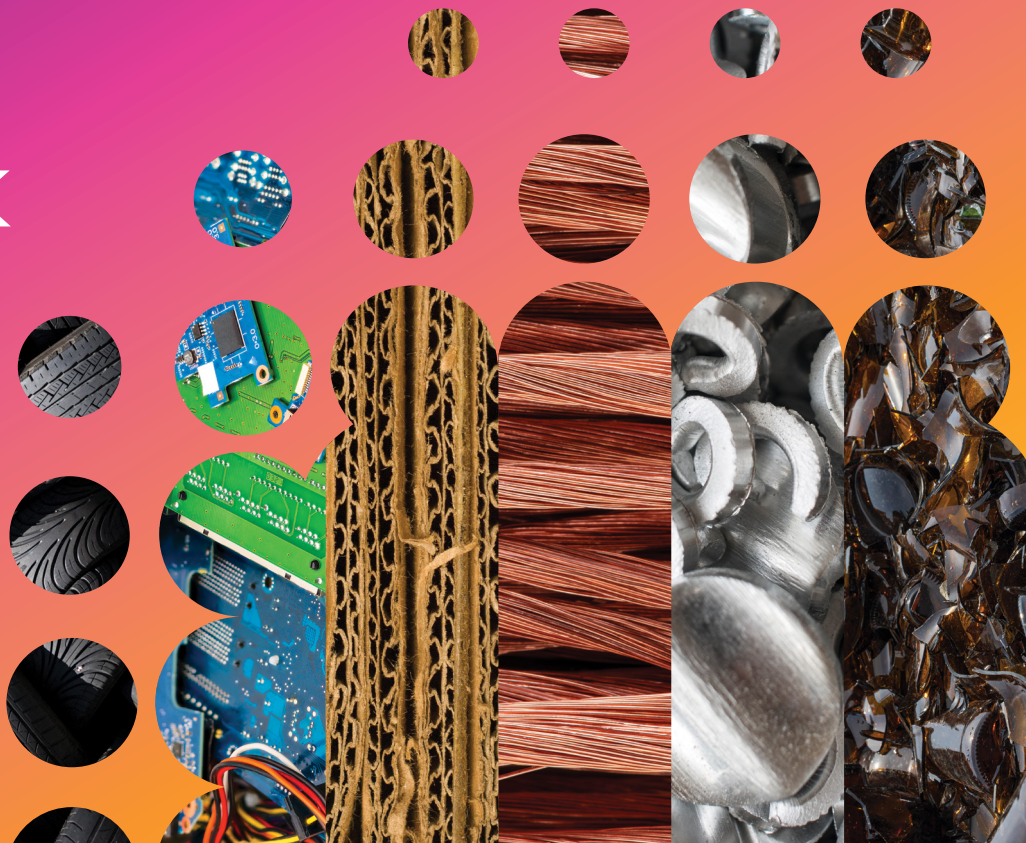
2025 ReMA Yearbook



Recycled Materials Association

Sustainable. Resilient. Essential.

On behalf of ReMA, we are pleased to present the 2025 ReMA Yearbook. The yearbook serves as a definitive reference on the recycled materials industry and provides a comprehensive overview of the markets, policies, and innovations that support the industry. It provides valuable statistical data, sector analysis, and insight into domestic and global trends influencing our industry.

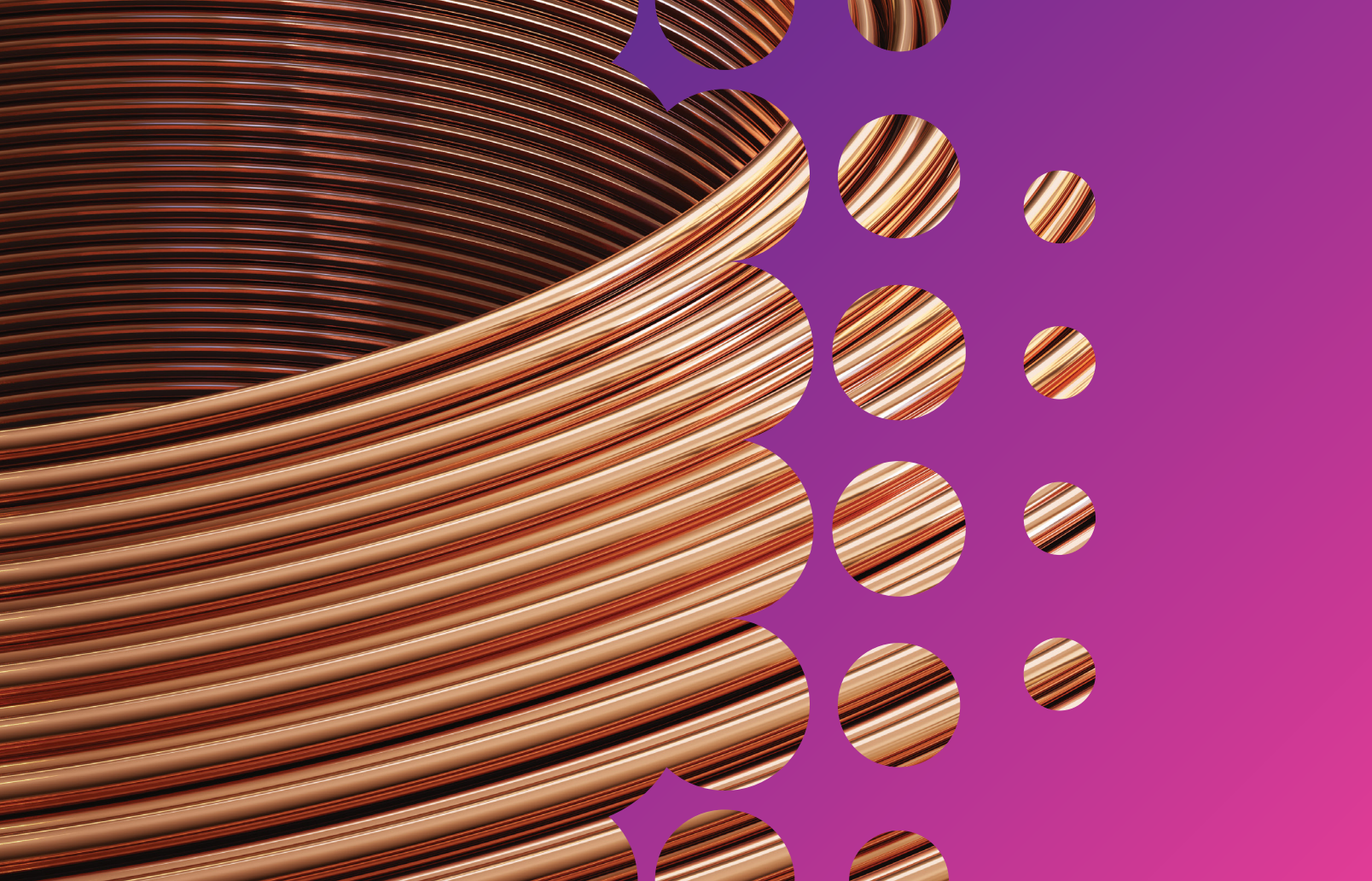
The 2025 edition of the yearbook covers the information that is key to understanding today's recycled materials industry including:

- Recycling's Critical Role in the Economy
- Recycled Materials, Infrastructure, and Supply Chains
- Industry Investment and Consolidation
- Recycling, Sustainability, and the Environment
- Electric Vehicles and Battery Recycling
- Recycling in Your Community
- Transportation and Logistics

The importance of recycled materials to our economy, environment, and society has never been greater. This yearbook illustrates the scope and impact of our industry, who we are, what we do, and how our industry creates jobs, advances U. S. competitiveness, and supports our nation's supply chain resilience through safe, economically sustainable, and environmentally responsible recycling. For more information, please visit recycledmaterials.org.

Colin Kelly
Chair

Robin Wiener
President



Contents

ReMA and the Recycled Materials Industry

About ReMA

ReMA's mission is to promote safe, economically sustainable, and environmentally responsible recycling through networking, advocacy, and education. With more than 1,700 member companies operating in thousands of locations in the United States and around the globe, our members provide the high-quality recycled materials needed to make both everyday items and the essential infrastructure on which people depend.

ReMA members process, broker, and consume the full range of recycled materials including recycled metals, paper, plastics, glass, tires and rubber, electronics, and textiles—whether sourced from industrial, commercial, or residential activities. While most of the material recycled in the United States comes from industrial and commercial operations, the share of recycling represented by curbside or residential recycling programs is equally important as it represents the most visible part of the recycling infrastructure for the general public.

Our membership also includes those companies that provide recyclers with the services and equipment they need, including optical and infrared scanners, balers, shredders, conveyors, and other machinery and transportation equipment that are used in all parts of the recycling supply chain.

From our headquarters in Washington, D.C., and through 18 chapters located in North America, ReMA raises public awareness and advocates on behalf of recycling's positive impacts on the economy, trade, the environment, and sustainable development.

FOR MORE INFORMATION OR TO JOIN, visit recycledmaterials.org/join.

The Recycled Materials Industry

Who We Are

» We are the recycled materials industry.

What We Do

» We provide the high-quality raw materials needed to make both everyday items and the essential infrastructure people depend on.

Why It Matters

» We make the supply chain more sustainable, resilient, and secure.

» We protect natural resources.

» We reduce carbon emissions.

Where We're Going

» We're continuously innovating to recycle more material, more efficiently.

» We're one part of the solution and we're working with individuals and communities to help them sort and recycle more.

» Because consumer brands and big companies have a role to play, we partner with them to help them recycle more, use more recycled materials in their products, and design their products to be recycled more easily.

THE FUTURE IS MADE OF RECYCLED MATERIALS.

The recycled materials industry provides the high-quality materials needed to make everyday items and essential infrastructure people depend on. Today, more of the roads we drive on and the cars we drive in, the wires and beams in our homes and offices, and the boxes and containers that bring consumer goods and food to households all come from recycled materials. The recycled materials industry is helping the nation source more materials locally and sustainably, making our supply chain more secure and our manufacturing more self-sufficient.

Key Recycled Materials Industry Developments

Recycling's Critical Role in the Economy

The recycled materials industry plays a key role in the U.S. economy by providing the critical raw materials that manufacturers need to make both everyday items and the essential infrastructure on which people rely, while at the same time creating jobs and generating tax revenues that are reinvested in communities.

According to the latest U.S. Recycling Industry Economic Impact Study conducted for ReMA by John Dunham and Associates, the recycled materials industry is a major contributor to the U.S. economy, generating $169 billion in economic activity annually.

The recycled materials industry generates substantial revenues for federal, state, and local governments throughout the United States. The industry generates about $7.2 billion in state and local revenues annually—revenues that are used to help communities and people throughout the country. Another $11.6 billion in federal taxes are paid annually by the industry and its employees.

The Recycled Materials Industry is a Major Contributor to the U.S. Economy, Generating **$169 Billion** In Economic Activity Annually

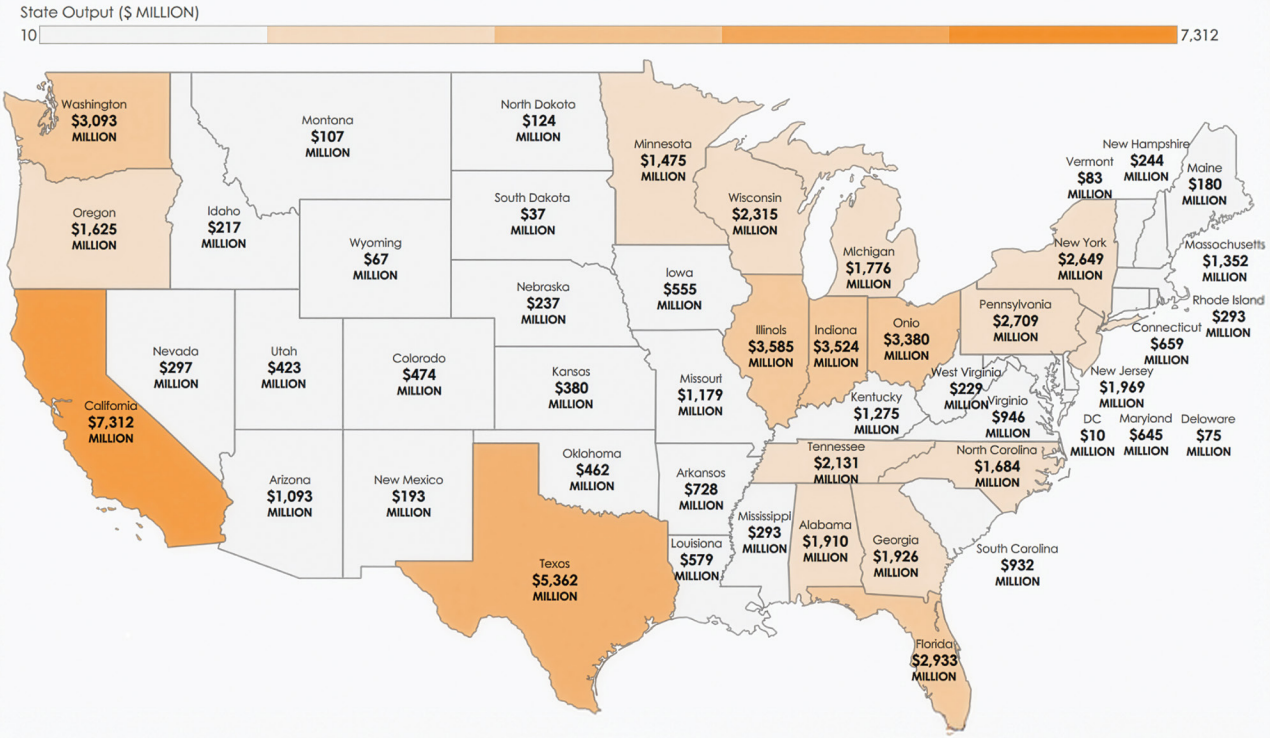
The recycled materials industry is a significant employer, supporting hundreds of thousands of jobs across the United States for decades.

The study found that in 2024, the recycling operations within the industry directly supported nearly 171,470 full-time equivalent (FTE) jobs in the United States. These are good jobs, paying an average of $90,100 in wages and benefits to American workers.

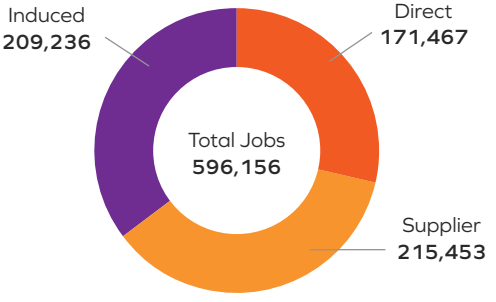
In addition, 424,690 FTE jobs throughout the U.S. economy are indirectly supported by the recycled materials industry through suppliers and the indirect impact of the industry's expenditures. Overall, the recycled materials industry employs nearly 600,000 workers directly or indirectly nationwide.

Recycled Materials Industry Output

ACROSS THE U.S. AS OF 2024



Jobs Supported by the U.S. Recycled Materials Industry



Source: ReMA and John Dunham & Associates, Economic Impact Study, U.S.-Based Recycling Industry, 2025.

The people who make up the recycled materials industry are as diverse as our nation. They work not only in firms that directly source high-quality raw materials for manufacturers, but also those that support those operators, like material suppliers, machinery providers, and transporters. In addition, thousands of people in industries seemingly unrelated to the recycled materials industry, from servers in restaurants, to construction workers, to teachers in local schools, depend on the re-spending of the wages and taxes paid by the recycled materials industry to their workers and suppliers.

The economic benefits generated by the recycled materials industry are widespread. Recycling centers are in every state, in both urban and rural communities, and their suppliers and service providers are similarly widespread. This means the U.S. recycled materials industry provides good-paying jobs across the nation.

Recycled Materials Make Supply Chains Stronger

Industry investment and government policies are increasingly focused on strengthening domestic supply chains, particularly for critical minerals and materials that are not abundant under U.S. soil or are sourced from geopolitically sensitive regions. Uncertainty in the global trade landscape and protectionist measures overseas have elevated the need for U.S. manufacturers to secure reliable domestic and regional sources of raw materials. Recycled materials offer a proven solution, providing manufacturers with a stable, homegrown supply of high-demand materials, including critical minerals.

In 2024, the U.S. recycled materials industry processed 135 million metric tons of recycled materials, including 65 million tons of recycled iron and steel, 42 million tons of recovered paper and fiber, 9 million tons of nonferrous metals, and 6 million tons of recycled and reused electronics.

More than 75% of all the recycled material processed in the United States was sold to domestic manufacturers who rely on recycled materials to produce everything from steel beams to cardboard boxes, electric vehicles and batteries, household appliances, cell phones, computers, and electronics.

Volume of Recycled Materials Processed in the U.S., 2024

Type of Recycled Material	Million Metric Tons and %
Iron and Steel	65.0
Nonferrous	
Aluminum	5.7
Copper	1.8
Lead	1.0
Zinc	0.1
Recovered Paper and Fiber	41.7
Post-Consumer Plastic	2.3
Electronics	5.9
Other (Includes Tires & Rubber, Textiles, Glass, etc.)	11.1
TOTAL	**134.9**
U.S. Recycled Materials Exports	31.6
Export Share	23%

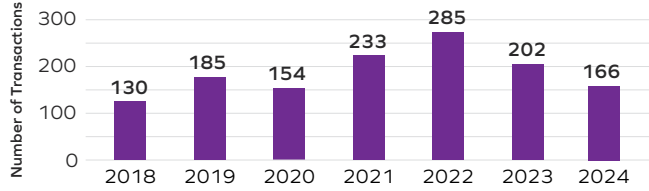
Sources: U.S. Geological Survey; U.S. Census Bureau; U.S. International Trade Commission; American Forest & Paper Association; Stina, Inc.; U.S. Tire Manufacturers Association, American Iron and Steel Association, and ReMA analysis.

Industry Investment and Consolidation

In recognition of the economic, supply chain, and environmental benefits associated with using recycled materials, billions of dollars of private funding are being invested in new recycling plants, capital equipment, and technologies. At the same time, the competition for access to the supply of recycled material continues to incentivize both vertical and horizontal industry consolidation.

- Private investment in battery recycling and critical minerals recovery continues to grow, driven by manufacturer demand for domestically sourced materials.
- Capital investment by recyclers across the metals, paper, plastics, electronics, and other sectors remains elevated.
- Nonferrous metals recyclers have announced planned investments of more than $7 billion, including new copper and aluminum smelters and plants.
- WM, one of the largest publicly traded companies in the recycled materials industry, reports recycling capital investment plans of approximately $1 billion during 2022–2025.

M&A Activity in Recycling and Related Industries



Source: Capstone IQ, FactSet, Pitchbook, and Capstone Partners.

Trends In Mergers & Acquisitions

The competition for access to recycled material and search for higher profit margins have generated a wave of M&A activity, peaking at 285 transactions in 2022 according to Capstone Partners. Frequently cited drivers for the trend in recycled materials industry consolidation include:

- Producer commitments for recycled content and the need to secure additional supplies of recyclables;
- Aging infrastructure, high labor costs, and volatile markets;
- Rising quality standards for recycled product outputs;
- Higher regulatory burdens; and
- Increased regulations driving additional recycling requirements and investments.

Recycling, Sustainability, and Society

The recycled materials industry has a positive environmental impact because it protects natural resources, reduces energy usage, and lowers carbon emissions. By keeping materials already in the supply chain in productive use, the recycled materials industry allows manufacturers to create new products without depleting natural resources.

The industry is continuously innovating to recycle more material more efficiently. ReMA is working with individuals and communities to help them sort and increase recycling. We are also partnering with brands and manufacturers to help them recycle more, use more recycled materials in their products, and design their products to be recycled more easily.

A SUSTAINABLE, RESILIENT SUPPLIER FOR AMERICAN MANUFACTURING

The recycled materials industry provides American manufacturing with a sustainable source of low-carbon, low-cost materials that supply chains depend on for long-term resiliency. Compared to the processing and transportation needed for mining, drilling, harvesting, or other methods of extracting natural resources for manufacturing, the use of recycled materials requires less energy and fewer resources to make the same end-products.

- Using recycled materials in manufacturing can reduce energy consumption by up to 90%.
- Greenhouse gas emissions can be lowered by up to 96% by using recycled materials.

The recycled materials industry is a sustainable supplier for the battery-powered and clean energy future. Recyclers are sometimes the only viable domestic supplier for a critical mineral. Demand for lithium-ion batteries is projected to grow 5-10-fold by 2031 compared to 2021. To produce 1 ton of battery-grade lithium requires 750 tons of brine or 250 tons of ore, but only 28 tons of spent lithium-ion batteries. For cobalt, to produce 1 ton of battery-grade material requires 300 tons of ore but only 5-15 tons of spent batteries. Using recycled materials from spent batteries has the potential to decrease costs by 40%, energy use by 82%, water use by 77%, and sulfur oxide emissions by 91%.[i]

Meeting the demand for tomorrow's power grid, vehicles, and consumer goods will rely on materials that are in today's batteries, laptops, cell phones, and cars; it is the recycled materials industry that can capture and transform these items into new materials and products.

Energy and GHG Emissions Savings Generated by Using Recycled Material vs. Primary Material

(Calculation based on the average figure for all commodities)

Material/Product	Energy Savings	GHG Emissions Savings
Corrugated Containers	56%	39%
Office Paper	27%	35%
Magazines/third-class mail	2%	35%
Newspaper	41%	47%
Mixed Paper (general)	62%	47%
HDPE	67%	50%
PET	56%	47%
PP	67%	52%
Mixed Plastics	61%	48%
Aluminum Cans	76%	83%
Aluminum Ingot	90%	96%
Steel Cans	55%	50%
Copper Wire	67%	66%
Mixed Metals	71%	71%
Glass	28%	46%
Structural Steel	37%	56%

These results are based on EPA's Waste Reduction Model (WARM), Version 16, using default values as a first approximation and assuming 100% virgin material use for primary production. Some values are rounded.

Recycling in Your Community

Recyclers are increasing their community engagement to demonstrate the essential nature of recycling, both for their neighborhoods and for the planet. ReMA supports free access to its JASON Learning Recycling Activities Curriculum, a STEM-based K-12 curriculum that integrates recycling with core classroom subjects. Our annual youth poster and video contest also invites K-12 students to tackle a recycling challenge, with the winners attending our annual convention. Additionally, many ReMA members sponsor local schools with access to a full set of STEM learning modules.

In addition to STEM based curriculum, ReMA and its members regularly engage local communities through efforts like backpack donations filled with school supplies made of recycled materials, participating in food drives, building playgrounds, and more.

ReMA continues to be a strong proponent of recyclers' community engagement and the operation of environmentally responsible and safe recycling operations. We all share common goals and a commitment to power local communities, support a more sustainable world, and help build a better future through our work while promoting the health and safety of employees, customers, and neighbors.

Recycled Materials Workforce

The recycled materials industry plays a critical role in the U.S. economy, supporting a wide range of jobs that span manufacturing, logistics, business services, and sustainability. According to ReMA's 2024 Economic Impact Report, the industry supports over 596,000 jobs nationwide, including 171,467 direct jobs, 215,453 supplier jobs, and 209,236 induced jobs. These positions collectively generate $47.5 billion in wages and contribute over $168.6 billion to the national economy.

Creating Good Jobs in Local Communities

There are far-reaching economic benefits generated by the recycled materials industry. Not only are recycling operations located in every state and in urban and rural communities, but the companies that supply materials and goods and services to processors and brokers are also located in every part of the country. In 2024, jobs in the recycled materials industry averaged $90,100 in wages and benefits across all 50 states.

The recycled materials industry offers a wide variety of job opportunities from equipment operators and maintenance technicians to commodities brokers and sustainability professionals. These roles require a mix of technical skills, on-the-job training, and industry certifications. Workers in this field can benefit from long-term career opportunities and an increasing emphasis on safety and innovation. However, like many industries, the recycled materials sector faces challenges in workforce recruitment and retention, particularly in skilled labor, mechanics, and CDL-certified drivers.

Workforce Development

ReMA is committed to building a strong, sustainable workforce across every stage of the talent pipeline, from seasoned professionals to the next generation of industry leaders. Through a variety of programs that support hiring, training, mentorship, and education, ReMA equips its members with the tools to recruit and retain talent while advancing long-term industry growth.

Building Today's Workforce:

- Pathways Program: Connects ReMA members with vetted intern and fellow candidates interested in the recycled materials industry, facilitating recruitment and nurturing emerging talent.
- Inclusion Cohort: Fills vacancies with qualified candidates with disabilities by providing direct employment solutions, comprehensive employer training, candidate sourcing, and ongoing support.

Supporting the Workforce of the Future:

- K-12 Curriculum by JASON Learning: FREE, comprehensive K-12 Science, Technology, Engineering, and Math (STEM) curriculum focused on recycling, featuring engaging hands-on activities that members can easily share with local schools.
- School Sponsorship by JASON Learning: ReMA members are sponsoring local schools across the U.S. with full access to the JASON STEM Curriculum Library.
- Annual Youth Recycling Contest: Each year, K-12 students respond to a new recycling challenge by creating a poster or video, and two winning teams and their families receive a trip to ReMA's annual Convention to learn about the industry and be celebrated for their academic achievement.

More information about ReMA's workforce development initiatives is available at:
recycledmaterials.org/workforce-management

Transportation and Logistics

The transportation of recycled materials connects collection points with processing facilities and manufacturers across an extensive logistics network, moving millions of tons of valuable resources annually.

RAIL

Freight rail is central to this logistics network, ensuring recycled materials reach the nation's steel mills, aluminum and copper smelters, and plastics and glass reclaimers. More than 40 million tons of recycled materials are transported by rail annually across the United States. Due to railcars' greater tonnage capacity and lower per-ton costs over long distances, the recycled materials industry depends heavily on rail transportation for shipping and receiving materials. For many recyclers, rail is the only practical mode of transportation—particularly for commodities that cannot be moved efficiently or safely by truck due to distance, density, or sheer volume. However, fluctuating shipping expenses, unreliable railcar availability, and operational barriers can disrupt supply chains and increase costs for recyclers.

TRUCK

Trucks offer flexibility and accessibility that rail cannot, making them vital for smaller processors and remote operations. Trucks are used extensively in the domestic transportation of recycled materials, excelling in last-mile delivery, intra-regional flows, and shorter-distance shipments. However, trucking has the highest cost per ton and is not logistically feasible for all commodities or distances. There are also many instances where shipments of recycled material must move by rail rather than by truck to accommodate manufacturers' operational needs.

WATER

Recycled materials are also transported by water via the nation's inland waterways and ports. Water transportation is an economical solution for moving heavy, bulky recycled materials on a per-unit basis. More than 150 million metric tons of recycled materials are transported by water annually in the U.S., including 94 million metric tons of recycled iron and steel, 50 million metric tons of recovered pulp and paper, and 8 million metric tons of recycled nonferrous materials.[ii] Both recycled materials processors and end-user customers

(e.g., mini-mills) strategically locate operations along the country's waterways to take advantage of this system. Although adverse weather conditions can affect barge traffic and cause delays, water transportation remains the preferred mode for operations near waterways due to significant cost savings.

INTERNATIONAL TRADE AND CONTAINERIZATION

Containerization has opened overseas markets to a wider range of U.S. processors by standardizing handling procedures and reducing shipping complexity. While portions of exports still ship as bulk cargo, standardized containers have made international markets more accessible to smaller processors who previously couldn't access global markets cost-effectively.

In 2024, the United States exported more than 31 million metric tons of recycled materials worldwide, valued at $28.1 billion and supporting thousands of American jobs. Approximately half of this export value left through New York, NY ($4.7 billion), Los Angeles, CA ($4.7 billion), and Buffalo, NY ($4.5 billion, reflecting overland exports to Canada). Other major export hubs with over $1 billion in exported recycled materials in 2024 included Norfolk, VA, San Francisco, CA, Laredo, TX, Savannah, GA, and Houston-Galveston, TX.

INTERMODAL TRANSPORTATION

Modern recycling operations increasingly utilize intermodal approaches, combining trucks, trains, and barges to optimize cost and efficiency while improving delivery reliability.

INFRASTRUCTURE INVESTMENT NEEDS

A reliable and efficient freight transportation network is critical to the recycled materials industry to efficiently transport raw materials and feedstocks to manufacturers across the nation and around the globe. Multimodal infrastructure and capacity investment is necessary to collect, process, and deliver essential materials.

Inadequate infrastructure creates bottlenecks that increase costs, reduce competitiveness, and limit market access for recyclers. The industry supports freight network modernization and transportation infrastructure investments to eliminate these inefficiencies and expand competitive transport options. This includes reforming outdated policies that limit access to the Surface Transportation Board for remedies, ensuring the industry isn't unfairly charged for disruptions caused by common carriers.

Modernizing infrastructure essential for moving these critical materials ensures the uninterrupted flow of recycled commodities and supports an economy that conserves natural resources while meeting growing global demand for recycled materials.

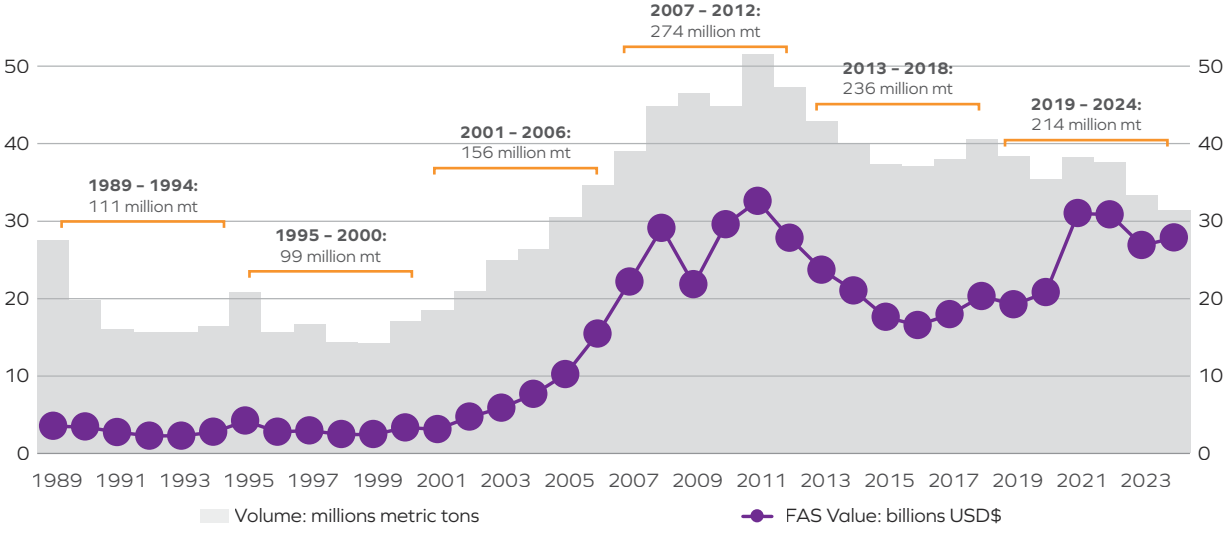
Recycled Materials Trade

Due in large part to continuous innovation and increased efficiency, U.S. recyclers process more material than domestic manufacturers consume each year. This is true across recycled materials categories—including recycled steel (carbon and stainless), copper, aluminum, and paper. This success allows recycled materials processed in the U.S. to serve as an essential raw material for the manufacturing of new products worldwide, making the industry integral to both domestic and global manufacturing supply chains.

International trade allows the recycled materials industry to continue to invest in workers and communities nationwide—by exporting materials not consumed domestically to manufacturers worldwide that need them. However, trade restrictions reduce the competitiveness of U.S. recyclers, particularly when government intervention limits the free movement of material to where it is most demanded. If recycled commodities cannot be traded because of artificial market restraints, these materials may end up in landfills.

In 2024, more than 75% of all recycled materials processed within the United States were consumed domestically, while the balance was exported into the global manufacturing supply chain, supplying industrial consumers in more than 100 countries. U.S. exports of recycled materials have declined in recent years—in 2024, total export volume fell by 6% to 31.4 million metric tons. This shift in market dynamics toward providing more recycled materials to U.S. consumers reflects a market-driven response to federal policies aimed at revitalizing U.S. manufacturing, suggesting market forces are already directing more material to domestic buyers.

U.S. Exports of All Recycled Materials to WORLD, 1989–2024



Source: U.S. Census, ReMA Analysis

In 2024, more than 75% of all recycled materials processed within the United States were consumed domestically, while the balance was exported into the global manufacturing supply chain, **supplying industrial consumers in more than 100 countries.**

2024 U.S. Recycled Materials Exports: Top 10 Destinations

Ranked By Tonnage	mmt	Ranked By Value ($)	Billions $
Turkey	4.4	Canada	6.2
Mexico	4.3	China	3.1
India	4.3	India	2.3
Thailand	2.8	Mexico	2.1
Malaysia	2.6	Malaysia	2.1
Canada	2.1	Thailand	1.8
Bangladesh	1.9	Turkey	1.7
Vietnam	1.8	Italy	1.0
Taiwan	1.7	South Korea	1.0
South Korea	1.0	Germany	0.7
All others	4.8	All others	6.1
TOTAL	**31.6**	**TOTAL**	**28.1**

Source: U.S. Census, ReMA analysis

U.S. Recycled Materials Trade, 2024

	Volume (mmt)			Value (Billions $)		
	Exports	Imports	Net Exports	Exports	Imports	Net Exports
All Recycled Materials	31.6	7.1	24.5	28.1	6.8	21.3
Steel*	13.9	3.7	10.2	5.6	1.4	4.2
Copper	1.0	0.1	0.9	5.4	0.8	4.6
Aluminum	2.1	0.7	1.4	4.0	1.4	2.6
Stainless Steel	0.4	0.2	0.2	0.4	0.3	0.1
Paper	12.4	1.0	11.4	2.6	0.1	2.5

*Less stainless and alloys / Source: U.S. Census, ReMA analysis

ReMA's ISRI Specifications: Understanding What They Are & How They Are Used

RECYCLED MATERIALS SPECIFICATIONS

ReMA's ISRI Specifications are internationally recognized guidelines used by buyers and sellers of recycled materials and products:

- They facilitate the trading of recycled materials commodities.
- Specifications are regularly reviewed and updated to reflect the expanding range of commercially recyclable materials.
- Each sale is subject to negotiation between buyer and seller, and the material must also comply with national and international regulations.
- ReMA's ISRI Specifications provide guidelines for what constitutes recycled content for manufacturers seeking to increase the use of recycled materials in new products.

PROVIDING A FRAMEWORK FOR THE INDUSTRY

Recycled materials are highly valuable commodities, and specifications provide a framework for commercial transactions involving these materials. In 2024, 113 million metric tons of recycled materials, valued at more than $120 billion, were traded globally.

TRANSPARENCY AND OPENNESS

There is a formal process for making changes to specifications:

- Any person may submit a request to ReMA to add, amend, or withdraw a specification.
- The relevant division and/or committee responsible for the affected specification will review the request and make a recommendation to the ReMA Board of Directors.
- Following a public comment period, the ReMA Board of Directors acts on the recommendation.
- Public notice of the board's action is provided, along with a 30-day window for filing an appeal.
- If an appeal is filed, the board will hear it at its next meeting.

GLOBAL RECOGNITION

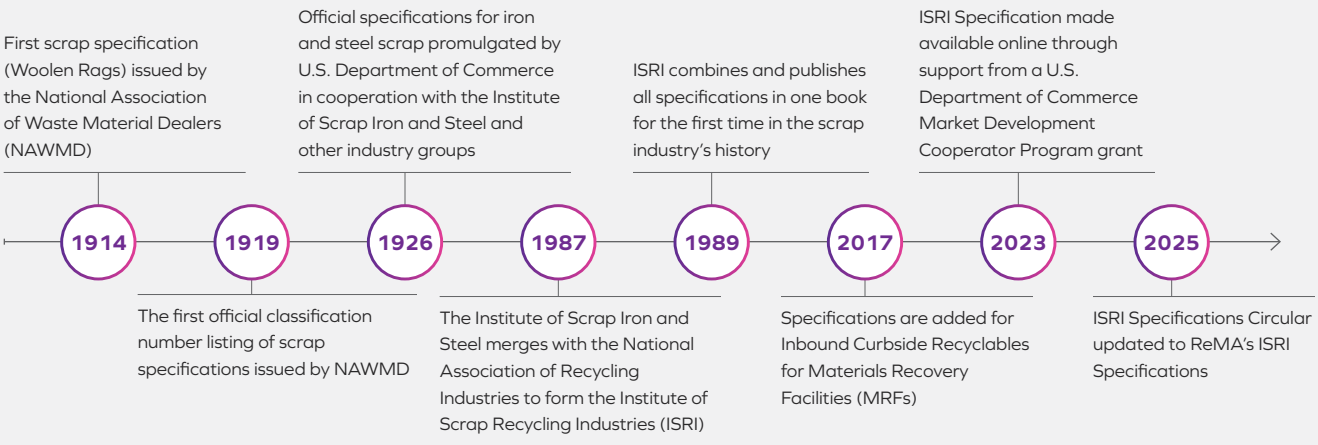
Recyclers around the world rely on ReMA's ISRI Specifications. Countries most frequently engaged in trade involving the specifications include China, Indonesia, Vietnam, India, South Korea, Pakistan, Malaysia, Japan, Australia, and Brazil.

Import regulations in India, Australia, and the United States incorporate ReMA's ISRI Specifications into their customs rules and regulations.

CLEARLY DEFINED

Each specification is shorthand for a recycled product. The specification consists of a name—the word, number, and/or letters assigned to the specific recycled product—followed by a brief description of the material. Buyers and sellers can add more specific details to these descriptions.

A Brief History of ReMA's ISRI Specifications



Recycled Material Markets

Recycled Material Market Fundamentals

Recycled material markets are subject to many of the same factors that drive primary material markets (e.g., iron ore, crude oil, natural gas, copper cathode, primary plastic resins, wood pulp) and thus experience similar price volatility.

Changes in economic growth and manufacturing demand, inventories, energy and transportation costs, foreign exchange rates, trade barriers, and substitution effects can all move material markets.

However, recycled and primary material markets can diverge in important ways. Recycled material prices generally follow traditional open market relationships: prices (and price discounts to primary materials) tend to reflect supply and demand balances. When demand exceeds supply, prices tend to rise. When demand wanes, prices tend to fall. Primary material price volatility, on the other hand, has increasingly been influenced by shifts in investment fund flows, market speculation, algorithm-based trading strategies, and other factors not based on market fundamentals.

Another important distinction between recycled and primary material markets is how inventories are managed. Recycling is generally a high-volume, low-margin business, and experienced recyclers know that continually turning over inventory is critical to managing risk. In contrast, primary material producers often stockpile materials in large warehouses to manage swings in supply and prices, a strategy that would entail much higher risks and costs for recyclers.

Even within the recycling sector, different market factors come into play depending on the type of material and its source. For example, residential recycling differs from industrial recycling because supply does not change based on market conditions, but rather on collection volumes that are not determined by price. Contracts between material recovery facilities (MRFs) and municipal governments often set the terms for what materials the MRF will collect and at what frequency. Because supply has less price elasticity, a sudden reduction in demand can cause prices to collapse. This happened in 2018, when China stopped importing most recycled plastics and mixed paper and set extremely low levels of allowable contaminants in other recycled material imports. With buyers in the United States and around the world unable to absorb the volumes previously purchased by Chinese buyers, prices dropped precipitously. Similar dynamics have affected markets in subsequent years as trade policies and global demand have continued to shift.

Iron and Steel

Steel forms the backbone of American infrastructure. From the cars we drive and the bridges we cross to the skyscrapers where we work and the homes where we live, steel is everywhere. It powers our defense systems, enables our transportation networks, and supports the infrastructure that keeps our economy moving. Most of this essential material comes from an efficient recycling process that transforms yesterday's steel into tomorrow's products.

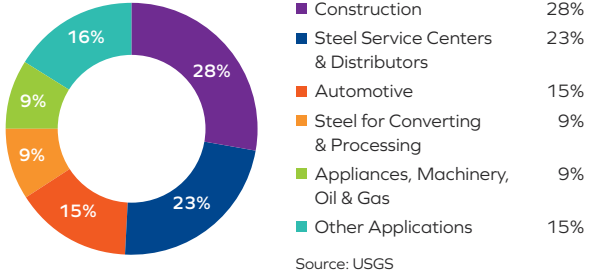
RECYCLED STEEL POWERS U.S. MANUFACTURING

More than 70% of all steel manufactured in the United States is produced from recycled materials rather than virgin iron ore.[iii] This reflects the recycled materials industry's ability to deliver high-quality, low-carbon steel products that meet the demanding specifications of modern applications.

POWERING EFFICIENCY THROUGH INNOVATION

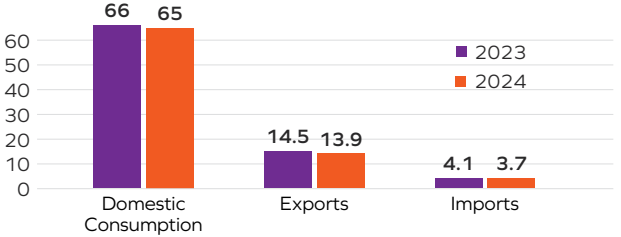
Steel produced at electric arc furnaces (EAFs), typically uses 90–95% recycled steel inputs. These operations require less than half the energy needed to produce steel from primary materials like iron ore. In 2024, 49 companies operated 104 mini-mills across the United States, collectively consuming 63 million metric tons of recycled iron and steel to produce 81 million metric tons of new steel products.[iv]

U.S. Steel Consumption by End-Use Market



Source: USGS

U.S. Recycled Iron and Steel Industry (Million metric tons)



Source: USGS, U.S. Census, ReMA analysis. Trade data excludes stainless and alloy steel.

THE JOURNEY OF RECYCLED STEEL

The recycled materials industry has created an intricate network that captures steel from multiple sources:

- **End-of-Life Recovery:** The industry recovers steel from obsolete consumer products. Automobiles lead this effort with an astounding near-100% recycling rate annually. More than 15 million tons of steel are recovered from approximately 12 million cars each year through a network of over 7,000 vehicle dismantlers and 350 car shredders across North America.
- **Construction and Infrastructure:** When buildings are demolished, bridges are replaced, or railroad tracks are retired, the recycled materials industry ensures that 98% of structural steel finds new life in new applications.
- **Manufacturing Efficiency:** The industry also captures steel leftover from manufacturing processes like stamping, cutting, and trimming—ensuring that virtually no steel goes to waste.

IMPRESSIVE RECOVERY RATES ACROSS ALL SECTORS

The recycled materials industry maintains consistently high recovery rates:

- Automobiles: Nearly 100% recycling rate
- Structural steel: 98% recycling rate
- Appliances: 88% recycling rate
- Rebar and reinforcement steel: 71% recycling rate
- Steel packaging: 70% recycling rate

Overall steel recycling rates have remained between 80–90% for the past decade, demonstrating the industry's reliability and effectiveness.

ENVIRONMENTAL AND ECONOMIC IMPACT

The recycled materials industry's contribution extends far beyond just processing recycled metal. By recycling steel from automobiles alone, the industry saves enough energy to power 18 million homes every year. This energy savings translates to reduced carbon emissions and lower costs across the entire steel supply chain. The industry also reduces the burden on landfills and prevents the accumulation of abandoned steel products in communities.

MEETING GROWING DEMAND

With EAF capacity expansion plans underway in the United States and internationally, recycled ferrous metal consumption is projected to rise substantially in the coming years. The industry processes three distinct types of recycled steel:

- **Post-consumer (58%):** Steel from end-of-life products like cars and appliances
- **New (24%):** Material generated during steel-product manufacturing
- **Home (18%):** Recirculating material from current steel production operations

The industry serves diverse markets, with construction accounting for 28% of steel shipments, followed by steel service centers and distributors (23%), automotive (15%), and various other applications.

Nearly 80% of the recycled iron and steel recovered in the United States is sold to domestic steelmakers, foundries, and other manufacturers.

TRADE

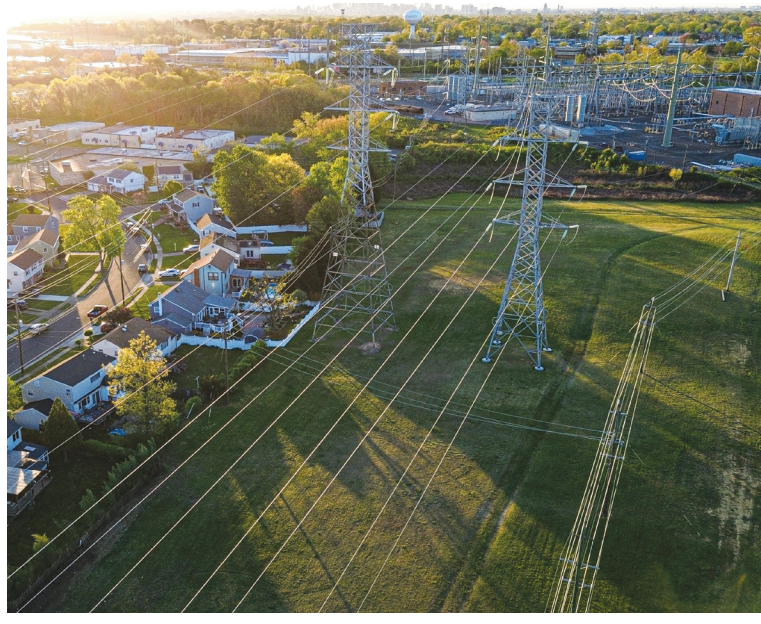
About 80% of the recycled iron and steel recovered in the United States is sold to domestic steelmakers, foundries, and other manufacturers. The balance is exported to consumers around the world. The United States is the largest single exporter of recycled iron and steel globally. U.S. recycled iron and steel exports (excluding stainless and alloy steel) declined 4% year-on-year in 2024 by quantity to 13.9 million metric tons and were down 4% in dollar terms to $5.6 billion.

Nonferrous Metal

Nonferrous metals—including copper, aluminum, nickel, lead, zinc, and tin—can be recycled an infinite number of times. Due to their chemical properties, lower costs, and smaller environmental footprint, manufacturers have become increasingly reliant on recycled nonferrous metals to make everything from power cables and wiring to electronics, batteries, beverage containers, automobiles, airplanes, aluminum siding, and much more.

According to data from the U.S. Geological Survey (USGS) and ReMA estimates, the United States recovered nearly 9 million metric tons of nonferrous metals in 2024. As sustainable development, supply chain security, and infrastructure investment have come into focus, public and private investment in the nonferrous recycling sector continues to grow.

Private firms operating in the United States have announced in 2025, their planned investments of several billion dollars in new nonferrous recycling operations and manufacturing plants. Broader investment in U.S. manufacturing capacity is also expected to boost demand for nonferrous metals, such as copper and aluminum.



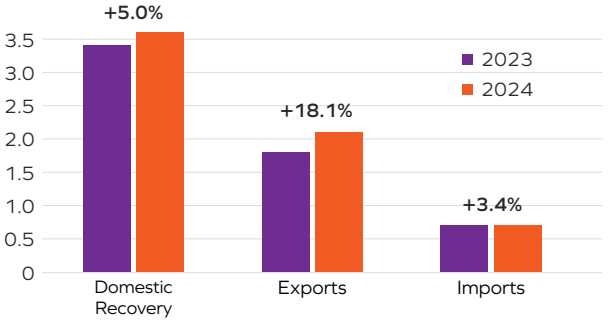
Aluminum

Aluminum consumption in the United States is dominated by the transportation sector (36%), followed by packaging (23%), building (14%), electrical (9%), machinery (8%), consumer durables (8%), and "Other" (2%), according to data from the U.S. Geological Survey (USGS). Aluminum's lightweight, ductile, malleable, and corrosion-resistant characteristics make it a popular choice with engineers and manufacturers.

Meanwhile, the share of aluminum produced in the United States coming from recycled metal continues to grow. The domestic recovery of recycled aluminum increased 5% in 2024 to 3.6 million metric tons.

Common sources of recycled aluminum include old wire and cable, end-of-life automobiles and airplanes, aluminum siding, and used beverage containers. According to The Aluminum Association, it takes less than 60 days, on average, for an aluminum can to go from the recycling bin back to a grocery shelf. Making recycled aluminum only takes around 5% of the energy needed to make new aluminum—reducing carbon emissions and saving money for businesses and end-users.

U.S. Recycled Aluminum Industry (Million metric tons)



Source: USGS, U.S. Census, ReMA analysis.

In the United States, more than 80% of aluminum production comes from recycled aluminum. Given recycled aluminum's cost and sustainability advantages, the share of U.S. aluminum production from recycled materials is expected to rise, and aluminum producers are making significant investments in new and expanded aluminum recycling plants.

DOMESTIC AVAILABILITY

To support this growth, ample end-of-life material is available. A 2025 study commissioned by ReMA and conducted by Mining and Materials Markets Ltd. examined current and projected levels of end-of-life aluminum supply and demand in the United States. The research found that available end-of-life aluminum tonnage significantly exceeds annual domestic consumption—in 2025, the U.S. has an estimated 4.5 times more aluminum available for recycling than is consumed domestically. This "reservoir" of available material includes aluminum in construction left in place, consumer goods not yet recycled, and other stockpiled or abandoned sources. The study projects that available end-of-life aluminum will continue to grow faster than domestic recycled aluminum consumption through 2040, ensuring adequate material supply to meet future recycling needs.[v]

In the United States, 80% of aluminum production comes from recycled aluminum. Given recycled aluminum's cost and sustainability advantages, the share of U.S. aluminum production from recycled materials is expected to rise, and aluminum producers are making significant investments in new and expanded aluminum recycling plants.

Copper

Copper is infinitely recyclable and is critical to producing new copper products. The largest copper consuming sector in the United States is building construction, including everything from wiring and cables to heating and cooling systems, roofing, and rainwater systems. Manufacturers of electronics, transportation equipment, consumer goods, and industrial machinery also rely heavily on copper.

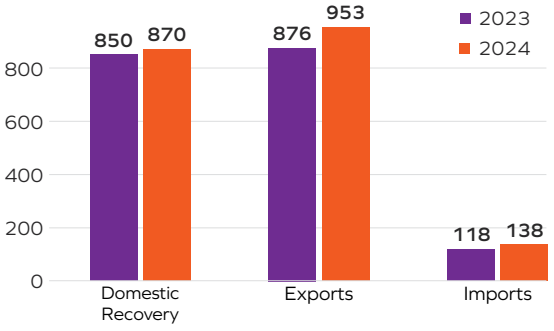
Copper combines well with other metals, such as tin, lead, and zinc, to form alloys. Bronze and brass are two of the most common copper alloys, but hundreds of others have been developed for specific applications and properties.

The U.S. Geological Survey estimates that 870,000 metric tons of recycled copper were recovered domestically in 2024.[vi] U.S. exports of recycled copper and copper alloys were an estimated 1 million metric tons valued at nearly $5.4 billion in 2024.

DOMESTIC AVAILABILITY

A 2025 study commissioned by ReMA and conducted by Mining and Materials Markets Ltd. examined current and projected levels of end-of-life copper supply and demand in the United States. The research found that available end-of-life copper tonnage far exceeds annual domestic consumption—in 2025, the U.S. has an estimated 35 times more copper available for recycling than is consumed domestically. The single largest contributor to this reservoir is electrical copper left in place, including wiring, cables, and other infrastructure that has not yet entered the recycling stream. The study projects that available end-of-life copper will continue to grow faster than domestic consumption through 2040, ensuring adequate material supply to meet future recycling needs.[vii]

U.S. Recycled Copper Industry (Thousand metric tons)



Source: USGS, U.S. Census, ReMA analysis.

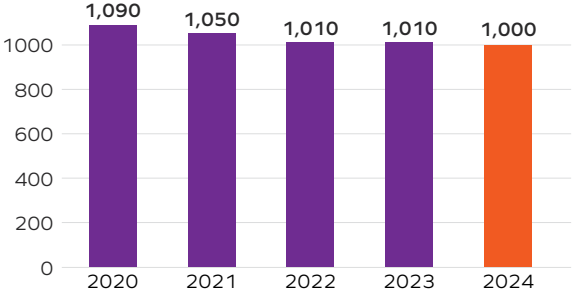
Lead and Zinc

Lead and zinc frequently exist together in lead-zinc ores that may contain lead sulfide, zinc sulfide, iron sulfide, iron carbonate, and quartz. Lead has been used for centuries as a building material and to produce ceramic glazes, leaded glass and crystal, paint, and protective coatings. Today, the lead-acid battery industry accounts for 86% of total U.S. lead consumption, according to the U.S. Geological Survey. Lead produced from recycled metal was valued at $2.4 billion in 2024.[viii] Almost all lead recovered in the U.S. comes from recycling end-of-life lead-acid batteries.

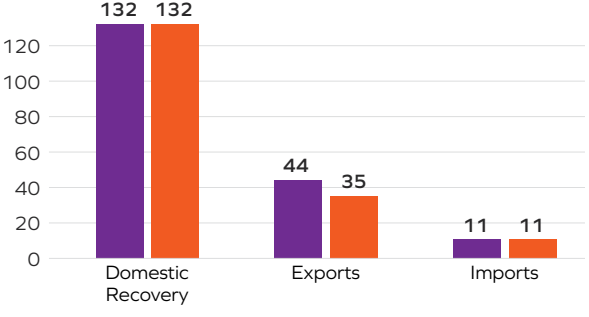
Zinc is primarily used for galvanizing steel to prevent corrosion, as well as for creating alloys such as brass and bronze. Its low melting point makes it useful for die-casting and rolling applications where more durable dies would be too expensive. Zinc is also used in rubber compounds, chemical salts, paint, and agricultural products.

In 2024, an estimated 132,000 metric tons of refined zinc produced in the United States came from recycled sources, including galvanizing residues and crude zinc oxide recovered from electric arc furnace dust.

U.S. Lead Production from Recycled (Secondary) Lead
Thousand Metric Tons



U.S. Recycled Zinc Industry (Thousands Metric Tons)



Source: USGS, U.S. Census, ReMA analysis.

Nickel and Stainless Steel

Recycled nickel plays a vital role in America's industrial economy, accounting for 85% of nickel consumption in the United States.[ix] Stainless steel production is the largest consumer of nickel globally, and recycled nickel serves as an essential input for numerous industrial applications.

Stainless steel is 100% recyclable, and according to World Stainless, 95% of stainless steel is recycled once it reaches end of life.[x] This high recovery rate has created a circular economy where U.S. stainless steel producers rely on recycled metal to supply up to 90% of their raw material needs. This reduces dependence on imported and newly mined materials, strengthening domestic supply chains while lowering production costs.

Stainless steel is integral to modern infrastructure and daily life. From the cutlery in our kitchens to the elevators in our buildings, from subway trains and rail stations to critical automotive and aerospace components, stainless steel is everywhere. Shipping tankers that transport fuels, chemicals, and other essential goods also depend on stainless steel's durability and corrosion resistance.

Stainless steel producers in the United States rely on recycled metal to supply up to **90% of their raw material needs**.

While stainless steel remains the primary use for nickel, the metal's role in battery technology is growing. Electric vehicle (EV) batteries contain significant amounts of nickel, and as more EVs reach end of life in the coming years, recycling nickel from batteries will become increasingly important. Battery recycling currently represents a small fraction of total recycled nickel, but this source is expected to grow substantially as EV adoption accelerates.

Recovered Paper and Fiber

Everyday items like the cardboard boxes used to ship millions of packages daily, boxboard packaging for food and medicine, paper towels, napkins, tissue, newspaper, office paper, and envelopes are all produced using recycled paper and fiber. Paper and paperboard are among the most widely recycled materials in the world.

U.S. paper mills rely on recycled paper and paperboard due in part to recovered fiber's significant cost and energy savings compared with primary fiber. Mills have substantially increased their use of recovered fiber over the past two decades—recycled fiber now accounts for 44.4% of all fiber used at domestic mills, up from 36.6% in 2005.[xi] For containerboard specifically, recycled content has risen to approximately 50%, up from about 33% just 15 years ago.[xii] This growth reflects billions of dollars invested since 2019 in new or modernized mill capacity that runs largely on recovered material.[xiii]

Using recycled paper instead of primary pulp to produce new paper products can cut energy usage by more than 60% and greenhouse gas (GHG) emissions by more than 40%.[xiv] In addition, recycling one ton of paper saves 3.3 cubic yards of landfill space.[xv] Society also benefits from having to cut down fewer trees and reduced greenhouse gas emissions when recycled paper is substituted for wood pulp. The American Forest & Paper Association estimates that U.S. mills consumed 32.7 million tons of recycled paper in 2024, up 1.29 million tons from the year before.[xvi] Approximately 46 million tons (42 million metric tons) of paper and paperboard were recovered in the United States in 2024, with an overall recycling rate of 60%–64% for paper and 69%–74% for cardboard.[xvii]

MARKET DYNAMICS

The 2024 recycling rate reflects three forces moving in different directions: exports of recovered paper fell as demand weakened in Asia, net imports of packaged goods rose, and domestic mills consumed more recovered fiber.[xviii] While recovery rates declined modestly, the increase in domestic mill consumption demonstrates strong underlying demand for recovered fiber.

The containerboard market faced headwinds in 2024, with box demand at its lowest level since 2016 following the pandemic-era surge in e-commerce packaging.[xix] Major producers have announced capacity adjustments in response to shifting market conditions.[xx] Despite these challenges, domestic mills continue to invest in recovered fiber processing capacity, signaling long-term confidence in recycled materials.

The ReMA Fiber Recycling Readiness Tool

To help ensure fiber-based packaging remains compatible with existing recycling infrastructure, ReMA developed the Fiber Recycling Readiness Tool. The Tool focuses specifically on evaluating post-consumer fiber-based packaging marketed in the United States. It uses a research-based approach to assess the extent to which fiber-based packaging is compatible with the current U.S. residential recycling system and does not pose known challenges for that system. The methodology is based on the ReMA Board of Directors-approved definition of recyclable materials: "a previously used material that can be processed into specification-grade commodity for which a market exists."

The Tool is an online resource that automatically scores each criterion based on the underlying research methodology. The results determine whether the packaging meets the criteria of the Tool, requires modifications to address specific challenges, or does not meet the criteria.

The Tool is regularly reviewed and updated to reflect current technologies and market conditions within the recycling process. The evaluation criteria were developed based on several empirical studies, including the 2021 ReMA Paper Recyclability MRF (Materials Recovery Facility) Survey conducted by Moore & Associates on behalf of ReMA.

Plastics

Plastics encompass a wide range of polymer types—including PET, HDPE, PP, PVC, LDPE, and polystyrene—each with different characteristics and end-market applications affecting how they are collected, sorted, and recycled. Recyclability varies widely: PET beverage bottles and HDPE containers are recycled at three times the average plastics rate, while multi-material packaging and many single-use plastics remain difficult to recover with current technologies.

RECOVERY AND MARKET DATA

In 2022, an estimated 2.3 million metric tons (5.02 billion pounds) of post-consumer plastic material sourced in the U.S. was recovered for recycling, according to Stina Inc. Post-industrial plastics supply an even larger share—according to Plastics News, 58% of U.S. plastic recovered for recycling came from post-industrial sources, while 42% originated from post-consumer sources.

Globally, plastics output reached 414 million metric tons in 2023, with 36.5 million metric tons of post-consumer plastics recovered, according to Plastics Europe. Mechanical recycling accounts for 99.2% of post-consumer plastics recycled worldwide. Packaging remains the largest source of demand for plastics, accounting for 44% of global usage.

Using recycled plastics in manufacturing can save 56% to 67% or more of the energy needed to produce plastics from primary materials.[xxi]

ADVANCING RECYCLING TECHNOLOGIES

Recycling technologies for plastics are advancing, enabling companies to process materials that have traditionally been considered hard to recycle. These include PVC products such as plumbing and irrigation pipes, siding, and IV bags, as well as plastic film used for everything from shielding crops to grocery bags. Recyclers processed more than 1 billion pounds of U.S. post-consumer plastic bags and film in 2022, up nearly 60% since 2005, accounting for 20% of post-consumer plastics recycling, according to Stina Inc.

Robotics, artificial intelligence, optical scanners, near-infrared optics, laser separation, and other sophisticated technologies are now commonly found in recycling operations, improving recovery rates and expanding the range of plastics that can be recycled.

DESIGN FOR RECYCLABILITY

Recycling requires constant innovation because products and materials are always changing. Recyclers are partnering with manufacturers to design new products with recyclability in mind. Examples include plastic water bottles that are 100% recyclable and laptop computers designed with modular components and without glues or adhesives, allowing easier disassembly and material recovery.

More manufacturers are increasing the use of recycled content and designing products that are easier to recycle, recognizing both the economic and environmental value as well as customer demand. A significant share of recyclable plastic packaging never makes it into the bin, representing an opportunity to expand collection and increase the supply of recycled material. ReMA is working closely with businesses to address product recyclability and strengthen recycling across all material categories.

ReMA's ISRI Specifications — Plastics

As new plastic products enter the supply stream and the technologies needed to cost-effectively sort and recycle plastics continue to evolve, ReMA regularly updates its recycled plastics specifications.

In June 2025, ReMA and The Association of Plastic Recyclers (APR) announced the latest updates to ReMA's ISRI Specifications and APR Model Bale Specifications for recycled plastics. Following a collaborative process between the two organizations and their members, the specifications were approved by both the ReMA Board of Directors and the APR Board of Directors. These updates more accurately reflect the recycled High-Density Polyethylene (HDPE) and Polyethylene film plastics currently being traded in the marketplace. In addition, two definitional changes were made to ReMA's ISRI Specifications.

Technology and innovation are constantly transforming the recycled materials stream. ReMA's ISRI Specifications are not only internationally recognized, but also essential for facilitating domestic trade for all recycled materials.

2025 REVISED PLASTICS SPECIFICATIONS:

- HDPE Color Bottles & Select Containers
- HDPE Injection Bulky Rigid Plastics
- HDPE Natural Bottles
- PE Clear Film (Grade A)
- PE Clear Film (Grade B)
- PE Color Film
- PE Furniture Mix Film

Definitions:

- Bale Integrity
- Allowable Contamination

The seven approved revisions modified existing specifications to reflect new packaging types and clarify which contaminants are not acceptable. The modifications reduce confusion and better reflect the scope of what is traded and processed in today's marketplace.

"Technology and innovation are constantly transforming the recycled materials stream," said ReMA President Robin Wiener. "ReMA's ISRI Specifications are not only internationally recognized, but also essential for facilitating domestic trade for all recycled materials. We are proud to collaborate with APR on these important plastic specification updates."

With the integration of advanced technologies like optical sorting, robotics, and artificial intelligence, the recycled materials industry has powerful tools to sort and monitor plastics collected for recycling. However, consistent improvements in recycled material quality, yield, and end markets require up-to-date bale specifications and packaging that is designed for recyclability. ReMA and APR remain committed to collaborative efforts to support the consistency and integrity of recycled plastics markets.

These specifications facilitate communication between MRFs and reclaimers by describing what materials are commonly accepted. They also clearly convey which contaminants are tolerable at low levels and which are prohibited because they are difficult or dangerous for reclaimers to manage.

Electronics

Rising disposable income, rapid product innovation, and broader technology adoption are driving unprecedented demand for electronic devices and accelerating device turnover. As the volume of end-of-life (EOL) electronics grows, so does the opportunity to recover valuable materials. Electronic devices contain metals, plastics, and glass that can be processed into new products, supporting circular material flows and reducing environmental impacts.

MARKET GROWTH AND SCALE

The electronics recycling and reuse sector continues to experience substantial growth. According to ReMA estimates, approximately 5.9 million metric tons of used electric and electronic equipment were recovered for recycling and reuse in the United States in 2024. However, EOL electronics generation is accelerating even faster, underscoring the need for expanded collection infrastructure, processing capacity, and downstream end markets.

Approximately 5.9 million metric tons of used electric and electronic equipment were recovered for recycling and reuse in the United States in 2024.

INDUSTRY INNOVATION AND MATERIALS RECOVERY

Electronics recyclers have become increasingly sophisticated at dismantling devices, safely removing hazardous materials such as lithium batteries, and recovering valuable ferrous and nonferrous metals —including precious metals and rare earth elements— alongside plastics, glass, and other recyclable materials. As demand for advanced materials rises, electronics recycling is increasingly recognized as a strategic source of critical minerals and high-value commodities.

BROADER SERVICE ECOSYSTEM

Electronics recycling operates within a broader service ecosystem known as IT asset management (ITAM) or IT asset disposition (ITAD). ITAM companies provide comprehensive services including collection, storage, upgrading, and transportation of electronic products; data erasure; device repair, refurbishment, and resale; as well as dismantling for parts resale and recycling. While most ITAD volume originates from commercial sources, consumers shape product return pathways, take-back programs, and municipal collection systems nationwide.

Consumer electronics suitable for recycling include laptops, cell phones, televisions, printers, chargers, cameras, cables, gaming consoles and controllers, and large household appliances. Proper disposal of electronics at the end of their useful life is the first critical step in facilitating resource circularity and environmental conservation. Growing interest in right-to-repair policies, producer responsibility programs, and public education initiatives are expected to strengthen collection rates and support continued market expansion.

Battery Recycling

Batteries are everywhere in our daily lives. They power our phones, laptops, electric cars, e-bikes, and countless other devices. As more people buy these products, the volume of batteries requiring end-of-life management is increasing rapidly.

The number of batteries available for recycling is projected to grow significantly over the next decade. Of the batteries entering the recycling stream, the vast majority will be small, loose batteries in small electronic devices, with the remainder embedded in larger devices. While small batteries will represent the majority of units, larger format batteries—particularly from electric vehicles and e-mobility devices—will account for most of the weight. This distribution creates distinct collection, safety, and processing challenges across battery categories.

To support the wider recycled materials industry in responding to the evolution of batteries entering the recycling market, and to invite collaboration on the issue with other stakeholders, in 2025 ReMA published a white paper that included policy considerations to advance safe, economically sustainable, and environmentally responsible battery recycling in the U.S. The white paper includes research ReMA commissioned on the status and projected future for batteries entering the recycling market.

MATERIALS RECOVERY AND CRITICAL MINERALS

End-of-life batteries are valuable sources of critical minerals. More than 90% of materials like cobalt, nickel, copper, and aluminum from lithium-ion batteries can be recovered and reused to make new batteries and products.

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Recycling batteries reduces the need for mining, lowers production costs, minimizes environmental impact, and supports domestic jobs in the recycling sector.

CRITICAL SAFETY AND FIRE RISK CHALLENGES

Improperly disposed lithium-ion batteries pose significant fire risks. When batteries end up in regular trash or recycling bins, they can cause serious fires—approximately 5,000 fires are reported annually at material recovery facilities due to lithium-ion batteries.[xxii] These fires injure workers, destroy equipment and recyclable materials, close operations for days or weeks, and can result in insurance rate increases of up to 5,000%. Fires occur when batteries enter regular recycling streams and become damaged during transport and processing, triggering thermal runaway that can lead to explosions and toxic gas emissions. The difficulty of detecting batteries within mixed recyclable materials makes early identification and removal both critical and costly.

ELECTRIC VEHICLE IMPACT ON MATERIAL COMPOSITION

The automotive sector's transition to electrification is reshaping material flows in recycling operations. A single electric car battery can weigh 1,000–2,000 pounds and contains valuable materials worth hundreds of dollars. Electric vehicles require six times the mineral inputs compared to conventional cars and contain different material compositions—more aluminum, copper, and specialized battery materials, while less steel and no catalytic converters. This shift presents both challenges and opportunities for automotive recyclers and shredders as they adapt to new material streams and safety protocols. While electric vehicles currently represent a small share of recycled battery units, their share of total battery weight in the recycling stream is expected to grow substantially as more EVs reach end of life.

POLICY LANDSCAPE

Federal and state governments recognize the strategic importance of battery recycling for economic competitiveness and supply chain security. The EPA has established a battery management program focused on improving collection infrastructure, supporting research on recycling technologies, and reducing fire risks in the waste stream.[xxiii] Eleven states and the District of Columbia now require battery manufacturers to fund recycling programs, and additional states are considering similar legislation.

Tires and Rubber

The U.S. tire and rubber recycling industry supports more than 10,000 American jobs and generates more than $2 billion in annual economic impact.[xxiv] Each year, more than 300 million end-of-life tires—over seven billion pounds—are generated in the United States. Rather than landfilling this valuable resource, recyclers transform it into products that strengthen our nation's infrastructure and support domestic manufacturing. Tire-derived aggregate serves as vibration-dampening fill beneath railroad and transit lines, and provides lightweight material for bridges, retaining walls, and stormwater management systems. Rubber-modified asphalt paves the nation's highways. Ground rubber surfaces the playgrounds, athletic fields, and running tracks where our children and athletes play and compete, and is manufactured into automotive parts, roofing materials, flooring, and durable consumer goods.

MARKET GROWTH AND OPPORTUNITY

According to data from the U.S. Tire Manufacturers Association (USTMA), 123 million tires[xxv] (equal to 2.3 million tons) were recycled in 2023. Tire recycling markets now consume nearly 80 percent of annually generated end-of-life tires, up significantly from prior years.[xxvi] In 2023, the largest usage of recycled tires was to produce ground rubber, 73 million tires or more than 1.3 million tons, according to USTMA estimates. Recycled ground rubber was in turn used to produce everything from loose mulch (29%) to molded and extruded products (27%), sports surfaces (26%), asphalt (12%), and automotive products (6%).

RUBBER-MODIFIED ASPHALT

Rubber-modified asphalt (RMA) represents a growing market for recycled tires and a critical opportunity for American infrastructure investment. RMA and tire-derived aggregate represent significant growth opportunities for tire recycling markets, supported by federal infrastructure investments. Research shows RMA offers significant benefits over traditional asphalt, including longer pavement life, reduced road noise, improved traction, and lower maintenance needs—

delivering long-term cost savings and environmental benefits. RMA made with recycled tires has been shown to contribute lifecycle CO2 emissions at least 32% lower than conventional pavement, according to the U.S. Tire Manufacturers Association.[xxvii]

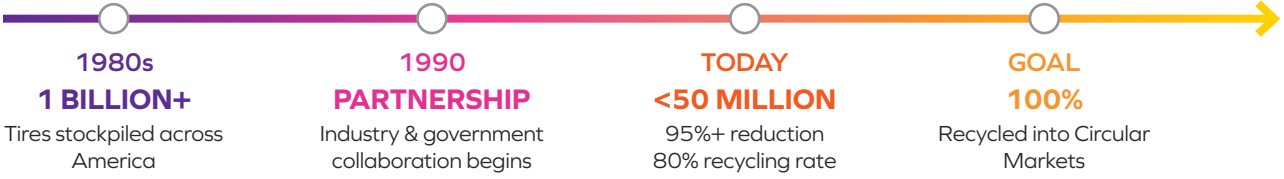
TIRE-DERIVED AGGREGATE

Tire-derived aggregate (TDA)—large shreds of end-of-life tires—offers a sustainable solution for civil engineering and construction. TDA serves as a cost-effective alternative to mined materials like gravel and sand in embankments, retaining walls, and drainage systems. It costs less while offering engineering advantages including light weight, excellent drainage, vibration dampening, and insulation.[xxviii]

HOW TIRES ARE RECYCLED

Tires are highly engineered composite products designed to be virtually indestructible—which makes them challenging to break down but ideal for reuse. Today's tire recyclers use two primary methods to process end-of-life tires. Ambient shredding uses powerful interlocking knives to cut tires into pieces at room temperature. Cryogenic processing uses liquid nitrogen to make tires brittle, then breaks them apart with hammer-style shredders. Both methods can reduce tires to fine crumb rubber powder, which is then used in the wide range of applications described above.

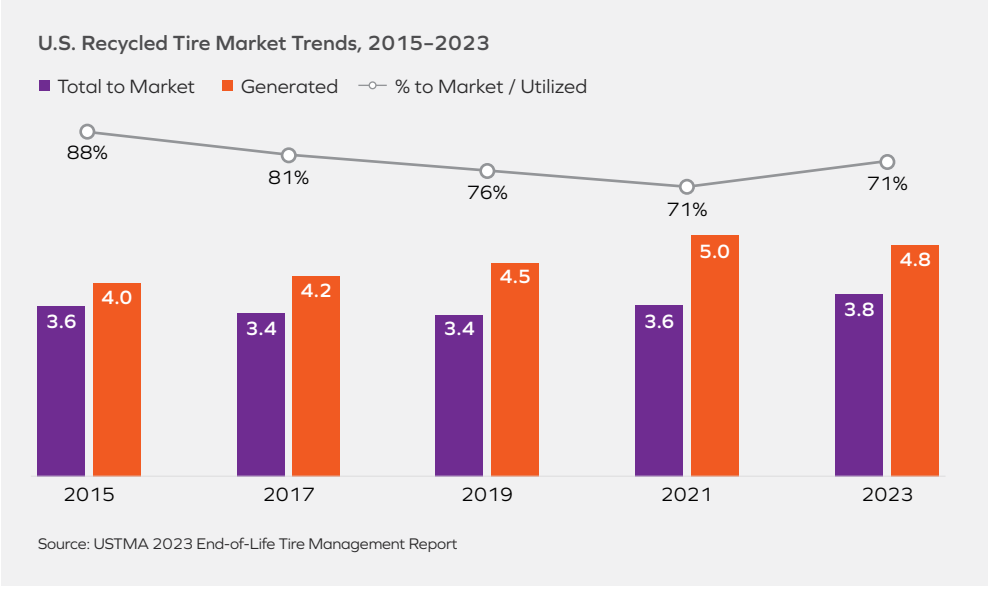
The Tire Recycling Turnaround



Source: USTMA

INDUSTRY RESULTS

American tire recyclers have made significant strides in recycling. End-of-life tire stockpiles have been reduced by more than 95 percent since 1990—when industry and government partnered to tackle the problem—from over a billion tires to fewer than 50 million today.[xxix] This remarkable reduction was driven by industry innovation supported by public-private partnerships and cleanup initiatives. With continued investment in end-use markets like rubber-modified asphalt and tire-derived aggregate, the U.S. tire recycling industry is positioned to lead the way—creating American jobs, strengthening domestic infrastructure, and advancing a circular economy.



Glass

Glass manufacturers require higher-quality recycled glass to meet market demand for new glass containers. Glass is 100% recyclable and can be recycled again and again with no loss in quality or purity. Every ton of glass recycled saves significant quantities of raw materials—1,300 lbs. of sand, 410 lbs. of soda ash, 380 lbs. of limestone, and 160 lbs. of feldspar—while also reducing energy use, lowering emissions, and extending the life of glass-manufacturing equipment.

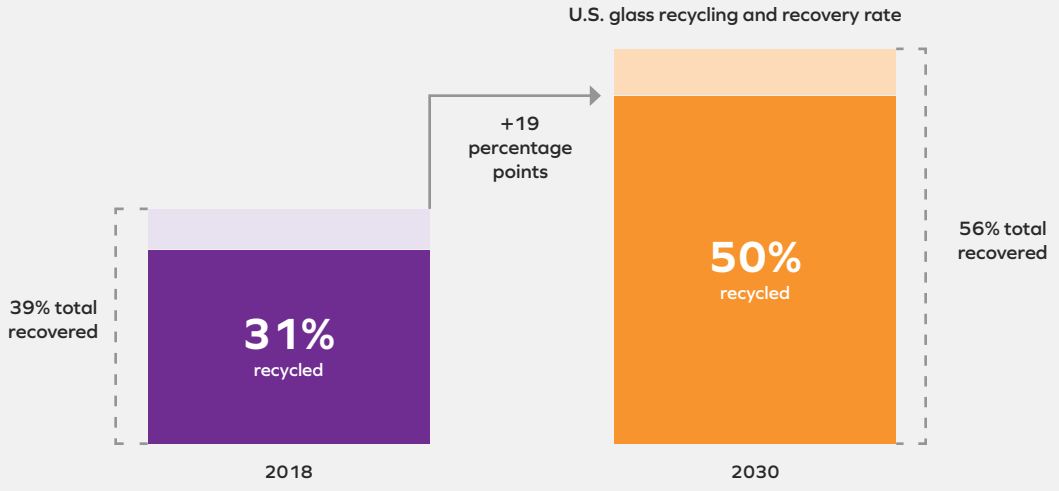
Furnace-ready recycled glass is called cullet. The container and fiberglass industries collectively purchase 3.35 million tons of recycled glass annually, remelting it for use in new containers and fiberglass products.[xxx]

Quality requirements drive collection practices. Glass containers for food and beverages are recyclable but must be kept separate from other types of glass such as windows, mirrors, and ceramics. Color sorting also matters—glass manufacturers are limited in the amount of mixed-color cullet they can use, so separating container glass by color helps ensure new bottles meet customer color standards. Drop-off and commercial collection programs tend to yield higher-quality container glass than single-stream curbside programs.

According to the Glass Packaging Institute, the U.S. glass container industry is targeting a 50% recycling rate by 2030. Achieving this rate would reduce greenhouse gas emissions by approximately 1.4 million metric tons annually—equivalent to removing about 300,000 cars from the road. The industry estimates that recycling 1,000 tons of glass creates approximately eight jobs.

Glass is 100% recyclable and can be recycled again and again with no loss in quality or purity.

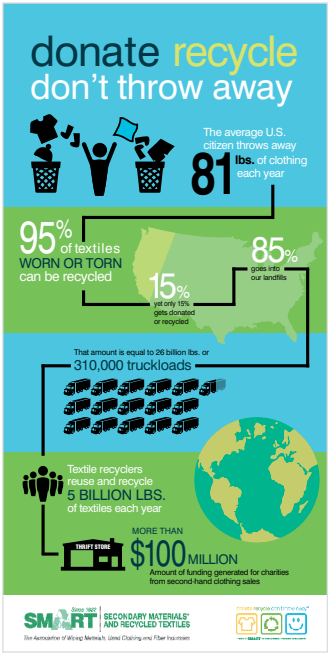
The U.S. Glass Container Industry is Targeting a 50% Glass Recycling Rate by 2030



Sources: Glass Packaging Institute, U.S. EPA, Boston Consulting Group.

Textiles

Each year, U.S. textile recyclers process billions of pounds of cotton, wool, synthetic, and synthetic-blend products. Sources of these recycled materials range from apparel and home furnishing manufacturers to textile mills and household consumers.



Recycled textiles serve multiple end markets. About 45% are sold as secondhand clothing, with the majority exported to international markets. Another 30% is converted into wiping and polishing clothes for industrial use. About 20% becomes fiber used as raw materials for the automotive, furniture, mattress, home furnishings, paper, and other industries. The remaining 5% is unusable and discarded.

According to SMART, more than 60% of recovered textile waste—over 1.4 billion pounds of used clothing—is exported to **more than 100 countries**, creating hundreds of thousands of jobs worldwide.

The textile recycling industry supports significant economic activity both domestically and internationally. According to the Secondary Materials and Recycled Textiles Association (SMART), more than 60% of recovered textile waste—over 1.4 billion pounds of used clothing—is exported to more than 100 countries, creating hundreds of thousands of jobs worldwide.[xxxi]

Textile recycling also reduces demand for virgin fiber production, which is resource-intensive, and diverts material from landfills and incinerators. The secondhand clothing market provides affordable options for consumers across a range of income levels.

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Statistical Appendices

APPENDIX A: U.S. and State Jobs Generated by the Recycled Materials Industry, 2024

Economic and Job Impacts on a State-by-State Level

	JOBS					OUTPUT ($ MILLIONS)			
	Direct	Indirect	Induced	Total	Multiplier	Direct	Indirect	Induced	Total
US	**171,467**	**215,453**	**209,236**	**596,156**	**2.5**	**4,204**	**$205,576,900**	**$664,852,600**	**12,068**
AK	211	230	236	677	2.2	$69	$73	$75	$217
AL	4,079	5,748	4,505	14,332	2.5	$1,910	$1,501	$854	$4,264
AR	1,963	2,357	2,074	6,394	2.3	$728	$611	$414	$1,753
AZ	2,943	3,706	4,168	10,817	2.7	$1,093	$980	$856	$2,930
CA	18,402	22,017	23,242	63,661	2.5	$7,312	$6,109	$5,090	$18,511
CO	1,499	1,922	2,045	5,466	2.6	$474	$578	$499	$1,550
CT	2,038	2,126	2,229	6,393	2.1	$659	$586	$500	$1,745
DC	35	38	54	127	2.6	$10	$13	$40	$63
DE	239	277	286	802	2.4	$75	$109	$104	$288
FL	7,941	11,410	11,105	30,456	2.8	$2,933	$2,512	$2,116	$7,561
GA	4,863	7,006	6,217	18,086	2.7	$1,926	$1,701	$1,242	$4,869
HI	677	642	737	2,056	2.0	$231	$147	$164	$542
IA	1,944	2,002	1,969	5,915	2.0	$555	$568	$472	$1,595
ID	562	719	760	2,041	2.6	$217	$187	$188	$591
IL	9,739	11,269	12,369	33,377	2.4	$3,585	$3,064	$2,565	$9,214
IN	7,972	10,065	8,877	26,914	2.4	$3,524	$2,767	$1,760	$8,051

Economic and Job Impacts on a State-by-State Level

	JOBS					OUTPUT ($ MILLIONS)			
	Direct	Indirect	Induced	Total	Multiplier	Direct	Indirect	Induced	Total
KS	1,221	1,392	1,367	3,980	2.3	$380	$368	$309	$1,057
KY	2,460	3,782	3,064	9,306	2.8	$1,275	$1,101	$634	$3,010
LA	1,632	2,194	1,927	5,753	2.5	$579	$769	$443	$1,791
MA	3,749	3,694	4,536	11,979	2.2	$1,352	$1,013	$1,001	$3,366
MD	2,070	2,177	2,144	6,391	2.1	$645	$515	$449	$1,609
ME	588	704	678	1,970	2.4	$180	$162	$157	$499
MI	4,942	6,619	6,274	17,835	2.6	$1,776	$1,763	$1,295	$4,834
MN	3,653	4,327	4,777	12,757	2.5	$1,475	$1,179	$1,023	$3,677
MO	3,209	4,149	3,847	11,205	2.5	$1,179	$1,074	$780	$3,032
MS	935	1,221	983	3,139	2.4	$293	$327	$218	$838
MT	363	470	422	1,255	2.5	$107	$144	$108	$359
NC	4,814	6,305	5,560	16,679	2.5	$1,684	$1,554	$1,179	$4,418
ND	310	331	359	1,000	2.2	$124	$109	$116	$350
NE	800	906	931	2,637	2.3	$237	$254	$240	$731
NH	761	829	803	2,393	2.1	$244	$212	$185	$640
NJ	5,557	6,128	6,236	17,921	2.2	$1,969	$1,619	$1,323	$4,911
NM	563	584	633	1,780	2.2	$193	$151	$147	$492
NV	969	1,290	1,111	3,370	2.5	$297	$359	$242	$899

Economic and Job Impacts on a State-by-State Level

	JOBS					OUTPUT ($ MILLIONS)			
	Direct	Indirect	Induced	Total	Multiplier	Direct	Indirect	Induced	Total
NY	7,494	7,738	8,287	23,519	2.1	$2,649	$2,210	$1,960	$6,820
OH	9,020	12,000	11,112	32,132	2.6	$3,380	$3,277	$2,129	$8,786
OK	1,350	1,786	1,559	4,695	2.5	$462	$491	$348	$1,301
OR	4,017	4,895	4,536	13,448	2.3	$1,625	$1,216	$873	$3,714
PA	7,582	9,130	9,342	26,054	2.4	$2,709	$2,526	$1,887	$7,122
RI	881	887	924	2,692	2.1	$293	$210	$198	$702
SC	2,840	3,471	3,161	9,472	2.3	$932	$867	$620	$2,419
SD	204	222	244	670	2.3	$37	$83	$100	$221
TN	5,391	7,029	6,306	18,726	2.5	$2,131	$1,783	$1,262	$5,175
TX	13,587	19,607	18,973	52,167	2.8	$5,362	$6,105	$4,072	$15,539
UT	1,432	1,752	1,730	4,914	2.4	$423	$493	$371	$1,287
VA	2,621	3,064	2,892	8,577	2.3	$946	$801	$610	$2,357
VT	235	260	284	779	2.3	$83	$64	$81	$227
WA	5,195	7,096	6,334	18,625	2.6	$3,093	$2,056	$1,415	$6,564
WI	4,959	6,752	6,119	17,830	2.6	$2,315	$1,664	$1,232	$5,210
WV	689	858	666	2,213	2.2	$229	$312	$156	$696
WY	267	270	242	779	1.9	$67	$96	$70	$233

Source: ReMA and John Dunham & Associates, Economic Impacts of the U.S. Recycling Industry, 2024.

Appendix B: U.S. Exports of Recycled Materials

U.S. Exports of Recycled Materials
Volume (Millions Metric Tons)

Country	2020	2021	2022	2023	2024
Turkey	4.1	3.5	3.5	4.1	4.4
Mexico	3.7	5.7	6.2	4.7	4.3
India	3.3	5.0	6.1	4.8	4.3
Thailand	1.2	2.2	2.5	3.1	2.8
Malaysia	2.7	3.0	2.3	2.3	2.6
Canada	2.3	2.2	2.2	2.1	2.1
Bangladesh	1.4	1.4	1.7	1.5	1.9
Vietnam	2.4	3.4	2.7	2.5	1.8
Taiwan	2.5	2.6	2.2	2.2	1.7
South Korea	1.8	1.8	1.6	1.3	1.0
China	5.1	1.2	1.2	1.0	0.9
Pakistan	0.8	0.9	0.7	0.5	0.7
Peru	0.3	0.6	0.7	0.5	0.6
Indonesia	0.7	0.7	0.6	0.5	0.5
All Others	3.1	4.2	3.2	1.9	2.0
Total	**35.4**	**38.3**	**37.4**	**33.1**	**31.6**

Sources: Census Bureau/U.S. International Trade Commission; ReMA.

U.S. Exports of Recycled Ferrous

Volume (Millions Metric Tons)

Country	2020	2021	2022	2023	2024
Turkey	4.1	3.4	3.4	4.1	4.4
Mexico	1.8	2.6	3.1	2.2	1.9
Bangladesh	1.4	1.4	1.7	1.5	1.9
Taiwan	1.5	1.4	1.2	1.2	1.1
India	0.5	0.4	1.7	1.4	1.1
Peru	0.3	0.5	0.7	0.5	0.6
Pakistan	0.7	0.7	0.5	0.4	0.6
Canada	0.7	0.6	0.6	0.6	0.5
Vietnam	1.0	1.4	0.9	0.9	0.5
Thailand	0.4	0.3	0.3	0.4	0.4
Italy	0.0	0.2	0.1	0.2	0.2
Greece	0.2	0.3	0.3	0.1	0.2
Egypt	0.3	0.5	0.3	0.0	0.2
South Korea	0.5	0.6	0.5	0.4	0.1
Malaysia	1.4	1.4	0.1	0.1	0.1
All Others	0.9	0.9	0.7	0.4	0.2
Total	**15.8**	**16.7**	**16.0**	**14.5**	**13.9**

U.S. Exports of Recycled Aluminum
Volume (Millions Metric Tons)

Country	2020	2021	2022	2023	2024
India	308	351	343	369	407
Malaysia	417	476	347	329	357
Thailand	73	75	100	176	356
South Korea	286	250	268	254	232
Hong Kong	69	200	114	119	164
Mexico	152	166	141	114	137
Canada	72	100	123	119	130
China	154	18	18	52	82
Indonesia	97	71	61	48	60
All Others	214	219	207	198	176
Total	**1,843**	**1,926**	**1,721**	**1,778**	**2,100**

U.S. Exports of Recovered Paper and Fiber
Volume (Millions Metric Tons)

Country	2020	2021	2022	2023	2024
India	2.1	3.8	3.6	2.5	2.1
Malaysia	0.4	0.8	1.2	1.7	2.0
Thailand	0.6	1.8	2.0	2.4	1.9
Mexico	1.4	2.2	2.3	1.8	1.8
Vietnam	1.3	2.0	1.8	1.6	1.3
Canada	0.9	0.9	0.8	0.8	0.9
South Korea	0.8	0.8	0.8	0.6	0.5
Taiwan	0.9	1.1	0.9	0.7	0.4
China	4.8	0.8	0.7	0.6	0.4
Indonesia	0.5	0.5	0.5	0.4	0.4
All Others	1.3	1.8	1.5	0.6	0.7
Total	**14.8**	**16.7**	**16.0**	**13.7**	**12.4**

U.S. Recycled Plastics Exports, Top 10 Countries
(Metric Tons)

Country	2020	2021	2022	2023	2024
Canada	163,719	171,426	148,082	155,917	139,894
Mexico	62,345	83,371	83,435	74,249	86,391
India	20,106	42,219	44,069	45,720	37,740
Malaysia	119,124	81,547	35,238	33,966	35,584
Vietnam	52,179	36,017	14,277	20,077	24,219
Indonesia	21,564	27,486	20,470	17,730	18,676
Spain	4,355	5,643	6,281	12,512	11,204
Turkey	17,842	13,556	10,667	5,773	7,759
Germany	9,592	7,995	12,349	6,687	4,924
El Salvador	7,487	13,271	10,132	5,357	4,239
All Others	164,549	94,654	72,684	51,696	48,134
Total	**625,782**	**555,920**	**435,205**	**417,640**	**409,601**

U.S. Exports of Recycled Electrical and Electronics

FAS Value ($) (Millions)

Country	2022	2023	2024
Mexico	$384	$367	$443
South Korea	$122	$119	$188
Canada	$103	$152	$109
Japan	$53	$84	$102
India	$3	$36	$26
Spain	$0	$11	$13
Belgium	$6	$7	$8
Germany	$3	$0	$5
Singapore	$0	$1	$4
Taiwan	$1	$1	$3
Netherlands	$0	$0	$3
Philippines	$1	$4	$2
China	$5	$10	$2
Portugal	$0	$0	$2
Malaysia	$2	$3	$1
Hong Kong	$0	$1	$1
Thailand	$1	$0	$1
United Arab Emirates	$1	$3	$0
All Others	$4	$11	$6
Total	**$688**	**$811**	**$919**

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The Recycled Materials Association (ReMA) represents more than 1,700 companies in the U.S. and 40 countries around the globe. Based in Washington, D.C., ReMA provides advocacy, education, safety and compliance training, and promotes public awareness of the vital role recycled materials play in the U.S. economy, global trade, the environment and sustainable development.

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