NAVIGATING THE PATH TO CIRCULARITY

A guide to circular economy roadmaps

CE-HUB
UKRI National Interdisciplinary Circular Economy Research

NICER PROGRAMME

UNIVERSITY OF EXETER

UK Research and Innovation

The shift towards a circular economy has gained significant momentum globally as a means to mitigate the negative environmental and economic impacts of the traditional linear economic system. The circular economy aims to conserve natural resources and ecosystems while promoting economic and social prosperity. The concept of the circular economy is multi-disciplinary and involves the participation of various actors across multiple value chains, from production to consumption. But despite its widespread popularity, the circular economy concept is complex and has been interpreted in a variety of ways, giving rise to diverse circular-driven agendas. Various strategies and measures, referred to as Circular Economy Roadmaps (CERMs), have been developed to facilitate the transition to a circular economy.

Defining Roadmaps and 'Roadmapping'

CERMs offer a systematic method for defining the circular economy's vision, objectives, and desired outcomes. They outline the necessary conditions, important stages, and steps required for successful implementation, and some roadmaps also include KPIs and metrics to track progress. However, the diverse understandings of the circular economy and varying motivations among stakeholders pose a challenge in creating a standardised and uniform roadmap.

Roadmapping originated as a strategic tool in technology and has been adapted to various fields to set goals, make operational decisions, and plan action in the circular economy context. The roadmapping process was developed by Motorola in the 1970s and involved creating a structured visual representation of the strategy to achieve a desired future state. Roadmapping is beneficial for communicating visions, bringing together resources from multiple stakeholders, stimulating research, and tracking progress.

Building on our experience designing roadmaps—including work carried out for NHS Wales—researchers at the UKRI CE-Hub conducted a systematic review of existing literature on circular economy roadmaps, creating a roadmapping framework that can be used to assess existing CERMs and produce new ones. The findings of the review, which will be published in due course, provide valuable insights into the design and implementation of CERMs, making it a useful resource for practitioners and policymakers who are pursuing a transition to a circular economy.

This short article introduces the different types of CERM and examines their characteristics as relevant to various contexts.

Types of CERM

Based on their objectives, CERMs occupy different positions on a spectrum. Our review identified three types of roadmaps: National, Municipal and Baseline.

- National CERMs are policy-driven and at the upper end of the spectrum.
- Baseline CERMs focus on processes and data, covering life cycle analysis of materials in a sector or value chain and typically operate at the scale of products, resources, materials and sectors.
- Municipal CERMs filter upwards to the national level, where policies are combined with elements from process integration, industrial ecology, and national circular economy agendas.

The proposed typology of CERMs is depicted in the image below, but we will now describe each of them in more detail.

National CERMs

National CERMs are developed by governments and policy makers to support the transition of entire countries towards a CE. National CERMs provide a high-level

"Roadmapping is beneficial for communicating visions, bringing together resources from multiple stakeholders, stimulating research, and tracking progress."

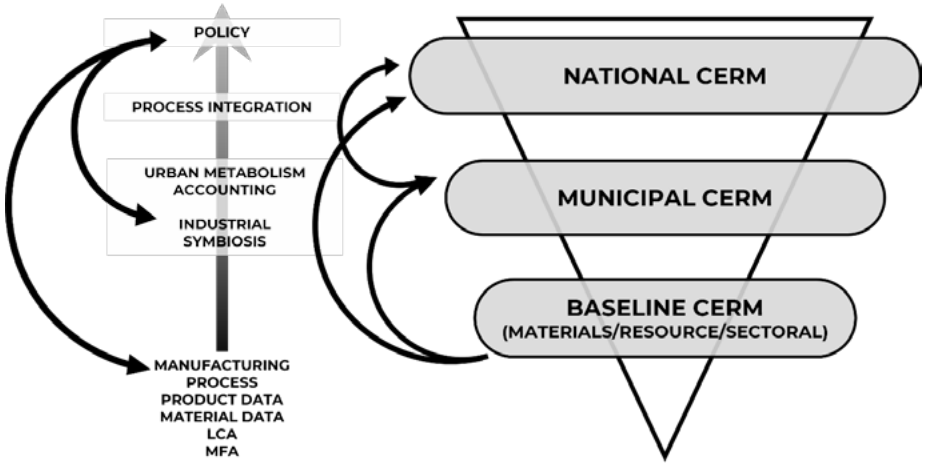

Figure 1. Typology of Circular Economy Roadmaps (Abu-Bakar, forthcoming)

vision for the country's CE future and outline the policies, regulations, and initiatives needed to achieve it. National CERMs are typically based on a comprehensive analysis of the country's current state, including its resource use, waste management practices, and economic activities. The goal of national CERMs is to provide a framework for the sustainable development of the country, to help reduce its environmental impact, and to create a more resilient and sustainable economy.

Food waste is at the forefront of the national Circular Economy Roadmap Agendas, with the ever-growing population and heightened demand for food, paired with ineffective resource utilisation and food distribution, resulting in a mounting problem of food waste at every stage of the food value chain. This, in turn, has a profound impact on the environment. To tackle this challenge, national agendas are being formed to shift towards more sustainable practices and reduce the negative effects of food waste. Scotland's CERM has developed initiatives such as the Love Food Hate Waste campaign to reduce food waste, while one of Sweden's priorities is sustainable farming practices and local food production, with a draft regional food strategy expected to include circular economy principles. Both regions are also focusing on initiatives to make the food sector more circular, including reducing food waste, promoting urban agriculture, and supporting local food production.

National CERMs also highlight circular business models and incentives for circular products. For example, Sweden's CERM supports innovative business models such as the REKO-ring which promotes local food production and consumption by facilitating direct trading between producers and consumers, without intermediaries or administrative costs. The EU's circular economy action plan proposes developing standards and definitions to link product and packaging design to recycling, regulating products with externalities, and exploring new business models that reduce structural waste and promote access to goods or services over ownership. These themes semphasise the need for new legislative frameworks, stronger stakeholder interaction across value chains, and greater collaboration among various actors. Researchers and practitioners have taken advantage of this opportunity to transition to more sustainable and environmentally friendly business practices.

Municipal CERMs

Municipal CERMs are locally developed strategies that focus on the impact of local activities, business practices, and industrial ecology on the local economy and the effects of national and global value chains. These road maps are usually driven by local authorities and civil society, with significant participation from local businesses and the wider community.

The action frameworks within Municipal CERMs offer local authorities a broader perspective on circular economy implementation, beyond just recycling and waste management—this is also a detail we address through the NICER Programme, as CE can still be misunderstood as primarily about recycling. Municipal CERMs also provide a way to standardise existing circular economy practices, involve stakeholders in identifying solutions, and study best practices.

The development of these roadmaps starts with an analysis of the community's current state and engagement with stakeholders to develop a shared vision. The Municipal CERMs focus on waste management, resource use, and economic development and outline initiatives, policies, and regulations to

support the transition towards a CE model. They emphasise the importance of efficient use and recycled materials.

Some examples include:

- Glasgow's CERM charts a sustainable future by embedding circular principles of eco-design, sharing, reuse, repair, and remanufacture throughout the city to create a localised, low carbon economy that stimulates civic participation and prosperity, forging a path towards a more prosperous future.
- Copenhagen and Kitakyushu promoting the use of recycled materials and extended use of textiles and workwear through procurement, and
- Ljubljana's public tender for hygienic paper products requiring the material to be made of recycled cardboard collected within the city.

Similarly, the Route Map for the West Midlands are city-centric plans aimed at promoting a circular economy by implementing concepts such as urban metabolism accounting and industrial symbiosis while managing waste and energy efficiently. These roadmaps are valuable for local governments and communities to create more sustainable and resilient local economies, reduce environmental impact, and improve the quality of life for residents.

By working together, various stakeholders can implement these roadmaps and achieve a CE model characterised by closed loop use of resources, waste reduction, and economic opportunities.

Baseline CERMs

Baseline roadmapping focuses on a specific product, resource, or material, such as plastic or paper. The roadmap outlines the steps needed to create a closed loop for that specific product, resource, or material at much more granular (component) levels than the other types. It also focuses on fostering sustainability through product design, material recyclability and the implementation of circular business models with a drive to promote a strategy for adopting green procurement practices, including the procurement of less harmful materials, reduced material consumption and increased utilisation of renewable and recyclable materials.

Examples include:

- Indonesia's plastic roadmap aims to achieve full circularity by 2025, with a baseline study including material flow analysis and life cycle assessment. Signatories, representing 20% of all global plastic packaging, aim to promote innovation and collaboration, set targets and engage with stakeholders while developing waste management, a circular economy task force, and partnerships with businesses and NGOs.
- Laos' circular economy strategy emphasises reducing reliance on new resources and prioritising metal recycling through material flow analysis and bioleaching of e-waste. The government is encouraged to require clean material recovery processes to promote circularity, ensuring the sustainable use of resources and minimising waste.

Looking forward and next steps: CERMs can help us arrive at our destination

The move towards a circular economy has garnered substantial worldwide attention to reduce the harmful effects of traditional linear economics and preserve natural resources. To ease the shift towards a circular economy, Circular Economy Roadmaps offer a systematic approach to defining its vision and goals and charting a route to follow.

Based on this work, we're developing a global dashboard of Circular Economy indicators, integrated with, among other variables, countries' resource efficiency, waste management, material recovery, and material footprint data. The dashboard will provide data-driven insights into countries' CE adoption efforts, enabling informed decision-making, highlighting priority areas, and recommending targeted action plans. We're committed to accuracy and reliability, compiling, and analysing relevant information from various sources. Stay tuned for updates on our progress and the official

Halid Abu-Bakar

The series editor is Ryan Nolan and it is published by the UKRI CE-Hub. If you would like to get in touch, please email ce_hub@exeter.ac.uk or visit our Knowledge Hub at www.ce-hub.org.