

Breakout Session Report Out

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



2a: End of Life and Unintended Consequences

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New term for end of life?

- Post-consumer fate
- End of intended life
- Post application use
- Post intended use
- Post functional use
- **Post application fate**

Each chapter of a product will have different issues and some products have multiple functions in a circular or circular-like economy

Problems

- Biodegradability for products that do leak to the environment
- Education
- Control conditions for biodegradability
- Depends on application space. Some products need long lives while others don't
- Microplastics, need to understand the fate and impact
- Overall lifecycle carbon footprint including transportation
- Where and how recycling infrastructure employed (social justice)
- Multi-fate compatibility (recycling, incineration, environmental leakage)
- Needs to match/exceed performance of current plastics
- Where do the simple vs complex plastics go and the design of those pathways

Solutions

- Minimize plastics through reuse/repair
- Permanent CO2 sequestration
 - Intentionally long lived plastics (responsible landfilling)
 - Incineration with CCS
- Metrics for biodegradability – how long and under what conditions?
- Multiple degradation triggers for recycling, environment, ocean
- Introduce barcodes and labels
- One pot recycling - Tunable plastics and tunable recycling
- Design composites have the same end of life
- Maybe food packaging should be biodegradable or edible
- What is the potential to have a shorter shelf life? (improve logistics?)
- New materials need to be either better or less expensive
- How to design incentives and assign liability/responsibility

Unintended Consequences

- Microplastics and their degradation products
- Changing the ecosystem or biodiversity due to the degradation of biodegradable plastics or leakage of enzymes/microbes from recycling
- Hygiene and food safety
- How do we not stifle all of the new and exciting technologies with premature regulation/policy
- How do we control the diversity of the resource/recycling streams
- Loss of functionality
- Increases GHGs
- Education and misleading marketing of the information
- Complacency and consumer attitude - REBOUND EFFECT
- Potential job impacts as markets change
- Could we design for composting and have a positive impact on the environment