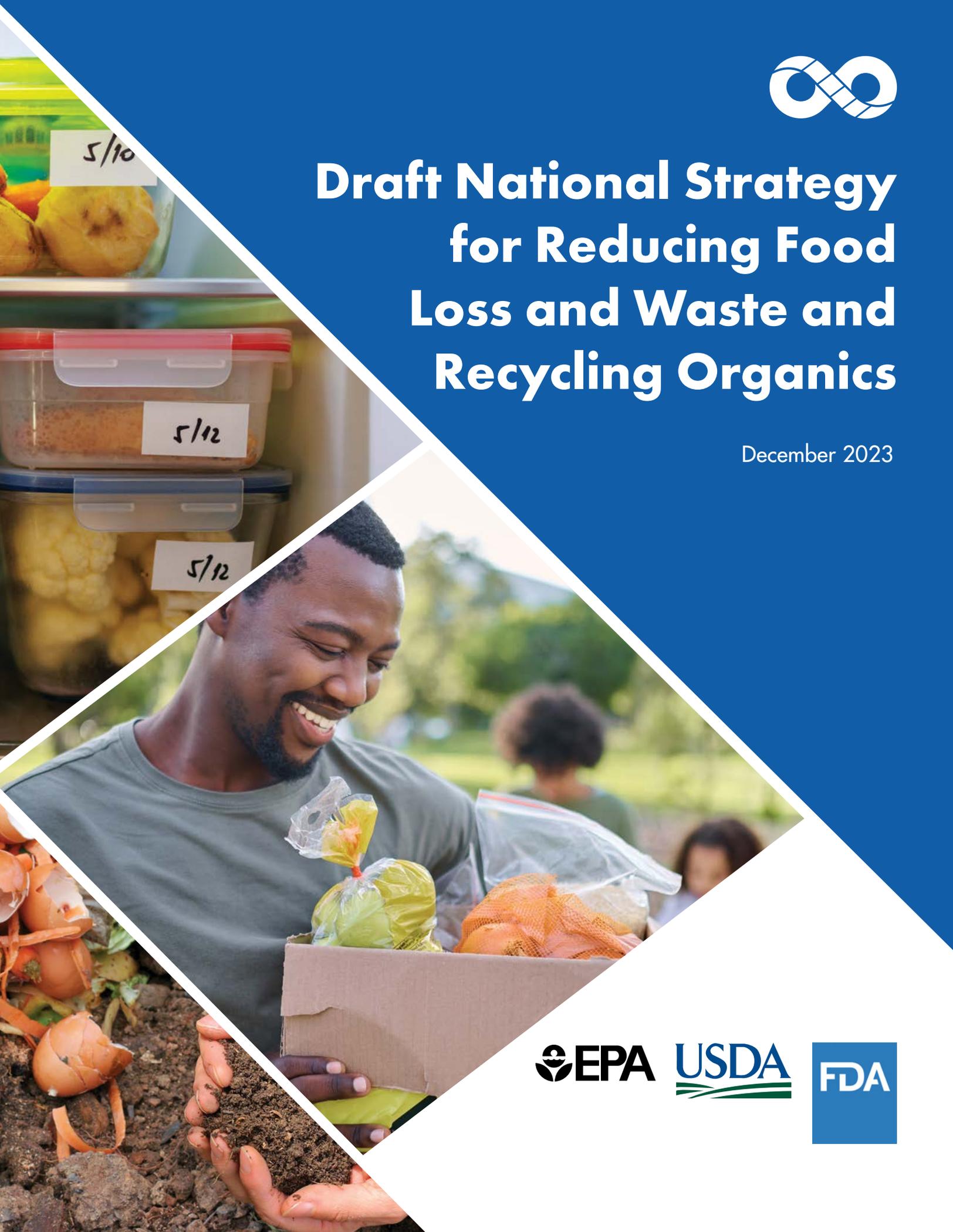




# Draft National Strategy for Reducing Food Loss and Waste and Recycling Organics

December 2023





# Background

In 2015, the U.S. Environmental Protection Agency and the U.S. Department of Agriculture jointly announced an ambitious national goal to reduce food loss and waste by 50% by 2030. In 2021, EPA directly aligned the food waste part of the goal with the United Nations Sustainable Development Goal (SDG) Target 12.3:<sup>1,2</sup> “by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.”<sup>3</sup> Recycling food and other organic waste (e.g., composting, creating other beneficial byproducts) will also drive progress toward EPA’s nationwide goal of a 50% recycling rate by 2030 and support the USDA Climate Smart Agriculture and Forestry Strategy.<sup>4</sup> Achieving these complementary goals supports the *U.S. Methane Emissions Reduction Action Plan*,<sup>5</sup> which identified reducing food waste in landfills as an Administration action to reduce methane emissions.<sup>6</sup> Lastly, food waste is responsible for 58% of landfill methane emissions released to the atmosphere,<sup>7</sup> so diverting food waste from landfills is an effective strategy to reduce harmful landfill emissions, including methane. The concentration of methane (a potent greenhouse gas) in the atmosphere has more than doubled over the past 200 years. Scientists estimate that this increase is responsible for 20 to 30% of climate warming since the Industrial Revolution.<sup>8</sup> Per the Fifth National Climate Assessment (NCA5), the increase in global greenhouse gas emissions is causing rapid warming and other large-scale changes, many unprecedented in thousands of years, including rising sea levels, changing rainfall patterns, shift in timing of seasonal events, and others.<sup>9</sup>

Through this *Draft National Strategy for Reducing Food Loss and Waste and Recycling Organics*, the Biden-Harris Administration identifies concrete steps—and complementary EPA, USDA, and Food and Drug Administration actions—that will accelerate the prevention of food loss and waste, where possible, and the recycling of the remainder with other organic waste, across the entire supply chain.<sup>10</sup> To build a more circular economy for all, EPA, USDA and FDA seek to highlight opportunities to use raw materials more efficiently, enable those resources to be used for their highest value, and recover valuable resources from discarded materials. EPA, USDA and FDA seek to accomplish this in ways that address climate change while being inclusive of all communities, consider environmental justice concerns and the potential to reduce food and nutrition insecurity, and drive innovation and economic growth. EPA, USDA and FDA collaborate on food loss and waste efforts, and all three work closely with a variety of public- and private-sector partners. The three federal agencies have a formal interagency agreement focusing on the cooperation and coordination of efforts to reduce food loss and waste.<sup>11,12</sup>

**Audience:** Governmental and non-governmental organizations, communities and businesses focused on preventing food loss and waste and increasing organics recycling.

**Scope:** Food loss and waste is created throughout the food supply chain from production through household consumption. This Strategy focuses on preventing food loss and waste and recycling organic waste (including food, yard and tree trimmings) and other organic materials along the entire supply chain.

The term “organic” in this Strategy means “carbon-based materials”; it does not refer to food and fiber certified under the Organic Foods Production Act of 1990.

In the United States, the average family of four spends \$1,500 each year on food that ends up uneaten.<sup>13</sup> More than one-third (nearly 100 million tons) of the U.S. municipal waste stream is organic waste, including food, yard and tree trimmings and other organic materials.<sup>14</sup> Sixty-six million tons of this is food.<sup>15</sup> Food is also the single most common material found in landfills, comprising 24% of municipal solid waste in landfills,<sup>16</sup> and 61% of methane generated by landfilled food waste is not captured by landfill gas collection systems and is released to the atmosphere.<sup>17</sup> The production and current management of this material as waste uses significant resources. It also contributes to a broad range of environmental impacts, including:

- Climate change.
- Air pollutants.
- Water scarcity.
- Biodiversity loss.
- Soil and water quality degradation.

For example, producing, grading, packing, processing, distributing, retailing, preparing and disposing of the amount of food that is currently wasted annually in the United States contributes greenhouse gas (GHG) emissions equivalent to those of 60 coal-fired power plants and requires enough water and energy to supply more than 50 million homes each year.<sup>18,19</sup> Food loss and waste and other organic materials are resources rich in essential plant nutrients that can be recovered and returned to soils, building soil health and resiliency in urban to rural environments and reducing reliance on mined and synthetic fertilizers.<sup>20</sup> Preventing food loss and waste where possible, and recycling organic waste, can substantially reduce environmental impacts. This effort will also provide social and economic benefits which can also help address the needs of underserved communities, such as:

- The potential to increase food access for food-insecure Americans and increase the recovery and donation rate of wholesome food, for example through the emergency food system.
- Creating materials management or food waste reducing innovation-related new jobs, industries and sectors of the economy.
- Increasing supply chain resiliency.
- Delivering financial savings to households.

**Food loss and waste (FLW)** happens when food intended for human consumption is not ultimately consumed by humans.

**Food loss** happens when food leaves the human food supply chain on the farm, following harvest, or in the processing or distribution sector.

**Food waste** leaves the human food supply chain in the retail, food service or household sector.

**Prevention** of food loss and waste in this Strategy broadly refers to preventing food from becoming waste in the first place (i.e., source reduction) and keeping it in the human food supply chain by rescuing and/or upcycling it.

**Organics recycling** in this Strategy refers to collecting and processing food loss and waste and other organic (carbon-based) materials, such as yard and tree trimmings, that would otherwise be landfilled or incinerated, and turning it into new products, such as soil amendments (e.g., by composting food scraps). Some organics recycling solutions also generate heat and/or biogas that can be captured and used to produce electricity or fuel.

With the release of this draft Strategy, the Biden-Harris Administration is seeking input from diverse partners—including local, state, Tribal, and territorial governments; professional and industry associations; individuals, private companies, and those working in food and agricultural industries; academic institutions; and non-governmental and community-based organizations. In many cases, this Strategy builds upon the successful work and input of these partner organizations.<sup>21</sup> The Biden-Harris Administration will address the comments received on this draft Strategy, finalize it, and begin implementation of the final Strategy in 2024. EPA will use the Bipartisan Infrastructure Law’s materials management grants,<sup>22</sup> and other resources available, to implement actions in this Strategy as appropriate. Specifically, under the law, at least 40% of these investments, as part of the Justice40 initiative<sup>23</sup>, will fund projects that benefit disadvantaged communities. USDA will use American Rescue Plan Act (ARPA) and Inflation Reduction Act (IRA) funds, capacity, and competitive research, education, Extension funding, and other resources available to implement actions, as appropriate to their authority. The Biden-Harris Administration is seeking input from individuals and partners on what federal actions should be included or modified in the Strategy and how best to collaborate on those efforts with partners across all sectors of society.

## Goal of the National Strategy for Reducing Food Loss and Waste and Recycling Organics

**Prevent the loss and waste of food, where possible; increase recycling of food and other organic materials to support a more circular economy for all; reduce GHG emissions; save households and businesses money; and build cleaner, healthier communities.**

The actions detailed in this Strategy will help the United States meet its *National Food Loss and Waste Reduction Goal*<sup>24,25</sup> to halve food loss and waste by 2030 and contribute to achieving the National Recycling Goal<sup>26</sup> to achieve a 50% recycling rate by 2030, as well as contribute to global achievement of the United Nations SDG Target 12.3.<sup>27,28</sup> Preventing food loss and waste and recycling food and other organic waste will also reduce landfill methane emissions, in support of the *U.S. Methane Emissions Reduction Action Plan*.<sup>29</sup> Coordinated efforts to reduce food loss and waste will complement the Administration’s additional efforts to reduce methane emissions from landfills and agriculture (e.g., supporting anaerobic digestion). These efforts are part of the Administration’s whole-of-government methane strategy—including actions to cut emissions from landfills and food waste, agriculture, the oil and gas sector, abandoned mines, and other major sources, while improving measurement and monitoring—to fulfill the Global Methane Pledge, which aims to reduce anthropogenic methane emissions by at least 30% by 2030 from 2020 levels.

## Scope of materials included in this Strategy

This Strategy addresses organic waste, defined as food, yard and tree trimmings, and other organic (carbon-based) materials in the waste stream. States and local jurisdictions often vary in the materials included in their definitions of organic waste. Organic materials such as yard and tree trimmings are often recycled on their own, but they may also be recycled together with food and therefore are included in this Strategy. Composting nitrogen-rich materials, like food, requires carbon-rich materials such as woody yard and tree trimmings and dried leaves.

## Environmental justice and equity

Identifying and addressing the challenges related to food loss, food waste and organic waste to help meet the needs of Tribal communities and communities with environmental justice concerns is an integral part of the Strategy. These communities bear the brunt of the adverse environmental, social and economic consequences of waste management, among other systems. More equitable outcomes, including waste or recycling collection and/or materials management options, require addressing their needs. Furthermore, this Strategy was a deliverable in the Biden-Harris Administration's National Strategy on Hunger, Nutrition, and Health, and these efforts align with Pillar 1, "Improve Food Access and Affordability," which seeks to reduce barriers to food recovery by making it easier for food retailers and the service industry to donate wholesome foods.<sup>30</sup>

Strategies to recover food that would otherwise be lost or wasted could help deliver additional wholesome foods, especially fresh fruits and vegetables, to emergency food assistance organizations, such as food banks and food pantries. This in turn could have health and economic benefits for households that use such sources when they are experiencing food insecurity. Such strategies would also contribute to feeding the growing global population with less environmental impact. The Strategy highlights opportunities, especially where there are environmental justice concerns, to build community-scale organics recycling infrastructure; reduce pollution; create jobs within underserved communities; and use compost made from recycled organic waste, including food, to support green infrastructure and build healthier soil across communities.

A central part of addressing environmental justice and equity is the meaningful engagement of communities in decisions that affect them. Robust engagement with communities most affected by the obstacles identified below is a foundational component of this Strategy. Through community partnerships grounded in equity, this Strategy will ensure that communities most in need will be deeply engaged in its development and implementation—and will be beneficiaries of its success.

## Challenges

Many challenges must be overcome to prevent half of food loss and waste (*National Food Loss and Waste Reduction Goal*) and to recycle half of all waste, including food and other organic waste (*National Recycling Goal*). This Strategy addresses seven key challenges:

- **Limited outreach and education.** A national, coordinated behavior change campaign that goes beyond awareness could enable businesses across the food supply chain, and also consumers, to make a noticeable difference on reducing food loss and waste. Limited outreach efforts have focused on awareness and fallen short of this goal.
- **Limited fundamental research funding.** Fundamental research in both the technical sciences and the social sciences can provide the groundwork for the development of new and innovative technologies, solutions and practices; improve capacity building; lead to the widespread commercialization of valuable innovations; and improve our understanding of why people waste food and what solutions can drive changes. USDA funds some foundational research on food loss and waste as part of its overall research portfolios but does not have dedicated funding for food loss and waste.

- **Need for collaboration.** The drivers of organic waste, including food loss and waste, vary by stage of the supply chain. In many cases, they can be best overcome by actors from multiple stages of the supply chain working together. Partnerships within the private sector, as well as between the private and public sectors, including underserved communities, will be needed to identify effective solutions, scale up their implementation, and measure progress toward the national goal.
- **Obstacles facing underserved communities.** Lack of access to healthy and affordable food in communities leads to higher rates of food insecurity. Underserved communities may face greater challenges around food and nutrition security and may rely on emergency food assistance organizations more than other communities. In addition, underserved communities may not have access to composting options that improve soil health and keep the economic and job benefits of organics recycling in those communities.
- **Insufficient infrastructure and planning.** Current organics recycling infrastructure is not sufficient to meet the National Recycling Goal, in part because the goal is insufficiently reflected in state and local government planning processes. Funding, equipment, reliable hauling collection services, assistance with obtaining siting approval and permitting, and identification of suitable locations will be needed to increase recycling of certain types of food waste and other organic waste into animal food (e.g., where wholesome), compost, energy and other products at industrial and community scales. Moreover, infrastructure to distribute wholesome food to emergency food assistance organizations and to properly store it to extend its usable life (e.g., sufficient cold storage) is also limited.
- **Organics recycling market expansion.** Markets for the use of recycled products made from organics, such as compost, must be expanded to increase the economic incentive for organics recycling. Opportunities exist in a variety of applications to increase the use of compost to enhance soil health and water retention, reduce soil erosion and stormwater runoff, build resilience to climate change impacts, and serve as a contaminated site remediation tool. However, contamination in the waste stream for organic materials, especially with plastic packaging and persistent chemicals, must be addressed. Furthermore, market expansion of compost is limited by lack of awareness and education, among compost producers and customers, about the various uses and benefits of compost application; by challenges the composting industry faces around distributing compost and marketing it to a wider audience; by the need to produce different types of compost for different sectors; and by compost quality concerns.
- **Obstacles to estimating food loss and waste and progress toward goals.** USDA, EPA and ReFED (a national nonprofit with a formal agreement with the Federal Food Loss and Waste Collaboration<sup>31</sup>) have been collaborating to improve data and estimation methodologies, but there are many obstacles, such as limited, nationally representative data on food loss and waste in some areas (e.g., on the farm and during production stages). Data gaps and limitations make it difficult to understand the extent and consequences of food loss and waste, track progress toward the national goal, and measure success. The Administration also has been working to expand and enhance tools and strategies to more precisely



monitor, measure, verify and report methane emissions from food waste and other sources. For example, in 2023, NASA partnered with NOAA, NIST, and EPA to fly next-generation cameras and sensors over several North American cities (Los Angeles, Chicago, New York, Baltimore/D.C., Toronto) to identify methane emissions from landfills and other sources.

## Objectives

Building on the latest evidence on food loss and waste, this National Strategy proposes four objectives:

- 1. Prevent food loss where possible.**
- 2. Prevent food waste where possible.**
- 3. Increase the recycling rate for all organic waste.**
- 4. Support policies that incentivize and encourage food loss and waste prevention and organics recycling.**

For each objective, the Strategy highlights strategic actions that EPA, USDA and FDA could take to address the key challenges and build on collaborative stakeholder efforts already underway. The Strategy includes EPA, USDA and FDA actions underway or planned to help meet the national goals, and it is not meant to be comprehensive of all environmentally positive actions possible in this area. Many programs included here have competing priorities and may include food loss and waste as only part of their total funding. Specific actions ultimately adopted will be informed by evidence-based research to the extent available and stakeholder engagement, and implemented through technical and financial assistance, pilots and programs, and policies, where appropriate and subject to funding and resource availability.

Preventing the loss and waste of food (i.e., source reduction) and rescuing and upcycling food are powerful strategies to reduce the environmental impact of feeding a rapidly growing global population<sup>32</sup> while potentially improving the economic security of producers, potentially supporting emergency food assistance organizations that serve food-insecure people, and providing resources for new types of businesses and jobs. Improved food system efficiency may reduce the need for agricultural expansion into tropical forests and other critical ecosystems, both in the United States and abroad. By one estimate, more than 85% of the GHG emissions associated with food waste occur before the food reaches the landfill (i.e., during production, processing and distribution).<sup>33</sup> This means that prevention offers the greatest opportunity of all food loss and waste strategies to decrease GHG emissions, protect critical ecosystems and address climate change.<sup>34</sup>

The first two objectives below address prevention of food loss and waste. (Food loss occurs on farms or during food manufacturing/processing, storage and distribution, whereas food waste occurs in retail, food service or households.)

# Objective 1: Prevent the loss of food where possible

Opportunities to reduce food loss at the production and distribution stages of the food supply chain can lead to greater economic returns for producers, manufacturers and distributors. By some estimates, food loss and waste and surplus food was valued at roughly 2% of U.S. gross domestic product—or \$444 billion—in 2021.<sup>35</sup> Innovation, collaboration and market development will drive progress toward preventing the loss of foods and enable significant social, environmental and economic benefits from farm to table. Some actions, such as policy adjustments and innovations, can apply to both food loss and waste and can allow the equitable development of new technologies at all levels of government that help the United States meet its National Food Loss and Waste Reduction Goal.

## Strategic actions

- A. Optimize the harvest or collection of raw commodities and foods.** Deepen collaboration among farmers, fishers, livestock producers, processors, distributors, retailers, schools and emergency food assistance organizations (such as food banks and pantries) to develop new business models and data to support new policies that use a greater share of foods produced. Examples could include but are not limited to whole crop purchase and/or partial order acceptance by retailers, procurement models to source local produce in select circumstances (e.g., between farms and schools that accept produce donations), specification changes for market orders, better integration of production and processing facilities, improved on-farm storage, and technical assistance on loss reduction approaches through public-private partnerships. Incorporate loss-reducing business, agricultural and technological innovations, such as improvements in demand forecasting, cultivars, machinery and technologies including predictive analytics (i.e., Artificial Intelligence), and strengthen on-farm food rescue and the equitable distribution of surplus food.<sup>36</sup>
- USDA's Food and Nutrition Service (FNS) aims to continue supporting The Emergency Food Assistance Program (TEFAP) Farm to Food Bank Projects, subject to continued authorization and funding from Congress. These projects are designed to reduce food waste at the agricultural production, processing or distribution level through the donation of food and provide food to individuals in need; and build relationships between agricultural producers, processors, and distributors and emergency feeding organizations through the donation of food. Projects are administered by state and local agencies to cover the cost to harvest, package, process and transport commodities that may otherwise go to waste.
  - The USDA Farm Service Agency's (FSA's) Farm Storage Facility Loan Program provides low-interest financing so producers can build or upgrade facilities to store commodities (e.g., cold storage for produce and frozen foods) to increase the shelf life of products



so they are more likely to make it to market. A “microloan” category addresses the needs of smaller farms and specialty crop producers.

- USDA’s Local Agriculture Market Program (LAMP) consists of several programs by the Agricultural Marketing Service and Rural Development that, in addition to other priorities, provides support for on-farm food loss and waste activities such as food recovery, community composting and K–12 education.
- USDA’s National Institute for Food and Agriculture (NIFA) is investing \$15 million in ARPA funding in the Community Food Projects (CFP) Competitive Grants Program to develop links between food producers, providers, food recovery organizations (e.g., gleaners) and emergency feeding organizations to get surplus wholesome food to individuals via emergency food assistance organizations. NIFA will solicit proposals that focus on food loss and waste efforts, and strengthen the evaluation (metrics) collected on these topics. This funding also covers a new partnership with the USDA NIFA Sustainable Agriculture Research and Education (SARE) program, which will increase future training and technical assistance efforts to build capacity for food loss and waste initiatives.
- USDA is investing in innovations to reduce food loss and waste or to make new products out of food scraps and other resources—including plant-derived coatings to protect fruits from frost damage before harvest, fruit cultivars with longer shelf lives, using insect meal for animal food, harvest machinery that reduces bruising, and new tools that prevents cross-contamination.<sup>37</sup> USDA’s Agricultural Research Service (ARS), through its national Product Quality and New Uses program, will continue to research solutions to agricultural challenges from farm to table by improving quality, reducing spoilage and finding ways to convert wholesome agricultural processing byproducts and waste into valuable food and other products.
- USDA will also continue to help move ARS research discoveries to market to solve agricultural problems and expand the economic impact of ARS research and development through ARS’s Office of Technology Transfer, which works on partnerships, patenting and licensing.

**B. Reduce food loss in food manufacturing/processing, storage and distribution.**

Optimize handling, routing and storage; improve transportation, inventory and supply chain management with best practices and technologies, such as artificial intelligence, blockchain technology and remote sensing. Upcycle food ingredients or products and processing byproducts into new foods for human consumption and create animal food with remaining food that would otherwise be lost, where economically feasible, wholesome and safe.

- USDA will continue to invest in emerging technologies through the Small Business Innovation Research (SBIR) program, the Small Business Technology Transfer (STTR) program, and other programs to improve supply chain resiliency, including food waste reduction and utilization.

- USDA will continue to invest in innovative manufacturing technologies which, amongst other priorities, include improving the monitoring of product quality, food packing materials (including nanotechnology), and systems to extend shelf life and prevent food loss and waste.
- USDA will research food packaging materials from biobased and renewable sourced polymers using novel physical processes and chemical modifications. These products protect and enhance food products, eliminate or reduce pathogens, address antimicrobial resistance, extend shelf-life, and reduce food waste and reliance on fossil-fuel-based packaging.



## Objective 2: Prevent the waste of food where possible

Food waste from consumers and consumer-facing businesses (retail and food service), which comprises roughly half of U.S. food loss and waste,<sup>38</sup> carries larger environmental and economic costs than food losses upstream (i.e., on-farm or within food processing and distribution), since costs accumulate as food is wasted further down the supply chain. The first two actions below are built on the recommendations of the *National Academies of Sciences, Engineering and Medicine's A National Strategy to Reduce Food Waste at the Consumer Level*.<sup>39</sup>

*Measurement: Progress will be measured by federal government estimates, and evaluation methods will be developed as part of the actions below.*

### Strategic actions

#### A. **Develop, launch and run a national consumer education and behavior change campaign.**

Akin to successful efforts in other countries, a national consumer campaign is needed to raise awareness about the environmental and economic impacts of food waste and to share food waste prevention tactics—such as food storage or meal planning—with consumers, with emphasis on those in underserved communities. The campaign should be informed by research and delivery of messaging through community-trusted communication routes. Community leaders, advocacy groups, business leaders and influencers can help drive education and messaging to all levels of society.

- Building on its *Blueprint for a National Campaign to Prevent Wasted Food* and in consultation with USDA, EPA will fund the development and implementation of a national wasted food prevention campaign aimed at households. Communities will be able to customize the campaign to fit their needs and audiences. The campaign will be informed by learnings from community-level food waste prevention intervention projects. In addition to existing research, projects are being funded by EPA's Science to Achieve Results (STAR) grants, one of which is focused on low-income households.
- The Strategy also proposes to rigorously test and measure, with support from at least USDA, the effectiveness of different consumer education campaign messages in encouraging households to reduce food waste.
- Expertise from USDA and FDA, on subjects such as on date labeling and consumer-reaching food safety, will be considered in the national consumer education campaign design.

#### B. **Educate children and youth about strategies to reduce food waste; encourage development and adoption of lifelong best practices in schools to reduce food waste.**

Providing children and youth with knowledge about food loss and waste and reduction strategies can have the potential to change wasteful behavior before it gets entrenched.

Educational activities can build on and complement several of USDA's strategic actions:

- USDA is investing \$10 million of ARPA funds in NIFA's Food and Agriculture Service Learning Program (FASLP) grants for food loss and waste reduction on school grounds. These grants are to engage in and scale up efforts that increase capacity for students to learn how to prevent food waste, change the school environment (e.g., through student-led cafeteria food waste audits), and use cafeterias and other parts of school grounds as classrooms. Also, with this funding, NIFA and the National 4-H Council will develop food loss and waste leadership trainings for youth who attend national and state level events; these youth can take lessons back to their communities and implement them locally.
- USDA FNS's Patrick Leahy Farm to School Grant Program, among other priorities, can support farm-to-school activities related to food loss and waste, such as composting school cafeteria food scraps and using the compost for school gardens or teaching children to feed cafeteria food scraps to chickens they raise on school grounds.
- USDA FNS periodically conducts the School Nutrition and Meal Cost Study (SNMCS), which estimates the amount of plate waste in the National School Lunch and School Breakfast Program. The SNMCS has identified practices that school nutrition professionals can consider implementing in their school meals programs that may help reduce plate waste, such as offering more entrée choices, offering raw vegetables every day, addressing the time and length of mealtimes, and implementing offer versus serve (an option that allows students to decline some of the food offered in a reimbursable lunch or breakfast).<sup>40</sup>

**C. Partner with the private sector to find upstream solutions to consumer food waste.**

Some of the most effective solutions to preventing consumer food waste may lie upstream from households. Changes in the consumer environment should be explored, with partners in retail, food service, and food manufacturing industries and food advocates, to make it easier for all consumers and community types to waste less food. For example, successful efforts in other countries have included changes in packaging design, date labeling, marketing promotions and portion sizes.

- EPA is partnering with the United Nations Environment Programme (UNEP), the Pacific Coast Collaborative, and the Consumer Goods Forum to fund the development and testing of new interventions with retailers, food service providers and manufacturers aimed at helping consumers waste less food. Results and learnings will be shared broadly to inspire industry-wide action.
- EPA and USDA will seek other opportunities to test solutions in settings such as traditional brick-and-mortar shopping settings, as well as online shopping settings.
- USDA and EPA are committed to expanding the U.S. Food Loss and Waste 2030 Champions, a public-private partnership that includes businesses that have publicly committed to reducing food loss and waste in their own U.S. operations in half by 2030.

**D. Facilitate and incentivize food donations to improve access to healthy and affordable food.**

- EPA will refine and expand on food donation infrastructure data in the *Excess Food Opportunities Map*,<sup>41</sup> a national tool that provides information on potential sources of excess food as well as potential infrastructure to help businesses, organizations and governments make better use of food by ensuring it goes to feed people or recycling it.<sup>42</sup>
- EPA will continue to support projects aimed at increasing food rescue and donation models.
- Through several programs, USDA will continue to help expand the food donation infrastructure and support research, education and extension projects that improve and innovate food donation channels. For example, FSA's Farm Storage Facility Loan Program and Rural Development's Community Facilities and Rural Energy for America Program (REAP) loan and grant programs can help fund cold storage infrastructure that helps extend shelf life. USDA will continue to clarify guidance on food safety for food donations. USDA will continue to provide guidance on the donation of eligible meat and poultry products to nonprofit organizations.
- USDA will continue to provide outreach on the benefits of using tax credits to encourage the donation of food.
- USDA will continue outreach to businesses on the liability protections afforded by the Bill Emerson Good Samaritan Food Donation Act.

**E. Research and identify and address unique drivers of U.S. food loss and waste and the incentives to reduce it.**

- USDA will partner with academics to build on their seminal research findings on the economic drivers in the farm and pre-retail sectors for fresh produce loss to other food groups and sectors.
- USDA will support research that provides estimates of the returns on investment for food loss and/or waste reduction activities (e.g., by sector or for particular food groups).
- EPA is partnering with UNEP, the World Resources Institute and the Waste and Resources Action Programme (WRAP) to identify systemic drivers of food waste unique to the United States and recommend strategies to address them.

**F. Invest in behavioral science to determine the most effective strategies to change household behaviors related to food waste.**

- EPA and USDA will explore investing in behavioral science expertise and research to guide iterative design and implementation of a national campaign.

- USDA's NIFA launched a new \$1.5 million cross-cutting Agriculture and Food Research Initiative (AFRI) program area titled "Center for Research, Behavioral Economics, and Extension on Food, Loss and Waste." This center will use a systems approach in conducting research and Extension outreach to address inefficiencies in the food system, such as food waste. The center should create meaningful momentum on food loss and waste prevention and recovery among land grant universities, their partners, and external stakeholders. The Center awardee will be announced in spring 2024.

**G. Test new approaches in the United States and abroad, identify technology-based solutions, and facilitate sharing of best practices to reduce food loss and waste among retailers, manufacturers and food service providers, including in their supply chains.**

- EPA is partnering with UNEP and the Pacific Coast Collaborative to fund projects that test interventions to prevent wasted food across the whole supply chain, with both large industrial-scale and smaller retailers and manufacturers. Learnings will be shared to increase awareness about food waste reduction opportunities among businesses and other leading organizations and amplify solutions.
- EPA and USDA will continue to provide funding opportunities through SBIR grants to small businesses seeking to develop new technological approaches to prevent food waste.
- USDA is supporting research to develop innovative tools that will enable organizations or group initiating or running food waste reduction campaigns geared towards households to affordably and accurately track progress and success.
- FDA will continue to work with industry to implement the New Era of Smarter Food Safety Blueprint-Tech-Enabled Traceability to allow stakeholders in the supply chain to adopt and leverage digitally enabled technologies and data sharing to more quickly and accurately pinpoint contaminated food product and remove it from the marketplace, reducing food loss and waste associated with such events.

**H. Participate in international forums to share best practices, data and tools.** Many countries around the world are interested in reducing food waste and see it as an important action to reduce GHG emissions. The United States is a leader in food loss and waste reduction practices, data and tools and can showcase these efforts internationally. It can also bring back successful best practices from other countries.

- EPA and USDA, with support from other agencies, will continue to collaborate with the Group of Seven (G7), the Group of 20 (G20), the Commission for Environmental Cooperation, the Asia-Pacific Economic Cooperation, and the Organisation for Economic Cooperation and Development to exchange policies and best practices for reducing and measuring food waste.
- USDA will continue to host its roundtable series on food loss and waste success stories in the United States and around the world.

- USDA will host sessions (e.g., workshops for states, municipalities/localities and Tribal communities) to share the development of other food loss and waste information and highlight and disseminate best practices.



# Objective 3: Increase the recycling rate for all organic waste

Recycling organic waste offers the opportunity to recover valuable resources, such as nutrients and energy, and create healthy soils, in a way that also promotes environmental justice. Certain types of organic waste can be converted to animal food, composted, anaerobically digested, or converted into energy or other products, thus providing nutrients to livestock, returning nutrients to the soil, or displacing the use of fossil fuels—all while reducing GHGs. Organics recycling is essential to building a more circular economy for all and reducing landfill methane emissions.

*Measurement: Progress will be measured by EPA's metric for food waste and other organics (by management pathway destination—e.g., composting, anaerobic digestion, landfill).<sup>43</sup>*

## Strategic actions

- A. Support the development of additional organics recycling infrastructure through grants and other assistance for all communities, especially those that are underserved.** The development of additional organics recycling infrastructure will be essential to meet the *National Recycling Goal* and to ensure that all communities can participate and share in the benefits of organic waste recycling. These actions will support centralized and de-centralized (i.e., community-scale) organics recycling operations, as well as education and training for community members.
- USDA Rural Development's REAP guarantees loans of up to \$25 million and provides grants of up to \$1 million to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements, including anaerobic digesters that incorporate food waste as feedstock.
  - USDA is investing \$30 million over three years in the Office of Urban Agriculture and Innovative Production's (OUAIP's) Composting and Food Waste Reduction (CFWR) cooperative agreements. This program engages private producers and their local governments and partners to develop, implement and test strategies for planning and implementing municipal compost plans and/or food waste reduction plans.
  - EPA will fund up to \$275 million in grants through the Solid Waste Infrastructure for Recycling Grant Program (SWIFR)<sup>44</sup> (part of the Bipartisan Infrastructure Law), which includes supporting organics recycling infrastructure (e.g., composting and anaerobic digestion) as eligible activities. EPA anticipates providing technical assistance and peer networking opportunities to SWIFR grantees and will make available future funding opportunities under SWIFR.
  - EPA will fund up to \$75 million in grants through the Recycling Education and Outreach Grant Program (REO)<sup>45</sup> (part of the Bipartisan Infrastructure Law), which includes supporting education and outreach efforts for food and organics recycling

as eligible activities. EPA will provide technical assistance and peer networking opportunities to REO grantees and will make available future funding opportunities under REO.

- EPA will continue to convene the recipients of its *Supporting Anaerobic Digestion in Communities* funding to share information and lessons learned from their demonstration projects, feasibility studies, and technical assistance and education projects focusing on anaerobic digestion of food waste.
- EPA's AgSTAR program will continue to provide technical assistance support and guidance for on-farm anaerobic digesters that co-digest food waste.

**B. Expand the market for products made from recycled organic waste.** Education and outreach on the value of recycled products made from organic waste—compost as well other beneficial products—can help increase the market for procurement and use of these products by municipalities, state transportation departments, real estate developers, farmers, landscapers and other entities. Research to support market expansion can include the value and benefits of these recycled products made from organics. For example, it can include the benefits of compost and other beneficial products when used to improve soil quality, increase water retention, serve as green infrastructure to control erosion and stormwater runoff, build climate resilience, and aid in cleanup of contaminated soils.

- USDA and EPA will continue to conduct research and develop new materials to communicate the benefits, costs and impacts of using compost, digestate and other organic soil amendments in a variety of applications, such as building climate resilience and a more circular economy. For example:
  - › USDA's Natural Resources Conservation Service (NRCS), in consultation with various land-grant universities, will continue to support research and outreach material related to compost and other soil-related products.
  - › EPA will publish a report quantifying and communicating the environmental and economic values of using compost for a variety of purposes, including improving soil quality, remediating soil contamination, reducing soil erosion, and building resilience to a changing climate.
  - › USDA NIFA's Bioeconomy, Biorefining, and Biomanufacturing will continue prioritizing research projects that investigate how food waste and mixed waste can be diverted from the landfill and used as a feedstock for other bioproducts.

**C. Enhance support to advance de-centralized (i.e., community-scale and home composting) organics recycling,** with emphasis on Tribal communities and communities with environmental justice concerns, allowing all communities to benefit—economically and environmentally—from certain types of organics recycling efforts. Federal resources could be used to provide tools and increase capacity for communities for certain types of organics recycling and end-product use where possible. These efforts should include community investment and job creation.

- EPA is providing up to \$275 million in funding through SWIFR<sup>46</sup> (part of the Bipartisan Infrastructure Law). This funding could include support for capacity building and training for underserved communities, including efforts to enable increased decentralized composting.
- USDA is investing \$30 million over three years through CFWR cooperative agreements, which engage private producers and their local governments and partners to develop, implement and test strategies for planning and implementing municipal/community compost plans and/or food waste reduction plans and identify food waste solutions.
- EPA and USDA will identify model community composting operations and share outreach materials to support the advancement of community composting, highlighting its environmental, economic and social benefits.
- EPA and USDA will continue to strengthen opportunities for Tribes to develop composting programs on Tribal lands—for example, through training workshops, funding support and technical assistance.

**D. Build, refine, and share tools and data to aid decision-making about infrastructure investments, waste management policies, and waste management pathway destinations (e.g., composting, anaerobic digestion, landfill).**

- EPA will promote its new Wasted Food Scale,<sup>47</sup> a tool that ranks wasted food management methods based on their environmental impacts and contribution to circularity. The tool's ranking is based on the findings of EPA's 2023 report *From Field to Bin: The Environmental Impacts of U.S. Food Waste Management Pathways*.<sup>48</sup>
- EPA will create a decision support tool that identifies the best pathways for managing waste within given circumstances (e.g., geography, type of waste, facilities/ technologies available).
- EPA will develop or refine tools, such as the Co-Digestion Economic Analysis Tool (CoEAT), that help decision-makers assess economic feasibility and benefits of adding food waste into existing organics recycling programs and infrastructure.
- EPA will continue to gather data on organic materials management, including but not limited to the generation, collection, recycling and use of organic materials. EPA commits to developing new information collection tools as needed and to make any data collected publicly available.
- Several USDA programs mentioned above, such as CFWR and REAP, will share selected aggregated data and information publicly, as well as information and tools, on food waste management pathway destinations (e.g., composting, anaerobic digesters) with awardees.
- Department of Energy will continue to provide assistance for the development of community-centered solutions and business plans for resource and energy recovery



from organic waste streams, including \$10 million for awards for Community Scale Resource and Energy Recovery from Organic Wastes and over \$1.5 million in ongoing technical assistance provided by the National Renewable Energy Laboratory. This technical assistance assists U.S. municipalities and counties in the lower 48 states, Alaska, Hawaii, and U.S. territories—as well as Tribal governments—with addressing knowledge gaps, specific challenges, decision-making considerations, planning, and project implementation strategies related to waste to energy technologies.

- *The National Strategy to Advance an Integrated U.S. Greenhouse Gas Measurement, Monitoring, and Information System* includes a task to establish measurement test beds that combined atmospheric observations of carbon dioxide and methane with activity data from landfill operations to improve municipal solid waste landfill emissions models, emissions factors, and activity data. Additionally, agencies will advance development of cost-effective measurement and monitoring approaches with landfill emissions. These tasks will be aligned and supported by parallel efforts to monitor and quantify food loss and waste reduction strategies.

**E. Address contamination in the organic waste recycling stream.** One current limit on organics recycling is the contamination of this waste stream with plastics, persistent chemicals and other materials.

- As requested, EPA and USDA will provide subject matter expertise and technical assistance to state, Tribal, territorial and local governments (as well as other entities) to address contamination in the organic waste recycling stream.
- EPA and USDA will support research on the uptake and bioaccumulation of PFAS in plants and animals, including PFAS bioaccumulation via biosolids application.<sup>49</sup>
- In coordination with actions under its draft *National Strategy to Prevent Plastic Pollution*,<sup>50</sup> EPA will consider how to scale and refine existing solutions that address non-compostable plastic contamination in the organic waste recycling stream.
- EPA will continue to share effective outreach materials that communities can customize and use to address and reduce contamination in their composting programs through its *Composting Food Scraps in Your Community: A Social Marketing Toolkit*.<sup>51</sup>

# Objective 4: Support policies that incentivize and encourage food loss and waste prevention and organics recycling

Policies that incentivize and encourage the prevention of food loss and waste, redistribution of surplus food, development of additional organics recycling infrastructure, and expansion of markets for recycled products made from organics and soil amendments made from food and other organic waste—at all levels of government—can help the United States meet its *National Food Loss and Waste Reduction Goal and National Recycling Goal*. For example, efforts can include sharing case studies; promoting state and local goal setting and climate planning; and facilitating peer learning on effective and equitable surplus food redistribution systems, organic waste collection and processing infrastructure, cost-benefit analytical tools, and market-based incentives or policy approaches to divert organic waste from landfills and incinerators (such as “pay-as-you-throw” programs or landfill bans on organic materials). Many states and cities have enacted policies to prevent the waste of food and to keep organic waste out of landfills. In 2021 alone, 25 different states introduced food waste legislation.<sup>52</sup>

## Strategic actions

- A. Support international policymakers aiming to build more circular economies.** The United States is advancing a range of circular economy approaches internationally in several priority sectors, including agriculture and food loss and waste.
  - EPA and USDA, with support from other agencies, will continue to collaborate with the G7, the G20, the Commission for Environmental Cooperation, the Asia-Pacific Economic Cooperation, and the Organisation for Economic Cooperation and Development to exchange best practices and policies for the reduction and measurement of food waste.
  - USDA, with support from other agencies, continues to support the United States’ participation in the Food Is Never Waste Coalition, which was launched in Rome in 2021 at the UN Food Systems Summit to reduce food loss and waste while emphasizing financial and economic sustainability.
  - USDA Secretary and EPA Administrator are members of the Champions 12.3 coalition, which consists of executives from governments, businesses, international organizations, research institutions, farmer groups and civil society dedicated to inspiring ambition, mobilizing action and accelerating progress toward achieving SDG Target 12.3 by 2030.
- B. Support Tribal, territory, state, and local policymakers aiming to build more circular economies.**
  - EPA and USDA will provide subject matter expertise and technical assistance to Tribes, territories, states and local governments, as requested, on policy approaches and



options for reducing food loss and waste and increasing food waste and/or other organics recycling.

- EPA and USDA will identify barriers to decentralized community composting and share information with partners, such as state and local policymakers.
- EPA will continue to convene the National Compost and Anaerobic Digestion Peer Network, composed of state and local government staff working on organics recycling efforts, as well as the Food: Too Good to Waste Peer Network, composed of state and local government staff who share successful strategies for reducing household food waste. These networks aim to share information on current research, challenges and solutions and provide a platform for state and local governments to collaborate and learn from each other. EPA will continue to expand participation in both networks.
- EPA will continue to share example state and local climate action plans on its website that contain actions to reduce food loss and waste, as well as recycle organic waste.<sup>53</sup>
- USDA will continue to host events that highlight success stories and sharing of information for food loss and waste prevention. These events could include information on building a more circular economy.
- FDA will continue to work to encourage uniform adoption of food donation practices updated in the Food Code, which provide consistency and uniformity for public health officials to ensure alignment with food safety requirements, by state, local, Tribal, and territorial retail food protection programs.

# Measuring progress toward the objectives

EPA and USDA will work together and collaborate with external partners to improve measurement of food loss and waste and to track progress toward the *National Food Loss and Waste Reduction Goal*, the *National Recycling Goal*, and *SDG Target 12.3*.<sup>54</sup>

EPA and USDA will rely on—and expand and improve where necessary and feasible given available resources—their existing datasets for food loss and food waste. More data will be needed in some areas, such as on-farm food losses, and more regular updates may be needed in other areas to track progress. All data sources will be peer-reviewed to ensure quality. Ultimately, this work will be partially guided toward data analytics that can be used for accurate predictive tools for food loss and waste along the supply chain. Models already exist for what and how these data could be provided so that tracking food loss and waste and seeking opportunities can become proactive rather than reactive.

EPA will also develop measures to track the environmental benefits achieved through progress toward the *National Food Loss and Waste Reduction Goal*, and will publicly report these measures in its *Report on the Environment*.<sup>55</sup> The first metric will quantify the methane emissions associated with landfilling food waste and will build on EPA's 2023 report *Quantifying Methane Emissions from Landfilled Food Waste*.<sup>56</sup>

As noted above, agencies will coordinate under the *National Strategy to Advance an Integrated U.S. Greenhouse Gas Measurement, Monitoring, and Information System* to enhance quantification tools to measure landfill emissions. The agencies will also address composting and other strategies through ongoing efforts to measure, monitor, report on and verify greenhouse gas emissions reductions resulting from the adoption of conservation practices and strategies.



# Glossary

**Circular economy:** An economy that uses a systems-focused approach and involves industrial processes and economic activities that (a) are restorative or regenerative by design; (b) enable resources used in such processes and activities to maintain their highest values for as long as possible; and (c) aim for the elimination of waste through the superior, cost-effective design of materials, products and systems (including business models).<sup>57</sup>

**Environmental justice:** The just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation or disability, in agency decision-making and other federal activities that affect human health and the environment.<sup>58</sup>

**Equity:** The consistent and systematic fair, just and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, Indigenous and Native American persons, Asian Americans and Pacific Islanders, and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.<sup>59</sup>

**Food loss:** Food intended for human consumption that is not ultimately consumed by humans because it is lost on the farm, post-harvest, or in the processing or distribution sectors.

**Food loss and waste:** Loss or waste that happens when food intended for human consumption is not ultimately consumed by humans. Crops grown to produce biofuel, feed or seed, or other non-food products are not included. Food loss and waste may also be referred to as “wasted food.”

**Food rescue:** Collecting and distributing surplus or excess food to keep the food in the human food supply chain. This often happens through donation.

**Food waste:** Food intended for human consumption that is not ultimately consumed by humans because it is discarded or recycled in the retail, food service or household sectors.

**Green infrastructure:** The range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters.<sup>60</sup>

**Organics recycling:** Collecting and processing food loss and waste and other organic (carbon-based) materials, such as yard and tree trimmings, that would otherwise be landfilled or incinerated, and turning it into new products, such as soil amendments (e.g., by composting food scraps). Some organics recycling solutions also generate heat and/or biogas that can be captured and used to generate electricity and/or fuel.



**Organic waste:** Includes food, yard and tree trimmings, and other organic (carbon-based) materials in the waste stream. Materials included in the definition of organic waste vary by state and local jurisdiction (e.g., some state and local jurisdictions include lumber and manure). The term “organic” in this Strategy does not refer to food and fiber certified under the Organic Foods Production Act of 1990.

**Prevention:** In this Strategy, “prevention” of food loss and waste broadly refers to preventing food from becoming waste in the first place (i.e., source reduction) and keeping it in the human food supply chain by rescuing and/or upcycling it.

**Surplus food:** Food that is donated to food banks, pantries, and other organizations, or upcycled into new food products, and therefore kept in the human food supply chain. Surplus food is not considered food loss or food waste. May also be referred to as “excess food.”

**Underserved community:** A population sharing a particular characteristic, or a geographic community, that has been systematically denied a full opportunity to participate in aspects of economic, social and civic life.<sup>61</sup>

**Upcycled food:** Foods that use ingredients that otherwise would not have gone to human consumption, are procured and produced using verifiable supply chains, and have a positive impact on the environment.<sup>62</sup>

**Wasted food:** This term can be used interchangeably with “food loss and waste” to mean food intended for human consumption that is not ultimately consumed by humans.

# Endnotes

- 1 United Nations. (2023). Goal 12: Ensure sustainable consumption and production patterns. <https://sdgs.un.org/goals/goal12>.
- 2 United Nations. (2023). Target 12.3: Food loss & waste. <https://sdg12hub.org/sdg-12-hub/see-progress-on-sdg-12-by-target/123-food-loss-waste>.
- 3 U.S. Environmental Protection Agency. (2021). United States 2030 Food Loss and Waste Reduction Goal. <https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal>. In September 2021, EPA updated the baseline of the national 2030 goal to align it with SDG Target 12.3, which aims to reduce the amount of food from food retail, food service, and households that has been removed from the human supply chain. This is defined as food waste that is being sent to the following six management pathways: landfill; controlled combustion; sewer; litter, discards, and refuse; co/anaerobic digestion; compost/aerobic digestion; and land application.
- 4 U.S. Department of Agriculture. (2021). Climate-smart agriculture and forestry strategy: 90-day progress report. <https://www.usda.gov/sites/default/files/documents/climate-smart-ag-forestry-strategy-90-day-progress-report.pdf>.
- 5 White House Office of Domestic Climate Policy. (2021). U.S. methane emissions reduction action plan. <https://www.whitehouse.gov/wp-content/uploads/2021/11/US-Methane-Emissions-Reduction-Action-Plan-1.pdf>.
- 6 White House Office of Domestic Climate Policy. (2021). U.S. methane emissions reduction action plan. <https://www.whitehouse.gov/wp-content/uploads/2021/11/US-Methane-Emissions-Reduction-Action-Plan-1.pdf>.
- 7 RMI. (2022). Key strategies for mitigating methane emissions from municipal solid waste. <https://rmi.org/insight/mitigating-methane-emissions-from-municipal-solid-waste/>.
- 8 National Aeronautics and Space Administration. (2023). Global climate change: Methane. <https://climate.nasa.gov/vital-signs/methane/>.
- 9 U.S. Global Change Research Program. (2023). The fifth National Climate Assessment. <https://nca2023.globalchange.gov/>.
- 10 This Strategy is part of a set of strategies to help governments, businesses, industry and nonprofits in the United States build a circular economy for all: <https://www.epa.gov/recyclingstrategy/strategies-building-circular-economy-all>.
- 11 U.S. Environmental Protection Agency, Food and Drug Administration, and U.S. Department of Agriculture. (2018). Formal agreement among the United States Environmental Protection Agency and the United States Food and Drug Administration and the United States Department of Agriculture relative to cooperation and coordination on food loss and waste. <https://www.usda.gov/sites/default/files/documents/usda-fda-epa-formal-agreement.pdf>.
- 12 U.S. Environmental Protection Agency. (2019). Winning on reducing food waste: FY 2019–2020 Federal Interagency Strategy. EPA 530-F-19-004. <https://www.usda.gov/sites/default/files/documents/interagency-strategy-on-reducing-food-waste.pdf>.
- 13 Buzby, J. C., H. F. Wells, and J. Hyman. (2014). The estimated amount, value, and calories of postharvest food losses at the retail and consumer levels in the United States. U.S. Department of Agriculture. EIB 121. [https://www.ers.usda.gov/webdocs/publications/43833/43680\\_eib121.pdf?v=9290.1](https://www.ers.usda.gov/webdocs/publications/43833/43680_eib121.pdf?v=9290.1).

- 14 U.S. Environmental Protection Agency. (2020). Advancing sustainable materials management: 2018 fact sheet. EPA 530-F-20-009. [https://www.epa.gov/sites/default/files/2021-01/documents/2018\\_ff\\_fact\\_sheet\\_dec\\_2020\\_fnl\\_508.pdf](https://www.epa.gov/sites/default/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf). The definitions of other organic materials vary by state and local jurisdiction. Some state and local jurisdictions include lumber and manure.
- 15 U.S. Environmental Protection Agency. (2023). 2019 wasted food report. EPA 530-R-23-005. [https://www.epa.gov/system/files/documents/2023-03/2019%20Wasted%20Food%20Report\\_508\\_opt\\_ec.pdf](https://www.epa.gov/system/files/documents/2023-03/2019%20Wasted%20Food%20Report_508_opt_ec.pdf).
- 16 U.S. Environmental Protection Agency. (2020). Advancing sustainable materials management: 2018 fact sheet. EPA 530-F-20-009. [https://www.epa.gov/sites/default/files/2021-01/documents/2018\\_ff\\_fact\\_sheet\\_dec\\_2020\\_fnl\\_508.pdf](https://www.epa.gov/sites/default/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf).
- 17 U.S. Environmental Protection Agency. (2023). Quantifying methane emissions from landfilled food waste. EPA-600-R-23-064. <https://www.epa.gov/land-research/quantifying-methane-emissions-landfilled-food-waste>.
- 18 U.S. Environmental Protection Agency. (2023). Quantifying methane emissions from landfilled food waste. EPA-600-R-23-064. <https://www.epa.gov/land-research/quantifying-methane-emissions-landfilled-food-waste>.
- 19 U.S. Environmental Protection Agency. (2021). From farm to kitchen: The environmental impacts of food waste (part 1). EPA 600-R21-171. [https://www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste\\_508-tagged.pdf](https://www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste_508-tagged.pdf).
- 20 U.S. Environmental Protection Agency. (2023). From field to bin: The environmental impacts of U.S. food waste management pathways (part 2). EPA/600/R-23/065. <https://www.epa.gov/land-research/field-bin-environmental-impacts-us-food-waste-management-pathways>.
- 21 Strategies, road maps and plans developed by partners include the following: [Roadmap to 2030: Reducing Food Waste by 50%](#) (ReFED, 2021), [U.S. Food Loss & Waste Policy Action Plan for Congress & the Administration](#) (FLPC, ReFED, NRDC, WWF, 2021), [A National Strategy to Reduce Food Waste at the Consumer Level](#) (NASEM, 2020), [Local Government Advisory Committee \(LGAC\) recommendations](#) (2021), and [Farm, Ranch, and Rural Communities Advisory Recommendations to U.S. Environmental Protection Agency Administrator Michael S. Regan](#) (FRRCC, 2021).
- 22 U.S. Environmental Protection Agency. (2023). The Bipartisan Infrastructure Law: Transforming U.S. recycling and waste management. <https://www.epa.gov/rcra/bipartisan-infrastructure-law-transforming-us-recycling-and-waste-management>.
- 23 <https://www.whitehouse.gov/environmentaljustice/justice40/>.
- 24 U.S. Environmental Protection Agency. (2021). United States 2030 Food Loss and Waste Reduction Goal. <https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal>.
- 25 U.S. Department of Agriculture. (n.d.) Food waste FAQs. <https://www.usda.gov/foodlossandwaste/faqs>.
- 26 U.S. Environmental Protection Agency. (2021). U.S. National Recycling Goal. <https://www.epa.gov/recyclingstrategy/us-national-recycling-goal>.
- 27 United Nations. (2023). Goal 12: Ensure sustainable consumption and production patterns. <https://sdgs.un.org/goals/goal12>.
- 28 United Nations. (2023). Target 12.3: Food loss & waste. <https://sdg12hub.org/sdg-12-hub/see-progress-on-sdg-12-by-target/123-food-loss-waste>.
- 29 White House Office of Domestic Climate Policy. (2021). U.S. methane emissions reduction action plan. <https://www.whitehouse.gov/wp-content/uploads/2021/11/US-Methane-Emissions-Reduction-Action-Plan-1.pdf>.

- 30 The White House. (2022). Biden-Harris Administration national strategy on hunger, nutrition, and health. <https://www.whitehouse.gov/wp-content/uploads/2022/09/White-House-National-Strategy-on-Hunger-Nutrition-and-Health-FINAL.pdf>.
- 31 U.S. Environmental Protection Agency. (2023). Federal interagency collaboration to reduce food loss and waste. <https://www.epa.gov/sustainable-management-food/federal-interagency-collaboration-reduce-food-loss-and-waste>.
- 32 U.S. Environmental Protection Agency. (2021). From farm to kitchen: The environmental impacts of food waste (part 1). EPA 600-R21-171. [https://www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste\\_508-tagged.pdf](https://www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste_508-tagged.pdf).
- 33 U.S. Environmental Protection Agency. (2020). Documentation for greenhouse gas emission and energy factors used in the Waste Reduction Model (WARM): Organic materials chapters. [https://www.epa.gov/sites/default/files/2020-12/documents/warm\\_organic\\_materials\\_v15\\_10-29-2020.pdf](https://www.epa.gov/sites/default/files/2020-12/documents/warm_organic_materials_v15_10-29-2020.pdf).
- 34 U.S. Environmental Protection Agency. (2023). From field to bin: The environmental impacts of food waste management pathways (part 2). EPA-600-R-23-065. <https://www.epa.gov/land-research/field-bin-environmental-impacts-us-food-waste-management-pathways>.
- 35 ReFED. (2023). In the U.S., 38% of all food goes unsold or uneaten—and most of that goes to waste: What is the impact? [https://refed.org/food-waste/the-problem?gclid=CjwKCAjwjOunBhB4EiwA94JWslt9lrOOXyYulbmmqJzKIAStYy8lgelwRRTlcoGAb4EGjzbryFjElxoCLUcQAvD BwE#what\\_is\\_the\\_impact](https://refed.org/food-waste/the-problem?gclid=CjwKCAjwjOunBhB4EiwA94JWslt9lrOOXyYulbmmqJzKIAStYy8lgelwRRTlcoGAb4EGjzbryFjElxoCLUcQAvD BwE#what_is_the_impact).
- 36 U.S. Department of Agriculture. (2020). Economic drivers of food loss at the farm and pre-retail sectors: A look at the produce supply chain in the United States. <https://www.ers.usda.gov/publications/pub-details/?pubid=95778>.
- 37 Hatami, T., M. A. A. Meireles, and O. N. Ciftci. (2019). Supercritical carbon dioxide extraction of lycopene from tomato processing by-products: Mathematical modeling and optimization. *Journal of Food Engineering*, 241, 18-25. <https://doi.org/10.1016/j.jfoodeng.2018.07.036>.
- 38 U.S. Environmental Protection Agency. (2021). From farm to kitchen: The environmental impacts of food waste (part 1). EPA 600-R21-171. [https://www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste\\_508-tagged.pdf](https://www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste_508-tagged.pdf).
- 39 National Academies of Science, Engineering and Medicine. (2020). A national strategy to reduce food waste at the consumer level. <https://www.nap.edu/catalog/25876/a-national-strategy-to-reduce-food-waste-at-the-consumer-level>.
- 40 U.S. Department of Agriculture. (2022). Reducing food waste at K–12 schools. <https://www.usda.gov/foodlossandwaste/schools>.
- 41 U.S. Environmental Protection Agency. (2023). Excess food opportunities map. <https://epa.gov/foodmap>.
- 42 U.S. Environmental Protection Agency. (2023). Excess food opportunities map. <https://epa.gov/foodmap>.
- 43 U.S. Environmental Protection Agency. (2021). United States 2030 Food Loss and Waste Reduction Goal: Measuring the success of the goal. <https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal#measure>.
- 44 U.S. Environmental Protection Agency. (2022). Solid Waste Infrastructure for Recycling Grant Program. <https://www.epa.gov/infrastructure/solid-waste-infrastructure-recycling-grant-program>.
- 45 U.S. Environmental Protection Agency. (2022). Consumer Recycling Education and Outreach Grant Program. <https://www.epa.gov/infrastructure/consumer-recycling-education-and-outreach-grant-program>.
- 46 U.S. Environmental Protection Agency. (2022). Solid Waste Infrastructure for Recycling Grant Program. <https://www.epa.gov/infrastructure/solid-waste-infrastructure-recycling-grant-program>.

- 47 U.S. Environmental Protection Agency. (2023). Wasted Food Scale. <https://www.epa.gov/sustainable-management-food/wasted-food-scale>.
- 48 U.S. Environmental Protection Agency. (2023). From field to bin: The environmental impacts of U.S. food waste management pathways (part 2). EPA/600/R-23/065. <https://www.epa.gov/land-research/field-bin-environmental-impacts-us-food-waste-management-pathways>.
- 49 U.S. Environmental Protection Agency. (2023). Research for understanding PFAS uptake and bioaccumulation in plant and animals in agricultural, rural, and tribal communities: Request for applications (RFA). <https://www.epa.gov/research-grants/research-understanding-pfas-uptake-and-bioaccumulation-plant-and-animals>.
- 50 U.S. Environmental Protection Agency. (2023). Draft national strategy to prevent plastic pollution. EPA 530-R-23-006. <https://www.epa.gov/circulareconomy/draft-national-strategy-prevent-plastic-pollution>.
- 51 U.S. Environmental Protection Agency. (2023). Composting food scraps in your community: A social marketing toolkit. <https://www.epa.gov/sustainable-management-food/forms/composting-food-scraps-your-community-social-marketing-toolkit>.
- 52 Harvard Food Law and Policy Clinic. (2022). New policies to spur food waste Reduction: Policy finder tool from ReFED and FLPC provides insights. <https://chlpi.org/news-and-events/news-and-commentary/commentary/new-policies-to-spur-food-waste-reduction-policy-finder-tool-from-refed-and-flpc-provides-insights/>.
- 53 U.S. Environmental Protection Agency. (2023). Example local government climate action plans that address materials management and waste. <https://www.epa.gov/smm/example-local-government-climate-action-plans-address-materials-management-and-waste>.
- 54 United Nations. (2023). Goal 12: Ensure sustainable consumption and production patterns. <https://sdgs.un.org/goals/goal12>.
- 55 U.S. Environmental Protection Agency. (2023). Report on the environment. <https://www.epa.gov/report-environment>.
- 56 U.S. Environmental Protection Agency. (2023). Quantifying methane emissions from landfilled food waste. EPA-600-R-23-064. <https://www.epa.gov/land-research/quantifying-methane-emissions-landfilled-food-waste>.
- 57 U.S. Congress. (2020). S.1982—Save Our Seas 2.0 Act. <https://www.congress.gov/bill/116th-congress/senate-bill/1982/text>.
- 58 The White House. (2023). Executive Order on revitalizing our nation’s commitment to environmental justice for all. <https://www.federalregister.gov/documents/2023/04/26/2023-08955/revitalizing-our-nations-commitment-to-environmental-justice-for-all>.
- 59 The White House. (2021). Executive Order on advancing racial equity and support for underserved communities through the federal government. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>.
- 60 U.S. Environmental Protection Agency. (2023). What is green infrastructure? <https://www.epa.gov/green-infrastructure/what-green-infrastructure>.
- 61 The White House. (2021). Executive Order on advancing racial equity and support for underserved communities through the federal government. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>.
- 62 Upcycled Food Association. (n.d.). About upcycled food. <https://www.upcycledfood.org/upcycled-food>.



