United States Government Accountability Office

Report to Congressional Requesters

December 2020

RECYCLING

Building on Existing Federal Efforts Could Help Address Cross-Cutting Challenges

GAO-21-87

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GAO Highlights

Highlights of GAO-21-87, a report to congressional requesters

Why GAO Did This Study

In 1976, Congress sought to reduce solid waste and encourage recycling as part of RCRA, which gave primary responsibility for recycling to states and municipalities but requires EPA and Commerce to take specific actions. The United States generated almost 1,800 pounds of waste per capita in 2018. Recycling rates for common recyclables, such as paper, plastics, glass, and some metals, remain low. Furthermore, recent international import restrictions have reduced demand for U.S. exports of recyclables. GAO was asked to review federal efforts that advance recycling in the United States.

This report examines (1) cross-cutting challenges affecting recycling in the United States, (2) actions that selected federal agencies have taken that advance recycling, and (3) actions EPA has taken to plan and coordinate national efforts to advance recycling. GAO reviewed laws and agency documents; and interviewed federal officials and nonfederal stakeholders, such as states, municipalities, and industry representatives, selected for their expertise and efforts to advance recycling.

What GAO Recommends

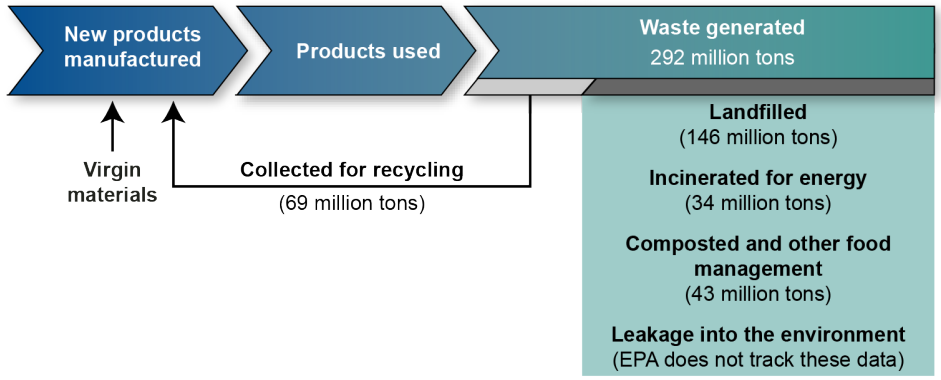
GAO is making one matter for congressional consideration to clarify a RCRA requirement for Commerce or to assign responsibility for stimulating domestic markets to another agency; and three recommendations to EPA, including that it take actions to fulfill certain RCRA requirements. EPA concurred with GAO's recommendations.

View GAO-21-87. For more information, contact J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov.

What GAO Found

Based on GAO analysis of stakeholder views, five cross-cutting challenges affect the U.S. recycling system: (1) contamination of recyclables; (2) low collection of recyclables; (3) limited market demand for recyclables; (4) low profitability for operating recycling programs; and (5) limited information to support decision-making about recycling. For example, the Environmental Protection Agency's (EPA) most recent data show that less than a quarter of the waste generated in the United States is collected for recycling (69 million of 292 million tons) and is potentially available, along with new materials, to make new products (see fig.).

Estimated Generation and Disposition of Waste in the United States, as of 2018



Source: GAO analysis of most recent Environmental Protection Agency (EPA) data. | GAO-21-87

EPA, the Departments of Commerce (Commerce) and Energy, and the Federal Trade Commission have taken actions that advance recycling, such as collecting data and awarding grants for research on recycling technologies. However, EPA has not conducted studies or developed recommendations for administrative or legislative action on the effect of existing public policies on recycling, as the Resource Conservation and Recovery Act (RCRA) requires. Conducting these studies would provide Congress with information to better evaluate the effect of different policies on U.S. recycling efforts. In addition, Commerce is not fully meeting its RCRA requirement to stimulate the development of markets for recycled materials because it has not taken actions to stimulate domestic markets, as GAO recommended in 2006. Commerce officials stated that their work to stimulate international markets fulfills Commerce's obligations under RCRA. Congress may need to act to clarify Commerce's responsibilities under RCRA or assign responsibility for stimulating domestic markets to another agency. By taking action, Congress can ensure a federal response to the reduction in international demand for U.S. recyclables.

EPA has taken several actions to plan and coordinate national efforts to advance recycling, such as releasing a draft national recycling strategy in October 2020. However, EPA has not incorporated some desirable characteristics for effective national strategies, identified in prior GAO work. By better incorporating such characteristics as it finalizes and implements its draft strategy, EPA will have greater assurance of the strategy's usefulness in making resource and policy decisions and will better ensure accountability for its implementation.

Contents

Abbreviations

Commerce	Department of Commerce
COVID-19	Coronavirus Disease 2019
DOE	Department of Energy
EPA	Environmental Protection Agency
EPR	extended producer responsibility
FTC	Federal Trade Commission
Green Guides	Guides for the Use of Environmental Marketing Claims
MRF	material recovery facility
RCRA	Resource Conservation and Recovery Act

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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December 18, 2020

The Honorable Betty McCollum
Chair
Subcommittee on Interior, Environment, and Related Agencies
Committee on Appropriations
House of Representatives

The Honorable Haley Stevens
Chairwoman
Subcommittee on Research and Technology
Committee on Science, Space, and Technology
House of Representatives

The Honorable Chellie Pingree
House of Representatives

The Honorable Mark Takano
House of Representatives

In 2018, the United States generated about 292 million tons of household and commercial trash—known as municipal solid waste (municipal waste)—or almost 1,800 pounds per capita, according to the Environmental Protection Agency's (EPA) latest estimates.[1] EPA reported that 69 million tons of this municipal waste, or less than 24 percent, was collected for recycling, typically through a complex system of stakeholders, such as municipalities, waste haulers, and material recovery facilities (MRF).[2] EPA estimates that the remaining 223 million tons of municipal waste was sent to landfills (approximately 50 percent),

[1]Environmental Protection Agency, *Advancing Sustainable Materials Management: 2018 Fact Sheet*, *Assessing Trends in Material Generation and Management in the United States*, EPA 530-F-20-007 (Washington, D.C.: November 2020). Municipal solid waste includes commercial and residential waste collected by either private or public waste haulers.

[2]According to EPA, common recyclables include paper; plastics; glass; and some metals, such as aluminum. MRFs clean, sort, and separate the different types of materials into packaged bundles or bales of recyclables for sale to processors who use the bales of materials to make new products. MRFs send nonrecyclable materials they collect to landfills or incinerators.

was incinerated (approximately 12 percent), or was composted or was food that was managed in other ways (approximately 15 percent).[3]

According to EPA, the recycling of municipal waste has many potential economic and environmental benefits.[4] For example, recycling can reduce litter; marine debris; pressure on limited landfill space; air pollution; greenhouse gas emissions; and the amount of electricity, fuel, and water used to manufacture goods, which can also reduce costs for businesses. In addition, EPA has reported that recycling contributes to jobs; wages; and federal, state, and local tax revenues.[5]

For decades, the U.S. recycling industry has relied on selling recyclables in international markets to help manage our nation's municipal waste. For example, from 2010 to 2017, the United States exported an average of $3.3 billion per year of waste paper for recycling—accounting for 36 percent of the world's waste paper exports in 2017—and China was the main waste paper destination for U.S. exports, averaging 60 percent of the exports over this period.[6] However, in 2018, the Chinese government—through its National Sword policy—banned imports of various plastics and mixed papers and set a standard for contamination levels that most U.S. exporters of recyclables could not meet, thus reducing an important source of international demand for U.S. recyclables.[7] Subsequently, several Southeast Asian countries created

[3]For example, EPA estimated the amount of food waste that was managed through animal feed, anaerobic digestion, and donations, among other ways. In addition, some waste was leaked into the environment by polluters but, according to agency officials, EPA does not estimate this amount. Note that the waste management rates do not add up to 100 percent due to rounding.

[4]Environmental Protection Agency, *Advancing Sustainable Materials Management: 2018 Fact Sheet*, 14.

[5]Environmental Protection Agency, *Advancing Sustainable Materials Management: 2020 Recycling Economic Information Report* (Washington, D.C.: December 2020).

[6]U.S. International Trade Commission, *China's Recycled Wastepaper Import Policies: Part 1 Impact on the United States*, *Executive Briefing on Trade* (Washington, D.C.: April 2018).

[7]Chinese Government Network, *Notice of the General Office of the State Council on Issuance of Reform and Implementation Plan to Enhance Solid Waste Import Management System by Prohibiting the Entry of Foreign Waste* (July 27, 2017). The Chinese government stated that it enacted a policy to prohibit the entry of foreign waste, in part, to improve solid waste import management policies, crack down on smuggling of foreign waste, and enhance the level of domestic solid waste recycling.

similar restrictions, which further reduced international demand for U.S. recyclables.

In 1976, Congress sought to, among other things, reduce solid waste and encourage recycling by enacting the Resource Conservation and Recovery Act (RCRA). Under RCRA, states and municipalities have the primary responsibility for managing municipal waste within their jurisdictions, such as providing services to collect and sort recyclables or contracting these services to businesses. Funding for recycling programs varies across municipalities and can come from a mix of local taxes, garbage collection fees, and sales of recyclables. Ten states have laws requiring consumers to pay refundable deposits on certain beverage cans and bottles, known as bottle bills.[8] Several states have enacted extended producer responsibility (EPR) laws, which require manufacturers to pay to collect and recycle specific materials, such as pharmaceuticals and electronic waste.[9] For example, at least 23 states have enacted EPR laws for electronic waste.

In addition, RCRA requires the Secretary of Commerce to encourage greater commercialization of proven resource recovery technology by stimulating the development of markets for recyclables.[10] Among its responsibilities under RCRA, EPA issues guidelines for federal agencies and others to procure certain items made with recyclables. More recently,

[8]Beverage container laws, or bottle bills, generally require consumers to pay a deposit at the time of purchase of certain types of beverage containers, such as those made of glass, aluminum, or plastic, and require vendors to accept empty containers and return the deposits. However, California's law requires beverage manufacturers and distributors to pay the deposit and provides for a refund of the deposit to consumers who return beverage containers to recycling centers. In 1990, we reported that most of the studies we examined concluded, and state officials concurred, that bottle bills significantly reduced litter and diverted waste away from landfills. GAO, *Solid Waste: Trade-offs Involved in Beverage Container Deposit Legislation*, GAO/RCED-91-25 (Washington, D.C.: Nov. 14, 1990).

[9]With EPR, manufacturers generally develop product stewardship programs and associated fees to offset the cost of postconsumer management or end-of-life disposal of their products, which generally include recycling these products. Under EPR systems, businesses often work with a specific nonprofit organization to collect the fees and manage the recycling or disposal of the products.

[10]RCRA uses the term "recovered materials" for waste material and byproducts that have been recovered or diverted from solid waste but not materials and byproducts generated from, and commonly reused within, an original manufacturing process. Recovered materials are more commonly known as recyclables. For the purposes of this report, we refer to "recovered materials" as "recyclables."

the explanatory statement accompanying EPA's fiscal year 2020 appropriation directed EPA to develop, in collaboration with others, a national recycling strategy to be reported to the House and Senate Appropriations Committees by September 15, 2020.[11] We discuss the development of this strategy later in our report.

In addition to federal agencies, states, and municipalities, other stakeholders, such as tribal organizations, nonprofit organizations, businesses, trade associations, and academic researchers, also play important roles in supporting recycling in the United States. For example, businesses and trade associations, such as Walmart and members of the Plastics Industry Association, have pledged to use more postconsumer recycled content in their products and packaging.[12]

In 2006, we examined broad issues related to recycling in the United States, including steps EPA and the Department of Commerce (Commerce) were taking to encourage recycling and federal policy options that could help increase recycling.[13] We recommended that EPA establish performance measures and gather performance data on those measures to evaluate the impact of EPA's recycling programs. In response, EPA established a new performance measure that it began tracking in fiscal year 2019. We also recommended that Commerce develop and implement a strategy to stimulate the development of markets for recyclables in the United States in order to fully meet its responsibilities under RCRA. However, in its response to our report, Commerce did not directly address this recommendation and has not taken action to implement it.

You asked us to review federal efforts that advance recycling in the United States. This report (1) identifies cross-cutting challenges affecting recycling in the United States, (2) examines the extent to which selected federal agencies have taken actions that advance recycling in the United States, and (3) assesses the extent to which EPA has taken actions to

[11]Explanatory Statement Accompanying the Further Consolidated Appropriations Act, 2020, 165 Cong. Rec. H11061, H11293 (Dec. 17, 2019), which directed EPA to submit the report on a national recycling strategy detailed in H.R. Rep. No. 116-100.

[12]Postconsumer recycled content, referred to as PCR content, refers to the percentage of recovered materials used to make a new item. For the purposes of this report, we refer to postconsumer recycled content as "recycled content."

[13]GAO, *Recycling: Additional Efforts Could Increase Municipal Recycling*, GAO-07-37 (Washington, D.C., Dec. 29, 2006). For a list of our previous work in this area, see the Related GAO Products page at the end of this report.

plan and coordinate national efforts that advance recycling in the United States.

To address all three objectives, we reviewed reports on recycling by federal agencies, such as EPA. We also interviewed officials and staff from Commerce, the Congressional Research Service, the Council on Environmental Quality, the Department of Energy (DOE), the Department of the Interior, the Department of State, EPA, the Federal Trade Commission (FTC), the Food and Drug Administration, the National Science Foundation, and the Office of the U.S. Trade Representative. To obtain information about the context and policy issues related to recycling, we also attended various conferences and workshops on recycling sponsored by EPA and nonfederal stakeholders, such as nonprofit organizations.

To identify cross-cutting challenges affecting recycling in the United States, we interviewed nonfederal stakeholders, including representatives from academic researchers, businesses, municipalities, nonprofit organizations, states, trade associations, a tribal organization, and waste haulers. We identified these nonfederal stakeholders through a snowball approach, in which we interviewed federal and nonfederal stakeholders for recommendations of other key stakeholders to include in this review, reviewed stakeholder documents, and attended webinars and conferences. We selected a nonrepresentative sample of 30 nonfederal stakeholders based on several criteria, such as their knowledge of recycling and whether they are conducting research about recycling issues or participating in recycling activities. While the views of these nonfederal stakeholders are not generalizable to all stakeholders that study recycling or participate in recycling, they provide illustrative examples of the challenges facing the recycling industry in the United States and actions to address those challenges.

To examine the extent to which selected federal agencies have taken actions that advance recycling in the United States, we reviewed federal statutory requirements, including RCRA requirements for Commerce and EPA, and compared them with federal programs and activities that the agencies identified. We selected EPA, Commerce, DOE, and FTC for review because they have ongoing activities that we determined have the effect of advancing recycling, including agency activities that were not necessarily designed to directly advance recycling.

To assess the extent to which EPA has taken actions to plan and coordinate national efforts that advance recycling in the United States, we compared EPA's efforts to develop a national recycling strategy against selected desirable characteristics for effective national strategies, based on our prior work.[14] For example, we asked EPA officials about the process they used to develop the draft national recycling strategy and the extent to which they incorporated specific, desirable characteristics. See appendix I for more details on our scope and methodology.

We conducted this performance audit from August 2019 to December 2020, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

U.S. Recycling System

Municipalities generally have their own recycling programs to manage the municipal waste generated from households and arrange for recyclables to be collected and hauled to MRFs, where the materials are sorted and cleaned.[15] Commercial and institutional entities, such as businesses, schools, and hospitals, generally use private recycling services that are separate from municipal recycling programs but must follow any applicable state and local laws and regulations. States, municipalities, and MRFs establish their own lists of accepted recyclables, which often vary from jurisdiction to jurisdiction.[16] Commonly accepted recyclables

[14]GAO, *Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism*, GAO-04-408T (Washington, D.C.: Feb. 3, 2004).

[15]RCRA defines the term "municipality" as (1) a city, town, borough, county, parish, district, or other public body created by or pursuant to state law, with responsibility for the planning or administration of solid waste management, or an Indian tribe or authorized tribal organization or Alaska Native village or organization; and (2) includes any rural community or unincorporated town or village or any other public entity for which an application for assistance is made by a state or political subdivision thereof. See 42 U.S.C. § 6903(13).

[16]Items that are not on the list of accepted recyclables may also be collected but generally lead to contamination.

include paper and cardboard; glass; metals, such as aluminum; and specific types of plastics.

Many municipalities have curbside recycling programs where waste haulers collect items from bins, carts, or bags that individuals set out on the street. However, curbside recycling is typically only available to single-family or smaller, multifamily homes and generally does not extend to larger, multifamily homes.[17] Curbside recycling programs are generally either single stream—where all recyclable materials are comingled in a single container that is collected by a waste hauler—or dual stream—where individuals sort recyclables, typically to separate paper and cardboard from other recyclables, which waste haulers collect separately. Some municipalities have drop-off recycling centers or redemption centers—locations where individuals can bring recyclables to a common collection location either instead of, or in addition to, curbside services.[18]

Contamination can prevent otherwise recyclable items from being recycled. Recyclable materials are transported to MRFs, which clean them to reduce contamination. Contamination can be caused by a variety of factors, such as when recyclable items have residues like food or liquids; when otherwise recyclable items contain nonrecyclable labels or constituent parts, such as nonrecyclable lids; when a MRF does not have the equipment to process otherwise recyclable materials; or when the format of the product does not allow for effective recycling, such as items that are too small. MRFs process recyclables using a combination of equipment and manual labor to sort the materials into bales of like materials, such as aluminum, glass, or paper, as shown in figure 1.

[17]The Recycling Partnership, *The 2016 State of Curbside Report* (Falls Church, VA: December 2016, revised Jan. 31, 2017).

[18]Sustainable Packaging Coalition, *2015-2016 Centralized Study on Availability of* Recycling (Charlottesville, VA: July 26, 2016). This study found that dual-stream programs make up 10 percent of single-family curbside recycling programs and that an estimated 94 percent of the U.S. population has access to some type of recycling program—53 percent with access to curbside recycling that is provided automatically and 64 percent having access to a drop-off recycling facility.

Figure 1: Bales of Sorted Recyclable Plastic, Paper, and Metal

Source: Copyright © Recology. | GAO-21-87

The market for recyclables generally consists of MRFs selling bales of materials to brokers, who in turn sell them to manufacturers that use them to make new products.[19] In some cases, commercial businesses generate unmixed recyclables, such as cardboard bundled at retail stores, which they may sell directly to brokers when these recyclables do not need to be sorted or cleaned at a MRF. According to EPA officials, the following four key stages comprise the U.S. recycling system:

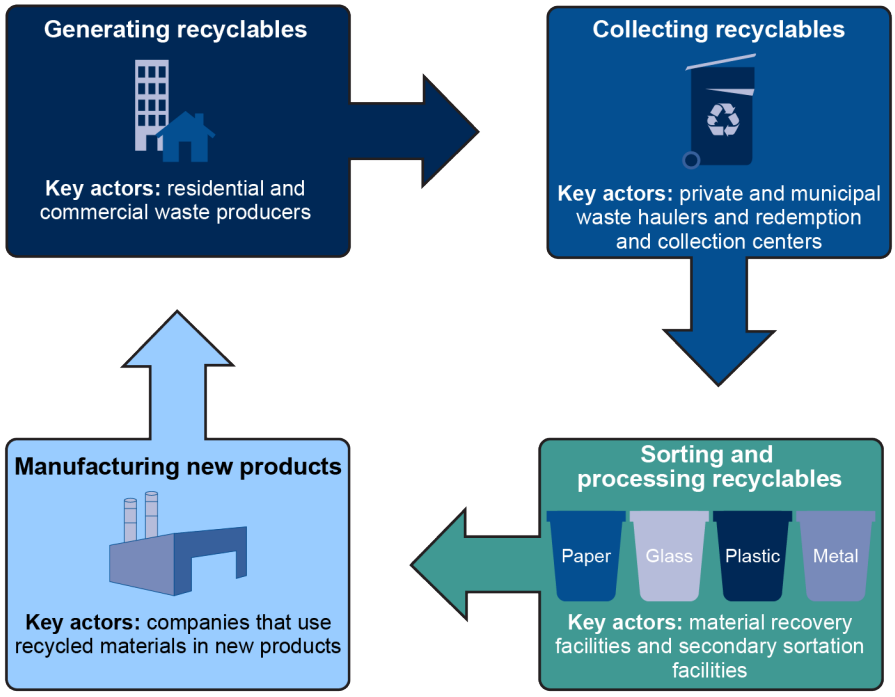
- Generating recyclables. Households, businesses, and institutional entities generate municipal waste from materials they have used and then either dispose of or separate them for recycling.
- Collecting recyclables. Municipal and private waste haulers collect recyclables from residences and businesses and transport them to MRFs. Individuals also bring materials to drop-off centers or redemption centers.

[19]According to EPA, recyclables are bought and sold just like raw materials would be, and prices go up and down depending on supply and demand in the United States and the rest of the world.

- Sorting and processing recyclables. MRFs sort, clean, and bale recyclables and sell them to brokers or send them to landfills for disposal. Some materials, like plastics, may require further processing, such as secondary sortation—which can produce bales of more distinct materials with lower contamination rates—or turning these materials into small, uniform pellets that manufacturers can more easily use.
- Manufacturing new products. Manufacturers generally purchase bales of recyclables from brokers and use the recycled content to make new products.

Figure 2 shows the relationship among key actors at each of the four key stages of the U.S recycling system.

Figure 2: Key Stages and Actors in the U.S. Recycling System



Source: GAO analysis of Environmental Protection Agency and stakeholder views and documents. | GAO-21-87

Recycling Rates by Material

According to EPA estimates, roughly 24 percent of municipal waste generated in the United States was recycled in 2018, but recycling rates vary by material, as shown in table 1.[20]

Table 1: Recycling Rates for Commonly Recyclable Items, by Type of Material in 2018

Material type	Examples	Material type recycled (millions of tons)	Approximate U.S. recycling rate (percent)
Metals	Ferrous and nonferrous metals, such as aluminum and steel	9	34
Glass	Clear, brown, and green bottles	3	25
Plastics	Varies based on type of plastic	3	9
Paper	Newspaper, computer paper, boxes from food containers, cardboard boxes	46	68
Other items[a]	Mattresses, paint and paint cans, tires, batteries, plastic bags	Unavailable	Unavailable

Source: GAO presentation of Environmental Protection Agency information and stakeholder documents. | GAO-21-87

[a]Some items require recycling through other pathways outside common curbside recycling programs, such as batteries that can be returned to retailers for recycling.

Recycling rates vary for different reasons, such as demand for specific materials; consumer recycling participation; and contamination rates, which can differ by material. For example, according to stakeholders we

[20]Environmental Protection Agency, *Advancing Sustainable Materials Management: 2018 Fact Sheet.* EPA estimates the annual amount of material recycled using industry data based on the amount of recyclables that are baled for sale by MRFs. To calculate recycling rates, EPA divides the amount recycled by the amount of municipal waste generated, which includes residential commercial and institutional municipal waste and does not include some types of waste that end up in landfills, such as construction and demolition waste, municipal wastewater sludge, and nonhazardous industrial wastes. EPA estimates municipal waste generation from Commerce and industry data on domestic manufacturing adjusted for imports and exports and adjusted for the lifetime of products. In addition, EPA estimated wasted food generated from residential, commercial, and institutional sources, using data from curbside waste sampling studies and industry-specific studies in combination with demographic data and national, industry-specific business statistics. EPA also reports the amounts of municipal waste composted and combusted—which come from industry and state data—and food waste managed with other pathways—which come from various industry-specific studies and state-reported composting data, among other sources. Finally, EPA computes the amount landfilled by subtracting the combusted, recycled, composted, and food waste managed through other pathways volumes from the generation volumes. EPA's methodology for estimating the recycling rates is not designed to estimate how much of the baled materials is actually converted into new products. For example, a portion of the bales might not be used due to contamination or the quality of the materials in them. Recycling rates are approximate, given that, according to agency officials, EPA's estimates of recycling rates are based on data that are voluntarily reported, and stakeholders use varying methodologies for calculating recycling rates.

interviewed, demand for plastics with resin identification codes 1 and 2 is typically higher than demand for plastic types 3 through 7, which are typically sorted by MRFs into mixed bales and, therefore, may require additional sorting to reduce contamination.[21] Furthermore, municipal recycling programs typically accept some, but not all, of the various types of plastic, which are shown in table 2.[22]

Table 2: Types of Plastic

Resin Identification Code[a]	Type of plastic	Examples of plastic items
	Polyethylene terephthalate	Water bottles, some carpets, clothing
	High-density polyethylene	Detergent bottles, pipe, decking, flower pots, crates
	Polyvinyl chloride	Pipe, flooring, some carpets, binders, siding
	Low-density polyethylene	Compost bins, trash bags, shipping envelopes, decking, furniture
	Polypropylene	Hangers, cups, auto parts, plant pots, paint cans, straws
	Polystyrene	To go containers, CD cases, egg cartons, foam packaging
	Other	Auto parts, multilayer packaging, pouches, nylon, acrylic

Source: GAO analysis of Environmental Protection Agency data and stakeholder views and documents. | GAO-21-87

[a]Resin Identification Codes are numeric codes used to identify the primary type of plastic resin in a product and are not intended to convey information about recyclability.

[21]ASTM International, “Standard Practice for Coding Plastic Manufactured Articles for Resin Identification,” ASTM D7611 (West Conshohocken, PA: 2020). Resin Identification Codes are numeric codes used to identify the primary type of plastic resin in a product. There are seven categories of plastics, indicated by their Resin Identification Codes 1 through 7. The standards now specify that the number be placed within a solid triangle.

[22]Many types of plastic can be recycled; however, municipalities and waste haulers may only collect a subset of plastic types. Collection varies by municipality and waste hauler.

Municipal waste generation in the United States, per capita, has remained relatively constant since 1990, but by 2017 the share of plastics had increased by almost 61 percent, according to EPA.[23] At the current rate of growth, global demand for plastics is forecasted to triple by 2050, suggesting that plastics will continue to make up a significant percentage of the municipal waste generated in the United States.[24]

International Context Related to Plastic Recycling

Concerns about the economic, environmental, and health effects of plastic have led to international action.[25] For example, a European Union directive requires member states to implement EPR programs for specified single-use plastic products, meet minimum recycled content requirements for certain plastic beverage bottles beginning in 2025, and ban the sale of certain single-use plastic products, among other things. In addition, in 2019, the countries that are parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal agreed to an amendment that added certain plastic wastes to the list of other wastes covered by the treaty and requires parties to the treaty to obtain written consent before exporting these wastes to other countries.[26] Furthermore, in 2015, the United Nations set a Sustainable Development Goal of ensuring sustainable consumption and production patterns around the world, which includes recycling plastic.[27]

[23]Environmental Protection Agency, *Advancing Sustainable Materials Management: 2018 Fact Sheet;* and *Advancing Sustainable Materials Management: 2018 Tables and Figures*, *Assessing Trends in Material Generation and Management in the United States* (Washington, D.C.: November 2020).

[24]Closed Loop Partners, *Accelerating Circular Supply Chains For Plastics* (New York, NY: April 2019).

[25]United Nations Environment Program, *Single-Use Plastics: A Roadmap for Sustainability* (Nairobi, Kenya: 2018). Most plastics do not biodegrade. Instead, plastic slowly breaks down into smaller fragments, known as microplastics, and can take up to thousands of years to decompose. Plastic may be ingested by humans and wildlife, potentially affecting the food supply chain and human health.

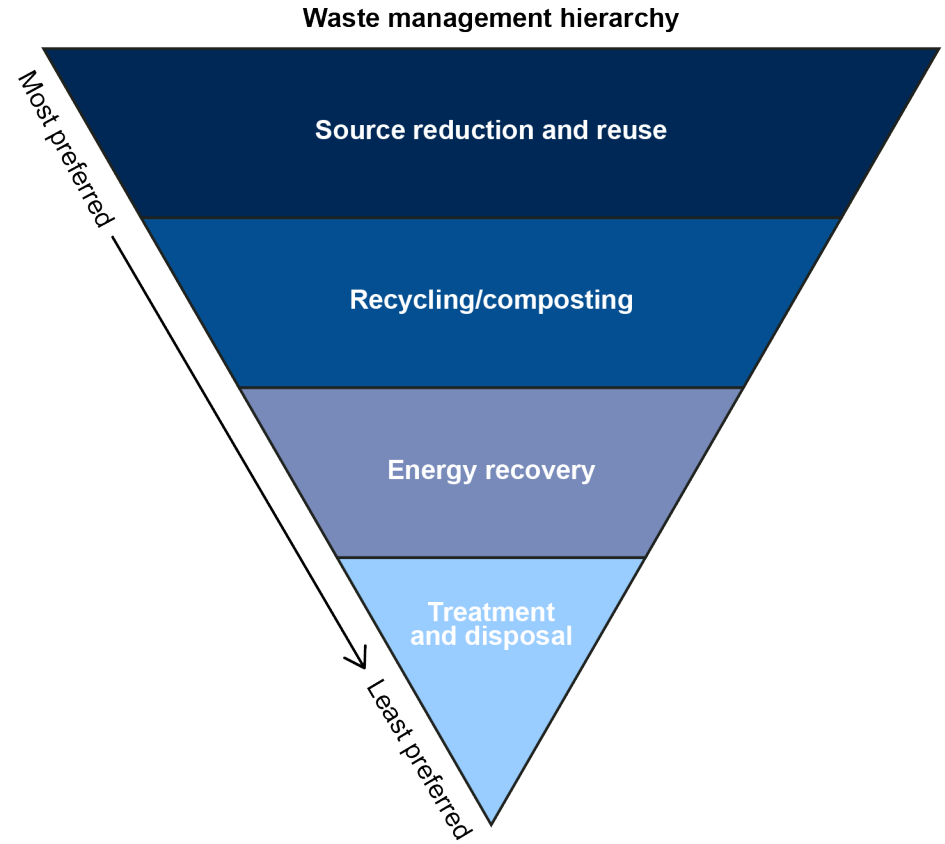
[26]The Basel Convention is a treaty that aims to protect human health and the environment against adverse effects resulting from the generation, transboundary movements, and management of hazardous and other waste. The amendment is set to take effect in 2021. The United States is not a party to the Basel Convention but, according to EPA, does participate in Basel Convention negotiations.

[27]United Nations Sustainable Development Goal 12.5 calls for member nations to substantially reduce waste generation through prevention, reduction, recycling, and reuse by 2030.

Recycling's Role in Waste Management Strategies to Reduce Environmental Effects

To help guide municipal waste management decision-making, EPA developed a hierarchy that ranks various municipal waste management strategies from most to least environmentally preferred, as shown in figure 3. For example, the hierarchy prioritizes waste prevention—reducing waste generation, such as reusing or donating items, reducing packaging, and redesigning products—as the preferred strategy, ahead of recycling. EPA's hierarchy considers treatment, such as reducing the toxicity and volume of waste, and disposal, such as landfilling and incineration, as the least environmentally preferred strategies.

Figure 3: EPA's Hierarchy of Preferred Waste Management Strategies



Source: Environmental Protection Agency (EPA). | GAO-21-87

EPA also promotes a sustainable materials management approach to waste management, which seeks to use and reuse materials in the most productive and sustainable way across their entire life cycles, from the

time they are produced to when they are used, reused, and ultimately recycled or discarded.[28] This life cycle approach is a "cradle to grave" assessment of the benefits and costs in the life cycle of a product, which can help decision makers find new opportunities to reduce environmental effects. For example, life cycle analyses have been used to evaluate recycling on a case-by-case basis, by comparing different packaging types that vary in their recyclability. In addition, life cycle analyses can help evaluate the short- and long-term economic, environmental, and health costs and benefits of using materials in different ways, such as recycling versus using virgin (i.e., new) materials. Some researchers have found that recycling does not always provide the highest environmental benefits.[29]

For example, Oregon's Department of Environmental Quality has used life cycle analyses to quantify the greenhouse gas and other environmental impacts of making, transporting, selling, and disposing of materials and has determined that the majority of environmental impacts are related to the design, production, and consumption of materials rather than their end-of-life management. As a result, Oregon developed a sustainable materials management vision that prioritizes waste prevention and other actions prior to materials entering the municipal waste stream, including reducing waste generation rates.[30] In addition, some recycling stakeholders are promoting a shift to a circular economy model that emphasizes a need to eliminate waste and pollution through improved design of products for durability, reuse, remanufacturing, and recycling to keep materials in use in perpetuity.

[28]EPA, *U.S. EPA Sustainable Materials Management Program Strategic Plan Fiscal Year 2017-2022* (Washington, D.C.: October 2015); and *Sustainable Materials Management: The Road Ahead* (Washington, D.C.: June 2009).

[29]Sustainable Materials Management Coalition, *Guidance on Life-Cycle Thinking and Its Role in Environmental Decision Making* (2014), 15. According to the Sustainable Materials Management Coalition, a public-private partnership that works with EPA to advance recycling, life cycle analyses of the environmental costs of alternative products has revealed that in some cases packaging goods in light-weight, but nonrecyclable, materials creates fewer greenhouse gas emissions compared with using recyclable packaging alternatives, such as steel. Jesse R. Catlin and Yitong Wang, "Recycling gone bad: When the option to recycle increases resource consumption," *Journal of Consumer Psychology*, vol. 23, no. 1 (2013): pp. 122-127. Researchers have found that when recycling is an option, people tend to consume more.

[30]State of Oregon Department of Environmental Quality, *Materials Management in Oregon: 2050 Vision and Framework for Action* (Portland, OR: 2012).

Five Cross-Cutting Challenges Affect Recycling in the United States

Through our analysis of stakeholder views, we identified five cross-cutting challenges that affect the efficiency and effectiveness of recycling in the United States.[31] These challenges are the (1) contamination of recyclables, (2) low collection of recyclables, (3) limited market demand for recyclables, (4) low profitability for operating recycling programs, and (5) limited information to support decision-making about recycling. Some stakeholders we interviewed also identified steps they have taken to address these challenges.

Contamination of Recyclables

According to our analysis of stakeholder views, high contamination rates in the U.S. recycling system increase the costs for collecting, hauling, sorting, and cleaning recyclables. For example, removing contamination can require additional equipment, labor, or time for MRFs. According to some stakeholders we interviewed, some items, such as thin plastic bags and films, while potentially recyclable when collected separately, cause contamination. These types of items are often collected through single-stream and dual-stream recycling programs and then get stuck in MRF equipment and require dangerous, time-consuming, and manual removal. Also, broken pieces of glass can contaminate other materials due to their small size. Incorrectly disposed materials can prevent MRF equipment from functioning properly and pose additional risks to workers. For instance, batteries can cause fires at MRFs, according to one MRF operator we interviewed. For these reasons, MRFs cannot process many contaminated materials, which adds to their operating costs, and instead they send otherwise recyclable materials to landfills or incinerators.

According to our analysis of stakeholder views, contamination also decreases the quality and quantity of recyclables, and this reduces the ability of manufacturers to incorporate recycled content into new products. For example, according to several stakeholders, manufacturers prefer high-quality recyclables because those recyclables are easier to use to meet their production requirements. In some cases, manufacturers must take additional processing steps and incur costs to add chemicals to contaminated plastics to meet their production requirements for color and clarity. In addition, concerns about contamination reduce the quantity of recyclables that manufacturers are willing to buy and the price they are willing to pay for them. One stakeholder cited an example of a

[31]We obtained these views by interviewing stakeholders about the key challenges at each stage of the recycling system–-generating, collecting, sorting and processing recyclables, and manufacturing new products—in addition to the steps they have taken to address those challenges.

manufacturer that was using recycled paper content but discontinued the practice as contamination increased.

According to several stakeholders we interviewed, contamination is due, in part, to confusion about what is and is not recyclable, and other beliefs, which leads consumers to attempt to recycle items that are nonrecyclable. Contamination rates vary across the United States but, according to stakeholders we interviewed who gather data on recycling, the national contamination rate—the amount of materials collected for recycling that are nonrecyclable—is estimated to be approximately between 15 and 25 percent. Several stakeholders we interviewed stated that some factors contributing to contamination include:

- Unclear labeling on products and packaging. According to stakeholders we interviewed, including national retailers, businesses vary in how they label their products for recyclability. These stakeholders told us that the U.S. recycling system has no widespread, commonly used standards for designating what constitutes a recyclable product or package. They said this can lead to consumer confusion and create difficulties for retailers that sell products across areas that have different recycling requirements. In addition, some stakeholders stated that the Resin Identification Code numbering system on plastic products and packaging is a potential source of consumer confusion because the code is not designed to convey recyclability but rather the type of plastic used to manufacture them, but consumers often rely on those codes to decide what to recycle.
- Variations in what is accepted in recycling programs and unclear messaging about those policies. According to stakeholders we interviewed, there are over 20,000 different recycling systems in the United States, and each has its own policies about what items to accept for collection. For example, some programs accept all types of plastic, whereas others only accept some plastics, such as plastic types 1 and 2. Confusion also arises when consumers move between recycling systems, because items that may be accepted in one location may not be accepted in other locations. According to stakeholders we interviewed, this fragmentation exacerbates challenges related to unclear labeling and makes it more difficult to establish consistent messaging that would aid consumers in making informed choices.
- Increasing complexity of packaging. The rising complexity of packaging increases contamination. For example, packaging with multiple material types, such as multiple types of plastic or plastic

mixed with metal, can render the entire items nonrecyclable because the other types of materials act as contamination. For example, plastic bottles and containers with metal caps may result in the entire item being treated as a metal item, which adds plastic contamination to the metal bales, because MRFs may sort recyclables based on the density of the items or using magnetic sortation equipment.

- Aspirational recycling. Consumers attempt to recycle items when they are not certain whether they are recyclable, hoping that they will be recycled. However, when a consumer attempts to recycle an item that is not accepted by that local program, it is treated as a contaminant.

Some stakeholders we interviewed told us they have successfully reduced contamination by improving consumer knowledge about recycling through informational labels for recycling collection bins, educational materials, and advertisements.

Low Collection of Recyclables

According to our analysis of stakeholder views, the U.S. recycling system collects a relatively small amount of potentially recyclable materials. In particular, approximately 17 percent of aluminum and less than 9 percent of plastics that are generated in the U.S. municipal waste stream are recycled, according to EPA's latest estimates.[32]

According to many stakeholders, the low collection of recyclables is due, in part, to consumers' limited access to recycling services and a lack of public trust in the recycling system, both of which lower participation rates. For example, some municipalities have drop-off centers rather than curbside pick-up, and this generally lowers participation rates because drop-off centers are less convenient for consumers. In addition, some municipalities have either reduced or stopped curbside collection programs due to the high operating costs. Cancelling collection programs lowers the participation rate because consumers have fewer opportunities to recycle. For example, municipal officials told us that some municipalities stopped glass collection due to high transportation costs and low market value. One stakeholder that tracks these cancellations since 2017 found that over 90 recycling programs have cancelled recycling services; however, due to negative public reactions and other reasons, 12 have resumed recycling collection.

[32]Environmental Protection Agency, *Advancing Sustainable Materials Management: 2018 Fact Sheet.* EPA's estimates rely on voluntary self-reporting.

In addition, according to some stakeholders, discouraging media coverage and consumer confusion over what can be recycled diminish public trust in the recycling system, which also lowers participation rates. For example, this discouraging media coverage includes stories about recyclables ending up as marine litter and recyclables being diverted to landfills. Some stakeholders we interviewed told us that they have increased participation rates through educational campaigns that aim to reduce consumer confusion.

Limited Market Demand for Recyclables

According to our analysis of stakeholder views, limited demand for U.S. recyclables leads to low market prices for recyclables. As a result, recycling programs may be unable to sell their recyclables at prices that would cover their costs, resulting in operating losses. For example, some stakeholders we interviewed cited examples of MRFs sending recyclables to landfills because they were unable to sell the recyclables at a price that would cover their operating costs. Several stakeholders interviewed stated that limited demand results from several factors, including the following:

- Recent changes to international markets. Recent changes, such as the Chinese government's decision to restrict imports of recyclables, have reduced demand for U.S. recyclables, especially plastic and paper. In addition, according to some stakeholders, changes to the Basel Convention that will go into effect in 2021 are expected to increase barriers to the international trade in recyclables, especially plastics. Furthermore, domestic markets that could lower transportation costs—such as MRFs and manufacturing facilities that are in close proximity—are limited, according to some stakeholders. States that previously relied extensively on exporting recyclables, such as Oregon and California, are now experiencing difficulty finding domestic markets for some recyclables, according to state officials we interviewed.
- Manufacturers' preferences. According to some stakeholders, manufacturers' demand for recycled content is low, in part due to concerns about its quality. As a result, some manufacturers prefer using virgin materials. For example, representatives of manufacturers told us that a challenge with using recycled plastics to create new products is that products that use recycled plastics may not match the manufacturer's preference for color, such as a bottle being cloudy or grey.
- Economic competitiveness of recycled content. According to some stakeholders we interviewed, recycled content is often not

economically competitive, as it is commonly more expensive, when compared with virgin materials, in part because of the high costs of operating recycling programs. For example, Commerce officials stated that virgin plastic is cheaper than recycled plastic because of the low price of shale natural gas, which is used to make virgin plastic. Some manufacturers have made commitments to use recycled content in their products and packaging, but in part, as these companies often operate on small margins, they are unwilling to pay more for recycled content than virgin materials. Some companies may be unable to meet their recycled content goals due to this and other reasons.

Some stakeholders we interviewed identified steps they have taken to increase demand. For example, some MRFs partnered with manufacturers, such as plastic processors, to increase the consistency and quality of recycled content. According to one stakeholder, these partnerships aim to increase manufacturers' demand for recyclables and raise the prices manufacturers are willing to pay for recycled content. According to some stakeholders, to stimulate demand, local or regional markets in close proximity to MRFs are needed to lower transportation costs and increase access to markets to make recycled content more economically competitive. One stakeholder, with EPA assistance, created a regional map to help connect MRFs to local manufacturers. In addition, in September 2020, California enacted a law establishing minimum recycled content for plastic beverage containers sold in the state beginning in 2022, in part because the state's recycling facilities were struggling to find markets for recycled materials.[33]

Low Profitability for Operating Recycling Programs

According to our analysis of stakeholder views, MRFs often are unable to meet their operating costs, and many MRFs operate at a loss. For example, research by one stakeholder recently found that the national average cost to MRFs of processing recyclables is approximately $82 per ton, but the average sale revenue is approximately $34 a ton.[34] These operational losses have, in some cases, led to the closure of recycling

[33]A.B. 793 (2019) (*codified at* Cal. Pub. Res. Code §§ 14549.3, 14547, 18017). This law generally requires that plastic beverage containers sold by a beverage manufacturer in the state on average contain no less than 15 percent recycled content by 2022, 25 percent by 2025, and 50 percent by 2030. In addition, beginning in 2023, the law imposes administrative penalties on beverage manufacturers that do not meet the minimum recycled content requirements. These penalties must be used to support the recycling, infrastructure, collection, and processing of plastic beverage containers in the state.

[34]The Recycling Partnership, *The State of Curbside Recycling in 2020* (Falls Church, VA: Feb. 13, 2020).

programs, increased recycling fees for consumers, or in payments from municipalities to MRFs to offset costs.

According to several stakeholders, many MRFs are old, space constrained, and use machinery that was designed primarily for paper sortation because paper was the material that was primarily processed for recycling when many MRFs were constructed. To keep up with changes to the materials used to make products and packaging, such as increases in the volume and complexity of plastics, MRFs often require expensive investments in new machinery and technology. However, stakeholders we interviewed stated that some MRFs have been unable to secure funding or financing for these upgrades, partially because their low profitability makes securing investments difficult.

Furthermore, according to some stakeholders, the lower costs of alternatives to recycling, such as tipping fees for landfilling waste—usually assessed in dollars per ton of materials dumped—can make it difficult to justify operating recycling programs.[35] According to MRF operators we interviewed, landfill tipping fees are often so low that it is more expensive to operate recycling programs than to send recyclables to landfills. Often, the cost of disposal of a product is not reflected in the price consumers pay for their recycling collection or garbage collection fees, so the additional cost of disposal is borne by municipalities or municipal waste programs, according to some stakeholders. For example, one stakeholder representing municipalities reported that an emergency flare, which may cost $1 to purchase, costs municipalities nearly $10 to dispose of safely.

Some states have enacted EPR requirements for certain materials to hold manufacturers financially responsible for the disposal of their products. For example, according to stakeholders from New York we interviewed, New York's EPR requirements for electronic waste have effectively reduced the costs to municipalities and MRFs to operate recycling programs.

[35]A landfill tipping or disposal fee is paid by a waste hauler to a waste management company in order to use a landfill. Landfill tipping fees vary widely, according to officials from states and municipalities we interviewed. Some stakeholders reported that tipping fees in areas with more space constraints, like the Northeast or near cities, may be higher than in less populated areas.

Limited Information to Support Decision-Making about Recycling

According to our analysis of stakeholder views, state, municipal, and industry stakeholders do not have enough information to support decision-making about recycling policies, programs, and initiatives, especially given the effects of recent developments, such as the Chinese government's National Sword policy. Based on our analysis of stakeholder views, information is limited in several areas, including the following:

- Recycling rates. EPA provides national data on recycling rates, but some stakeholders stated that EPA's data often do not make key distinctions important to decision makers or provide regional granularity and may not be timely. For example, EPA's recycling rate estimates do not account for whether recyclables actually were used to manufacture new products.[36] In addition, there is usually a long lag in reporting available data on recycling rates, in part because EPA relies on voluntary reporting from states, municipalities, and industry.[37] Furthermore, EPA does not report data at regional or local levels. However, states and municipalities vary in how they calculate recycling rates and collect data, which makes it difficult to compare recycling rates across jurisdictions. For example, San Francisco includes municipal wastewater treatment sludge and construction debris in its recycling rates, which increases its relative recycling rate, but most other cities, states, and the EPA do not. Stakeholders we interviewed also provided examples of interstate variation in data collection that may lead to difficulties in comparing regional or local data: Virginia requires only solid waste planning units or localities with a population of greater than 100,000 residents to report recycling data to the state annually; South Carolina's annual solid waste report indicates that county governments are required to report recycling data to the state, but not private companies or municipalities; and Florida uses a methodology for calculating the recycling rate that includes a renewable energy recycling credit system so that each megawatt produced by a renewable energy facility using solid waste as a fuel counts toward the state's recycling goal. In addition, companies often do not voluntarily report recycling data due to concerns about privacy and competitiveness.

[36]EPA defines recycling as the process of collecting and processing materials that would otherwise be thrown away.

[37]EPA's most recent report on national recycling rates contains information for 2018, including some data from before the Chinese government's National Sword policy went into effect.

- Life Cycle costs and benefits. Some state and municipal officials we interviewed identified life cycle cost assessment models as important tools to support decision-making about various municipal waste management and recycling strategies. However, according to these stakeholders, these models need improvement. For example, according to one stakeholder, EPA's life cycle assessment models provide useful information on greenhouse gas emissions but are often based on outdated data. In addition, according to some stakeholders, decision makers experience difficulties with current models and tools used to compare alternative municipal waste management approaches. For example, according to stakeholders, landfill tipping fees often do not factor in costs for municipalities required to address long-term environmental effects. According to one stakeholder, an incomplete accounting of the costs to maintain landfills may make recycling appear relatively more expensive, which may lead some communities to favor using landfills over recycling.

Some stakeholders have taken steps to improve the information available to support decision-making. For example, California and Oregon developed tools, such Oregon's Waste Impact Calculator, that state officials use to assess the life cycle environmental costs and benefits of different municipal waste management approaches to help develop policies that improve the sustainable management of materials in those states.

EPA, Commerce, DOE, and FTC Have Taken Actions That Advance Recycling, but EPA and Commerce Have Not Fully Met Statutory Requirements

EPA, Commerce, DOE, and FTC have taken actions that advance recycling in the United States, but EPA and Commerce have not fully met some statutory requirements, according to our review of agency documents and interviews with agency officials. EPA has not conducted certain studies and developed recommendations for administrative or legislative action on the effect of existing public policies on recycling and the necessity of imposing disposal charges on packaging and other manufactured goods, as required by RCRA. Commerce has not fully met its RCRA requirement to stimulate the development of markets for recyclables.

EPA Has Taken Several Actions That Advance Recycling but Has Not Met Certain Statutory Requirements

EPA has taken several actions in the following areas that advance recycling:

- Education, outreach, and technical assistance. EPA disseminates information and educational resources for different audiences about how to recycle on its website and through printed pamphlets, brochures, and other materials distributed at conferences. For example, EPA provides information on how to recycle common materials, such as paper, batteries, and plastics, and disseminates educational resources related to recycling, such as activities and toolkits for teachers and students. EPA also provides a downloadable guide for state and local governments to help standardize the measurement of recycling data, which EPA officials said the agency plans to update in 2021.[38] The guide includes instructions, example worksheets, and survey forms. In addition, through its WasteWise program, EPA provides tips, guidelines, and best practices to help businesses, governments, and nonprofit organizations establish and accomplish sustainable materials management goals. The program allows participants to publicize their achievements using a WasteWise logo.[39]
- Data collection and information sharing. EPA collects and shares data, develops software tools, and facilitates data-sharing among stakeholders to advance recycling and sustainable materials management. For example, EPA compiled and analyzed data on the economic impact of recycling and in 2016 released a report on the impact of recycling on jobs, wages, and tax revenues.[40] Also, EPA's State Data Measurement Sharing Program is an online tool that allows states to share information, such as how recycling programs are staffed and funded, to help promote the replication of successful recycling, reuse, and municipal waste reduction programs.[41] EPA's

[38]EPA, *Measuring Recycling: A Guide for State and Local Governments*, EPA 530-R-97-011 (Washington, D.C.: September 1997); and *National Framework for Advancing the U.S. Recycling System*, 530-F-19-008 (Washington, D.C.: November 2019).

[39]EPA, *WasteWise, 25th Anniversary 1994-2019*, 530-K-19-002 (Washington, D.C.: November 2019).

[40]EPA, *Advancing Sustainable Materials Management: 2020 Recycling Economic Information Report* (Washington, D.C.: December 2020).

[41]EPA Sustainable Materials Management: U.S. State Data Measurement Sharing Program landing page, accessed October 21, 2020, *https://www.epa.gov/smm/sustainable-materials-management-us-state-data-measurement-sharing-program*.

Waste Reduction Model is a downloadable software tool to help officials and organizations involved with solid waste planning to track greenhouse gas emissions reductions, energy savings, and economic impacts from several different municipal waste management practices.[42]

- Market development. To meet its RCRA requirement to develop guidelines for federal agencies and others to procure products with the highest percentage of recovered materials (i.e., recycled content), EPA produces the Comprehensive Procurement Guideline, which assists federal agencies and others in complying with the statutory requirement to procure such products.[43] According to a 2020 Federal Register Notice, this "buy-recycled" program seeks to harness the federal purchasing power to stimulate the demand for products made with recyclables.[44] According to an EPA report, the goal of this program is to encourage the use of materials recovered through recycling and thereby help to reduce the amount of municipal waste that is disposed.[45]

However, EPA has not met an RCRA requirement to conduct studies and develop recommendations for administrative or legislative action on (1) the effect of existing public policies, including subsidies and economic incentives and disincentives upon the recycling and reuse of materials and the likely effect of the modification or elimination of such incentives and disincentives upon the reuse, recycling, and conservation of such

[42]EPA Waste Reduction Model landing page, accessed October 27, 2020, *https://www.epa.gov/warm*.

[43]The Comprehensive Procurement Guideline is found in 40 C.F.R. pt. 247. The RCRA requirement for EPA to issue these guidelines is codified at 42 U.S.C. § 6962(e).

[44]85 Fed. Reg. 19473 (Apr. 7, 2020). On April 7, 2020, EPA published a notice in the *Federal Register* seeking public comments concerning the list of designated items and recommendations issued in the associated Recovered Materials Advisory Notices (85 Fed. Reg. 19473). According to this notice, buying products with recycled content fosters the diversion of materials from the solid waste stream and promotes the use of these materials in the manufacture of new products, strengthening the U.S.'s recycling system. EPA has designated 61 items in eight product categories and has issued recycled-content recommendations and procurement specifications for these items in a series of Recovered Materials Advisory Notices published in the *Federal Register*. According to EPA officials, as of September 2020, EPA is currently analyzing the comments received and determining next steps.

[45]EPA, *2007 Comprehensive Procurement Guideline Program*, EPA 530-F-07-044 (Washington, D.C.: October 2007).

materials;[46] and (2) the necessity and method of imposing disposal or other charges on packaging, containers, and manufactured goods, among other things, that would reflect the cost of final disposal, the value of recoverable components of the item, and any social costs associated with nonrecycling or uncontrolled disposal of such items.[47] For the purposes of this report, we refer to the first required study as a study of the effect of existing policies and the second required study as a study of EPR requirements.[48]

According to EPA officials we interviewed, EPA has not conducted these required studies on the effects of existing policies and EPR requirements because EPA instead prioritized other studies and activities to use its resources for advancing recycling efficiently.[49] For example, EPA conducted the statutorily required study about the extent to which guidelines and criteria for solid waste management and disposal facilities are adequate to protect human health and the environment from groundwater contamination.[50] In addition, according to these officials, EPA has not conducted these studies because RCRA prohibits EPA officers or employees, in an official capacity, from lobbying for or otherwise representing an agency position in favor of resource recovery or resource conservation as a policy alternative for adoption by state and local governments.[51] EPA officials stated that this policy might complicate how they report their findings because they would need to be careful to not represent an agency position on a specific existing state or local policy, although these officials acknowledged that this policy would not

[46]42 U.S.C. § 6985(a)(6).

[47]42 U.S.C. § 6985(a)(7). In economic theory, social costs are private costs borne by individuals directly involved in a transaction together with the external costs borne by third parties not directly involved in the transaction.

[48]In addition to EPR, other methods could be used to impose disposal or other charges on packaging, containers, and manufactured goods, such as direct disposal fees or taxes on consumers or producers.

[49]Such as Environmental Protection Agency, *Report to Congress: EPA Activities and Accomplishments under the Resource Conservation and Recovery Act: Fourth Quarter Fiscal Year 1986 through Fiscal Year 1987,* EPA 530-SW-88-007 (Washington, D.C.: December 1987).

[50]EPA*, Report to Congress: Solid Waste Disposal in the United States,* EPA 530-SW-88-011A (Washington, D.C.: October 1988).

[51]42 U.S.C. § 6983(g).RCRA states that upon request, the full range of alternative technologies, programs, or processes deemed feasible to meet the resource recovery or resource conservation needs of a jurisdiction shall be described in such a manner as to provide a sufficient evaluative basis from which the jurisdiction can make its decisions.

prevent the agency from conducting the required studies. However, it is not clear to us how this statutory prohibition on lobbying for, or taking a position on, the adoption of a policy alternative by state and local governments would prevent or complicate EPA's ability to write statutorily required reports with recommendations for administrative and legislative actions.

Several federal, state, and local policies affect the reuse, recycling, and conservation of materials. For example, state bottle bills encourage recycling, and several states have implemented EPR requirements for certain products, which may increase the recycling of those products. Conversely, federal and state tax incentives to the oil and gas industries that stimulate the production of virgin plastics from raw petroleum or natural gas may reduce manufacturers' demand for recycled plastic content when it is not cost-competitive with virgin plastics. Based on our analysis, this patchwork of policies across the United States contributes to the limited information to support decision-making about recycling, one of the cross-cutting challenges we identified through our analysis of stakeholder views.

Decision makers at all levels of government could benefit from more information on the effect of policy alternatives for municipal waste management and recycling. By conducting studies and developing recommendations for administrative or legislative action regarding the effect of existing policies and EPR requirements, EPA would provide itself, Congress, and other stakeholders with information to help them evaluate the effectiveness of various public policies on recycling, and Congress would have more information to inform potential deliberations about ways to advance recycling, including establishing EPR requirements. Because EPA has not been able to prioritize these studies to date, the agency would benefit from developing an implementation plan to guide how it will conduct these studies. Developing an implementation plan would allow EPA to consider these required studies within the context of other agency activities, determine how best to allocate available resources, and develop a time line for conducting these studies.

Commerce Has Taken Actions That Advance Recycling but Has Not Fully Met Its Requirement to Stimulate the Development of Markets for Recyclables

Commerce has taken actions in the following areas that advance recycling:

- Research, development, and technology. Commerce's National Institute of Standards and Technology conducts and funds research to develop standards and methods for classifying the quality of recyclables, which manufacturers can use to determine the quality of materials that are needed to meet their production requirements.[52] For example, the National Institute of Standards and Technology provides financial assistance for research to develop tools to characterize the quality of recovered plastic marine debris, such as the extent of weathering of plastic leaked into oceans, and its suitability for use as recycled content for manufacturing new products. National Institute of Standards and Technology officials stated that developing tools and standards to measure the quality of recycled content will help manufacturers incorporate more recycled content into their products. Furthermore, National Institute of Standards and Technology officials stated that its research activities help to build the foundation for the development of new markets for U.S. recyclables.
- Export market development. As part of its mission to strengthen the international competitiveness of U.S. industry, promote trade and investment, and ensure fair trade and compliance with trade laws and agreements, Commerce's International Trade Administration works with the Office of the U.S. Trade Representative and participates in international bodies, such as the Organization for Economic Cooperation and Development, to advance policies that promote U.S. exports, including recyclables.[53] The International Trade Administration also supports a federal advisory committee, which provides advice and guidance to the Environmental Trade Promotion Working Group of the Trade Promotion Coordinating Committee in the development and administration of programs to expand U.S. exports

[52]The National Institute of Standards and Technology is a nonregulatory federal agency within Commerce whose mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life.

[53]The U.S. Trade Representative is responsible for developing and coordinating U.S. international trade, commodity, and direct investment policy and overseeing negotiations with other countries. The Organization for Economic Cooperation and Development is an international organization representing 37 countries that researches a variety of economic, social, and governance issues to help member states better address the challenges of the global economy.

of environmental technologies, goods, services, and products.[54] Commerce officials stated that this federal advisory committee provides advice regarding promoting the export of recyclables. The International Trade Administration is also currently assisting U.S. businesses in developing export markets for recyclables, for example, by helping to plan a business development mission in Southeast Asia.

RCRA requires the Secretary of Commerce to stimulate the development of markets for recovered materials. In 2006, we reported that Commerce was not fully meeting its responsibilities under RCRA and recommended that Commerce develop and implement a strategy to stimulate the development of markets for recycled materials in the United States.[55] Commerce has not developed such a strategy or taken steps to stimulate the development of domestic markets but has continued to take actions to develop international markets for recyclables. Commerce and International Trade Administration officials we interviewed stated that Commerce had fulfilled its responsibilities under RCRA through various actions that Commerce took in the decade following the enactment of RCRA and through actions to develop export markets for recyclables.[56] In October 2020, Commerce officials told us that RCRA does not require the department to stimulate domestic markets. Instead, these officials said the statute leaves it to Commerce to determine how best to stimulate the development of markets for recyclables and, according to the officials, the stimulation of international markets fulfills Commerce's obligations under RCRA.

RCRA does not distinguish between stimulating the development of international versus domestic markets. However, in enacting RCRA, Congress found that the recovery and conservation of materials can

[54]The Secretary of Commerce was required by statute to establish this federal advisory committee, known as the Environmental Technologies Trade Advisory Committee. 15 U.S.C. § 4728(c)(1). The working group is a subcommittee of the interagency coordinating committee that was established pursuant to statute to address all issues with respect to the export promotion and financing of U.S. environmental technologies, goods, and services and develop a strategy for expanding exports of these items. 15 U.S.C. § 4728(b)(1). The interagency coordinating committee—the Trade Promotion Coordinating Committee—was also established pursuant to statute to provide a unifying framework to coordinate the export promotion and export financing activities of the U.S. government and develop a government-wide strategic plan for carrying out federal export promotion and export financing programs. 15 U.S.C. § 4727(a).

[55]GAO-07-37.

[56]The Secretary delegated authority for implementing this RCRA requirement to the International Trade Administration.

reduce the dependence of the United States on foreign resources and reduce the deficit in its balance of payments. In addition, one of RCRA's objectives is to establish a cooperative effort among federal, state, and local governments and private enterprise in order to recover valuable materials and energy from solid waste. Commerce's interpretation that RCRA does not require stimulation of domestic markets is not consistent with either the congressional finding or this statute's objective that is focused on domestic activities. Moreover, RCRA's legislative history suggests that Congress intended Commerce to stimulate markets within the United States as well as abroad because of the need for resource recovery projects to be in close proximity to product markets.[57] Furthermore, Commerce's current strategic plan includes a strategic objective on strengthening domestic commerce and the U.S. industrial base to enhance job creation.[58] As a result, Commerce is committed to stimulating the development of domestic markets, in general.

We believe that stimulating the development of domestic markets is an important component of the larger effort to stimulate the development of markets for U.S. recyclables. The need for domestic markets for recyclables has grown since 2006, when we recommended that Commerce develop and implement a strategy to stimulate the development of markets for recyclables in the United States. For example, due to recent trade restrictions by the Chinese government and other Southeast Asian nations, international demand for U.S. recyclables has declined. In addition, according to EPA officials, changes to the Basel Convention that will go into effect in 2021 may further reduce international demand for U.S recyclables by tightening restrictions on the export of certain plastics. According to one stakeholder we interviewed, export markets are unlikely to be reliable in the future because of the low international market demand for recyclables. Several stakeholders we interviewed stated that developing local or regional domestic markets would help to reduce the costs of transporting materials, which could increase the economic competitiveness of recyclables and increase the demand for U.S. recyclables used in domestic production.

However, since Commerce has not taken action to stimulate the development of domestic markets for recyclables, as we recommended in 2006, and since Commerce officials told us they interpret RCRA as not

[57]H.R. Rep. No. 94-1491, at 43 (1976).

[58]Department of Commerce, *Helping the American Economy Grow: 2018-2022 Strategic Plan* (Washington, D.C.: Feb. 13, 2018).

requiring the agency to do so, Congress may need to act to clarify Commerce's responsibilities under RCRA or assign this responsibility to another agency. In 1976, Congress made Commerce responsible for stimulating development of markets for recovered materials because of the agency's long-standing relationship with private enterprise as well as to avoid any potential conflicts of interest or institutional bias if EPA promoted technology while also researching, testing, and regulating technology.[59] Congress may still believe that Commerce is the appropriate agency for this type of market development activity or may now consider EPA or some other federal entity to be better positioned to accomplish such objectives. By taking action, Congress can help ensure that a federal agency will respond to the reduction in international demand for U.S. recyclables by stimulating the development of domestic markets.

DOE Has Provided Financial Assistance for Research and Development Activities That Advance Recycling

Since at least 2015, DOE has provided financial assistance, including grants, to support a number of academic, federal, and other research programs and other efforts that advance recycling. For example, in 2019, DOE launched the Plastics Innovation Challenge, a coordinated set of funding opportunities, partnerships, and programs to develop new recycling technologies; create new approaches to use recycled plastics in making new, high-value products; and develop new plastics that are recyclable by design and can be manufactured domestically.[60] In addition, in 2017, DOE entered into a cooperative agreement to establish and manage the REMADE Institute, which brings together industry, academia, government, and other stakeholders to collaborate on research to improve the overall energy efficiency of manufacturing through increased material reuse, recycling, and remanufacturing.[61] Furthermore, in February 2020, DOE signed a memorandum of understanding with the American Chemistry Council to collaborate on addressing various

[59]H.R. Rep. No. 94-1491, at 43-44 (1976).

[60]Among its goals, the Plastics Innovation Challenge aims to improve biological and chemical technologies to deconstruct plastic waste. As a part of this initiative, DOE announced an opportunity to submit research proposals for funding for up to $25 million in fiscal year 2021.

[61]GAO, *Advanced Manufacturing: Innovation Institutes Have Demonstrated Initial Accomplishments, but Challenges Remain in Measuring Performance and Ensuring Sustainability*, GAO-19-409 (Washington, D.C.: May 23, 2019); and *Advanced Manufacturing: Commerce Could Strengthen Collaboration with Other Agencies on Innovation Institutes,* GAO-17-320 (Washington, D.C.: Apr. 6, 2017).

challenges related to plastic recycling, such as by designing plastics to improve recyclability.[62]

DOE also has two programs focused on developing cost-effective technologies for recycling lithium-ion batteries, such as those used in electric cars. Specifically, ReCell is a research and development center developing new, energy-efficient recycling technologies, and the Lithium-Ion Battery Recycling Prize is a multiphase competition with monetary awards for identifying solutions for collecting, sorting, storing, and transporting spent lithium-ion batteries.

FTC Has Taken Enforcement Actions against Some Unfair and Deceptive Marketing Claims about the Recyclability and Recycled Content of Products

FTC enforces section 5 of the Federal Trade Commission Act, which prohibits unfair or deceptive practices in or affecting commerce.[63] FTC has issued Guides for the Use of Environmental Marketing Claims (Green Guides), which help companies avoid making environmental marketing claims that are unfair or deceptive, such as claims about a package being recyclable or recycled content in products.[64] For example, the FTC's Green Guides state that a product or package should not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item.

FTC is not required to issue, review, or update the Green Guides. However, FTC staff told us that they conduct research to better understand how consumers interpret various claims; solicit public comments; and, from time to time, make changes to the Green Guides based on this information. FTC first issued the Green Guides in 1992 and has updated them three times, most recently in 2012. According to these staff, FTC plans to begin considering updates to the guides again in 2022.

[62]Department of Energy, *Memorandum of Understanding between the Department of Energy and the American Chemistry Council on Plastics Innovation* (Washington, D.C.: Feb. 3, 2020).

[63]Under the act, a representation, omission, or practice is deceptive if it is likely to mislead consumers acting reasonably under the circumstances and is material to consumers' decisions. FTC considers three factors when determining whether a practice is unfair: (1) whether it injures consumers, (2) whether it violates established public policy, and (3) whether it is unethical or unscrupulous.

[64]16 C.F.R. pt. 260. The Green Guides explain FTC views about environmental marketing claims, including general environmental benefit claims, carbon offsets claims, compostable claims, degradable claims, free-of claims, nontoxic claims, ozone-safe claims, recyclable claims, recycled content claims, refillable claims, renewable energy claims, renewable materials claims, and source reduction claims.

FTC can take action under the FTC Act if an environmental claim is made that is inconsistent with the Green Guides. According to agency staff, FTC uses the Green Guides to inform decisions about pursuing enforcement for unfair or deceptive trade practices and works with other agencies, including EPA and DOE, to obtain technical expertise for investigating possible unfair or deceptive trade practices.[65] Between 1994 and 2019, FTC brought 15 enforcement actions in federal district court or as administrative proceedings against companies for falsely representing that their products were recyclable or that their products were made with recycled content, or both.[66] For example, FTC brought an enforcement action against a company for falsely representing that its paper plates were recyclable after ordinary use[67] and against another company for falsely advertising that its plastic lumber was made of 90-percent recycled plastic.[68] All of these enforcement actions resulted in the company being ordered not to make false representations about the recyclability of its products, the recycled content of the products, or both.[69]

[65]FTC staff stated that investigations often start either from a complaint—such as from an outside group or Congress—or from a targeted evaluation by FTC of an area of concern.

[66]Some of these enforcement actions also included additional claims of false representations that are not relevant to recycling.

[67]In the Matter of Keyes Fibre Company, 118 F.T.C. 150 (Aug. 2, 1994).

[68]In the Matter of N.E.W. Plastics Corp., FTC File No.132-3126 (Apr. 3, 2014).

[69]One of these enforcement actions was brought in federal district court and resulted in penalties being assessed against the company for violating an FTC order to refrain from making false representations about the recyclability of its products.

EPA Has Taken Several Actions to Plan and Coordinate National Efforts to Advance Recycling, but Opportunities Exist to Better Incorporate Desirable Characteristics

EPA has taken several actions to plan and coordinate national efforts to advance recycling in the United States, but opportunities exist to better incorporate desirable characteristics for effective national strategies and avoid potential fragmentation, overlap, and duplication in federal efforts. For example, in 2007, EPA convened a working group to develop a roadmap to accelerate the country's move toward sustainable materials management, including recycling, and EPA issued a report in 2009 that contained three recommendations from this working group.[70] The working group's recommendations called for EPA and state environmental agencies to (1) promote their efforts to manage materials and products on a life cycle basis; (2) build capacity, such as conducting research to support life cycle materials management, and integrate materials management approaches into existing government programs; and (3) accelerate the public dialogue on life cycle materials management.

Subsequently, EPA released a strategic plan for sustainable materials management that includes the following four objectives to focus agency efforts on advancing recycling in the United States:

(1) decreasing disposal rates through waste reduction, reuse, and recycling;

(2) reducing the environmental impacts of materials;

(3) increasing the socioeconomic benefits of materials management; and

(4) increasing the capacity of state and local governments, communities, and key stakeholders to adopt and implement sustainable materials management policies, practices, and incentives.[71]

In addition, EPA has an ongoing initiative to coordinate national recycling efforts with key stakeholders, such as states, local and tribal governments, businesses, and nonprofits. Specifically, in 2018, through its America Recycles initiative, EPA brought together 45 stakeholders who signed a pledge to begin working with EPA to identify specific actions to address the U.S. recycling system's challenges. As part of this initiative, EPA formed four working groups aligned to focus stakeholders' efforts on specific action areas: (1) promoting education and outreach;

[70]EPA, *Sustainable Materials Management: The Road Ahead.*

[71]EPA, *U.S. EPA Sustainable Materials Management Strategic Plan Fiscal Year 2017-2022.*

(2) enhancing materials management infrastructure; (3) strengthening recycling markets; and (4) enhancing measurement. According to EPA officials, the working groups have grown to over 290 stakeholders, including representatives from federal agencies.

In November 2019, EPA released a report that described the working groups' accomplishments and potential short-term activities, such as evaluating the feasibility of a national public relations campaign to lay the foundation for common messaging about recycling issues.[72] In addition, through its collaboration with the America Recycles enhancing materials management infrastructure working group, one stakeholder established a website that was designed as a place that communities and businesses can easily access for recycling tools, resources, and information on best practices.[73]

Further, in December 2019, the explanatory statement accompanying EPA's fiscal year 2020 appropriation directed EPA to develop, in collaboration with businesses, nonprofits, state and local governments, and other stakeholders, a national recycling strategy to strengthen and sustain the current recycling system, with recommendations for voluntary action to be reported to the appropriations committees by September 15, 2020.[74] In response to this directive, EPA released a draft national recycling strategy on October 5, 2020, for public comment that contains three strategic objectives.[75]

In our prior work, we identified desirable characteristics for effective national strategies, such as addressing why the strategy was produced,

[72]EPA, *U.S. EPA National Framework for Advancing the U.S. Recycling System* (Washington, D.C.: November 2019).

[73]The U.S. Chamber of Commerce Foundation manages this website. Beyond 34's Recycling and Recovery Resources Hub landing page, accessed August 31, 2020, https://www.beyond34.org/resources/.

[74]Explanatory Statement Accompanying the Further Consolidated Appropriations Act, 2020, 165 Cong. Rec. H11061, H11293 (Dec. 17, 2019), which directed EPA to submit the report on a national recycling strategy detailed in H.R. Rep. No. 116-100.

[75]EPA, *Draft National Recycling Strategy* (Washington, D.C.: Oct. 5, 2020). EPA's draft national strategy contains three strategic objectives for strengthening the U.S. recycling system, including (1) reducing contamination in the recycling stream, (2) increasing the processing efficiency of recycling infrastructure and technologies, and (3) improving domestic markets for U.S. recyclables.

what the strategy is trying to achieve, and who will implement it.[76] EPA has taken actions to implement some of these desirable characteristics, such as coordinating with stakeholders and developing goals.[77] Specifically, according to EPA officials, EPA coordinated with the Council on Environmental Quality; federal agencies, such as Commerce and DOE; and nonfederal stakeholders, including the members of the America Recycles working groups, to develop the draft national recycling strategy. In addition, in September 2020, EPA released a menu of potential draft performance measures for public comment that will be used to: (1) assess system-wide recycling performance; (2) reduce contamination in the recycling stream; (3) increase materials processing efficiency; and (4) strengthen domestic markets for recyclable materials.[78]

EPA announced a national recycling goal of increasing the recycling rate to 50 percent by 2030, as part of its recognition of America Recycles Day in November 2020. In addition, EPA announced an initial set of updated national recycling performance measures, one to support each of the three strategic objectives.[79] According to agency officials, EPA selected this initial set of performance measures to focus stakeholder efforts until EPA can make further progress in developing a range of recycling

[76]GAO-04-408T. GAO found that effective national strategies address (1) why the strategy was produced, the scope of its coverage, and the process by which it was developed; (2) the particular national problems and threats the strategy is directed toward; (3) what the strategy is trying to achieve, steps to achieve those results, as well as the priorities, milestones, and performance measures to gauge results; (4) what the strategy will cost, the sources and types of resources and investments needed, and where resources and investments should be targeted based on balancing risk reductions with costs; (5) who will be implementing the strategy, what their roles will be compared with others, and mechanisms for them to coordinate their efforts; and (6) how a national strategy relates to other strategies' goals, objectives, and activities and to subordinate levels of government and their plans to implement the strategy.

[77]GAO-04-408T. National strategies are documents that are national in scope, cutting across levels of government and sectors, and involving a large number of organizations and entities (i.e., the federal, state, local, and private sectors).

[78]EPA America Recycles: U.S. National Recycling Goals landing page, accessed September 3, 2020, https://www.epa.gov/americarecycles/us-national-recycling-goals. For example, to assess system-wide recycling performance, EPA proposed draft performance measures, or metrics, including the recycling rate, recycling access rate, participation rate, and the number of recycling-related jobs.

[79]EPA announced that it will measure and track (1) the percentage of contamination in recycled materials, (2) the percentage of materials successfully recycled through a recycling facility compared with the materials that the facility receives, and (3) the average price of a ton of recycled materials (also known as the commodity value) on the market.

performance measures for each of the strategic objectives. Furthermore, these officials stated that definitions and related terminology developed by the America Recycles working group on enhancing measurement will assist EPA's efforts to define and communicate the scope of these draft performance measures and the draft national strategy itself.[80] According to EPA officials, the agency plans to work with the America Recycles stakeholders throughout 2021 to establish baselines and national targets for measuring progress toward the new recycling goal. According to EPA officials, the agency plans to address the public comments on the draft national recycling strategy and finalize the strategy in early 2021.

However, based on our interviews with EPA officials, the draft national strategy will not incorporate some desirable characteristics for effective national strategies called for in our prior work. Specifically, EPA officials told us the draft recycling strategy will not (1) identify the resources and investments needed and balance the risk reductions with costs, (2) clarify the roles and responsibilities of participating entities, or (3) articulate how EPA and other federal agencies will implement the strategy and integrate the activities identified in the draft national recycling strategy with existing programs and activities.

EPA officials stated that fully incorporating desirable characteristics for effective national strategies requires significant time and resources. However, according to these officials, due to the short time frame the agency had to develop the draft national recycling strategy and the effects of Coronavirus Disease 2019 (COVID-19) on stakeholders, such as limited availability and scheduling complications, EPA was not able to fully incorporate these desirable characteristics into its draft national recycling strategy. Nevertheless, the officials said EPA will consider incorporating such practices as it finalizes the strategy and develops a plan for implementing it. By better incorporating desirable characteristics for effective national strategies as it moves forward with finalizing and implementing its strategy, EPA would better ensure that it is coordinating effectively with key stakeholders, would have greater assurances of the strategy's usefulness in making resource and policy decisions, and would

[80]For example, the America Recycles working group on enhancing measurement definition for the recycling rate is the percentage of the total amount of discarded or used materials generated that are utilized as feedstock for the manufacture of new products. In addition, the working group defines curbside contamination as the percentage of materials that residents place in their recycling collection that are not accepted in their curbside program or acceptable materials that have high amounts of residue.

better ensure accountability for its implementation. For example, EPA can better avoid the risks of potential duplication and overlap of fragmented recycling efforts by assigning specific roles and responsibilities to federal agencies and other entities to ensure that multiple entities are not conducting overlapping work and that the participants are working to accomplish all the desired outcomes.[81]

Conclusions

Recycling is a complex and dynamic issue with economic and environmental consequences that affect many stakeholders across the United States, including individuals, states, and businesses. Federal agencies have taken actions to develop programs and policies that advance recycling, and continued federal action could strengthen responses to the cross-cutting challenges affecting our nation's recycling system. In particular, EPA has been leading efforts by bringing together key stakeholders to identify specific actions to address the U.S. recycling system's challenges and is developing a national strategy to strengthen and sustain U.S. recycling. However, EPA has not taken steps to implement RCRA requirements to conduct studies and develop recommendations for administrative and legislative action about either existing policies or EPR requirements. These studies and recommendations would provide Congress and other decision makers with information to better assess the effectiveness of existing policies on U.S. recycling efforts and the potential for new policies to advance recycling in the United States. EPA would benefit from assessing its available resources, prioritizing these studies, and developing a time line for conducting these studies.

Furthermore, EPA's draft national strategy does not align with desirable characteristics for effective national strategies, such as identifying necessary resources; clarifying the roles and responsibilities of participating entities; and articulating how EPA will implement the strategy and integrate the activities with existing programs and activities. By taking steps to better incorporate certain desirable characteristics for effective national strategies as it finalizes and implements its national recycling strategy and goals, EPA will have greater assurance of the strategy's usefulness in making resource and policy decisions, better ensure

[81]GAO, *Fragmentation, Overlap, and Duplication: An Evaluation and Management Guide*, GAO-15-49SP (Washington, D.C.: Apr. 14, 2015). This guide can help identify when national strategies increase the risk of establishing fragmented, overlapping, or duplicative government programs. EPA officials stated that the agency supports employing principles and recommendations in the GAO fragmentation, overlap, and duplication evaluation and management guide to finalize the strategy.

accountability for its implementation, and better avoid potential duplication and overlap of fragmented recycling efforts.

Commerce has taken actions to advance recycling, in part by supporting export markets for U.S. recyclables. However, Commerce has not taken action to stimulate the development of domestic markets for recyclables, as we recommended in 2006. Yet since then, the need to stimulate the development of domestic markets for recyclables has only grown in importance as international demand for U.S. recyclables has declined. Moreover, according to EPA officials, recent changes to the Basel Convention that are set to take effect in 2021 may further reduce export markets for plastic recyclables. Stimulating the development of domestic markets could help address the reduced international demand for U.S. recyclables, which is a critical challenge facing our nation's recycling system. Since Commerce has not taken action on our 2006 recommendation and has stated that RCRA does not require it to stimulate the development of domestic markets for recyclables, Congress should determine how best to ensure the development of domestic markets for recyclables.

Matter for Congressional Consideration

Congress should consider clarifying whether the Secretary of Commerce's responsibility under RCRA to stimulate the development of markets for recyclables specifically includes domestic markets or assign that responsibility to another agency. (Matter for Consideration 1)

Recommendations for Executive Action

We are making the following three recommendations to EPA:

The Director of EPA's Office of Resource Conservation and Recovery should develop an implementation plan for conducting a study and developing recommendations for administrative or legislative action regarding the effect of existing public policies, and the likely effect of modifying or eliminating such incentives and disincentives, upon the reuse, recycling, and conservation of materials, as required by RCRA. (Recommendation 1)

The Director of EPA's Office of Resource Conservation and Recovery should develop an implementation plan for conducting a study and developing recommendations for administrative or legislative action regarding the necessity and method of imposing disposal or other charges on packaging, containers, vehicles, and other manufactured goods to reflect the cost of final disposal, the value of recoverable components of the item, and any social costs associated with

nonrecycling or uncontrolled disposal, as required by RCRA. (Recommendation 2)

The Director of EPA's Office of Resource Conservation and Recovery should, while EPA finalizes and implements its national recycling strategy, incorporate desirable characteristics for effective national strategies, including (1) identifying the resources and investments needed, and balancing the risk reductions with costs; (2) clarifying the roles and responsibilities of participating entities; and (3) articulating how it will implement the strategy and integrate new activities into existing programs and activities. (Recommendation 3)

Agency Comments

We provided a draft of this report to Commerce, DOE, EPA, and FTC for review and comment. Commerce and FTC provided technical comments, which we incorporated as appropriate. DOE told us that it had no comments on the draft report. In its comments, reproduced in appendix II, EPA concurred with our findings, conclusions, and recommendations.

In response to our recommendations that EPA should develop an implementation plan for conducting studies and develop recommendations for administrative or legislative action about existing policies and EPR requirements, EPA stated that it anticipates that the agency could address these recommendations through an action identified in its draft national recycling strategy to conduct an analysis of different state and local polices that could help address challenges to recycling.

In response to our recommendation that EPA incorporate desirable characteristics for effective national strategies, EPA stated that it agrees with incorporating these characteristics as it finalizes and begins implementing its national recycling strategy. Further, EPA stated that it intends to finalize its national recycling strategy in the spring of 2021 and developing an implementation roadmap by the fall of 2021.

We are sending copies of this report to the appropriate congressional committees, the Administrator of EPA, the Secretary of Commerce, the Secretary of Energy, the Chairman of the Federal Trade Commission, and other interested parties. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or gomezj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last

page of this report. GAO staff who made key contributions to this report are listed in appendix III.

J. Alfredo Gómez
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

Our objectives were to (1) identify cross-cutting challenges affecting recycling in the United States, (2) examine the extent to which selected federal agencies have taken actions that advance recycling in the United States, and (3) assess the extent to which the Environmental Protection Agency (EPA) has taken actions to plan and coordinate national efforts that advance recycling in the United States.

To address all three objectives, we reviewed reports related to recycling by federal agencies, such as EPA. We also interviewed knowledgeable officials and staff engaged in recycling issues from the Congressional Research Service, the Council on Environmental Quality, the Department of Commerce (Commerce), the Department of the Interior, the Department of State, the Department of Energy (DOE), EPA, the Food and Drug Administration, the Federal Trade Commission (FTC), the National Science Foundation, and the Office of the U.S. Trade Representative. To obtain information about the context and policy issues related to recycling, we also attended various conferences, webinars, and workshops on issues related to recycling sponsored by EPA and nonfederal stakeholders, such as nonprofits and industry. For example, we attended the February 2020 Plastics Recycling Conference and Trade Show in Nashville, Tennessee.

To examine cross-challenges affecting recycling in the United States, we interviewed representatives of six different types of nonfederal stakeholders: (1) state, local, and tribal governments; (2) academic researchers; (3) nonprofit organizations; (4) businesses, including retailers and manufacturers; (5) trade associations; and (6) waste haulers. We identified 79 representatives of these nonfederal stakeholders through a snowball approach, in which we interviewed federal and nonfederal stakeholders for recommendation of other key stakeholders to include in this review, reviewed stakeholder documents, and attended webinars and conferences. We selected a nongeneralizable sample of 30 nonfederal stakeholders based on six criteria that we considered through our review of stakeholder documents and interviews with agency officials: (1) knowledge and experience; (2) how active the stakeholder has been in recycling issues, such as whether the stakeholder has identified key challenges or proposed recommendations to address specific challenges; (3) prominence of the recommendations for that stakeholder; (4) geographical representation; (5) differentiation of viewpoints, such as whether they represented state and local governments or private industry; and (6) minimum representation of at least three within each stakeholder group. We contacted each of these stakeholders up to 3 times to request an interview, and 27 stakeholders

accepted our request to be interviewed. The views of the 27 nonfederal stakeholders we interviewed are not generalizable to all nonfederal stakeholders, but they provide illustrative examples of research on recycling, challenges facing recycling in the United States, and actions nonfederal stakeholders are taking to address those challenges. Some nonfederal stakeholders we interviewed fell into more than one of the six stakeholder types. For example, some municipalities and waste haulers we interviewed also operate public or privately owned material recovery facilities (MRF).

We structured our interviews with nonfederal stakeholders around four phases of the materials production and recycling process, adapted from EPA information, including (1) generating, (2) collecting, (3) sorting and processing recyclables, and (4) manufacturing new products. For each of these phases, we asked stakeholders about their views of key challenges and opportunities and their current activities. In addition, we asked stakeholders about challenges and opportunities regarding recycling data; how recycling impacts their organizational goals; and their views on a list of specific government policies that have been adopted by states or local governments, such as bottle bills, single-use plastic bans, minimum recycled content requirements, and extended producer responsibility (EPR) requirements, and whether such policies would be beneficial at a national level. We asked stakeholders about their views on recycling in general and also by material type, such as plastic and glass. We also asked selected stakeholders to provide information about the effects of Coronavirus Disease 2019 (COVID-19) on the recycling system.

In addition, we interviewed some international stakeholders, such as officials from the British Columbia provincial government in Canada, in order to obtain contextual sophistication and provide illustrative examples of key steps other governments have taken, best practices and lessons learned they identified, challenges and factors they encountered to implement those steps to increase recycling, and the steps they have taken that may impact the market for U.S. recyclable materials.

To examine the extent to which selected federal agencies have taken actions that advance recycling in the United States, we reviewed the activities of 10 agencies, identified through discussions with EPA and other stakeholders, and determined that four agencies have taken steps that have the effect of advancing recycling, even if these activities were not designed to advance recycling: (1) EPA has promoted research, training, and educational programs related to recovering materials; (2) Commerce undertook a number of actions required under the Resource

Conservation and Recovery Act (RCRA) to encourage the development of new uses for recovered materials in the decade following the enactment of RCRA in 1976, according to Commerce officials we interviewed; (3) DOE provides financial assistance for certain recycling programs and research because of the growing consumption of materials and the importance of manufacturing materials in an energy efficient manner;[1] and (4) FTC brings enforcement actions against unfair and deceptive trade practices, and FTC produces the Guides for the Use of Environmental Marketing Claims (Green Guides), which provide the FTC's views about unfair and deceptive environmental marketing claims, including claims about a product or packaging being recyclable and the recycled content of products and packaging.[2] In addition, we reviewed federal statutory requirements, such as RCRA requirements for Commerce and EPA, and compared them with federal programs and activities that the agencies identified. Furthermore, we determined that the information and communication component of federal standards for internal control were significant to this objective, along with the underlying principles that management should internally and externally communicate the necessary quality information to achieve the entity's objectives.[3]

To assess the extent to which EPA has taken actions to plan and coordinate national efforts that advance recycling in the United States, we asked knowledgeable EPA officials about the extent to which they incorporated desirable characteristics for effective national strategies that we identified in our prior work (see table 3).[4]

[1]DOE has also taken steps that advance recycling because most energy consumption within the energy-intensive manufacturing subsectors is used to convert raw materials into end products and, therefore, technologies that enable the recycling, reuse, and remanufacturing of materials can have significant energy and cost savings.

[2]The FTC's Green Guides are codified at 16 C.F.R. pt. 260.

[3]GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: September 2014). We reviewed whether EPA had implemented these principles in addressing federal statutory requirements.

[4]GAO, *Combating Terrorism: Evaluation of Selected Characteristics in National Strategies Related to Terrorism*, GAO-04-408T (Washington, D.C.: Feb. 3, 2004).

Table 3: Summary of Desirable Characteristics for a National Strategy

Desirable characteristic	Description
Purpose, scope, and methodology	Addresses why the strategy was produced, the scope of its coverage, and the process by which it was developed.
Problem definition and risk assessment	Addresses the particular national problems and threats the strategy is directed toward.
Goals, subordinate objectives, activities, and performance measures	Addresses what the strategy is trying to achieve; steps to achieve those results; as well as the priorities, milestones, and performance measures to gauge results.
Resources, investments, and risk management	Addresses what the strategy will cost, the sources and types of resources and investments needed, and where resources and investments should be targeted based on balancing risk reductions with costs.
Organizational roles, responsibilities, and coordination	Addresses who will be implementing the strategy, what their roles will be compared with others, and mechanisms for them to coordinate their efforts.
Integration and implementation	Addresses how a national strategy relates to other strategies' goals, objectives, and activities, and to subordinate levels of government and their plans to implement the strategy.

Source: GAO. | GAO-21-87

To determine whether EPA was incorporating each desirable characteristic, we asked EPA officials about the processes they were using to develop the national strategy. We also interviewed other stakeholders, such as the Council on Environmental Quality and state officials, to determine the nature of their collaboration, if any, for developing the national recycling strategy, and we reviewed the draft national strategy to identify whether there was an example of the desirable characteristic. We highlighted specific desirable characteristics that EPA had not incorporated that we believe are critical to ensure the success of the national recycling strategy. For example, we asked EPA about the extent to which the draft national recycling strategy will identify the costs, resources, or investments needed; assign specific roles or responsibilities to participating stakeholders; or identify how the strategy will be implemented, and EPA officials stated that the draft national strategy will not incorporate these characteristics. Furthermore, we determined that the information and communication component of federal standards for internal control were significant to this objective, along with the underlying principles that management should internally and externally communicate the necessary quality information to achieve the entity's objectives.[5]

[5]GAO-14-704G. We reviewed whether EPA had implemented these principles in developing the draft national recycling strategy.

We conducted this performance audit from August 2019 to December 2020, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the U.S. Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 07 2020

OFFICE OF
LAND AND EMERGENCY
MANAGEMENT

Mr. Alfredo Gomez
Director
Natural Resources and Environment
U.S. Government Accountability Office
Washington, D.C. 20548

Dear Mr. Gomez:

Thank you for the opportunity to review and comment on GAO's draft report, "GAO-21-87, RECYCLING: Building on Existing Federal Efforts Could Help Address Cross-Cutting Challenges." The purpose of this letter is to provide the U.S. Environmental Protection Agency response to the draft report's findings, conclusions, and recommendation(s).

As you know, in the last three years, EPA has convened stakeholders from across the recycling sector to address the challenges that the United States faces in recycling the current material stream. Since November 2018, over 290 organizations and entities have signed the America Recycles Day Pledge to work together to address the challenges facing our nation's recycling system in order to identify solutions that create a more resilient materials economy and protect the environment. In this report, GAO has identified many of the same challenges that EPA has identified and worked to address. Because of the significant overlap in EPA's recycling work and GAO's recommendations, EPA agrees that the identified actions in GAO's recommendations can help improve the recycling stream.

GAO's draft report identified five cross-cutting challenges affecting the U.S. recycling system: (1) contamination of recyclables, (2) low collection of recyclables, (3) limited market demand for recyclables, (4) low profitability for operating recycling programs, and (5) limited information to support decision making about recycling. The cross-cutting challenges GAO identified are similar to the objectives EPA identified in the draft National Recycling Strategy: (1) reduce contamination in recycling, (2) make our recycling processing system more efficient, and (3) strengthen economic markets for recycled materials. According to the report, assistance is needed from the federal government to help address these challenges. EPA has taken significant actions to advance recycling in the United States—bringing together stakeholders to find effective solutions through creating the America Recycles Day Pledge and hosting three annual National Recycling Summits and two Innovation Fairs—and continues to push for further progress as evidenced by the recently announced ambitious National Recycling Goal to recycle 50 percent of materials by 2030.

EPA appreciates the revisions the GAO made to this report in response to comments the Agency provided on the draft Statement of Facts. EPA does not have any further comments on the findings or conclusions provided in this draft report. EPA responses to GAO's recommendations are:

GAO Recommendation 1:

The Director of EPA's Office of Resource Conservation and Recovery should develop an implementation plan for conducting a study and developing recommendations for administrative or legislative action regarding the effect of existing public policies, and the likely effect of modifying or eliminating such incentives and disincentives, upon the reuse, recycling, and conservation of materials, as required by RCRA.

GAO Recommendation 2:

The Director of EPA's Office of Resource Conservation and Recovery should develop an implementation plan for conducting a study and developing recommendations for administrative or legislative action regarding the necessity and method of imposing disposal or other charges on packaging, containers, vehicles, and other manufactured goods to reflect the cost of final disposal, the value of recoverable components of the item, and any social costs associated with non-recycling or uncontrolled disposal, as required by RCRA.

EPA Response to Recommendations 1 and 2:

We anticipate that Action 1.2.2 of EPA's draft National Recycling Strategy to conduct an analysis of different state and local policies that could address recycling challenges will address GAO's recommendations to conduct the studies outlined in RCRA 42 U.S.C. § 6985(a)(6) and 42 U.S.C. § 6985(a)(7). Accordingly, EPA agrees with the recommendations and the Agency anticipates finalizing the National Recycling Strategy in the spring of 2021 and developing an implementation roadmap by the fall of 2021.

GAO Recommendation 3:

The Director of EPA's Office of Resource Conservation and Recovery should, while EPA finalizes and implements its national recycling strategy, incorporate desirable characteristics for effective national strategies, including (1) identifying the resources and investments needed, and balancing the risk reductions with costs, (2) clarifying the roles and responsibilities of participating entities, and (3) articulating how it will implement the strategy and integrate new activities into existing programs and activities.

EPA Response to Recommendation 3:

GAO's recommendation is consistent with EPA's ongoing work and future plans for engagement with stakeholders to improve the recycling system in the United States. Accordingly, EPA agrees with the recommendation to incorporate the three characteristics identified as the Agency finalizes and begins implementing the National Recycling Strategy. EPA intends to finalize the

National Recycling Strategy in the spring of 2021 and develop an implementation roadmap by the fall 2021.

In conclusion, the EPA agrees with the GAO's findings, conclusions, and recommendations and thanks the GAO for the opportunity to review the draft report. GAO can contact Kecia Thornton at Thornton.Kecia@epa.gov or 202-566-1913 with any further questions or informational needs.

Sincerely,

Wright, Peter Digitally signed by Wright, Peter Date: 2020.12.07 06:18:49 -05'00'

Peter C. Wright
Assistant Administrator

cc: Barry Breen, OLEM
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Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

J. Alfredo Gómez, (202) 512-3841 or gomezj@gao.gov

Staff Acknowledgments

In addition to the contact named above, Chad M. Gorman (Assistant Director); Joseph Capuano (Analyst-in-Charge); Mark Braza; Lilia Chaidez; Gretel Clarke; John Delicath; Skip McClinton; Jeanette Soares; Sara Sullivan; and Sarah Veale made key contributions to this report.

Related GAO Products

Science and Tech Spotlight: Consumer Electronics Recycling. GAO-20-712SP. Washington, D.C.: August 31, 2020.

Marine Debris: Interagency Committee Members Are Taking Action, but Additional Steps Could Enhance the Federal Response. GAO-19-653. Washington, D.C.: September 25, 2019.

Food Loss and Waste: Building on Existing Federal Efforts Could Help to Achieve National Reduction Goal. GAO-19-391. Washington, D.C.: June 21, 2019.

Advanced Manufacturing: Innovation Institutes Have Demonstrated Initial Accomplishments, but Challenges Remain in Measuring Performance and Ensuring Sustainability. GAO-19-409. Washington, D.C.: May 23, 2019.

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