Data and Harmonization to Improve the Circularity of Plastics

Strengthening Harmonization through Common Understanding

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The Field is Full – How to move forward without confusion?

Sample of thought leaders and standards development organizations

ASTM Strategies for creating broad stakeholder engagement

Broad Policy on International Standards

- Encourage use of international standards with choice and flexibility
- Foster technical quality, competitiveness, and innovation

Support Participation in Standards Development

- Engage an array of stakeholders, globally
- Cooperative discussions to maximize ideas and leadership
- Leverage existing networks and partnerships

Proactive SDO Engagement

- ASTM – CEN Cooperative Program in Plastics
- ASTM – ISO Agreement for Additive Manufacturing
- UN Environmental Assembly - Plastic Pollution Working Group
- Asia Pacific Economic Cooperation – Working Group on microplastics

THE ASK:

Understand how the plastics industry fits into a world committed to sustainability

Using trend information, identify opportunities for D20 to develop relevant and timely new standards

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PLAN OF ACTION:

01

Secondary Research

- Review **at least 30** reports and industry publications which call for “standards” or “certifications”

(March – July)

02

Qualitative Interviews

- Select 8-10 interviewees from report authors and reach out to understand the specifics of the ask (qualitative interviews)

(April – September)

03

Survey to understand industry needs

- Survey sent to ASTM participants and public (through LinkedIn) to understand industry needs

(May-August)

- Collaborate with ASTM E60 (sustainability) to understand outcomes of recent spring workshop on circular economy broadly

04

Report Findings

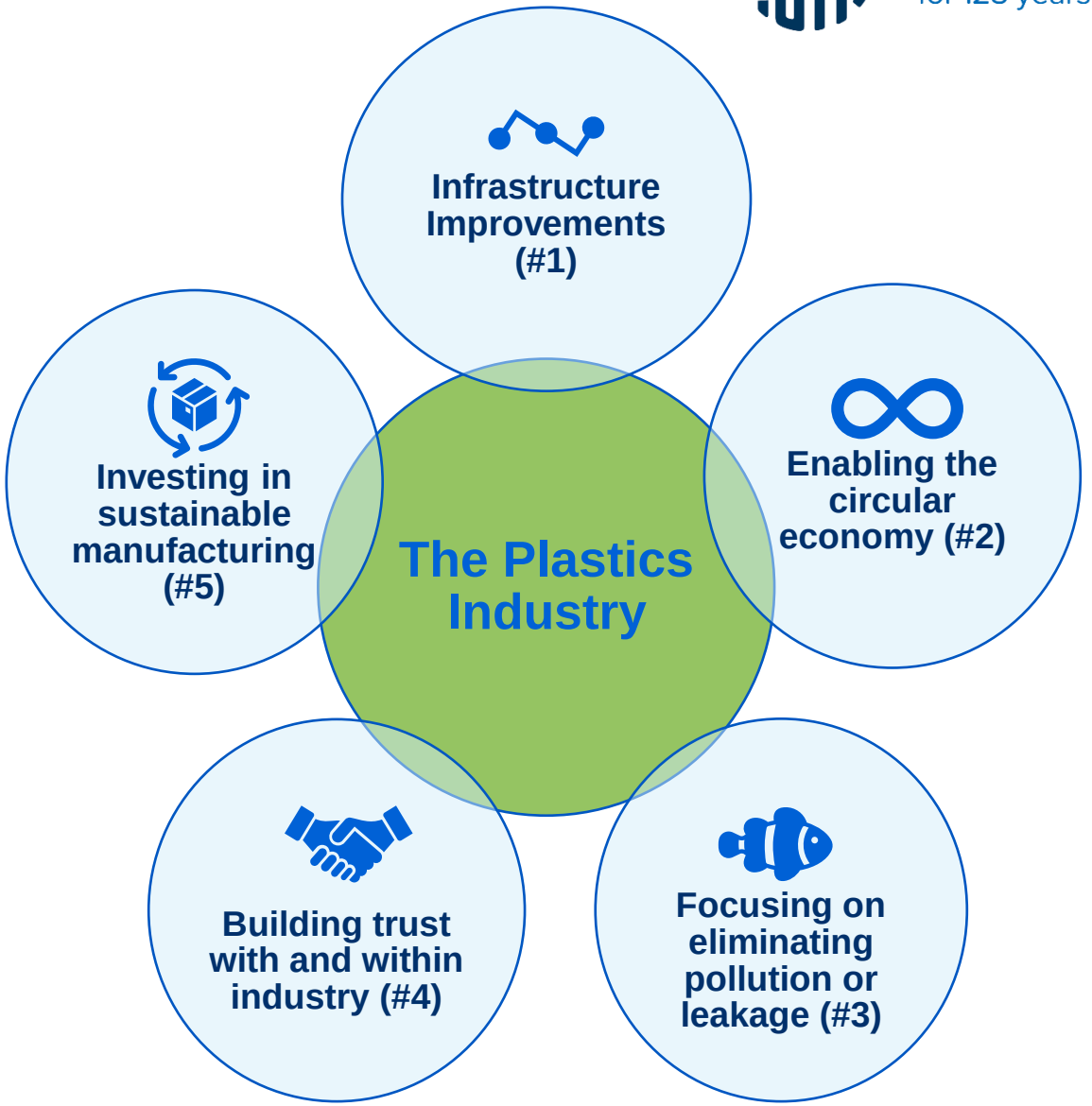
- Trends and gaps with recommendations to ASTM D20

(October)

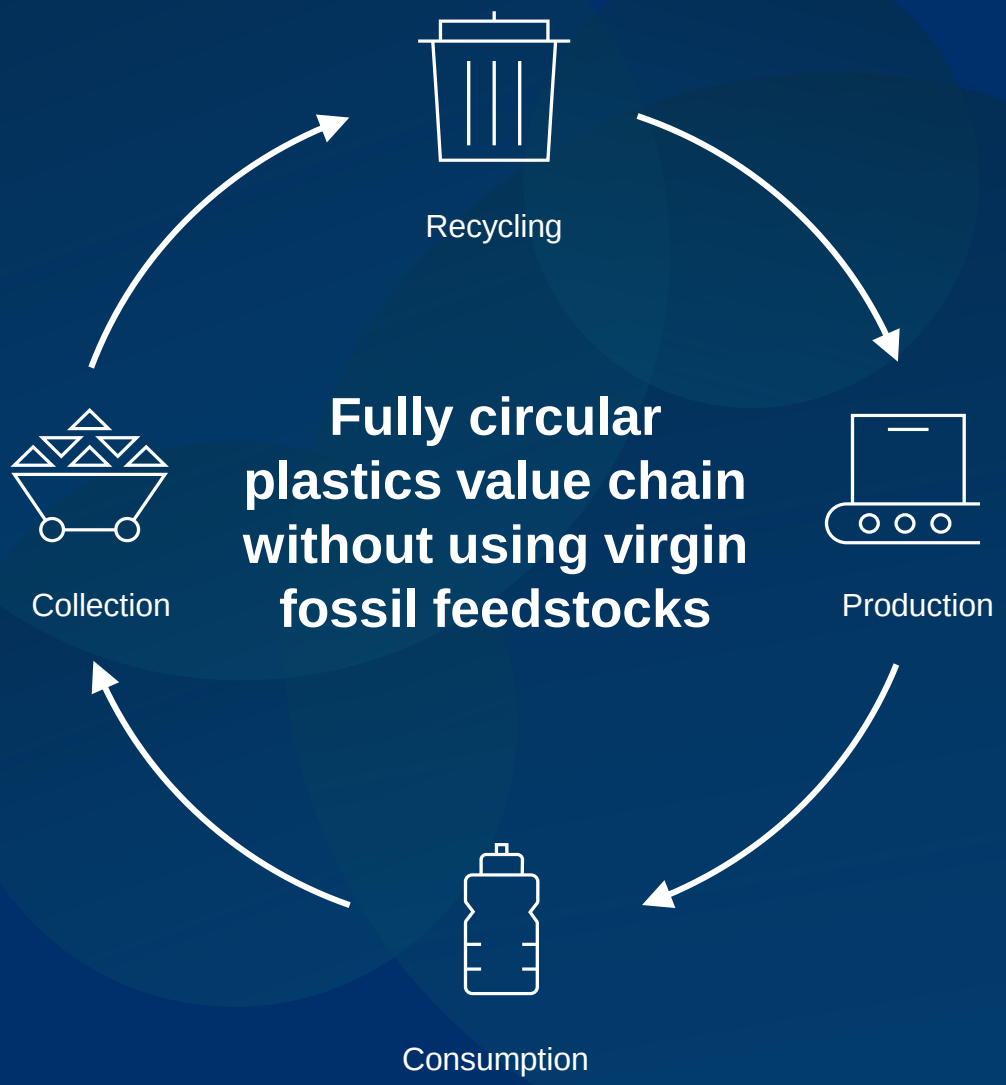
D20: Plastics Committee Survey Results

N=176
Survey Open from July 14, 2022-August 22, 2022

What is the vision for the future of the plastics industry?



A vision for a future with full circularity of plastics



To turn this vision into reality, the industry should follow six key principles:

Reduce, reuse, recycle

The solution should adhere to and encourage the reduction, reusability, and recycling of plastics packaging.

Material circularity

Materials should be recovered using high yield, material-to-material recycling.

Environmental and social impact

Lower CO_2 and other emissions impact compared to virgin production; technologies meet or exceed regulatory requirements to improve quality of life for employees and communities.

Complementary types of recycling

Enabling an integrated waste ecosystem with complementary roles of mechanical and molecular recycling

Economic viability

Recycling options should be economically efficient to enable the long-term success of the circular economy.

Transparency

Claims about the different recycling technologies are clear, transparent, and accountable with third-party certifications.

Are there specific standards ASTM should work on?

Expand the recyclability code concept currently found on virgin materials and apply it to post-consumer resins (in concept) that have met certain performance and consistency values.
Performance and consistency-based certification, especially for high-value applications requiring listings such as UL, FM, ISO, etc.
Process maps and solutions on how to take recyclables full circle. Current standards to future standards
Need clarity on Post Industrial Recycle vs regrind. Need standards for purity of recycled durable plastics
Harmonization between recycling and resin codes/symbols. Traceability of recycled content material inputs.
Standardized labeling (like nutrition labels) would be game changing - we need labels to be clear and honestly tell consumers what is recyclable and HOW recyclable it is. Plastics that are easier to recycle should be prioritized and manufacturers should be incentivized to use those materials.
standards for characterizing and classifying recycled natural fiber composites (or composites using new fillers) is paramount. Evaluating their durability and longevity will help improve such properties of natural fiber composites which are prone to early degradation.
Verification of recycled content of polymers. Degradation and compostability methods. Varied approaches to analysis of microplastics.
Recovered plastics quality (or contamination). Labeling. Methods for optical or automated sorting of recovered plastics.
It would be great to modify some of D20 test methods for synthetic textiles. This could be done in collaboration with experts at D13
There could be value in creating standards around waste-to-energy, chemical recycling (pyrolysis, gasification, hydrolysis, etc.) and monomer purity from chemical recycling, and standards for plastic "cleanliness" required to use it for a particular process.
There should be a standard along the lines of NIR technology or some kind of consideration to product design when at its end of life is expected to be appropriately sorted- establishing a comprehensive and effective way to accurately sort waste would be helpful alongside guidance and standardization for infrastructures claiming they follow this comprehensive sorting technology; not just for recycling but also for composting. Many composting infrastructures are not most up to date in their methods and technologies- guidance on how to improve this would be useful. Additionally consideration to LCA but with improvements on materials that are compostable.

YES!

Covering all biodegradable standards, clarifying the recycling resin codes, assisting with definitions for microplastics, test methods for microplastics, working with the recycling infrastructure to develop new methods to ensure recycling streams are accepted, standards for design for packaging to align with recycling
I think it would help convince manufacturers to use more recycled feedstock if standards could demonstrate properties of recycled material are equal to properties of virgin materials.
Third-party assessments and certifications of industry processes must be standardized ASAP. This includes mass-balance schemes, recycling feedstock tracking, LCA, etc.
Defining what is circular and what is not. All too often the examples given of circularity, especially from the plastic industry, are not circular at all, but just add a loop or two to a line, while still producing toxic waste and GHG emissions. Having a standard to not allow those types of not-truly-circular economies to exist would be ASTM's major contribution to supporting sustainability and transitions to a circular economy.
1. Develop a recyclability standard for commodity polymers that mirrors and improves upon the APR scheme., 2. Improve testing standards and methods for home and water compostable plastics and fiber items. Ensure that these are science based and independent of agenda-based NGOs.
Regrind needs to go where it is best used. You don't want post consumer scrap in potable water pipe or blood bags
Development of a metric, or a number of metrics; a calculation for the effective reduction of specific Key Performance Indicators - relative to successful recycling or the effectiveness for targeted pollution reduction. - A testing process to compare the quality of recycled plastic, as a raw material; compared to the quality of a virgin plastic. The test(s) would be material specific; for each plastic type or for each family of plastic species. - Testing methods to be developed for determination of foreign components in a recycled plastic processed into a raw material. - Standards for the inclusion/allowance of chopped strand glass in a recycled Polypropylene. - Cutting edge awareness of new plastic recycling technologies, and the development of standards to measure their performance.
Standard contamination levels, particle size and shape of flake
Sustainable management, strategy and assessments for waste infrastructures.
Labelling standards for materials perhaps in conjunction with end of life management through collection and sorting.
Standards for post-consumer, end of life plastics materials and their reuse.

Common Themes: Priority Actions

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Better Infrastructure: Composting

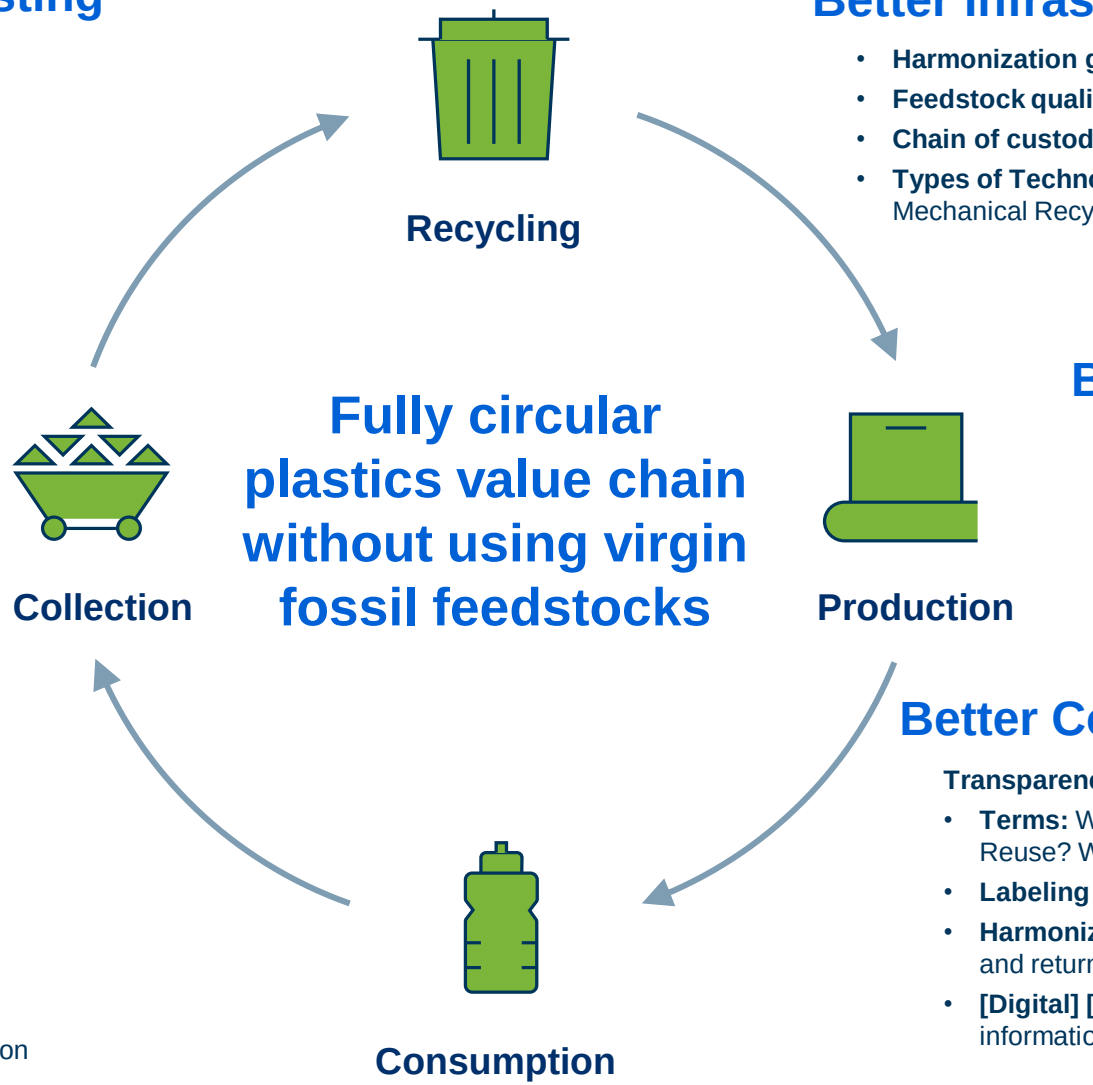
- **Terms:** Differences between biodegradable and compostable and biobased
- **Biobased plastic,** definitions and test methods
- **Compost collection and sorting**
- **More Industrial / home composting**
- **More education**

Better Infrastructure: Collection and Recovery

- **Decommissioning, deconstructing, decoupling, demanufacturing**
- Routing specific plastics to **reuse** versus **recycle** versus **repurposing** versus **remanufacturing**, **cascading etc.**
- Guidance on **slowing and closing loops**

Better Pollution Prevention & Mitigation

- **Logistics to close loops**
- **Microplastics**
  - Industrial standards & test methods
  - Test methods for research (NIST)
- **Plastic Credits and Banks** – Incentivizes collection



Better Infrastructure: Recycling

- **Harmonization guide** to ensure consistency of collection
- **Feedstock qualification**
- **Chain of custody** and **mass balance calculations**
- **Types of Technology:** Chemical Recycling, Physical recycling, Mechanical Recycling, Biological Recycling

Better Design

- **Adopt green / sustainable chemistry principles**
- Improvements to **packaging requirements**
- Phase out specific **chemicals of concern**
- **Short-term v. long-term durable plastics**

Better Communication

Transparency and messaging

- **Terms:** What is circular economy? Circular Polymers? Recycle? Reuse? What is a resin ID?
- **Labeling guidance** on how to recycle, reuse, compost
- **Harmonize definitions** of reusable packaging, including refillable and returnable packaging
- **[Digital] [Circular] data passport**, standardization of the information to be collected for plastic in a circular economy

Prioritized Action Steps (for ASTM)

NOW

ASTM D20
recently finished or is actively working on:

- **Compostability and biodegradability** test methods and reports [D20.96 manages ASTM D6400 with several others in market and more on way]
- **Microplastics** specifications and test methods [some already in development through D20.96, with nanoplastics on way]
- **NEW! Terms and definitions for Circular Polymers** [in development through D20.95, work item to be announced in Q1 2023]
- **NEW! ISO 15270: Guide for the Recyclability of Plastics -** Standards for Mechanical Recycling, Chemical Recycling, Biological Recycling, Physical Recycling [ISO 15270-4 in development through ANSI / ASTM D20.61 mirror committee]

NEXT

ASTM D20
prioritized projects in Q3 2023 and beyond:

- **Quality assurance** of materials from mechanical, chemical or physically recycled plastics
- Standards related to **acceptable levels of contamination** for recycled or compostable material streams
- Specifications for recycled content including **resin ID modernization**
- Standard guide for **reusing, sorting, recycling** to improve the material recovery infrastructure
- Standards guide or spec for characteristics: measurements for recyclability of materials and products **(bendability, puncturable)**

ACTIVE PARTNERS

ASTM E60
recently finished or is actively working on with ASTM D20:

- **Alternate Approaches for Modeling Input and Output Flows of Secondary Materials and Related Recycling Scenarios in LCA** including specific info for plastics [ASTM E3199-22A published in Q4 2022]
- **Circular Economy Standard** [Work item 83603 announced in Q4 2022]
- **Green chemistry principles guidance document** [Work is set for 2023]

ASTM D20
Other Collaborations

- **With E50** -- Regarding environmental risk
- **With D34** on waste management and compostables
- **With ISO TC 61 (Plastics) and CEN TC 249 (Plastics)** – On recyclability of plastics (ISO 15270 etc) and as observer to CEN TC 249, as they tackle the standardization request from EU for recyclability standards

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Rethinking our standards system:

Standards will need to focus on activating vision for a circular economy

The work is ongoing: Join Us!

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