

Sustainable and Circular Economy

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Abstract

This poster presents on case studies showing opportunities to recover critical materials through circularity and to address the end of life challenge for plastics. It shows examples of projects that are investigating the Circular Economy and helping understand each sectors unique challenges. It further lays out the methodology for the case studies that could be used for other industry assessments. Lastly, it demonstrates how the funded analysis tools can be used in conjunction with each other to answer both economic and environmental justice questions.

Relevance to IEDO/AMMTO

The analyses inform the development of secure, resilient, diverse, and sustainable critical mineral and materials supply chains that underpin clean energy transition, and Net-Zero manufacturing goals.

Publications and Future Work

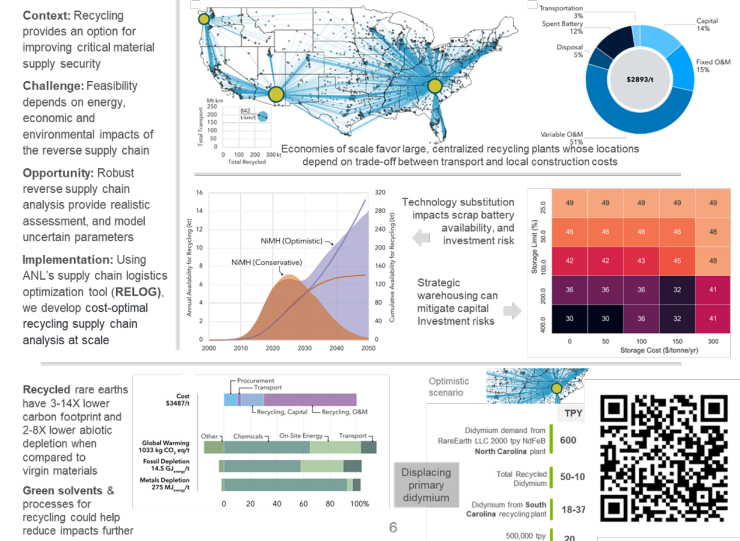
- Publications**
- Regional economic potential for recycling consumer waste electronics in the United States. *Nature Sustainability* (2023)
 - Techno-Economic, Life-Cycle, and Socioeconomic Impact Analysis of Enzymatic Recycling of Poly(ethylene Terephthalate), *Joule* (2021)
 - Manufacturing Energy and Greenhouse Gas Emissions Associated With Plastics Consumption, *Joule* (2021)
 - Evaluating Opportunities To Improve Material and Energy Impacts in Commodity Supply Chains, *Environment Systems and Decisions* (2017)
 - A systematic analysis of the costs and environmental impacts of critical materials recovery from hybrid electric vehicle batteries in the U.S., *iScience* (2022)
 - Towards a circular economy for PET bottle resin using a system dynamics inspired material flow model. *Journal of Cleaner Production* (2023)
 - Technical, Economic, and Environmental Comparison of Closed-Loop Recycling Technologies for Common Plastics. *ACS Sustainable Chemistry & Engineering* (2023)
- Pending Publication:**
- Paper under review for plastic end of life
 - Paper pending for PV siting for critical material recover

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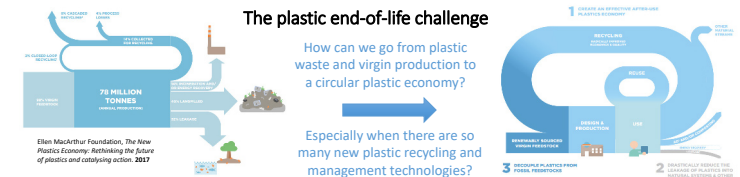
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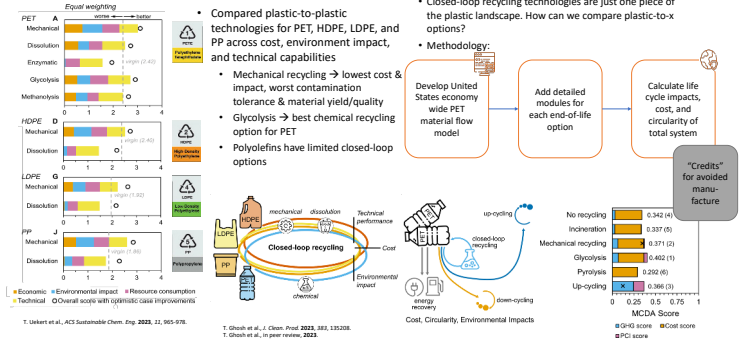
Recovering Critical Materials from NiMH Batteries



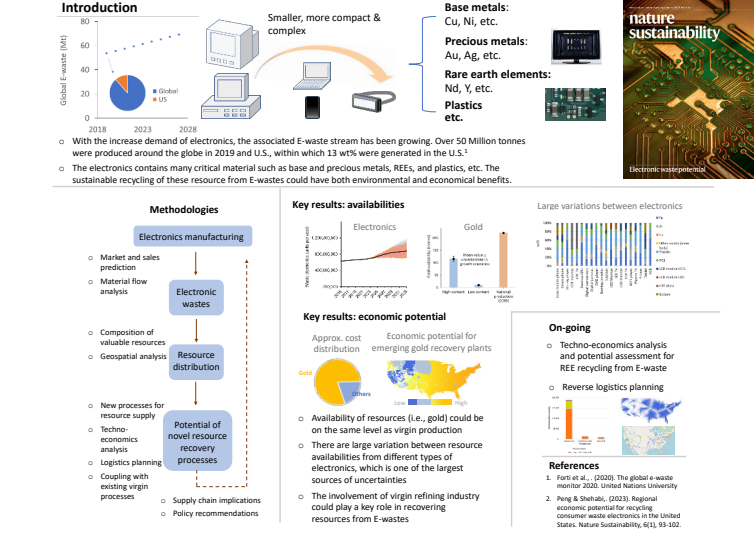
Plastics and the Circular Economy



Comparing closed-loop recycling options



Recovering Critical Materials from Electronics



Green Technologies and Critical Materials

