



Executive Summary: Equity-centered Strategies for Circularity: Focus on Organic Materials, June 14, 2021

Key Questions

- How do we make environmentally beneficial, healthy materials recovery systems economically viable and convenient for stakeholders?
 - Through deep collaboration across the entire value chain from design of materials, products, and end of life infrastructure
- What are scalable approaches to materials and product design that: deliver on performance, are economically feasible, consider full life cycle impact, and do not place inequitable burden on underserved communities?
 - These systems and approaches can only be achieved through concurrent consideration of multiple materials, products, and end-of-life fates.

Framing by Plata illustrated how far we are from circularity in organic materials flows, commented on the fate of leaked material, explained that mechanical recycling was the predominant current recycling route, and demonstrated how recovery decisions involve tradeoffs among uncertain greenhouse gas emissions and, often more uncertain, other metrics of environmental performance. Plata shared a vision of how multi-functional plants and routes might provide economic and environmental opportunities.

Company presentations from Inditex, PepsiCo, Dow, and Cargill focused on challenges associated with recovery both pre- and post-consumer waste (i.e. separating materials to the purest stream necessary for desired end use) and the need for scalable technology innovations to support meaningful change. The group articulated that recovery technologies were a continuum along dimensions of complexity and temporal relevance where the end goal is to create a product with neutral or negative carbon emissions (while ensuring end-market economic viability) and the challenge of consumer participation. At the forefront of these companies' minds is the need for more sustainable material solutions for the packaging and textile markets where potential is seen in leveraging access to renewable carbon and bio-based approaches (linking with the workshop on nature-based solutions). For novel materials, however, the discussion emphasized challenges scaling new materials at the volumes required beyond niche applications. For bio-based solutions, one must consider not only the size of the current flow, but also bio-degradability, feedstock availability, current infrastructure, and whether there is net benefit in environmental performance.

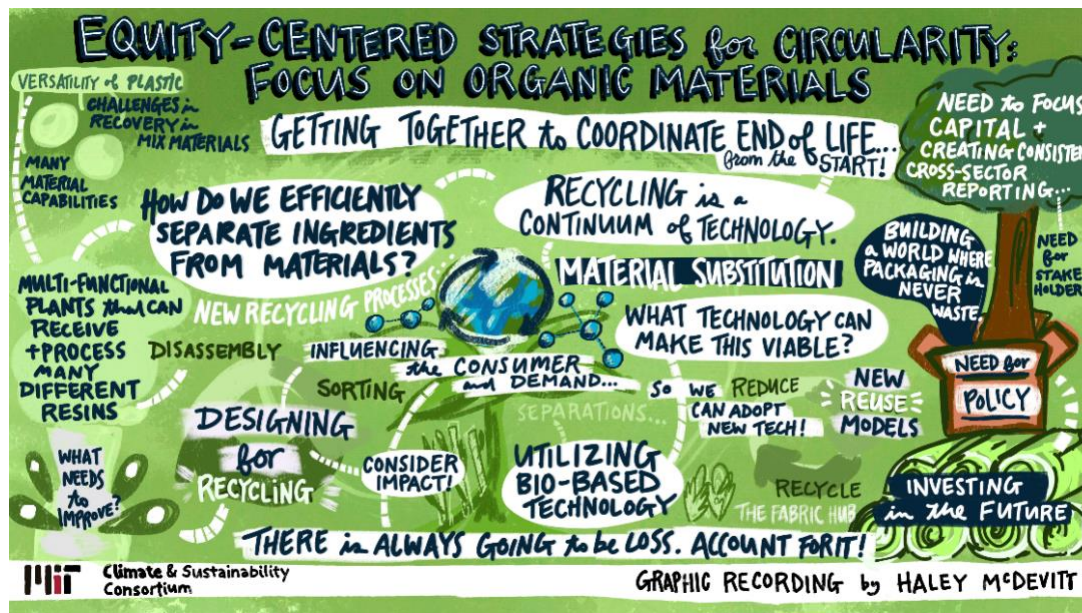
An MIT Faculty round table moderated by [Johnson](#), included [Olsen](#), [Rutledge](#), [Boriskina](#), [Rao](#), [Yang](#) and [Yoeli](#). Johnson's relevant research develops molecular additives that can drop into existing production, but at minimal cost to allow those materials to become recyclable. Olsen described his research in material substitution with bio-based alternatives and new recycling processes based on the fundamental science necessary for materials design. Rutledge showcased work in nano-fiber degradable technology development with links to soft flexible devices. Boriskina's work innovates around sustainable and easy-care mono-material fabrics for passive thermoregulation, with a focus on market-ready materials and textile engineering. Rao described the need for investment in new and innovative technologies focusing on long-term and consistent reporting standards across sectors that cover



transparency and accountability. Yang stressed that consideration must be given to the end consumer as well as consumer behavior when thinking about product design, but emphasized the importance of designing for a culture shift in this area. Yoeli spoke about taking a behavioral science approach to get consumers to participate in the end of life process.

Across the workshop discussion, themes included shaping policy in a way that moves the needle given geographic diversity in regulation and infrastructure as well as material and product diversity; the importance of accountability for both companies and consumers; and data needs, considering the role of information-sharing in promoting circularity and improving value-chains challenges. Proposed follow up activities include:

- Align, optimize, and transform equitable recovery infrastructure for textiles and packaging;
- Maximize synergy across performance metrics for market-ready, life cycle-based materials development and product design;
- Bottles to Fabric 2.0: Unlocking circularity across the entire value chain;
- Architect inclusive, effective policy and behavior to design for and realize materials recovery



Themes drawn by Haley McDevitt, artist and graphic facilitator, highlighted coordination, making use of bio-based technology, working with consumers, building a world where packaging is never to become waste, and the need to focus on cross-sector reporting for stakeholders.

[Image Linked Here.](#)