

The Roadmap To Reuse

Plastics Solutions
for America 2020

from single
use to re useSM



AN INITIATIVE BY PLASTIC MAKERS
FOR A WASTE-FREE AMERICA

American[®]
Chemistry
Council

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Message from the President & CEO

Today is an exciting time to be engaged in the plastics and packaging materials industries, even if it may seem counterintuitive. Are there challenges inherent in the work we do? Certainly. Do people have legitimate questions about how plastics contribute to the problem of waste in society? Absolutely. But part of what gets our members out of bed in the morning is facing those challenges head-on, proud and confident in the knowledge that we are involved in the manufacturing of materials that can help us do more with less, that contribute to a more efficient use of resources and that ultimately can help address climate change and lead the way to a better planet and a safer world.

There will be almost 10 billion people on earth to feed, clothe and house safely and sustainably by 2050—a 28% increase over 2020. That means a rapidly expanding need for the health, safety and environmental benefits that plastics efficiently provide. Along with growing demand for the products we produce, we also see growing expectations of sustainability across society, demanding product benefits, affordability and greater confidence in the management of plastic waste.

We are committed to meeting these expectations and are calling on manufacturers and businesses along the value chain to join us by adopting the Roadmap to Reuse that America's Plastics Makers have developed.

It's true that over time our challenges have grown more complex as we seek to sustain the health and well-being of humans and the environment. But making smart choices about what we design, produce and reuse is important. Plastics must be produced, used and reused in ways that not only deliver product performance, but also support people's health and the environment.

We must also put the power of chemistry and our industry's best minds to work—along with experts from the fields of energy, water, nutrition, health care, building and construction, transportation, recycling and waste management, environmental protection and sustainable development—to develop new and innovative contributions to a sustainable future.

Plastics makers are working toward a vision of circularity that is shared by policy makers, brand owners, retailers and citizens. Consumers want to keep plastics out of landfills and the environment, but they don't feel they know how to do that or have good options. Achieving a circular economy for plastics will require sustained commitment, ongoing public-private partnerships and investments in new technology, product design and infrastructure.

Members of the American Chemistry Council's Plastics Division recognize the need for solutions. The status quo is simply unacceptable. In 2018, we announced an ambitious set of goals to reduce, reuse and recover all plastics packaging in the United States. Many brand owners and NGOs have also announced goals. After consultation, analysis and development we are proud to present a plan that encompasses the whole system.

The American Chemistry Council and its members have worked for many years to solve some of the biggest challenges facing our nation and our world. We are committed to fostering progress in our economy, environment and society by convening those in our industry and society dedicated to the same principles of sustainable development through science, and catalyzing action that achieves our mission.

This plan provides a framework and identifies actions to deliver the solutions America needs. We hope you will join us on the journey that this Roadmap to Reuse represents, a journey that, while not easy, and certain to include refinements and challenges, will enable us to work together in common purpose on shared goals that will enrich us all and the planet we share.



Chris Jahn
President & CEO | American Chemistry Council

A Vision for the Future

In May of 2018, the American Chemistry Council's (ACC) Plastics Division announced three new circular economy goals to guide and accelerate the capture, recycling and recovery of plastics packaging.

- 1 By the end of 2020, 100% of the U.S. manufacturing sites operated by ACC's Plastics Division members will participate in Operation Clean Sweep blue, a formal, measurable raw plastics containment program, with all of their manufacturing sites across North America participating by 2022.
- 2 By 2030, 100% of plastics packaging used in the United States will be recyclable or recoverable.
- 3 By 2040, 100% of plastics packaging will be reused, recycled or recovered.

These are ambitious, aspirational goals. They build on a long history of the plastics industry working to improve recycling and recovery in the U.S., a journey we have already begun. For example, Plastics Division members have already started working toward the first goal by committing to achieve Operation Clean Sweep blue (OCS blue) status in their relevant U.S. operations by the end of 2020 and all of their North American operations by 2022. OCS is a system for containing plastic pellets at all stages of production, shipping and handling to minimize accidental releases in the environment.

Achieving all of our goals will require a whole-of-society approach—involving industry, value chain stakeholders, governments, NGOs, research and development and the public. And they will require new ways of looking at materials and systems for capturing and reusing plastics. But we believe they're achievable.

Let us not underestimate the problem, however, because the plastic waste issue is real.

While plastics make a positive net contribution to sustainability, including reducing our carbon footprint, we recognize more must be done to increase recycling, recovery and reuse of plastics and other packaging materials under a circular economy framework. There is widespread discomfort with plastic waste and concerns about the future. People are hungry for answers and practical solutions, and rightly expect plastics makers to be leaders in developing and implementing solutions.



Two principle issues concern consumers about plastic waste today: plastics ending up in the environment, particularly the ocean, lakes and rivers; and plastics going to landfills after a single cycle of use. We agree plastic waste does not belong in our environment, and plastic resources used only once are being wasted.

Plastic use has grown over several decades because it delivers performance benefits and value to consumers and society beyond other materials. Innovation with plastics continues to deliver new, safe, practical and healthy products, parts and packaging for Americans.

Plastics packaging helps keep the products we rely on fresher, cleaner and in some cases, sterile. Often, plastics can provide these benefits using significantly fewer resources and with lower environmental impacts than alternatives. In fact, a study by Trucost found that “the environmental cost of plastic in consumer goods is 3.8 times less than the alternative materials that would be needed to replace plastic.” To further illustrate that point, a study by Imperial College found that if all plastic bottles used globally were made from glass, the additional greenhouse gas emissions would be equivalent to 22 large coal-fired power plants.

Plastics clearly play a role in reducing our carbon footprint and addressing climate change, not to mention the impact on greenhouse gas emissions is even greater with recycling. For example, research from the Association of Plastic Recyclers (APR) shows that using recycled plastic reduces energy consumption by at least 79% and reduces greenhouse gas emissions by at least 67% compared to using raw materials. Ultimately, ongoing innovations in plastics packaging—and how we manage packaging after use—are essential to improving living standards across the globe while enabling populations to live more sustainably.

The fundamental question, therefore, is: how do we deliver the essential day-to-day benefits and value of plastics to consumers and society while addressing the problem of plastics and other packaging materials including glass, paper and metal that escape into the environment or are discarded in landfills? How do we change a complex system that touches so many people, industries and institutions so that it delivers the benefits we need but eliminates the environmental trade-offs we can't accept?

While there is no one solution to the waste problem, which will require contributions from all of us, plastics makers are taking a leadership role in building the Roadmap to Reuse that America needs. We know what the goals are. We understand that this is a complex system involving many stakeholders that enables the enormous benefits of plastics, but also the current waste problem. This document provides an update on the Guiding Principles, strategies and the individual and collective actions that will deliver solutions.



A Circular Economy for Plastics

Plastics provide many environmental benefits. Because plastics are often lighter than other materials, they allow us to use fewer resources to fulfill many of the same functions, which often helps to reduce energy use, our carbon footprint and even the amount of waste we generate. But all of us need to do a better job of collecting, reusing or repurposing plastics after we use them. And plastics makers are working to help drive that change.

Like other materials, the production and consumption of plastics have largely followed the linear model “make, use, dispose.” The result: not enough valuable plastics are being recovered or repurposed.

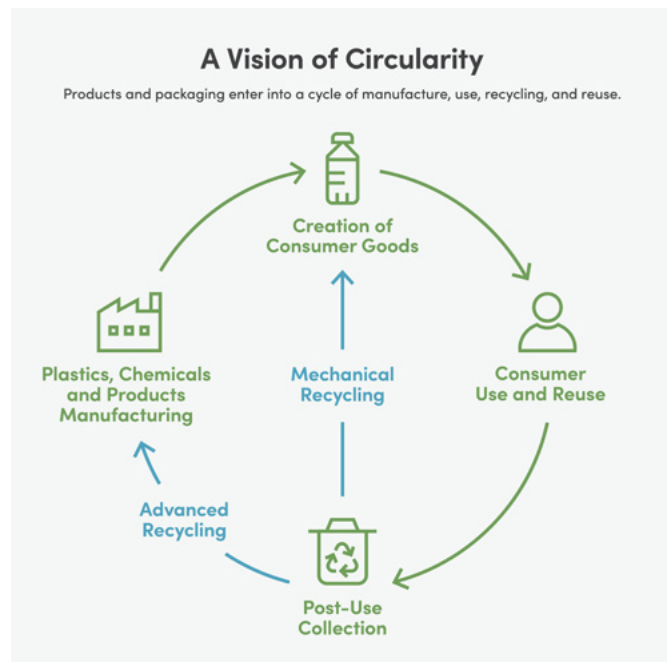
This old model is being replaced with a more sustainable, circular model in which plastics are designed, managed, recovered and repurposed rather than disposed of—a model that not only helps keep plastics out of the environment but also harnesses their inherent value to create new products.

The drive toward an increasingly circular economy for plastics packaging will help conserve natural resources such as energy, water and food; support resource efficiency and optimization; and reduce waste and emissions into the environment. Achieving a more circular economy for plastics will enable society to continue to harness plastics’ essential benefits while optimizing how we use resources, as well as help protect and restore the environment for future generations.







This circular model will reinforce to consumers, brand owners and policy makers that the benefits of

plastics to society can be secured while still mitigating plastic waste.

America’s Plastics Makers are working in cooperation with retailers, brand owners, government, non-profits and other stakeholders to grow plastics recycling and move toward a more circular vision of how we design, manufacture, recycle, recover and reuse plastics. While we can’t do it alone, we have designed a systemic Roadmap for building a future circular economy for plastics. It provides direction, strategy and action to move us forward. It will now take a collective effort—by the full plastics value chain, stakeholders, government, NGOs, researchers, educators and the public—to make the future circular economy for plastics a reality.



The Roadmap to Reuse







Focus Areas		Phase I: Jump-start impact (2020-2023)	Phase II: Most elements in place (2024-2027)	Phase III: Full system complete (2028-2040)
Supply	 Value chain engagement	Roadmap	Create and implement national recycling framework	
		Material innovation and product redesign		
	 Consumer engagement	Standardize labeling and expand recycling education		
		Develop and implement incentives and penalties		
	 Access to recycling	Expand access for multi-family	Expand access for suburban/exurban Expand access for away from home	Expand access for rural residential single-family
	 Collection and sortation capability	Activate programs for films, foams, flexible and small items	Scale-up alternative collection programs and accelerate investment in sortation facilities	
Demand	 Recycling capabilities	Demonstrate advanced recycling	Scale-up advanced recycling	Fully commercialize advanced recycling
		Expand and improve mechanical recycling		
	 Economics/end markets	Economic support to stabilize recycling of non-bottle plastics	Economic support for return to profitability	
		Grow and expand end markets		

FOCUS AREAS, STRATEGIES AND ACTIONS

The Roadmap to Reuse has six strategic areas of focus to support achieving circularity goals. Within each focus area, we have outlined a set of actions we believe are required (by our members, other members of the plastics and packaging value chain, other stakeholders and society) to reach these goals.

In developing and implementing the Roadmap, ACC and its members will be guided by the following set of policy directions:

- Support development of policies that encourage recycling for all packaging materials.
- Advance innovative, market-based solutions and catalyze private capital to prevent and reduce plastic waste and marine debris.
- Ensure decisions about mandatory material uses or bans are informed by scientific and life-cycle analysis for all applicable materials.

Focus Areas	Resin producers	Manufacturers/ Brands/Retailers	Haulers/ MRFs	Reclaimers	Industry groups	Governments
 Value chain engagement	<ul style="list-style-type: none"> Continue producing resins that support recyclability Drive innovation in materials and design 	<ul style="list-style-type: none"> Design packaging for recyclability 	<ul style="list-style-type: none"> Identify needs to improve collection and sortation 	<ul style="list-style-type: none"> Identify needs to improve quality and expand markets 	<ul style="list-style-type: none"> Catalyze support and drive dialogue Maintain roadmap and guide actions 	<ul style="list-style-type: none"> Enable national recycling framework Track and measure progress
 Consumer engagement	<ul style="list-style-type: none"> Support policy and programs to drive education/behavior Provide funding to non-profits to expand education 	<ul style="list-style-type: none"> Use labeling programs Multi-material packaging fees to fund education, behavior, access 	<ul style="list-style-type: none"> Expand education and outreach to communities Support coalition policy to drive access 	<ul style="list-style-type: none"> Continue to develop design guidance on recyclability 	<ul style="list-style-type: none"> Expand education and labeling Create model incentive systems 	<ul style="list-style-type: none"> Support pay-as-you throw incentives Expand education and incentive programs Support labeling
 Access to recycling	<ul style="list-style-type: none"> Support policy and programs to expand access 	<ul style="list-style-type: none"> Multi-material packaging fees to fund education, behavior, access 	<ul style="list-style-type: none"> Expand residential recycling access Support coalition policy to drive access 		<ul style="list-style-type: none"> Engage partners and geographies Coordinate support 	<ul style="list-style-type: none"> Expand residential recycling access Expand public space recycling Support away-from-home recycling
 Collection and sortation capability	<ul style="list-style-type: none"> Partner with value chain to invest in technologies to improve collection and sortation of harder to recycle items 	<ul style="list-style-type: none"> Partner with value chain to invest in technologies to improve collection and sortation of harder to recycle items 	<ul style="list-style-type: none"> Invest in additional sortation capacity Partner with value chain to invest in technologies to improve collection and sortation of harder to recycle items 	<ul style="list-style-type: none"> Develop bale specifications for mechanical and advanced recycling markets 	<ul style="list-style-type: none"> Identify and share new data, research and best practices to improve collection and sortation 	<ul style="list-style-type: none"> Support research and development of new technology
 Recycling capabilities	<ul style="list-style-type: none"> Commercialize advanced recycling Expand mechanical recycling 	<ul style="list-style-type: none"> Use recycled content plastics in packaging 	<ul style="list-style-type: none"> Expand specification bales of plastics for advanced recycling 	<ul style="list-style-type: none"> Commercialize advanced recycling Expand mechanical recycling 	<ul style="list-style-type: none"> Identify and share new data, research and best practices to improve recycling technologies 	<ul style="list-style-type: none"> Develop policy to incentivize investment in mechanical and advanced recycling
 Economics / end markets	<ul style="list-style-type: none"> Expand markets for recycled resins Partner with value chain on residual/rigids sortation and markets 	<ul style="list-style-type: none"> Design packaging using recycled materials Partner with resin manufacturers on residual/rigids sortation and markets 	<ul style="list-style-type: none"> Partner with resin manufacturers, brands on residual/rigids sortation and markets 	<ul style="list-style-type: none"> Expand markets for recycled resins Supply on-spec bales for customers 	<ul style="list-style-type: none"> Coordinate enhanced recycling facilities Expand new markets 	<ul style="list-style-type: none"> In collaboration with industry, develop recycled content standards



FOCUS AREA #1: VALUE CHAIN ENGAGEMENT

Strategy:

Build support and catalyze industry/stakeholder engagement to achieve scaled impact on plastics packaging recycling and recovery.

ACTION 1: ROADMAP AND SUPPORT

The ACC's Plastics Division members represent one segment of the plastics industry—plastic resin producers. Successfully achieving our goals will require mutual support and commitment from our partners across the full value chain. Industry groups must catalyze support, drive dialogue and guide actions of those they represent—resin producers must develop materials that support recyclability; converters, consumer packaged goods (CPG) companies and retailers must design packaging for efficiency and recyclability; and haulers, Material Recovery Facilities (MRFs) and reclaimers must communicate how the others can help them support the goals of the Roadmap.

Governments can provide research, development and policies that incentivize the circular economy. Actions to activate support for the Roadmap include:

- Building alignment on the Roadmap across the full value chain as well as among key stakeholders.
- Building alignment on approach and fundraising strategies for collective investment (e.g., education, access, sorting economics).
- Coordinating investment across education, access and economics, including selecting partnership vehicles and managing performance.

ACTION 2: CREATE AND IMPLEMENT A NATIONAL RECYCLING FRAMEWORK

A National Recycling Framework will be critical to success in achieving circularity goals. Ultimately, governments must enable a framework. But there are actions all of us in the value chain can take to stimulate and support the realization of a National Recycling Framework. The actions described here focus on the engagement of the value chain in the creation of integrated systems, definitions and standards that support a National Framework. Additional actions are listed below in Focus Area #3.

Together with our value chain partners and others, we will:

- Support integrated waste management systems, standardization and specifications across the country.
- Support increased investment in modernized collection, sorting and processing systems so the market can accept the full range of packaging formats.

ACTION 3: MATERIAL INNOVATION AND PRODUCT REDESIGN

Design innovation will play an integral part in reducing the amount of material used in the products we all rely on. It will also support expansions for plastics reuse and reusable packaging, which will in turn increase the recyclability and reusability of products and the volume of recycled content. ACC Plastics Division members can play a role in promoting product design innovation and adjustments across the value chain by:

- Working with existing resin producing members and advanced recycling companies to develop feedstock specifications for advanced recycling and identify an organization to develop guidelines and build a supporting coalition.
- Supporting material innovations in the development of industry-driven design guidelines, building alignment across the value chain and scheduling phase-in.
- Working directly with our customers on packaging design that meets sustainability.



FOCUS AREA #2: CONSUMER ENGAGEMENT

Strategy:

Increase consumer engagement and participation in recycling, both at home and away from home.

The actions consumers take or don't take are outside the control of any one industry. However, it is important to acknowledge that, without the increase in supply of recycled materials that would result from increased consumer participation, the supply chain breaks down. Therefore it is important that producers, converters, retailers, industry groups and government take a coordinated approach to consumer outreach, including education, labeling and incentivization.

ACTION 1: EXPAND EDUCATION AND STANDARDIZE LABELING

- Support the development of financing mechanisms via multi-material packaging fees and fees on disposal to fund education and consumer engagement-based initiatives.
- Improve the effectiveness of residential and community recycling programs through public education and outreach.
- Support increased standardization around recycling programs and expand access to residential recycling across the United States.
- Partner with organizations to implement national labeling standards for consumers.

ACTION 2: DEVELOP AND IMPLEMENT INCENTIVES AND PENALTIES

- Remove outdated regulatory roadblocks and establish deployment incentives to accelerate adoption of advanced recycling.
- Establish and fund grants, loans and other mechanisms to award financial assistance to state, local and tribal governments for recycling infrastructure.
- Advocate for transition to pay-as-you-throw disposal fees (PAYT) and landfill fees to incentivize recycling and support.
- Support development of recycling education, collection and sortation infrastructure via multi-material fees on packaging.



FOCUS AREA #3: ACCESS TO RECYCLING

Strategy:

Provide convenient recycling access for residential and away from home locations.

ACTIONS

A National Recycling Framework will be critical to the success of our industry and nation achieving our circularity goals. At the core of the framework will be widespread, consumer-friendly access points that make recycling practical and easy.

- Support the development of financing mechanisms via multi-material packaging fees and fees on disposal to expand access

to rural, suburban, exurban, away from home and multi-family recycling.

- Support increased standardization around recycling programs and expand access to residential recycling across the United States.
- Advocate for transition to PAYT fees and support an awareness campaign.



FOCUS AREA #4: COLLECTION AND SORTATION CAPABILITY

Strategy:

Develop and expand the capability to collect and sort difficult material forms in post-consumer recycling (e.g., film, flexible, foam, small items). Giving consumers access to robust recycling resources can be addressed by adequate prioritization and financial support. Ensuring they use them properly, and that residential recycling services can manage the wide variety of materials we need to recycle, takes increased commitment. A critical component in the supply chain will be post-consumer recycling processes.

ACTIONS

- Scale-up existing alternative collection programs such as Materials Recovery for the Future (MRFF) technology and secondary bagging programs (e.g., Hefty® EnergyBag®).
- Improve plastics product design to increase recyclability and reduce the amount of material required in products.
- Work with The Recycling Partnership's Film and Flexibles Task Force to pilot and scale alternative approaches to collection and sortation for films, tubes, small formats and other challenging packaging types.
- Support research and development of innovative ways to repurpose used plastics.
- Explore ways to use repurposed plastics in infrastructure projects such as roads and bridges; in durable applications such as appliances, textiles and eyewear; and in packaging applications such as food and medicine.
- Support the development of plastics value chain financing for collecting and sorting of flexibles, films, foams and plastics packaging formats such as tubes, lids, cups, pouches and small formats.



FOCUS AREA #5: RECYCLING CAPABILITIES

Strategy:

Demonstrate, refine and scale advanced recycling capabilities while modernizing, expanding and improving mechanical recycling.

In order to fully realize our circularity goals, enhancements and access to recycling processes are needed. While mechanical recycling is mature and well understood, there are still areas for process improvements. Significant investments are needed to further develop advanced recycling processes in order to capture the true value of available recyclable materials. Policy will play a critical role in helping to scale these investments. The ACC will take the following actions in collaboration with members, value chain partners and government.

ACTIONS

- Continue to evolve a more circular business model to utilize post-use plastics as a feedstock for the creation of new chemicals, plastics and other products of chemistry.
- Increase awareness of newly announced investments in advanced and mechanical recycling to build on the more than \$5 billion in investments in advanced and mechanical recycling projects announced since August 2017.
- Modernize, increase and expand traditional (mechanical) recycling via partnerships.
- Partner with government, including Department of Energy (DOE) efforts, to support advanced recycling and help ensure recycled content definitions include output from advanced recycling.
- Advocate for policies that ensure the products of advanced recycling are counted as recycling, and that mass balance is used for calculating recycled content.
- Support policies that ensure advanced recycling technologies are not disincentivized in the marketplace, and that there is alignment of plastics feedstocks specifications for advanced recycling.
- Support additional life cycle assessments and other scientifically credible studies on advanced recycling by Argonne National Laboratory, the National Academy of Sciences and other respected institutions.



FOCUS AREA #6: ECONOMICS AND END MARKETS

Strategy:

Resolve the shortcomings of the current recycling market's economic business model and maximize the value of plastics by expanding the current recycling market and growing demand for new product streams.

Even if there is an abundance of recovered material, if the economics of processing the waste stream don't make sense and if the markets for recycled and recovered products don't exist, the circle is broken. It will take a collective effort from all parts of the value chain to expand market opportunities and make the circular economy work. The ACC will support market access for recycled content by:

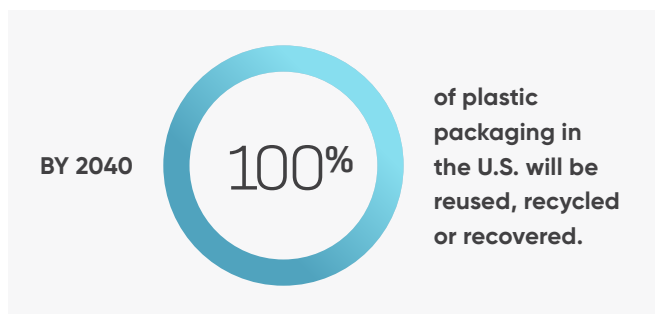
ACTIONS

- Continuing to support industry initiatives, such as The Recycling Partnership's new Polypropylene Recycling Coalition and others, to improve collection and sortation of polypropylene.
- Promoting the use of recycled plastics as feedstock to produce new plastics, chemicals, other products and fuels.
- Supporting improvements in plastics product design to increase recyclability and reduce the amount of material required in products.
- Continuing to work cooperatively with the value chain to identify potential new markets for recycled plastics such as asphalt and construction materials.
- Encouraging development of new material innovations to enable more use of recycled content.
- Supporting science-based and evidence-informed legislation governing recycled content.
- Advocating for federal programs and incentives that spur technology and innovation.

Reporting/Measurement

Measuring the performance of the U.S. recovery and recycling system is essential for ensuring we are making progress toward our circular economy goals. Today there are significant data gaps that make tracking results a challenge. Filling those gaps to produce standardized national reporting will require coordinated action from governments, stakeholders and the full value chain.

100% OF PLASTICS PACKAGING IS REUSED, RECYCLED OR RECOVERED BY 2040



Each year, the Environmental Protection Agency (EPA) releases data on municipal solid waste generation and management in the Advancing Sustainable Materials Management: Fact Sheet. The most recent report shows much more is required to increase residential recycling rates for plastics packaging. For example, HDPE and PET bottles are valuable materials, but the recycling rates for both are roughly 30%. That's a lost economic opportunity.

In 2018, the estimated value of purchased bales of collected PET and HDPE bottles was more than \$525 million, according to the 2018 United States National Postconsumer Plastic Bottle Recycling Report. We want to see recycling rates as high as possible to capture the economic value of plastics packaging, so we're working closely with our partners at The Recycling Partnership, Materials Recovery for the

Future and The Wrap Recycling Action Program to make that a reality.

Additionally, we're working on improving overall collection rates and accounting for packaging, including bottles, non-bottle rigids (e.g., containers, caps, lids, etc.) and film (e.g., PE wraps and bags). At least 1 billion pounds of post-consumer film, 1.35 billion pounds of post-consumer non-bottle rigid plastic and 2.85 billion pounds of bottles were collected for recycling.



These results show the growing domestic demand and economic potential for recycled plastics. However, the information about the quantities of material that are reused, recycled and recovered are in the hands of hundreds of recycling facilities and thousands of municipalities. Collecting this data today is done through a survey mechanism managed by ACC that faces challenges from inconsistent definitions and voluntary participation that reduces response rates and accuracy of the data.

As the next step forward, we need to improve the accuracy of data collected on the total supply of plastics packaging in all formats and the total amount that is reused, recycled and recovered. The collection of this information requires agreement on clear and simple definitions for "reuse," "recycle" and "recover," as well as collaboration with several partners, including governments, brand owners, retailers, MRFs and municipalities. Our goal is to build common definitions, reporting categories and standards into a National Recycling Framework that will support effective data collection and tracking.

100% OF PLASTICS PACKAGING IS RECYCLABLE OR RECOVERABLE BY 2030



Reporting on the recyclability of plastics is more consistent because the definition of “recyclability” for marketing purposes is provided under federal government guidance. The Federal Trade Commission Green Guides state that marketers can only make unqualified recyclable claims when recycling facilities

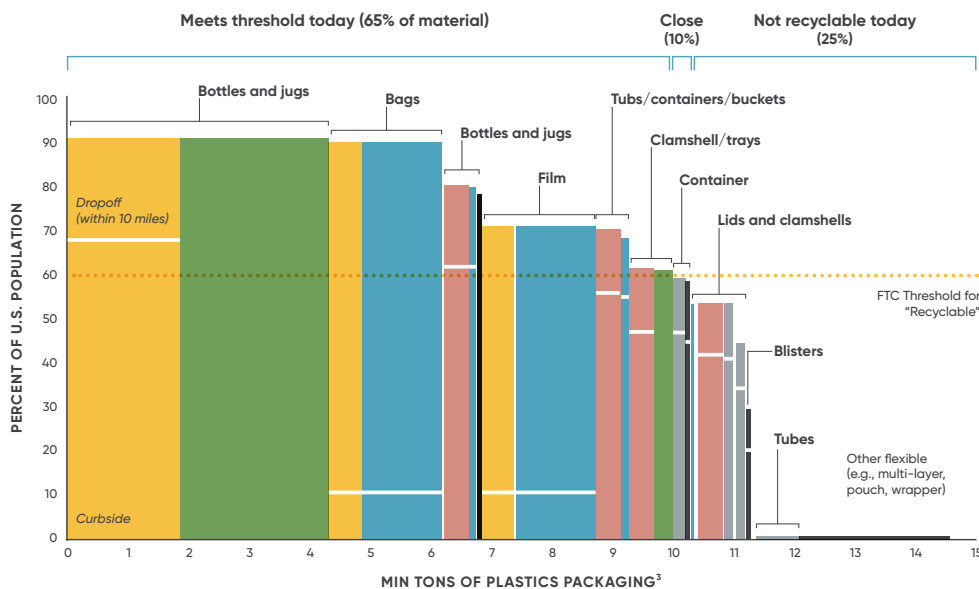
are available to at least 60% of consumers or communities where a product or package is sold.

PET bottles, HDPE jugs, bags, tubs, buckets, trays and plastic film are all recyclable, but there’s still more to do before lids and clamshells can be recycled in many residential programs. We are working hard with our partners at The Recycling Partnership to solve technological and market challenges and increase access to recycling for plastic packaging, including polypropylene cups, coffee pods and pouches. And, while collection and sortation of materials is important, the commercialization of advanced recycling technologies that can convert multi-layer films and other hard-to-recycle plastics back into their basic molecular components is an essential part of our strategy to ensure all plastic packaging is recyclable by 2030.

Currently ~65% of packaging is recyclable as defined by the FTC—an additional 10% of volume is near the FTC threshold.

Access to recycling in U.S. by plastic type¹

Percent of U.S. population served by recycling program for each plastic type/form



Many common plastic packaging types are well above FTC 60% access threshold

- HDPE jugs and PET bottles meet the threshold with large acceptance in curbside programs (90%+ access)
- PE Bags and film have high access levels, driven by front-of-store access (90%+ access)

The 25% of material that does not meet the FTC definition includes **difficult-to-sort** materials (small, 2-D) and **difficult-to-reclaim** (multi-layer)



1. Data set includes packaging rigid plastics, films and bags 2. No data available on split between curbside and drop off access for PET packaging 3. Tonnage data reflects EPA estimate of each polymer type used in packaging, combined with estimates for each polymer application split (e.g. non-film HDPE split 80% bottles and 20% tubes) SOURCE: Moore Recycling 2015-2016 Centralized Study on Availability of Plastic Recycling 2012 National Reach Study; 2012 Update; 2013 FPA Flexible Packaging Industry Segment Profile Analysis, EPA, IHS

For hard-to-recycle plastics, including foam takeout containers, candy wrappers and chip bags, our goal is to ensure they're recoverable. These plastics have value and, once collected, they can be converted into new plastics, chemicals, waxes, fuels and energy.

The Hefty® EnergyBag® Program is just one example of the actions the sector is taking to support the goal of ensuring plastics that are not recycled are recovered. The program, currently available in certain communities in Georgia, Nebraska and Idaho, compliments existing recycling services to collect hard-to-recycle plastics. For plastics items not accepted in municipal recycling programs, residents in these communities can put them in a Hefty® EnergyBag® so they can be diverted from the landfill. They are then sealed and placed in recycling bins with other packaging for collection. Once at a MRF, the bags are separated and sent to recovery facilities, where these hard-to-recycle plastics can be converted into products such as composite lumber and alternative fuels.

PREVENTING SPILLS AT MANUFACTURING SITES: 2020 AND 2022 GOALS

One of the areas that resin manufacturers are better positioned to control is the leakage of plastic pellets or other raw materials from their manufacturing sites. ACC's Plastics Division set a goal that all member sites in the U.S. will participate in Operation Clean Sweep blue (OCS blue) by the end of 2020 and all their manufacturing sites across North America will be covered by 2022. OCS blue includes training of employees, process auditing and reporting to achieve zero pellet, flake or powder loss.



OCS blue member companies commit to the following:

- Metric Reporting—Companies must annually report metric data to the Plastics Industry Association or ACC, and this data will be made publicly available in aggregate.
- Metric Data—Data to be reported annually includes the number and volume of incidents of any unrecovered release of plastic pellets, flakes, powders or granules, within the physical custody of a member company, from containment to ground or water outside member-operated facilities and estimated to be greater than 0.5 liters or 0.5 kilograms per incident.

We are working with all members to help equip their North American sites with the training and reporting necessary to gain OCS blue status by 2022.

ACTIONS TO IMPROVE DATA COLLECTION

Improving data collection is a challenge that requires several partners to effectively address. That's why we are continuing to work with stakeholders throughout the value chain to deliver results while advancing our own initiatives. Here are some more actions we're taking to build a baseline set of data from which to measure progress:

- Collecting recycling and recovery data for expanded polystyrene, PVC and industrial packaging, such as pallet covers and fertilizer bags.
- Tracking advanced recycling data and developing a baseline to measure progress against our 2040 goal.
- Gathering data on residential access to recycling and recycling infrastructure capacity to track progress toward our 2030 goal.

With these improvements, our plan is to combine new data collection initiatives and our existing reports on bottles, film and non-bottle rigids into one comprehensive report that measures the sector's success against our circular economy goals.

Partnerships

Achieving our objectives will require society-wide participation, integrated solutions and cross-sector partnerships. Our members are proud to manufacture materials that can help us do more with less and use resources more efficiently. We are also working together with partners in other industry sectors, government, NGOs, non-profits and the research and development community to develop and invest in projects that harness their collective resources and technical expertise. Below are a few examples of partnerships that are making progress today and can make an even bigger difference tomorrow.



All over the world, public and private sectors have come together to address the plastic waste challenge. The Alliance to End Plastic Waste is an independent and global non-profit, public charity with 50 member companies and supporters partnering with national and local governments, environmental and economic development NGOs and communities to develop solutions that will help solve the global plastic waste challenge. The Alliance is targeting to invest \$1.5 billion over five years toward solutions to prevent the leakage of plastic waste and contribute to a circular economy with focus on four strategic areas: waste management and recycling infrastructure, innovation, education and engagement, and clean up. Through the development of sustainable and economic viable solutions, the Alliance will scale its investments and impact working with venture capital, private investors, development banks and governments to deliver truly transformational change.



**Advanced Recycling
Alliance for Plastics**

ADVANCING SOLUTIONS FOR PLASTICS RECYCLING

Advanced plastics recycling, also called chemical recycling or advanced recycling and recovery, refers

to several different processes that use existing and emerging technologies that return post-use plastics to their basic chemical building blocks that can be converted into a versatile mix of new plastics, chemicals, fuels and other products.

The ACC's Advanced Recycling Alliance for Plastics aims to grow awareness of the benefits of advanced plastics recycling technologies that convert post-use plastics into new products, grow and scale advanced recycling into a viable industry solution and demonstrate broad support for advanced recycling technologies through an expanding network of allies.



From Single Use to Reuse is a collaborative effort of industry innovators, primarily America's Plastics Makers, dedicated to ending plastic waste through upstream and downstream solutions. ACC and its member companies are investing in efforts to demonstrate what is possible, and to educate people on the critical changes needed to solve our society's plastic waste issue by building a more circular economy for plastics. *From Single Use to Reuse* will bring new plans, systemic solutions and a willingness to collaborate with government, NGOs, consumers, civic groups and the full industry value chain.

WORKING WITH FEDERAL GOVERNMENT

Along with industry and all other stakeholders along the value chain, the U.S. government also needs to be part of the solution. To that end, both the EPA and the DOE are collaborating with the ACC and its members.

As part of the DOE Plastics Innovation Challenge, the ACC and DOE signed a memorandum of understanding (MOU) in 2020. The MOU serves as

a framework for DOE and ACC to collaborate on the development of innovative plastics recycling technologies and strengthen the domestic plastics supply chain. At the time of the announcement, Under Secretary of Energy Mark W. Menezes said, "The Department recognizes that it will take collaboration across the value chain, and we look forward to working with the American Chemistry Council and other stakeholders to advance DOE's Plastics Innovation Challenge."

ACC has also signed a joint MOU with the EPA and the Sustainable Packaging Coalition to support The Wrap Recycling Action Program's efforts to promote the sustainable management of plastics, build capacity for the collection of flexible film plastics materials in grocery and retail stores and educate consumers.



ACC and members of our Plastics Division are inaugural partners of The Recycling Partnership (TRP), which works to boost education, infrastructure, access and technical assistance for curbside recycling programs. Since 2014, TRP has delivered new recycling carts to more than 700,000 U.S. households, affected avoidance of 251,000 metric tons of carbon emissions, reached more than 77 million households nationwide and diverted more than 230 million pounds of recyclables from landfills. ACC is also a founding member of the newly-formed Polypropylene Recycling Coalition that looks to significantly increase the recycling of polypropylene as part of TRP's "Pathways to Circularity."



In July 2020, Closed Loop Partners launched its Advanced Recycling Innovator Program (ARIP). This program brings together innovative technology companies in advanced recycling, including members

of ACC's Advanced Recycling Alliance for Plastics. Closed Loop Partners is working with these companies and a network of industry and non-profit stakeholders to further analyze the impacts of advanced recycling processes and identify investable opportunities along the supply chain to scale safe and circular technologies that create value from plastic waste by transforming plastic waste into valuable new products or into building blocks to make new plastic or packaging.



ACC is a member of the REMADE Institute, which specializes in applied research and development in partnership with industry, academia and national labs to advance applied research and technology development to support the U.S. manufacturing ecosystem. REMADE focuses its efforts on addressing knowledge gaps that will eliminate and/or mitigate the technical and economic barriers that prevent greater material recycling, recovery, remanufacturing and reuse.



The Association of Plastic Recyclers (APR) is often referred to as "The Voice of Plastics Recycling." As the international trade association representing the plastics recycling industry, membership includes independent recycling companies of all sizes, processing numerous resins, as well as consumer product companies, equipment manufacturers, testing laboratories, organizations and others committed to the success of plastics recycling. APR works to enhance quality and increase supply through technical resources, testing programs, design solutions, corporate training, regulatory leadership and education programs.

Investments

Plastics recycling in the U.S. has been growing since we began measurement in the early 1990s. America's Plastics Makers and others have invested billions of dollars in plastics recycling. In partnership with brand owners, retailers and recyclers, these investments are producing encouraging results but much more needs to be done.

For example, the volume of plastics recycled has doubled since 2009, and the domestic demand for recycled plastics continues to grow. When we combine plastics recycling with the energy recovery of non-recycled plastics, 27% of all plastics generated were diverted from landfills in 2013.

Then in July 2017, China announced it would no longer permit imports of paper and plastics scrap above a stringent 0.5% contamination threshold. Beginning in January 2018, what was referred to as the new "National Sword" policy came into effect and waste plastic exports to China were virtually eliminated.

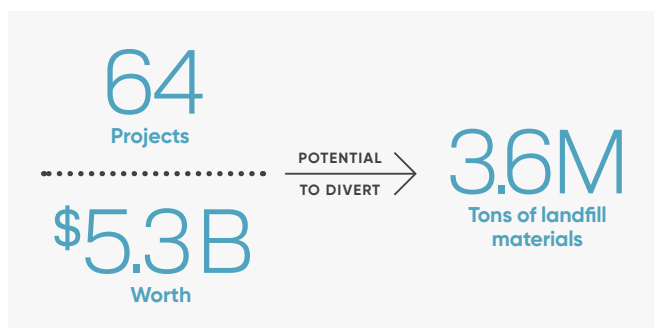
This challenge presents a significant opportunity to grow domestic industry and jobs.

Over the past three years alone (July 2017–August 2020), there have been 64 projects worth more than \$5 billion in announced investments in modern recycling technologies in the U.S., many of which expand the types and volumes of plastics that can be reused. These projects have the potential to divert more than 3.6 million tons (~8.0 billion pounds) of waste from landfills.

Of the announced projects, nearly one-third have been completed or are under construction, more than two-thirds are planned and in some cases, early commercial pilots or demonstration-scale facilities are operational.

Advancements in traditional, or mechanical recycling, account for 19% of announced investments. For example, new sorting technologies (e.g., artificial intelligence, robotics, near-infrared optics) enable different polymer types to be sorted more effectively than before. Meanwhile, markets for innovative products using recycled content, such as auto parts, carpeting, outdoor furniture, clothing and footwear, packaging/bottles/bags/containers and more continue to grow.

Of the announced investments, 83% of the announced investments are in the growing field of advanced recycling. These technologies include methods such as pyrolysis and gasification, in which material is heated to create an oil or gas that can be converted to plastic, chemical building blocks or liquid fuels. Another method of advanced recycling is dissolution, where plastics are dissolved in a solvent to separate out building block chemicals. Not only are these investments good for the environment, but also for the U.S. economy, considering 29% of these projects include foreign direct investment. Recycling also helps create new well-paying jobs in the recycling and manufacturing industries right here in the U.S. where more than 3,700 businesses are involved in recycling plastics.



Industry in Action: Select Examples

America's Plastics Makers are deeply committed to ending plastic waste and moving toward a more circular economy. In many cases, they have jump-started progress, in parallel with the development of the Roadmap to Reuse. They are setting targets and taking action in the U.S. and globally, getting directly engaged in technology and research partnerships as well as investing in recovery and recycling, application design, product slate renewal, supply chain innovation, education and communication. Members of the ACC and ARAP are involved in 17 projects in the U.S. and 18 internationally. All of these projects are anticipated to demonstrate the viability of these technologies, which can be expanded and adapted to meet the needs of other geographies and economic systems.

Plastics makers have moved from discussion and planning directly to commercial action with a broad range of value chain partners and recycling systems and technologies. For example, plastics manufacturers are applying new material science to design packages to be more easily recycled, brand owners and manufacturers are working with advanced recyclers to capture value from waste plastics and chemistry companies are independently signing offtake agreements with advanced recyclers to integrate waste plastics into their operations as a feedstock.

The following selection of examples of commercial actions and commitments demonstrates the range of technologies coming to market, the diversity of partnerships the market is generating and the commitment to sustainability and ending plastic waste at each step of the value chain.



ACC member AmSty has invested in Regenyx, a joint venture with Agilyx focused on advanced recycling. This commercial facility in Oregon breaks down (depolymerizes) used polystyrene products into a liquid form that can be used to remanufacture styrene products. AmSty is committed to a goal of using 25% recycled content in all of its foodservice and food packaging products by 2030.



ACC member BASF has invested in Quantafuel, a company that converts all kinds of plastic waste into chemically recycled pyrolysis oil and purified hydrocarbons. BASF will use these secondary raw materials, produced at Quantafuel's plant in Denmark, in its ChemCycling™ project. ChemCycling™ is complimentary to mechanical recycling and uses waste plastics which are difficult to recycle mechanically, such as mixed plastic waste, plastics with residues or multi-layer food packaging.

BASF also sells mechanically recycled engineering plastics, Nypel® and Petra®, and plastics additives that enable the increased use of recycled content and aid in the recyclability of polyolefins.



Brightmark, a global waste solutions provider based in San Francisco, has announced an initiative to procure more than 1.2 million tons per year of post-use plastics for recycling at its existing advanced

recycling plant in Indiana and soon-to-be-built plants nationwide. Output from the plants include industrial wax, ultra-low sulfur transportation fuel and naphtha which will be further developed to create a circular solution of producing its origin product, plastic.



ACC member Covestro announced a new focus on innovative recycling as part of its strategy to accelerate the transition to a circular economy. Covestro and partners have founded a consortium called Circularise PLASTICS to create a blockchain-based system for tracking plastics.

The ultimate goal is to create an open standard for sharing data about where plastics resins or materials originate—information that’s important for moving to circular production models that help the plastics industry increase the use of recycled content. Having this standard will improve transparency, efficiency and sustainability throughout the whole plastics value chain so that suppliers and manufacturers can focus more on developing sustainable and circular materials, while recycling companies can select the most suitable processes and transform the recyclable materials into new products.

CYCLYX

The new Cyclyx partnership between GE and Agilyx is planning to form an industry consortium to use artificial intelligence and machine learning to develop new supply chains that will aggregate and preprocess larger volumes of post-use plastics than current systems can support.



Monroe Energy, Delta’s subsidiary refinery, will start converting plastic waste into jet fuel under an agreement with Agilyx. As part of the agreement, Agilyx will open a facility near Monroe’s facility in Trainer, Pa., and supply up to 2,500 barrels per day of the company’s synthetic feedstock to Monroe Energy.



ACC member Dow has a holistic approach that starts with designing for recyclability. Dow’s research and development team has created new materials to make more packaging reusable and recyclable, such as RecycleReady™ technology. Their materials science experts then collaborate with brand companies and package designers at Dow’s Pack Studios to create new packaging innovations to meet the demands of consumers and help to ensure their products are recyclable.

Dow partners with TRP to expand recycling access across the U.S. and is also working with Hefty® brand manufacturer Reynolds Consumer Products to collect harder-to-recycle plastics using the curbside Hefty® EnergyBag® Program. The materials are collected and turned into products such as composite lumber and alternate fuels.

Dow collaborates with waste and recycling experts to convert post-consumer plastic film into recycled resin that can be used in multiple everyday applications such as beverage multipack overwrap, garbage bags and can liners. Dow’s Elvaloy™ asphalt technology enables use of recycled plastics in roads and parking lots. Dow also partners with the Fuenix Ecology Group, based in The Netherlands, for the supply of pyrolysis oil feedstock made from plastic waste. The feedstock will be used to produce new polymers at Dow’s production facilities in Terneuzen, The Netherlands, providing a high-quality recycled plastics product to the market.

EASTMAN

In 2019, ACC member Eastman began chemically recycling a broad set of materials at commercial scale, and is moving rapidly to incorporate increasing content from advanced recycling processes into its products. Eastman's technologies are "plastic-to-plastic" or "waste-to-feedstock," where plastic waste is broken down into its original monomers or molecules in order to create new, recycled plastics and other materials. Eastman's advanced circular recycling solutions can process materials that cannot be recycled by traditional methods, dramatically expanding the amount of materials that can be recycled.

ExxonMobil

ExxonMobil is focusing a significant portion of its research and development on technologies across the plastics value chain. The company is creating innovative products that reduce plastic waste by meeting performance standards with less material, increasing recyclability of packaging and enabling customers to increase recycled content. For example, ExxonMobil's Vistamaxx™ performance polymers increase customers' ability to use recycled materials and improve recycled materials' toughness and tear resistance.

At the end of the product life cycle, ExxonMobil supports expansion of mechanical recycling and is focusing its efforts on advanced recycling solutions, such as pyrolysis and co-processing options that will create and capture value from plastic waste and reduce overall greenhouse gas emissions on a full life cycle basis.

INEOS STYROLUTION

INEOS Styrolution is building a 100-ton-per-day polystyrene advanced recycling facility in Illinois

using technology licensed from Agilyx. The facility will accept post-consumer and post-industrial polystyrene from the Greater Chicago area and the Midwest. The plant will produce styrene monomer, which will be used as a feedstock in INEOS Styrolution's U.S. polystyrene production operations for sale into automotive, appliance and packaging markets. INEOS Styrolution is also working with two other advanced recyclers that plan to employ different technologies to produce styrene monomer streams—GreenMantra Technologies and Pyrowave.

lyondellbasell

ACC member LyondellBasell has announced its ambition by 2030 to produce and market two million metric tons of recycled and renewable-based polymers annually. In 2020, ACC member LyondellBasell started up an advanced recycling pilot plant in Italy, bringing the company one step closer to developing a commercial scale process that will efficiently break down plastic waste into its molecular form for use as a feedstock. The proprietary technology, called MoReTec, was proven at laboratory scale in collaboration with Germany's Karlsruhe Institute of Technology. Also in 2020, LyondellBasell launched the first commercial, world-scale Hyperzone polyethylene plant, located in Texas. The Hyperzone technology has demonstrated the ability to manufacture lighter-weight products without compromising strength, ultimately reducing the amount of raw material required while also incorporating high levels of post-consumer recycled materials into the polyethylene produced.

LyondellBasell and SUEZ are joint venture partners in Quality Circular Polymers (QCP), a mechanical recycling facility in The Netherlands. QCP uses mechanical recycling to transform post-consumer plastic waste into high quality polymers that can be used to make new products. QCP is the first-ever collaboration between a leading waste company and a major global plastics producer.



ACC member NOVA Chemicals and advanced recycler Enerkem from Montreal have embarked on a research partnership to transform municipal waste, including plastics, into ethylene feedstock for NOVA Chemicals' North American chemical and plastics production. NOVA Chemicals and Merlin Plastics, a major North American recycler, have entered into an agreement to increase the supply of high quality polyethylene post-consumer recycle for consumer packaging using curbside recycling. NOVA Chemicals has also developed several recipes for recyclable polyethylene multi-layer films that can be used in stand-up pouches and other food packaging applications, new products that allow for recycled content addition and new resin technology for use in biaxially oriented structures.



ACC member SABIC has partnered with brand owners such as Unilever to use their certified circular polymers (produced using Plastic Energy's technology process to convert plastics into a recycled oil called TACOIL®) in various consumer packaging applications as one of the circular solutions offered in their TRUCIRCLE™ portfolio. SABIC is providing the recycled content resins to Unilever for its Magnum ice cream brand. Magnum has announced that it will produce the world's first recycled ice cream packaging, making more than 7 million ice cream tubs from more than 176 tons of recycled plastics.

In addition, SABIC has committed to increase the amount of recycled plastics in its polyethylene, polypropylene and other high-value products by 200,000 tons between now and 2025. This pledge will include advanced recycling of mixed-plastic waste, new polycarbonate resin based on certified renewable feedstock and mechanically recycled polymers.



Sealed Air Corporation has agreed to collaborate with and invest in Plastic Energy to accelerate advanced recycling. Plastic Energy transforms post-consumer plastic waste into new recycled oil that can be used to create essential packaging solutions, including protective packaging for food. The company has set a goal of processing 300,000 tons of plastics by 2025, and its parent company Plastic Energy Global has set a vision of building 50 new facilities over the next 10 years. For its part, Sealed Air has pledged to design and advance packaging solutions that are 100% recyclable or reusable by 2025, with 50% average recycled content across all packaging solutions and 60% of that coming from post-consumer recycled content.



Using a potentially transformative new model, ACC member Shell is taking feedstock material made from used plastics in its chemical plant in Norco, La., to make a range of chemicals. The feedstock supplied by Atlanta-based Nexus Fuels is made from hard-to-recycle plastic waste using pyrolysis technology. Shell's target is to use 1 million metric tons of plastic waste a year as feedstock in its global chemical plants by 2025.



ACC member Total's ambition is to produce 30% of its polymers from recycled materials by 2030. Total partnered with PureCycle Technologies and committed to purchasing recycled polypropylene from its future facility in the U.S. Together with partners from across the plastics value chain—including Citeo, Recycling Technologies, Mars, Nestlé and its Synova affiliate—Total is continually working on developing advanced plastics recycling channels.

Glossary

Discussions about plastics and recycling can be filled with industry acronyms and technical language. Below you'll find a list of commonly used terms and their definitions to aid your understanding.

Advanced Recycling

Any process by which plastic is chemically changed into its building blocks to produce new plastics, chemicals and/or other products. Also known as chemical recycling.

Circular Economy

An economic system based on designing and managing the entire life cycle of products and conserving product resources so they can be reused or recycled in a way that significantly reduces waste and pollution.

Circularity

The idea that things like plastic should be used, and then reused in another form. This way it has a cyclical life, greatly reducing the likelihood that it will become waste or enter the environment.

Feedstock

Any raw material that can be used to supply or fuel an industrial process or a machine.

Flexible and Film Plastic Packaging

Any package or part of a package whose shape can be readily changed. Flexible packaging includes, but is not limited to, bags, pouches, liners and wraps that utilize plastic or film.

Mass Balance

A method to match output (e.g., products with recycled content) with input (e.g., quantity of recycled feedstock) within a predefined system boundary and within a given booking period (usually one year).

Materials Recovery for the Future

A program formed in 2015 by a coalition of recycling advocates to examine how existing recycling processes could be utilized to capture flexible plastic packaging (FPP) in curbside recycling programs.

Mechanical Recycling

A process by which waste materials are turned into raw materials without changing the basic structure of the material.

Plastics Value Chain

The process or activities of adding value to plastic, including everything from production and marketing to reuse and recycling.

Post-Consumer Material

Material that has reached its intended end user and is no longer being used for its intended purpose.

Pre-Consumer Recycled Content

Material that has never reached the end user, having been diverted from the waste stream during a manufacturing process. Excluded is the reutilization of materials generated in a process and capable of being reused as a substitute for a raw material without being modified in any way.

Recoverable

The process of converting waste materials into energy, fuels and other raw materials.

Recyclable

According to the Federal Trade Commission Green Guides, an item can only be labeled as recyclable when recycling facilities are available to at least 60% of consumers or communities where a product is sold. Examples that already meet the 60% threshold include bottles, caps, tubs and containers (and PE film packaging via store drop-off programs). Additional items that can be recycled, but do not yet meet the access requirements, can be labeled recyclable with qualifying statements about local access to recycling.

Recycled Plastic Feedstock

Materials made from recycled plastics that can be used to supply or fuel an industrial process or a machine.

Recycling

The process of converting waste materials into new materials and objects. Note: there is currently no consensus definition of recycling. One of the critical requirements for the Roadmap to Reuse is to establish a clear, simple definition that encourages innovation and growth.

Resin

An organic substance, sometimes plant-based but generally synthetic, which is used as a base material for the manufacturing of some plastics.

Reuse

The use of a product or material again for the same purpose, in its original form or with little enhancement or change (EPA).

Single-Use Plastic

Any plastic that is only used once and not returned to the value chain.

from
single use
to
re(use)SM

AN INITIATIVE BY PLASTIC MAKERS
FOR A WASTE-FREE AMERICA

For more information, please contact:

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