

What Are the Implications of Recycling Technology Choice on Environmental Benefits of Recycling?

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» Research Questions Addressed

How does the interaction between choices of recycling technology and product design for recycling affect the environmental benefit generated by recycling?

When are collective recycling systems more efficient than individual recycling systems?

» Primary Findings

Collective recycling systems have long been criticized for restricting the environmental benefits of extended producer responsibility because of free-riding issues among producers. This study revisits and refines this assertion and shows that when recycling technology choice is taken into account, collective recycling systems can lead to higher environmental benefits than individual recycling systems.

The superior performance of the collective recycling systems is due to the stronger incentives they provide for recycling technology improvements. In turn, these improvements can help overcome the environmental drawbacks associated with inferior product design-for-recycling outcomes caused by free-riding concerns among producers.

» Relevant Sectors

Consumer goods
Recycling

» Keywords

Design for environment
Recycling
Recycling technology
Supply chain collaboration

» Firms and Industries Appearing in Research

America's Remanufacturing Company
Appliances
Embraco
Hewlett Packard
Nat.Genius





» Highlights

An exclusive focus on product design-for-recycling to assess the environmental benefits of extended producer responsibility-based recycling systems needs scrutiny. Producers and policy makers need to evaluate recycling systems with respect to the incentives they provide not only for product design-for-recycling but also for recycling technology choices.

Collective recycling systems can provide stronger incentives for recycling technology improvements and lead to higher environmental benefits relative to individual systems. This particularly happens when recycling volumes between producers at a shared processor are relatively even, and recycling technology choice has at least as high impact on recycling process efficiency as product design-for-recycling choice.

» Topic Overview

Extended producer responsibility (EPR) legislation is a widely adopted global policy tool that holds producers responsible for proper treatment of their end-of-life products. One of the main purposes of EPR is to provide design-for-recycling incentives for producers. However, it is often argued that many implementations of EPR legislation have created limited incentives for producers to design for recycling and therefore have undermined the potential of the policy instrument to benefit the environment. The lack of such design incentives is largely ascribed to the collective practice of recycling, i.e., processing a mix of different products from multiple producers in shared recycling facilities. Specifically, collective recycling systems are considered to be prone to free-riding between producers and also to dilute incentives to design products for recycling. Therefore, from an environmental point of view, collective recycling systems have often been argued to be inferior to individual recycling systems where different producers' products are processed separately. This study challenges that assertion by examining the effect of recycling technology choices on the environmental efficiency of both systems.

» Implications for Sustainable Business

Rapid growth in consumer product sales has led to consumer products becoming the fastest-growing municipal waste stream. Recycling has the potential to minimize the amount of landfilled consumer products and reduce associated environmental impacts. The increased prevalence of extended producer responsibility (EPR) legislation is shifting the recycling burden to producers. Results of this study can guide the development of more effective recycling programs for producers and processors of consumer products including electronics, cell phones, appliances, carpets, plastics, textiles, and mattresses.

» Link to Academic Paper

Gui, L., Rahmani, M., & Atasu, A. (2018). The implications of recycling technology choice on collective recycling. *Georgia Tech Scheller College of Business Research Paper*, No. 18-21. <https://ssrn.com/abstract=3186900>.

» Related Links

Atasu, A., Agrawal, V., Rinaldi, M., Herb, R., & Ulku, S. (2018). Rethinking sustainability in light of the EU's new circular economy policy. *Harvard Business Review*. Retrieved from <https://hbr.org/2018/07/rethinking-sustainability-in-light-of-the-eus-new-circular-economy-policy>

Atasu, A. (2018). Operational perspectives on extended producer responsibility. *Journal of Industrial Ecology*. doi.org/10.1111/jiec.12816