	25%	50%	75%	100%
Durable products	66%		26%		6%
Low maintenance and easily repairable products	56%		32%	12	2%
Energy and/or water efficient products	55%		35%		9%
Responsible sourced products	46%	2	29%	22%	
Availability of repair shops	33%	40%		22%	
Products associated with leasing services	16% 14%	50%		11%	9%



100%

6%

75%

SOCIAL OPPORTUNITIES Agree Mostly Agree Mostly Disagree Disagree Don't know 0% 25% 50% Presence of product certifications and guarantees 64% 25% 50%



TECHNICAL OPPORTUNITIES



CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES



SOCIAL CHALLENGES

Major challenge Significant challenge Insignificant challenge Not a challenge Don't know 0% 25% 50% 75% 100% Lack of awareness on circular economy benefits 47% 9% 5% Social trend of replacing rather than repairing 5% 5% products Lack of knowledge and understanding of circular 8% 5% 5% products and practices Limited maintenance and repair services 25% 17% 6% 5% Limited social acceptance of reused, refurbished 22% 15% 5% and recycled products 21% Limited leasing services 24% 9%



TECHNICAL CHALLENGES

Technical limitations in different circular economy loops (e.g. for parts reuse, life extension, etc.)	0% 30%	25%	50%	75%	100%
Concerns over personal and/or organisational data security	21%	45%		23%	5% 6%
Limited best practice circular economy demonstration projects	19%	52%		18%	9%

📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know

ECONOMIC ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	25%	50%	75%	100%
Ensuring financial viability of circular products	48%		42%		6%
Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale e.g. reduced VAT	45%		39%		6% 8%
Funding research to optimise circular products	39%		49%		5% 6%
Green Public Procurement	35%	4	0%	12%	12%
Additional government funding for circular economy skills training of people	31%	50%			10% 7%



SOCIAL ENABLERS

	0%	25%	50%	75%	100%
Increasing accessibility to products' repair and replacement services	43%		47%		5%
Making products' repair and replacement services available	40%		50%		6%
Campaigns to promote circular economy consumption and practices	36%	449	6		14%
Affordable and reliable leasing services	22%	43%		16%	17%

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

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TECHNICAL ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	25%	50%	75%	100%
Designing and manufacturing for end of life reuse and circularity	52%		37%		7%
Dissemination of best practice circular economy demonstration projects	31%	51%		8%	7%
Mechanisms to avoid exposure of stored personal data in E&E products	27%	43%		21%	8%
Availability of information for tracking products	16% 6	3%		12%	7%



Household End Users – results charts

Survery responses = 857

Participation of each country in the survey Acros the world



Analysis to Household End Users



Participation of each country in the survey - Europe

Analysis to Household End-Users



Map: Exergy • Get the data • Created with Datawrapper

Participation of each country in the survey - Europe

Analysis to Household End - Users



Chart: Exergy · Get the data · Created with Datawrapper



Country (Europe)	Percentage
Spain	22,9%
Italy	14,4%
Croatia	11,7%
United Kingdom	11,0%
Hungary	6,5%
Germany	5,9%
Romania	5,6%
Netherlands	3,4%
Portugal	3,4%
Turkey	3,1%
France	2,9%
Belgium	2,2%
Austria	1,1%
Sweden	1,0%
Finland	0,8%
Switzerland	0,8%
Poland	0,7%
Denmark	0,4%
Czech Republic	0,4%
Norway	0,4%
Greece	0,2%
Luxembourg	0,2%
Bosnia and	
Herzegovina	0,1%
Estonia	0,1%
Cyprus	0,1%
Lithuania	0,1%
San Marino	0,1%
Slovakia	0,1%



Analysis to Household End-Users



No answers from French Guiana Map: Exergy • Get the data • Created with Datawrapper

Country	Percentage
Spain	22,1%
Italy	13,9%
Croatia	11,3%
United Kingdom	10,6%
Hungary	6,3%
Germany	5,7%
Romania	5,4%
Netherlands	3,3%
Portugal	3,3%
Turkey	3,0%
France	2,8%
Belgium	2,1%
Austria	1,1%
Russia	1,1%
Sweden	0,9%
Finland	0,8%
Switzerland	0,8%
United States	0,8%
Poland	0,7%
Denmark	0,4%
Czech Republic	0.4%



Norway	0,4%
China	0,4%
Greece	0,2%
Luxembourg	0,2%
Japan	0,2%
Bosnia and	0,1%
Herzegovina	
Estonia	0,1%
Cyprus	0,1%
Lithuania	0,1%
San Marino	0,1%
Slovakia	0,1%
Slovenia	0,1%
Argentina	0,1%
India	0,1%
Nigeria	0,1%
México	0,1%
Israel	0,1%
Lebanon	0,1%
Pakistan	0,1%
Ukraine	0,1%



Analysis to Household End-Users



Chart: Exergy • Get the data • Created with Datawrapper

Age Range

Analysis to Householders End-Users



Chart: Exergy • Get the data • Created with Datawrapper



Education Level

Analysis to Household End - Users



Chart: Exergy • Get the data • Created with Datawrapper

Please rate your level of agreement that the following factors influence your decision to purchase electrical and electronic product





TECHNICAL OPPORTUNITIES 📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know 0% 25% 50% 75% 100% Reuse and easy maintenance and repair of 61% products Optimization/improvements in WEEE 47% 12% 6% recycling methods Improving WEEE collection methods 43% 8% 13% Get the data • Created with Datawrapper CIRCULAR ECONOMY BUSINESS MODELS ADOPTION **OPPORTUNITIES** 📕 Agree 📕 Mostly Agree 📕 Mostly Disagree 📕 Disagree 📕 Don't know 0% 25% 50% 75% 100% Incentivising return of products 49% 7% 6% Renting or leasing products 26% 37% 13% 14% 9% Get the data • Created with Datawrapper SOCIAL CHALLENGES 📕 Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know 0% 25% 50% 75% 100% Social trend of replacing rather than repairing 53% 7% products Lack of awareness on circular economy benefits 9% 5% 38% Lack of knowledge and understanding of circular 34% 8% 5% products and practices Limited social acceptance of reused, refurbished 13% 5% and recycled products Limited maintenance and repair services 30% 14% 6% Limited leasing services 14% 12% 19% 23% Get the data • Created with Datawrapper **TECHNICAL CHALLENGES** Major challenge 📕 Significant challenge 📕 Insignificant challenge 📕 Not a challenge 📕 Don't know 0% 25% 50% 75% 100% Concerns over personal and/or organisational data 23% 9% 22% 10% security Limited best practice circular economy 14% 6% 12% demonstration projects Get the data • Created with Datawrapper

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ECONOMIC ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know



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SOCIAL ENABLERS

Major enabler 📕 Significant enabler 📕 Insigni	ficant enabler	Not an enabler 📃 D	on't know		
	0%	25%	50%	75%	100%
Making products' repair and replacement services available	46%		42%		7%
Increasing accessibility to products' repair and replacement services	43%	44	4%		8%
Campaigns to promote circular economy consumption and practices	35%	47%			11%
Affordable and reliable leasing services	30%	36%		17%	5% 12%

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TECHNICAL ENABLERS

📕 Major enabler 📕 Significant enabler 📕 Insignificant enabler 📕 Not an enabler 📕 Don't know

	0%	25%	50%	75%	100%
Designing and manufacturing for end of life reuse and circularity	54%		33%		5% 5%
Mechanisms to avoid exposure of stored personal data in E&E products	30%	40%		16%	9%
Dissemination of best practice circular economy demonstration projects	27%	47%		14%	9%



WEEE Handlers – results charts

Survey Responses = 88

Participation of each country in the survey Acros the world



Analysis to WEEE Handlers

Participation of each country in the survey - Europe

Analysis to WEEE Handlers



Map: Exergy • Get the data • Created with Datawrapper





Participation of each country in the survey - Europe

Analysis to WEEE Handlers

Chart: Exergy • Get the data • Created with Datawrapper

Country (Europe)	Percentage
Italy	25,3%
Spain	19,3%
Portugal	10,8%
Romania	10,8%
Norway	4,8%
Belgium	3,6%
United Kingdom	3,6%
Germany	2,4%
Hungary	2,4%
Netherlands	2,4%
Poland	2,4%
Slovenia	2,4%
Austria	1,2%
Croatia	1,2%
Estonia	1,2%
France	1,2%
Greece	1,2%
Ireland	1,2%
Serbia	1,2%
Switzerland	1.2%



Analysis to WEEE Handlers



No answers from French Guiana Map: Exergy • Get the data • Created with Datawrapper

Participation of each country in the survey - Europe Vs rest of the world

Analysis to WEEE Handlers



Chart: Exergy • Get the data • Created with Datawrapper



Country (world)	Percentage
Italy	24,1%
Spain	18,4%
Romania	10,3%
Portugal	10,3%
Norway	4,6%
Belgium	3,4%
United Kingdom	3,4%
Slovenia	2,3%
Germany	2,3%
Netherlands	2,3%
Hungary	2,3%
Poland	2,3%
Austria	1,1%
Croatia	1,1%
France	1,1%
Ireland	1,1%
Greece	1,1%
Switzerland	1,1%
Estonia	1,1%
Serbia	1,1%
Australia	1,1%
Madagascar	1,1%
Canada	1,1%
United States	1.1%



Size of the company

Analysis to WEEE Handlers





TECHNICAL OPPORTUNITIES



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CIRCULAR ECONOMY BUSINESS MODELS ADOPTION OPPORTUNITIES

Agree Mostly Agree Mostly Disag	ree	Disagree	Don't know		
	0%	25%	50%	75%	100%
Recovering useful materials from end of life products	70%			26%	
Realising third party repair, remanufacture, refurbishment, upgrade and resale	46%		34%		8% 10%
Realising in house repair, remanufacture, refurbishment and upgrade and resale	40%		36%	1	10% 6% 8%

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LEGISLATIVE CHALLENGES

Major challenge Significant challenge	Insignificant of	challenge 📕 Not a chall	enge 📕 Don't know
	0% 25	% 50%	75% 100%
Lack of global regulatory consensus	37%	46%	11%
Not enough compliance checks at Member States level	34%	40%	9% 13%
Overregulation	33%	44%	13% 7%
Inconsistent level of compliance with legislative requirements	33%	49%	7% 7%
Unregulated circular economy competition	33%	37%	22%
Varying level of enforcement of legislative requirements	26%	61%	7%
Undecided national circular economy legislative requirements	26%	49%	15%


BUSINESS AND MANAGEMENT CHALLENGES





SOCIAL CHALLENGES



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TECHNICAL CHALLENGES

Major challenge 🔜 Significant challeng	je 📃	Insignificant ch	allenge 📕 N	lot a challenge 📗	Don't kno	W
	0%	25%	50	0% 7!	5%	100%
Lack of transparency about products' content	30%		45%		16%	
Limited information for tracking products	23%	43%		22%		8%
Concerns over personal and/or organisational data security	23%	37%		23%	8%	9%
Limited best practice circular economy demonstration projects	15%	52%		20%		8%
Limited circular economy technical knowledge and supporting tools	14%	52%		24%		



SUPPLY CHAIN CHALLENGES



CIRCULAR ECONOMY BUSINESS MODELS IMPLEMENTATION CHALLENGES

Major challenge 📕 Significant challenge	Insig	nificant ch	allenge	Not a challe	enge 📃 Don	t know
Insufficient incentives for designing and manufacturing products for end of life	0% 31%	25%	44%	50%	75%	100%
circularity Insufficient interest from customers	30%		39%		22%	6%
No organisational circular economy policy/strategy	26%		49%		8%	11%
Shift from short-life products to extended life cycle of products	25%	٢	19%		7%	7% 11%
Undeveloped circular economy skills and training	24%	3	8%		23%	9% 6%
Lack of collaboration between supply chain parties	24%	5	3%		16	%
Unclear circular economy business case	14%	58%			11%	10% 7%



LEGISLATIVE ENABLERS

Major enabler Significant enabler Insignificant enabler Not an enabler Don't know 0% 25% 50% 75% 100% Global regulatory consensus 43% 7% Mandatory National circular economy 39% 9% legislative requirements Campaigns for WEEE legislation awareness, 30% 22% understanding and compliance Taxing virgin materials more than recycled 28% 6% 9% feedstock Regulated competition 20% 16% 10% 10% Development of organisational and supply chain tools for compliance monitoring and 20% 26% 7% 6% enforcement

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BUSINESS AND MANAGEMENT ENABLERS

Major enabler 🔛 Significant enabler	Insignifica	nt enabler	Not an e	nabler 📃 Don't	know	
Long-term management approach to	0%	25%	50	%	75%	100%
circular economy	34%		54%			
Developing new circular procurement	32%		50%		7%	6%
Clear circular economy business case	31%		49%		11%	7%
devise strategies and methods to extend the lifecycle of products	30%	4	47%		11%	7%
Viable financial feasibility studies for circular economy related capital and operational investments	30%		53%		7%	7%
Considering customer preferences in circular economy business models	28%	55	5%		7%	
Circular economy training programmes	17%	58%			18%	



ECONOMIC ENABLERS



Major enabler Significant enabler	Insignificant en	abler	Not an enabler	Don't know	
	0% 2	25%	50%	75%	100%
Increasing accessibility to products' repair and replacement services	36%		47%		10%
Making products' repair and replacement services available	34%		52%		8%
Campaigns to promote circular economy consumption and practices	31%	47	7%	139	% 6%
Affordable and reliable leasing services	24%	52%		16%	6%



TECHNICAL ENABLERS



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SUPPLY CHAIN ENABLERS

Major enabler Significant enabler	nsignificant en	abler 🗾 Not a	n enabler	Don't know	
Viable and cost effective technologies for	0%	25%	50%	75%	100%
WEEE recovery	~ ~~				
Viable takeback schemes	32%	47%		14%	
Suppliers offering circular products	30%	49%		15%	
Available information on materials', products and components' traceability	28%	48%		15%	7%
Accepted assurance schemes for reuse of secondary materials	26%	55%		13%	
Improved circular economy awareness across supply chain	21%	61%		15%	
Enhanced circular economy knowledge and skills through training	20%	56%		20%	



BUSINESS MODELS' IMPLEMENTATION ENABLERS





Annex C – Highest ranked answers for each question

Selected by the highest % of: Agree + Mostly Agree / Major challenge + Significant challenge / Major enabler + Significant enabler

	Designers	Suppliers	Manufacturers	Retailers	Business End Users	Household End Users	WEEE Handlers
Economic Opportunities	Building trust	Building trust	Enhancing Corporate Social Responsibility reputation	Enhancing Corporate Social Responsibility reputation Building trust	-	-	Capturing new markets Generating new revenue streams
Social	Improve customer	Enhance circular	Enhance circular	Reuse and easy	Reuse and easy	Reuse and easy	Enhance circular
Opportunities	loyalty	economy knowledge and skills	economy knowledge and skills	repair of products	maintenance and repair of products	repair of products	economy knowledge and skills
Technical Opportunities	Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling	Using more efficient manufacturing processes	Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling	Design and manufacturing for product reuse, maintenance, repair, refurbishment, remanufacture and recycling Disruptive development (improvements) in recycling and recovering technologies	Reuse and easy maintenance and repair of products	Reuse and easy maintenance and repair of products	Disruptive development (improvements) in recycling and recovering technologies
Circular Economy Business Models adoption	Recovering useful materials from end of life products	Recovering useful materials from end of life products	Recovering useful materials from end of life products	Increased recycled	Incentivising return of products	Incentivising return of products	Recovering useful materials from end of life products
Legislative Challenges	Lack of global regulatory consensus Lack of awareness of legislative requirements	Varying level of enforcement of legislative requirements	Lack of global regulatory consensus	Overregulation	-	-	Varying level of enforcement of legislative requirements
Business and Management Challenges	Insufficient incentives for designing and manudacturing products for end of life circularity	Lack of collaboration between supply chain parties	Unclear circular economy business case	Insufficient interest from customers	-	-	Unclear circular economy business case Lack of collaboration between supply chain parties
Economic Challenges	Repairs, refurbishment, remanufacture and recycling costs	Low value and low profit margin of recycled products	Unclear cost implications to adopt and implement circular economy business models	Repairs, refurbishment, remanufacture and recycling costs	-	-	Repairs, refurbishment, remanufacture and recycling costs
Social Challenges	Lack of knowledge and understanding of circular products and practices Limited social acceptance of reused, refurbished and recycled products	Social trend of replacing rather than repairing products	Lack of knowledge and understanding of circular products and practices	Lack of knowledge and understanding of circular products and practices	Social trend of replacing rather than repairing products	Social trend of replacing rather than repairing products	Social trend of replacing rather than repairing products
Technical Challenges	Technical limitations in different circular economy loops	Technical limitations in different circular economy loops	Technical limitations in different circular economy loops	Technical limitations in different circular economy loops Concerns over personal and/or organisational data security Lack of transparency about products' content	Technical limitations in different circular economy loops	Limited best practice circular economy demonstration projects	Lack of transparency about products' content
Supply chain challenges	Lack of information on product and material traceability	Limited suppliers offering circular products	Limited suppliers offering circular products	Limited suppliers offering circular products	-	-	Competing/conflicting priorities among parties in the supply chain
Circular economy business models implementatio n challenges	Inconsistent supply of secondary raw materials	End-user unwillingness to accept shared access and use	Unclear added value in adopting circular economy business models	Unclear added value in adopting circular economy business models	-	-	Lack of collaboration between supply chain parties
Legislative enablers	Development of organisational and supply chain tools for compliance moitoring and enforcement	Global regulatory consensus	Global regulatory consensus	Taxing virgin materials more than recycled feedstock	-	-	Global regulatory consensus
Business and management enablers	Long-term management approach to circular economy	Long-term management approach to circular economy	Long-term management approach to circular economy	Long-term management approach to circular economy Considering customer preferences in circular economy business models	-	-	Long-term management approach to circular economy
Economic enablers	Ensuring financial viability of circular products	Funding research to optimise circular products Fiscal incentives for repair, remanufacture, refurbishment, merade and resale	Ensuring financial viability of circular products	Funding research to optimise circular products	Ensuring financial viability of circular products	Ensuring financial viability of circular products	Fiscal incentives for repair, remanufacture, refurbishment, upgrade and resale



Highest ranked answers for each question contd.

	Designers	Suppliers	Manufacturers	Retailers	Business End Users	Household End Users	WEEE Handlers
Social enablers	Increasing accessibility to products' repair and replacement services	Increasing accessibility to products' repair and replacement services	Campaigns to promote circular economy consumption and practices	Making products' repair and replacement services available	Increasing accessibility to products' repair and replacement services Making products' repair and replacement services available	Making products' repair and replacement services available	Making products' repair and replacement services available
Technical enablers	Designing and manufacturing for end of life reuse and circularity	Enhancing circular economy technical knowledge and skills through training	Innovative resource efficient recycling and recovery processes	Innovative resource efficient recycling and recovery processes	Designing and manufacturing for end of life reuse and circularity	Designing and manufacturing for end of life reuse and circularity	Innovative resource efficient recycling and recovery processes
Supply chain enablers	Suppliers offering circular products	Viable and cost effective technologies for WEEE recovery	Viable and cost effective technologie for WEEE recovery	Suppliers offering circular products	-	-	Viable and cost effective technologie for WEEE recovery
Business models' implementatio n enablers	Developing innovative design and manufacturing for circular products	Developing innovative design and manufacturing for circular products Incentivised return of products	Incentivised return of products Developing new circular procurement systems	-	-	-	Developing innovative recycling and recovery technologies for circular products
Influence decision to purchase EEE	-	-	-	-	Durable products	Durable products	-



Annex D - Lowest ranked answer for each question

Selected by the highest % of: Mostly Disagree + Disagree	/Insignificant challenge + Not a challenge / Insignificant enabler + Not an enabler

		Mostry Disagree + Disagre	e / marginneant chantenge	+ Not a chantenge / margin	incant enabler + Not an en	abiei	
	Designers	Suppliers	Manufacturers	Retailers	Business End Users	Household End Users	WEEE Handlers
	Reducing production		Poducing coordinate	Reducing production			
Economic	process cost	Increasing market	Reducing energy cost	process cost			Increasing market
Opportunities	Reducing raw material	share	Reducing water cost	Reducing energy cost	-	-	share
	cost						
Social	Overcome gender, age	Overcome gender,	Overcome gender,	Overcome gender,	Overcome gender,	Overcome gender,	Overcome gender,
Opportunities	and social barriers	age and social barriers	age and social barriers	age and social barriers	age and social barriers	age and social barriers	age and social barriers
				Using blockchain to			
Technical				support and	Optimization/improve	Improving WEEE	
Opportunities	Using 3D printing	Using 3D printing	Using 3D printing	accelerate circular	ments in WEEE	collection methods	Using 3D printing
				supply chains	recycling methods		
Circular Economy							Realising in house
Business Models	Renting or leasing	Incentivising return of	Renting or leasing	Renting or leasing	Renting or leasing	Renting or leasing	repair,
adoption	products	products	products	products	products	products	remanufacture,
Opportunities							returbishment and
	Not enough compliance	Lack of awareness of	Lack of awareness of				upgrade and resale
Legislative	checks at Member	legislative	legislative	Unregulated circular	-	-	Unregulated circular
Challenges	States level	requirements	requirements	economy competition			economy competition
		Insufficient incentives					
Ducine as and	C1:0.6 1 1.1.1.6	for designing and					
Management	Shift from short-life	manufacturing	No organisational	Lack of collaboration			Limited interest from
Challongos	life cycle of products	life circularity	nolicy/strategy	parties	-	-	senior management
		Insufficient interest		porces			
		from customers					
Economic	Limited leasing services	Limited leasing	Limited leasing	Limited maintenance	-	-	Limited maintenance
Challenges		services	services	and repair services			and repair services
		Lack of promotion for					
		sustainable	N	N			NI
Social Challenges	Limited leasing services	Limited social	of required content in	of recycled content in	Limited leasing	Limited leasing	of required content in
Social chaneliges	Linned leasing services	acceptance of reused.	new products	new products	services	services	new products
		refurbished and					
		recycled products					
	Concerns over personal	Limited circular	Lack of transparency	Limited circular	Limited best practice	Limited best practice	Concerns over
Technical	and/or organisational	economy technical	about products'	economy technical	circular economy	circular economy	personal and/or
Challenges	data security	knowledge and	content	knowledge and	demonstration	demonstration	organisational data
		supporting tools		supporting tools	projects	projects	security
Supply chain	confidentiality among	confidentiality among	Lack of interest from	Lack of takeback			Lack of takeback
challenges	parties in the supply	parties in the supply	supply chain	schemes	-	-	schemes
enunenges	chain	chain					
Circular economy	tionite days dependence dime.	Limited	Limited				
business models	of circular economy	understanding of	understanding of	inconsistent supply or	_	_	oconomy skills and
implementation	husiness models	circular economy	circular economy	materials			training
challenges	business models	business models	business models	materials			t dining
		Development of	Comparison (co.) MEEE				Development of
Legislative		supply chain tools for	Legislation awareness	circular economy			supply chain tools for
enablers	Regulated competition	compliance	understanding and	legislative	-	-	compliance
		monitoring and	compliance	requirements			monitoring and
		enforcement					enforcement
			Research and				
			development				
Business and	Circular economy	Clear circular	initiatives to devise	Circular economy			Circular economy
management	training programmes	economy business	strategies and mothods to oxtond	training programmes	-	-	training programmes
enablers		cuse	the lifecycle of				
			products				
	Additional government	Additional	Additional	Additional		Additional	Additional
Economic enablers	funding for circular	government funding	government funding	government funding	Green Public	government funding	government funding
	economy skills training	for circular economy	for circular economy	for circular economy	Procurement	for circular economy	for circular economy
	Campaigns to promote	SKILIS training of	skills training of	SKIIIS training of		skills training of	skills training of
Casial angle is a	circular economy	Affordable and	Affordable and	Affordable and	Attordable and	Affordable and	Affordable and
Social enablers	consumption and	services	services	reliable leasing	reliable leasing	services	services
	practices	Machapiers to such	Machapiers to such	50.0005	Machapiers to suit	Machapiersta	50.7005
	exposure of stored	exposure of stored	exposure of stored	Availability of	exposure of stored	exposure of stored	Availability of
Technical enablers	personal and/or	personal and/or	personal and/or	information for	personal and/or	personal and/or	information for
. common chapiels	organisational data in	organissational data in	organissational data in	tracking products	organissational data in	organissational data in	tracking products
	E&E products	E&E products	E&E products		E&E products	E&E products	
		Enhanced circular					
		economy knowledge					
	Available information	and skills through	Enhanced circular	Enhanced circular			Enhanced circular
Supply chain	on materials', products	Available information	economy knowledge	economy knowledge	_	_	economy knowledge
enablers	and components'	on materials'	and skills through	and skills through	-	-	and skills through
	traceability	products and	training	training			training
		components'					
ļ		traceability					
Business models'	Disseminating the	Disseminating the	Disseminating the				Disseminating the
implementation	benefits of renting and	benefits of renting	penetits of renting	-	-	-	benefits of renting
enablers	leasing products	and reasing products	and leasing products		Products associated	Broducts associated	and reasing products
	-	-	-	-	. Todacis associated	. Todacis associated	-