ReCiPSS

Paving the way for innovative Circular Economy products and services in the electronic and automotive sectors

A physical event by the H2020 C-SERVEES and ReCiPSS projects

19 October | Brussels & online | 09:00 - 13:00

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- Panel discussion: Resource-efficient Circular Product-Service Systems (ReCiPSS) and how large-scale implementation of circular manufacturing systems in the electronics / white goods and automotive sectors can lead to a stable circular economy in the EU
- Joint panel discussion: Policy-relevant results and insights for the Circular Economy, jointly provided by C-SERVEES and ReCiPSS

Activating Circular Services in the Electric and Electronic Sector

Paving the way for innovative Circular Economy products and services in the electronic and automotive sector

An event by the H2020 C-SERVEES and ReCiPSS projects

Welcome and C-SERVEES GENERAL ANIMATION

Itziar Carracedo, AIMPLAS, C-SERVEES Project Coordinator

Date & Place: 19 October 2022| Brussels

Activating Circular Services in the Electric and Electronic Sector

Paving the way for innovative Circular Economy products and services

C-SERVEES Circular Economy Business Models Innovation & Product Service-System (PSS) Demonstration

Mohamed Osmani, Loughborough University (LOU)

Date & Place: 19 October 2022| Brussels

The Challenge

- Although the concept of Circular Economy (CE) is generally acknowledged and accepted, it is proving difficult to implement.
- To date, the adoption of Circular Economy Business Models (CEBMs) in the Electrical and Electronic Equipment (E&E) sector has been piecemeal despite regulatory, business, and economic drivers.
- This is compounded by:
  - the lack of an integrated sector-wide CE approach;
  - absence of an accepted framework for depicting CEBMs; and
  - stakeholders' uncertainty of the potential benefits of CEBMs for their businesses.

C-SERVEES solution

C-SERVEES project addressed these sectoral and organisational challenges through two concurrent tasks:

- ✓ Development of a **REFERENCE CIRCULAR ECONOMY BUSINESS MODEL (REF-CIRCMODE) for the E&E sector**
- ✓ Applying and customising REF-CIRCMODE to develop **4 product-specific E&E CEBMs**:
  - WASHING MACHINES CIRCULAR ECONOMY BUSINESS MODEL (WASH-CIRCMODE)
  - PRINTERS CIRCULAR ECONOMY BUSINESS MODEL (PRINT-CIRCMODE)
  - ALM CIRCULAR ECONOMY BUSINESS MODEL (ALM-CIRCMODE)
  - TV SETS CIRCULAR ECONOMY BUSINESS MODEL (TV-CIRCMODE)

C-SERVEES CEBM development stages

Capturing **EEE stakeholders' CEBM awareness, opportunities & barriers** (Survey: 1,300 responses, 13 EU countries)

Identifying **EEE stakeholders' business and operational CEBM implementation requirements**

Assessing current CEBMs (including PSS) and **evaluating their relevance to the E&E sector**

Identifying EU and national WEEE and Circular Economy related **policy instruments relevant to the EEE sector**

Identifying and categorising **circularity indicators** that support CEBM measurement

Generating a consolidated **five-layered REFERENCE CIRCULAR ECONOMY BUSINESS MODEL (REF-CIRCMODE)** & Producing a step by step **guidance to use REF-CIRCMODE as a framework to develop E&E product-specific CEBMs**

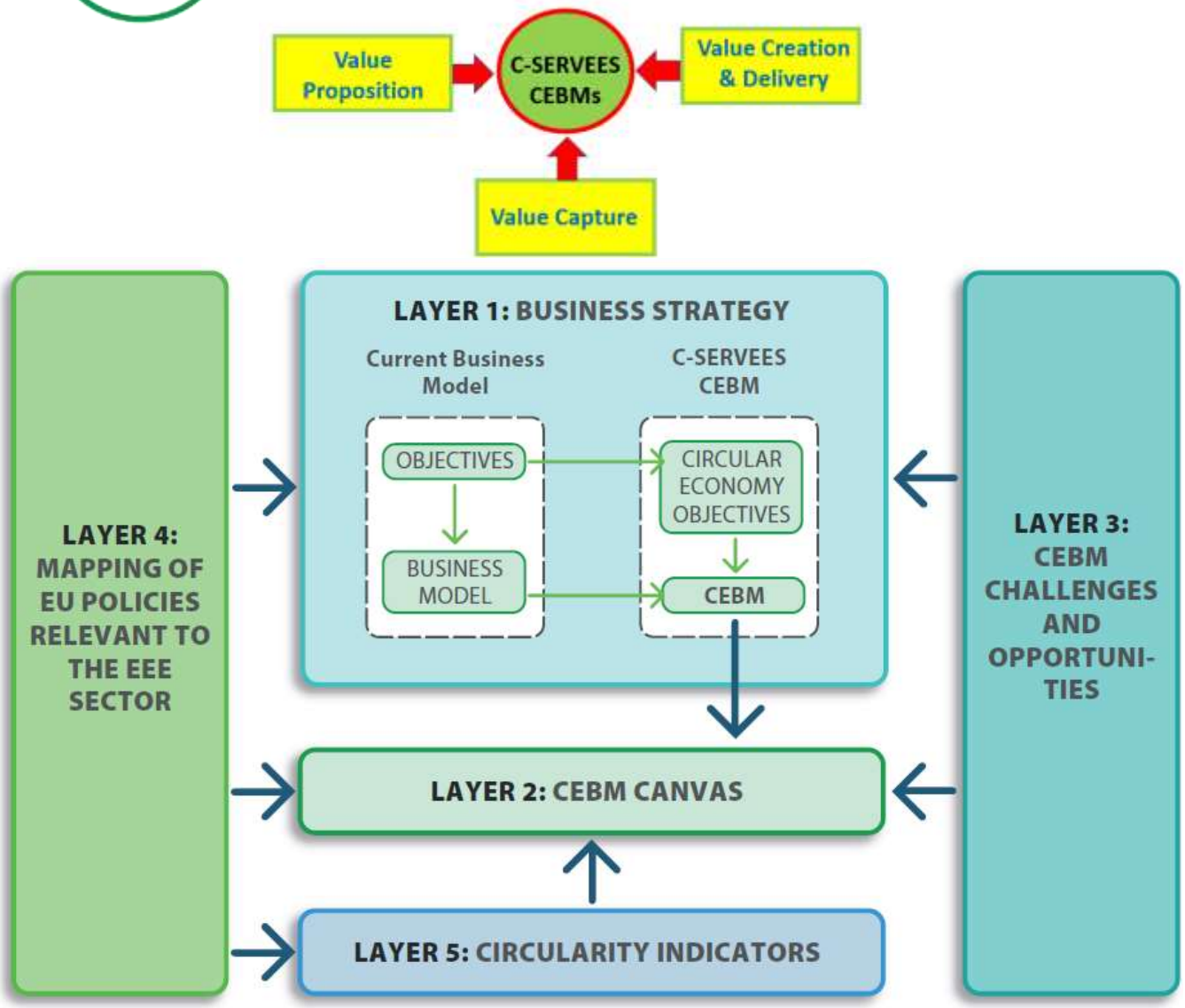
Developing **four C-SERVEES E&E product-specific CEBMs**

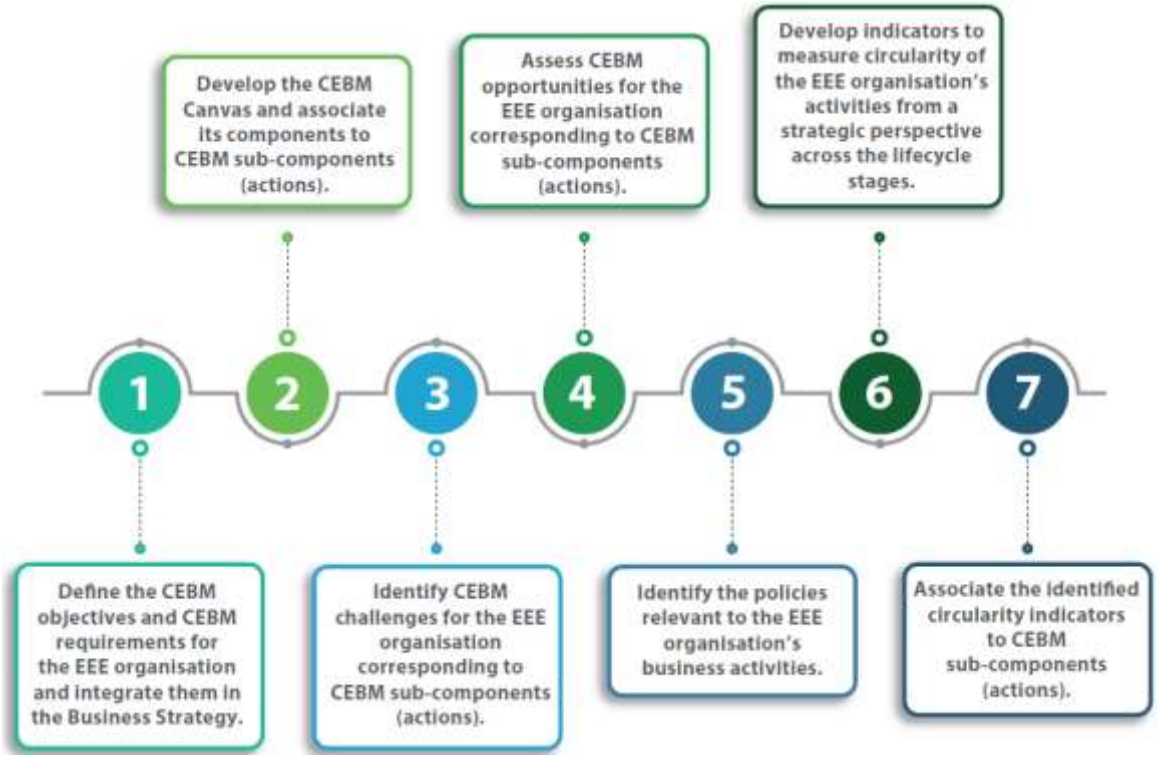
WASH-CIRCMODE | **PRINT-CIRCMODE** | **ALM-CIRCMODE** | **TV-CIRCMODE**

Producing **short, medium, and long-term 'Circular Economy Actions'**

Implementing short-term 'Circular Economy Actions' in four C-SERVEES demonstrations

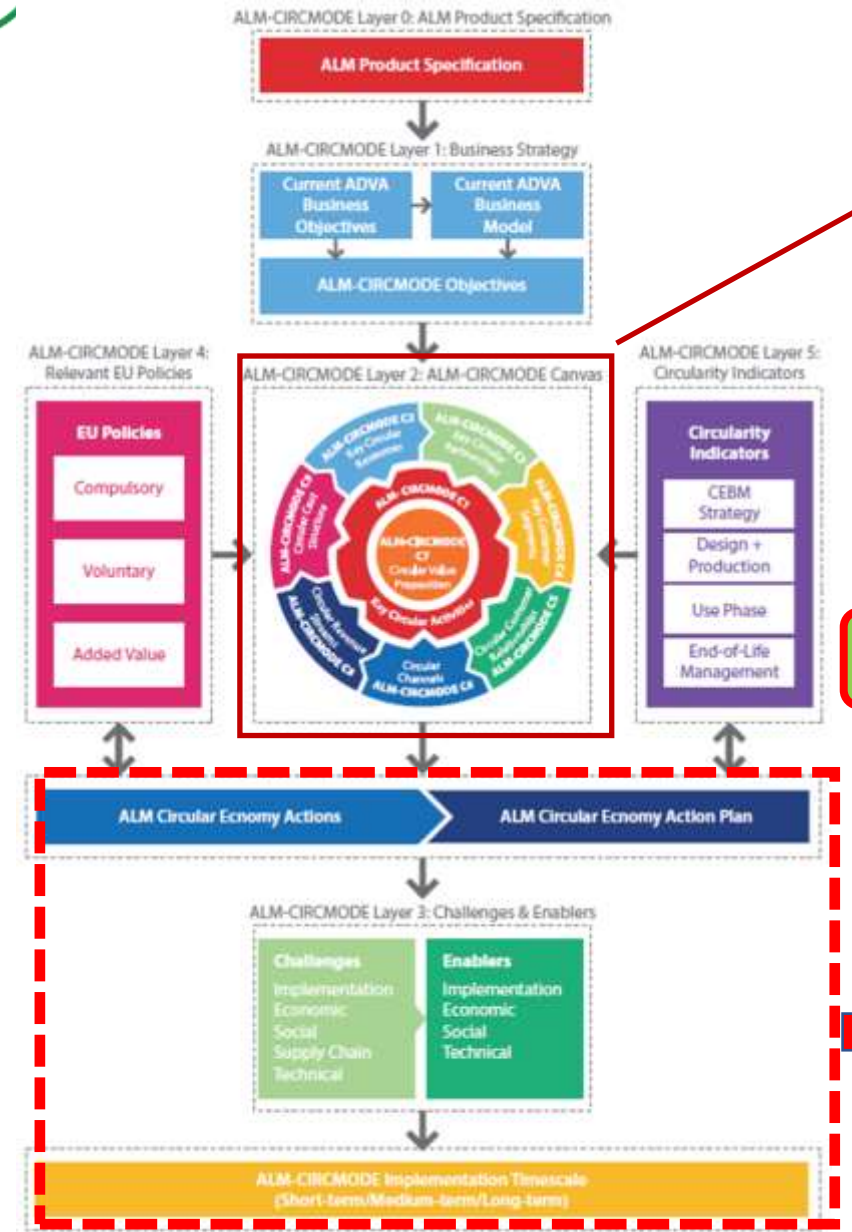
C-SERVEES REFERENCE CIRCULAR ECONOMY BUSINESS MODEL (REF-CIRCMODE)





Publication (2021): "**A circular economy business model innovation process for the electrical and electronic equipment sector**", **Journal of Cleaner Production** DOI: 10.1016/j.jclepro.2021.127211 (https://www.sciencedirect.com/science/article/pii/S095965262101430X?via%3Dihub)

C-SERVEES Product specific CEBMs



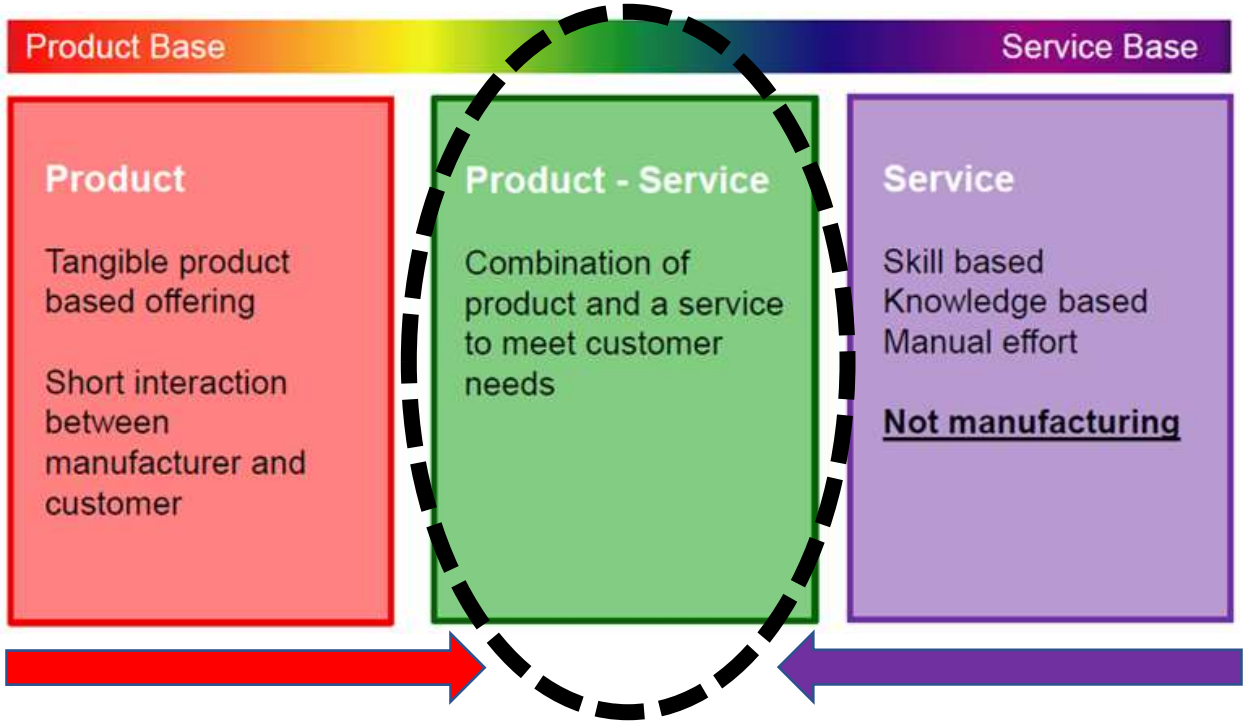
Demos

PSS

Key Circular Activities	1.1 Diversify circular activities	A1.1 Expand product and component recovery and refurbishment programme
	1.2 Embrace eco-design	A1.2 Design to improve the durability of products and components
	1.3 Circular product bn strategies	A1.3 Continously audit production and suppliers production against circularity indicators
	1.4 Circular logistics and distribution	A1.4 Improve reverse logistics for greater product take-back
	1.5 Repair and maintenance services	A1.5 Explore competitivness of 3D print hg for smaller plastic parts for repair
	1.6 End-of-life circularity	A1.6 Provide recyclers with material declaration to aid recycling
	1.7 Track materials and components	A1.7 Material labels or tags (RFID, QR) for recycling
Key Circular Resources	2.1 Competitive financing models	A2.1 Conduct cost analysis on secondary/virgin materials
	2.2 Skills and training programmes	A2.2 Improve promot bn and training of circular economy for sub-contractors
	2.3 Use of ICT	A2.3 Use ICT to improve informat bn sharing across the supply chain
Key Circular Partnerships	3.1 New alliances/existing partnerships	A3.1 Improve partnerships with component suppliers
	3.2 Private/public procurement	A3.2 Form partnerships to expand the customer base
	3.3 Partnerships' cultural issues	A3.3 Active media/PR campaign on refurbished products
Key Customer Segments	4.1 B2B/B2C customer segments	A4.1 Ensure refurbished products are desirable to environmental conscious customers
	4.2 Cultural pat erns	A4.2 Target 'green conscious' B2B customers
	4.3 Social class/demographic segments	A4.3 Study networks of resellers to take advantage of a long-term B2C market
Circular Customer Relationships	5.1 Customer relationships initiatives	A5.1 Offer/discuss circular solutions with dedicated customers
	5.2 Social media platforms	A5.2 Enable customer circular economy requirements' feedback via company platforms
	5.3 Change traditional relationships	A5.3 Existing/new contracts modified to provide extra support for takeback/buyback
	5.4 After-sales services	A5.4 Provide enhanced after sales services and /warranty for circular offerings
Circular Customer Relationships	6.1 Customer communications	A6.1 Use ICT platforms to disseminate and communicate circular economy offerings
	6.2 Brand and organisation's image	A6.2 Inclusion of circular activities when participating in events/symposia
	6.3 Eco-labelling and certificates	A6.3 Participate in eco-labelling cartification and/or standards for circular economy
	6.4 Data security	A6.4 Address data security issues for returned/refurbished equipment
	6.5 Marketing strategies	A6.5 Include circular economy messages in bilateral communication
Circular Value Proposition	7.1 Products as a service/bundles	A7.1 Introduce a Product Service System offering to complement current portfolio
	7.2 Leased, rented or shared product	A7.2 Explore the Potential for shared products through simulation and calculation
	7.3 Sustainable consumption patterns	A7.3 Leverage the use of blockchain based ICT tools to improve printers' circularity
	7.4 Circular end-of-life options	A7.4 Learn from best pract te to improve the product collection/return programme
Circular Revenue Streams	8.1 Recurring revenues	A8.1 Incentivize customer returns of end-of-use product for high-end product lines
	8.2 Financial administration	A8.2 Explore renting or leasing options for medium size B2B customers
	8.3 Value from waste	A8.3 Reuse end-of-life parts in refurbished products
Circular Cost Structure	9.1 Mitigate addit bnal costs	A9.1 Reduce legislative compliance fees for WEEE management via collection programme
	9.2 Manufacturing and sales processes	A9.2 Reduce the costs of design for recycling measures
	9.3 Cost of take-back and return	A9.3 Improve tracking and reverse logistics system to mit gate costs with returned products
	9.4 Lower lifetime costs over initial cost	A9.4 Expose the real, hidden cost of waste management to consumers

Product Service-System (PSS) Definition

PSS represents a shift in a business model focus **from traditional business offerings** that concentrates on manufacturing (and seeing) products to an **integrated system of products and services** which are jointly capable of fulfilling specific customers' demands and generating value. Hence, **decoupling business success and economic growth from pure product sales**.



Product Service-System (PSS) Types

Product-orientated	Use-orientated	Results-orientated
Add a service to a product	Ownership is maintained by company	Product is part of the service

PSS Type	Offers	Provides
Product-orientated	Extended lifetime covered by warranty	Delivers service related to products Selling additional services alongside products (maintenance or product related consultancy)
	Maintenance & repair Upgrade services	
Use-orientated	Leasing products Renting products	Provides access to products for specific time period or number of units
	Sharing products	
Results-orientated	Service provision agreements	Sale of service or capability rather than product. Delivery of functional results, with no pre-determined products involved
	Contracts for delivery of functional results	

Product Service-System (PSS) Barriers & Benefits

	Benefits	Barriers
Customers	• Product and service customisation • Avoid repair & maintenance costs, obligations and risks • Optimised service • After sales care • Fashion trends	• Preference for ownership • Concerns about cleanliness, damage, etc. • Affordability (real and perceived) • Unfamiliar with PSS concept
Companies	• Marketing opportunities, open to new customers, expanding customer base • Enhanced reputation and CSR • Less volatility in ash flows • Locking in customers, locking out competition • Multiple life cycles	• Initial investment • Changing rate of return on investment • Changing revenue patterns • Market demand • Support across value chain

C-SERVEES PSS Demonstration

Telecom equipment:
ADVA ALM product line
Demo: 200 units

DEMONSTRATION GOALS			
	Design phase	Use phase	End-of-life phase
ADVA 	Implement eco-design (design for energy efficiency and design for recycling)	Analyse and implement PSS for ALM products	Lifetime optimisation model for ICT products (LCA based)

Lessons learned from PSS demonstration analysis and implementation for ALM products will be reported in the C-SERVEES '**Panel Discussion**' at 9:30am.

Thank you!

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C-SERVEES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776714

Activating Circular Services in the Electric and Electronic Sector

Paving the way for innovative Circular Economy products and services in the electronic and automotive sectors

How can ICT tools help in implementing Circular Economy Business Models?

Teresa Oberhauser, Circularise
Juan Carlos Liebana, Soltel
Sara Fozza, RINA-C

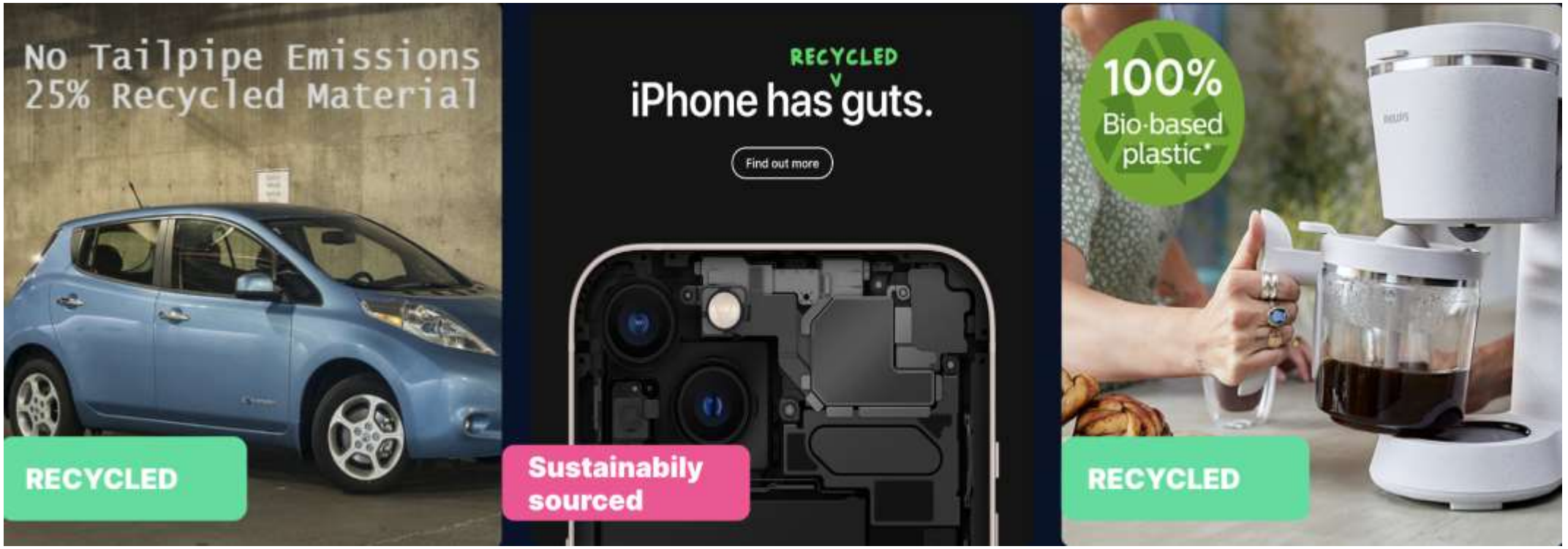
Date & Place: 19 October 2022| Brussels

The Information Communication Technology Tools (ICT)

With the help of software three companies (Circularise, Soltel and Rina-C teamed up to solve Circular Economy through software

We managed to create software that:
- allows companies to assess and retrieve material composition data until deep into their supply chain
- communicate sensitive material data safely without ever giving it out of hand, through blockchain (digital product passport)
- connect the actors of the EEE product's life cycle to share useful information to help promote the re-use, repair and the efficient recovery of EEE products and materials
- developing the best routing mechanism that optizimes route planning and truck amounts for waste or product collection

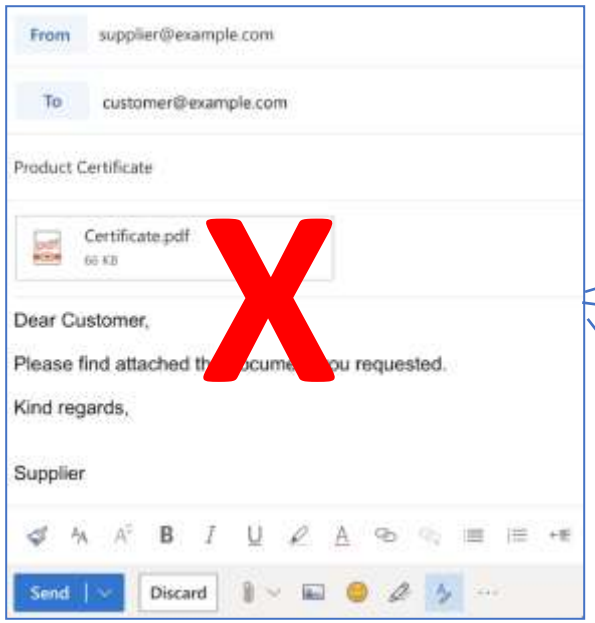
Proofing sustainability claims with CIRCULARISE



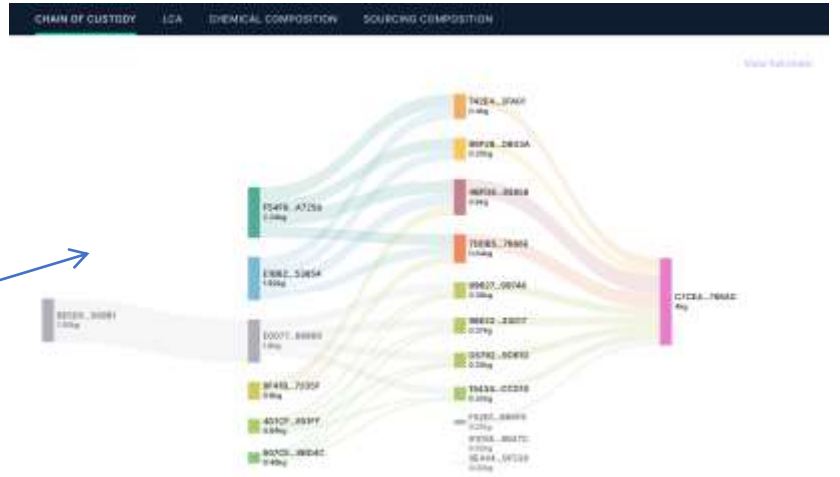
We see a strong trend towards using more sustainable materials. But how are these claims assessed and proven?

Digital Product Passport Tool of

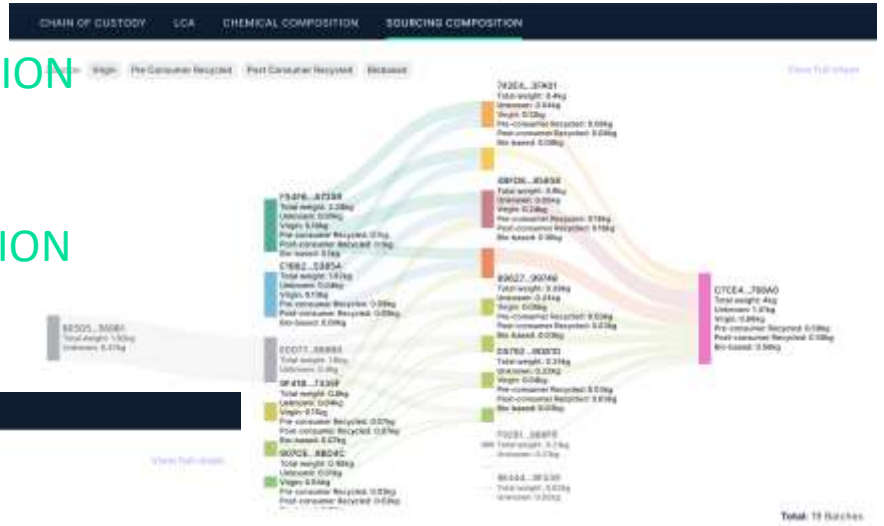
CIRCULARISE



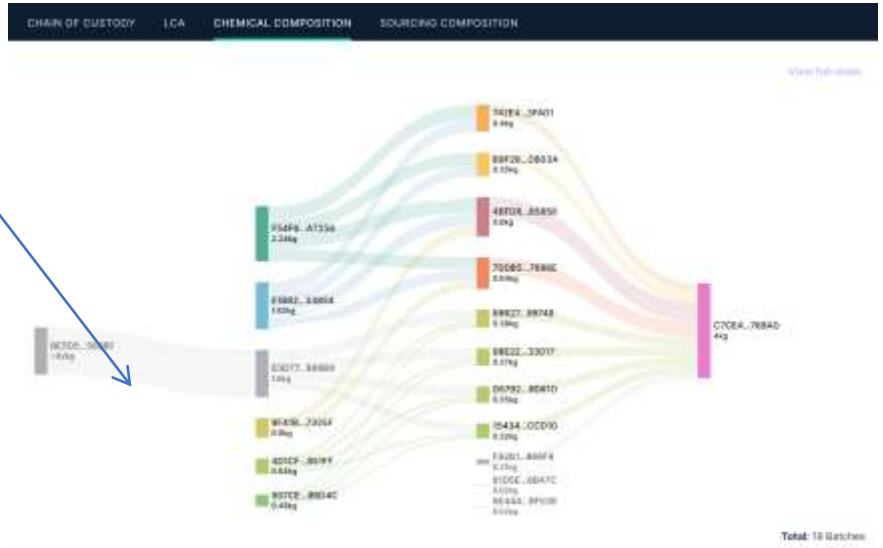
CHAIN OF CUSTODY/
DIGITAL TWIN



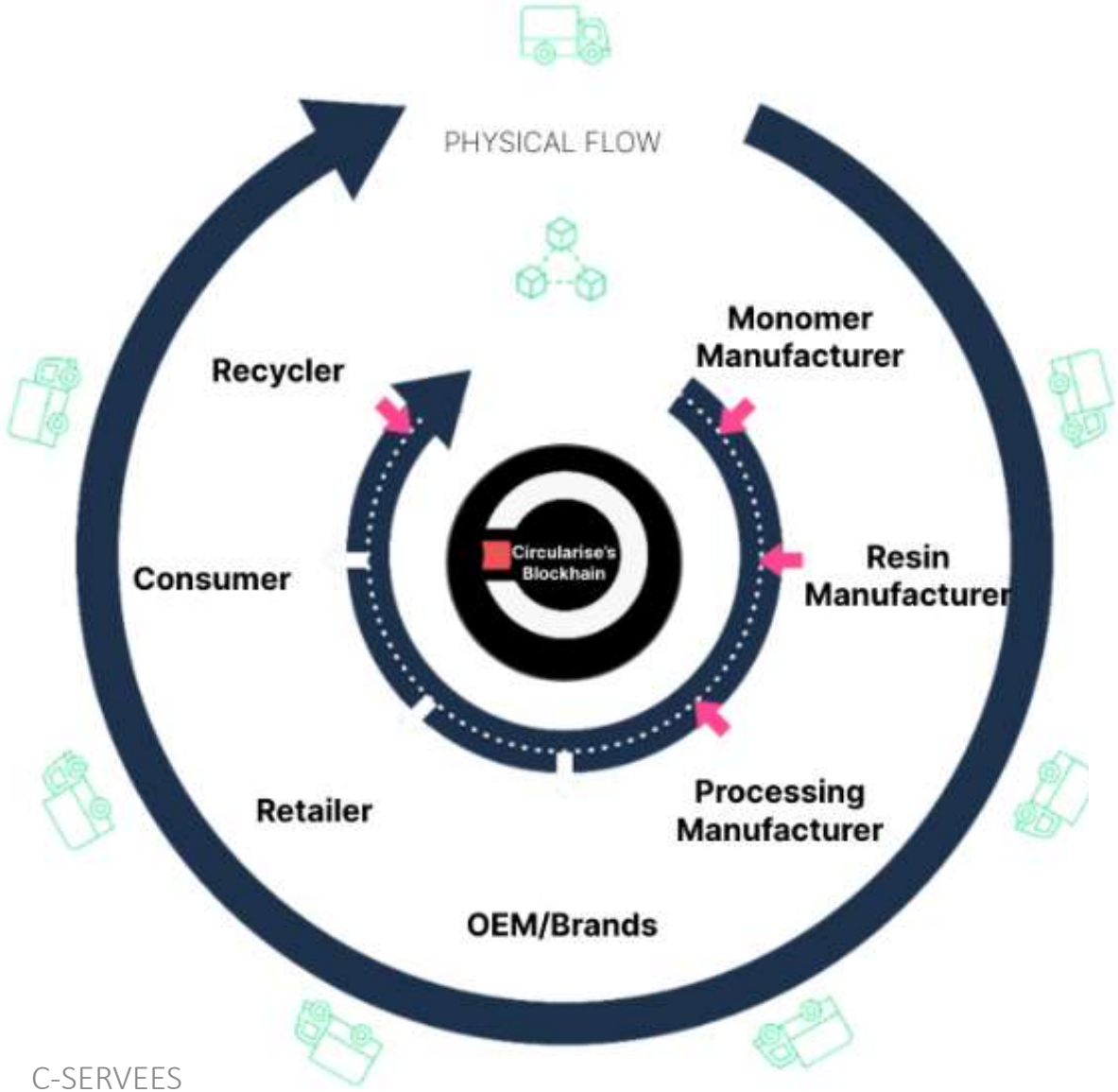
SOURCING COMPOSITION

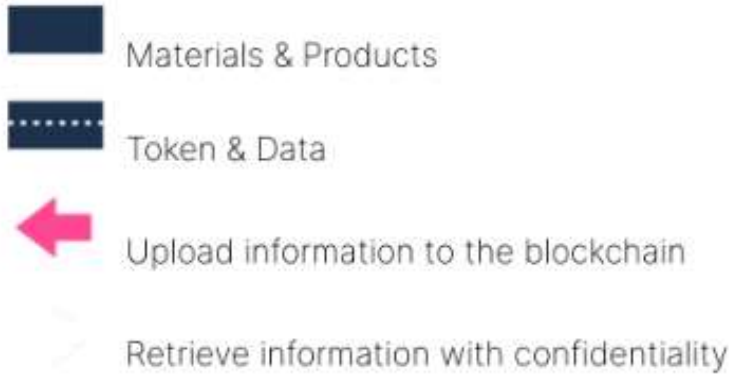


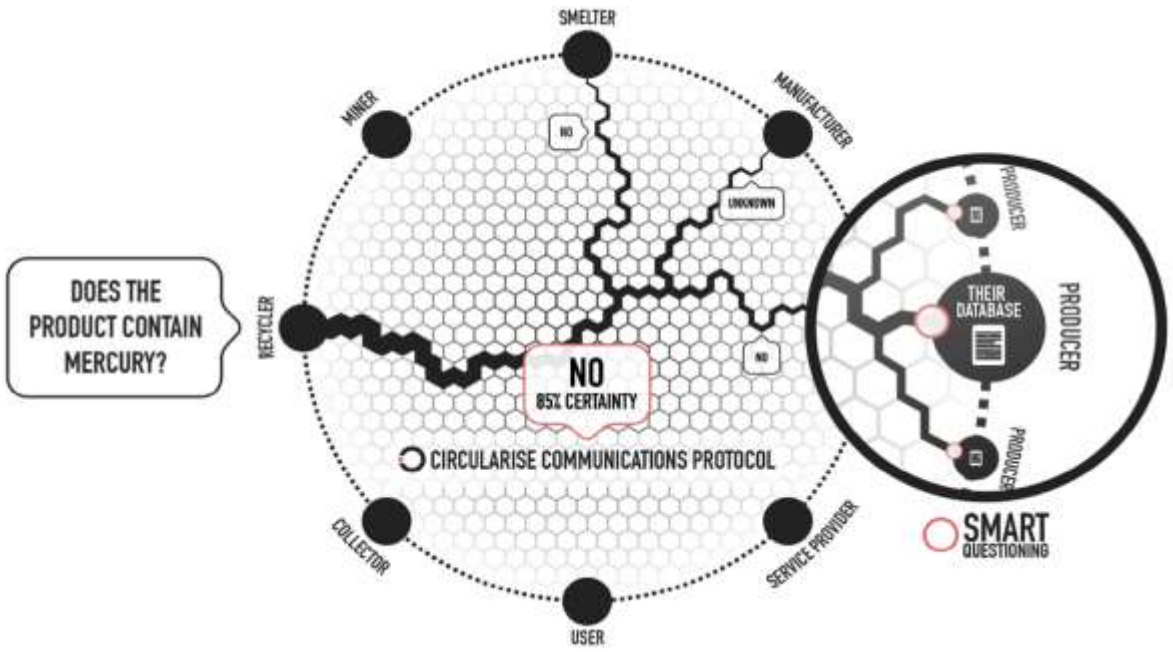
CHEMICAL COMPOSITION



Blockchain for material traceability







1.Create Digital Product Passports

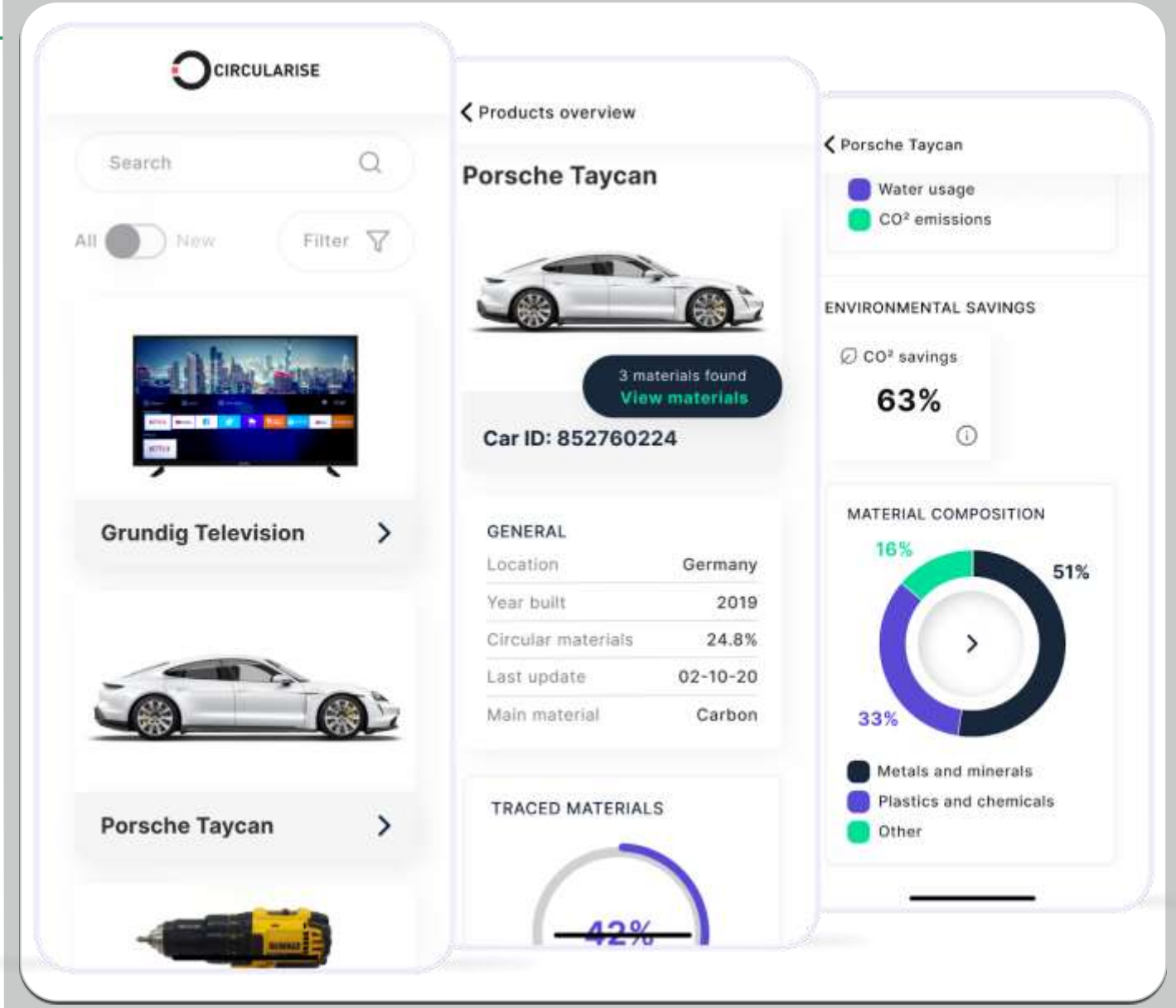
2. Showcase innovation and sustainability efforts to strengthen brand

3. Incentivise sustainable behaviour change e.g. to support take-back systems

4. Differentiate your sustainable products to grow your revenue

5. Share information e.g. user or repair guides to support maintenance and life time extension

6. Collect (Anonymised) Use data e.g. required repairs or downtime of asset throughout lifecycle

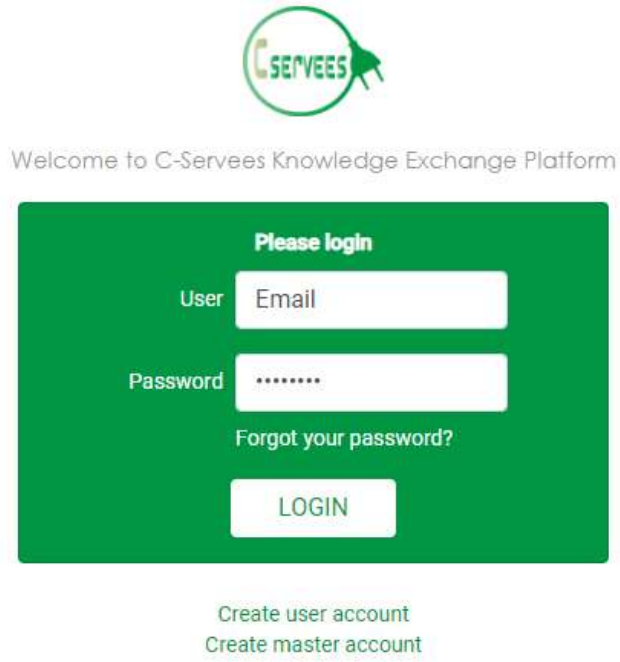


The Information Exchange Platform

Behind technology there will always be **people and companies interested in approaching each other** to be part of something greater.

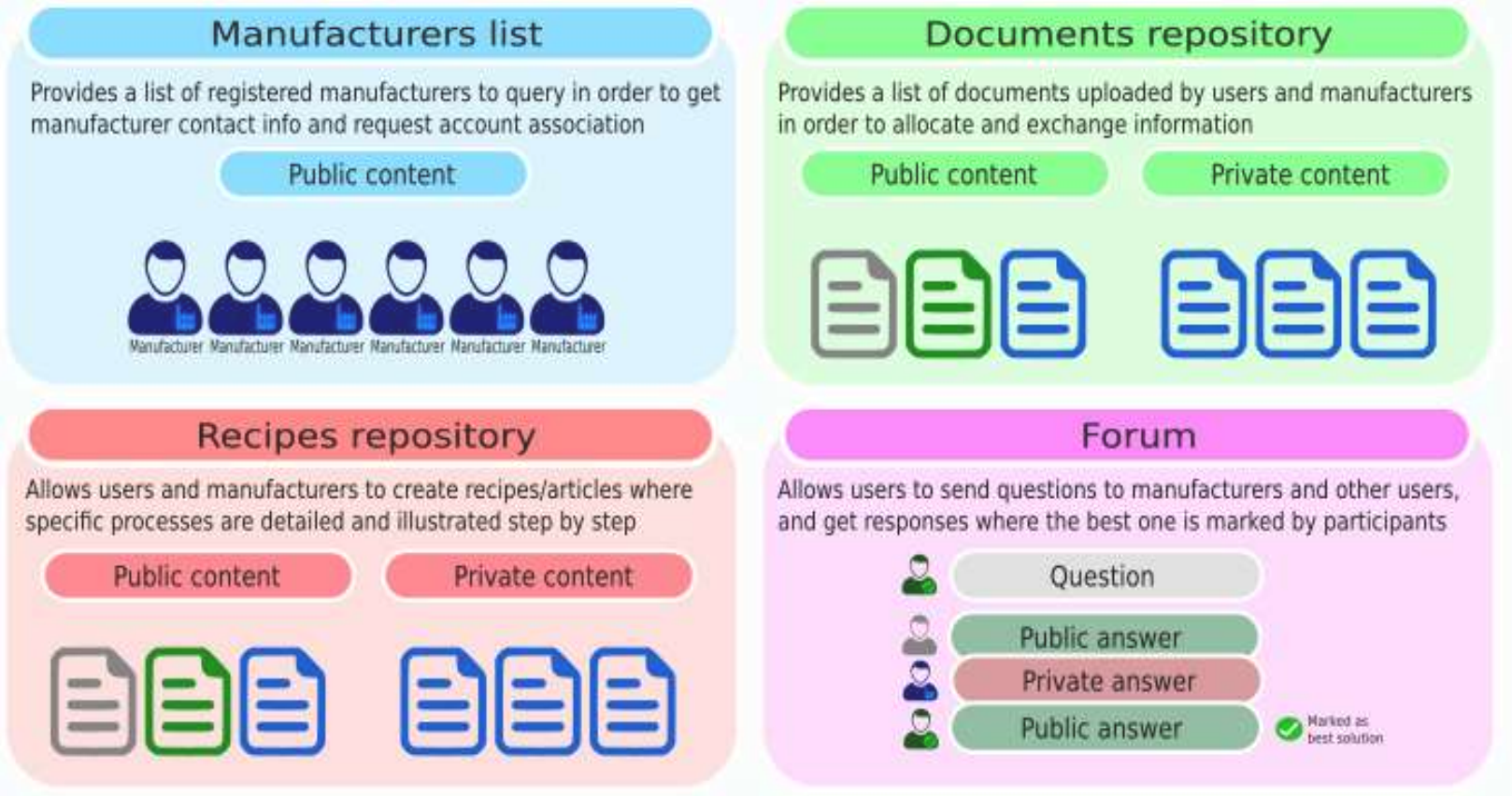
In addition to developing tools that help us facilitate circular economy processes, we must address the most basic needs of users: **discover, connect and exchange information.**

https://soltel-idi.es/cservees



The Information Exchange Platform

The IEP is an ICT tool to connect the actors of the EEE product's life cycle **to share useful information to help promote the re-use, repair and the efficient recovery of EEE products and materials.**



The Information Exchange Platform

All the platform's functionalities are aimed at facilitating **the connection between users** and **simplifying the exchange of information:**

- ✓ Partners lists
- ✓ Share documents (.PDF, .DOCX, .XLSX)
- ✓ Create and share quick guides.
- ✓ Forum.

Lexmark	PDF		Dismantling manual MS812	Dismantling manual MS812 Dismantling order with illustrations	May 5, 2022	
Lexmark	XLSX		Lexmark TEST	Lexmark TEST	May 6, 2022	
Lexmark	Quick guide		How to Print a Device Statistics Report on Your Lexmark MS517dn	It's a report from your printer that covers a whole bunch of important information like how many pages your printer has printed; how much toner your cartridge has; how much toner is being printed on each printed page, and more!	May 6, 2022	
Lexmark	Quick guide		How to Download and Install Print Driver	How to Download Print Driver. How to install Print Driver	May 6, 2022	
Indumetal	PDF		Printer demo-Dismantling Manual	Optimised protocol for the disassembling of specific printer components	May 18, 2022	
Soltel	Quick guide	SpecialBelt	Logistic Platform test quickguide	Logistic Platform test quickguide	May 19, 2022	
Arcelik	PDF		EN user manuel for CSERVEES WM demo product	EN user manuel for CSERVEES WM demo product	Jun 23, 2022	
Arcelik	PDF		ES user manuel for CSERVEES WM demo product	ES user manuel for CSERVEES WM demo product	Jun 23, 2022	
Arcelik	PDF		TR user manuel for CSERVEES WM demo product	TR user manuel for CSERVEES WM demo product	Jun 23, 2022	
Xabier Narbaiza	DOCX		BELT REPLACEMENT	Washing machine belt replacement process.	Oct 4, 2022	

The Information Exchange Platform

Process steps

Step	Image	Name	Description
1		Step 1	Üst tabla 2 adet vida ile gövdeye gruplıdır. Top plate have 2 screws (indicate with red color circle).
2		Step 2	2 vida sökülerek üst tabla açılır. Top plate screws are removed (indicate with red color circle).
3		Step 3	Üst tabla açılır. Top plate is removed.
5		Step 5	Sağ ve solda bulunan pano bağlantı vidaları sökülür. Cabinet - panel connection screws on the right and left are removed (indicated with red circle).
6		Step 6	Deterjan kutusu - pano bağlantı vidası sökülür. Detergent box - panel connection screw is removed (indicated with red circle).

Forum - Recycler's certification (SOLVED)

Lexmark
6th May 2022
Solved

What accredited certification standard an electronics recycler has to have?

Solution

Solution
Most voted
Indumetal
18th May 2022
1 vote

In Spain it is compulsory, only the Authorization for waste management. Indumetal has also WEELABEX, ISO 9001 and 14001, but they are optionals.

The information exchange platform was tested during **Lexmark's demonstration** on printers and within **Arçelik's demonstration** on televisions and washing machines.

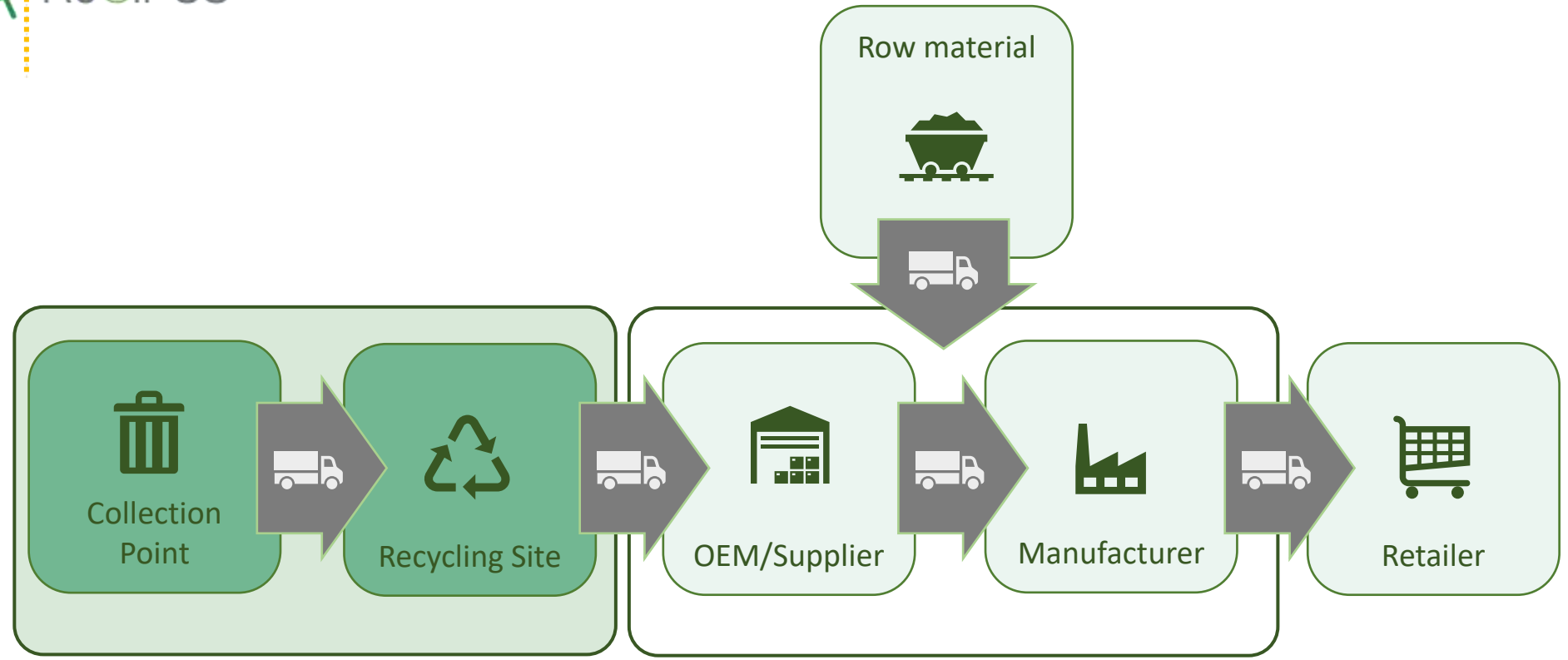
In both cases it has been a considerable advantage to be able to store the documents in a **common and secure repository** to share them with their partners in a **simple and fast way**.

The Logistic Platform

The **efficient management of the reserve logistics** is one of the elements which makes the **circular value chain sustainable** and attractive.

- Good planning of the journeys
- Reduction of greenhouse gas emissions
- Reduction of transport costs
- Contribution to the reduction of the final cost of the product
- Increase attractiveness of the re-used and second-hand materials
- Increase environmental behavior

The Logistic Platform



The Logistic Platform **allows to create and compare new logistics scenarios** including recovered materials as new nodes of the supply chain with traditional ones.

The tool is **road network** based and aims at optimising the potential multi-stop pathway covered by trucks to connect all the stakeholders.

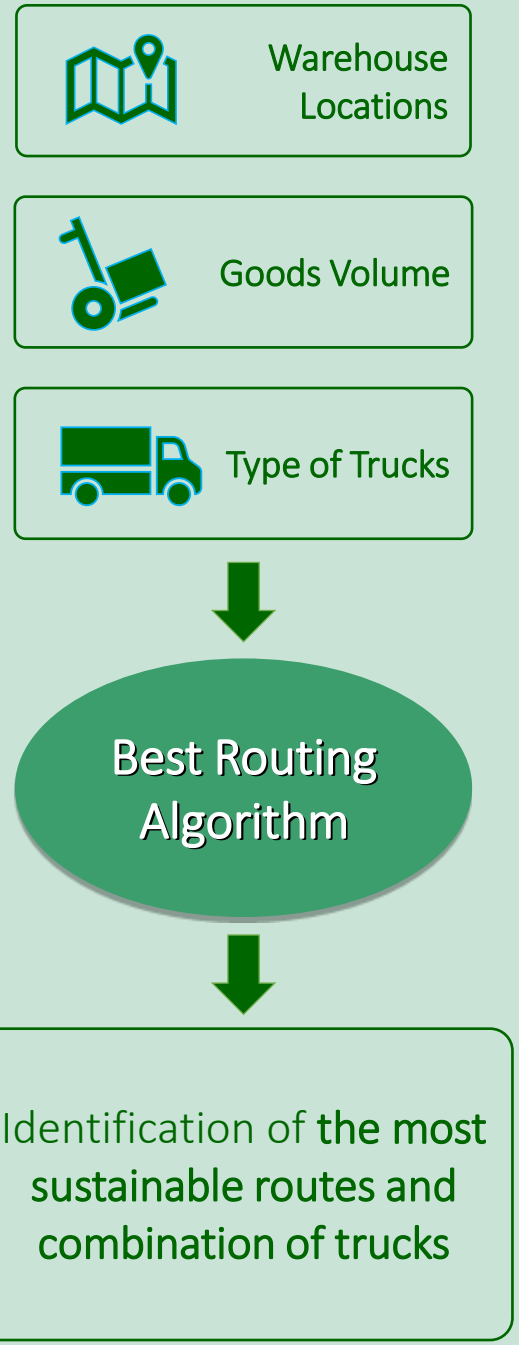
The Logistic Platform

How the Best Routing Algorithm works:

- ✓ **Optimizing the route planning** by defining the best sequence of nodes of the supply chain in order to **minimising the driving distance**; and
- ✓ **Identifying the appropriate number of trucks** according to loading constraints.

For the identified routes the tool evaluates the **environmental impact** applying a methodology based on COPERT 5.2.2

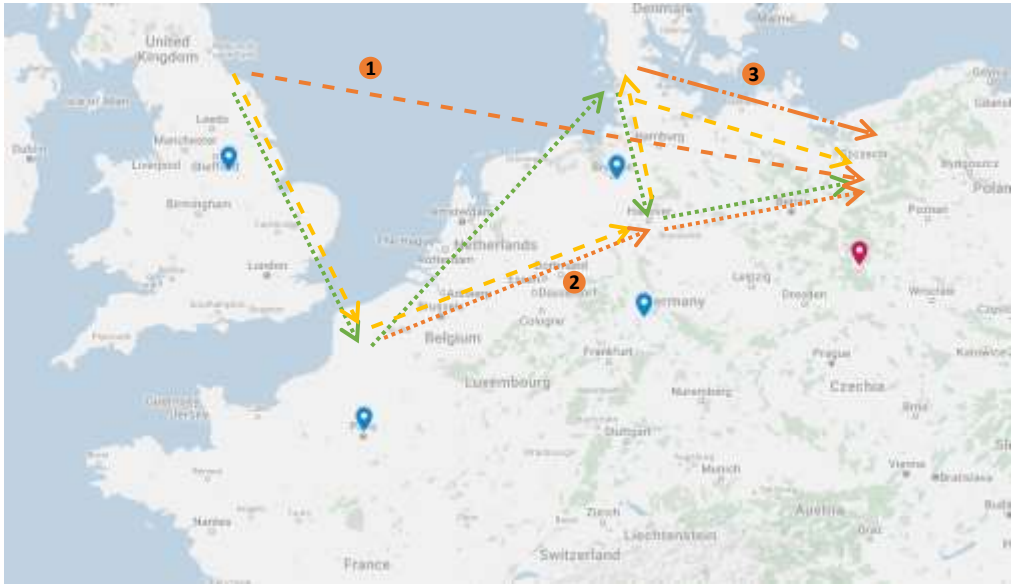
https://logistic.platformdev.xyz/auth/login



The Logistic Platform

The Logistic Platform was applied within the Lexmark demonstration on printers and within the Arçelik demonstration on TVs and washing machines.

In both cases the **environmental savings** made through the best routing, in terms of driving distance and emissions, **compared with the worst** (no multi-path route) **are about 30-40%**.



Path	Total CO2 (kg)	Total Nox (kg)	Total PM10 (kg)	Total distance (km)	Truck	Delivery Time
[Mansfield-United Kingdom, Saint-Denis-France, Bremen-Deutschland, Weyhe-Deutschland, Żary-Polska]	1,315.45	5.81	0.25	2,017.56	1	21:15:30
[Mansfield-United Kingdom, Saint-Denis-France, Weyhe-Deutschland, Bremen-Deutschland, Żary-Polska]	1,316.63	5.81	0.25	2,019.37	1	21:16:31
……						
[Bremen-Deutschland, Saint-Denis-France, Weyhe-Deutschland, Mansfield-United Kingdom, Żary-Polska]	2,181.39	9.63	0.42	3,345.69	3	Day 1 + 10:39:57

CONTACTS

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Sara Fozza
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sara.fozza@rina.org

Software Demonstration will happen during lunch break
Please send an email or LinkedIn message to request a personal demonstration!

C-SERVEES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776714

ReCiPSS

Panel discussion

How did the C-SERVEES Circular Economy Business Models work in practice?

Demonstrations on TVs, ALMs, printers and toner cartridges, and washing machines

Michele Liberati, PNO
Ana Isabel Díaz, GAIKER
Özlem Ünlüer, Arçelik
Klaus Grobe, ADVA
Patrick Carminati, Lexmark
Hans-Christian Eberl, EC DG RTD

Activating Circular Services in the Electric and Electronic Sector

ReCiPSS

Paving the way for innovative Circular Economy products and services in the electronic and automotive sectors

C-SERVEES Circular Economy Business Models. Results from Printers, ALMs, TVs and Washing Machines Demonstrations

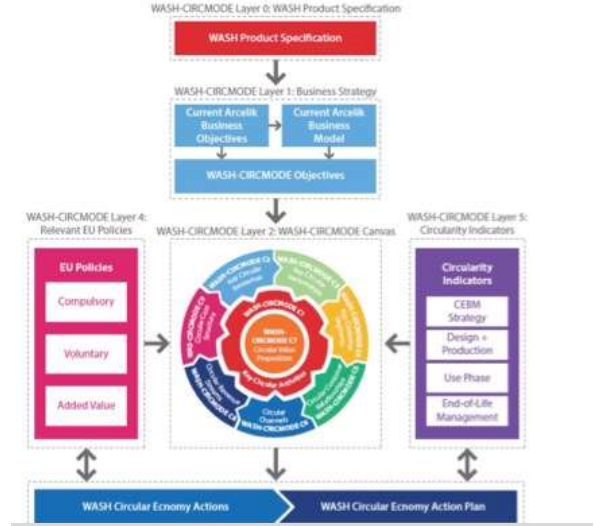
Michele Liberati, PNO Consultants

Date & Place: 19 October 2022| Brussels

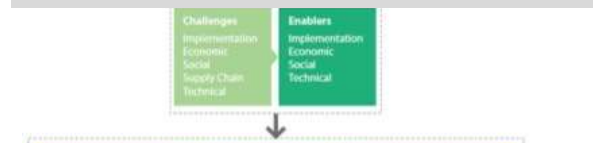
CSERVEES | ReCiPSS

Phase A - Framework

a Current Business Model Assessment



b Framework Development



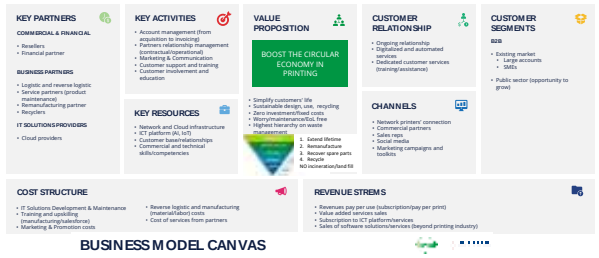
c Circular Economy Actions

Phase B - Demo

Short Term Actions

Phase C - Validation

Business Model Canvass Validation



Implementation Road Maps

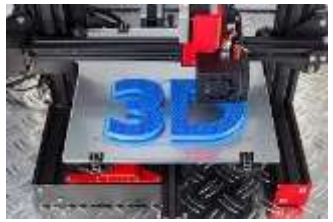
Medium/Long Term Actions

Demo Main Results

Printers and Cartridges Lexmark™

Design & Production

3D printing



For non-functional parts

Distribution and use

Product Service System (PSS) - Analysis

Eco - leasing, maintenance, take-back

End-of-life

Improvements EoL Reverse Logistics

ICT

RINA-C
LCCP

Improvements Refurbishment Operations

ICT

Soltel

+ Vol. EoL Collection,
- Logistics Cost

15%-20% Efficiency expected (volume driver)

Lifecycle and «Knowledge» Results

Eco-Design for Refurbish-Reuse-Recycle

Modular construction of subassemblies

Customer Feedback/Acceptance

Cosmetic Issues/ Refurbished Products

Business Case on Recovery/Recycling

ICT

Circularize

EoL printer spare parts , ABS EoL cartridges (25%)

Demo Main Results

ALM - Access Link Monitoring

Design & Production

Packaging Improvements

Plastic reduction/ elimination

Distribution and use

Product Service System (PSS) - Analysis

Eco - leasing, maintenance, take-back

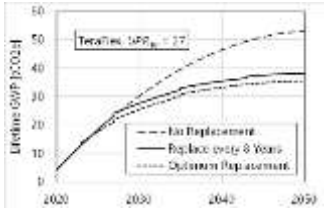
End-of-life

Lifecycle and «Knowledge» Results

Eco - Design Recommendations

New design for LCA Optimization (+30ys)

New Lifetime Analysis KPI



ITU-T standardization (under discussion)

Full Material Declarations

Test for future ICT tools/services

Circularize

Demo Main Results


Washing Machine and TV

Arçelik

Design & Production

Eco_Design

ICT ***QR Code***

WM Recycled plastic **+2%**

TV Recycled plastics **+30%**

Distribution and use

Product Service System (PSS) - Test

Eco - leasing, maintenance, take-back

End-of-life

EoL Product Recovery, Refurbishment

emaús

ICT ***Soltel***

Extension in EU

Lifecycle and «Knowledge» Results

Novel/Patented PET Solutions (Formulas)

\+ Productivity

\- Virgin raw materials

Customer Feedback/Acceptance

"Living lab"/Survey

39% rent, 78% refurb. (cheaper)

Analysis of Recovery/Recycling

ICT ***Circularize***

Components recovery by specialized org.

Future Outcome Expectations

		Washing Machines	TV	Printers	ALM
		Arcelic	*Arcelic*	*Lexmark*	*ADVA*
Phase/Principles	**Objectives (SMART)**				
Design and production / Eco - Desing	**% of recycled contents**	🟢	🟢	🟢	🟢
	Products' lifetime extension/optimization (LCA i.e. carbon footprint reduction)	🔴	🔴	🟢	🟢
Distribution and use phase / Eco - Leasing	**NPV - Net present value of business**	🟡	🟡	🟡	🟡
	Sales of new services: leasing, training, manitenance and associated (% of total revenues)	🔴	🔴	🟡	🟢
End-of-life phase / ReUse, ReManufacture	**Volume of reused/remanufactured products/componets (% of total volume)**	🟡	🟡	🟢	🟢
	New job creation (units)	🟢	🟢	🟡	🟡
Impact of new ICT Tools	Improved traceability of recycled materials (certification)				
	Improved knowledge about material compositions				
	Optimization of logistic networks and activities				
	Imporoved information and knowledge sharing				

*Evaluation of **expected** results after C-Servess project (3-5 year implementation)*		
🔴	🟡	🟢
<2%	2%<x<10%	>10%
<2%	2%<x<10%	>10%
<0	0<x<10mln€	>10mln€
<2%	2%<x<10%	>10%
<2%	2%<x<10%	>10%
<100	100<x<1000	>1000

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C-SERVEES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776714

ReCiPSS

Panel discussion

Resource-efficient Circular Product-Service Systems (ReCiPSS) and how large-scale implementation of circular manufacturing systems in the electronics / white goods and automotive sectors can lead to a stable circular economy in the EU

Dr Farazee Asif, KTH
Aleš Mihelič, Gorenje
Markus Wagner , C-ECO
Ruud de Bruijckere, Signifikant AB
Hans-Christian Eberl, EC DG RTD

Activating Circular Services in the Electric and Electronic Sector

Paving the way for innovative Circular Economy products and services in the electronic and automotive sectors

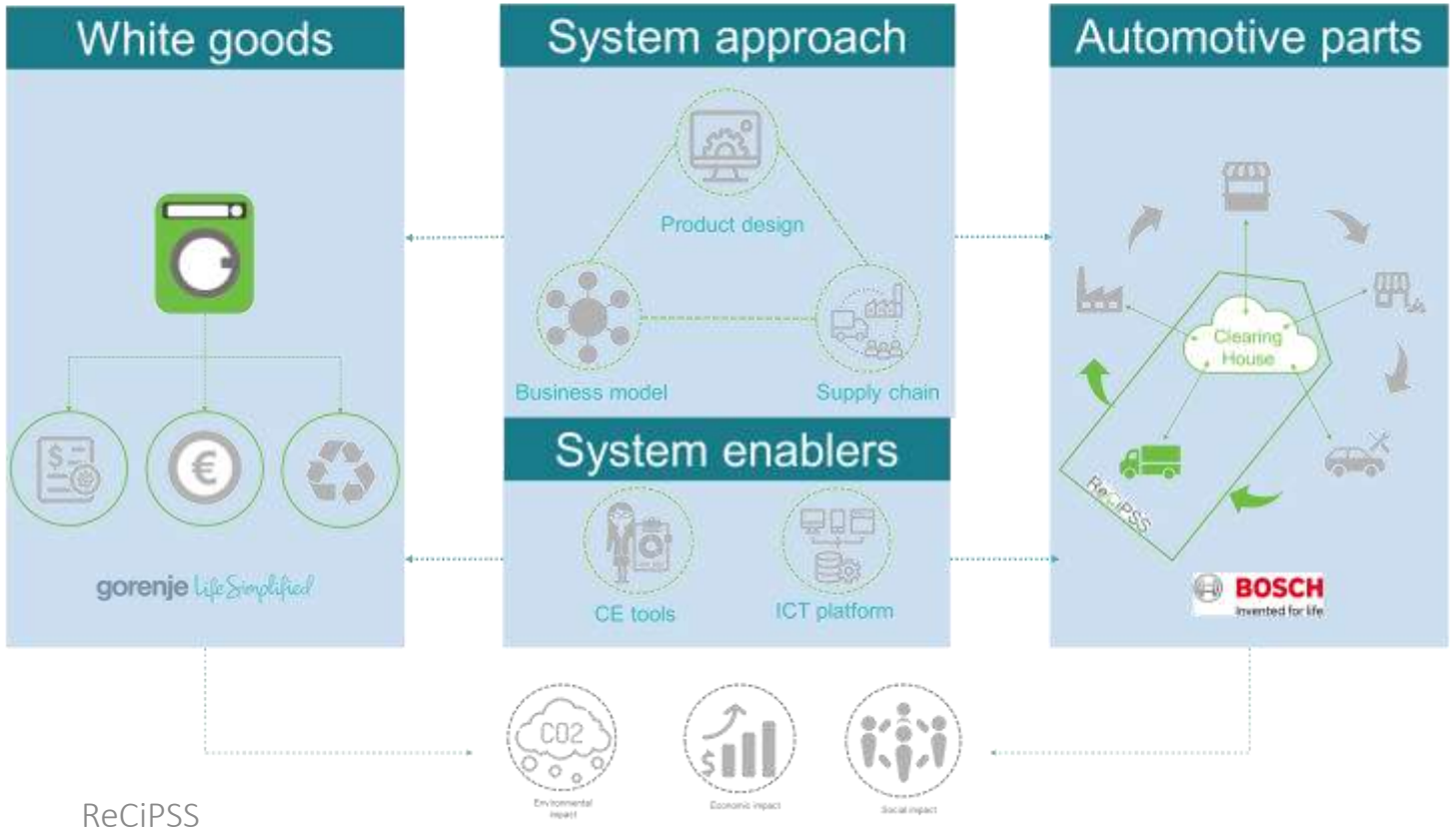
Introduction to the ReCiPSS project

Prof. Magnus Wiktorsson, KTH Royal Institute of Technology
Dr. Farazee Asif, KTH Royal Institute of Technology

Date & Place: 19 October 2022| Brussels

Resource Efficient Circular Product Service Systems

Large-Scale Demonstrations of Circular Manufacturing Systems (CMS)



ReCiPSS consortium

KNOWLEDGE PROVIDERS

TECHNOLOGY PROVIDERS

ORIGINAL EQUIPMENT MANUFACTURERS

ReCiPSS General Animation

Activating Circular Services in the Electric and Electronic Sector

Paving the way for innovative Circular Economy products and services in the electronic and automotive sectors

White goods demonstrator in ReCiPSS

Dr. Aleš Mihelič, Gorenje

Date & Place: 19 October 2022| Brussels

Agenda

- Challenges
- The demonstrator
- Key developments
- Support developments
- Economic, environmental and social impacts
- Lessons learned
- Way forward

Challenges

- The linear Economy of Take-Make-Use-Dispose is not sustainable
- Companies like Gorenje cannot run business in a sustainable and profitable way as the material supply uncertainty and material price volatility are increasing
- Demonstrate that it is possible to achieve a win-win effect by transitioning/upgrading the traditional manufacturing industry into a service provider

The demonstrator

Deploy at least 300 appliances as pay-per-use on 4 different markets for B2B and B2C customers

Key developments

Designed and developed long-lasting smart appliances with real-time condition monitoring as well as designed for reparability, refurbishment and recyclability (built with natural materials such as metal and glass)

Developed an IoT platform to support the implementation of the pay-per-use by connecting machines, manufacturer and service providers

Developed mobile/web applications with backend ICT infrastructure for condition monitoring, contract signing, billing and installation order as well as service interventions etc.

Support developments

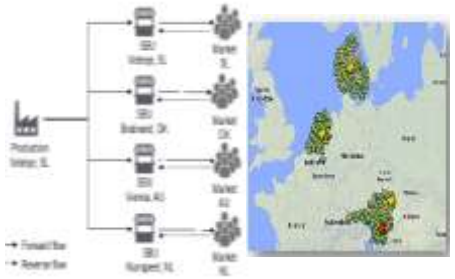
Characterized market and developed and evaluated pay-per-use business model

Developed long-term product design strategies using 4 design methodologies

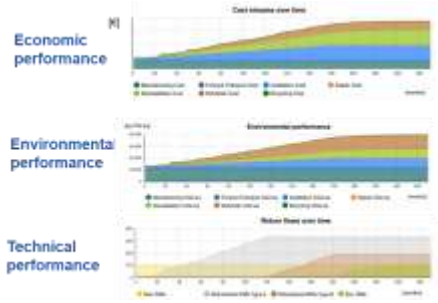
Co-created product and service design

Support developments

Assessed reverse logistics and refurbishment/remanufacturing capability



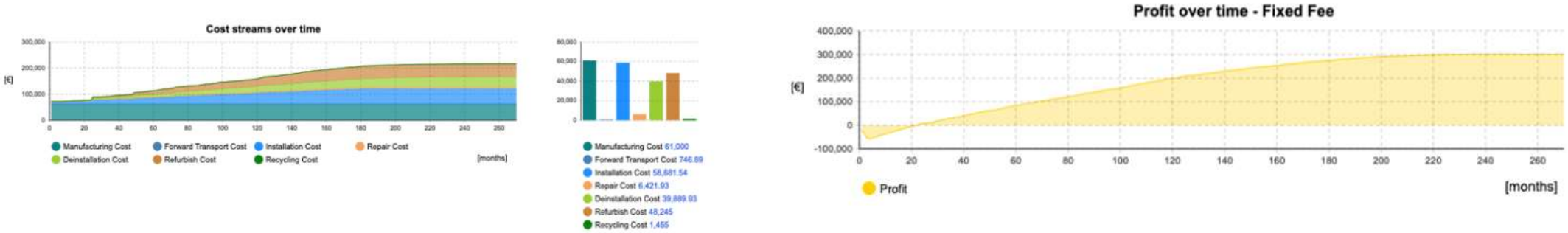
Analyzed supply chains using multi-method simulation models



Analyzed economic, environmental and technical performance using multi-method simulation models

Economic impacts

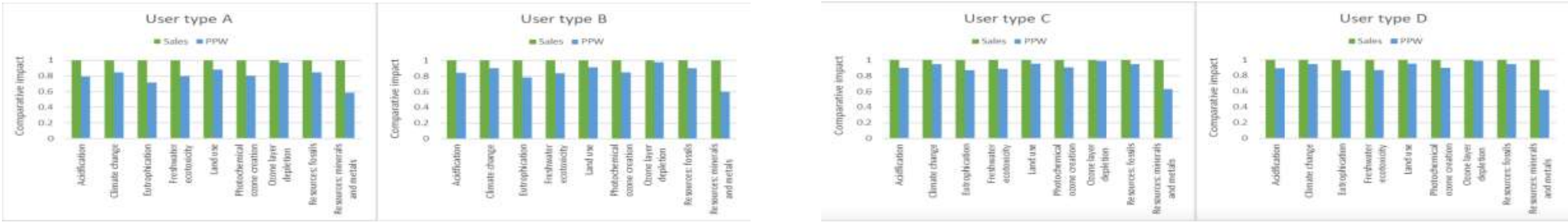
- It is possible to have profitable pay-per-use,
  - 25% profit margin
  - Monthly fee of 25 Euro/month
  - A high number of use cycles, in average 6 use cycles
- Profitability starts with significant delay, breakeven in month 23
- Operating costs (installation, reinstallation, and transport etc.) are more than 60% of the manufacturing costs



Cost and profit overview from the simulation of 100 washing machines deployed for 15 years

Environmental impacts

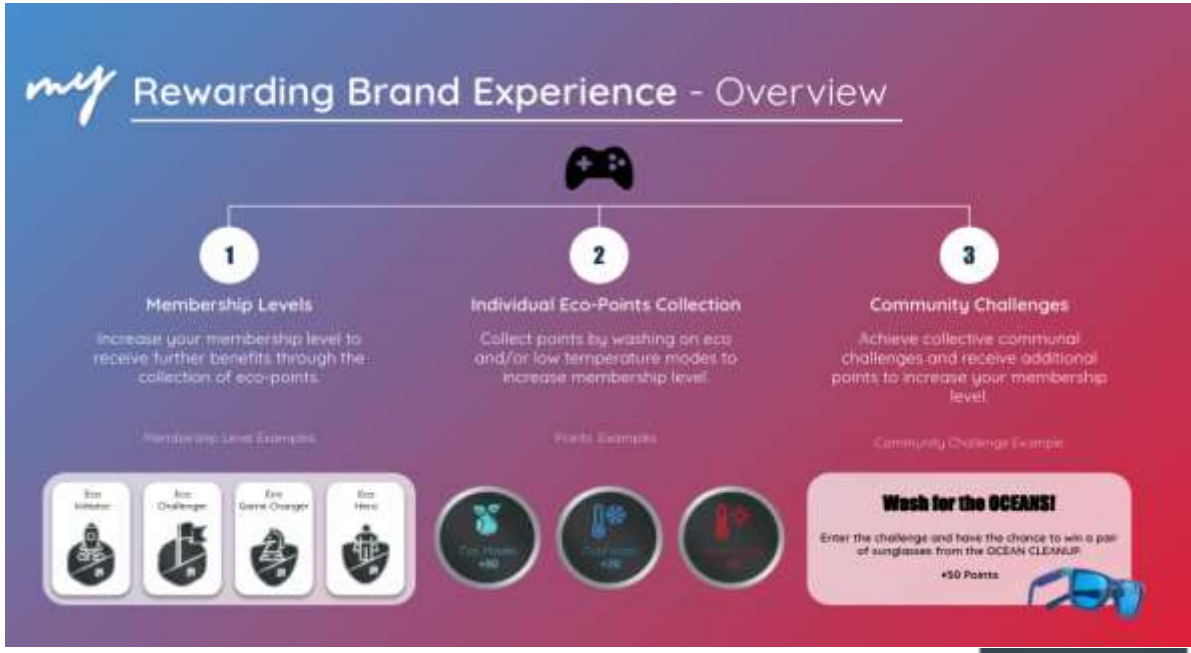
- The environmental impact of the sales and pay-per-use model are relatively close to each other
- Combined with price incentives, the pay-per-use model can reduce environmental impacts by 20-40% compared to the sales model



Relative environmental impact per impact category, for user types A, B, C and D

Social impacts

- The new business model with gamification has a large impact on users' behaviour
- The user acceptance of the recycled, reused, shared change in a positive direction
- Empathy and community feeling can increase
- Clear and transparent marketing and no room for greenwashing



Lessons learned

- The pay-per-use model is evaluated (internally) in the frame of the linear systems
- It will take at least 23 months to breakeven the pay-per-use business model, top management, shareholders, or financiers do not like this
- Customers are asking to complete washing solutions, i.e. washing machines and dryers
- Internal conflicts: SBUs see pay-per-use as a threat to their current business

Lessons learned

- Challenging with flexible pricing, e.g. less cost at lower temperature washing, a legal and marketing challenge of informing the consumers of pricing parameters under consumer protection laws
- Some customers are washing less than expected thus can delay the breakeven
- Appliances disconnect from customer Wi-Fi, no possibility to monitor the usage
- Too unstandardized ICT infrastructures; needed to switch the ICT platform several times during the developments

Lessons learned

- Legal ambiguity as there is no legal framework for the pay-per-use model (cross-border transfer of used appliances eq. waste export)

- Country-specific solutions for some business model elements: e.g., pricing has to reflect a willingness to pay in diverse countries

- Consumer sensitivity to privacy. Finding the acceptable balance between privacy and data collection needs

Way forward

- Scale up the pay-per-use business model
- Continue to collect data from the customers
- Implement different technologies to make value recovery digitalized
- Recovering spare parts from used appliances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fridgemaster

Joint panel discussion

Policy-relevant results and insights for the Circular Economy, jointly provided by C-SERVEES and ReCiPSS

Federica Rosasco, RINA-C
Jan Koller, Fraunhofer IPA
Özlem Ünlüer, Arçelik
Maxime Furkel, Lexmark
Aleš Mihelič, Gorenje
Markus Wagner, C-ECO
Olivia Chassais, EC DG ENV

Activating Circular Services in the Electric and Electronic Sector

Policy-relevant results and insights for the Circular Economy, jointly provided by C-SERVEES and ReCiPSS

Introduction by policy recommendations from C-SERVEES and ReCiPSS

Federica Rosasco, RINA C

Date & Place: 19 October 2022| Brussels

C-SERVEES: Policy recommendations - Methodology

Analysis of policy framework

- Desk research on EU policy framework
- Analysis of the information provided by the AB and Involvement of Consortium partners
- Interlink with other RINA's activities

Analysis of non-technical barriers

- Online interviews with EEE manufacturers and recyclers of the target products

Stakeholders' consultation

WEEE Forum and Electrao, ERION, ASSORAEE, C-SERVEES AB members

- Presence of legislative barriers in E&E sector and ideas on how to overcome them

Analysis of findings & development of policy recommendations

- *Legislative Framework in E&E sector*
- *Ecodesign requirements*
- *End of Waste criteria*
- *Recovery, Re-use, Recycle Targets*
- ***Legislative** Barriers and Recommendations*

C-SERVEES Target Products

C-SERVEES: Policy recommendations – Main results

EU institutions for E&E sector

Actor Involved	Leg. Recommendation
• Commission • Member States	• guidelines → increase understanding & compliance with E&E sector regulatory framework • public campaigns targeting the main actors: manufacturers, recyclers, administration, final users (improve accurate identification of materials and proper disposal)
• Commission • Policy makers	• differentiate regulations according to the specificity of the product • maintain the requirements of CE at EU level (national laws → market fragmentation)
• Commission • Parliament • Council	• bring the global consensus in a unified market view: examinate the laws applicable to E&E sector to create an EU-wide legislation
• Policy makers	• integrate LCA studies as requirement in procurement practices or invitations to EU projects tender* • consider the needs of stakeholders within the E&E value chain while updating framework, e.g.: - REACH Directive, the CMRT template or the SVHC list - WEEE Directive: competencies and responsibilities of stakeholders - POPs Regulation: obstacle in the recycling of plastic waste - WSR Directive strong restrictions for the export of waste out the EU (cross-border movement), without a distinction between properly treated waste and untreated one

*Life cycle assessment for the impact assessment of policies (2016)", JRC Technical Report

C-SERVEES: Policy recommendations – Main results

Other actors in E&E sector

Actor Involved	Leg. Recommendation
• Public authorities	• express recommendations, via procurement policies, to promote the use of products with higher content of recycled plastic
• Manufacturers	• analyze the impacts of their products according to LCA-based method
• Manufacturers • Standards Bodies	• state required grade of recycled material to their components' suppliers → suppliers of recycled material can anticipate and meet the manufacturers' actual needs. Criteria for the grades of recycled material development: manufacturer R&D, Standards Bodies
• Cooperation of the whole value chain	• with national and local authorities across Europe is fundamental to achieve recycled content targets
• Technology developers	• provide technical recommendations on standardisation, normalisation and obsolescence of equipment • provide instruction manuals that enable and facilitate maintenance & repair

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C-SERVEES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776714

Activating Circular Services in the Electric and Electronic Sector

Paving the way for innovative Circular Economy products and services in the electronic and automotive sectors

ReCiPSS – Policy Recommendations

Legislative Obstacles and Barriers that Inhibit the Full Potential of Circular Economy

Jan Koller, Fraunhofer IPA

Date & Place: 19 October 2022| Brussels

ReCiPSS – Policy Recommendations (1/3)

	Project's Findings	Legislative Recommendation	References
01	**Double taxation on circular products** rewards the one-time use of products compared to multiple life cycles.	Exemption of re-used products from VAT.	▪ Umsatzsteuer-Anwendungserlass (»Altteilsteuer«)
02	**Lack of financial incentives for service-based business models** due to the same level of taxation and potentially higher costs compared to product-based business models.	Reduction of taxation on service-based business models or End-of-Life activities through, e.g., reduced VAT on products and labor costs.	▪ Umsatzsteuergesetz in Germany ▪ Revision 2016:1055 of the income tax law 1999:1229 in Sweden
03	**Difficulties in harmonizing the markets across countries** result in unnecessary hurdles in international trade.	Creation of global standards and incentivize or facilitation of the aftermarket stakeholders in Free Trade Agreements (FTA).	▪ Decree of Turkish Import Regime ▪ FTA EU and United Kingdom

ReCiPSS – Policy Recommendations (2/3)

	Project's Findings	Legislative Recommendation	References
04	**Cross-border transportation of used products can cause difficulties** if the product is intended to be remanufactured and is labeled as 'waste'.	Declaration of used products as products intended to be re-used, remanufactured, or refurbished' and not as 'waste' in EU legislation and standards.	▪ Directive (EU) 2018/851 ▪ EU Waste Shipment Regulation (EC) No 1013/2006 ▪ Kreislaufwirtschaftsgesetz (KrWG) § 3 in Germany
05	**Different international remanufacturing processes and quality standards** weaken the substantiate of remanufacturing credibility.	Development of a standard to define a common understanding of remanufacturing processes to which remanufacturers can refer and commit.	▪ ISO 9001
06	**Insufficient visibility of sustainable products for the customer** leads to a lack of awareness of circular economy and sustainable consumption.	Implementation of Green Public Procurement by decision-makers into national law.	▪ Loi n° 2020-105 in France

ReCiPSS – Policy Recommendations (3/3)

07

Project's Findings

A shared indicator for recycling and re-use often leads to the recycling of products that could still be reused.

Legislative Recommendation

Separation of the target requirements for re-use and recycling on WEEE to prioritize re-use over recycling and separation of recycling targets by material category.

References

- Directive 2012/19/EU
- Kreislaufwirtschaftsgesetz (KrWG) § 6 in Germany

ReCiPSS recommendations for CE standardization

Technical committee: ISO/TC 323- Circular Economy

Working Group: WG2-Practical approaches to develop and implement Circular Economy

Standard: ISO 59010:2023, Circular economy — Guidelines on business models and value Networks

Development process

- **June 2020-** New Work Item Proposal (NWIP) for ISO 59010 ballot and confirmation of Leadership and Secretary
- **March 2021-** ISO 59010 WD1- call for comments by experts in WG2
- **September 2021** - ISO 59010 WD2- call for comments by experts in WG2
- **16 December 2021-** ISO 59010 WD3- call for comments by experts in WG2
- **30 May 2022-** ISO 59010 CD- call for comments by experts in WG2
- **6-8 December 2022-** WG2/CG meeting in Paris to finalize the comments on ISO 59010 CD and

ReCiPSS recommendations for CE standardization

1. Mapping the value network (ISO 59010, Clause 4)
2. A step-by-step process for evaluation of Business Model Elements (ISO 59010, Clause 5)
3. Guidelines on how to measure KPIs (ISO 59010, Clause 5)
4. Guidelines for “analyzing desired future”, and “translating gaps into opportunities” (ISO 59010, Clause 5)
5. Linking circularity performance to the business model elements (ISO 59010, Clause 6)
6. Economic rationalization and financial design (ISO 59010, Clause 6)
7. The governance structure (ISO 59010, Clause 7)

C-SERVEES highlights from CE Standardization analysis

- EN 4555x Series standards apply to any ErP: **every standardization product committee should prepare a set of standards for the assessment of material efficiency aspects adapted for their specific scope**
- The scope should be to adapt the general assessment methodologies to the specificities of a product, being **material efficiency aspects strictly related and prioritized in accordance with the product use profile**
- The future product group specific standards **should take into consideration also** other elements : **Mission profile, Dependability, Interoperability, Digitization, Energy saving and efficiency, Environmental footprint (as per "IEC/Guide 109 "Environmental aspects - Inclusion in electrotechnical product standards"**)
- Strict collaboration should be considered between product group specific TC/WGs and IEC/TC 111, ISO/TC 207

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ReCiPSS project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776577-2

Stay tuned!

https://c-serveesproject.eu/

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thank you