

**Fiscal Year  
2017 - 2022**

**U.S. EPA Sustainable Materials  
Management Program  
Strategic Plan**



*October 2015*

## EPA's Mission

To Protect Human Health and the Environment



## Sustainable Materials Management (SMM) Program Vision

Protecting human health and the environment by advancing the sustainable use of materials throughout their lifecycle to minimize waste and environmental impacts

## SMM Program Objectives

**Objective 1: Decrease disposal rate** - This objective focuses on tracking and reducing the overall amount of materials disposed, which would encompass activities targeting *source reduction, reuse, recycling* and *prevention*.

**Objective 2: Reduce environmental impacts of materials** - This objective focuses on reducing the environmental impacts of materials across their life cycle, including greenhouse gas emissions and reductions in water and energy use.

**Objective 3: Increase socio-economic benefits** - This objective focuses on tracking and reporting material impacts on the economy as well as social aspects.

**Objective 4: Increase capacity of state and local governments, communities and key stakeholders to adopt and implement SMM policies, practices and incentives** - This objective involves increasing the number of states and communities where SMM capacity has been expanded as a result of EPA's technical assistance and support. This objective also involves increasing the per capita quantity and/or quality of recyclables recovered for manufacturing and increasing the number of households with access to organic collection and recycling.

## SMM Strategic Priorities

**The Built Environment**

**Sustainable Food Management**

**Sustainable Packaging**

## Additional Emphasis Areas

**Sustainable Electronics Management**

**Life Cycle Assessment and SMM International Efforts**

**Overarching Measurement Efforts**

# Introduction

*Sustainable Materials Management (SMM) is an approach to serving human needs by using/reusing resources productively and sustainably throughout their life cycles, generally minimizing the amount of materials involved and all associated environmental impacts.<sup>1</sup> This SMM Strategic Plan covers a 5-year period from Fiscal Year (FY) 2017 to 2022.*



According to the UN Environment Programme (UNEP), “Humans are consuming resources and producing waste at a greater scale than ever before and per capita consumption levels are projected to increase with continued development.” For every 1% increase in GDP, resource use has risen 0.4%.<sup>2</sup> Further, “one half to three quarters of annual resource inputs to industrial economies is returned to the environment as wastes within just one year.”<sup>3</sup>

The Resource Conservation & Recovery Act (RCRA) provides the legislative basis for EPA’s Sustainable Materials Management (SMM) Program, setting a strong preference for resource conservation over disposal. EPA’s report, *Beyond RCRA: Waste and Materials Management in 2020* (2002) made the argument for focusing efforts on materials management, and EPA’s report, *SMM: The Road Ahead* (2009) provided recommendations and an analytical framework for moving toward sustainable materials management. The *Road Ahead* serves as the foundation for the SMM Program. In addition, EPA’s waste hierarchy continues to provide guidance, highlighting **source reduction/waste prevention & reuse** over recycling and composting, energy recovery, and treatment & disposal.

Responsibility for managing materials and waste is largely at the state and local levels, yet capacity and approaches vary widely. EPA helps to provide national consistency and co-implements RCRA with states by providing states, businesses and others stakeholders with national standards, guidelines, and technical support to more effectively conserve and manage materials and waste. In addition, through its convening role, EPA facilitates the dialogue and collaboration needed to address the complex challenges we face to sustainably manage our natural resources while experiencing healthy economic growth. Indeed, access to and increased

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- *Weight of Nations: Material Outflows from Industrial Economies, World Resource Institute*

utilization of U.S. collection, processing and recycling infrastructure is imperative if SMM is to succeed. Material recovery and waste reduction are essential components to the productive and sustainable use of materials across their entire life cycle to conserve resources, reduce waste, slow climate change, and minimize the environmental impacts of the materials we use. Yet every day, the lack of such infrastructure contributes to the problem of Americans wasting valuable commodities and resources by discarding reusable or recyclable materials. National system approaches and methods are needed to reduce waste and disposal and increase recycling rates by capturing high quantity wastes (packaging and containers, organic residuals, etc.) more effectively and efficiently through developing capacity to convert these materials into marketable, useable commodities and products that yield substantial economic and environmental benefits.

EPA’s SMM Program activities are specifically reflected in EPA’s FY2014-FY2018 Strategic Plan Goal 3, as well as the Cross-Cutting Strategy Working Toward a Sustainable Future. Specific SMM Program commitments and targets were articulated (and met) in EPA’s FY2014 Action Plan under the Agency’s Cross-Cutting Sustainability Strategy, and SMM is highlighted again in the FY2016 Action Plan. SMM was listed along with Green Products and Procurement, Green Infrastructure, and Energy Efficiency as the first areas of emphasis when the Agency responded to the National Academy of Sciences recommendations to EPA for

<sup>1</sup> Sustainable Materials Management: The Road Ahead. EPA. 2009.

<sup>2</sup> Circular Advantage: Innovative Business Models and Technologies to Create Value in a World without Limits to Growth <http://www.accenture.com/us-en/Pages/insight-circular-advantage-innovative-business-models-value-growth.aspx>

<sup>3</sup> Matthews, Emily, et al. *Weight of Nations: Material Outflows from Industrial Economies*. World Resource Institute. Washington, DC, 2000.

implementing sustainability across the Agency. Sustainable Food Management continues to be recognized by the Administrator, across the Agency and with outside stakeholders as an area of significant importance. The White House Council on Environmental Quality recognized and supported SMM Program efforts around the Federal Green Challenge and continues to recognize EPA's leadership role across federal agencies in the National Strategy for Electronics Stewardship.

SMM Program efforts also are aligned with international priorities and efforts aimed at managing our global resources. SMM is recognized internationally and EPA is collaborating with partners and stakeholders in a variety of initiatives such as: the UNEP 10 Year Framework of Programme Consumption and Production, efforts led by the Organization for Economic Cooperation and Development, and the development of the United Nation's Sustainable Development Goal for the U.S. that addresses food loss and food waste, among others. Most recently, EPA represented the U.S. Government in the G7 Resource Efficiency area and saw its recommendations on materials management and life cycle-based decision making reflected in the G7 Declaration and Annex that resulted from the G7 Summit of world leaders in June 2015. Significant follow-up efforts are underway related to the G7 Alliance formed that will continue to progress SMM approaches and concepts at home and abroad.

The SMM Program Strategic Plan specifically builds on efforts initiated in 2010 when the Office of Resource Conservation and Recovery (ORCR) and the EPA Regions shifted program emphasis from a broad array of resource recovery initiatives to sustainable materials management. The current SMM Program has demonstrated measureable results in its efforts in sustainable food management, sustainable electronics management and the federal government leading by example (which include the Food Recovery, Electronics and Federal Green Challenges); measurement, state capacity, and local government zero waste efforts; and efforts to support evaluating the beneficial uses of industrial materials. Much has been learned from the current SMM Program and EPA has received and will continue to seek input on its SMM initiatives both informally and formally (e.g., Packaging Dialogue (2012), Electronics Forum (2014), Sustainable Food Management Summit (planned for November 2015), and various discussions at the EPA regional level.

In FY 2017-FY 2022, EPA will continue to invest in improving measurement systems that can be used to track and evaluate trends associated with prevention, reuse, recycling, disposal, processing capacity, feedstocks for markets, and public access to recycling or reuse options.

In addition, EPA will maintain and improve the analytical tools and methods for quantifying the environmental and economic impacts of SMM efforts. Work will build on the current three SMM Challenges to better support the strategic priorities. The beneficial use evaluations for industrial materials and C&D materials will be completed and shared and will serve as the foundation for future efforts. Finally, collaboration with stakeholders at the national and international levels will continue and be strengthened.

## SMM Program Objectives & Strategic Priorities

The three strategic priorities chosen as the focus of the SMM Program from FY2017 to FY2022 present significant opportunities for environmental, economic, social (and program performance) results. The Strategic Priority Areas are: 1) The Built Environment; 2) Sustainable Food Management; and 3) Sustainable Packaging. Work under each of these areas will support the four primary SMM Program objectives to:

1. Decrease the disposal rate, which includes *source reduction, reuse, recycling* and *prevention*;
2. Reduce the environmental impacts of materials across their life cycle;
3. Increase socio-economic benefits; and
4. Increase the capacity of state and local governments, communities and key stakeholders to adopt and implement SMM policies, practices and incentives.

The specific activities provided as examples under each Strategic Priority Area in this Strategic Plan are only a sampling of potential efforts and might evolve based on program transition efforts in FY2016 and early FY2017. These example activities also represent a continuum; different parts of the country have different needs relative to materials management. It also is important to leverage existing stakeholder relationships, and EPA expertise and capacity that varies from Region to Region and in Headquarters. Thus, not every EPA Region will engage in every activity being proposed under this Strategic Plan; there is a flexible yet focused package of recommended core elements and action areas that are measurable, scalable, and when combined, enable us to implement a cohesive national SMM Program focused on management of materials throughout their life cycle. EPA will continue to commit to achieving specific goals within the recommended national program priority areas. Greater emphasis will be placed on targeting, measuring and reporting environmental outcomes to augment the current targeting of specific numbers of SMM Challenge participant recruitment and retention.

## **The Built Environment:**

### ***1. Incorporate lifecycle SMM concepts into the built environment marketplace.***

#### **Anticipated Outcomes by 2022:**

- Increase safe reuse and recycling of C&D materials.
- Increase the safe beneficial use of high priority industrial byproduct materials.

### ***2. Advance climate adaptation and community resilience efforts.***

#### **Anticipated Outcomes by 2022:**

- A national data tracking approach to begin to measure amounts of debris generated and how it is managed.
- Decreased disposal of debris (measured by new national tracking system).
- Improved disaster debris management plans in communities to enhance resilience to disasters.
- Improved building codes and ordinances in communities to reduce disaster debris.

### ***3. Improve and enhance data & measurement of C&D and industrial byproduct materials.***

#### **Anticipated Outcomes by 2022:**

- A national baseline and trend data for generation, reuse, recycling and disposal of C&D materials (based on methodology implemented in FY16).
- A national, replicable methodology to provide baseline and trend data for generation, reuse, recycling, and disposal of high-priority industrial byproduct materials; and
- Improved and expanded WARM and other tools and calculators to allow quantification of environmental and economic benefits and impacts related to C&D materials management and industrial byproduct materials.

## **Sustainable Food Management:**

### ***1. Develop an infrastructure to support alternatives to landfill disposal of wasted food.***

#### **Anticipated Outcomes by 2020:**

- Increase the number of new and existing composting and anaerobic digestion facilities that accept wasted food.

### ***2. Promote opportunities across the entire food life cycle to reduce wasted food from landfills, with a preference for those approaches higher up on EPA's food recovery hierarchy.***

## **Anticipated Outcomes by 2022:**

- Make progress towards the U.S. 50% reduction of food loss and waste 2030 goal by decreasing the amount of wasted food from retail to consumer, as well as the amount of food waste ultimately disposed of in landfills.

### ***3. Improve and standardize measurement of wasted food.***

#### **Anticipated Outcomes by 2022:**

- Quantify the number of composting and anaerobic digestion facilities that accept wasted food.
- Align EPA's measurement with other national and international protocols to create uniform methods; and
- Develop a comprehensive report on food loss that identifies key opportunities to target source reduction and diversion activities within the food life cycle and capture the environmental, social and economic impacts from wasted food.

## **Sustainable Packaging:**

### ***1. Convening and Partnerships: Infrastructure.***

### ***2. Work Across EPA and with Other Federal Agencies as Strategic Partners.***

### ***3. Research, Data, and Measurement for Packaging.***

#### **Anticipated Outcomes by 2022:**

- Increase per capita quantity of recyclables collected.
- Increase yield rates of recyclables collected, processed and made available to the secondary materials market (quality).
- Increase average household lbs/year of recyclables collected.
- Increase access to and participation in recycling collection.

**Additional Emphasis Areas:** Work will also be conducted in the area of Sustainable Electronics Management (e.g., SMM Electronics Challenge and National Strategy for Electronics Stewardship). There are Life Cycle Assessment (LCA) efforts involving the development of tools, SMM indicators and work to develop a Federal LCA Commons (a network of interoperable data, databases and models that facilitate the ability to conduct LCAs). In addition, SMM international efforts and overarching measurement and analysis that support the SMM Program will continue.

# SMM and the Built Environment



Opportunities exist for increasing safe reuse, recycling and safe disposal of industrial byproducts, building materials and debris. Over 500 million tons of industrial materials are generated in the U.S. each year. Over 110 million residences exist in the U.S., almost 70% of which are single-family homes with a wide range of materials, goods and services used directly or indirectly in construction and potential demolition. In addition, natural disasters can create millions of debris. For example, Hurricane Andrew generated 20 million cubic yards of debris – enough to fill a football field a mile high. The following Action Areas outline how EPA will work to implement a life cycle, systems-based approach to address the full range of impacts associated with materials management in the built environment.

**Action Area 1: Incorporate lifecycle SMM concepts into the built environment marketplace.** Work to influence the building design marketplace, including architects, engineers, product designers, educators and students by working with federal, state, and community stakeholders to adopt and implement SMM policies, practices and incentives that affect designing, building, using, renovating, demolishing, recycling or reusing materials in the built environment.

## Anticipated Outcomes by 2022:

- Increase safe reuse and recycling of C&D materials.
- Increase the safe beneficial use of industrial byproduct materials, such as coal fly ash and spent foundry sand.

## Examples of Possible Activities:

- Integrate SMM into an existing lifecycle building design competition.
- Target large construction or demolition projects for beneficial use or recycling.

**Action Area 2: Advance climate adaptation and community resilience efforts.** Advance climate adaptation efforts and strengthen community resilience to natural disasters through sustainable construction techniques and improved disaster debris planning and management.

## Anticipated Outcomes by 2022:

- A national data tracking approach to begin to measure amounts of debris generated and how it is managed.
- Decreased disposal of debris (measured by new national tracking system).
- Improved disaster debris management plans in communities to enhance resilience to disasters.
- Improved building codes and ordinances in communities to reduce disaster debris.

## Examples of Possible Activities:

- Expand measurement and tracking systems used by EPA, FEMA and the Army Corps to capture actual debris amounts and disposition; and develop model contracts for emergency situations.
- Engage with building code organizations to have them consider incorporating SMM concepts into applicable codes in order to improve resiliency of built environment in communities.

**Action Area 3: Improve and enhance data & measurement of C&D and industrial byproduct materials.** Provide high-quality scientific information and data, and develop and maintain tools to quantify the environmental and economic benefits of adopting and implementing SMM policies, practices and incentives in the built environment.

## Anticipated Outcomes by 2022:

- A national baseline and trend data for generation, reuse, recycling and disposal of C&D materials (based on methodology implemented in FY16)
- A national, replicable methodology to provide baseline and trend data for generation, reuse, recycling, and disposal of high-priority industrial byproduct materials; and
- Improved and expanded WARM and other tools and calculators to allow quantification of environmental and economic benefits and impacts related to C&D materials management and priority industrial byproduct materials.

## Examples of possible activities:

- Develop transparent and replicable data sources and reports for industrial byproduct materials generation, reuse, recycling and disposal
- Develop tools and calculators to estimate other environmental benefits and economic benefits associated with reuse and recycling of C&D and the priority industrial byproduct materials.

# Sustainable Food Management

The case for focusing SMM Program efforts on sustainable food management is compelling. Roughly one third of the food produced in the world for human consumption every year (approximately 1.3 billion tonnes) gets lost or wasted (UNEP 2011). In addition, in the United States, more than 30% of edible food goes to waste costing Americans approximately \$161 billion annually. The cost to the environment is staggering. Food loss represents a tremendous waste of resources used in production such as land, water, energy, and inputs. Food is the largest stream of materials in our landfills, accounting for 21% of the American waste stream. This large volume of disposed food is a main contributor to the roughly 18% of total U.S. methane emissions that come from landfills. Costs are even greater considering that 48 million Americans, of which roughly 16 million are children, live in food insecure households. One UNEP global indicators goal is to “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” by 2030. To achieve this ambitious goal, the U.S., led by EPA and USDA, need to work with the public and private sectors to reduce wasted food by roughly 66 billion pounds within 15 years.



**Action Area 1. Develop an infrastructure to support alternatives to landfill disposal of wasted food.** Work with stakeholders to develop and expand organic residual collection and processing infrastructure and technologies, such as increasing the number of new and existing composting and anaerobic digestion (AD) facilities that accept wasted food.

#### Anticipated Outcome by 2020:

- Increase the number of new and existing composting and anaerobic digestion facilities that accept wasted food.

#### Examples of Possible Activities:

- Work with strategic partners such as states, municipalities, and industry groups to facilitate capacity building for the collection and processing of food residuals.

**Action Area 2: Promote opportunities across the entire food life cycle to reduce wasted food from landfills, with a preference for those approaches higher up on EPA’s food recovery hierarchy.** Deliver tools and education, and convene networks across the food spectrum to implement more sustainable food management practices.

#### Anticipated Outcomes by 2022:

- Make progress towards the U.S. 50% reduction of food loss and waste 2030 goal by decreasing the amount of wasted food from retail to consumer, as well as the amount of food waste ultimately disposed of in landfills.

#### Examples of possible Activities:

- Host food recovery and waste reduction stakeholder dialogues with key players in the food economy.
- Implement existing tools and approaches to connect sectors that produce excess food and other organic residuals with those who can beneficially use the materials; and to reduce residential food waste.
- Facilitate development of community-based approaches to achieve common objectives and/or share expertise and best practices.

**Action Area 3: Improve and standardize measurement of wasted food.** Provide high-quality scientific data and improve tools to quantify the environmental, social and economic benefits from implementing sustainable food management policies, practices and incentives.

#### Anticipated Outcomes by 2022:

- Align EPA’s measurement with other national and international protocols to create uniform methods.
- Develop a comprehensive report on food loss that identifies key opportunities to target source reduction and diversion activities within the food life cycle and capture the environmental, social and economic impacts from wasted food.

#### Examples of Possible Activities:

- Quantify the number of composting and anaerobic digestion facilities that accept wasted food.
- Collaborate with groups such as the UN and other federal agencies to align measurement protocols.
- Work with other federal agencies to develop a comprehensive report on food loss throughout the U.S. food system.

# Sustainable Packaging

Americans generate approximately 250 million tons of municipal solid waste (MSW) every year with a stagnant 35 % recycling rate (a rate that is at or near the bottom compared with other industrialized nations.) According to EPA's 2013 SMM Facts and Figures Report, approximately 30% of the MSW generated is composed of containers and packaging-related materials, or over 75 million tons. The Packaging Strategic Area focuses on increasing the quantity and quality of reused and recycled materials from MSW, development of sufficient public and private sector collection and processing infrastructure and end markets, promoting the productive and sustainable use of materials across their entire life cycle, and leveraging how the federal government, private industry and consumers reduce the use of materials through thoughtful policy, manufacturing innovations, and information that consider the life-cycle impacts.



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## Anticipated Outcomes by 2022:

- Increase per capita quantity of recyclables collected.
- Increase yield rates of recyclables collected, processed and made available to the secondary materials market (quality).
- Increase average household lbs/year of recyclables collected.
- Increase access to and participation in recycling collection.

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**Action Area 1. Convening and Partnerships: Infrastructure.** Work with States, communities, non-governmental organizations (NGOs) and industry on common interests and alignment on systematic and life-cycle based approaches, including supportive policies, practices and incentives; alignment of measurement systems, metrics, and benchmarking; and transparency of secondary materials markets and end users.

## Examples of Possible Activities:

- Convene national stakeholder dialogues on key packaging source reduction and waste topics to actively promote the connection between reducing and recovering packaging waste.
- Develop and actively engage regional collaboratives to work with states, communities, NGOs and industry on supportive policies, practices and incentives, and actionable data and measurement.

**Action Area 2. Work Across EPA and with Other Federal Agencies as Strategic Partners.** Work with other EPA program offices and other federal agencies as strategic partners to coordinate and harmonize packaging-related policies and programs, research and development of new materials, and/or recycling processes for hard-to-recycle materials.

## Examples of Possible Activities:

- Support implementation of EPA's Office of Water's Trash Free Waters program, which is working to reduce loadings of plastic packaging in our nation's waters; and continue to coordinate with OCSPP to strengthen and support packaging criteria.

- Coordinate and work with other agencies that influence SMM in areas such as; mandates on labeling; environmental claims standards; coordinated programs and grants for collection and processing infrastructure; and, economic development with state and industry-led efforts.
- Scale-up and leverage partnership with Department of Defense and its Net Zero Program to incentivize and support development and optimization of community-based and local recycling infrastructure.

**Action Area 3. Research, Data, and Measurement for Packaging.** Increase the availability of information that supports recycling of packaging; expand and enhance materials flow studies and efforts; apply life-cycle analysis methods and tools to identify the environmental impacts of packaging materials and forms, and support the adoption of SMM policies optimizing materials flows for recovered packaging using data gathered on material production, LCA and disposal/recycling practices.

## Examples of Possible Activities:

- Convene national stakeholder dialogues to align national definitions, metrics and benchmarking or indicators needed for transparency in reporting for system enhancements and interventions that maximize the recovery of materials.
- Build on and scale-up LCA tools and foster the use of database approaches like the LCA Digital Commons that help make lifecycle thinking a reality.