Fraunhofer CCPE

Summary of the position paper

Challenges and requirements in comparative life cycle assessment of plastics recycling

To achieve a circular and sustainable plastics value chain, one strategy is to improve plastics recycling. However, there is a lack of guidance on transparent environmental impact assessment and life cycle inventories for recycling. The most used method for evaluating the environmental impacts of products or services is life cycle assessment (LCA). Currently, LCA studies have been criticized for lacking consistent and harmonized rules, which can lead to misleading communication and decision-making. We examined ten challenges and ten requirements for comparing three different perspectives on modelling plastics recycling.

Challenges of comparative LCAs of plastics recycling

1. The diversity of plastics recycling technologies
2. Intrinsic multi-functionality of recycling
3. Complexity of joint plastics recycling
4. Different waste origins
5. Misdirected and non-recyclable or partly recyclable waste
6. Quality losses of recycled plastics
7. Non-disclosure of data and reporting of assumptions
8. Inadequate data sources, monitoring and acquisition schemes
9. Outdated or unavailable location-based data
10. Significant changes in background conditions over time

To ensure comparability of LCA results, consistency is mandatory. Addressing these challenges supports standardization, harmonization, and filling data gaps in plastics recycling.

Requirements for comparative LCA of plastics recycling

1. Ensure comparable technological scales of plastics recycling technologies.
2. Pay attention to the choice of system boundaries.
3. Maintain the recycling chain as a coherent row of activities.
4. Handle multi-functionality using substitution when modelling recycling as end-of-life option.
5. Find a consensus regarding the issue of multi-functionality in the modelling of recycled plastics.
6. Depict the input waste quality at the point of collection.
7. Indicate the quality based on functional properties at the point of substitution.
8. Use and disclose a uniform process scheme for data collection and reporting.
9. Be careful with claiming recycled content when using post-industrial recycled plastics.
10. Use prospective background data for future scenarios.

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Extended version

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Keywords

- Life Cycle Assessment
- Plastics recycling
- Circular Economy
- Environmental assessment

Industries that we encourage to collaborate

- Waste collectors and sorters
- Plastics recyclers
- Plastics processors
- LCA experts

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