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CIRCOTRONIC

Circular EEE Sector for a Sustainable Future

Transnational Strategic Action Plan to Implement the CEAP 2020 in Central Europe

Contents

Glossary

CEAP	Circular Economy Action Plan 2020
EEE	Electrical and Electronic Equipment
WEEE	Waste from Electrical and Electronic Equipment

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The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Interreg CENTRAL EUROPE programme.

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Introduction

The EEE manufacturing sector requires a transformation towards circular, resource-efficient processes, value chains, products, and services. A key factor in achieving this is the establishment of a supportive policy framework that promotes circular economy measures, enhancing both circular EEE manufacturing and the management of e-waste as a valuable resource.

The Circular Economy Action Plan (CEAP) 2020 provides a strong strategic foundation at the EU level, advocating for a transition towards circularity across Europe. This strategic action plan aims to accelerate the implementation of CEAP 2020 in Central Europe, with a particular focus on fostering a circular economy for Electrical and Electronic Equipment (EEE).

The EEE sector is complex and fast-evolving, characterized by intricate value chains and increasingly challenging waste streams. This plan serves as a guide and reference for all stakeholders involved in the EEE value chain and its waste management processes.

The vision of this action plan is to support stakeholders, particularly policymakers, in creating a favorable environment and ecosystem for a sustainable EEE sector.

About the CEAP 2020

The EU's Circular Economy Action Plan (CEAP) 2020 is a key component of the European Green Deal, which aims to make the European economy more sustainable by moving away from the traditional linear economic model of „take, make, dispose" to a circular economy where resources are reused, recycled, and retained in the economy for as long as possible. The CEAP 2020 outlines various measures to reduce waste, promote sustainable product design, and encourage the efficient use of resources across different sectors.

Key Elements of the Circular Economy Action Plan 2020:

- **Sustainable Product Policy Framework**
  The plan introduces a framework to make sustainable products the norm in the EU, focusing on extending product lifecycles, improving reparability, and reducing environmental impacts. This includes initiatives to set requirements for products like electronics, textiles, and construction materials.

- **Empowering Consumers and Public Buyers**
  The plan aims to empower consumers by providing them with reliable information about product sustainability and ensuring their right to repair. It also encourages public procurement practices that prioritize sustainable products and services.

- **Focusing on Key Product Value Chains**
  The CEAP 2020 targets specific sectors that have a high environmental impact and potential for circularity, one of these sectors is electronics.

- **Minimizing Waste**
  The plan includes measures to reduce waste generation and enhance waste management systems. It promotes a „waste hierarchy" that prioritizes prevention, reuse, and recycling over disposal.

- **Innovation and Investments**
  The CEAP supports research, innovation, and investment in circular economy initiatives. This includes financial support and incentives for businesses and regions to adopt circular practices.

- **Global Leadership and Cooperation**
  The plan also emphasizes the EU's role in promoting circular economy practices globally through trade policies, international cooperation, and leadership in setting global standards.

The overall goal of the CEAP 2020 is to decouple economic growth from resource use, reduce environmental impacts, and create new business opportunities while also providing benefits to consumers and addressing global challenges like climate change and biodiversity loss.

EEE sector

Electrical and electronic devices and equipment have become an essential part of our everyday lives. Their availability and widespread use have enabled much of the global population to benefit from higher standards of living. The digitalisation of the economy and society is driving a rapid increase in the manufacturing of these products, which has a severe negative impact on the environment due to material use, emissions of air pollutants and greenhouse gases, chemical use and waste. The way we produce, consume and dispose of the so-called e-waste is unsustainable. We have ever higher levels of e-waste generation from discarded devices and appliances. Moreover, planned obsolescence is often used in EEE. As a result, Waste Electrical and Electronic Equipment (WEEE) or e-waste is one of the fastest-growing waste streams in the world. It is highly problematic due to environmental and health hazards, the complexity of disassembling modern electronics, and the high costs of advanced recycling technologies, which make efficient recycling challenging, despite e-products contain valuable materials like gold, copper, and rare earth metals.

Digitalisation plays a critical role in the green transition by enabling more efficient, sustainable, and data-driven approaches to address environmental challenges. Digital technologies allow for precise monitoring and optimization of resource, smart energy management or facilitate the sharing economy, to name just a few examples.

The challenge that we face is to make the electronic and electrical devices that facililate our life style but also the green transition as circular and sustainable as possible.

Why a Strategic Action Plan for EEE is Needed

To address this challenge, the EU's Circular Economy Action Plan (CEAP), one of the main building blocks of the European Green Deal, announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption and aims to ensure that waste is prevented and the resources used are kept in the EU economy for as long as possible.

The transition to a circular economy in the electronics sector is met with numerous challenges, encompassing technical, societal, and economic barriers. From a technical perspective, one of the key difficulties lies in accurately quantifying the use of recycled materials and ensuring that products maintain their quality when recycled content is incorporated. This complicates the process of assessing circularity, as manufacturers struggle to meet standards while ensuring product performance remains uncompromised. Additionally, there are challenges related to product design, particularly in making devices more modular and standardized to facilitate easier repair, recycling, and reuse.

On a societal level, both consumers and businesses face hurdles in understanding and embracing the principles of upcycling and recycling. Many are unaware of the benefits or processes involved in circular practices, leading to resistance or indifference towards adopting them. This is compounded by entrenched consumption patterns that favor new products over refurbished or recycled ones. Moreover, societal attitudes towards sustainability are often mixed, with some viewing products made from recycled materials as inferior, further slowing the shift towards a circular economy.

Regulatory ambiguities add another layer of complexity. Current policies often fail to provide clear guidelines on how manufacturers should approach product lifecycle management, including end-of-life responsibilities. Insufficient regulatory pressure on manufacturers to take responsibility for the disposal and recycling of their products means that circular practices are not being implemented at scale. The absence of strong policies mandating circular designs, take-back programs, and waste management standards allows many companies to continue operating within a traditional, linear economy model.

Economic constraints also play a significant role in slowing the transition. The high cost of producing sustainable electronics, often due to the need for advanced recycling technologies and eco-friendly materials, makes it difficult for these products to compete with cheaper, mass-produced alternatives. Large, established brands with significant market dominance can continue to push inexpensive, non-circular products, limiting the growth of more sustainable options. Smaller companies attempting to innovate with circular models often struggle to scale due to financial limitations and the need to invest heavily in sustainable production processes.

Additionally, the lack of skilled labor presents a major challenge. Circular economy practices, such as advanced recycling techniques, modular product design, and repair services, require a specialized workforce. In many regions, particularly in Central Europe, there is a shortage of workers with the necessary skills to support these activities, slowing the adoption of circular models.

To overcome these barriers, a comprehensive approach is needed, one that involves not only technological innovation but also education, regulatory improvements, and better collaboration among stakeholders. Technological advancements, such as improved recycling processes and materials innovation, will be crucial in addressing technical challenges. At the same time, raising awareness among consumers and businesses about the environmental and economic benefits of circularity is essential to overcoming societal resistance. Regulatory bodies will need to play a stronger role in setting clear and supportive framework for the entire lifecycle of EEE. Lastly, fostering collaboration between companies, policymakers, and educational institutions is vital for building the skilled labor force necessary to support a circular economy in the electronics sector.

Vision

The vision of this transnational strategic action plan is to establish a sustainable, circular economy in Central Europe's electrical and electronic equipment (EEE) sector. The goal is to ensure that products are designed for longevity, reuse, and recyclability, thereby fostering innovation and resource efficiency while minimizing environmental impact. Through collaborative efforts, increased consumer awareness, and streamlined regulatory frameworks, this action plan aims to create a thriving market for secondary raw materials, reduce e-waste, and set a benchmark for sustainability in the European EEE sector.

This strategic action plan is directed towards stakeholders and policymakers at the local, regional, and national levels. It focuses on areas of policy action that are within the capacity of these actors to influence, aiming to foster sustainability, circularity, collaboration, and innovation. It aligns with the broader goals of the EU Circular Economy Action Plan while addressing the specific needs of the EEE sector in Central Europe.

The vision of a sustainable, cicular economy in Central Europe's EEE sector will be realised through five areas of action:

1. Enhance product design for circularity and prevent waste in the EEE manufacturing process

2. Improve E-waste collection and recycling and stimulate the market for secondary raw materials

3. Foster innovation and research

4. Administrative and legal simplification

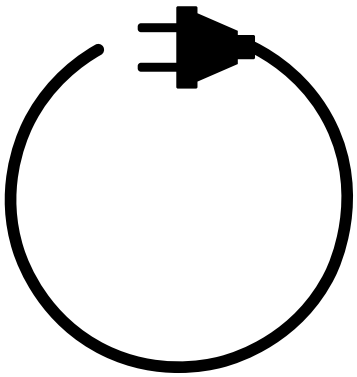
5. Encourage sustainable consumption patterns and public engagement

Long-Term Impact and Benefits

By implementing this action plan, the electronics sector will experience a transformation toward sustainability. Manufacturers will design products with circularity in mind, ensuring that valuable materials are continuously cycled through the economy, reducing the environmental burden of e-waste. Consumers will be empowered to make greener choices, driving demand for longer-lasting, repairable, and recyclable electronics. Regulatory clarity and incentives will encourage businesses to adopt circular models, while collaboration among stakeholders will build a supportive ecosystem for innovation and best practices.

The long-term benefits of this vision include a significant reduction in the extraction of virgin resources, decreased electronic waste, and lower greenhouse gas emissions associated with production and disposal. At the same time, the creation of new jobs in recycling, repair, and sustainable design will provide economic opportunities and help close the skills gap in the labor market. Ultimately, this vision for a circular electronics economy will contribute to broader European sustainability goals, contributing to positioning the industry as a leader in the green transition and ensuring the responsible use of technology in the 21st century.

Actions to Implement a Sustainable, Circular Economy in Central Europe's EEE Sector



In this section, actions and measures are presented to implement the vision of a sustainable, circular economy in Central Europe's electric and electronic equipment sector.

1. Enhance Product Design for Circularity and Prevent the Production of E-Waste

- **Advance Circular Economy Practices**
  Establish and fund initiatives to accelerate the adoption of circular economy principles across the electrical and electronic industry, with a focus on sustainable practices and reduced e-waste production.

- **Promote E-Waste Collection, Repair and Reuse**
  Increase the collection and recycling of e-waste through enhanced public awareness and participation programmes. Establish and promote local repair cafes and repair bonus schemes.

- **Integrate Circular Economy into Education**
  Incorporate principles of e-waste management and circular design into educational curricula and publish resources to enhance understanding and engagement with circular economy concepts.

- **Support and Fund Circular Economy Innovations**
  Provide financial support and incentives for projects and initiatives that promote circularity in the electric and electronic equipment sector, including funding for sustainable solutions and aligning with long-term national environmental goals.

- **Enhance Public and Regulatory Engagement**
  Raise awareness and improve compliance with circular economy practices through strategic public engagement campaigns and address regulatory challenges to support effective waste management and circularity goals.

2. Improve E-waste Collection and Recycling and Stimulate Market for Secondary Raw Materials

- **Accelerate Innovation and the Adoption of Recycled Materials**
  Establish a dedicated hub for the secondary material economy to drive research, innovation and the deployment of technologies for recovering and utilising critical raw materials in the EEE sector. Expanding direct recycling technologies for critical components like lithium-ion batteries.

- **Promote Industry 4.0 and Sustainable Production Practices**
  Facilitate the implementation of Industry 4.0 technologies to enhance industrial processes, improve the sustainability of EEE production and support the integration of recycled materials into new products.

- **Develop and Expand the Market for Secondary Raw Materials**
  Create and support initiatives to raise awareness and build a market for secondary raw materials, involving stakeholders and promoting circular economy practices in the EEE sector.

3. Foster Innovation and Research

- **Initiate Innovative Regional Projects in EEE**
  Launch and support innovative regional projects focused on sustainable practices and technologies within the EEE sector, aligning with the CEAP and driving local advancements in circular economy solutions.

- **Promote Collaborative Research and Project Development**
  Establish and formalise partnerships through memorandums of understanding and showcase innovative projects, such as CIRCOTRONIC and others, at key industry events to foster collaboration among universities, industry leaders and environmental technology clusters.

- **Enhance WEEE Management through Advanced Tools**
  Develop and implement comprehensive tools to provide companies with detailed insights into their waste generation and recycling capabilities, improving the effectiveness of e-waste management strategies.

- **Advance Sustainable Technology Development**
  Support strategic projects for the development of sustainable and circular solutions, such as a Megawatt charger for electric vehicles, through environmental assessments and guidance on integrating circularity into product development processes.

- **Facilitate Access to Funding for Circular Electronics**
  Organise workshops and informational events and campaigns on EU, national and regional funding opportunities, specifically targeting circular electronics, to support universities, SMEs, startups and other stakeholders in securing financial resources for research and innovation.

- **Accelerate the Support for a Sustainable Transformation of the Business Sector**
  Educate and support companies in sustainable transformation by providing knowledge on circular economy principles, fostering resource sharing and facilitating collaboration to address common challenges and drive innovation.

4. Administrative and Legal Simplification

- **Streamline Circular Economy Regulations**
  Establish circular economy task forces at the regional or local level comprising experts from science, business and civil society to advise the public authorities and policymakers on refining and implementing circular economy strategies, with a focus on simplifying regulations and enhancing the effectiveness of the electronic sector's transition to circularity.

- **Reform Waste Legislation to Improve E-Waste Recycling**
  Propose and advocate for amendments to waste legislation to simplify, accelerate and increase transparency in e-waste recycling processes, aiming to boost recycling rates and support the broader implementation of circular economy practices.

5. Encourage Sustainable Consumption Patterns and Public Engagement

- **Increase Public Awareness and Engagement in E-Waste Disposal**
  Launch and expand campaigns to educate students and the general public about the proper disposal of electrical and electronic waste through posters, school training and collection events, emphasising the importance of responsible e-waste management.

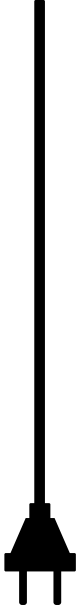
- **Educate on the Socio-Economic Benefits of Circular Economy Practices**
  Develop educational programmes and exhibitions to enhance public understanding of the broader socio-economic advantages of the circular economy, fostering greater engagement with sustainable practices and effective WEEE management.

- **Promote Reuse and Extend the Lifespan of EEE**
  Implement public awareness campaigns and establish reuse corners at local utility company collection points to encourage the repair and extended use of still-operational electronic appliances, reducing the overall production of e-waste.

- **Facilitate Knowledge Exchange on Best Practices in WEEE Management**
  Organise study visits and learning exchanges to leading examples in WEEE management, enabling companies and stakeholders to adopt best practices and innovative recycling techniques, thereby improving local WEEE management.

- **Support Repair Initiatives and Foster Industry Collaboration**
  Introduce and promote repair bonus schemes to incentivise the repair of household electrical and electronic devices, while organising gatherings for administrators, non-governmental organisations and businesses to raise awareness and encourage collaboration in the EEE sector.

Call for Engagement in Advancing the Circular Economy for the EEE Sector



The transition to a circular economy in the electrical and electronic equipment sector cannot be achieved without the active participation of all stakeholders. Collective action is crucial to addressing the environmental and economic challenges we face. Now is the time to mobilize efforts across government, industry, academia, and civil society to ensure the success of this strategic action plan. By working together, we can create a circular EEE sector that not only minimizes waste but also maximizes innovation, resource efficiency, and economic opportunities.

The success of this plan depends on a wide range of actors, each playing a unique and critical role:

- **Governments (Local, Regional, National)**
  Policymakers are essential for creating supportive regulatory frameworks, providing incentives for circular practices, and investing in the infrastructure needed for recycling and e-waste management.

- **Industry and Manufacturers:**
  Businesses must redesign products for durability, modularity, and recyclability while adopting new circular business models like leasing or take-back schemes. They are also key in driving innovation and market transformation, for instance in the secondary raw material sector.

- **Consumers and Civil Society**
  Public participation is essential. Consumers must be encouraged to embrace sustainable consumption patterns by opting for eco-friendly products, repairing instead of replacing electronics, and supporting recycling programs.

- **Research Institutions and Educational Bodies**
  These entities are crucial for advancing research in circular technologies and materials, as well as for training the next generation of skilled workers equipped to meet the demands of a circular economy.

- **Non-Governmental Organizations (NGOs) and Advocacy Groups**
  NGOs can play a powerful role in raising public awareness, advocating for policy change, and holding stakeholders accountable for progress.

This strategic action plan provides a clear set of measures for advancing a more sustainable and resource-efficient approach in Central Europe's electronics sector. By targeting key areas such as product design, waste management, innovation, and public engagement, the plan lays the foundation for a transition toward a greener, more circular economy. With a strong emphasis on collaboration and policy alignment, it seeks to address the specific challenges of the region while contributing to broader European sustainability goals.

The successful implementation of this strategic action plan relies heavily on the engagement of stakeholders. It is urgent that organizations and individuals commit to executing the selected actions and the Circular Economy Action Plan (CEAP) to propel the plan into action, fostering a sustainable and circular future for the EEE sector. Your participation is essential in this critical endeavor to promote circular economy principles, reduce e-waste, and create a more sustainable future. Your engagement and commitment are vital to driving meaningful change.

WEB PAGE:

https://www.interreg-central.eu/projects/circotronic/

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