EPEE – Economics and Policy of Energy and Environment

EPEE SPECIAL ISSUE

THE CIRCULAR ECONOMY AS A LEVER FOR DECARBONIZATION

Sustainable development implies improving living conditions over time and throughout the world within Earth's planetary boundaries and carrying capacity. Decoupling increases in income and wellbeing from the environmental impact of economic activities is essential for this purpose.

One main environmental concern connects to global warming due to greenhouse gas emissions and the need for urgently stopping or limiting temperature increase. Nevertheless, focusing on climate change alone may give rise to new and unintended challenges as well as underestimate potential benefits from other policy objectives.

Energy storage, renewable energy, bioeconomy, electric mobility, carbon removal, etc., may imply larger demand for both traditional biotic and abiotic resources as well as "critical" materials. In this context, the Circularity Gap Report (Circle Economy, 2021) estimates that circular economy strategies could eliminate up to 22.8 Gt of CO_2 annually—approximately 39% of global emissions—by significantly reducing the use of virgin materials and the energy required for their extraction and processing. The more recent Circularity Gap Report (Circle Economy, 2023) emphasizes that we can meet people's needs using only 70% of the materials currently consumed, thereby reversing the overshoot of planetary boundaries and limiting the global temperature rise to within 2 degrees.

However, while resource efficiency and the circular economy are worldwide recognised as fundamental to reduce waste discharge and raw materials extraction, the extent to which they may also help pursue climate neutrality remains underemphasized, both from an economic and technological viewpoint.

Modelling exercises show that well-designed material efficiency strategies may significantly reduce by 2050 life-cycle emissions in sectors such as the residential (up to 35% in G7 countries and 60% in China & India) and the automotive (40% and 35%, respectively) (IRP, 2020). Other approaches have added evidence in this respect. For instance, in the construction sector, one of the largest consumers of resources and energy, circular building techniques, such as modular prefabrication, enable the reuse of components and significantly reduce emissions associated with cement and steel production (Oladapo *et al.*, 2024). In transportation, shared mobility services, such as car and bike sharing, can limit material consumption and the energy required for vehicle production, making a substantial contribution to decarbonization (Businge & Mazzoleni, 2023). Similarly, in manufacturing, remanufacturing strategies can drastically cut both energy consumption and CO_2 emissions linked to the production of new components (Bressanelli & Saccani, 2025). Nevertheless, further research is needed to better understand challenges and opportunities in a fast-changing world.

This special issue aims to expand this area of research by inviting papers that provide evidence on the benefits of circular activities in decarbonization. Specifically, it seeks to highlight economic

savings resulting from the adoption of circular-based mitigation strategies in achieving emission reduction objectives at both micro and macro levels.

A non-exhaustive list of possible topics includes:

- Circular bioeconomy (e.g., regenerative agriculture and circular agri-food systems for decarbonization)
- Industrial symbiosis (e.g., collaborative platforms and cross-sector symbiosis strategies with decarbonization benefits)
- Waste recycling and reusing (e.g., advanced recycling and recovery technologies and infrastructure)
- Eco and circular design (e.g., modular design and remanufacturing of components)
- Sector-based assessments (e.g., construction, agriculture, automotive)
- Policy and governance (e.g., the role of regulations in the circular transition and decarbonization)
- Digital solutions for the circular economy (e.g., artificial intelligence systems for optimizing logistics and supply chains)
- Monitoring, metrics, and standardization for the circular economy and decarbonization
- Business models for circularity and decarbonization (e.g., pay-per-use and subscription models to reduce production impacts).

Suggested methodologies for assessment include:

- Life Cycle Assessment
- Integrated Assessment Modeling
- Computable General Equilibrium Modeling
- Econometrics and Statistical Modeling
- Cost-Benefit Analysis
- Multi-Criteria Decision Analysis
- System Dynamics
- Case Study Analysis
- Comparative Policy Analysis
- Action Research
- Delphi Study

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SUBMISSION INFORMATION

All submitted papers must contain only original work, which has not been published by or is currently under review for any other journal.

Detailed guidelines for editing are available at the following link:
http://www.francoangeli.it/riviste/NR/Efe-norme.pdf

Manuscripts should be submitted via this link:
http://ojs.francoangeli.it/_ojs/index.php/fr/about/submissions

Full paper submission deadline: **30 September 2025**
Final decision notification: **30 January 2026**
Publication: **March 2026**

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