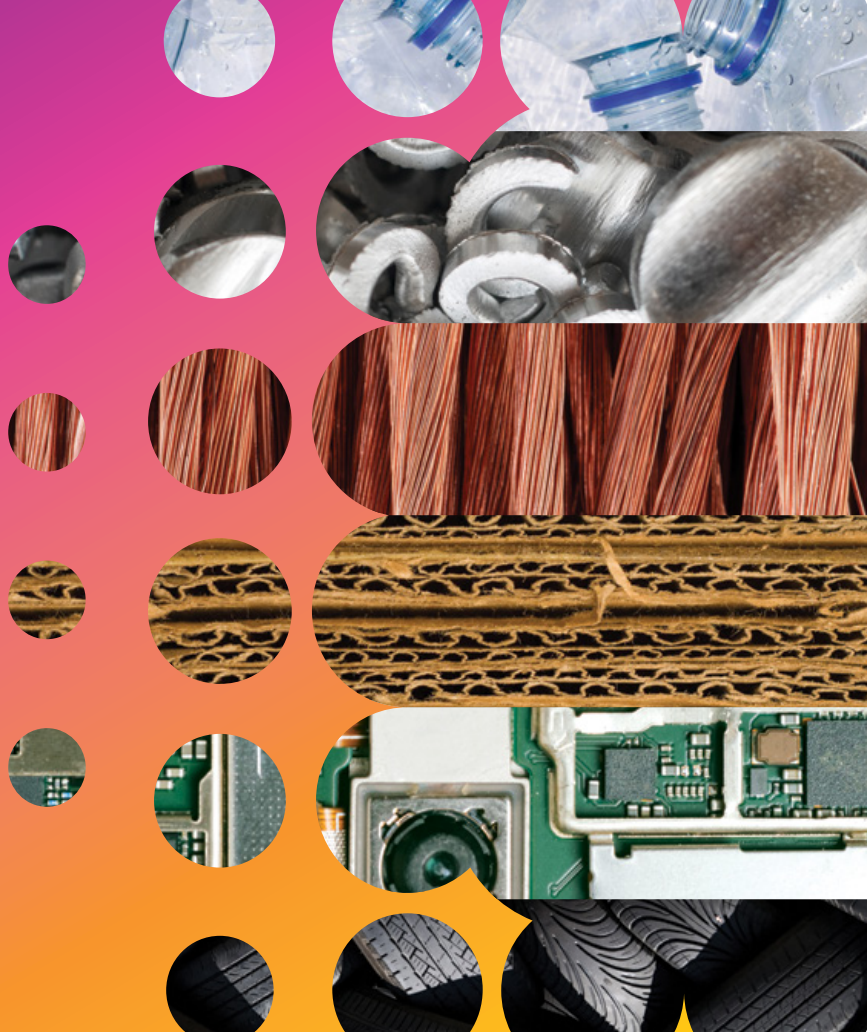
2023 ReMA Yearbook



Recycled Materials Association

Sustainable. Resilient. Essential.

On behalf of ReMA, we are pleased to present the 2023 ReMA Yearbook. The yearbook is designed to be a comprehensive source of information about the recycled materials industry, as well as a reference document with a wealth of statistical data about our industry.

This edition of the yearbook covers recent developments that are key to understanding today's recycled materials industry including:

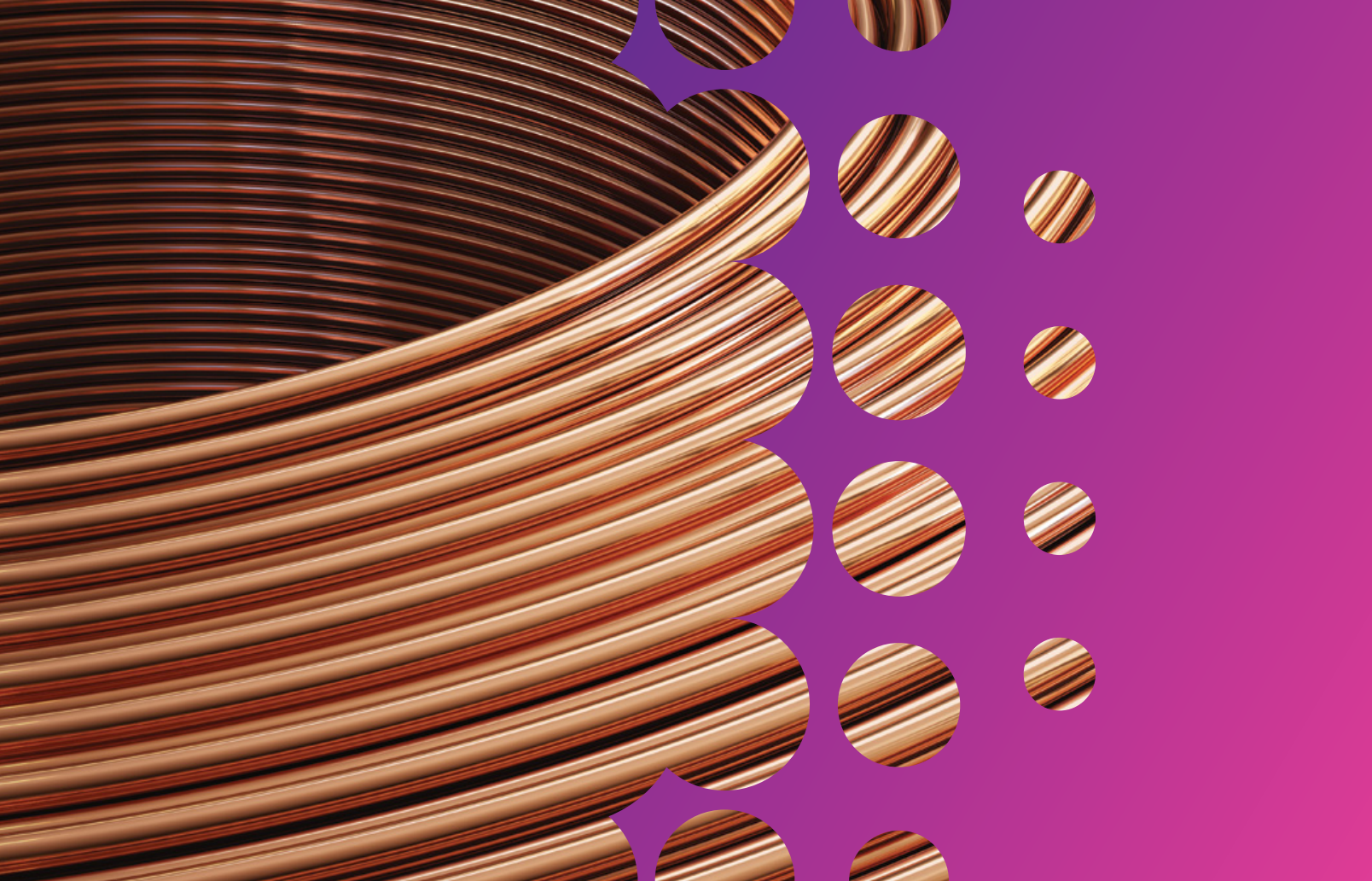
- Recycling's Critical Role in the Economy
- Recycled Materials, Infrastructure, and Supply Chains
- Industry Investment and Consolidation
- Recycling, Sustainability, and the Environment
- Electric Vehicles and Advanced Battery Recycling
- Recycling in Your Community
- The COVID Pandemic and Recycling
- Transportation and Logistics
- The Shifting Global Trade Landscape
- ReMA Specifications

During this period of both extreme challenges and opportunities, the importance of recycling to our economy, environment, and society has never been greater. The yearbook is an excellent resource to learn more about who we are as an industry, what we do, why it matters, and where we're going.

This edition of the yearbook also provides useful information about ReMA's efforts to promote safe, economically sustainable, and environmentally responsible recycling through networking, advocacy, and education. For more information, please visit recycledmaterials.org.

Brian Henesey
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 1,600 member companies operating in thousands of locations in the United States and around the globe, our members provide the high-quality raw 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. In fact, the vast majority of material recycled in the United States comes from industrial and commercial operations, as opposed to the much smaller share of recycling represented by curbside or residential recycling programs.

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.

ReMA Members Benefit from a Wide Array of Services, Resources, and Programs Including:

- Health & safety, and environmental compliance resources and training
- Networking and education opportunities
- Market research and reporting
- Regulatory and legal information
- Industry-specific publications
- Industry representation
- Advocacy on the state, national, and international levels
- Workforce development resources
- Youth Outreach activities

For more information or to join, **visit recycledmaterials.org**.

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.

» We reduce waste.

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.

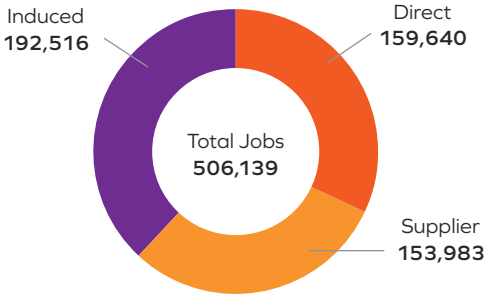
Recycled materials provide the high-quality materials needed to make the everyday items and essential infrastructure people depend on. Today, more of the roads we drive on and the cars we drive in, the wires and beams in our homes and offices, and the boxes and containers that bring consumer goods and 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.

Jobs Supported by the U.S. Recycled Materials Industry



Source: ReMA and John Dunham & Associates, Economic Impact Study, U.S.-Based Recycling Industry, 2021.

The Recycled Materials Industry is a Major Contributor to the U.S. Economy, Generating **Nearly $117 Billion** In Economic Activity In 2021

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 nearly $117 billion in economic activity in 2021:

- **The recycled materials industry employs 506,000 workers** directly or indirectly nationwide.
- **The industry generates $12.3 billion in tax revenues** while protecting the earth's air, water, and land for future generations.
- **It provides jobs averaging $77,300 in wages, benefiting** the communities in which they operate in all 50 states.

America's Infrastructure Relies on Recycled Materials

From our cars and roadways to our bridges, train stations, airports, and more, America's infrastructure and transportation systems rely on the work of the recycled materials industry.

The recycled materials industry supports more than 16,900 transportation and communication jobs and has an annual economic impact of $4.9 billion on the U.S. transportation and communication industries. Induced impacts generated by re-spending of employees of the recycled materials industry and supplier firms supports an additional 11,490 transportation and communication jobs with an annual economic impact of $4.1 billion.[1]

Infrastructure Investment and Recycling

In 2023 and beyond, the U.S. recycled materials industry will be essential towards meeting infrastructure investment and sustainability goals mandated by the historic $1.3 trillion infrastructure law and other stimulus measures.

Recent announcements include $192 million from the Department of Energy to support advanced battery recycling (June 2023) and $100 million from the Environmental Protection Agency to expand recycling infrastructure and waste management systems across the country (September 2023).

[1] ReMA and John Dunham & Associates, Economic Impact Study, U.S.-Based Recycling Industry, 2021.

Recycled Materials Make Supply Chains Stronger

Industry investment and government policies are increasingly geared toward securing supply chains, especially in light of the rising demand for critical minerals that are needed to meet decarbonization, electrification, and sustainability goals. Uncertainty regarding the global trade landscape and protectionist trade measures overseas have elevated the need for U.S. manufacturers to strengthen their domestic and regional supply chains.

Recycled materials provide the best solution to resolving the supply chain insecurity for critical minerals and sustainably produced materials. In 2022, the U.S. recycled materials industry processed 137 million metric tons of recycled materials, including nearly 70 million tons of recycled iron and steel, 45 million tons of recovered paper and fiber, 9 million tons of nonferrous metals, and more than 5 million tons of recycled and reused electronics.

Supply Chain Security also depends on stronger regional supply networks, also called "near shoring." North American supply chains across the United States, Canada, and Mexico have become increasingly integrated, including for recycled materials. More than 14 million tons of recycled materials were traded between the U.S., Canada, and Mexico in 2022.

More than 70% 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.

Estimated Volume of Recycled Materials Processed in the U.S., 2022

Type of Material	Million metric tons and %
Iron and Steel	69.5
Nonferrous	
Aluminum	5.4
Copper	1.8
Lead	1.0
Nickel	0.2
Zinc	0.3
Recovered Paper and Fiber	44.5
Post-Consumer Plastic	2.3
Electronics	5.5
Other (includes tire & rubber, textiles, glass, etc.)	7.0
TOTAL	**137.0**
U.S. Recycled Commodity Exports	37.6
Export share	27%

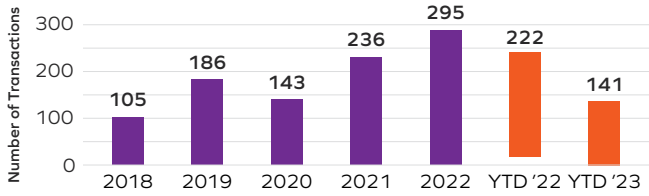
Sources: U.S. Geological Survey; U.S. Census Bureau; U.S. International Trade Commission; American Forest & Paper Association; Stina, Inc.; U.S. Tire Manufacturers Association, ReMA.

Industry Investment and Consolidation

In recognition of the superior environmental, economic, and supply chain benefits associated with using recycled materials, billions of dollars of public and 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.

- Since 2021, the Department of Energy's Loan Programs Office has announced $15 billion of awards and conditional commitments designed to promote advanced battery recycling and battery production from recycled 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 recycling industry, reports recycling capital investment plans of approximately $1 billion during 2022–2025.

M&A Activity in Recycling and Related Industries



Year-to-Date (YTD) ended September 1.
Sources: Capital IQ, Factset, Pitchbook, and Capstone Partners.

Trends In Mergers & Acquisitions

The competition for access to recycled material and search for higher profit margins has generated a wave of M&A activity, peaking at 295 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. The recycled materials industry allows manufacturers to create new products with sustainable alternatives to cutting trees, mining, drilling, or harvesting 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 big companies to help them recycle more, use more recycled materials in their products, and design their products to be recycled more easily.

By using recycled material instead of primary material that comes from mining and drilling, manufacturers can reduce their energy consumption and GHG emissions significantly. For example, aluminum manufacturers can reduce their energy consumption by 90% and GHG emissions by 96% by using recycled metal to produce new aluminum ingot.

A PROVEN SOLUTION TO THE CLIMATE CRISIS

The recycled materials industry reduces emissions. 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 produces fewer greenhouse gas emissions.

- Using recycled materials in manufacturing reduces energy consumption by 27–90%.
- Greenhouse gas emissions can be lowered by 35–96% by using recycled materials.

One Ton of Recycled Materials Equals:

- The amount of gas you would use to drive across the United States 2.5 times in your car.
- Saving 3,200 pounds of coal from being burned.
- Restoring 3.4 acres of U.S. forests each year to capture carbon dioxide in the atmosphere.

Calculation based on the average figure for all recycled materials.
Source: EPA Greenhouse Gas Equivalencies Calculator.

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%
Mixed Paper (general)	62%	47%
HDPE	75%	56%
PET	62%	52%
Mixed Plastics	68%	53%
Aluminum Cans	76%	83%
Aluminum Ingot	90%	96%
Steel Cans	55%	50%
Copper Wire	67%	66%
Mixed Metals	71%	71%
Glass	29%	47%

Notes: Results are based on EPA's Waste Reduction Model (WARM), Version 15. Savings represent the relative reduction in or avoidance of energy consumption or GHG emissions. Some values are rounded.

ReMA's Environmental Social Governance (ESG) Initiative

ESG reports are published by companies or organizations regarding their environmental, social, and governance impacts. According to PwC, "the growing importance of ESG or sustainability reports is supported by the fact that investors and other stakeholders are calling on companies to disclose more about their sustainability and environmental, social and governance strategies and risks. Many legislative documents requiring companies to disclose non-financial information are currently being prepared or have become effective."

In response, ReMA'S ESG Initiative and Toolkit are being offered to ReMA members to help navigate sustainability issues, focusing on creating opportunities to drive business value by shaping resilient and profitable companies for years to come.

- **The Purpose of the Toolkit** — To provide support for ESG strategy development, reporting, education, and tools for ReMA's members
- **The Process** — Chapter by chapter breakdown by topic through monthly interactive workshops
- **Timeline** — A year-long cadence to develop the program to allow time to absorb information
- **Ongoing Support** — Information will continue to be available and updated online for ReMA member reference and use. Staff will be available to provide support, as well.

ReMA will provide information and tools to support ESG strategy development, goals, programs, and reporting.

Goals + Strategy for Each Goal + Tactics + Reporting = ESG Strategic Planning

Recycling in Your Community

Amid heightened concern about the need for sustainable development from all segments of society, recycling's role as an environmental solution is receiving more attention. In turn, recyclers are increasing their community engagement in order to demonstrate the essential nature of recycling, both for their neighborhoods and for the planet.

ReMA continues to be a strong proponent of recyclers' community engagement and the operation of environmentally responsible and safe recycling facilities. ReMA also supports the broad objectives of **environmental justice**, including:

- The equal treatment and opportunity for all people regardless of race, ethnic origin, heritage, language, or economic status;
- Contributing positively to the communities in which our members operate;
- Promoting continued environmental stewardship; and
- Further promoting the health and safety of employees, customers, and communities.

CREATING GOOD JOBS IN LOCAL COMMUNITIES

There are far-reaching economic benefits generated by the recycled materials industry. Not only are recycling facilities 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 2021, jobs in the recycled materials industry averaged $77,300 in wages and benefits across all 50 states.

Workforce Development Programs

ReMA is actively engaged in workforce development through its Sustainability Pathways Program (which connects current students and recent graduates with paid fellowship and internship opportunities at recycling companies), Ukrainian Refugee Workforce Pilot Program, and other programs.

More information about the Sustainability Pathways Program is available at:

recycledmaterials.org/workforce-management/pathways-program

COVID-19 and Recycling

The economic and societal shocks caused by the COVID-19 pandemic continue to reverberate today. As the labor force participation rate declined, labor markets tightened and remain so today, contributing to a resurgence of labor union activity. The vast array of government stimulus measures, combined with supply shortages and the resurgence of consumer spending, contributed to elevated inflation levels that continue to shape central bank monetary policies and borrowing rates. In response to supply chain disruptions, government and private-sector firms have implemented measures to minimize import reliance and/or "nearshore" supply, redirecting international trade flows.

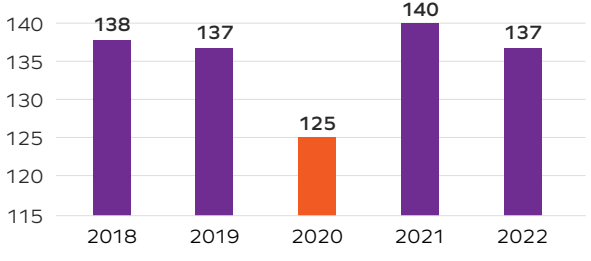
The pandemic also significantly impacted the recycled materials industry, including how the industry operates, the mix of materials being processed, how those recycled materials are transported, and where they are consumed.

MATERIAL COLLECTION AND PROCESSING VOLUMES

Particularly in the early stages of the pandemic, the supply and demand for recyclables was significantly impacted. The collection of cans and bottles, for example, was briefly curtailed in many areas due to concerns about material surface contamination. As companies and schools increasingly turned to remote work and learning, the generation and demand for recycled goods also shifted.

Recycled materials normally generated in the workplace, such as sorted office paper, were suddenly in short supply. At the same time, demand for reused and refurbished electronics increased sharply as households upgraded their home computers and wireless capabilities. More broadly, as manufacturers and other firms scaled back their operations and the economy entered a recession, demand decreased for recycled metal, plastics, paper, and other materials.

Estimated Volume of Recycled Materials Processed in the United States, 2018–2022 (million metric tons)



Source: ReMA

As compared to pre-pandemic levels when the U.S. recycled materials industry was typically processing more than 135 million tons of recycled materials annually, that volume declined by 12 million tons, or 9%, to 125 million tons in 2020, according to ReMA estimates.

As the economy and industrial output rebounded sharply in 2021, so did demand for recycled materials. ReMA estimates U.S. recyclers processed more than 140 million tons of all recycled material in 2021, a 12% increase as compared to 2020. As supply and demand rebalanced in 2022, processing levels returned to their pre-pandemic levels of around 137 million tons.

ReMA IN ACTION: RECYCLING REMAINS ESSENTIAL

ReMA played an instrumental role in getting timely and critical information and resources to recycled materials industry participants on a range of pandemic-related issues including:

- **The Recycler's Guide to Safe Operations.** This document provides guidance to help recyclers operate safely and minimize the potential for exposure to COVID-19.
- **COVID-19 State & Local Policy Dashboard.** This dashboard brings together, in one place, state and local government action on COVID-19 response. The resource includes emergency declarations, executive orders, and other sources of official information in all 50 states, as well as many local jurisdictions.

- **Specific Federal and State Resources.** Information on state and federal actions, assistance programs, business resources, and closure orders impacting recyclers.
- **Securing Recognition of Recycling as a Part of Essential Critical Infrastructure.** Recycling operations are deemed an essential part of critical manufacturers' supply chain.

For More Information

Please visit ReMA's COVID-19 Resource Hub:
recycledmaterials.org/COVID-19

Transportation and Logistics

After having surged in the aftermath of the COVID pandemic amid major port backlogs and container, chassis and truck shortages, shipping rates have been declining just as quickly since 2022. The Wall Street Journal reported in late 2023 that container freight rates were down 90% from their peak during the pandemic, prompting major carriers to begin cutting their capacity levels and payrolls. The capacity cuts further complicated recyclers' efforts to export their products to consumers around the world.

For U.S. recyclers, truck, rail, and barge continue to be the three most common modes of transportation for domestic shipments. Of the three, trucks have the highest cost per ton. Rail can be less costly because rail cars have a greater tonnage capacity than trucks. However, volatile rail shipping expenses, unreliable rail car availability, and other barriers have made this method of shipment less attractive. Barges and other waterborne shipments are the third major mode of domestic transportation for recycled materials. Although adverse weather conditions and engineering projects can significantly affect barge traffic, barges are often the lowest-cost option.

In late 2023, the Bureau of Transportation Services contacted ReMA to provide details about a dry bulk intermodal transportation project they have begun. The information obtained through this research will significantly benefit the recycled materials industry.

Recycled material export shipments move within North America via these three shipping modes as well as by oceangoing vessels around the world. Although a significant portion of U.S. recycled material exports ship as bulk (unpackaged) cargo, container shipping has expanded the ability of recyclers to fill international market demand for recycled materials.

The Shifting Global Trade Landscape

The recycled materials industry is driven by demand. Absent trade restrictions, global consumers of recycled materials determine the quality and volume of recyclables they need and the price they are willing to pay. Global trade in recyclables occurs because not every region has the infrastructure and technology needed to collect and process recyclable material into high-quality materials. In that respect, the United States has a competitive advantage.

The latest trade data from the U.S. Commerce Department show **U.S. exports of all recycled materials** (including ferrous and nonferrous metals, paper, plastics, textiles, rubber, glass, electronics, etc.) **in 2022 declined 2% year-on-year by quantity to 37.6 million metric tons. It fell 1.5% by value to $30.8 billion** (note the tracking of U.S. exports of recycled electronics began in 2022 and so were not included in the 2021 data).

U.S. exports by major recycled material group in 2022 were as follows (as compared to 2021):

- **Recycled iron and steel exports** (excluding stainless and alloy steel) declined 3.9% by quantity to 16.0 million metric tons and were down 0.2% in dollar terms to $6.86 billion;
- **Recycled base metal exports** (including Cu, Al, Ni, Zn, Pb, and Sn) rose 2.6% by quantity to 3.2 million metric tons and increased 9.1% by value to $9.5 billion;
- **Recovered paper and fiber exports** declined 3.9% by quantity to 16.0 million tons, but they were up 1.4% by value to $3.5 billion;
- **Recycled plastics exports** declined 21.5% by quantity to 436,322 metric tons and were down 4.2% by value to $283.7 million.

Top 10 Destinations of U.S. Recycled Materials Exports, 2022 (US $)

Country	
Canada	4,492,387,332
India	2,929,983,944
Mexico	2,773,731,797
China	2,412,388,406
Germany	2,339,517,752
Malaysia	1,724,007,843
Japan	1,516,151,991
South Korea	1,498,654,096
Turkey	1,489,808,671
Thailand	1,091,687,227
All Others	8,532,610,917
TOTAL	**30,800,929,976**

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

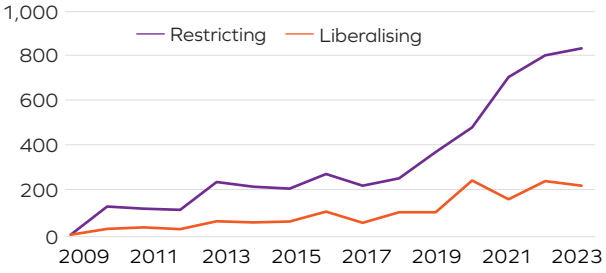
Trade Restrictions

The free and fair trade of recycled materials around the world is critical to capturing the full economic and environmental benefits generated by recycling. Unfortunately, fragile global supply chains, rising economic nationalism, confusion over what is product and what is "waste," — and how to properly account for recycling's contribution to emissions savings, have led to increased concerns about trade restrictions and protectionism.

Potential expansions and revisions to the scope of multi-lateral agreements and regulations pose risks to the global economy, environment, and recycling infrastructure. These include the Basel Convention and European Waste Shipment Regulations, unintended consequences from trade agreements designed primarily to protect manufacturers in advanced economies, and national restrictions on recycled material imports and exports.

Amid the escalation in restrictive trade policy measures, **ReMA's Specifications** provide clear guidelines on the recommended composition and allowable contamination limits on recycled material transactions.

Number of New Policy Measures



Source: World Bank Global Economic Prospects, June 2023.

ReMA Specifications

- ReMA Specifications are designed to facilitate the trading and use of the entire range of recycled materials. These include **recycled ferrous and nonferrous metals, paper, plastics, electronics, glass, tire and rubber, and residential recyclables.** By providing a common language for buyers and sellers of recycled materials around the world, the Specifications also play a key role in market development and realizing the full economic and environmental benefits generated by recycling.
- **The Specifications are reviewed on an ongoing basis to ensure they meet the demands of the domestic and global marketplace.** Any individual, company, or organization can propose additions, modifications, or deletions to the Specifications. As the flow of recyclable materials continues to evolve with the introduction of new products into the supply stream, ReMA will continue to update the Specifications.
- **In June 2023, ReMA launched the new online specifications resource ReMAspecs.org.**
- Funding from the U.S. Commerce Department/International Trade Administration's Market Development Cooperator Program was generously provided to create the new resource, update and expand the specifications, and support educational outreach to inform stakeholders about industry standards and best practices.

DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA

INTERNATIONAL
TRADE
ADMINISTRATION

- State and federal government agencies are eager to facilitate trade according to industry-recognized standards. Enhancing the public interface of the Specifications through improved search and discover applications will aid in those efforts. It will result in more opportunities for economic growth and environmental sustainability through increased trade of recyclables. This in turn will divert end-of-life materials from landfills and provide valuable feedstock to manufacturing.

Recycled Material Markets

Recycled Material Market Fundamentals

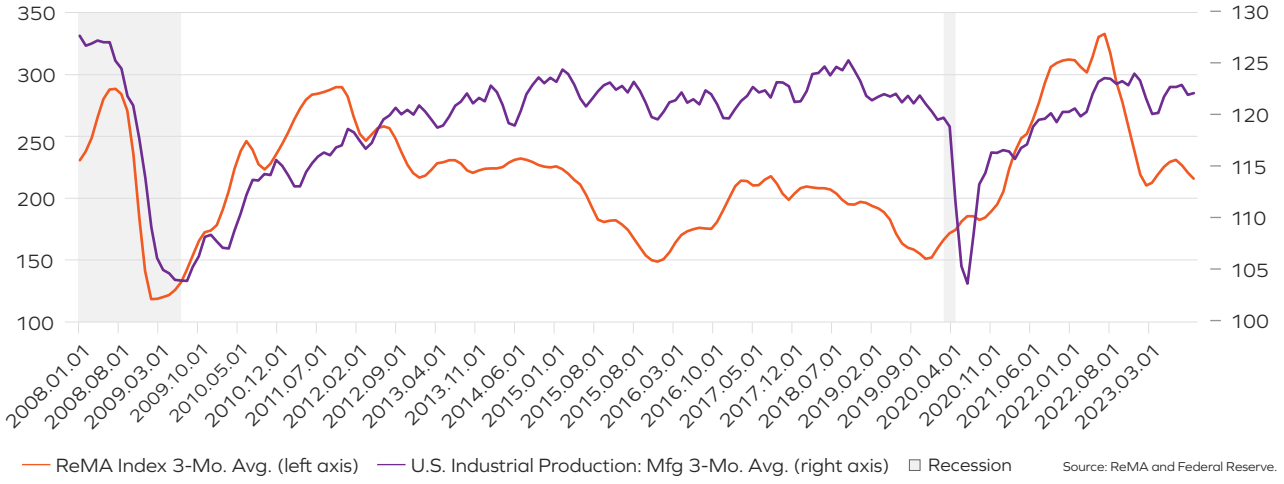
Recycled material markets are subject to many of the same factors that drive primary material markets (e.g., iron ore, crude oil, gas, copper cathode, primary plastic resins, wood pulp), and thus experience similar price volatility. Changes in economic growth and manufacturing demand, inventories, energy 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 it 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 that are not based on 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 therefore experienced recyclers know that continually turning over their inventories is critical to managing risk. In contrast, primary material producers often stockpile their materials in large warehouses to manage swings in inventories 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 upon the type of material, as well as its source. For example, residential recycling differs from industrial recycling because the 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 the supply has less price elasticity, a sudden reduction in demand can wreak havoc with prices. 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 other consumers in the United States and around the world unable to absorb the volumes previously purchased by Chinese consumers, prices dropped precipitously.

ReMA Index and U.S. Industrial Production — Manufacturing: 3-Mo. Moving Avg. 2008–YTD 2023, Not Seasonally Adjusted
(Jan 1998 = 100)



Source: ReMA and Federal Reserve.

ABOUT THE ReMA INDEX

The ReMA Index is a weighted average of producer prices for recycled plastics, iron and steel, nonferrous metals, and paper. Given the advanced incorporation of recycled materials into the manufacturing supply chain, changes in the ReMA Index often precede changes in U.S. industrial production and manufacturing output. The ReMA Index dropped sharply during the Great Recession and prior to the COVID-induced recession in 2020. Recycled material prices subsequently rose sharply through the first half of 2022 as economic activity and industrial production ramped up, but were on a downward trajectory from the second half of 2022 until the third quarter of 2023 as manufacturing output cooled.

Iron and Steel

The production of cars and trucks, highways, bridges, railroads, energy, homes and commercial buildings, structures, appliances, machinery and equipment, and weapons systems in the U.S. defense industry, all rely heavily on steel.

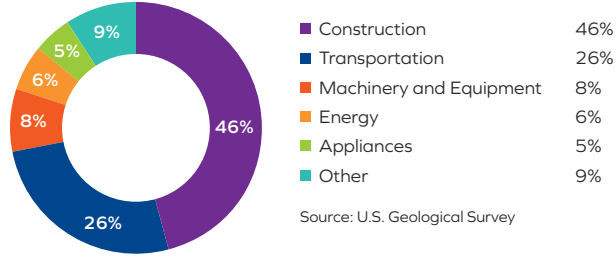
U.S. steel manufacturers in turn rely on recycled iron and steel to produce the high quality, low-embodied carbon steel products — those made with less climate impact — required by end users. Over 70% of the steel manufactured in the United States is so called "green steel," made from recycled material. Producing steel from recycled material at electric arc furnaces (EAFs) — which routinely use 90–95% recycled material inputs — requires less than half the energy required by producing steel from primary materials like iron ore.

In 2022, U.S. steel mills consumed approximately 56.6 million metric tons of recycled iron & steel in order to produce 82 million metric tons of steel.

End-of-life (obsolete) consumer products such as cars and appliances, along with demolished buildings, old railroad tracks, decommissioned ships, and used farm equipment are major sources of recycled iron and steel.

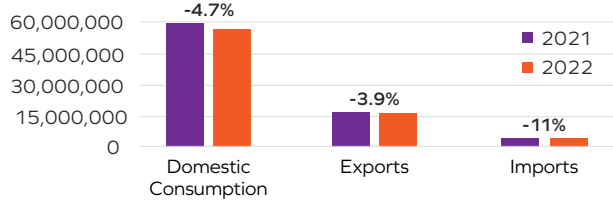
In addition, the manufacturing process produces prime recycled steel: leftover material that results from stamping, cutting, trimming, or punching. **Recycled ferrous metal consumption is projected to rise in the coming years amid significant EAF capacity expansion plans in the U.S. and abroad.**

U.S. Steel Consumption by End Use Market



Source: U.S. Geological Survey

The U.S. Recycled Iron and Steel Industry, 2022 vs. 2021* (metric tons)

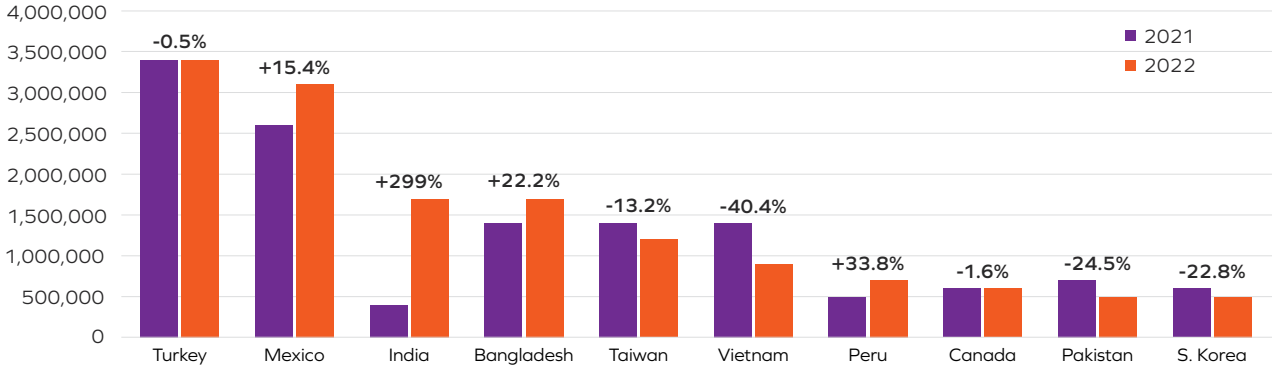


Sources: U.S. Geological Survey; Census Bureau/U.S. International Trade Commission; ReMA.
*Trade data excludes stainless and alloy steel.

Recent U.S. Steel Mill Capacity Expansion Plans — short tons (st)				
Company	**Location**	**Product**	**Capacity (st/yr)**	**Start-up**
SDI	Sinton, Texas	Sheet	3 million	Ramping Up
Nucor	Gallatin, Kentucky	Sheet	1.4 million	Ramping Up
Northstar Bluescope	Delta, Ohio	Sheet	850,000	Ramping Up
Nucor	Brandenburg, Kentucky	Plate	1.2 million	Ramping Up
CMC	Mesa, Arizona	MBQ	500,000	Ramping Up
ArcelorMittal/Nippon	Calvert, Alabama	Sheet	1.6 million	2H 2023
US Steel (Big River)	Osceola, Arkansas	Sheet	3 million	2023
Nucor	Mason County, WV	Sheet	3 million	2023
Nucor	Kingman, Arizona	Bar	600,000	2023
Nucor	Lexington, NC	Bar	430,000	2023
CMC	Berkeley County, WV	Bar	500,000	2025
Hybar	Osceola, Arkansas	Bar	600,000	2025
Pacific Steel	Mojave, CA	Bar	380,000	2025

Source: Argus Media.

U.S. Recycled Iron and Steel* Exports by Major Destination, 2022 vs. 2021 (metric tons)

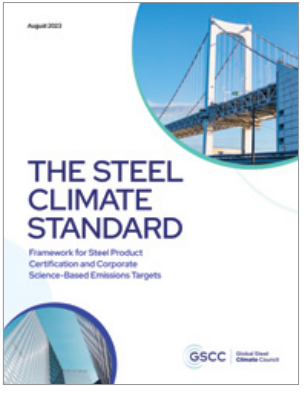


Sources: Census Bureau/U.S. International Trade Commission; ReMA.
*Excludes stainless and alloy steel.

Nearly 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 recycled steel consumers in 80-plus countries around the world. **The United States is the largest single exporter of recycled iron and steel in the world**. U.S. recycled iron and steel exports (excluding stainless and alloy steel) declined 3.9% year-on-year in 2022 by quantity to 16.0 million metric tons and were down 0.2% in dollar terms to $6.9 billion.

Global Steel Climate Council



The Global Steel Climate Council (GSCC) is a non-profit association created to advance climate strategy by establishing standards and advocating for carbon emissions reductions by members of the steel industry. The GSCC includes more than 35 international producing members and supporters who are steel manufacturers, trade associations, end users, recycled metal suppliers, and non-governmental organizations.

The founding members of the GSCC are the CELSA Group, Commercial Metals Company, ReMA, Nucor Corporation, Steel Dynamics, Inc., and Steel Manufacturers Association (SMA).

GSCC's mission is to lead the way toward a truly effective low-emission steel standard for all producers that accurately counts carbon emissions — regardless of the production methods. The GSCC Steel Climate Standard is designed to incentivize true decarbonization of the steel sector and has three important objectives:

1. It provides a single, technology-agnostic framework for steel product certification and company science-based emissions target-setting that applies to all steel producers equally on a global basis.
2. It allows all steel customers to know the carbon emissions associated with the steel products they are purchasing.
3. It creates an industry standard for achieving the emissions reduction goals in the Paris Climate Agreement by 2050.

For more information about GSCC and the Steel Climate Standard, please visit: **GlobalSteelClimateCouncil.org**

Nonferrous Metal

Nonferrous metals — including copper, aluminum, nickel, lead, zinc, and tin — can be recycled an infinite number of times. As a result of their chemical properties, lower costs, and superior 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.

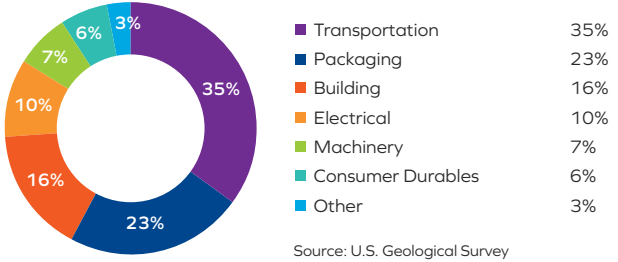
According to data from the U.S. Geological Survey[2] (USGS) and ReMA estimates, the United States recovered nearly 9 million metric tons of nonferrous metals in 2022. As sustainable development, supply chain security, and infrastructure investment have come into focus, public and private investment in the nonferrous recycling sector continues to grow.

In 2022, as part of the Bipartisan Infrastructure Law, more than $600 million was allocated to projects to recover nickel from spent lithium-ion batteries and for the synthesis of nickel-containing precursor and cathode active materials. Since 2021, the Department of Energy's Loan Programs Office has announced

$15 billion of awards and conditional commitments designed to promote advanced battery recycling and battery production from recycled materials. Private firms operating in the United States have recently announced planned investments of more than $7 billion in new nonferrous recycling facilities and manufacturing plants, including new copper and aluminum smelters and production facilities.

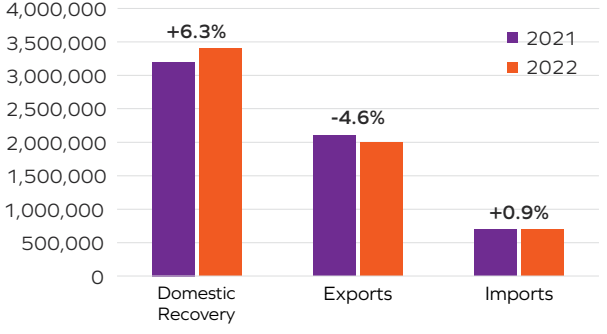
[2] USGS.gov/Centers/National-Minerals-Information-Center/Commodity-Statistics-and-Information

U.S. Aluminum Consumption by End Use Market



Source: U.S. Geological Survey

The U.S. Recycled Aluminum Industry, 2022 vs. 2021* (metric tons)



Sources: U.S. Geological Survey; Census Bureau/U.S. International Trade Commission; ReMA.
*Including Remelt Scrap Ingot and Used Beverage Containers.

Aluminum

Aluminum consumption in the United States is dominated by the transportation sector (35%), followed by packaging (23%), building (16%), electrical (10%), machinery (7%), consumer durables (6%), and "Other" (3%), 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 6.3% in 2022 to 3.4 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. **It takes as little as 60 days for an aluminum can to go from the recycling bin back to a grocery shelf**. Making products from recycled aluminum saves up to 90% of the energy needed to manufacture them as compared to mined materials.

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.

Recently Announced Aluminum Production and Recycling Plans Include:

- **Novelis** announced a $2.5 billion investment to build a fully integrated aluminum manufacturing facility including recycling/casting, hot rolling and finishing for beverage can and automotive markets in Bay Minette, AL. The facility will be powered by renewable energy, use recycled water and operate as a zero-waste facility.
- **Aluminum Dynamics** — owned by Steel Dynamics — announced a $2.2 billion investment to build a low-carbon, recycled aluminum flat rolled mill, with two supporting satellite recycled aluminum slab centers in Columbus, MS.
- **MetalX** announced a $200 million investment in building a greenfield aluminum rolling slab facility in the Midwest. The plant is expected to become fully operational in the first half of 2026 and will employ approximately 100 people.
- **Spectro Alloys** announced a $77 million investment to expand its aluminum recycling facility in Rosemount, IL.
- **Hydro** announced a $50 million investment in its extrusion plant in Cressona, PA. The investment will expand the site's recycling capabilities, which include remelt and extrusion billet casting, producing low-carbon aluminum products.

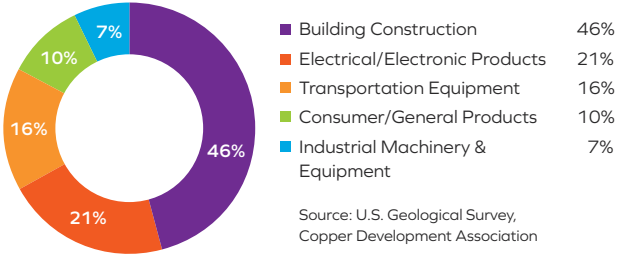
Copper

As with other metals, copper is infinitely recyclable and is critical to producing new, sustainable copper products. The largest copper consuming sector in the United States is building construction, including everything from wiring and cables to heating and cooling, 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 metal alloys. Bronze and brass are two of the most common copper alloys, but hundreds of others have been created for the specific properties they can provide.

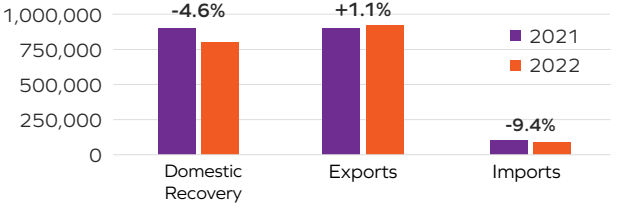
The U.S. Geological Survey estimates that 830,000 metric tons of recycled copper were recovered domestically in 2022. Copper recycling in the United States is a growth industry, with major recent announcements from **Aurubis AG** to invest more than $700 million to build a secondary copper smelter in Augusta, Georgia and **Wieland North America's** $100 million investment to open a copper recycling and refining facility in Shelbyville, Kentucky.

U.S. Copper Consumption by End Use Market



Source: U.S. Geological Survey, Copper Development Association

The U.S. Recycled Copper Industry, 2022 vs. 2021 (metric tons)



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

The superior quality of U.S. recycled copper is also highly valued by manufacturers overseas. U.S. exports of recycled copper and copper alloys exceeded 926,000 metric tons valued at nearly $4.9 billion in 2022.

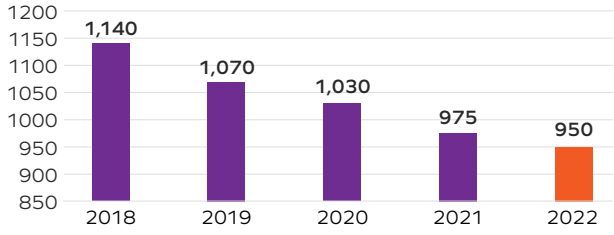
Lead and Zinc

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 U.S. Geological Survey estimates the lead-acid battery industry accounts for 92% of total U.S. lead consumption and lead produced from recycled metal was valued at $2.4 billion in 2022. The planned replacement of an estimated 9.2 million lead service lines across the United States is expected to have significant implications for lead metal recyclers, consumers, and U.S. communities in the coming years.

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

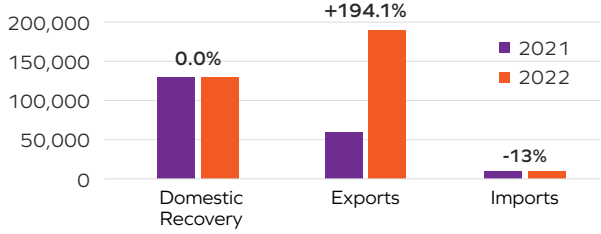
In 2022, an estimated 60% (or 132,000 metric tons) of the refined zinc produced in the United States came from recycled zinc, including galvanizing residues and crude zinc oxide recovered from electric arc furnace dust, according to the U.S. Geological Survey. In late 2023, Nyrstar announced the suspension of production at two U.S. zinc mines.

U.S. Lead Production from Recycled (Secondary) Lead
Thousand metric tons contained lead



Source: U.S. Geological Survey

The U.S. Recycled Zinc Industry, 2022 vs. 2021 (metric tons)



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

Nickel and Stainless Steel

The production of stainless steel, alloy steels, and other nickel-containing alloys typically accounts for more than 85% of nickel consumption in the United States. In turn, stainless steel is used to produce everything from cutlery to home appliances, elevators and escalators, subway trains and rail stations, automotive and aerospace parts, and the shipping tankers that transport fuels, chemicals, and other modern necessities.

Electric vehicle batteries are an increasingly important source of nickel demand as lithium-ion batteries depend on nickel-containing cathodes to boost performance. The Bipartisan Infrastructure Law allocated more than $600 million for projects to recover nickel from spent lithium-ion batteries and for the synthesis of nickel-containing precursor and cathode active materials, according to the USGS.

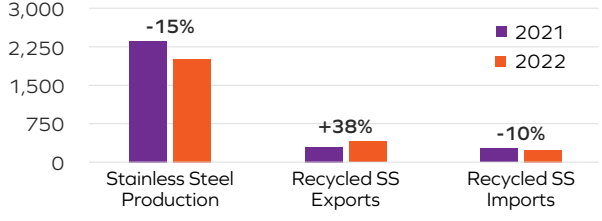
For recyclers of nickel and stainless steel, transparent nickel price benchmarks are fundamentally important to conducting business. The repercussions of the nickel price "melt-up" and suspension of nickel trading at the London Metal Exchange in early 2022 continue to impact market participant confidence in exchange-traded nickel contracts.

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

LME Nickel Prices ($/metric ton)

Sources: LME, Marex.

The U.S. Stainless Steel Industry, 2022 vs. 2021
/ Thousand metric tons



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

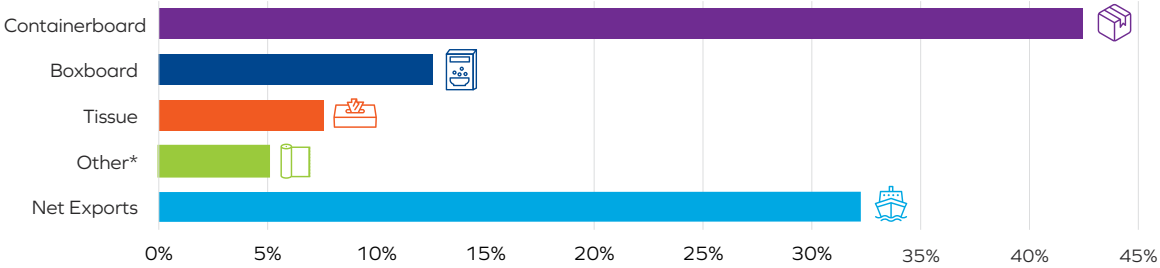
Recovered Paper and Fiber

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. In fact, paper and paperboard are some of 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. Society benefits from having to cut down fewer trees and reduced greenhouse gas emissions when recycled paper is substituted for wood pulp. 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%. In addition, recycling one ton of paper saves 3.3 cubic yards of landfill space.

The American Forest & Paper Association estimates **49.1 million tons** (44.5 million metric tons) of paper and paperboard were recycled in the United States in 2022, with an overall **recycling rate of 67.9%**.

Where Recycled Paper Goes — About 2/3 of recycled paper goes into products Americans rely on every day



*Other includes newsprint, printing-writing, Kraft packaging and Industrial converting, construction paper and board, and molded pulp.
Source: AF&PA Statistics and U.S. Census Bureau.

The ReMA Fiber Recycling Readiness Tool

The ReMA Fiber Recycling Readiness Tool focuses specifically on recycling post-consumer fiber-based packaging that will be marketed in the United States. The Tool is a research-based approach for users 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 for the Tool is based on the ReMA Board of Directors-approved definition of recyclable materials, which is "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 methodology research conducted for development of this tool. The results determine whether the packaging meets the criteria of the Tool, has challenges that require modifications, or does not meet the criteria.

Paper and paperboard are some of the most widely recycled materials in the world. Paper recycling recovers fiber that can be used to manufacture other paper products while producing jobs and protecting the environment.

The Fiber Recycling Readiness Tool is a living document that is reviewed and updated to reflect current technologies and market conditions within the recycling process on a regular basis. The determining criteria were developed based on results of several empirical studies, including the 2021 ReMA Paper Recyclability MRF (Materials Recovery Facility) Survey conducted by Moore & Associates on behalf of ReMA.

Plastics

"Plastics" is an umbrella term for a diverse array of materials, some more easily recycled than others. For example, many single-use plastics are difficult to recycle, given current technological limits. And when plastic is infused into other materials like packaging, it can be difficult to recover for recycling. But other plastics, such as the material used in soda bottles and laundry detergent bottles, are recycled often — at three times the average plastics recycling rate.

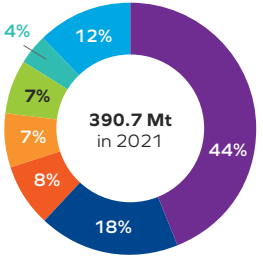
The good news is that recycling technologies for plastics are advancing, and as a result companies are recycling plastics that have traditionally been considered hard to recycle. These include PVC products, such as plumbing and irrigation pipes and drains, and plastic film used for everything from shielding crops to grocery bags. Recyclers processed at least 1 billion pounds of U.S. plastic bags and film in 2017, up 54% since 2005.

Scientists and recyclers have developed several technologies for plastics recycling during the past decade, some of which are highly developed, with others still in their infancy. Robotics, artificial intelligence, optical scanners, laser separation and other sophisticated technologies are now commonly found in recycling operations, allowing recycling to get better and do more.

Recycling requires constant innovation because the products and materials used across the economy are always changing. It's a major reason recyclers are teaming with manufacturers to design new products with greater recycling in mind so that when discarded more of the plastic can be recycled. Two prime examples are plastic water bottles that are 100% recyclable and certain laptop computers that eliminate the use of glues and adhesives while incorporating a modular design to allow better access to the various parts for recycling.

While there is still a long way to go, more manufacturers are increasing the use of recycled content and making products that are easier to recycle. They are recognizing the societal value, both economic and environmental, and the demand from their customer base. ReMA is working closely with businesses to address product recyclability and find ways to strengthen recycling across all material categories.

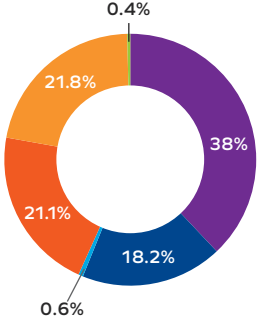
Global Plastics Use by Application in 2021



Packaging	44%
Building & Construction	18%
Automotive	8%
Electrical & Electronics	7%
Household, Leisure & Sports	7%
Agriculture, Farming and Gardening	4%
Others	12%

Source: Plastics Europe.

U.S. Sourced Post-consumer Plastic Recovered for Recycling by Category



PET Bottles	38%
HDPE Bottles	18.2%
PP & Other Bottles	0.6%
Non-bottle Rigids	21.1%
Film	21.8%
Other Plastics (excluding foam)	0.4%

Source: Stina Inc.

Due to rounding, some totals may not correspond with the sum of the separate figures.

[3] EPA Waste Reduction Model (WARM).

In 2021, **5,085.6 million pounds** (~2.3 million metric tons) of post-consumer plastic material sourced in the U.S. was recovered for recycling, according to Stina Inc.

Following the COVID pandemic, global plastics output rebounded to 390.7 million metric tons in 2021, including the recovery of 32.5 million metric tons of post-consumer plastics, according to Plastics Europe. Packaging continues to be the largest source of demand for plastics, accounting for 44% of global usage in 2021. With that growth comes the need to ensure that these materials are recycled in an environmentally responsible manner once they reach the end of their useful lives.

Using recycled plastics in manufacturing can save 75% or more of the energy needed to produce plastics from primary materials.[3]

In 2021, 5,085.6 million pounds (~2.3 million metric tons) of post-consumer plastic material sourced in the U.S. was recovered for recycling, according to Stina Inc. Post-industrial plastics may supply an even larger share of recycled plastic. According to a recent Plastics News survey, 58% of U.S. plastic recovered for recycling came from post-industrial plastics, while 42% originated from post-consumer plastics.

ReMA Plastics Specifications

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

In November 2023, ReMA and The Association of Plastic Recyclers (APR) announced the latest updates to the ReMA Specifications and APR Model Bale Specifications to include updated recycled plastics specifications. 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 specification updates are intended to more accurately reflect the recycled Polypropylene (PP) and Mixed Rigid plastics currently being traded in the marketplace.

2023 Revised Plastics Specifications:

- PP Small Rigid Plastic
- Mixed Small Rigid Plastic
- Mixed Bulky Rigid Plastic

The three approved revisions replace several existing PP and Mixed Rigid specifications to reduce confusion and better reflect the scope of what is traded and processed in today's marketplace.

"These most recent ReMA and APR Specifications updates align with the recycled materials industry focus on technological innovations and Design for Recycling®," said ReMA President Robin Wiener. "The changes announced reflect the ongoing review by dedicated volunteers in ReMA's Plastics Division and our partnership with the Association of Plastic Recyclers. Our partnership allows us to work together to strengthen our specifications."

As a result of technological innovations — including optical sorters, robotics and the application of artificial intelligence — the industry can now sort and process plastics for recycling more effectively than ever before. However, the continually evolving packaging and recycling streams mean that updated bale specifications and recycling-compatible package design remain critical to maintain and improve recycled material quality.

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

Electronics

The electronics recycling and reuse sector has seen tremendous growth over the past decade. Demand for reused and refurbished computers, routers, servers, cell phones, and other electronic equipment was significantly impacted by the COVID pandemic. ReMA estimates that approximately 5.5 million metric tons of used electric and electronic equipment were recovered for recycling and reuse in the United States in 2022.

Electronics recycling is only one segment of a set of services more broadly called IT asset management (ITAM) or IT asset disposition (ITAD). ITAM companies may provide collection, storage, upgrading, and transportation of electronic products; data erasure; device repair, refurbishment, and resale; and dismantling for parts resale as well as recycling. Up to 75% of the ITAD material stream by volume comes from businesses and other commercial sources.

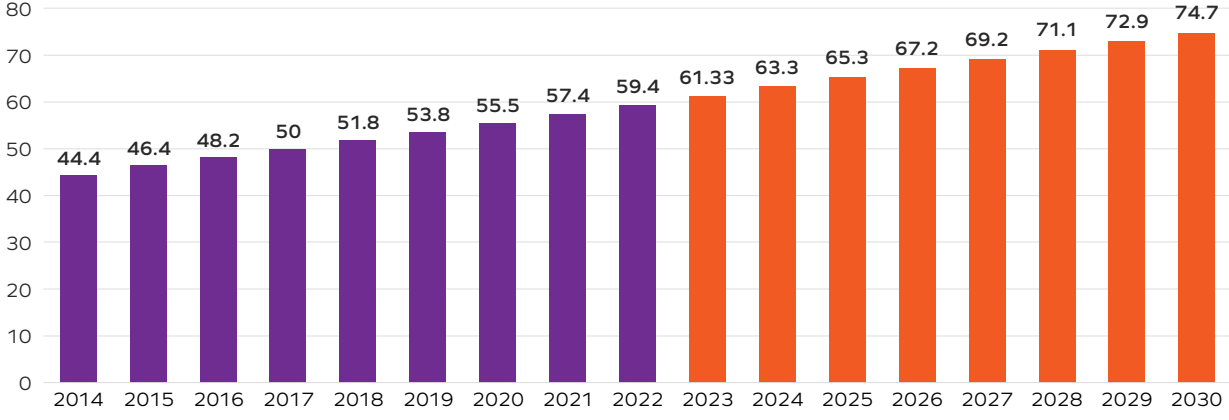
Electronics recyclers have become highly efficient at dismantling devices, removing potentially hazardous materials such as lithium batteries and fluorescent bulbs, and recovering their many and varied materials. Electronic products may contain ferrous and nonferrous metals — including precious metals and rare earth metals — plastics, glass, and other recyclable materials. The electronics manufacturing industry is constantly innovating, and recyclers must ensure their processes can keep pace with the changes.

"The consumption of Electrical and Electronic Equipment (EEE) is strongly linked to widespread global economic development. EEE has become indispensable in modern societies and is enhancing living standards, but its production and usage can be very resource demanding... **On average, the total weight (excluding photovoltaic panels) of global EEE consumption increases annually by 2.5 million metric tons**."

— THE GLOBAL E-WASTE MONITOR 2020

Electronics recycling is a growth industry as global demand for electronics continues to rise. According to a United Nations University study, the global generation of end-of-life electrical and electronic products will increase from 44.4 million tons in 2014 to 74.7 million tons by 2030.

Projected Growth in Global Generation of End-of-Life Electrical and Electronic Products (million tons)



Source: United Nations University.
Future projections do not take into account economic consequences of the COVID-19 crisis.

Electrical Vehicles and Advanced Battery Recycling

The rise in electric vehicle (EV) adoption has been historic, with 670,000 EVs sold in the first half of 2023, compared to 306,000 sold in the first half of 2021, according to Atlas Public Policy/Atlas EV Hub. By 2030, Edison Electric Institute forecasts this momentum to yield 5.6 million annual EV sales in the United States.

To power these vehicles, the U.S. Department of Energy (DOE) estimates that the global demand for lithium-ion batteries will grow by a factor of five to 10 over the next decade. Given this demand and the increasing prices of critical minerals powering these batteries, automakers are heavily investing in supplies of minerals and materials for their batteries to ensure that they are as cost-effective as possible.

To navigate rising critical mineral costs and accelerate their EV sales, automakers are making strategic decisions between different battery chemistries. In 2022, nickel-manganese-cobalt (NMC) had 60% market share globally, lithium-iron-phosphate (LFP) was at 30%, and nickel-cobalt-aluminum (NCA) was at 8%.

Other chemistries like sodium-ion (Na-ion) and solid-state batteries are still largely being tested, but offer potential cost advantages and reduced reliance on critical minerals.

MATERIALS RECYCLING & INTEGRATING CIRCULARITY

While automakers focus on battery circularity, efforts to enhance the sustainability of their vehicles are ongoing. Recent sustainability reports from automakers emphasize using recycled materials as an input to vehicle manufacturing, as well as second-use or recycling of vehicle components at end of life.

Regardless of whether they go onto second-life applications or not, all batteries eventually make their way to either a landfill or a recycling facility. Recycling batteries into components and minerals decreases the need for new raw materials to be mined, lowering the environmental, social, and potentially economic impact of the battery lifecycle.

The University of Technology Sydney estimated that more than 90% of minerals like cobalt, nickel, copper, and aluminum from lithium-ion batteries are recyclable. The U.S. DOE currently estimates recycling batteries is a net cost, however, with transport making up half of the total.

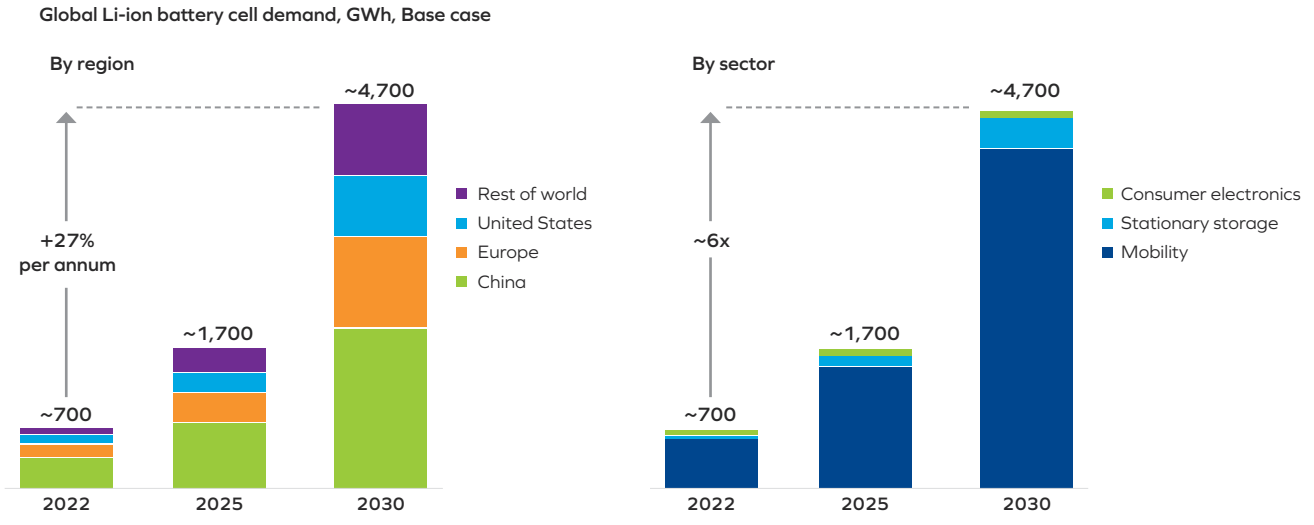
EV battery manufacturers across the nation are establishing battery recycling facilities and partnering in public-education efforts to promote recycling to reach circularity. The Environmental Protection Agency is working with the battery industry to establish best practices for labeling and recycling, aligning with the Department of Energy's goal of a 90% recycling rate for all consumer, EV, and grid-storage batteries by 2030. According to McKinsey & Company, the global Li-ion battery value chain will provide revenue opportunities of more than $400 billion by 2030, including $13 billion of reuse and recycling opportunities.

According to the U.S. Department of Energy's Office of Manufacturing and Energy Supply Chains (MESC), $15 billion of conditional grants and awards have been announced since 2021 that are designed to promote sustainable advancy battery production and recycling in the United States. Additional funding opportunities and tax credits identified by MESC include:

MESC-10	MESC-20	MESC-30
Facility and Workforce Assistance	**Battery and Critical Materials**	**Energy Sector Industrial Base**
FY23 Industrial Assessment Centers $15M	**BIL 40207 Battery Material Processing $3B**	BIL 40555 Rebate Program $20M
BIL 40523 IAC Expansions $150M	**BIL 40207 Battery Manf. $3B**	IRA 50142. Manufacturing Conversion Grants $2.0B
BIL 40521 IAC Imp. Grants $400M	BIL 40207(f3) Battery Recycling: State/ Local Programs $50M	DPA (IRA) $250M
BIL 40209 Manufacturing/ Recycling Grants in Energy Communities $750 M	BIL 40207(f4) Battery & Crit. Mineral Recycling: Retailer Collection $15M	**48C Tax Credits (IRA) $10B**
BIL 40534 State Manufacturing Leadership $50M	**BIL 40205 Rare Earth Demo $160M (with FECM)**	

Source: U.S. Department of Energy, Office of Manufacturing and Energy Supply Chains.

Li-ion Battery Demand is Expected to Grow by About 27 percent Annually to Reach Around 4,700 GWh by 2030.



GWh = Gigawatt hours

*Including passenger cars, commercial vehicles, two-to-three wheelers, off highway vehicles, and aviation.

Source: McKinsey Battery Insights Demand Model

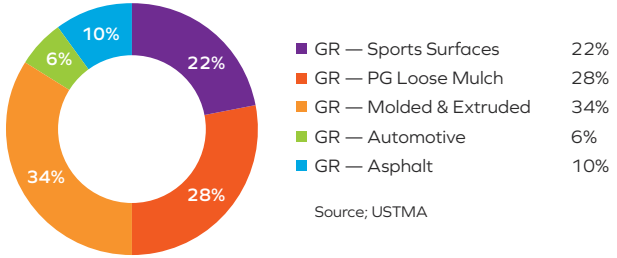
Tires and Rubber

Rubber from recycled tires is used to manufacture new tires, playground surfaces, rubberized asphalt, and a variety of other everyday products. Some manufacturers are combining recycled rubber with materials such as recycled plastics to produce benches, flower pots, roofing tiles, and auto parts.

Excluding the production of tire-derived fuels, 119 million tires (equal to nearly 2.2 million tons) were recycled in 2021, according to data from the U.S. Tire Manufacturers Association (USTMA).

In 2021, the largest usage of recycled tires was for the production of ground rubber, 77 million tires or more than 1.4 million tons, according to USTMA estimates. Recycled ground rubber was in turn used to produce everything from molded and extruded products (34%) to loose mulch (28%), sports surfaces (22%), asphalt (10%), and automotive products (6%). The use of recycled rubber in molded products reduces greenhouse gas emissions anywhere from 25% to 80% compared to the use of primary resins.

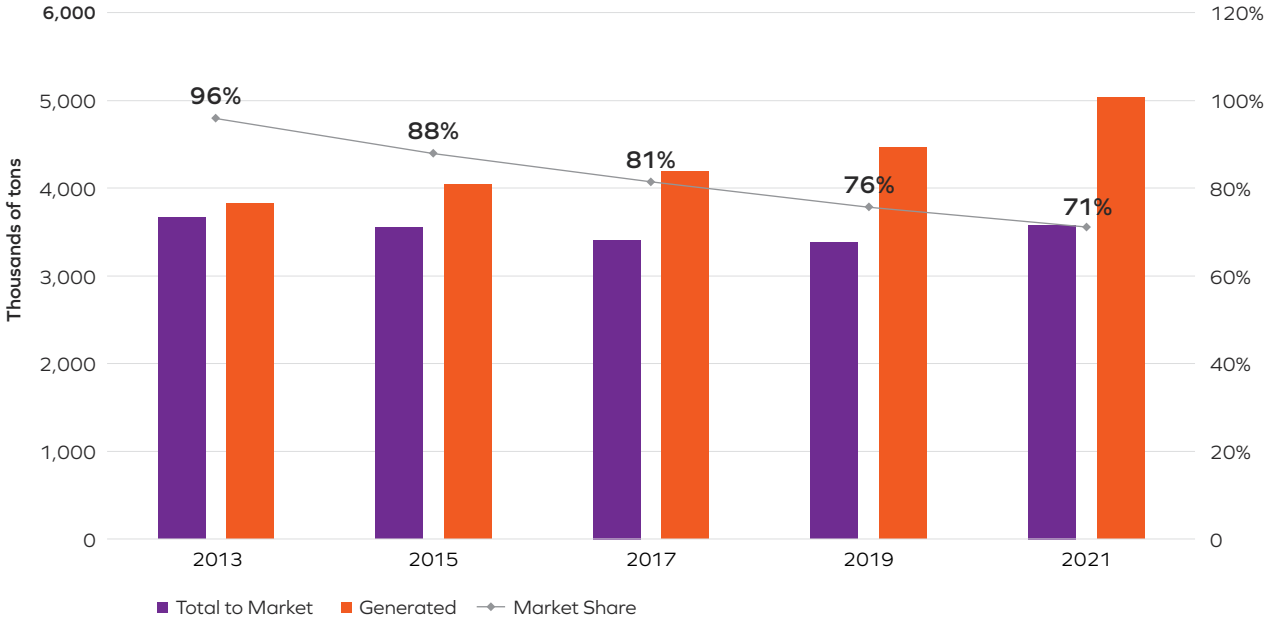
U.S. Ground Rubber Markets in 2021



Source; USTMA

Tires are highly engineered composite products that are virtually indestructible. Today's tire recyclers have two approaches for tire processing: **Ambient shredding** uses powerful interlocking knives to cut tires into pieces at room temperature. **Cryogenic processing** uses liquid nitrogen to change the physical properties of the tires, making them brittle. Powerful hammer-style shredders then smash the tire into small pieces. Grinders and granulators can reduce the material to a fine powder.

U.S. Recycled Tire Market Trends, 2013–2021



Source: USTMA

Glass

Glass manufacturers are requiring higher-quality recycled glass to meet market demand for new glass containers. Glass can be recycled again and again with no loss in quality or purity.

Every ton of glass recycled saves large quantities of raw materials — 1,300 lbs. of sand, 410 lbs. of soda ash, 310 lbs. of limestone, and 160 lbs. of feldspar — as well as saving energy, reducing emissions, and extending the life of glass-manufacturing equipment.

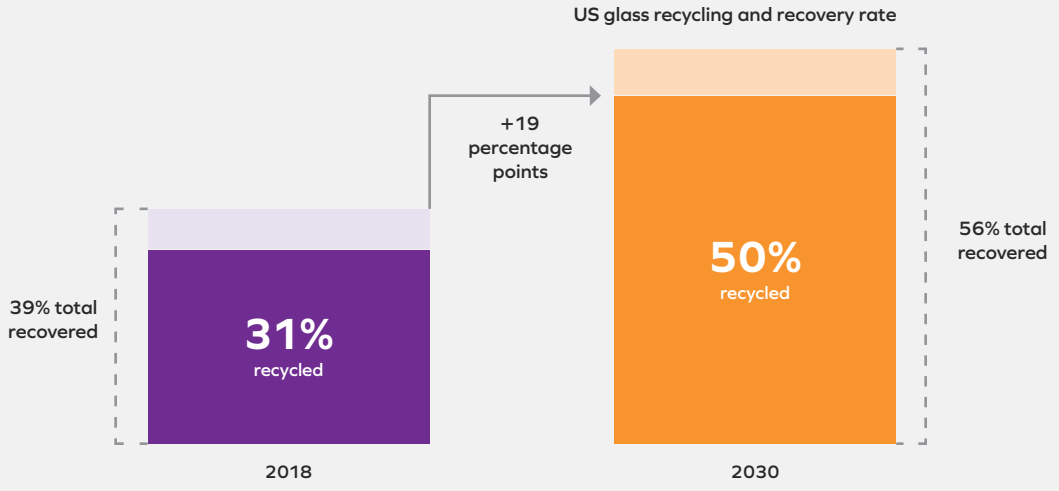
Furnace-ready recycled glass is called cullet. Color-sorted, contaminant-free recycled glass helps ensure that these materials are recycled into new glass containers. Drop-off and commercial collection programs help ensure that recycling programs yield high-quality container glass.

In 2023, **more than 2,000 tons** of lightweight, recycled glass were used to fill in a collapsed section of I-95 in Philadelphia that was destroyed by a gas truck fire.

ACCORDING TO THE GLASS PACKAGING INSTITUTE

- Glass containers for food and beverages are 100% recyclable (but not with other types of glass).
- Color sorting makes a difference. Glass manufacturers are limited in the amount of mixed color-cullet (called "3 mix") they can use to manufacture new containers. Separating recycled container glass by color allows the industry to ensure that new bottles match the color standards required by glass container customers.
- While the curbside collection of glass recyclables can generate high participation and large amounts of recyclables, drop-off and commercial collection programs tend to yield higher quality recovered container glass.
- The container and fiberglass industries collectively purchase 3.35 million tons of recycled glass annually, which is remelted and repurposed for use in the production of new containers and fiberglass products.
- The U.S. glass container industry is targeting a 50% glass recycling rate by 2030.
- Recycling 1,000 tons of glass creates slightly over eight jobs.

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. The sources of these recycled materials range from apparel and home furnishing manufacturers to textile mills and household consumers.

About 45% of recycled textiles are sold as secondhand clothing, which typically is exported to developing countries, providing jobs for both exporting and importing countries. Another 30% gets turned into wiping and polishing cloth. And 20% becomes fiber used as raw materials for the automotive, furniture, mattress, home furnishings, paper, and other industries.

According to Secondary Materials and Recycled Textiles (SMART), the benefits of textile recycling include:

- Reducing the need to create more landfill space.
- Reducing pollution created by incinerators.
- Providing low-cost clothing to low-income households all over the world.
- Saving the environment from tons of harsh chemicals, waste products and waste water used in the manufacturing of clothing.

According to SMART, clothing and household textiles currently make up 6.3% of the waste stream, or the equivalent of 81 pounds per person thrown away annually in the U.S. **Nearly 95% of used clothing and textiles can be reused and recycled.**

According to Martin Böschen, president of the Bureau of International Recycling's Textiles Division: "We are witnessing greater awareness among textile producers, brands and retailers of the need for recycling, resulting in an explosion of related initiatives." Given the rising share of polymers in textile production, fiber recycling initiatives are on the rise.

Statistical Appendices

Appendix A: Economic Impacts of Recycling at the State Level*

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

	Direct			Suppliers			Induced			Total		
	Jobs	Wages	Output	Jobs	Wages	Output	Jobs	Wages	Output	Jobs	Wages	Output
AL	3,736	$252,288,800	$1,192,402,200	4,128	$251,792,700	$890,181,300	4,204	$205,576,900	$664,852,600	12,068	$709,658,400	$2,747,436,100
AK	212	$19,174,700	$54,178,000	154	$12,219,000	$60,120,300	211	$13,175,600	$46,395,200	577	$44,569,300	$160,693,500
AZ	2,500	$193,013,600	$625,697,000	2,163	$147,946,100	$558,098,300	2,929	$160,860,700	$523,803,700	7,592	$501,820,400	$1,707,599,000
AR	1,638	$87,225,000	$413,492,400	1,490	$72,580,500	$329,792,900	1,511	$57,086,800	$265,596,100	4,639	$216,892,300	$1,008,881,400
CA	16,684	$1,381,572,600	$4,748,571,900	15,069	$1,227,926,800	$3,521,983,700	19,676	$1,293,131,900	$3,955,296,200	51,429	$3,902,631,300	$12,225,851,800
CO	1,410	$106,935,100	$335,496,800	1,298	$93,338,000	$299,385,000	1,770	$99,607,000	$350,617,300	4,478	$299,880,100	$985,499,100
CT	2,049	$173,850,500	$599,866,500	1,461	$126,687,300	$346,153,300	2,124	$147,568,300	$411,967,600	5,634	$448,106,100	$1,357,987,400
DE	222	$16,525,400	$51,343,000	173	$13,555,800	$53,908,800	258	$16,410,100	$67,172,200	653	$46,491,300	$172,424,000
DC	32	$1,803,000	$6,484,400	27	$2,704,900	$7,942,400	48	$4,727,300	$16,357,800	107	$9,235,200	$30,784,600
FL	7,229	$515,634,800	$2,078,457,100	7,960	$476,922,600	$1,505,023,800	9,734	$484,450,200	$1,644,997,100	24,923	$1,477,007,600	$5,228,478,000
GA	4,298	$245,360,400	$1,217,735,500	4,927	$303,166,300	$1,033,962,900	5,220	$251,886,900	$920,828,100	14,445	$800,413,600	$3,172,526,500
HI	664	$51,422,300	$159,032,700	423	$28,020,200	$84,678,100	632	$34,697,800	$115,021,500	1,719	$114,140,300	$358,732,300
ID	507	$48,703,500	$140,149,000	523	$32,982,600	$106,842,400	661	$36,115,300	$124,159,700	1,691	$117,801,400	$371,151,100
IL	9,385	$818,903,300	$2,578,380,000	7,314	$583,153,600	$1,729,397,600	11,049	$689,772,800	$2,069,094,300	27,748	$2,091,829,700	$6,376,871,900
IN	7,382	$522,218,200	$2,256,137,100	6,611	$456,061,700	$1,524,749,800	8,128	$442,358,000	$1,376,420,600	22,121	$1,420,637,900	$5,157,307,500
IA	1,894	$117,606,300	$507,154,100	1,574	$102,108,000	$362,417,900	1,990	$100,360,200	$379,728,600	5,458	$320,074,500	$1,249,300,600
KS	1,143	$73,197,800	$252,721,600	890	$56,293,500	$221,962,100	1,155	$58,343,000	$239,194,000	3,188	$187,834,300	$713,877,700

*Data is from 2021, the most recent available.

Economic and Job Impacts on a State-by-State Level (cont.)

	Direct			Suppliers			Induced			Total		
	Jobs	Wages	Output	Jobs	Wages	Output	Jobs	Wages	Output	Jobs	Wages	Output
KY	2,351	$164,720,100	$841,674,300	2,949	$192,718,800	$674,447,300	3,088	$161,149,000	$518,597,700	8,388	$518,587,900	$2,034,719,300
LA	1,566	$109,750,800	$397,351,800	1,503	$100,655,200	$552,066,300	1,704	$85,469,900	$365,643,900	4,773	$295,875,900	$1,315,062,000
ME	569	$33,589,300	$119,177,100	562	$29,181,900	$100,551,100	594	$28,005,900	$97,388,400	1,725	$90,777,100	$317,116,600
MD	1,778	$130,809,500	$426,364,200	1,295	$97,962,200	$274,373,800	1,828	$111,923,700	$360,659,300	4,901	$340,695,400	$1,061,397,300
MA	3,684	$317,748,000	$931,953,900	2,448	$209,256,900	$551,895,900	3,962	$277,311,400	$760,409,800	10,094	$804,316,300	$2,244,259,600
MI	4,778	$366,314,500	$1,309,359,500	4,770	$340,003,700	$1,081,761,900	5,910	$327,187,500	$1,033,885,300	15,458	$1,033,505,700	$3,425,006,700
MN	3,365	$266,104,600	$940,588,100	2,980	$225,303,700	$672,300,000	4,268	$250,675,200	$771,143,600	10,613	$742,083,500	$2,384,031,700
MS	911	$58,868,200	$284,330,000	1,028	$56,024,900	$227,314,000	1,011	$47,597,400	$183,348,800	2,950	$162,490,500	$694,992,800
MO	2,878	$193,840,300	$778,496,300	2,663	$173,648,000	$572,049,600	3,374	$172,881,800	$580,083,900	8,915	$540,370,100	$1,930,629,800
MT	337	$20,462,100	$71,980,900	344	$21,402,500	$95,409,900	353	$15,274,800	$63,243,000	1,034	$57,139,400	$230,633,800
NE	775	$46,687,700	$177,306,400	618	$38,426,500	$139,213,400	825	$42,845,600	$178,662,900	2,218	$127,959,800	$495,182,700
NV	743	$62,672,300	$190,615,400	677	$48,249,000	$177,397,700	810	$43,068,300	$154,406,400	2,230	$153,989,600	$522,419,500
NH	809	$68,458,200	$213,176,100	601	$43,628,600	$125,610,700	848	$51,697,600	$153,123,400	2,258	$163,784,400	$491,910,200
NJ	5,143	$446,557,100	$1,653,631,900	4,035	$338,579,700	$911,865,600	5,853	$381,797,400	$1,101,083,000	15,031	$1,166,934,200	$3,666,580,500
NM	484	$39,283,500	$121,299,800	349	$21,490,400	$97,931,600	511	$25,598,000	$97,523,700	1,344	$86,371,900	$316,755,100
NY	7,024	$557,372,200	$1,857,707,900	5,212	$468,927,500	$1,252,837,500	7,455	$570,520,200	$1,592,505,700	19,691	$1,596,819,900	$4,703,051,100
NC	4,547	$310,817,700	$1,234,537,400	4,846	$303,932,900	$996,028,100	5,424	$285,151,500	$979,437,000	14,817	$899,902,100	$3,210,002,500
ND	283	$20,123,700	$72,211,800	213	$13,800,000	$55,538,500	305	$15,086,800	$61,614,000	801	$49,010,500	$189,364,300

Economic and Job Impacts on a State-by-State Level (cont.)

	Direct			Suppliers			Induced			Total		
	Jobs	Wages	Output	Jobs	Wages	Output	Jobs	Wages	Output	Jobs	Wages	Output
OH	8,460	$652,284,200	$2,387,020,000	7,847	$551,532,300	$1,816,880,400	10,287	$557,365,000	$1,794,271,300	26,594	$1,761,181,500	$5,998,171,700
OK	1,171	$72,336,100	$292,222,000	1,078	$64,941,900	$262,887,200	1,230	$56,917,300	$227,192,000	3,479	$194,195,300	$782,301,200
OR	3,839	$279,882,100	$1,173,283,600	4,416	$295,124,100	$881,872,900	4,850	$249,478,800	$768,469,700	13,105	$824,485,000	$2,823,626,200
PA	7,176	$537,021,300	$1,835,434,800	5,904	$445,077,700	$1,378,014,700	8,187	$476,881,900	$1,461,122,800	21,267	$1,458,980,900	$4,674,572,300
RI	753	$53,347,800	$176,945,100	511	$33,928,500	$102,201,500	724	$39,284,000	$122,647,900	1,988	$126,560,300	$401,794,500
SC	2,742	$238,426,700	$721,399,400	2,486	$166,138,600	$552,237,700	3,077	$169,933,700	$517,944,700	8,305	$574,499,000	$1,791,581,800
SD	452	$23,035,800	$129,172,300	350	$20,652,500	$76,937,000	451	$20,614,800	$82,915,100	1,253	$64,303,100	$289,024,400
TN	4,757	$372,319,200	$1,468,529,800	4,560	$323,432,900	$1,011,468,300	5,511	$329,623,000	$953,369,000	14,828	$1,025,375,100	$3,433,367,100
TX	12,050	$949,102,800	$3,470,320,800	12,113	$878,985,500	$3,358,399,000	15,476	$862,606,000	$2,945,188,100	39,639	$2,690,694,300	$9,773,907,900
UT	1,299	$89,788,900	$334,128,500	1,237	$76,028,400	$297,253,600	1,518	$74,222,600	$276,119,600	4,054	$240,039,900	$907,501,700
VT	233	$13,357,900	$50,703,700	206	$10,512,400	$37,952,400	231	$10,973,300	$42,170,100	670	$34,843,600	$130,826,200
VA	2,478	$167,014,600	$680,469,900	2,176	$145,870,400	$472,984,200	2,698	$139,254,200	$511,195,600	7,352	$452,139,200	$1,664,649,700
WA	5,386	$570,417,100	$2,707,098,500	9,762	$761,465,100	$2,238,172,400	9,863	$594,491,400	$1,706,724,500	25,011	$1,926,373,600	$6,651,995,400
WV	659	$42,291,100	$169,089,700	681	$41,996,700	$179,187,300	692	$31,870,600	$118,710,300	2,032	$116,158,400	$466,987,300
WI	4,905	$416,848,800	$1,874,027,000	7,171	$471,623,000	$1,432,359,300	8,053	$431,992,100	$1,294,263,800	20,129	$1,320,463,900	$4,600,650,100
WY	270	$17,723,500	$77,217,800	207	$13,229,900	$60,440,400	245	$11,358,700	$48,387,600	722	$42,312,100	$186,045,800
TOT	159,640	$12,334,813,000	$46,386,125,000	153,983	$11,011,191,900	$35,354,441,800	192,516	$11,046,238,200	$35,094,954,500	506,139	$34,392,243,100	$116,835,521,300

Source: ReMA and John Dunham & Associates, Economic Impacts of the U.S. Recycling Industry, 2021.

Appendix B: Historical Producer Price Indexes for Recycled Materials (Jan 1998 = 100)

	Recycled Plastic	Recycled Ferrous	Recycled Nonferrous	Recycled Paper
Jan-17	73.0	213.5	211.3	220.0
Feb-17	73.8	210.7	218.7	237.6
Mar-17	75.4	226.5	218.5	267.0
Apr-17	76.6	214.6	223.0	250.2
May-17	78.1	212.6	222.5	227.5
Jun-17	78.7	210.0	223.3	241.7
Jul-17	79.7	211.2	222.7	256.4
Aug-17	77.0	222.0	230.8	255.0
Sep-17	77.2	226.7	238.9	237.7
Oct-17	76.0	215.7	238.7	175.6
Nov-17	76.4	210.4	244.3	172.5
Dec-17	76.2	222.1	243.1	189.5
Jan-18	77.1	244.3	252.5	185.5

	Recycled Plastic	Recycled Ferrous	Recycled Nonferrous	Recycled Paper
Feb-18	78.3	250.1	247.0	170.0
Mar-18	75.3	261.6	252.8	155.2
Apr-18	77.5	274.7	251.4	146.1
May-18	79.1	270.5	252.3	140.9
Jun-18	82.0	267.4	258.7	140.8
Jul-18	81.5	262.6	248.7	147.5
Aug-18	82.6	249.1	228.8	152.4
Sep-18	82.1	238.5	225.4	153.4
Oct-18	80.0	241.9	226.8	153.9
Nov-18	75.6	250.9	225.4	154.1
Dec-18	78.1	251.2	234.1	154.0
Jan-19	79.2	231.8	234.6	148.8
Feb-19	80.3	227.8	242.2	134.2

	Recycled Plastic	Recycled Ferrous	Recycled Nonferrous	Recycled Paper
Mar-19	79.4	240.7	255.3	123.0
Apr-19	81.1	231.1	247.5	105.7
May-19	80.4	215.9	234.5	94.8
Jun-19	80.6	194.3	229.7	81.4
Jul-19	79.2	186.0	236.3	81.3
Aug-19	78.7	200.0	228.8	83.7
Sep-19	81.8	177.7	230.5	81.7
Oct-19	75.5	156.2	233.6	80.0
Nov-19	78.4	165.9	229.8	77.8
Dec-19	73.3	185.7	241.9	76.3
Jan-20	73.5	208.8	257.4	79.4
Feb-20	72.8	193.7	260.8	84.4
Mar-20	74.9	196.3	263.1	99.6
Apr-20	71.7	172.2	249.1	152.8

	Recycled Plastic	Recycled Ferrous	Recycled Nonferrous	Recycled Paper
May-20	76.4	181.5	233.9	192.2
Jun-20	75.3	184.9	236.8	177.8
Jul-20	79.3	174.3	253.6	143.7
Aug-20	73.4	183.1	268.5	127.0
Sep-20	73.3	205.4	279.0	135.1
Oct-20	69.3	206.0	283.7	134.5
Nov-20	72.3	209.4	289.8	137.8
Dec-20	75.0	261.6	299.5	158.4
Jan-21	74.1	319.9	318.3	164.5
Feb-21	76.1	294.4	322.4	166.2
Mar-21	77.8	318.5	332.7	172.4
Apr-21	83.0	307.5	346.9	181.1
May-21	90.3	320.1	385.9	186.4

	Recycled Plastic	Recycled Ferrous	Recycled Nonferrous	Recycled Paper
Jun-21	97.3	352.7	383.4	220.1
Jul-21	94.3	359.4	385.0	248.9
Aug-21	96.1	353.2	380.9	282.4
Sep-21	102.7	337.3	353.2	296.0
Oct-21	102.7	335.7	356.1	316.5
Nov-21	104.1	365.8	355.4	303.3
Dec-21	104.6	358.9	338.0	281.1
Jan-22	104.2	334.5	356.0	262.8
Feb-22	105.9	334.3	383.7	261.5
Mar-22	103.7	418.6	415.5	270.1
Apr-22	112.2	418.5	413.1	279.8
May-22	114.1	368.1	372.4	263.5
Jun-22	114.7	329.9	350.4	264.5
Jul-22	114.6	286.7	316.7	273.5
Aug-22	114.3	263.7	333.1	243.3
Sep-22	106.5	255.4	327.0	179.2
Oct-22	97.7	246.8	312.9	122.0
Nov-22	92.5	238.6	317.8	92.9
Dec-22	92.0	250.9	325.4	103.6
Jan-23	93.4	277.7	325.9	99.1
Feb-23	92.7	294.3	317.6	106.9
Mar-23	90.6	323.0	310.7	106.4
Apr-23	93.2	315.8	312.8	112.9
May-23	98.8	299.2	316.8	117.3
Jun-23	91.8	269.5	307.6	121.2
Jul-23	92.2	261.3	299.0	120.7
Aug-23	88.1	264.3	300.1	123.5

Source: Bureau of Labor Statistics.

Appendix C: Recycled Material Trade Flows

U.S. Recycled Material Exports to Top 10 Countries in 2023
FAS Value ($)

Country	Year 2022	2022 YTD	2023 YTD	YTD % CHG
Canada	4,492,387,332	3,392,757,718	3,824,886,769	12.7%
India	2,929,983,944	2,067,163,722	1,841,885,284	-10.9%
China	2,412,388,406	1,859,534,255	1,737,969,439	-6.5%
Mexico	2,773,731,797	2,185,057,779	1,719,868,546	-21.3%
Malaysia	1,724,007,843	1,313,780,324	1,256,163,327	-4.4%
Turkey	1,489,808,671	1,248,258,686	1,139,392,268	-8.7%
Germany	2,339,517,752	1,871,823,072	968,201,156	-48.3%
Thailand	1,091,687,227	786,462,688	958,418,656	21.9%
South Korea	1,498,654,096	1,188,056,884	891,565,265	-25.0%
Italy	1,079,107,421	811,154,305	809,222,249	-0.2%
All Others	8,969,655,487	7,258,193,167	5,030,078,650	-30.7%
Total:	**30,800,929,976**	**23,982,242,600**	**20,177,651,609**	**-15.9%**

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

FERROUS

U.S. Exports of Recycled Iron and Steel (ex-stainless and alloy steel)
Metric tons

Country	Year 2020	Year 2021	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
Turkey	4,054,151	3,430,790	3,414,553	2,718,334	2,907,096	6.9%
Mexico	1,840,195	2,646,063	3,054,698	2,386,508	2,440,460	2.3%
Bangladesh	1,369,267	1,355,062	1,656,008	1,490,277	1,112,235	-25.4%
Taiwan	1,461,371	1,368,977	1,188,388	927,014	888,446	-4.2%
India	543,806	424,286	1,692,805	717,476	860,059	19.9%
Vietnam	984,401	1,438,632	857,900	690,326	781,163	13.2%
Canada	718,091	601,118	591,773	438,932	488,401	11.3%
Peru	292,012	494,160	661,121	472,177	398,410	-15.6%
Pakistan	701,837	695,191	525,149	395,229	300,125	-24.1%
Thailand	448,678	275,209	324,710	257,319	326,563	26.90%
South Korea	464,006	631,211	487,194	421,363	295,324	-29.9%
Italy	31,567	229,278	55,569	2,795	190,126	6702.4%
Ecuador	61,995	190,733	162,353	134,728	99,870	-25.9%
Greece	210,820	298,371	310,461	253,942	92,946	-63.4%
Malaysia	1,448,243	1,380,149	143,578	115,356	92,931	-19.4%
All Others	1,191,778	1,232,508	907,836	736,118	295,550	-59.9%
Total:	**15,822,218**	**16,691,738**	**16,034,096**	**12,125,516**	**11,530,703**	**-4.9%**

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

STAINLESS STEEL

U.S. Exports of Recycled Iron and Steel by Major Destination
Metric tons

Country	Year 2020	Year 2021	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
India	120,887	144,350	152,831	105,925	141,634	33.7%
Mexico	35,809	39,733	106,016	105,074	107,379	2.2%
Taiwan	60,141	23,062	28,785	9,834	53,967	448.8%
Canada	197,229	39,104	56,711	46,500	27,403	-41.1%
Italy	215	258	438	238	23,016	9595.8%
Netherlands	661	1,091	3,296	1,276	11,373	791.3%
Spain	554	343	571	570	6,329	1010.40%
Pakistan	20,448	17,582	16,245	13,920	5,467	-60.7%
Belgium	1,182	502	1,510	310	5,413	1646.1%
South Korea	5,797	6,754	6,196	5,506	4,590	-16.6%
Thailand	6,085	2,443	4,029	2,729	2,925	7.2%
Malaysia	5,714	7,557	2,397	2,175	2,531	16.4%
China	236	679	1,115	282	2,007	611.7%
All Others	1,9145	9,886	2,3284	2,1432	6,672	-68.9%
Total:	**474,103**	**293,344**	**403,424**	**315,771**	**400,766**	**26.9%**

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

ALUMINUM

U.S. Recycled Aluminum Exports (including UBCs and RSI)
Metric tons

Country	Year 2020	Year 2021	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
India	307,607	441,650	460,086	356,890	361,961	1.4%
Malaysia	416,982	518,931	391,376	291,286	269,399	-7.5%
South Korea	286,182	283,472	294,998	217,233	209,811	-3.4%
Thailand	73,210	74,998	115,501	76,670	162,002	111.3%
Mexico	151,912	167,400	194,922	153,585	131,286	-14.5%
Hong Kong	69,016	200,109	133,474	107,619	124,964	16.1%
Canada	72,255	99,777	122,901	90,779	92,270	1.6%
China	154,469	18,288	17,565	12,963	41,448	219.7%
Taiwan	42,879	34,667	42,144	28,317	36,253	28.0%
Indonesia	97,196	71,016	60,934	49,046	29,908	-39.0%
Japan	19,840	29,477	29,370	20,048	26,449	31.9%
Vietnam	17,185	11,934	13,917	10,258	16,243	58.3%
All Others	114,992	121,809	91,653	97,183	69,111	-28.9%
Total:	**1,842,644**	**2,094,934**	**1,998,333**	**1,511,875**	**1,571,105**	**3.9%**

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

COPPER

U.S. Exports of Recycled Copper and Copper Alloys
Metric tons

Country	Year 2020	Year 2021	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
China	116,581	237,891	291,516	217,420	226,904	4.4%
Canada	83,978	114,968	107,086	81,854	74,036	-9.6%
India	44,359	52,390	85,600	64,769	54,246	-17.20%
Malaysia	175,949	152,043	66,426	49,888	52,087	4.4%
Thailand	25,723	45,663	63,416	48,469	48,458	0.0%
South Korea	64,166	64,301	53,529	42,559	30,006	-29.5%
Belgium	32,088	29,219	42,097	32,345	25,661	-20.7%
Germany	38,387	34,369	30,728	24,134	23,485	-2.7%
Japan	30,154	27,310	32,411	24,887	19,824	-20.3%
Hong Kong	15,562	30,666	20,518	16,825	14,447	-14.1%
Pakistan	15,164	24,875	27,332	21,990	12,926	-41.2%
Poland	11,565	13,628	16,777	12,229	11,985	-2.0%
Taiwan	33,409	20,120	17,566	14,584	9,179	-37.1%
UAE	4,192	5,088	6,557	4,844	6,725	38.8%
All Others	84,355	63,895	64,845	49,780	31,926	-35.9%
Total:	**775,631**	**916,426**	**926,401**	**706,577**	**641,893**	**-9.2%**

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

PAPER AND FIBER

U.S. Recycled Paper Exports, Top 10 Countries
Metric tons*

Country	Year 2020	Year 2021	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
India	2,088,408	3,833,796	3,578,487	2,646,534	1,930,201	-27.1%
Thailand	584,225	1,793,189	1,962,373	1,337,901	1,684,051	25.9%
Mexico	1,360,629	2,249,094	2,311,279	1,762,568	1,385,413	-21.4%
Vietnam	1,291,862	1,951,381	1,803,282	1,407,475	1,116,374	-20.7%
Malaysia	371,297	814,355	1,165,234	815,951	809,949	-0.7%
Taiwan	867,381	1,085,600	880,847	699,029	600,608	-14.1%
Canada	867,684	949,082	842,106	634,441	524,164	-17.4%
South Korea	848,074	810,092	768,817	559,537	508,704	-9.1%
China	4,798,400	842,321	738,814	581,803	501,602	-13.8%
Indonesia	471,288	524,739	505,474	412,070	337,458	-18.1%
Top Ten Countries	13,549,248	14,853,649	14,556,713	10,857,309	9,398,524	-13.4%
Rest of World	1,251,438	1,811,335	1,450,951	1,162,751	517,688	-55.5%
Total:	**14,800,686**	**16,664,984**	**16,007,664**	**12,020,060**	**9,916,212**	**-17.5%**

*Paper pulp fiber measured in component tons

Sources: U.S. International Trade Commission; ReMA.

PLASTICS

U.S. Recycled Plastic Exports, Top 10 Countries
Metric tons

Country	Year 2020	Year 2021	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
Canada	163,719	171,426	148,082	115,172	119,416	3.7%
Mexico	62,345	83,371	84,552	62,222	56,551	-9.1%
India	20,106	42,219	44,069	32,577	37,624	15.5%
Malaysia	119,124	81,547	35,238	28,114	22,202	-21.0%
Vietnam	52,179	36,017	14,277	10,967	14,859	35.5%
Indonesia	21,564	27,486	20,470	15,278	13,555	-11.3%
Spain	4,355	5,643	6,281	5,375	7,903	47.0%
Germany	9,592	7,995	12,349	11,099	6,561	-40.9%
Pakistan	4,809	4,588	6,407	5,395	4,677	-13.3%
Turkey	17,842	13,556	10,667	9,175	4,540	-50.5%
Top ten countries	475,634	473,850	382,394	295,375	287,887	-2.5%
Rest of World	150,147	82,070	53,928	42,866	29,165	-32.0%
Total:	**625,782**	**555,920**	**436,322**	**338,241**	**317,052**	**-6.3%**

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

ELECTRONICS

U.S. Recycled Electrical and Electronics Exports
FAS Value ($)

Country	Year 2022	Jan-Sept 2022	Jan-Sept 2023	YTD % CHG
Mexico	$383,691,369	$290,963,081	$278,219,674	-4%
Canada	$102,634,030	$77,667,939	$102,628,595	32%
South Korea	$117,771,939	$92,067,608	$74,534,864	-19%
Japan	$52,454,786	$37,315,500	$61,366,560	64%
India	$3,333,796	$1,529,031	$16,513,341	980%
Spain	$42,319	$3,545	$8,389,262	236551%
China	$5,043,803	$2,977,973	$8,380,204	181%
Philippines	$916,693	$156,173	$3,759,139	2307%
Israel	$380,310	$177,296	$3,398,046	1817%
United Arab Em	$884,311	$45,249	$2,924,720	6364%
Belgium	$6,111,081	$5,010,847	$2,261,033	-55%
Malaysia	$1,533,557	$909,208	$2,089,837	130%
All Others	$9,301,269	$6,217,945	$7,519,803	21%
Total:	**$684,099,263**	**$515,041,395**	**$571,985,078**	**11%**

Recycled Materials Association

Sustainable. Resilient. Essential.

1250 H Street, NW · Suite 400
Washington, DC 20005

recycledmaterials.org

Printed on Recycled Paper