Recycling Economic Information (REI) Report

The Recycling Economic Information (REI) Report aims to increase the understanding of the economic implications of material reuse and recycling. How our society uses materials is fundamental to our economic and environmental future. Global competition for finite resources will intensify as world population and economies grow. More productive and less impactful use of materials helps our society remain economically competitive, contributes to our prosperity and protects the environment in a resource-constrained future. By converting waste materials into valuable raw materials, recycling creates jobs, builds more competitive manufacturing industries and significantly contributes to the U.S. economy.

Background on the REI Report

In 2001, to encourage the development of an economic market for recycling, EPA supported the creation of a national Recycling Economic Information (REI) Project and the related REI report, based upon the work of several states and regions. The REI report was a ground breaking national study demonstrating the economic value of recycling and reuse to the U.S. economy. Compiled through a cooperative agreement with the National Recycling Coalition, the study confirmed what many have known for decades: there are significant economic benefits in recycling.

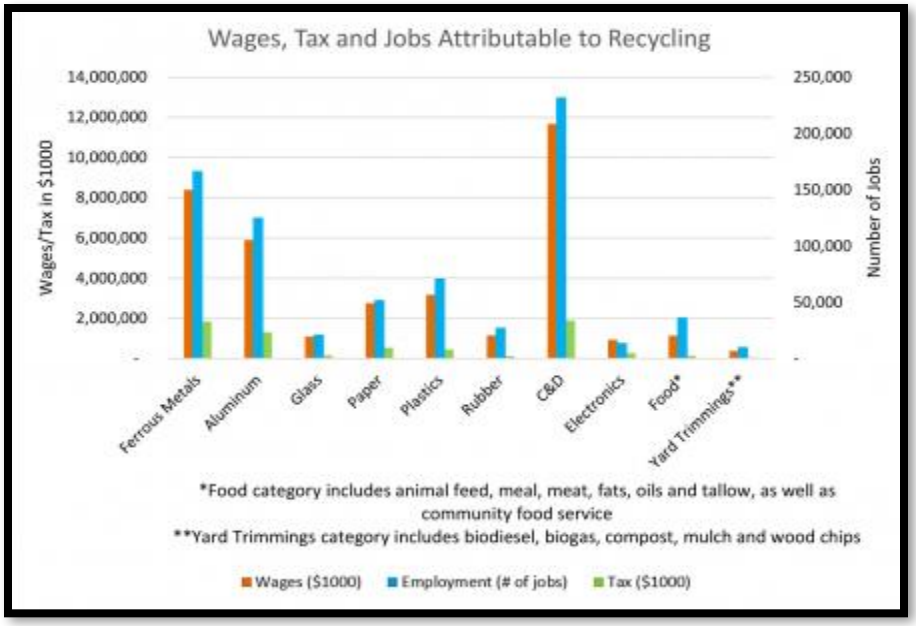
Key Findings of the 2016 REI Report

The 2016 REI Report includes updated information about the number of recycling jobs, wages, and tax revenue. The report shows that recycling and reuse of materials creates jobs, while also generating local and state tax revenues. In 2007, recycling and reuse activities in the United States accounted for:

757,000 jobs

$36.6 billion in wages; and

$6.7 billion in tax revenues



This equates to 1.57 jobs for every 1,000 tons of materials recycled. Construction and Demolition waste provides the largest contribution to all

three categories (job, wage, and tax revenue), followed by ferrous metals and non-ferrous metals such as aluminum.

The 2016 REI Report used an updated analytical framework and a new Waste Input-Output methodology, which focused on the life cycle of materials. These refinements offered significant improvements over the 2001 REI Study in terms of a better definition of recycling and a reduction in double counting. This new methodology will assist decision makers and researchers in more accurately estimating the economic benefits of recycling and create a foundation upon which additional studies can be built.

Frequent Questions

1. **What is the significance of the 2016 REI Report?**

Recycling conserves natural resources, strengthens our economy and creates jobs. Recycling is an essential part of Sustainable Materials Management (SMM), an approach that emphasizes the productive and sustainable use of materials across their entire life cycle, while minimizing their environmental impacts. In 2016, EPA released a new REI Report that utilizes an updated and refined analytical framework, and focuses on SMM. The 2016 REI Report covers the economic activities of nine sectors: ferrous metals, nonferrous metals (aluminum), glass, paper, plastics, rubber, construction and demolition (C&D), electronics and organics (including food and yard trimmings).

2. What is the significance of the report's title?

The 2016 Recycling Economic Information (REI) Report builds on the work from the 2001 REI study. The report focuses on the economic impacts of recycling rather than the environmental benefits, as the environmental benefits have been researched in detail. Accurately estimating the impact that recycling has on jobs, wages and taxes is important because the results can influence policy decisions and provide a more robust picture of recycling by adding an economic layer on top of the more heavily researched environmental impacts of recycling.

3. What is the new definition of recycling?

Recycling is defined as the recovery of materials, such as paper, glass, plastic, metals, construction and demolition (C&D) material and organics from the waste stream (e.g., municipal solid waste), along with the transformation of materials, to make new products and reduce the amount of virgin raw materials needed to meet consumer demands. In addition to updating the definition of

recycling, the 2016 REI Report identified nine materials and investigated their direct and indirect impact on jobs, wages and taxes. In contrast, the 2001 REI Report identified recycling processes rather than materials and investigated the impact of the processes on jobs, wages and taxes.

4. How does the report relate to Sustainable Materials Management (SMM)?

SMM refers to the use and reuse of materials in the most productive and sustainable way across their entire life cycle. On a broader scale, SMM examines social, environmental and economic factors, each playing a critical role, to get a more holistic view of the entire system. The benefits of maximizing this connection include conserving resources, reducing waste, slowing climate change and minimizing the environmental impacts of the materials we use. Since the third key element to SMM is economics, it was important to update the REI Report to provide an economic and systemic view of recycling.

5. What are the main outcomes (takeaways) of the report?

The 2016 REI Report reiterated that recycling and recycled products play an important role in our economy and have significant positive impacts on jobs, wages and tax collections.

Recycling and Reuse Activities in 2007

	Gross Totals	Economic Share
Jobs	Accounted for 757,000 jobs	0.52% of the U.S. economy
Wages	Produced $36.6 billion in wages	0.62% of the U.S. economy

Recycling and Reuse Activities in 2007		
	Gross Totals	**Economic Share**
Taxes	Produced $6.7 billion in tax revenues	0.90% of the U.S. economy

On a national average, there are 1.57 jobs, $76,030 wages and $14,101 tax revenues attributable, for every 1,000 (US) tons of recyclables collected and recycled.

6. was the methodology behind the 2016 REI Report and how does an input-output model work?

EPA developed a waste input-output (WIO) model to provide an improved analytical framework for better understanding the contributions of recycling to the U.S. economy. Instead of examining the job codes within the context of an I-O model, the 2016 REI Report focused on nine material categories and follows the flow of materials through the WIO model. By focusing on material categories, the model identified direct impacts of recycling on jobs, wages and taxes and then upstream indirect impacts. The WIO model built on the official U.S. input-output (I-O) tables maintained by the Bureau of Economic Analysis (BEA). These tables describe the economic transactions between industries in the U.S. and are used to formulate U.S. monetary and fiscal policy. Using the I-O tables as the starting point, the WIO model added information about recyclable and recycled material flows in the U.S., and information about employment and local, state and federal tax revenue. Combining this information with the detailed statistics regarding economic transactions enables the estimation of the economic activity attributable

to recycling. The combination of the WIO model results, along with detailed statistics regarding economic transactions, enabled the estimation of the economic activity attributable to recycling.

7. Which methodological approach was used to provide the statistics and metrics?

The **"direct and indirect production of recycling"**, also called the ***intermediate approach*** in the methodology document, was chosen to communicate the results of the study.

The **intermediate approach** accounted for not only direct, but also upstream supply chain economic activity attributable to recycling processes. In addition to the intermediate approach, three other approaches were analyzed and are explained in detail in the methodology document.

8. What are the data sources for the report?

The key data sources for this report include industry outreach, existing reports (including government, industry and other publicly available reports) and life cycle inventory datasets (such as Ecoinvent V.3.0 and CEDv.4.8). Below is a list of organizations and industry associations involved in the data sourcing for this report:

Material	Organization/Industry Association
Ferrous Metals	• Institute of Scrap Recycling Industries, Inc. (ISRI) • Steel Recycling Institute (SRI)
Nonferrous Metals	• The Aluminum Association

Material	Organization/Industry Association
Plastic	• American Chemistry Council (ACC) • The Association of Postconsumer Plastic Recyclers (APR) • Society of the Plastics Industry (SPI) • KW Plastics
Rubber	• Rubber Manufacturers Association
Glass	• Glass Packaging Institute • Container Recycling Institute
Paper	• American Forest and Paper Association (AF&PA) • American Wood Council (AWC) • U.S. Department of Agriculture (USDA)
Construction & Demolition	• Construction & Demolition Recycling Association
Electronics	• EPA Office of Resource Conservation and Recovery (ORCR) • Electronics TakeBack Coalition
Organics	• BioCycle

9. How does the 2016 REI Report differ from the 2001 REI Report?

The differences between the 2001 REI Report and the 2016 REI Report were primarily in the definition of recycling, scope, proportioning of economic factors, methodology and base years of data and recycling trends.

Definition of recycling processes:

- The 2001 RE Report identified recycling processes (e.g., material collection), processing and related activities (e.g., wholesaling), and estimates of direct economic contributions from recycling.
- The 2016 REI Report identified materials and industries directly engaged in recycling. The process associated with recycling these materials were counted as upstream or downstream processes that are captured in the indirect production of recycling approach. The indirect production of recycling approach included upstream and downstream processes associated with recycling the previously identified materials. The 2016 REI Report approach more accurately captured the jobs, wages and taxes associated with recycling and minimized the impact of double counting.

Scoping approach:

- The 2001 REI Report identified industry sectors directly or indirectly engaged in recycling based on the methodology established in earlier REI studies by the Northeast Recycling Coalition (NERC, 1998).
- The 2016 REI Report identified the scope of recycling activity using a materials flow approach. Based on government and industry information documenting the flows and destination, nine primary recyclable materials were selected with industries directly engaged in recycling. Industries indirectly engaged in recycling were identified using the WIO model.

Proportioning economic factors:

- The two studies used a different approach for apportioning jobs and wages associated with processes that use a mix of recyclable and natural resources.

- The 2001 REI Report counted all jobs (and associated wages) engaged in processing recyclables regardless of the mix of recyclable and virgin materials in the process.
- The 2016 REI Report apportioned jobs and wages according to the mix of recyclables and the virgin materials for which recycles are used as a substitute.

Multiplier methodology for estimating indirect effects:

- The 2001 REI Report used local and regional multiplier estimates based on proprietary information, while the 2016 REI Report used national Input-Output tables with peer-reviewed factor input multipliers, which limited double counting in the 2016 REI Report estimates.
- The 2016 REI Report improved the multiplier models used to estimate the indirect estimate on jobs.

Base year and recycling trends:

- The 2001 REI report used a base year of 1997.
- The 2016 REI report used a base year of 2007.
- The contributions of recycling to national economic activity can be affected by changes in conditions such as: economic output and employment in different sectors; recyclables recovery; recyclable and recycled material markets; and recycling technology.

10. Why was there double counting in the 2001 REI Report? Is double counting still an issue with the 2016 REI Report?

The 2001 REI Report acknowledged several challenges and limitations of the REI methodology, including the ability to isolate recycling activities within multi-faceted manufacturing sectors and identifying industry sectors directly or

indirectly engaged in recycling. The 2001 REI Report counted all jobs engaged in processing recyclables regardless of the mix of recyclable and virgin material content, while the 2016 REI Report apportioned jobs according to the mix of virgin and recycled material, which more accurately estimates the impact of recyclables in the production process and the upstream effect on jobs. The 2016 REI Report improved the multiplier models used to estimate the indirect estimate on jobs. The 2001 REI Report used local and regional multiplier estimates based on proprietary information, while the 2016 REI Report used national Input-Output tables with peer-reviewed factor input multipliers, which limited double counting in the 2016 REI Report estimates.

11. Does this report include "pre-use" or recycling materials that are reused within the manufacturing sector?

12.

No. “Pre-use” or recycled materials that are reused within the manufacturing sector were not included primarily due to a lack of data.