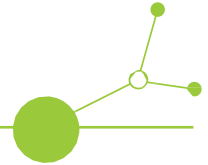




Strategy for Transnational WEEEP - CE Management



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Executive summary

The European Union (EU) faces substantial challenges and opportunities in managing Waste Electrical and Electronic Equipment (WEEE). Given the rapid progress of technology and the growing use of electronic devices, the EU acknowledges the significance of establishing efficient measures to tackle the environmental, economic, and social consequences of WEEE. This executive summary provides essential suggestions for WEEE management, with a specific emphasis on strategies for reusing and repairing of electronic devices in the project countries: Austria, Croatia, Czech Republic, Italy, Poland, Slovenia, and Slovakia.

The goal of WEEE management strategies is to tackle the issues related to WEEE by promoting responsible disposal, recycling, reuse and repair, minimizing adverse environmental effects, and establishing a sustainable and circular approach to electronic products. This vision comprises a range of objectives and ideas aimed at optimizing the longevity of electronic equipment, minimizing electronic waste, and advocating for responsible use. Therefore, there are seven prioritized strategies as follows:

❖ Strategy 1: Policy Framework

Encourage the project members to establish an all-encompassing and synchronized policy framework that conforms to the principles of circular economy. Strengthen current rules, such as the WEEE Directive, Eco-design directive in order to guarantee a uniform and effective approach. Promote the adoption of extended producer responsibility (EPR) and provide incentives for manufacturers to create products with circularity as a key consideration. Implement a comprehensive monitoring and reporting system to accurately monitor and report on the generation, collection, and recycling rates of WEEE. Enforce uniform reporting obligations for manufacturers and recyclers, guaranteeing clear and responsible practices. Continuously evaluate the efficiency of WEEE management strategies and modify regulations in response to advancing technologies and changing market conditions.

❖ Strategy 2: Collection and Repair Infrastructure:

Allocate resources to enhance and streamline the infrastructure for collecting and processing WEEE to ensure its appropriate disposal, recycling and repair. Establish user-friendly and readily available drop-off locations to facilitate the effortless return of WEEE upon reaching the end of their lifespan. Engage in cooperation with local authorities, retailers, and producers to build a comprehensive network of collection and repair locations.

❖ Strategy 3: Circular producer

Promote and support research and innovation in the advancement of environmentally friendly technologies and materials. Promote the development of eco-design rules to incentivize the production of products that are more readily recyclable, repairable, and upgradable. Promote the advancement of novel recycling methodologies to effectively manage complex electronic components.

❖ Strategy 4: Circular User

Implement comprehensive awareness and education initiatives to provide information to consumers, businesses, and other relevant stakeholders regarding the environmental impacts of WEEE and the advantages of mindful disposal. Encourage the adoption of a culture that emphasizes the reuse, repair, and recycling of electronic devices in order to minimize WEEE and cultivate a sense of accountability among users.



❖ Strategy 5: Circular re-user

Encourage the creation and utilization of digital collection services, such as mobile apps, websites, or similar platforms, to enhance user convenience and streamline the collection, reuse and repair process for citizens and practitioners. Foster the growth of markets dedicated to recycled electronic materials, as well as components for electronic repairs and spare parts.

❖ Strategy 6: International Collaboration

Enhance cooperation among EU member states and other nations to tackle transnational issues of the management of WEEE. Facilitate the exchange of effective methods, implement uniform systems for reporting, and create a shared repository to track and oversee the movement of WEEE. Facilitate collaborative efforts to improve recycling capabilities and the retrieval of resources.

❖ Strategy 7: Financial Scheme

Introduce economic incentives to encourage responsible WEEE management practices. Provide financial support for recycling facilities, tax incentives for manufacturers implementing sustainable practices, and penalties for non-compliance with regulations. Create a favourable economic environment that promotes a circular economy for electronic products.

The transnational strategies are also translated into a methodology, which include self-assessment tools, action plans, pilot actions that aim to support project partners to effectively incorporate these strategies into their WEEE management practices.

Effective management of WEEE is crucial for EU and project countries to achieve their sustainability goals and transition to a circular economy. By implementing the suggested strategies, action plans and pilot actions, the countries involved in the project can reduce the negative environmental impacts of WEEE, improve the efficient use of resources, and help create a sustainable future.



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Abbreviation

ASSO	Agency for Sustainable Development
BOKU	University of Natural Resources and Life Science Vienna
CE	Circular Economy
Circular WEEEP	The design and test of policies for reducing, repairing, recovering and reusing waste from electrical, electronic equipment and plastic in Central Europe
EEE	Electrical and Electronic Equipment
EPR	Extended Producer Responsibility
EU	European Union
GHGs	Greenhouse gases
JS	Joint Secretariat
POM	Put on Market
RERA	PI RERA S.D. for Coordination and Regional Development of Split Dalmatia County
WEEE	Waste Electrical and Electronic Equipment



A. Introduction

Global Waste of Electrical and Electronic Equipment (WEEE) generation reached a total of 53.6 million metric tons in 2019. Only 17 percent of these were officially recorded as being managed in an environmentally sound way. The whereabouts or disposal of approximately 83 percent (44.3 Mt) of the WEEE produced remain uncertain. These WEEE may undergo treatment and recycling through unregistered methods, or it may be disposed of, incinerated, or even recycled informally [1]. WEEE is one of the leaders growing waste in Europe, while, starting from 2019, the WEEE Directive mandates a minimum collection rate of 65% for all WEEE that has been put on market in the past 3 years [2].

WEEE comprises a complex combination of substances, including specific ones that pose a risk to health or the environment. If the discarded WEEE are not properly managed, this might lead to significant environmental and health issues. Modern electronic devices also comprise scarce and critical raw materials. When WEEE is properly managed, these materials can be recycled and reused.

Enhancing the process of collecting, processing, and reusing electrical and electronic equipment at the end of their lifespan can optimize the utilization of resources and facilitate the transition towards a circular economy. 'The design and test of policies for reducing, repairing, recovering and reusing waste from electrical, electronic equipment and plastic in Central Europe (Circular WEEEP)' project is co-funded by the European Union consisting of 12 partners from 7 European countries namely:

- Austria: University of Natural Resources and Life Science Vienna (BOKU)
- Croatia: PI RERA S.D. for Coordination and Regional Development of Split Dalmatia County (RERA)
- Czech Republic: Czech Technical University in Prague (Lead partner)
- Italy: Province of Rimini; ASSO Agency for Sustainable Development
- Poland: Regional Development Agency in Bielsko-Biała, City of Lublin, Bielsko District, Municipality of Gdańsk
- Slovakia: Bratislava Old Town
- Slovenia: Municipality Rogaška Slatina; REUSE Center

The project aims to develop a strategy for circular management of waste electrical and electronic equipment and plastic waste on a regional level. There are three main Work Packages (WP) which are briefly described as follows:

- WP1: Development of a transnational strategy which allows local, regional, and national institutions to design Action Plans which will increase their capacity to transform current WEEEP management into a circular WEEEP.
- WP2: pilot actions are implemented to test the action plan solutions for transnational WEEEP-CE management. The pilot actions refer to the design of appliances, re-use and recycling and awareness-raising which build 5 pilot projects to make society more aware of the WEEEP topic.
- WP3: Testing and implementation of digital solutions for the circular economy of WEEEP, aiming to increase capacities of Central European public and private stakeholders to implement circular economy policies and to exploit innovative solutions in practice.



This **Strategy for Transnational WEEEP - CE Management** is part of the WP1, which is under the responsibility of the WP leader: BOKU together with the joint secretariat (JS). The transnational strategy aims to support and facilitate the project countries to enhance WEEE management particularly the reuse and repair sector. The transnational strategies will outline the common visions and setting objectives including priorities in the mid-term and long term.



B. Background

General Information

The European Union (EU) is a political and economic alliance consisting of 27 member states that are primarily situated in Europe. The EU was created with the aim of fostering economic cooperation and preventing a recurrence of a catastrophic events in Europe following World War II. Over time, it has developed into a sophisticated and interconnected supranational entity. The objective is to cultivate peace, stability, and prosperity among the countries that are part of the organization. The EU functions based on the fundamental tenets of democracy, the rule of law, and the protection of human rights.

The EU has established a single market that facilitates free movement of products, services, capital, and individuals within its member states. This fosters economic efficiency and stimulates competition. It implements unified economic policies and efforts to tackle matters such as competition, trade, and regional development. Additionally, the EU provides financial resources to facilitate the advancement of economically disadvantaged regions within member states, fostering economic unity and mitigating inequalities. The EU member states has a wide array of geographical settings, spanning from the Nordic regions to the Mediterranean. The EU has formulated extensive environmental laws and regulations to tackle serious issues including climate change, biodiversity depletion, and pollution. These policies are designed to encourage sustainable practices and mitigate the environmental consequences of economic operations.

The EU advocates for the adoption of a circular economy model, which prioritizes resource efficiency, recycling, and waste reduction. It promotes the adoption of sustainable practices in both production and consumption. Furthermore, the EU has established ambitious objectives to enhance the proportion of renewable energy in its total energy composition. This encompasses investments in renewable technologies and attempt to diminish reliance on fossil fuels. The EU plays an active role in worldwide initiatives aimed at combating climate change. The organization has established specific objectives to decrease the release of greenhouse gases and shift towards an economy that has reduced carbon emissions.

Within this project scope, 7 European countries namely Austria, Croatia, Czech Republic, Italy, Poland, Slovakia, and Slovenia were studied regarding to their WEEE regulations, EEE POM, WEEE generation, collection, reuse and repair potential. The general information on their general information is shown in Table 1.

Table 1 General Information of seven project countries [4;5]

Country	Land area (km)	Population (2023)	GDP per capita in PPS (2022)	Inflation rate (2022)	Unemployment rate (2022)	GHG emissions (t/cap) (2021)	Renewable energy % (2021)	Recycling rate of MSW (2021)
Austria	82,519	9,104,772	124	8.6	4.8	8.8	34.6	62.5
Croatia	55,896	3,850,894	73	10.7	7	6.3	31.3	31.4
Czech Republic	77,212	10,827,529	90	14.8	2.2	11.4	17.7	43.3
Italy	297,825	58,850,717	97	8.7	8.1	7.1	19.2	51.9
Poland	307,236	36,753,736	79	13.2	2.9	10.7	15.6	40.3
Slovakia	48,702	5,428,792	71	12.1	6.1	7.6	17.4	48.9
Slovenia	20,145	2,116,792	90	9.3	4	7.7	25	60.8
Total:	889,535	126,933,232						



WEEE Management

The European Union has a highly advanced WEEE management system in place, which includes the collection of WEEE in municipality, retailers, and through private operators. Additionally, there are established procedures for both the initial processing and final processing of WEEE to guarantee that the materials inside WEEE are recycled into secondary raw materials, while also ensuring that non-recyclable and particularly hazardous components are disposed of in a safe manner. The majority of member states has the capability to manage and treat hazardous wastes.

In 2020, there were approximately 12.4 million tonnes of Electrical and Electronic Equipment (EEE) POM in EU, where only 4.7 million tonnes of WEEE were collected which equivalence to 10.5 kg per capita [3]. Despite the difficulty in precisely determining the extent of illegal waste exports, from 2 to 17 kt of WEEE were confiscated for being illegally transferred over international borders in 2019 from the EU [1].

The quantity of EEE POM were researched between 2019-2021 and the result shown that all 7 countries have an increased demand of EEE POM. The highest EEE POM per capita in 2021 was Poland at 32 kg/cap/year, following with Austria at 30.8 Kg/cap/year, where Croatia has the lowest EEE POM among the project countries which is approximately 18.4 kg/cap/year. Figure 1 shown the comparison of EEE POM per capita of 7 project countries in 2019 - 2021.

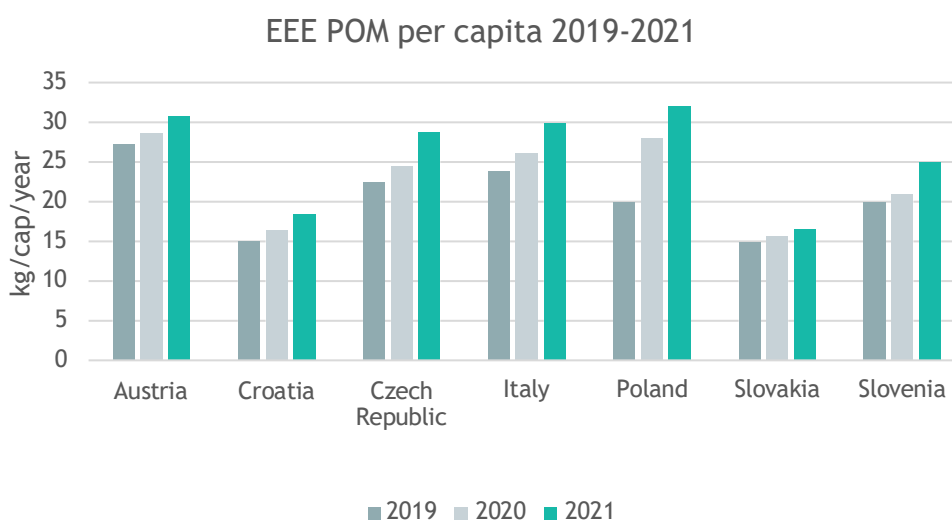


Figure 1 EEE POM in project countries (2019-2021) [6;7;8;9;10;11;12; 13]

The legislative framework for WEEE in Austria, Croatia, Czech Republic, Poland, Italy, Slovenia, and Slovakia demonstrates a shared dedication to tackling the issues associated with WEEE. All countries has adopted strategies to encourage the decrease, reutilization, conscientious administration, and elimination of WEEE, in accordance with wider directives from the EU. The legal framework outlines the responsibilities of producers, distributors, and consumers in the management of WEEE.

The prevalent obstacles and concerns regarding WEEE management highlight the complex and significant nature of dealing with WEEE within a wider environmental framework. These include the improper disposal of WEEE, inadequate and insufficient collection systems, and the necessity for improved cooperation among governments, producers, and consumers. Moreover, the rapid rate of technical progress and the growing quantity of electronic goods increase the difficulties in guaranteeing adequate recycling and secure disposal.



WEEE Collection

Extended Producer Responsibility is a cornerstone of WEEE collection in the EU. Producers are obligated to take financial responsibility for the collection and treatment of their products once they become waste. This encourages manufacturers to design products with recycling and recovery in mind. The project countries have established collection systems to facilitate the proper disposal of WEEE. This includes designated collection points, recycling centers, and systems for returning old appliances when purchasing new ones which involve collaborations between government agencies, local authorities, and private entities. There are educational campaigns aim to inform citizens about the locations of collection points, the significance of recycling, and the benefits of responsible electronic waste management.

Among the EEE that POM, about less than 50% of WEEE were collected among the project countries. In 2021, about 18 kg/cap/year of WEEE were collected in Croatia which is the highest collection rate among the project countries follow by Austria at 16 kg/cap/year, Poland at 14 kg/cap/year, Czech Republic at 12.7 kg/cap/year, Slovenia at 7.4 kg/cap/year, Slovakia at 3.7 kg/cap/year and Italy at 6.5 kg/cap/year. Figure 2 shown the WEEE collection per capita in 7 project countries between the year 2019 to 2021.

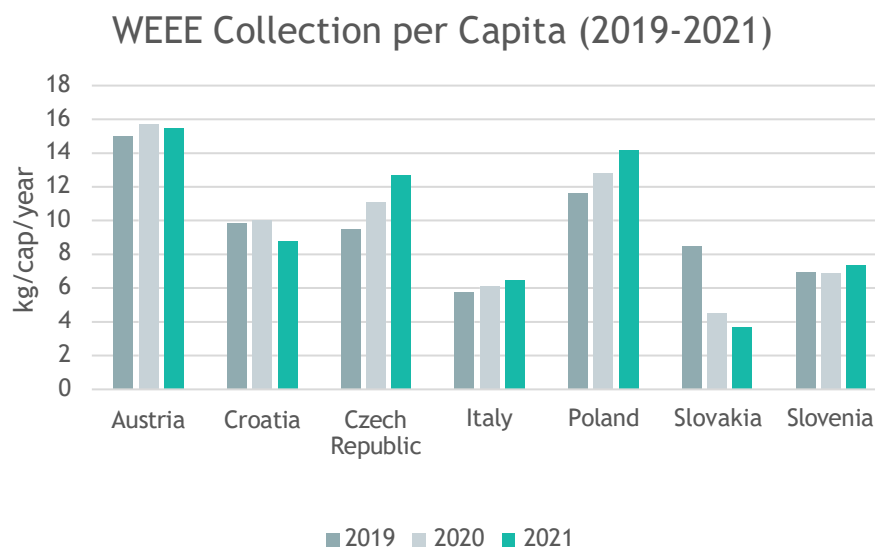


Figure 2 WEEE collection per capita in 7 project countries in 2019-2021 [6;7;8;10;11;12;13; 14;15]

WEEE Recycling

EPR is a core principle in WEEE recycling which mandates the manufacturers to bear the responsibility for the whole life cycle of their products, encompassing their appropriate recycling and disposal. This strategy incentivizes manufacturers to incorporate recycling concerns into their product designs and establishes precise recycling goals for various kinds of WEEE. Producers and recycling facilities must achieve these standards, which encourage the retrieval of valuable materials and decrease the environmental consequences of WEEE.

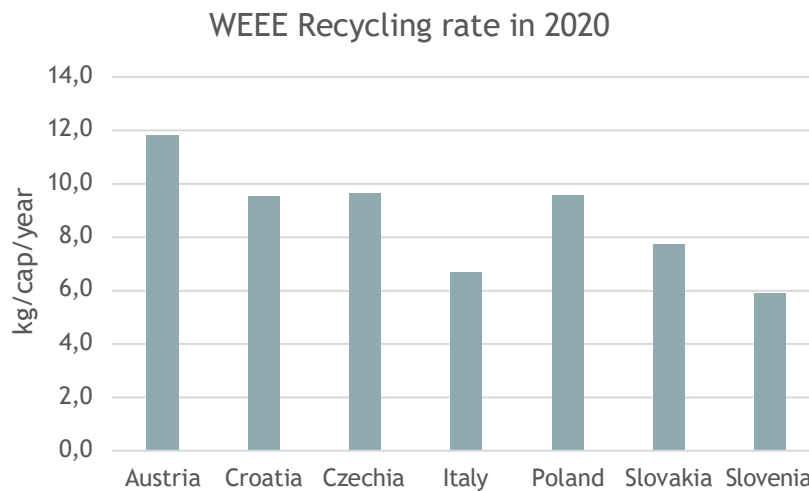


Figure 3 WEEE recycling rate in 2020 [16]

WEEE Reuse and Repair

The project countries have focused on addressing the essential aspects of the reuse and repair of WEEE, in line with the principles of the circular economy. They have emphasized the significance of prolonging the lifespan of products and have encouraged companies to produce products that are long-lasting, capable of being upgraded, and easily repairable. Initiatives are currently being implemented to enact laws that guarantee customers' access to essential information, spare parts, and maintenance services for electronic equipment. Community-driven such as repair cafes and reuse centers, are increasingly becoming popular in countries like Austria and Slovenia. These facilities offer individuals the opportunity to acquire repair skills, access tools, and contribute to the reduction of WEEE by prolonging the lifespan of items. Additionally, they foster a feeling of communal involvement and empowerment. Policymakers are considering strategies such as incentive to establish a conducive atmosphere for sustainable practices and responsible consumption.

However, this activity is obviously not taking much of the share in the WEEE management for all project countries. However, Croatia and Slovenia shown a relatively positive progress in their reuse potential at the rate of 8 and 6 kg/cap/year respectively. For Austria, it is about 1 kg/cap/year of WEEE preparation for reuse where the rest of the project countries are less than 1kg/cap/year.

Challenges

WEEE Management

Achieving the collection rates and recycling rate regarding to WEEE directive are certainly one of the main challenges of the project countries. In practice, there are still information gap on WEEE quantity among project countries which is challenging for further planning. Beside this, there is a high administrative burden in collection system and other regulations that affects and/or restrict the operational process. Additionally, the legal requirement often not clear in term of practices and eventually most of WEEE lead to export due to the stricter requirement in the member states.

There are some challenges in WEEE management due to the products' hazardous components and the complexity mainly the built-in Lithium batteries, the glued casing, complexity of design, short lifespan of the products which is not design for reuse and repair.



Furthermore, in the WEEE management process such as collection and repair have high personnel cost, high cost in transport route (collection, testing, return), tend to be expensive and time extensive to repair and it is economically disadvantage compared to recycling.

Beside this, there is a movement of illegal collection and not sufficient collection points throughout the project countries. Additionally, the collected WEEE often not suitable for reuse and repair purpose in term of quality and quantity. There is limited information for customers regarding collection and reuse and repair which hinder the repair activities where there is no demand or interests for repaired products.

WEEE recycling

There is a limited access to recycling facilities is the main challenges for WEEE recycling materials and regulator barrier. While recycling facilities recover valuable materials from WEEE achieving high rates of resource recovery can be challenging. Some materials are difficult to extract or separate, impacting the overall efficiency of the recycling process. Despite this, properly handling and erasing data from electronic devices before recycling is a critical aspect of WEEE management.

WEEE Reuse and Repair

There is a lack of legal framework e.g. obligatory reparability, availability of spare parts, no specifications on the minimum service life, cost constraints, testing the equipment is sometimes more expensive than the retail value. Beside this, the reusable products may not remove from the collection points and limited number of professional distributions channels. Despite this, there is a limited availability of skilled personnel for repair, interested customers, quality controls and product guarantee is limited.



C.Strategies

1.1. Vision

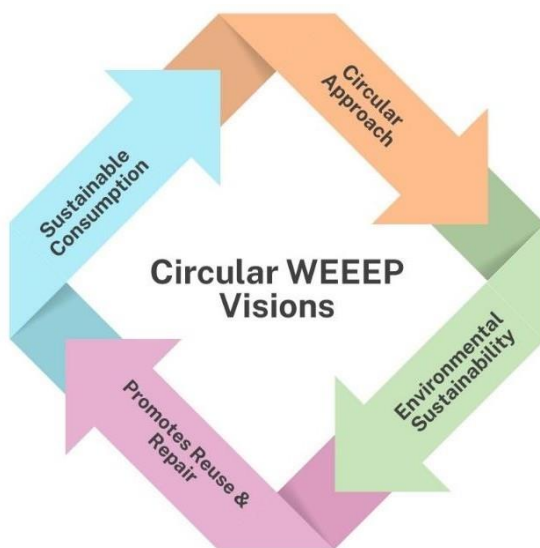


Figure 4 Circular WEEEP Visions

The vision of WEEE management strategies involves addressing the challenges associated with WEEE in a way that promotes reuse and repair, recycling, responsible disposal, the reduction of negative environmental impacts, and creating a sustainable and circular approach to electronic product. This vision encompasses various goals and principles to maximize the lifespan of electronic devices, reduce electronic waste, and promote responsible consumption.

1.2. Goals

Midterm goal:

- **Compliance with Regulations:** comply with local and international regulations governing the disposal and recycling of WEEE. This ensures that the handling of WEEE is in line with legal requirements and standards. Principle of Extended Producer Responsibility, where manufacturers take responsibility for the entire lifecycle of their products, including proper take-back and recycling.
- **Collection and recycling infrastructure:** improving the effectiveness of collection system that convenience and accessible for community, the sufficient collections and take back collaboration with the producers; ensure the state of the art of recycling technology.
- **Social Responsibility:** WEEE management recognizes the social aspects of electronic waste, including concerns related to human health and well-being. The vision includes approaches that prioritize the health and safety of workers involved in the handling and processing of electronic waste.
- **Public Awareness and Education:** raising public awareness about the environmental impact of WEEE and promoting responsible consumer behaviour, such as proper disposal and recycling of end-of-life electronic devices.



Long-term goal:

- **Circular Economy Principles:** WEEE management is aligned with the principles of a circular economy, emphasizing the importance of closing the loop by reusing, refurbishing, recycling electronic products to extend their lifecycle and promote sustainable consumption and product Design.
- **Environmental Sustainability:** The overarching goal is to minimize the environmental impact of WEEE, which often contains hazardous substances. WEEE management envisions sustainable practices that prevent the release of harmful materials to the environment.
- **Resource Conservation:** WEEE management aims to recover valuable resources from WEEE, including metals, plastics, and other materials. This supports a circular economy approach, where materials are reused or recycled, reducing the need for virgin raw materials.
- **Innovation and Technology:** WEEE management envisions the use of innovative technologies for the efficient and environmentally friendly recycling of WEEE. This may include advanced sorting techniques, material recovery processes, and the development of eco-friendly products.
- **Global Cooperation:** Envision international cooperation to address the challenges associated with the transboundary movement of WEEE. This includes collaboration on best practices, standards, and policies.



1.3. Prioritize strategies

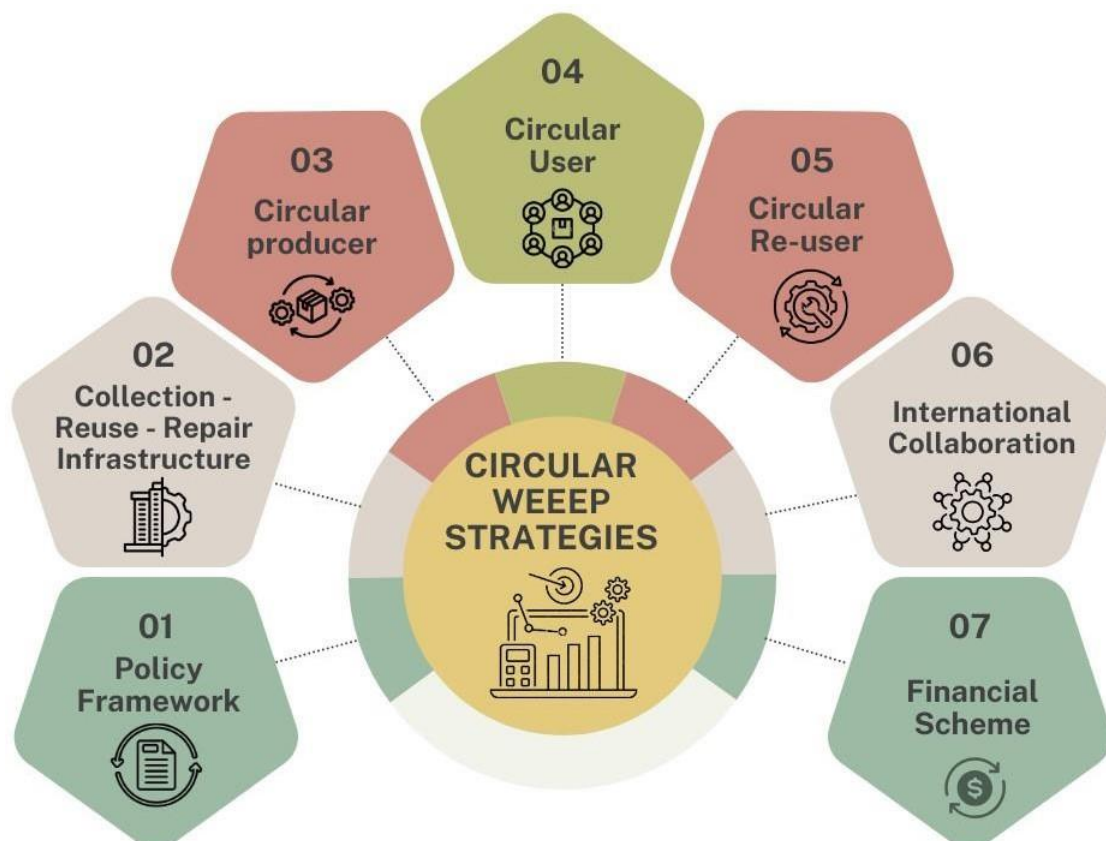


Figure 5 CIRCULAR WEEEP strategies

Strategy 1: Policy framework

Strategy for policy framework focus on creating and enforcing a legislation and regulation to manage WEEE in an environmentally responsible and sustainable manner. It is crucial for establishing a regulatory foundation that ensures proper disposal, recycling, and overall management of electronic waste including reuse and repair.

- **Product Labelling and Traceability:** Establish regulations requiring product labelling to indicate the presence of hazardous substances and information for proper disposal. Promote traceability of products to track their lifecycle and facilitate responsible end-of-life management.
- **Treatment and Recycling Standards:** Define standards and guidelines for the treatment, recycling, and disposal of electronic waste. This includes specifying acceptable methods for handling hazardous materials and promoting the recovery of valuable resources.
- **Banning or Restricting Hazardous substances:** Define standards and guidelines for the treatment, recycling, and disposal of electronic waste. This includes specifying acceptable methods for handling hazardous materials and promoting the recovery of valuable resources.



- **Market Surveillance and Enforcement:** Establish mechanisms for market surveillance to ensure compliance with WEEE regulations. Implement penalties for non-compliance and conduct regular audits to enforce adherence to legal requirements
- **Develop and enforce clear regulations that support and incentivize WEEE reuse and repair activities.** This may include tax incentives, subsidies, or other mechanisms to encourage businesses engaged in these activities.
- **Integrate provisions within EPR schemes that require manufacturers to support and contribute to WEEE reuse and repair infrastructure.** This may involve partnerships with repair businesses, provision of spare parts, and design considerations for product repairability.

Strategy 2: Collection and Repair infrastructure

- **Data Reporting and Monitoring:** Require producers and stakeholders to report data on the amounts and types of electronic waste generated, collected, and treated. Implement a monitoring system to track the progress of WEEE management efforts.
- **Develop a network of collection infrastructure, including dedicated collection points, recycling centers, and take-back programs.** Ensure these facilities are easily accessible to the public.
- **Community engagement:** Involve local communities in the collection process. Organize community events, workshops, and awareness programs to encourage residents to dispose of their electronic waste responsibly.
- **Mobile Collection Units:** Deploy mobile collection units to reach areas that may not have easy access to permanent collection points. These units can move through neighbourhoods, providing a convenient way for residents to dispose of their electronic waste.
- **Integration with Municipal Waste Management:** Integrate WEEE collection into existing municipal waste management systems. Ensure that electronic waste is properly sorted, transported, and processed in collaboration with local waste management authorities.
- **Technology for Collection Efficiency:** Leverage technology, such as mobile apps or online platforms, to facilitate the scheduling and tracking of electronic waste collection. This can improve efficiency and enhance public participation.
- **Continuous Improvement:** Regularly evaluate the effectiveness of the WEEE collection strategy and make adjustments based on feedback, changing technology, and evolving waste management needs.
- **Retailer Involvement:** Encourage retailers to participate in WEEE collection by providing convenient drop-off points for end-of-life electronic devices. Establish partnerships with retailers to integrate collection initiatives into their operations.

Reuse and Repair

- **Repair Workshops and Centres:** Establish and support repair workshops and centers that provide professional repair services for electronic devices. These centers can serve as hubs for skilled technicians and a resource for consumers seeking repair services.
- **Training Programs:** Implement training programs for technicians, entrepreneurs, and individuals interested in electronic device repair. This can help build a skilled workforce capable of repairing a wide range of electronic products.



- **Online Platforms for Repair Services:** Develop or support online platforms that connect consumers with repair professionals. These platforms can facilitate easy access to repair services and provide information about local repair options.
- **Partnerships with Manufacturers:** Establish partnerships with manufacturers to promote design practices that prioritize repairability. Encourage manufacturers to produce devices with modular components, standardized connectors, and easily replaceable parts.
- **Warranty and Guarantee Programs:** Advocate for and support warranty and guarantee programs that extend the lifespan of electronic products. This can include promoting extended warranties, encouraging manufacturers to offer repair services, and facilitating access to spare parts.
- **Monitoring and Evaluation:** Establish a system for monitoring and evaluating the effectiveness of the WEEE reuse and repair infrastructure. Regularly assess the number of repaired devices, the economic impact on local businesses, and the environmental benefits.

Strategy 3: Circular producers

- **Invest in Research and Development:** Allocate resources for research and development focused on sustainable and repair-friendly materials and technologies. Invest in innovations that enhance the repairability and recyclability of electronic products.
- **Design for Durability and Repairability:** Prioritize product design that emphasizes durability and ease of repair. Design products with modular components, standardized connectors, and clear disassembly instructions to facilitate repair activities.
- **Extended Product Lifespan:** Set internal goals and standards for extending the lifespan of products. Encourage design features and materials that contribute to longer product lifecycles, reducing the frequency of replacements.
- **Provide Access to Repair Information:** Ensure that repair manuals, guides, and diagnostic tools are easily accessible to repair professionals and end-users. Facilitate open access to repair information to encourage a culture of repair and maintenance.
- **Support Right to Repair Initiatives:** Advocate for and actively support right-to-repair legislation and initiatives. Collaborate with policymakers, repair communities, and NGOs to create an environment that promotes the repairability of electronic products.
- **Offer Spare Parts and Repair Kits:** Provide consumers and repair professionals with access to genuine spare parts. Offer affordable spare parts and repair kits to facilitate the replacement of components, extending the lifespan of products.
- **Implement Take-Back Programs:** Establish and promote take-back programs for end-of-life products. Ensure the proper collection, refurbishment, and recycling of returned devices, minimizing the environmental impact and promoting responsible disposal.
- **Collaborate with Repair Businesses:** Foster partnerships with independent repair businesses and technicians. Provide support, resources, and training to repair professionals to enhance their capability to repair products.



- **Incentives for Refurbishment:** Offer financial incentives for refurbishing and reselling returned products. Encourage the development of certified refurbished programs to extend the lifecycle of electronic devices.
- **Circular Economy Practices:** Embrace circular economy principles in product design and business models. Explore leasing, subscription, or upgrade programs that encourage consumers to return products for refurbishment or recycling.
- **Consumer Engagement Programs:** Engage with consumers through educational campaigns and loyalty programs that reward environmentally conscious behaviours, such as choosing repair options and returning products for proper disposal.
- **Track and Report Reuse and Repair Metrics:** Establish key performance indicators (KPIs) to measure the success of reuse and repair efforts. Regularly track and report metrics such as the percentage of products repaired, refurbished, and diverted from landfills.
- **Certifications for Repairable Products:** Pursue certifications or labels that highlight products with high repairability. Work with industry organizations to establish standards and benchmarks for evaluating and certifying repairable electronic devices.

Strategy 4: Circular users

- **Education and Awareness:** Educate consumers about the benefits of repair and the availability of repair services. Communicate the environmental impact of choosing repair over replacement and promote the value of extending product lifespans.

Strategy 5: Circular re-users

- Support the development and implementation of digital collection services. Such services like apps for mobile phones, websites or other can raise the convenience of the users and make collection easier for citizens.
- Develop the market for materials from recycling of electronics, but also for components for the repair of electronics and spare parts. Trading of used devices can also be supported by such platforms.

Strategy 6: International collaboration

- Collaborate with other countries and international organizations to address cross-border issues related to electronic waste. Harmonize WEEE regulations where possible to create a consistent global approach.
- Explore opportunities for collaboration with neighbouring countries to address cross-border electronic waste issues. Share best practices, technologies, and strategies for efficient WEEE collection and management



Strategy 7: Financial scheme

- **Incentives for Sustainable Practices:** Provide financial incentives or tax benefits to manufacturers and businesses that adopt environmentally sustainable practices, such as designing products for longevity, repairability, and recyclability.
- **Incentive Programs:** Implement incentive programs to encourage participation in WEEE collection. This can include discounts on new products, loyalty points, or other rewards for individuals and businesses that responsibly dispose of their electronic waste.
- **Introduce financial incentives or subsidies for repair businesses that adhere to environmental and ethical standards.** These incentives can include tax breaks, grants, or support for marketing and outreach efforts.
- **Green Loans for Businesses:** Offer low-interest green loans or financial incentives to businesses involved in electronic waste management, including collection, recycling, and repair services. This encourages the growth of sustainable practices in the industry.
- **Government Grants for Repair Businesses:** Allocate government grants to support repair businesses, especially small and local enterprises, engaged in the repair of electronic devices. These grants can be used for training, equipment purchase, and infrastructure development.
- **Collaboration with Manufacturers for Spare Parts Supply:** Encourage manufacturers to contribute financially to the availability of spare parts for repair purposes. Manufacturers can establish funds or programs to subsidize the cost of genuine spare parts for repair businesses.
- **Consumer Subscription Models for Repair Services:** Explore subscription models where consumers pay a regular fee for access to repair services. This can be implemented by repair businesses, providing a steady stream of income to support their operations.



D. Methodology

In order to support the consortium to implement and integrate the strategies into their WEEE management according to their operational sectors in the local or regional level throughout the project, number of steps need to be taken including number of testing period, feedback and evaluation. Therefore, the transnational strategies are translated into the following implementation steps:



Figure 6 Transnational Strategies Methodology



Self-Assessment tool

The primary objective of the Circular WEEEP Tools is to provide support to both project consortium partners and other stakeholders engaged in WEEE management, with the purpose of enhancing their overall performance. The purpose of the tools is to facilitate users in comprehending their present WEEE management performance in the context of CE prospects, as well as identifying the subsequent actions required to enhance performance.

The Circular WEEEP Tools comprise three distinct sets of tools, each tailored to certain target groups which are:

- The Circular Producer
- The Circular User
- The Circular Re-user

The instrument has been designed based on a WEEE model of sustainable product design, reduce waste to a minimum and consumer empowerment. These levels involve interactions that promote sustainability and circularity among industries, authorities, practitioners, and communities.

The instrument encompasses the fundamental principles of the CE model, which include sharing, leasing, reuse, repair, refurbishing, and recycling. These principles serve as guidelines for decision-making at all levels and define the objectives that a sustainable and circular WEEEP should strive to achieve. These objectives provide strategic guidance for the transition to a circular WEEEP model, offering significant support for the strategic management of WEEE. The essential cooperation among actors involved in the WEEE management is seen as a crucial factor in supporting the implementation of all CE WEEE principles.

Within this, the manual and video instruction of the self-assessment tools will be provided. For project consortium, the partners will receive online training on how to use the tools and how can they utilize the results to define the action plan in the next steps.

Action Plans

The Action Plans will be developed based on the visions, goals, prioritized tactics, and the results of the self-assessment plan. A comprehensive set of six action plans will encompass a comprehensive list of activities, an implementation schedule, and the necessary resources required for regional and local partners to effectively develop pilot actions in subsequent stages.

The peer reviews and technical partners will provide support and conduct reviews for the preparation of Action plans.

Pilot Actions Design

The design of the Pilot Actions is derived from the integrated action plans, market assessment, and the involvement of relevant stakeholders. The final result of the design should encompass the strategic plan, administrative measures, required resources, responsibility, timeframes, communication strategies, and monitoring procedures. The pilot will be initiated at this point in time with the assistance of communication and exploitation strategies.



Pilot Actions

The pilot initiatives will guarantee the engagement of essential key stakeholders, including local residents, students, policymakers, companies, the general public, and professionals. Consequently, a total of five pilot actions will be formulated and executed, as depicted in Figure 7.



Figure 7 CIRCULAR WEEEP 5 Pilot Actions

- **WEEE Design:** The objective is to promote circularity among industrial manufacturers in the EEE sector by providing recommendations on improved design and facilitating access to open data. This approach aims to facilitate the recycling and reparability of products.
- **WEEE lives:** promoting a second life of repaired equipment.
- **WEEE Social:** promoting social WEEE and Corporate Social Responsibility (CSR) - encouraging relevant organizations to promote the reuse and recycling of WEEE
- **WEEE Collect and WEEE Market:** The incorporation of digitization helps streamline the process of WEEE collecting, integrating the digitalization and online platform for stakeholders for secondary material
- **WEEE aware:** Engaging with the youth and policymakers to promote the implementation of Circular WEEE management.



Evaluation and Monitoring

An evaluation and monitoring plan aims to assessing the effectiveness of a project, to ensure the achievement of objectives, efficient utilization of resources, and the production of desired outcomes. This plan has the potential to assist stakeholders in effectively monitoring progress, identifying areas that require improvement, and tracking performance throughout the project period where numbers of the peer review, assessment of each stage are conducted for the development of action plans and pilot actions.



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