detritus | Multidisciplinary Journal for Circular Economy and Sustainable Management of Residues

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Editorial

CIRCULAR ECONOMY ACROSS STAKEHOLDERS: OBJECTIVES, CHALLENGES AND FUTURE PERSPECTIVES

Introduction

The overarching objective of the Circular Economy is to decouple economic development from resource depletion and environmental degradation by transforming waste into valuable resources.

Achieving this objective requires balancing economic growth, environmental protection, public health, and social well-being in accordance with the United Nations Sustainable Development Goals (SDGs).

Consequently, the Circular Economy should be viewed not merely as a waste management strategy but as a complex socio-technical system involving multiple stakeholders whose mutual interactions (schematically represented in Figure 1) strongly influence the effectiveness of the adopted strategies and the outcomes achieved. The different political, economic, and cultural influence exerted by the various actors can either facilitate or hinder the achievement of sustainability goals.

The Role of Key Stakeholders

Politicians

Within the Circular Economy framework, political representatives are called upon to establish objectives, priorities, and regulatory instruments capable of promoting the transition toward more sustainable production and consumption models. They must also foster awareness among citizens and businesses while maintaining continuous dialogue with the scientific community so that decisions are supported by the best available knowledge.

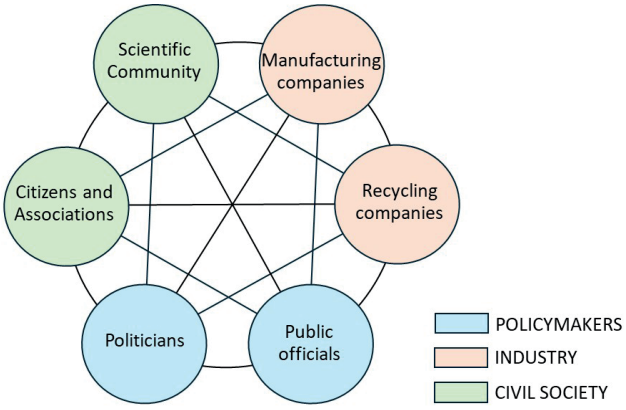

FIGURE 1: Schematic representation of the interrelationships among the main Circular Economy stakeholders.

Public Officials

Officials working within European, national, and local institutions play a central role in translating political decisions into practical actions. They develop technical and administrative regulations, manage programs and funding schemes, oversee regulatory compliance, and coordinate services and projects.

Citizens and Associations

Citizens and civil associations contribute to the Circular Economy through responsible consumption patterns and sustainable behaviors, including waste prevention, conscious purchasing decisions, product life extension, participation in sharing economy initiatives, and proper waste separation practices.

Scientific Community

Beyond supporting technological innovation, the scientific community plays a crucial role in providing objective evidence to policymakers, citizens and companies. By identifying emerging environmental and health concerns, evaluating risks, and proposing technically sound solutions, research helps ensure that circularity strategies remain scientifically robust and socially beneficial.

Industry and Business Sector

The business sector drives the Circular Economy. Companies create societal and economic value, but ultimately focus on profitability, continuity, and competitiveness. The circular landscape relies on two primary groups:

- *Manufacturing companies*: tasked with redesigning lifecycles to use fewer virgin materials, improve repairability, incorporate recycled content, and minimize production waste.
- *Recovery and recycling companies*: responsible for turning waste into secondary resources and ensuring the environmentally safe disposal of final residues.

Governance Failures and Stakeholder Distortions

Many of the shortcomings observed in current circular economy systems originate from distortions in stakeholder roles, responsibilities, and interactions:

- political decisions influenced by vested interests, demagoguery, short-term electoral considerations or ideological biases, (as exemplified by persistent opposition to certain waste-treatment technologies);
- insufficient technical and scientific updating among

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Detritus / Volume 35 - June 2026 / pages 1-2
https://doi.org/10.31025/2611-4135/2026.19601

parts of the public administration, whose participation in scientific forums has become increasingly limited;
- citizens' vulnerability to misinformation and fake news, particularly through social media;
- difficulties within the scientific community in providing clear, consistent, and widely shared information, sometimes yielding to pressures associated with industrial lobbying;
- industrial strategies focused primarily on profit maximization through planned obsolescence, fast-fashion business models, and proliferation of disposable products;
- inadequate communication between manufacturers and recycling operators regarding changes in product composition and design;
- reluctance among some industrial operators of the environmental and health risks associated with products and or specific recycling pathways.

Persistent Systemic Challenges

In addition to stakeholder-specific weaknesses, several systemic challenges continue to hinder the effective implementation of circular economy strategies, such as:

- insufficient prevention of disposable products generation;
- overly optimistic narratives that underestimate the technical and economic complexities of circular transitions;
- instability & volatility in secondary raw material markets;
- bureaucratic and regulatory barriers affecting End-of-Waste implementation;
- limited adoption of Extended Producer Responsibility schemes aimed at combating planned obsolescence and ensuring proper end-of-life management, especially for products that are difficult to recycle (e.g., textiles containing elastane);
- the transfer of environmental burdens associated with recycling activities to developing countries;
- the absence of an integrated strategy capable of effectively coordinating all stakeholders throughout the value chain.

Strategic Priorities for the Future

The transition toward a truly sustainable Circular Economy requires the adoption of a comprehensive strategy based on several key principles, (Fraeyman et al., 2026):

- comprehensive monitoring and control of material flows;
- ensuring the sustainable closure of mass balances;
- managing non-recyclable residues in a technically & environmentally sound manner, free from ideological biases;
- integration of prevention, reuse, recycling, energy recovery, and final disposal within a coherent system in which all components contribute to overall performance, much like gears within a complex mechanical system (Figure 2);
- strengthening the role of independent scientific research in policymaking processes;
- contrasting the distorting influence of lobbying activities on regulatory decisions;
- combating planned obsolescence and the production and widespread use of disposable products;

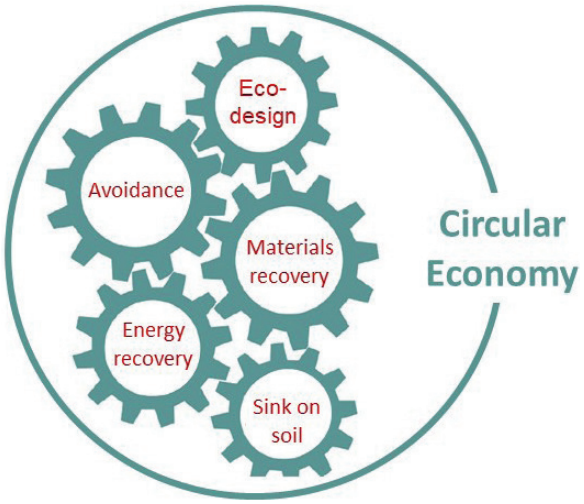

FIGURE 2: Graphical representation of the integrated management of products and waste from a sustainability perspective, supporting the objectives of the Circular Economy (Cossu, Ferrante, 2026).

- assessing and minimizing the release of contaminants, hazardous substances, and microplastics throughout product life cycles;
- recognizing the important contribution of energy recovery from waste through scientifically validated technologies, including biofuels, biohydrogen production, chemical recycling of plastics, and thermal recovery of non-recoverable residual fractions;
- acknowledging the strategic value of controlled land deposition of residues via the "Back to Earth" framework. This entails driving EU-level policy toward sustainable engineered "sinks," rather than merely amending older directives based on unsustainable traditional landfilling.

Conclusions

The Circular Economy represents one of the most promising strategies for addressing the environmental, economic, and social challenges of the twenty-first century. However, its success cannot rely on oversimplified narratives or purely ideological visions; rather, it will depend on the ability of stakeholders to transcend sectoral interests and embrace evidence-based decision-making. This approach must effectively integrate environmental and public health protection, economic competitiveness, and collective well-being. Only under these conditions can circularity become a tangible pathway toward sustainable development, rather than a merely aspirational concept.

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