



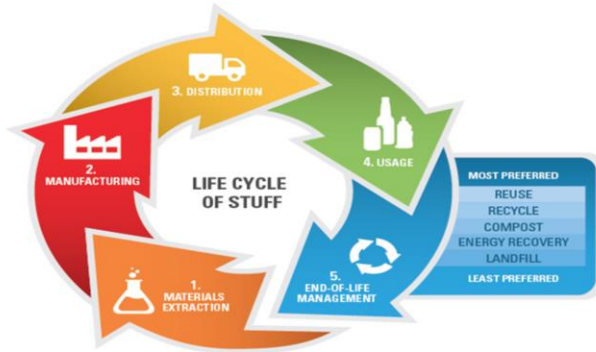
Sustainable Materials Management

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US EPA, Office of Solid Waste and Emergency Response
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CHANGING HOW WE THINK ABOUT OUR RESOURCES FOR A BETTER TOMORROW

- Hello, and thank you for the opportunity to speak to you today on Sustainable Materials Management, or SMM. I think in general, Germany's efforts around Resource Efficiency and our SMM efforts and approaches are nicely aligned.
- While there might be some differences, this is an opportunity to exchange information about our efforts, and I hope one outcome from this workshop can be a future exchange of best practices.
- I especially want to talk to you about SMM because we favor identifying the G-7 Resource Efficiency topic as SMM. This title specifically (1) identifies the topic as materials and not energy or water, (2) stresses sustainability, which includes resource efficiency but is broader, and (3) is already a term used by OECD

What is Sustainable Materials Management?



A systematic approach to using and reusing materials more productively over their entire lifecycles

CHANGING HOW WE THINK ABOUT OUR RESOURCES FOR A BETTER TOMORROW

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- *Sustainable Materials Management* refers to how we manage material resources as they flow through the economy, from extraction or harvest of materials and food (e.g., mining, forestry, and agriculture), to production and transport of goods, provision of services, reuse of materials, and if necessary disposal.
- By considering system-wide impacts, life cycle materials management casts a far broader net than traditional waste and chemicals management approaches and represents a change in how we think about environmental impacts.
- Because environmental and human health issues have become more complex, our approaches must change... only by **systems thinking (or life cycle thinking)** and integrative approaches will we be able to solve these challenging problems.

Why SMM?

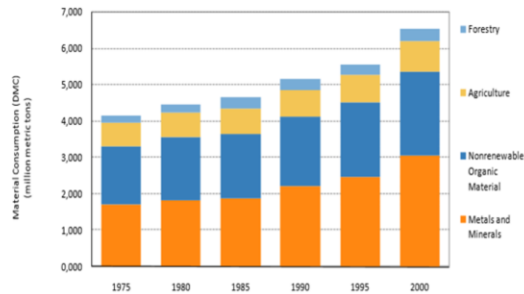


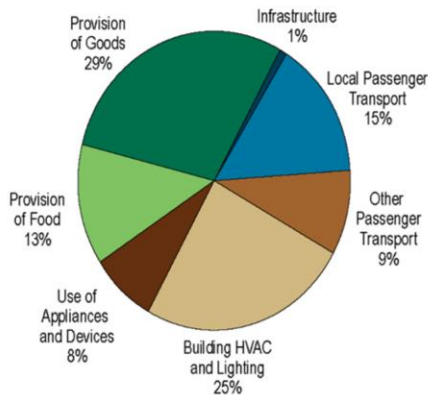
Figure 1: Materials Consumption in the United States by Sector of Origin, 1975-2000
Source: WRI Material Flows Database 2005

- **Addresses Complex Questions about Choices and Impact** – Every day, people make choices about products and services:
 - Which products do we buy?
 - What are they made of and how are they made?
 - How do we use them?
 - What do we do with stuff when we're through with it?
 All of these choices have environmental consequences – some large, some small, almost all unseen.
- **Multi-attribute** - Very narrowly focused attributes like “recyclable”, “biodegradable”, or “organic” don't tell us about all of the other potential environmental impacts that occur in all stages of the life cycle.
- **Offers Inter-related Solutions** - SMM requires interaction between programs that deal with a wide range of media (air, water, etc.) to identify and address "hotspots" which cause major environmental impacts.

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- This graphic illustrates that old approaches aren't working. Materials returning to the environment increased 26% from 1975 to 2000. (Road Ahead, 1)
- As individuals and organizations, we're faced with decisions every day about the materials and services we use: which products should I buy? What are they made of and how are they made? What do I do with this thing once I'm done with it?
- Even when we attempt to be informed consumers, narrowly focused attributes like “recyclable” or “biodegradable” can obscure all of the other unseen impacts that occur in association with the production of a good or service.
- SMM helps us look at materials, products and services in a holistic way.

Why SMM?



U.S. Greenhouse Gas Emissions

(Source: Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices 2009)

- Materials Management is represented by the **Provision of Goods** and **Provision of Food**.
- Accounting for 42% of U.S. GHG emissions.

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- EPA's report *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices* (2009) was developed to increase the understanding of how materials and land management practices relate to GHG emissions.

- The Report took the GHG emissions from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* and reallocated them through a materials and land management lens (i.e., a systems-based perspective).

- The systems-based view - or lifecycle view - of U.S. GHG emissions groups major GHG emission sources by system, where each system represents and comprises multiple parts of the economy that work together to fulfill a particular need.

- Examples:

- "Provision of Food" system includes emissions from the Electric Power Industry to keep the lights on, Transportation to get the food to market, and Agriculture sectors associated with growing, processing, transporting, and disposing of food. Provision of Food is estimated to account for 895 MMTCO₂E, or 13%, of 2006 U.S. GHG emissions.

- "Provision of Goods" system includes the emissions from associated with the goods and services we create, transport, and dispose of on a daily basis. In total, the Provision of Goods is estimated to account for 2,040 MMTCO₂E, or 29%, of 2006 U.S. GHG emissions.

- As you can see, materials management accounts for 42% of U.S. GHG emissions. This is significant and why SMM approaches are so necessary.

Why SMM?

- U.S. Recycling and reuse industry:
 - Consists of 56,000 establishments that employ >1.1 million people
 - Generates an annual payroll of nearly \$37 billion
 - Generates a gross over \$236 billion in annual revenues (U.S. Recycling Economic Information Study 2001)
- Southeast Recycling Development Council (SERDC) research:
 - In Tennessee, local governments pay \$42 million annually to bury commodities with a raw value of \$180 million.
 - Alabamians pay \$25 million to bury \$193 million worth of materials.
 - The Georgia Department of Community Affairs determined that their state pays \$100 million to bury \$300 million.
 - The SE region of the US could have 21,500 more private sector jobs if those states just recycled 10% more material.

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• EPA is currently updating the *U.S. Recycling Economic Information (REI) Study*. The study should be completed in the spring of this year. This slide lists a few findings from the 2001 study.

• We have domestic capacity to process 2 billion pounds of soda bottles, yet currently we only collect 1.4 billion/annually. And there is growing demand for more recycled plastic. The aluminum industry is eager for more aluminum cans – Yet in the U.S. we bury nearly half of our cans in landfills, which by the way are valued at over \$1 billion. Glass recycling capacity exceeds supply by 65%. Paper recycling is available to 87% of Americans. The structure is in place for steel can recycling. Both seek to increase their consumption. All of the materials collected are used in recycling, and the forecast is for this demand to increase.

• SERDC: Despite this enormous appetite for recyclable materials, we continue to bury in landfills or burn recyclable commodities worth Billions of dollars every year. And we pay to do so. The Southeast Recycling Development Council (SERDC) is an organization with members in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia committed to improving the quality and quantity of materials capture with a goal of strengthening local economies through recycling efforts.

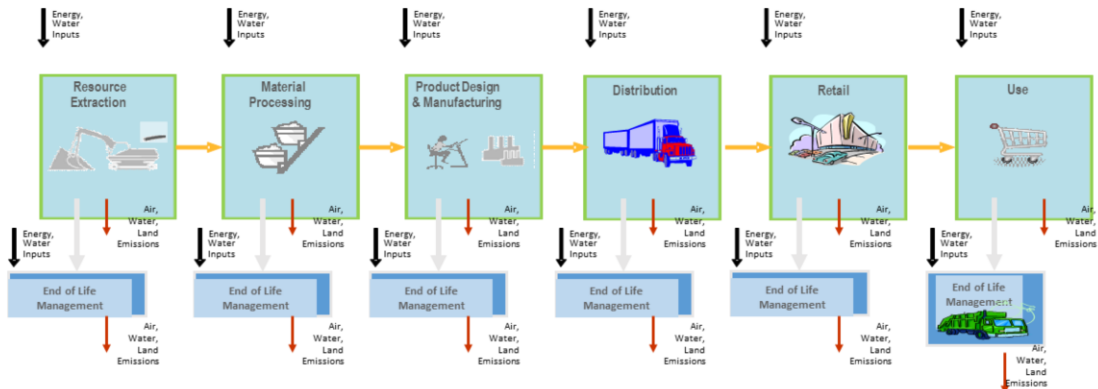
• According to SERDC:

- In Tennessee, local governments pay \$42 million annually to bury commodities with a raw value of \$180 million. \$180 million a year is an investment on par with new factory opening creating a thousand new jobs.
- Alabamians pay \$25 million to bury \$193 million worth of materials.
- The Georgia Department of Community Affairs determined that their state pays right at \$100 million to bury \$300 million.

• Recycling is a potent economic generator in a time where our country desperately needs jobs and economic development. We have an existing manufacturing base that has a demand for these materials and is willing to pay for them. And to put people to work while doing so.

• Indeed, SERDC's own research shows the SE region of the US could have 21,500 more private sector jobs if those states just recycled 10% more material.

Material/Product Life Cycle



- Hidden flows account for up to 75% of the total materials, but are not accounted for in the gross domestic product.

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- Here's an illustration of the life cycle of a material or product. You see that each stage requires inputs in terms of energy, water and materials, and each stage produces wastes. These inputs and wastes all result in environmental impacts.
- "Hidden" material flows (i.e., wastes) include mining overburden, earth moving, and erosion and account for as much as 75% of the total materials that industrial economies use.
- However, because these hidden flows do not enter the economy as commodities bought or sold, they are not considered part of the traditional waste stream, and are not accounted for in the gross domestic product.

Material/Product Life Cycle

- Most estimates of Earth's carrying capacity range from 8 to 16 billion people. "Global population is expected to reach ...around 10 billion by the end of the century." (UNEP (2012) *One Planet, How Many People? A Review of Earth's Carrying Capacity*, p. 11)
- "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." (UNEP, 2012, p. 12)
- For every 1% increase in GDP, resource use has risen 0.4% - "Circular Advantage"
- One half to three quarters of annual resource inputs to industrial economies is returned to the environment as wastes within just one year.

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- For every 1% increase in GDP, resource use has risen 0.4% - "Circular Advantage"
- According to the World Resources Institute, "one half to three quarters of annual resource inputs to industrial economies is returned to the environment as wastes within just one year." There is an opportunity to increase the time that these resources remain in the economy which is the emphasis of the circular economy.

Sustainable Materials Management: The Road Ahead (2009)



- **Used life cycle assessment to evaluate materials use across the U.S. economy.**
 - 38 materials, goods and services with significant environmental impacts identified.
- **Report also had specific recommendations for Government:**
 - Promote efforts to manage materials and products on a life cycle basis
 - Build capacity & integrate materials management approaches in existing government programs.
 - Accelerate the broad, ongoing public dialogue on life cycle materials management.

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- In 2009 EPA published *The Road Ahead* report that included life cycle assessment to evaluate materials use across the US economy.
- The analysis identified the 38 materials, products and services that represent potential significant contributors to environmental issues arising from US consumption of goods and services.
 - they fall generally in 7 groups: food products & services, textiles, nonrenewable organics (e.g., coal, oil), metals, construction and development, forestry and miscellaneous.
- *The Road Ahead* also had specific recommendations for government:
 - Promote efforts to manage materials and products on a life cycle basis.
 - Build capacity & integrate materials management approaches in existing government programs.
 - Accelerate the broad, ongoing public dialogue on life cycle materials management.

The Road Ahead Recommendations



- Recommendations and analysis serve as the foundation for current and future materials management efforts.
- Recommends various EPA-wide approaches.
 - Sustainable Food Management
 - Electronics
 - Life Cycle Assessment Efforts
 - Definition of Solid Waste (DSW) Rule
 - E3: Economy-Energy-Environment
 - Multi-attribute green product labeling standards
 - Product Service Systems – promotion of business models that transform the sale of products to the sale of services

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- *The Road Ahead* serves as the foundation for our current and future materials management efforts. The areas of food and electronics were indicated as having significant environmental impacts in the Road Ahead analysis. I'll talk a little bit more about those shortly. Life cycle assessment is also a tool critical to SMM. I'll talk a more on that as well. While much of our work in SMM is voluntary, I'll highlight where SMM is integrated in a regulation.
- The *Road Ahead* also recommends various EPA-wide approaches such as:
 - E3: Economy, Energy, Environment. This is a multi U.S.-Agency technical assistance program that helps communities, manufacturers and manufacturing supply chains adapt and thrive in today's green economy.
 - Working with stakeholders to develop life cycle-based, multi-attribute green product labeling standards for multiple product categories, with emphasis on priority materials/products. This work is highlighted in more detail a little later as well.
 - Another approach that was recommended was the promotion of business models that transform the sale of products to the sale of services. This is called "Servicizing" or "Product Service Systems". EPA is doing work in this area under the Rio+20 10 Year Framework Programs on Sustainable Consumption and Production. Many of you might be familiar and involved in this work as well.

Food Loss Reduction and Recovery in the U.S.

- 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)
- 40% of U.S. food goes to waste costing Americans approximately \$165 billion annually.
- Getting food to our table accounts for 10% of U.S. energy consumption, uses 50% of U.S. land, and 80% of fresh water consumed in the U.S.
- Uneaten food ends up in landfills where organic matter accounts for 16% of methane emissions.
- If we recovered only 15% of the wasted food we could feed 25 million Americans. (Natural Resources Defense Council 2012)



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- I want to talk in particular about Food and Electronics, not only because we are working on them in the U.S. but also because they can be a focus for the G-7 discussion of best practices

Here are some incredible statistics for you:

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Food Loss Reduction and Recovery in the U.S.

- EPA's Food Recovery Challenge
 - Partnering with organizations and businesses to prevent and reduce wasted food.
 - Over 700 participants (grocery stores, restaurants, universities, schools, hospitality and venues) conduct audits of their food management practices and identify steps in their process to reduce wasted food through source reduction, donation, or composting and/or anaerobic digestion.
 - Nearly 2 million tons of food recovered providing a GHG benefit of 1.4 million tons of CO₂E = annual emissions from 290 thousand passenger cars.
- EPA collaborating with U.S. Department of Agriculture
 - U.S. Food Waste Challenge
 - Sustainable Development Goals



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Through the Food Recovery Challenge, over 700 participants (grocery stores, restaurants, universities, schools, hospitality and venues) conduct audits of their food management practices and identify steps in their process to reduce wasted food through source reduction, donation, or composting and/or anaerobic digestion. They set a goal of at least 5% reduction in food waste and modify their processes to join efforts to:

Reduce food waste by improving product development, storage, shopping/ordering, marketing, labeling, and cooking methods.

Recover food waste by connecting potential food donors to hunger relief organizations like food banks and pantries.

Recycle food waste to feed animals or to create compost, bioenergy and natural fertilizers.

- In 2013, participants in the Food Recovery Challenge reported over 370,000 tons of food diverted from landfills and incineration.
- Nearly 2 million tons of food recovered so far, providing a GHG benefit of 1.4 million tons of CO₂E = annual emissions from 290 thousand passenger cars.
- EPA is also collaborating with the U.S. Department of Agriculture on the U.S. Food Waste Challenge which works with additional entities across the food chain – such as farms, agricultural processors, food manufacturers, and local governments to reduce and/or divert wasted food from disposal.
- As of November 2014, there were 1,000 participants in the U.S. Food Waste Challenge.
- Finally, EPA and USDA are working closely on the UN Sustainable Development Goals for food to significantly reduce wasted food by 2030.

Electronics



- For every million cell phones recycled, we can recover: 35,274 pounds of copper, 772 pounds of silver, 75 pounds of gold, and 33 pounds of palladium.
(U.S. Geological Survey, U.S. Department of Interior, 2006)
- The total wholesale sales of smartphones, tablets, TVs and other gadgets in the U.S. was \$207 billion in 2013.
(Consumer Electronics Association)

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Electronics



- USG National Strategy for Electronics Stewardship: *“Moving Sustainable Electronics Forward: An Update to the National Strategy for Electronics Stewardship”* (2014).
- (EPEAT) Electronic Product Environmental Assessment Tool - global environmental rating system that helps purchasers identify greener electronics.

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- In 2010, President Obama formed an interagency taskforce to develop a framework for the U.S. government to manage its electronics across the products’ life cycle. This National Strategy helps to:
 - **Ensure** that electronics are designed, purchased and managed in a more sustainable manner
 - **Protect** human health and the environment in the U.S. and abroad
 - **Promote** new and innovative technologies
 - **Facilitate** coordination across government and with stakeholders
 - **Catalyze** new efforts within and outside of government
- EPA co-leads this National Strategy effort with the White House Council on Environmental Quality and the General Services Administration.
- In August of last year, the federal government released a status report of its activities entitled: *Moving Sustainable Electronics Forward: An Update to the National Strategy for Electronics Stewardship*.
- A commitment under the NSES is EPA’s SMM Electronics Challenge. Original electronics manufacturers and retailers who join the Challenge are required to send 100% of their used electronics to certified recyclers, to continue to increase their collection of used electronics and to make their results from the Challenge publically available. (I will talk more about this on the next slide.)
- Finally, EPEAT or the Electronic Product Environmental Assessment Tool, is a global environmental rating system that helps purchasers identify greener electronics products.
- EPEAT registered products meet standards that cover: reduction/elimination of environmentally sensitive materials, use of preferable materials, design for reuse, recyclability, and longevity, energy conservation, responsible end-of-life management and corporate performance, and reduced and preferable packaging.

Electronics



- EPA's SMM Electronics Challenge
 - Participants contributed 22% of the total used electronics collected in the U.S. in 2012 (baseline year of Challenge).
- Champion Award winners included Best Buy Co., Inc., Dell Inc., and Sprint



- In 2013, Challenge participants increased their collection totals by over 7.6%. The increase of over 15,000 metric tons to certified recyclers is equal to:
 - Taking 8,500 passenger vehicles off the road for one year;
 - Or
 - Saving enough energy to power more than 3,700 U.S. homes for one year.

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- EPA's SMM Electronics Challenge engages with the industry leaders, who contributed over 22% of the total used electronics collected in the United States in 2012.
- Our Challenge partners sent over 220, 000 metric tons of end-of-life electronics to third party certified recyclers.
- In addition, three companies won a Champion award for demonstrating significant environmental, social, and economic outcomes that went beyond SMM Electronics Challenge requirements – Best Buy, Dell, and Sprint.
 - Best Buy successfully reached their goal of recycling 1 billion pounds of electronics over 6 years
 - Dell used innovative packaging techniques, finding environmentally preferable materials including mushrooms
 - And Sprint has consistently been a leader in cell phone recycling and refurbishing, recently holding a challenge to repurpose cell phones
- The Challenge participants worked hard to increase annual collection tonnage sent to third-party certified recyclers.
 - In 2013 Challenge participants increased collection by over 7.6%, which is over 15,000 metric tons.
 - The increase in collection has a significant environmental benefit, equal to taking 8,500 passenger vehicles off of the road for one year or saving enough energy to power more than 3,700 homes for one year.

SMM and Life Cycle Assessment (LCA)

- Development of a U.S. LCA Commons
- SMM Lifecycle Tool to operationalize LCA through targeting program resources on hotspots to achieve environmental impact reductions.
- SMM Coalition – industry; academics; environmental, community, state and local government organizations
 - Lifecycle Thinking Guidance – provides a simple description of LCA and provides examples of cases where life-cycle thinking provided solutions that were not obvious and that helped to identify unintended consequences.
- 10YFP-related work to promote international LCA cooperation
 - Development of a Global Network of Interoperable LCA database

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- Life cycle assessment (LCA) continues to be a tool used extensively in SMM.
- US Federal LCA Commons: EPA is working with other federal agencies and internationally on efforts that collectively, could overcome the cost and time burden of undertaking life cycle assessment, make life cycle data transparent and publicly available, and connect stakeholder needs with expert models and diverse data.
- My office specifically has built on the analytical framework developed in *the Road Ahead* report that I mentioned earlier. The Sustainable Materials Management Lifecycle Tool is a tool that, on a national level, identifies:
 - Materials, products and services that are potentially the most significant contributors to environmental impacts;
 - Associated impacts; and,
 - Associated impact sources (“hotspots”) in the supply chain.
- The Sustainable Materials Management Coalition (Coalition) was created in Spring 2011. The Coalition is a diverse stakeholder group made up of representatives of business and industry, academic institutions, environmental and community organizations, and State and local government organizations. While not a member, EPA participates in Coalition meetings.
- The Life cycle Thinking guidance attempts to provide a simple description of the LCA process and provide examples of cases where life-cycle thinking can help lead to solutions that weren’t obvious, and that help to identify unintended consequences. It seeks to provide some simple tools to help industry, government, NGOs and others to integrate life-cycle thinking more effectively into their environmental decision making and communicate the importance of a life-cycle perspective.
- Finally, many of you are also a part of the Rio+20 10 Year Framework of Programs on Sustainable Consumption and Production that involves an effort to promote international LCA cooperation.

Integration of SMM into EPA's Recycling Regulations

- EPA's recycling regulations advance the principles of SMM by recognizing the economic incentives manufacturers have for materials reuse and recycling in their production process.
 - This contrasts with stricter regulation of third-party hazardous material recyclers, who have an economic incentive to over-accumulate materials they are paid to accept.
- Specifically, the recycling regulations facilitate in-process recycling, where materials are returned to the production process. In addition, the regulations favor commodity-grade recycled products, such as metals commodities.
- The regulations also recognize the potential of higher value solvents from one industry (e.g., pharmaceuticals) being remanufactured into similar high grade solvents in another industry (e.g., chemical manufacturing).
- Benefits of the regulations include energy and resource savings in addition to an estimated future annual cost savings as high as \$59 million per year.

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- On January 13, 2015, EPA published a regulation called the Definition of Solid Waste (DSW) rule which advances the principles of SMM by recognizing and facilitating remanufacturing and reuse of hazardous secondary materials in the production process.
- In particular, the DSW rule is structured to recognize the legitimacy of in-process recycling and commodity-grade recycled products such as metals commodities, thus aligning the RCRA regulations with the best industry practices to conserve resources.
- In addition, the DSW rule includes a remanufacturing exclusion for higher value solvents being remanufactured into similar high grade solvents. For example, pharmaceutical manufacturers use at least 100 kg of solvents to make 1 kg of active pharmaceutical ingredient. Because of their origin, these solvents are only lightly contaminated and need minimal processing to be returned to a commercial-grade product.
- Benefits of the rule include energy and resource savings that result from maximizing the number of uses of a high-purity grade chemical product as an aid to chemical manufacturing and processing.
- Estimated future cost savings are as high as \$59 million per year.
- Background note: Cost savings are dependent on how many states adopt the rule. Costs savings assuming same level of adoption are \$1.0 to \$2.0 million per year. However, an assumption of higher state adoption rate increases this estimate to \$17.5 million to \$59 million per year.

Sustainable Purchasing Leadership Council (SPLC)

- U.S. coalition (industry, government, university and NGO) formed in 2013 to define & recognize leadership in enterprise-level sustainable purchasing.
- Many members are international companies operating throughout the G-7 countries.
- Creating a Platinum/Gold/Silver rating system for institutional purchasers by December 2015.
 - Builds on credible sustainability standards, ecolabels & other efforts from around the world (referencing them in the rating system to earn points).

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- I also wanted to highlight the Sustainable Purchasing Leadership Council.
- U.S. coalition (industry, government, university and NGO) formed in 2013 to define & recognize leadership in enterprise-level sustainable purchasing.
- Many members are international companies operating throughout the G-7 countries.
- Creating a Platinum/Gold/Silver rating system for institutional purchasers by December 2015. This rating system will be based on how well an institutional purchaser has addressed the major lifecycle sustainability hotspots through a proper analysis. The first draft of guidance was released in February 2015.
- Builds on credible sustainability standards, ecolabels & other efforts from around the world (referencing them in the rating system to earn points).
- SPLC is expanding the focus from public procurement to institutional purchasing. This is an example other G-7 members may want to follow. This can also be another topic for G-7 sharing of best practices.

Working With Industry

Recent conversations with U.S. industry representatives indicate EPA can do more to help:

- Better define terms like recycling, recovery, disposal, and diversion, so all can understand and align more closely on our definitions and measures of success.
- Convene and educate stakeholders across all parts of the materials use and recovery process, to facilitate true life cycle based approaches.
 - Examples include:
 - Product design for recycling based on multiple attribute impacts such as scaled-down flexible packaging is not designed for recycling, but uses much less virgin material.
 - Opportunities for innovation in paper, glass, plastics, food and aluminum.
 - Collection systems enhancements to maximize materials recovery.
- Open more communication channels and increase transparency in reporting so secondary materials markets and the businesses they spawn can be more efficient.
 - Specific focus on measurement systems including the enhancement of existing data and development of new data such as those for measuring the circular economy.

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- In preparation for this meeting, I had the opportunity to ask some of our key contacts in the recycling and materials recovery industry what EPA can do.
 - The industry groups that I met with were GreenBlue, AMERIPEN, SMM Coalition, SERDC, ISRI, and Waste Management
- Better define terms like recycling, recovery, disposal, and diversion, so all can understand and align more closely on our definitions and measures of success.
- Convene and educate stakeholders across all parts of the materials use and recovery process, to facilitate true life cycle based approaches
 - Examples include:
 - Product design for recycling based on multiple attribute impacts such as scaled-down flexible packaging is not designed for recycling, but uses much less virgin material.
 - Opportunities for innovation in paper, glass, plastics, food and aluminum.
 - Collection systems enhancements to maximize materials recovery.
- Open more communication channels and increase transparency in reporting so secondary materials markets and the businesses they spawn can be more efficient.
 - Specific focus on measurement systems including the enhancement of existing data and development of new data such as those for measuring the circular economy.
- I encourage you to work with industries in your respective countries to determine how you can facilitate ensuring secondary materials availability and increase efficiency.

In Summary



- Work with industry to incorporate Sustainable Materials Management principles into day-to-day operations.
- Develop joint statement on the value lifecycle thinking and reinforce existing work on Sustainable Materials Management.
- Coordinate future work on Sustainable Materials Management and Resource Efficiency with ongoing OECD work in this area to take advantage of synergies and avoid duplication of effort.
- Through webinars, meetings like this, and other communications mechanisms, share best practices that foster Sustainable Materials Management and Resource Efficiency in the G7 nations.
- Share information on life cycle assessment tools such as the SMM Lifecycle Tool and foster the use of database approaches like the LCA Digital Commons that help make lifecycle thinking a reality.

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- In closing, by considering system-wide impacts, life cycle materials management casts a far broader net than traditional waste and chemicals management approaches and represents a change in how we think about environmental protection.
- I would encourage governments to integrate the principles of sustainable materials management and resource efficiency into their day-to-day operations, and work with industry to do so as well.
- Develop joint statement on the value lifecycle thinking and reinforce existing work on Sustainable Materials Management.
- Coordinate future work on Sustainable Materials Management and Resource Efficiency with ongoing OECD work in this area to take advantage of synergies and avoid duplication of effort.
- Through webinars, meetings like this, and other communications mechanisms, share best practices that foster Sustainable Materials Management and Resource Efficiency in the G7 nations.
- Share information on life cycle assessment tools such as the SMM Lifecycle Tool and foster the use of database approaches like the LCA Digital Commons that help make lifecycle thinking a reality.

- I want to thank you for the opportunity to speak to you about this exciting, and very necessary approach to environmental protection and to conserving valuable and limited natural resources.

Appendix: The Road Ahead Analytical Framework

The Road Ahead contained an analytical framework – a lifecycle assessment of the U.S. economy.

The framework examined 480 materials, products and services that underlie the U.S. economy (spanning all stages of the material system from extraction such as copper ore to final consumption products and services such as jewelry or hospitals).

The materials, products and services were examined:

- Across 17 environmental criteria: abiotic depletion, land use, global warming, ozone layer depletion, human toxicity, freshwater aquatic toxicity, marine aquatic toxicity, terrestrial ecotoxicity freshwater sedimental ecotoxicity, marine sedimental ecotoxicity, photochemical oxidation, acidification, eutrophication, material use, water use, energy use and material waste.
- From three material system perspectives: business perspective, consumer perspective and direct impact or “hot spot” perspective.

The resulting 38 materials, products and services identified represent potential significant contributors to environmental issues arising from the consumption of products and services in the U.S.