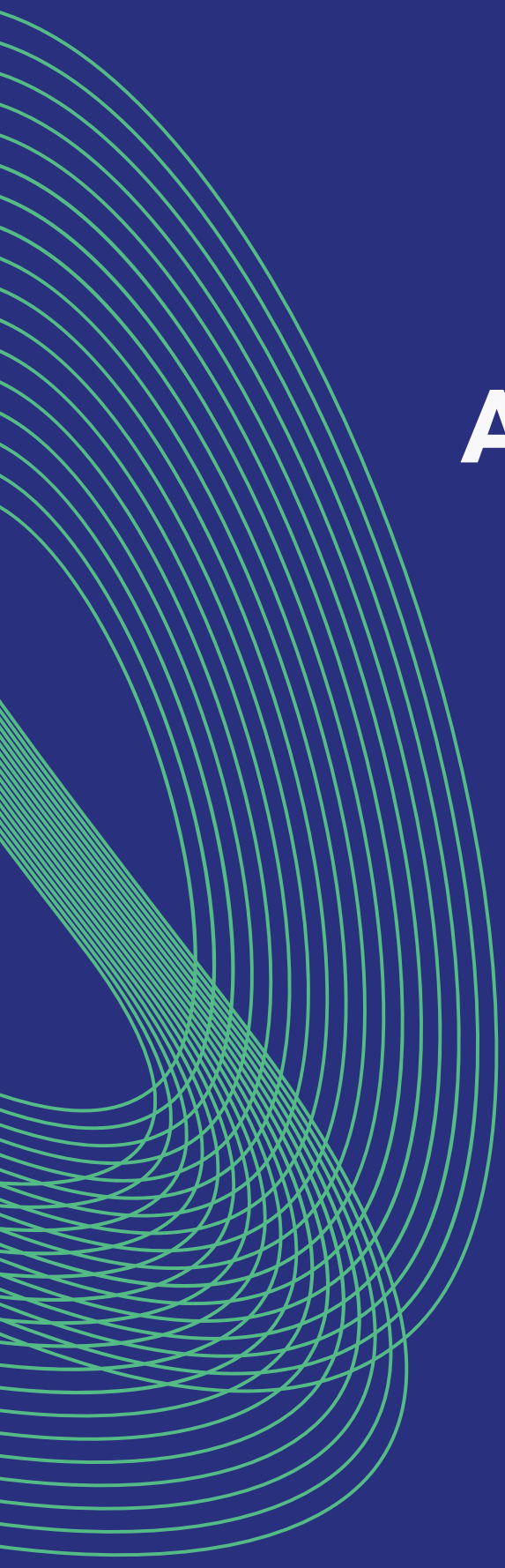
# 2024 FEDERAL CIRCULARITY AUDIT & REPORT



CIRCULAR ECONOMY COALITION

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# EXECUTIVE SUMMARY

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# Executive Summary

The United States (U.S.) Circular Economy Coalition is excited to release its first "Federal Circularity Audit and Report" to identify how the US government is encouraging increased adoption of circularity practices by corporations and companies operating in the U.S. This is a critical effort to ensure the U.S. private sector has the tools to lead on these efforts while the federal government remains efficient in its efforts to promote circularity.

Today, the U.S. economy is largely linear. We extract materials and resources, process them into products, use them for a finite period of time, and then largely discard them at the end of life. This model has significant impacts on society and the environment, including contributing to negative environmental consequences, domestic resource inefficiency, and supply chain strain.

A more circular economy would fundamentally change this linear model by, preserving resources at their highest possible value for as long as possible, through reuse, recycling, and recovery. Moreover, these activities contribute to the goal of increasing domestic resiliency and reducing environmental and social impacts, from materials' lifespans and associated waste. A circular economy is not an end in itself, but a path to thoughtful resourcefulness that improves materials management and costs, and reduces energy consumption and greenhouse gas emissions.

One clear benefit of a more circular economy would be the reduction of waste going to landfills which would contribute to a reduction in methane emissions. Methane is a highly potent greenhouse gas (GHG) that, according to the Intergovernmental Panel on Climate Change (IPCC) "has a Global Warming Potential (GWP) that is about 80 times greater than carbon dioxide over the first 20 years after it is released into the atmosphere."[1] Moreover, the release of methane emissions has significantly increased over time. According to the United Nations' (UN) 2021 Global Methane Assessment, modern methane release is about 262% of pre-Industrial Revolution levels. Furthermore, the true impact may be greater than we currently believe. A 2024 Harvard University report found that methane emissions from landfills may be as much as 77% higher than the U.S. Environmental Protection Agency's (EPA) estimates.[2] In addition to improving environmental outcomes, methane reduction can improve economic outlooks as well; the Global Methane Assessment estimates that each ton of methane reduced is worth approximately $4,300 in market and non-market impacts.[3]



1 IEA 2021
2 Burrows 2024
3 United Nations Environment Programme and Climate and Clean Air Coalition 2021

# Executive Summary

The formation of the U.S. Circular Economy Coalition is a recognition of these economic and environmental challenges and opportunities from a growing consensus of private sector companies and local governments which acknowledge the importance of employing strategies and technologies to use materials to their highest and best use. As a coalition, our goal is to create better opportunities for more corporations to practice circularity, which will achieve measurable, positive outcomes across the value chain.

**How does the federal government define a circular economy?**

According to the EPA, "a circular economy keeps materials and products in circulation for as long as possible." Moreover, the government refers to an economy that:

- Uses a systems-focused approach and involves industrial processes and economic activities that are restorative or regenerative by design,
- Enables resources used in such processes and activities to maintain their highest value for as long as possible, and
- Aims for the elimination of waste through the superior design of materials, products, and systems (including business models).

In other words, a circular economy marks a change to the model in which resources are mined, made into products, and then become waste. A circular economy reduces material use, redesigns materials and products to be less resource intensive, and recaptures "waste" as a resource to manufacture new materials and products.

In recent years, two significant pieces of legislation have enabled the U.S. government to begin to embrace a circular economy. The first is *Save Our Seas 2.0 Act* in 2020, and the 2021 Bipartisan Infrastructure Law (BIL). While *Save Our Seas 2.0 Act* helped define circularity and authorized new initiatives, BIL helped fund those programs.

**Analysis of federal government support for circularity**

The federal government continues to define and identify strategies to implement circularity. It has worked on developing a variety of strategies and solicited public comments. While the merits of circularity are mentioned in these strategies, and components of circularity are incentivized, the strategies themselves do not appear to address all aspects of circularity.

# Executive Summary

Federal assistance programs have helped encourage elements of circularity, but do not cover the breadth of business activities. In compiling this report, we found that many federal strategies and programs focus on recycling and reducing waste rather than promoting a fully recognized circularity model. The areas of interest by the federal government to date have focused mostly on reducing plastic waste via recycling. However, considerations for manufacturing and longevity are increasingly becoming sustainability criteria for grants. We also found only the more recent grants explicitly reference circularity. However, this does not mean grants have not supported circularity in the past. For example, some recurring grant programs have focused on recycling, supply chain, and sustainability, which are meaningful elements of circularity.

**This report examines programs and funding from five US government agencies:**

1. Environmental Protection Agency (EPA)
2. Department of Energy (DOE)
3. United States Department of Agriculture (USDA)
4. National Institute of Science and Technology (NIST)
5. General Services Administration (GSA)

**Finally, we conclude with recommendations for the U.S. federal government to increase its focus on circularity in order to:**

- Meet U.S. climate change goals,
- Create more opportunities for industry participation in a circular economy, and
- Become an international leader.

The Circular Economy Coalition is honored to share our First Annual Circularity Audit & Report, and we look forward to capturing even more federal circularity support in future annual reports. For more information on the Coalition and our goals, please visit https://www.uscecoalition.org.

# BACKGROUND

CIRCULAR ECONOMY COALITION

# Background

**Why we did this report**

This report provides a snapshot of how the federal government is participating as an entity and encouraging others to participate in a circular economy. We also wanted to begin to understand the federal government's level of maturity when it comes to participating in the circular economy. As the U.S. Circular Economy Coalition (CEC) continues to track the government's participation, we hope to assess the government's increasing circularity support, as well as identify areas for improvement.

**Definition**

Circularity, or "the circular economy," means building resourcefulness into a business activity or product. As a result, a circular economy keeps materials and products in circulation for as long as possible and reduces the need for new materials and disposal options for reusable materials.

Congress defined "circular economy" under the *Save Our Seas 2.0 Act of 2020* which refers to an economy that uses a systems-focused approach and involves industrial processes and economic activities that are restorative or regenerative by design, enabling resources used in such processes and activities to maintain their highest value for as long as possible, and aims for the elimination of waste through the superior design of materials, products, and systems (including business models).

**Circularity can be applied to any stage of a product's life and can include:**

1. Designing a product thoughtfully, sourcing materials that have as little environmental impact as possible to ensure clean air and clean water,
2. Using materials that are durable,
3. Using materials that are recycled and recyclable,
4. Salvaging discarded materials,
5. Enabling consumers to extend the life of a product through repair, refurbishment, or reusing parts,
6. Reusing products or components as long as possible,
7. Planning for the end of a product's life and making the consumer aware of recycling options,
8. Reusing byproducts from industrial processes,
9. Avoiding landfilling,
10. Limiting waste across the supply chain, and
11. Developing federal policies and incentives to reduce waste or use recycled content.

# Background

| Federal Government Areas of Interest and Industry Sectors | |
|---|---|
| *Circularity* AOI | *Industry/Technology AOI* |
| Recycling and recovery<br>Longevity<br>Reuse and remanufacturing | Energy<br>- Batteries<br>- Electric Vehicles<br>Critical Materials<br>Plastics<br>Textiles<br>Digital/Computers<br>Building Materials<br>Food |

**Why Circularity Matters**

The U.S. federal government (as noted by the EPA) understands that recycling alone will not be enough to ensure clean air and clean water and eliminate pollution while also fostering domestic resilience in acquiring critical minerals and energy sources.

By practicing circularity, businesses acknowledge the limited nature of available resources and become part of a solution for long-term sustainability. Circularity, when done efficiently and with the appropriate level of government support, may also realize business gains by reducing the costs of cultivating new materials.

A circular economy reduces material use, redesigns materials and products to be less resource intensive, and recaptures “waste” as a resource to manufacture new materials and products.

**Methodology/Scope for Report**

We looked at key U.S. federal government policies as outlined by Executive Orders, rulemaking, and federal programs. We also looked at recent legislation that supports future initiatives. Finally, we collected information on federal assistance programs from

# Background

federal agencies that are leading in the sustainability area. These grants cover FY19 to FY24 and have aspects of circularity even if “circularity” itself was not mentioned. We also found that because the term “circularity” may have not been explicitly listed in the grants, additional opportunities may exist beyond what we could identify.

# GOVERNMENTWIDE POLICIES & OVERALL AWARENESS

CIRCULAR ECONOMY COALITION

# Governmentwide Policies & Overall Awareness

This section provides an overview of the most substantial circularity-promoting activities from FY19-FY24 by the key government branches and agencies we looked at for this report.

## Legislation

In 2020, Congress enacted the *Save Our Seas 2.0 Act* to address the threat of plastic pollution and support grants to invest in recycling. This legislation was significant as it included a definition of "circular economy."

The *Save Our Seas 2.0 Act* mandates EPA to collaborate with key partners to identify innovative uses for plastic waste, recommendations for overcoming barriers to recycling, incentives to create new end-use markets for recycled plastics, and opportunities to minimize new plastic waste. The Act also authorized EPA to create and administer the new Solid Waste Infrastructure for Recycling grant program which was later funded by the *2021 Bipartisan Infrastructure Law (BIL)*.

In addition, the BIL provides funding to develop and implement the vision reflected in EPA's Circular Economy Strategy Series.

## Executive Orders

Shortly after the Bipartisan Infrastructure Law was enacted, President Biden signed an Executive Order titled "Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability." This E.O. placed the U.S. on a path to net-zero emissions by 2050.

**In order to achieve this, the Administration directed agencies to:**

1. Set goals and targets for reducing emissions,
2. Reduce Scope 1, 2, and 3 greenhouse gas emissions,
3. Transition to 100 percent carbon pollution-free electricity,
4. Transition to a zero-emission fleet,
5. Achieve net-zero emissions buildings, campuses, and installations,
6. Increase energy and water efficiency,
7. Reduce waste and pollution, and
8. Implement sustainable acquisition and procurement.

# Governmentwide Policies & Overall Awareness

The E.O. also established the Office of the Federal Chief Sustainability Officer and required agencies to designate their own Chief Sustainability Officers.

The Executive Branch has used multiple approaches for implementing legislation related to a circular economy and the 2021 E.O. Specifically, several agencies have developed new strategies to embrace elements of a circular economy. Agencies have also established or expanded research and development efforts and federal grant programs. The Executive Branch has also used the rulemaking process to guide overall federal activities to support circularity.

These efforts have collectively helped mature the federal government's sustainable materials management (SMM) approach, which federal agencies have pursued since 2009, to adopt circularity. Additionally, as seen with some recent grants, these efforts have also matured the government's approach to waste management. However, the U.S. Circular Economy Coalition believes that more must be done to acknowledge the importance of circularity and facilitate corporate adoption of circularity practices, especially in the context of sustainability.

## Agencies

We consider five federal agencies as leaders in the circularity space: EPA, DOE, USDA, NIST, and GSA.

### U.S. Environmental Protection Agency (EPA)

As previously mentioned, the *Save Our Seas 2.0 Act* identified EPA as a lead agency for efforts to reduce plastics while introducing a circular economy approach. The EPA's circularity efforts are led by the Office of Resource Conservation and Recovery (ORCR). ORCR has been working on developing a series of strategies to promote circularity and has three key grant programs.[4]



4 Environmental Protection Agency Office of Resource Conservation and Recovery 2022

# Governmentwide Policies & Overall Awareness

## U.S. Department of Energy (DOE)

DOE has multiple offices that oversee programs related to sustainability. A significant number of these programs apply research and development funding to support a circular economy.

- The Advanced Materials & Manufacturing Technologies Office (AMMTO) seeks to establish a circular economy for the goods economy through material and product design, recycling technology development, and reverse supply chain logistics.
- National Renewable Energy Laboratory's (NREL) promotes a circular economy via creating opportunities for new and improved energy materials, which are critical to the supply chain, that are more sustainable.

## U.S. Department of Agriculture (USDA)

Agriculture Research Service is the USDA's in-house research agency which examines solutions to agricultural problems. Solutions reach farmers, producers, industry, and communities. Recently, USDA has included the concept of circularity in its efforts to drive down food waste.

## National Institute of Standards and Technology (NIST)

NIST's mission is to support the nation's economy and our quality of life. The circular economy improves both. Governments, industries, and consumers around the globe are working towards a more circular economy, but there are plenty of gaps that need to be addressed before waste can be effectively removed from the supply chain. NIST is working to fill those gaps in the *materials, data, and measurement science* fields.

## General Services Administration (GSA)

GSA focuses on how the federal government acquires its buildings, fleet, and other goods and services. Additionally, they oversee government asset end-of-life programs. This is where the U.S. itself participates in the economy as it builds and repairs buildings, purchases goods and services and disposes of unneeded items.

# STRATEGIES BY AGENCY LEAD

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# Strategies by Agency Lead

Government agencies are advancing how they incorporate circularity into their programs. *A significant push for this activity is linked to the passage of the BIL*. While we expect that they will continue to mature as strategies are established and updated, there is a risk that when programs authorized and/or funded under BIL expire, we will lose the momentum gained through this legislation. This section presents the underpinning strategies to encourage or practice circularity that are employed by the agencies we evaluated.

## U.S. Environmental Protection Agency (EPA)

EPA appears to be at the beginning of its journey to incorporate a circular approach. To reduce the overall impacts of mismanaged waste and strengthen the U.S. recycling system, the EPA has undertaken advancing the national circular economy. However, this effort is tied to a pre-existing focus on recycling. While this is promising, it may be limited due to limitations in plastics recycling capabilities. To date, our research has found that EPA has focused on reducing plastic pollution, food waste, and the use of materials (including building materials). This is a good start, and we expect the EPA to continue to expand areas of interest to fully promote a circular economy model and all the industries that have a role in this model. Following is a timeline illustrating EPA circularity actions in recent years:

### 2020

EPA announced the National Recycling Goal to increase the U.S. recycling rate to 50 percent by 2030 and to galvanize efforts to strengthen the U.S. recycling system. One year later, the EPA released the National Recycling Strategy: Part One of a Series on Building a Circular Economy for All. The National Recycling Strategy proposes building a circular economy to reduce material use, redesigning materials to be less resource intensive, and recapturing “waste” as a resource to manufacture new materials and products.

### 2021

ORCR published its Circular Economy Strategy Series outlining a transformative 10-year vision that includes circularity and sustainable materials management. Actions include creating a national map of existing recycling infrastructure, conducting a financial needs assessment related to recycling infrastructure in the U.S., researching domestic and international circular economy policies, providing grants to support community recycling programs, and developing a recycling measurement guide for state, local, and tribal governments.

# Strategies by Agency Lead

## 2022

Following the passage of the *Inflation Reduction Act*, EPA issued an Interim Determination in December 2022 to provide GSA and Federal Highway Administration (FHWA) and other agencies with preliminary, actionable determinations that GSA and FHWA can use to qualify construction materials and products as having "substantially lower" embodied carbon. EPA's Interim Determination focused on interpreting "substantially lower" for four newly manufactured materials that the Federal Buy Clean initiative had chosen to prioritize based on high embodied emissions and significant government procurement: cement/concrete, glass, asphalt, and steel. In addition, the Interim Determination identified Minimally Processed Salvaged and Reused Materials/Products and Associated Services as qualifying as "substantially lower."

## 2023

EPA issued for public comment the "Draft National Strategy for Reducing Food Loss and Waste and Recycling Organics." The goal of the strategy is to prevent the loss and waste of food and increase recycling of organic materials, reduce greenhouse gas emissions, save households and businesses money, and build cleaner communities. This was done in partnership with USDA and FDA. EPA and USDA previously announced the U.S. 2030 Food Loss and Waste Reduction Goal, which seeks to cut food loss and waste in half by the year 2030.

## Also in 2023

EPA also put out for comment the "Draft National Strategy to Prevent Plastic Pollution." ORCR has teamed up with EPA's Office of Water and other federal agencies including the National Oceanic and Atmospheric Administration, the U.S. Department of Transportation, and NIST to lead the development of studies and strategies under the *Save Our Seas 2.0 Act* that will help break barriers and incentivize innovation to reduce plastic waste.

# Strategies by Agency Lead

## U.S. Department of Energy (DOE)

DOE is uniquely positioned to support research and development that will be critical to the circular economy. A key area of research in DOE's portfolio is plastic innovation. Additionally, programs supporting critical materials, chemicals, and rechargeables have also emerged over the last four years. This is due in part to the creation of two consortia - Remade and BOTTLE.

The Strategy for Plastics Innovation (SPI) focuses on resources from across the U.S. Department of Energy to create a comprehensive program to accelerate innovations that will dramatically reduce plastic waste in oceans and landfills by 2030. This initiative will position the United States as a global leader in advanced plastics recycling technologies and in the manufacturing of new plastics that are recyclable by design.

The Strategy for Plastics Innovation (SPI) builds off the Plastics Innovation Challenge, a DOE effort launched in 2019 to make domestic processing of plastic waste more economically viable and energy-efficient, develop new and improved plastic materials lacking the end-of-life concerns as incumbent materials, and ultimately reduce plastic waste accumulation. As a part of that effort, the Plastics Innovation Challenge Draft Roadmap was released in January 2021, along with a Request for Information on how to improve DOE's efforts to address plastic waste.6 Incorporation of feedback from the previously issued Request for Information and new technological developments are included in DOE's new SPI. This R&D strategy identifies key research needs and opportunities for DOE-sponsored R&D and catalogs challenges and opportunities facing SPI efforts. With a concerted and coordinated R&D effort, DOE's SPI aims to transform its approach to plastic waste and develop new classes of plastic that are recyclable and upgradeable by design. Four strategic goals include: deconstruction, upcycling, recyclable by design; and scale and deploy.

In March 2023, the DOE issued a request for information (RFI) to better understand the key opportunities and challenges associated with increased material circularity to inform DOE's upcoming efforts to advance circular economy technologies and systems in the U.S.

# Strategies by Agency Lead

## United States Department of Agriculture (USDA)

USDA has recognized that biomass and food reduction are important to our economy and will support a circular economy model.

In March 2024, USDA released *Building a Resilient Biomass Supply: A Plan to Enable the Bioeconomy in America*. USDA's plan to support a resilient and responsibly sourced biomass supply chain furthers the Department's commitment to developing a circular bioeconomy, where agricultural resources are harvested, consumed, and reused in a sustainable manner. Adopting circular economies ensures that wealth and other economic benefits in the form of jobs and other opportunities are created in rural communities, while also mitigating the effects of climate change and nature loss. Published alongside the Plan is an Implementation Framework that identifies actions USDA will take in the next year to increase available cultivated biomass, invest in infrastructure for biobased products, and support the responsible development of the biomass supply chain.[5]

USDA also released a fact sheet outlining the Department's 2023 bioeconomy accomplishments, which include $772 million in investments for research, development, and infrastructure involving biofuels, fertilizer production, crop innovations, biobased products, and more.

## National Institute of Science and Technology (NIST)

NIST's Circular Economy Program supports the nation's need to transition away from a model in which materials are extracted from the environment, manufactured into products, used, and then discarded (a so-called "linear economy") toward one in which the atoms and molecules that make up those products repeatedly cycle within the economy and retain their value.

NIST is currently developing a Circular Economy Resource Registry for key circular economy distributed expert resources--organizations, datasets, and tools--determined to be highly relevant for Circular Economy analysis.



5 U.S. Department of Agriculture 2024

# Strategies by Agency Lead

## General Services Administration (GSA)

GSA is responsible for managing the majority of public buildings and a significant amount of federal procurements. Specifically, GSA manages over 370 million square feet of real estate. GSA is working to decarbonize federal buildings through energy efficiency, electrification, carbon pollution-free electricity, and lower embodied carbon materials. For example, the agency finalized regulations to promote sustainability when considering federal facility locations. It is also working to reduce the embodied carbon in its building design and construction projects.

**Specifically, GSA worked with a variety of stakeholders to develop:**

- the GSA Facilities Standards for the Public Buildings Service (PBS-P100)] which requires project teams to evaluate ways to decarbonize their projects, and
- new standards for low-embodied concrete and environmentally preferable asphalt.

GSA has even issued an agreement to develop carbon pollution-free electricity tariffs or other offerings for federal facilities located in New Mexico and Texas.

As the government's largest purchaser of goods and services, GSA has an important role in determining what and how the government should make its purchases. It is responsible for approximately $84 billion in federal spending across the government each year. This type of influence can affect general market trends. GSA is building sustainability into its contract vehicles to increase resiliency in the federal supply chain while minimizing environmental impacts including associated GHGs. The agency has also been an important stakeholder in the rulemaking process regarding how the government should go about reducing its use of single-use plastics. The final rule requires a major federal contract to identify single-use plastic-free packaging availability for products beginning July 8, 2024.[6]

Finally, GSA assists agencies with end-of-life practices for the commodities agencies have purchased. When it comes to circularity, this approach is among the end-of-life options the agency considers. GSA states: “When a building or product has reached the end of its useful life, it is important to recognize the embodied carbon value that still remains... Waste management options [include] the concept of a circular economy [which] keeps resources in constant use through continuous product life cycles.”



6 This contract is the Federal Supply Schedules, also referred to as the Multiple Award Schedule (MAS). Federal spend going through MAS in FY21 was almost $40 billion. During the same year there were over 14,000 companies holding MAS contracts.

# PROGRAMS BY AGENCY LEAD

CIRCULAR ECONOMY COALITION

# Programs by Agency Lead

This section presents the programmatic support for circularity employed by each of the government agencies we evaluated. There are several existing grant programs that encourage recycling and reuse, and several more grant programs that focus on reducing plastics. We found that, in general, government programs do not yet fully cover the circularity model. Additionally, as we mentioned above in the scope and methodology section, additional opportunities may exist that we could not identify. As a result, the public and industry may find it difficult to identify opportunities and miss opportunities to participate in a circular economy.

## Environmental Protection Agency (EPA)

**Solid Waste Infrastructure for Recycling (SWIFR) Grant Program**
**(Tribal and States/Territories)**

The Solid Waste Infrastructure for Recycling program provides grants on a recurring basis to implement EPA's National Recycling Strategy. Specifically, the grant provides U.S. states and territories funds to support improvements to local post-consumer materials management, including municipal recycling programs, and to assist local waste management authorities in making improvements to local waste management systems.

*CDFA:* 66.920 -- Solid Waste Infrastructure for Recycling Infrastructure Grants
*Estimated Funding:* FY23 appears to be $40 million

**Recycling Education and Outreach Grant Program**

Projects funded through the grant Inform the public about residential or community recycling or composting programs; provide information about the materials that are accepted as part of residential or community recycling or composting programs; and increase collection rates and decrease contamination across the nation.

*CDFA:* 66.921 -- Reduce, Reuse, Recycling Education and Outreach Grants
*Estimated Funding:* FY23 appears to be $30 million

**Pollution Prevention Grant Program**

This program currently offers six grant programs to support pollution prevention, one of which is funded by BIL. These opportunities provide technical assistance, such as information, training, tools, and expert advice, to the industry to encourage the development and implementation of source reduction practices. Reducing the amount of pollution in the environment means producing less waste to control, treat, or dispose of

# Programs by Agency Lead

Less pollution means fewer hazards posed to public health and the environment. The current National Emphasis Areas are (1) food and beverage manufacturing and processing; (2) chemical manufacturing, processing, and formulation; (3) automotive manufacturing and maintenance; (4) aerospace product and parts manufacturing and maintenance; (5) metal manufacturing and fabrication; and (6) specific support for federally-recognized tribes and intertribal consortia. However, because this is a recurring grant, EPA can change its highest priority annually. For example, EPA announced the FY2024 overall focus was on reducing chemicals.

*CDFA:* 66.708 -- Pollution Prevention Grants Program

*Estimated funding:* FY24 funding appears to be about $141 million

**Annual P3 Awards**

The People, Prosperity, and the Planet (P3) Award Program supports college-level research, develops, designs, and demonstrates solutions to real-world challenges. Awards are made quarterly. FY22 marked the 19th year of the award program. EPA's priority science areas include: (1) Air Quality; (2) Safe and Sustainable Water Resources; (3) Sustainable and Healthy Communities; and (4) Chemical Safety.

*CDFA:* 66.516 -- P3 Award: National Student Design Competition for Sustainability

*Estimated Funding:* FY22 appears to be $3.2 million

**Science to Achieve Results (STAR) Research Program**

As a long-standing grant program, the STAR program leverages the scientific and engineering expertise of academic and non-profit institutions to conduct high-priority environmental and public health research. The program funds research on environmental and public health effects of air pollution, climate change, water quality and quantity, hazardous waste, toxic substances, pesticides, cumulative impacts, environmental justice, and more. Recent opportunities, like the one in FY24, have focused on specific areas of sustainability including chemistry which EPA has recognized as being at the forefront of the transition into a more circular economy. Specifically, in FY24, the Advancing Sustainable Chemistry (EPA-G2024-STAR-B1) opportunity is expected to support research needed on new chemical products and chemical processes that use energy and utilities more efficiently, ensure feedstocks are optimized, are strategically consumed and reused, and provide society with chemicals and manufacturing processes that are less harmful to human health and the environment.

# Programs by Agency Lead

*CDFA:* 66.509 -- Science To Achieve Results (STAR) Research Program
*Estimated Funding:* FY24 appears to be $6 million

**Consumer Recycling Education and Outreach (REO) Grant Program**

Projects under this opportunity inform the public about new or existing residential or community recycling programs; provide information about the recycled materials that are accepted as part of a residential or community recycling program that provides for the separate collection of residential solid waste from recycled material; and increases collection rates and decreases contamination in residential and community recycling programs. Specifically, projects are intended to improve consumer recycling education with the goal of achieving separate collections of recycled material across the nation, maximizing the efficient reuse of materials, and identifying strategies that otherwise result in an increase in the volume of recyclable materials.

*CFDA:* 66.921 -- Reduce, Reuse, Recycling Education and Outreach Grants
*Estimated Funding:* FY23 appears to be $30 million

**Source Reduction Assistance in Communities Grant** [7]

This opportunity funds assistance agreements that support research, investigation, study, demonstration, outreach, education, and training using source reduction approaches (also known as “pollution prevention” and herein referred to as “P2”). P2 means reducing or eliminating pollutants from entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal.

*CFDA:* 66.717 -- Source Reduction Assistance
*Funding unclear*, this is listed as a regional grant and may be part of a broader grant program

**Reducing Embodied Greenhouse Gas Emissions for Construction Materials and Production Activities**

EPA has two activities under this program. The first activity, while not a grant program, is the Label Program for Substantially Lower Embodied Carbon Construction Material. This initiative arose from the Inflation Reduction Act Section 60116. The second activity is the Sustainable Materials Management Grant (also referred to as EPD Assistance Program) which is intended to support data on GHG emissions associated with construction materials as well as spurring demand for such materials with



7 Our search found this opportunity to be available to a specific U.S. region. We have not been able to determine if this is part of a broader grant.

# Programs by Agency Lead

lower embodied GHG emissions.

*CFDA:* 66.721 -- Reducing Embodied Greenhouse Gas Emissions for Construction Materials and Product

*Estimated Funding:* FY23 appears to be $100 million

**Best Practices and Labeling for Batteries**

In addition to grants, the EPA is currently developing a Report to Congress on the best practices for the collection of batteries to be recycled that will be published in 2024. This report will identify existing best practices, describe the current state of battery collection, and lay out EPA's next steps. After the publication of this report, EPA will seek to capture and share new and innovative best practices to complement the report. The final product of these working sessions will be a set of voluntary labeling guidelines for various battery chemistries and types. The voluntary labeling guidelines will be published by 2026.

## Department of Energy

***DOE Research programs -- outside of grants***

DOE has two consortia related to circularity: REMADE and Bio-Optimized Technologies to Keep Thermoplastics out of Landfills and the Environment (BOTTLE) Consortia.

**Opportunities under REMADE have included:**

<u>REMADE Circular Design</u>

The Remade Institute intends to develop design frameworks that aim to assist designers in evaluating end-of-life options' environmental and economic impacts, improving remanufacturability, enhancing automation in assembly/disassembly, and increasing the use of recycled materials in products. They also intend to help create tools that are being developed to enable engineers to assess the lifecycle impacts of their designs, including energy, emissions, materials, and cost, as well as to balance initial production expenses with potential end-of-life revenue. Last but not least, the Remade Institute tends to pilot programs that test designs for Re-X tools that integrate with CAD systems, providing designers with best practices and quantifiable data on lifecycle and financial implications during the preliminary design phase.

# Programs by Agency Lead

REMADE Digital Remanufacturing

Efforts are underway to enhance inspection and disassembly processes to cut costs, create innovative tools for advanced condition assessment, develop affordable restoration technologies to boost remanufacturing, and propel digital remanufacturing forward by leveraging data and connectivity.

REMADE Full EV Reuse & Remanufacturing

The goal is to achieve substantial recovery of the entire electric vehicle by weight, create rapid disassembly processes, and develop swift shredding and material separation technologies. Additionally, there is a focus on developing condition assessment technologies to aid in component reuse and remanufacturing, as well as advanced recycling and recovery technologies to ensure high-purity materials are available for future EV production.

REMADE Plastics Recycling

The initiative aims to reduce primary feedstock consumption by 30% while increasing secondary feedstock usage by the same margin, enhance embodied energy efficiency by 25%, and present strategies for the economical cross-industry application of secondary feedstocks.

REMADE Recovery & Recycling of E-Scrap

Efforts are underway to design tools that are being developed to enhance the recyclability of photovoltaic modules, automation is being applied to cell phone battery disassembly, and technologies are being created to reclaim precious metals from consumer electronics. Additionally, the progression of material recovery and recycling technologies is being prioritized.

REMADE Textile Recycling

The Remade Institute is investing over $1 million in research and development to decarbonize the apparel industry, aiming to boost the use of recycled materials, cut energy consumption, and lower greenhouse gas emissions.

# Programs by Agency Lead

MRFnxtgen

The objective is to double material recovery and recycling rates, augment the materials supplied to U.S. manufacturers while reducing landfill waste, and enhance the economic viability of recycling nationwide. Material recovery facilities (MRFs) are essential to this effort but currently face challenges such as fluctuating market dynamics, contamination from single-stream recovery, diverse product mixes, and undercapitalization. The MRFnxtgen™ initiative, building on the REMADE Institute's technological advancements, aims to revolutionize the recycling industry by boosting the output of high-value scrap materials from MRFs, improving their economic performance, and enabling increased recycled content in products.

Opportunities under BOTTLE have included:

1. Efforts to improve recycling plastics include making tomorrow's products recyclable by design. Specifically, the consortium is supporting work on process development and integration, chemical catalysis, biocatalysis, material science, separations, modeling, economic analysis, and sustainability assessment.

**Bio-Optimized Technologies to Keep Thermoplastics out of Landfills and the Environment (BOTTLE) FOA - FY2020**

*A full description of the opportunity was not available on a federal website at the time this report was written.*

***Critical Materials Accelerator***

This opportunity, managed by AMMTO, would fund prototyping and small-scale pilots in technologies important to the critical mineral materials (CMM) supply chain in the following areas: (1) magnets with reduced critical materials content, (2) improved unit operations of processing and manufacturing of critical materials, (3) critical material recovery from scrap and post-consumer products, and (4) reduced critical material demand for clean energy.

*CFDA: 81.086 -- Conservation Research and Development*

*Funding:* FY24 appears to be $10 million

DOE also provides research and development opportunities via the SBIR/STTR program. Small Business Innovation Research ($4 million available for FY24). DEFINE SBIR/STTR

# Programs by Agency Lead

program. Additionally, DOE has a Critical Materials Collaborative's Critical Materials Accelerator ($10 million available for FY24). The Accelerator projects will feature innovation and foster industry partnerships that build and transform domestic critical materials supply chains. In particular, this FOA will fund multiple solutions, including reducing demand through alternative materials or technologies, extending the lifetime of critical materials, and advancing secure and sustainable critical materials manufacturing technologies.

SBIR Broad Agency Announcements in FY20 included[8]:

- Novel Utilization Strategies for Ocean Plastic Waste - FY2020
- Compatibilizers of Existing Plastics - FY2020
- Compatibilizers of Existing Plastics - FY2021
- Reshaping Plastic Design and Degradation for the Bioeconomy - FY2020
- Reshaping Plastic Design and Degradation for the Bioeconomy - FY2019
- Recycle Underutilized Solids to Energy (REUSE) - FY2020

***Industrial Demonstrations Program***

The Industrial Demonstrations Program will fund projects that focus on the highest emitting and hardest-to-abate industries where decarbonization technologies can have the greatest impact: iron and steel, cement and concrete, chemicals and refining, food and beverage, paper and forest products, aluminum, other energy-intensive manufacturing industries, and cross-cutting technologies. Demonstrating the technical and commercial viability of first- or early-of-a-kind commercial-scale industrial decarbonization approaches will promote widespread technology implementation and drive a U.S. edge in low- and net-zero carbon manufacturing while helping to substantiate a market for low-carbon products.

*CFDA:* 81.255

*Estimated Funding:* $6.3 million total funded by BIL and IRA

***FY23 Industrial Efficiency and Decarbonization Multi-Topic FOA***

This program focused on eight topics areas with the most focused area being on decarbonizing materials. The materials included: industrial heat, chemicals, iron and steel, food and beverage, cement and concrete, and forest products.



8 U.S. Department of Energy 2019

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*CFDA:* unavailable

*Funding:* FY24 appear to be $171 million

**Materials, Operation, and Recycling of Photovoltaics (MORE PV)**

This opportunity provides funding for research and development to reduce material usage, improve installation quality and resilience of photovoltaic (PV) systems, and address the handling of PV systems at the end of life. Includes the topic area of Solar Partnership to Advance Recycling and Circularity (Solar PARC).

*CFDA:* 81.087 -- Renewable Energy Research and Development

*Funding:* FY24 appears to be $20 million

**Chemical Upcycling of Polymers**

The DOE's Office of Science Basic Energy Sciences (BES) begins receiving applications to support fundamental experimental and theoretical efforts to advance the chemical upcycling of polymers and the circular design of next-generation plastics. The term “plastic” describes a wide array of polymeric materials with diverse compositions and properties. Finished plastic products may include multiple polymeric components and often contain additives to obtain desirable physical, chemical, or mechanical properties. Understanding of chemical approaches that make use of end-of-life plastic products as feedstocks to regenerate the same product, or otherwise upcycle them to new, more valuable products, is limited.

*CFDA:* 81.049 -- Office of Science Financial Assistance Program

*Funding:* FY21 appears to be $25 million

**Advanced Energy Manufacturing and Recycling Grant Program**

This program is intended to re-equip, expand, or establish a manufacturing or recycling facility for the production or recycling of advanced energy technologies and low-carbon materials or reduce greenhouse gas emissions of that facility.

*CFDA:* N/A

*Estimated Funding:* Total of $750 million

**Consumer Electronics Battery Recycling, Reprocessing, and Battery Collection**

This program is intended to increase consumer participation in battery recycling programs, improve the economics of consumer battery recycling, and help establish

# Programs by Agency Lead

state and local collection programs.

*CFDA:* N/A

*Estimated Funding:* FY24 appears to be $75.5 million

**Re-X Before Recycling Prize**

This three-phase competition is designed to develop innovative ways to extend the lifetimes of products or parts via re-using, repairing, refurbishing, remanufacturing, or repurposing ("Re-X") before recycling. By stimulating innovation and private investment in circular economy approaches, the innovations developed through this prize will reduce life-cycle energy and emissions, strengthen circular supply chains for emerging clean energy technologies, and decrease the demand for virgin materials.

*CDFA:* N/A

*Funding:* Up to $4.5 million in total cash prizes and $1.1 million in national laboratory analysis consultation and technical assistance

**Catalyzing Innovative Research for Circular Use of Long-Lived Advanced Rechargeables (CIRCULAR)**

The overarching goal of the CIRCULAR program is to successfully translate the definition of a circular economy to the domestic EV battery supply chain by supporting the development of innovative solutions that can overcome both the technological and economic barriers to broad commercial adoption. Current EV manufacturing practices have been established along a linear economic model of "take, make, use, and dispose" with negligible consideration for battery end-of-life (EOL). Besides risks associated with the disposal of spent batteries, such as fire hazards and/or potential releases of toxic chemicals into the environment, conventional battery recycling methods such as pyrometallurgy and hydrometallurgy are energy-intensive, produce significant quantities of greenhouse gases (GHGs), and lead to large volumes of waste deposited in landfills. The opportunity seeks to examine how to prolong the service life of EV batteries and recover the manufacturing value of spent batteries to the greatest extent possible through regeneration, repair, reuse, and remanufacture will reduce the demand for critical minerals, as well as the domestic energy burden and the subsequent carbon footprint of the EV battery supply chain.

*CFDA:* 81.135 -- Advanced Research Projects Agency - Energy

*Funding:* FY24 funding appears to be $30 million

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**Single-use Plastics Recycling (SPUR) under DOE's Strategy for Plastic Innovation**

*A full description of the opportunity was not available on a federal website at the time this report was written.*

*CFDA:* 81.086 -- Conservation Research and Development

*Funding:* FY21 appears to be $14.5 million

## United States Department of Agriculture (USDA)

In 2022, USDA used its ARSX program to fund three projects (at $100,000 each) to explore what a circularity model for agriculture looks like. ARSX is a challenge open to ARS scientists and post-doctoral fellows to help them develop and test bold and aspirational ideas. The 2022 theme centered around circular economies for agriculture and food systems.[9] The ideas generated in this initiative contribute to a paradigm shift to an emerging circular economy. Developing regenerative processes and closing gaps in existing loops can both maximize the use of and protect our natural resources.

USDA programs may or may not have ended up supporting circularity because notices of funding opportunities (NOFOs) mentioned elements of circularity but were not necessarily a requirement for selection.

**Agriculture and Food Research Initiative (AFRI) Sustainable Agricultural Systems**

This annual opportunity covers a variety of agriculture issues, among them the USDA seeks to strengthen the bioeconomy. USDA has stated that the current development and implementation of a sustainable and resilient circular bioeconomy is limited and new or improved production systems need to be developed. For example, circular principles can generate economic gains while alleviating pressure on the environment through recycling materials and capturing value (e.g., zero-waste, carbon neutral) along the supply chain. Under this program, USDA prioritizes funding of assessments of system circularity that examine feedstock production, storage, transportation, manufacturing processes, economic viability, labor supply and training, environmental impacts, and effects on communities, particularly underserved or overburdened communities. This is an annual grant whose objectives vary from year to year.

*CDFA:* 10.310 -- Agriculture and Food Research Initiative (AFRI)

*Funding:* FY24 appears to be $80 million



9 U.S. Department of Agriculture 2023

# Programs by Agency Lead

**Practical Approaches to Circularity in US-EU Food and Agricultural Trade**

This initiative is intended to support the design, plan, and implementation of workshops and seminars to inform stakeholders, regulators, and policymakers on scientific and technical options to address challenges arising from the implementation of new regulatory mandates on sustainability and circular economy themes such as plastic packaging bans, farm to fork traceability, ecolabeling, recycled food contact material certification, reverse supply chains for reusable packaging, and deforestation-free supply chains.

*CFDA:* 10.960 -- Technical Agricultural Assistance

*Funding:* FY22 appears to be $150,000

## National Institute of Science and Technology (NIST)

NIST is working on The Circular Economy Resource Registry which will be a catalog for key circular economy distributed expert resources--organizations, datasets, and tools--determined to be highly relevant for Circular Economy analysis.

**Educational Programs Focused on Circular Economy to Reduce Plastic Waste**

*A full description of the opportunity was not available on a federal website at the time this report was written.*

*FY24 $3Million to 6 universities*

*FY22 $2.5Million to 5 universities*

**Training for Improving Plastics Circularity (TIPC)**

The NIST Training for Improving Plastics Circularity (TIPC) Grant Program seeks to advance the development of coursework and hands-on training resources in polymer measurement methods, manufacturing, and systems thinking that will promote a skilled workforce to support expansion and increased scale of circular domestic plastics industries. The Program will support academic coursework development and implementation at the associate or bachelor's level or the development of a continuing education program for an existing workforce, related purchases and installation of equipment, and/or possible training experiences to help promote the development of a skilled and distributed workforce focused on the growing field of circular plastics.

*CFDA:* 11.620 -- Science, Technology, Business, and/or Education Outreach

*Funding:* N/A

# Programs by Agency Lead

## General Services Administration

GSA offers no grant programs but they oversee several policies governing how federal agencies should buy and dispose of products. These efforts are mentioned above in the Section 4 - Strategies. Additionally, the agency provides resources to assist with procurement activities.

Starting in May 2023, GSA piloted interim requirements for the use of low embodied carbon (LEC) construction materials in GSA projects funded by the IRA. The requirements were developed based on industry feedback and through collaboration with the U.S. Department of Transportation's Federal Highway Administration (FHWA), EPA, and the Federal Buy Clean Task Force. The pilot consisted of 11 new construction projects, land port of entry projects, limited scope modernizations, and paving projects with a total estimated low embodied carbon materials valued at more than $300 million.[10]

## Other Agencies

*USAID* has several foreign assistance programs with elements of circularity. All of the opportunities we identified as part of our grant research focus on reducing plastics, especially ocean plastics.

**Oceans Plastics - Solid Waste Management Activity**

This grant's goal is to reduce waste in municipalities leading to cleaner oceans. Recent opportunities include working with certain Dominican Republic communities and economies to build resilience to climate and economic shocks. Applicable work included a circular objective. Specifically, the notice of funding mentioned that circular economy models for plastic would foster innovations and establish and expand in partnerships with private sector partners.

*CFDA:* 98.002 -- Cooperative Development Program (CDP)

*Funding:* FY24 funding appears to be $15M

**Innovations for Reducing Plastics for a Cleaner Environment in India (inREPLACE) Activity**

The purpose of the activity is to reduce plastic pollution, including in the marine environment, through improvements in solid waste management and advancing a plastics circular economy in selected regions of India. Through the activity, USAID/India will



10 U.S. General Services Administration 2024

# Programs by Agency Lead

partner with the Government of India (GOI) to address the plastic pollution challenge by (1) improving plastic and solid waste management planning, infrastructure, and services; and (2) addressing the life cycle impacts of plastics and other materials by promoting a circular economy.

*CFDA:* 98.001 -- USAID Foreign Assistance for Programs Overseas

*Estimated Funding:* FY24 funding appears to be $30 million

**Addressing Ocean Plastics in Peru**

The United States Government, represented by the United States Agency for International Development (USAID) in the Republic of Peru is currently designing an activity that aims at addressing the issue of solid waste management in Peru

*CFDA:* 98.001 -- USAID Foreign Assistance for Programs Overseas

**Vietnam Action Against Plastic Pollution**

The overall objective of this activity is to reduce ocean plastic pollution at its source in Vietnam through strategic approaches such as convening stakeholders' power, promoting the creation and implementation of data-driven policies, enhancing knowledge and sharing learning, promoting appropriately scaled technology and solutions, and providing technical expertise and building capacity of local governments to manage waste at its source and prevent plastic pollution in our oceans.

*CFDA:* 98.001 -- USAID Foreign Assistance for Programs Overseas

*Funding:* FY22 appears to be $20 million

Similarly, the State Department had opportunities that supported international activities to reduce plastic pollution.

**Establishing the End Plastic Pollution International Collaborative (EPPIC)**

This opportunity would establish a collaboration aimed at significantly reducing plastic pollution by strengthening enabling environments, raising public awareness, and promoting multi-stakeholder engagements that advance solutions to enhance circularity across the plastics lifecycle, particularly with innovation in upstream design and production.

*Estimated Funding:* $14.5M in FY22.

# Programs by Agency Lead

**Small Grants Program to Address Plastic Pollution**

Bureau of Oceans and International Environmental and Scientific Affairs (OES), Office of Environmental Quality (ENV) announces an open competition for organizations interested in submitting applications for a program that supports civil society engagement in environmental protection through capacity building to address plastic pollution by advancing awareness, research, and projects that reduce, reuse, and/or recycle plastic, through formal and informal sectors. One to two awards totaling $641,975.00. The selected organization(s) will develop and manage a small grants program to increase public participation in reducing plastic pollution and improving the management of plastic waste across the lifecycle of plastics. The organization(s) must describe how it will issue and manage small grants of up to $50,000 to subgrantees at a local organization or institution in countries identified for the program.

*National Science Foundation*

**Design for Environmental Sustainability in Computing**

The goal of the Design for Environmental Sustainability in Computing (DESC) program is to address the substantial environmental impacts that computing has through its entire lifecycle from design and manufacturing, through deployment into operation, and finally into reuse, recycling, and disposal.

*CFDA:* 47.070 -- Computer and Information Science and Engineering

*Funding:* FY24 appears to be $11.8 million

# CONCLUSION

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# Conclusion

The U.S. federal government values the importance of promoting circularity. Of the five agencies we reviewed, all had incorporated circularity to some degree into their program activities. With grants in particular, the *Inflation Reduction Act of 2022* and the *Save Our Seas 2.0 Act* authorized and released billions of dollars to agencies that ultimately support circularity goals. Our review, however, reveals opportunities for enhancing the federal government's approach to circularity to further increase efficiency, promote circularity, and help the U.S. emerge as a world leader in promoting a circular economy.

**We Suggest That the Federal Government:**

1. **Improve Circularity Efforts to Achieve Meet Big Goals.** The Biden Administration set an ambitious goal of achieving a net-zero emissions economy by 2050. Circularity will be an important element in working towards this goal and strengthening the economy. As such, agencies need to consider what else they can be doing to build on the limited opportunities we identified. Helping businesses implement circularity measures would make long strides toward meeting a net-zero emissions target and finding efficiencies for the economy. As the World Business Council on Sustainable Development pointed out, companies can drastically reduce emissions when they practice circularity. Specifically, the council found in 2023 that companies in the European Union practicing circularity could lead to a 56% emission reduction over a baseline scenario.[11] Harnessing the power and reach of supply chains in reusing materials can keep our economy strong while reducing harmful emissions and streamlining the volume of materials headed to landfills.

2. **Better Coordinate Circularity Activities and Centralize Information.** By setting the example of prioritizing circularity, U.S. government agencies can serve as role models for businesses. Many agencies are instituting internal circularity measures in addition to their leveraging external-facing programming, via grants, to encourage businesses and communities to embrace circularity. The agencies we reviewed are off to a great start, and their current effect on circularity adoption could be exponentially improved through improved coordination. First, the adoption of a governmentwide definition for circularity would create clarity both within the federal government, to state and local governments and the private sector. Second, appointing circularity leads at each agency to collaborate would help establish consistency and accountability.



11 How to gain business and climate benefits from going circular – Key takeaways from our Masterclass on the Fundamentals of Decarbonization (2022)

# Conclusion

Third, developing a public-facing webpage that communicates circularity progress and compiles circularity grants within a single resource. This database would not only make it easier for businesses and communities to find funding to develop new methods for circularity and better adopt circularity practices, but it would place much-needed attention on circularity and increase efficiency.

3 **Promote Worldwide Circularity through International Engagement.** Circularity is gaining momentum on the global stage, with the E.U. adopting a circular economy action plan earlier in 2024. The U.S. federal government should also recognize the value of a circular economy and demonstrate that recognition by building circularity into its own climate action plans. Circularity is also a topic that is increasingly front-and-center at global climate summits like the U.N.'s annual Climate Change Conference and its fledgling Waste-to-Zero Initiative. U.S. leadership's support for and at these events will also demonstrate commitment and help ensure that circularity is embraced worldwide.

We hope you enjoyed learning about the U.S. federal government's circularity progress. The U.S. Circular Economy Coalition has undertaken this endeavor to establish an initial baseline of federal government efforts to facilitate industrial circularity. We plan to make this report an annual initiative, and we look forward to documenting the growth of the U.S. circular economy.

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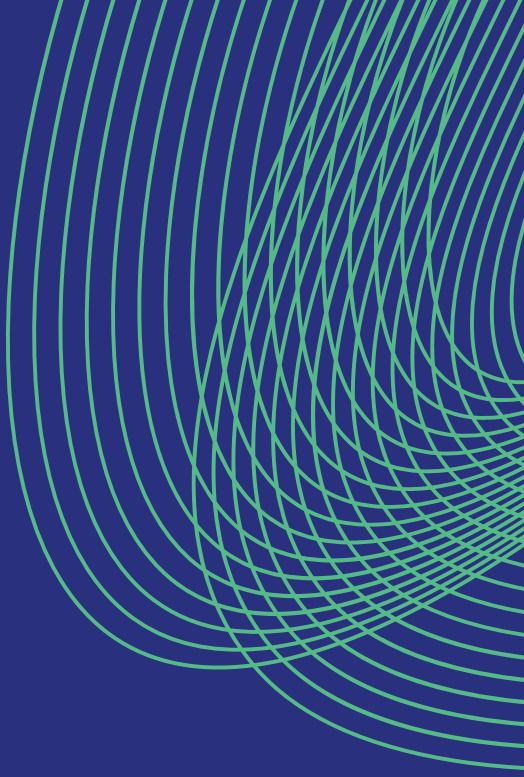

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