CE-HUB

UKRI National Interdisciplinary Circular Economy Research

University of Exeter

UK Research and Innovation

CIRCULAR DATA FOR THE CIRCULAR ECONOMY

In a new technical report, CE-Hub researchers examine and curate UK public data sources of potential relevance to circular economy (CE) implementation in the UK, providing several recommendations to improve coverage and fitness and outlining practical solutions being implemented as part of our work establishing a CE data observatory. The availability, management and dissemination of public data is central to scaling CE. By keeping materials in circulation for longer, designing out waste and retaining value within the economy, the CE will bring about a more sustainable and prosperous future for business and society, while contributing to environmental policy targets. However, gaps and inconsistencies in presently accessible data slow down the development of tools that could otherwise steer, monitor and improve circularity and its positive impacts.

DATA RESOURCES AND CIRCULAR ECONOMY

Defining 'circular economy' can be complicated [1]. The CE-Hub broadly understands CE as an economy that is regenerative and restorative by design. This stands in contrast to the take-make-waste linear economy, which is extractive and degenerative by design. But while defining CE may be complicated, measuring and quantifying it in practice can be considerably more so.

Among other things, it requires data that cover all stages of a given material, component or product's life cycle – spanning individual parts to industrial and national-scale processes to which they contribute. Some of this data exists, but a lot of it had been collected to describe the take-make-waste linear economy. In other areas relevant to CE, there are significant gaps and inconsistencies in data availability and management. What can be done?

We need to transition from linear to circular models of data collection. Maintaining the right data at the highest value for as long as possible will help remove barriers and accelerate the UK's transition to circularity.

In line with this effort, the CE-Hub has produced 'A guide to public data resources for a circular economy modelling & measurement framework', a technical report assessing the coverage fitness of publicly available datasets from UK sources, particularly in relation to inputs of an assessment framework developed to answer stakeholder questions consistently.

In this short companion piece, we highlight key findings and answer the 'so what?', while providing a dynamic overview of the guide's sections and their relevance to specific outcomes and stakeholder interests.

HOW WE CARRIED OUT THE RESEARCH

Our search focused primarily on public data published by UK and England public sector organistions.

At a glance...

This CE-Hub 2-pager accompanies the full report on circular economy data assets, which can be found on our Knowledge Hub.

Sections cover:

- The rationale behind the report
- A brief discussion of methodology
- A high-level overview of each main section, highlighting key findings
- Recommendations for key stakeholders and data publishers

For full details of CE-Hub and NICER programme research, visit www.ce-hub.org/knowledge-hub.

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We identified over 100 data assets relevant to the CE (full list available on request), providing a high-level view of gaps and an assessment of sources against the FAIR principles [2]. That is, we evaluated each dataset for its Findability, Accessibility, Interoperability, and Reusability. This is important. Beyond the formality of research methodology, we focus and expand upon FAIR principles because we want to promote good and consistent practice in data stewardship for building the CE evidence base going forward.

Consistency in approach and clarity in terms is the cornerstone of the CE-Hub and is central to the development of the CE Observatory. Full details of the methodology can be read in the paper here.

WHAT WE FOUND AND WHY IT MATTERS

In three sections, the report covers 1. Data input requirements, 2. Data coverage, and 3. (Meta)data and infrastructure fitness.

1. To help answer stakeholder questions, the CE-Hub have developed a framework to comprehensively test circular value propositions in given resource flows and track pathways to their realisation. Broadly speaking, this entails characterising the baseline state of a value creation process, appraising future target states, and determining interventions, incentives and indicators to steer and monitor the transformation process.

Applying the framework involves identifying, prioritising, validating and harmonising relevant data inputs – and in their absence, producing estimates.

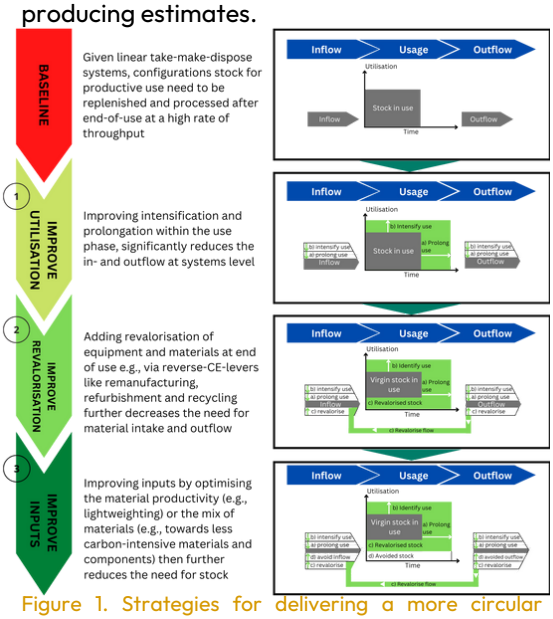

Figure 1. Strategies for delivering a more circular economy [3]

2. Having described the framework in the first section, section two presents identified data assets relevant to its application. The focus is on what the datasets can tell us and key stakeholders, while highlighting issues and gaps in data coverage at a range of levels.

Our initial findings suggest that current UK public data coverage is varied across and within the layers making up the analytical framework. This is perhaps to be expected, as we already highlighted many historical data assets were designed with the linear economy in mind.

In order to answer important stakeholder questions – such as, 'What is the value proposition of more circular business models to firms along the supply chain?' – we need data collection that proceeds with circularity in mind. To bridge this gap, we modelled what this might look like across an entire value chain by combining existing data sources (Fig 2).

3. Finally, the third section examines the fitness of identified data sources in relation to the FAIR principles extended into data openness and transparency aspects, and provides suggestions to enhance their potential reuse in (but also beyond) the observatory assessment framework.

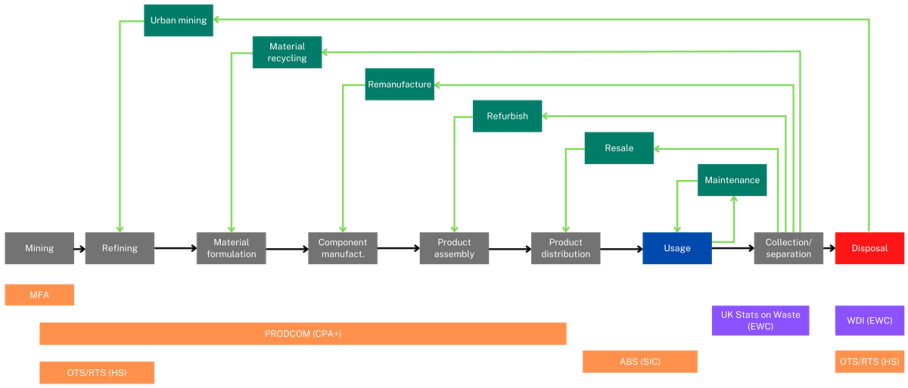

Figure 2. Tracing material flows across the CE-Hub value-chain taxonomy using existing data sources

Here, we assess shortlisted data assets against characteristics that could enhance the net benefits of their use and reuse within an observatory assessment and monitoring framework. We do this, in part, by reviewing the (meta)data against the FAIR principles. None of the datasets analysed passed when tested for their adherence to the combined FAIR principles. Given our interest in consistency and clarity as a measure of boosting confidence in CE-oriented decision-making, we also considered transparency relating to each dataset's uncertainties, bias, or methodological shortcomings.

Identifying systemic gaps and issues in the data ecosystem is a significant step in helping create high-quality circular data collection and dissemination. Improving existing datasets in line with our recommendations and utilising the observatory framework could boost net benefits for key stakeholders as they transition to circular economies.

IMPLICATIONS FOR STAKEHOLDERS AND KEY RECOMMENDATIONS

With a data ecosystem that is set up to capture information relevant to the CE, businesses and policymakers will be able to make better informed decisions with higher levels of certainty – whether they are about closing loops in a supply chain or meeting environmental policy targets. Coupling tools such as our observatory framework with the correct data inputs will provide stakeholders with the ability to describe, visualise and assess their CE transition, both across the value chain and at a range of levels, spanning materials and products to the national picture.

As the UK moves to a more circular economy, we also acknowledge that new challenges will arise with regards to the collection of data and information.

With materials and products in circulation and high value for longer, historical data that reflect a take-make-waste cycle are less useful. The CE-Hub are in the process of developing a suite of resources, from National CE roadmaps to KPI dashboards that will help identify and embed opportunities in the transition to a more circular UK economy.

With the above in mind, we make a range of recommendations for data holders and publishers, which include:

- The need for a coordinated effort to better capture dynamics of relevance to the circular economy in statistical classifications for e.g., products and activities across production and trade
- Greater consistency in the dissemination and formatting of datasets and related metadata, including shared terminology
- Clearer indications of reuse permissions for datasets
- More widespread communication of methodological approaches and pitfalls to foster confidence
- A culture of open access publication for data collected using public funding

References and further reading

[1] Conceptualizing the circular economy: An analysis of 114 definitions
[2] The FAIR Guiding Principles for scientific data management and stewardship
[3] Zills, M. 2022. Forthcoming.

Visit the CE-Hub's Knowledge Hub for the full report and other resources from the UKRI NICER Programme research centres.