THE ISRI SCRAP YEARBOOK 2016

ISRI
Voice of the Recycling Industry™

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Executive Summary

The ISRI Scrap Yearbook 2016 is designed to not only provide the most up-to-date information and statistics about the U.S. scrap industry and global scrap marketplace, but also aims to provide readers with a clearer understanding of what the scrap industry actually is and how it works, along with the tremendous economic, environmental, energy, and trade benefits the industry generates globally.

Despite the continued macroeconomic and industry-specific challenges faced in 2015, 190 million tons of scrap valued at more than $80 billion were exported globally, according to data from the United Nations Comtrade database. U.S. scrap recyclers processed more than 130 million tons of scrap metal, paper, plastics, electronics, textiles, glass, and rubber last year, creating significant energy savings, reducing greenhouse gas emissions, saving natural resources, and limiting the amount of material that would otherwise be sent to landfills. In addition to these critical environmental benefits, the scrap recycling industry also provides much-needed support to the U.S. economy and trade balance.

The United States exported more than 37 million metric tons of scrap commodities valued at $17.5 billion to more than 150 countries around world. Here at home, independent research conducted by John Dunham & Associates confirmed that the scrap recycling industry directly and indirectly supported more than 470,000 well paying jobs while generating nearly $106 billion in economic activity and $11.2 billion in federal, state, and local tax revenue in 2015.

In addition to providing an introduction to ISRI and overview of the U.S. scrap industry, the ISRI Scrap Yearbook also describes what we mean when we're talking about scrap (hint: it's not waste), where scrap comes from, how it gets processed, and who uses it. In addition, the 2016 Yearbook contains updated and expanded information on nearly every aspect of the global industry. For more information about ISRI and the global scrap recycling industry, visit the ISRI website at ***ISRI.org***.

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Chapter I: Introduction to ISRI

About ISRI

As the Voice of the Recycling Industry™, ISRI represents approximately 1,300 member companies operating at nearly 4,000 locations in the United States and 34 countries worldwide. ISRI members process, broker, and consume the entire range of recycled commodities including ferrous and nonferrous metals, recovered paper and fiber, tires and rubber, plastics, glass, electronics, and textiles. ISRI members range in size from small family-owned firms to large multinational corporations.

ISRI's stated purpose includes: promoting the best interests of the recycling industry; fostering the trade and commerce of its members; promoting free and fair trade; and aiding the industry by seeking to eliminate abusive and disruptive business practices and unfair competition.

Headquartered in Washington, DC, ISRI promotes public awareness of the vital role recycling plays in the economy, global trade, the environment, and sustainable development. ISRI members benefit from a wide array of services including: safety and compliance training; networking and education; market research and reporting; regulatory and legal information; industry-specific publications; and industry representation. For more information, visit: ***ISRI.org***.

Mark Lewon
Chair
Utah Metal Works, Inc.

Robin K. Wiener
President
ISRI

ISRI History

ISRI was formed by the merger of two parent organizations in 1987: the National Association of Recycling Industries (NARI) and the Institute of Scrap Iron and Steel (ISIS) both of which traced their roots to the early 1900s. Key events in the history of ISRI and the scrap recycling industry include:

1913 The creation of the National Association of Waste Material Dealers (NAWMD)

1914 The first scrap specification published

1928 The creation of the Institute of Scrap Iron and Steel (ISIS)

1958 NAWMD's Waste Paper Institute becomes the Paper Stock Institute of America

1959 Creation of the National Association Supply Cooperative

1960 NAWMD becomes NASMI

1965 Creation of forerunner to the ISRI Recycling Research Foundation

1972 NASMI becomes NARI

1987 ISRI formed from the merger of NARI and ISIS

1995 First ISRI ISO Training

1999 Passage of Superfund Recycling Equity Act (SREA)

2001 Merger of National Association of Scrap Tire Processors

2002 Establishment of Electronics Recycling Council

2003 Development of Recycling Industry Operating Standards (RIOS™)

2006-08 Development of Responsible Recycling (R2) Practices for E-Recyclers

2008 Establishment of Plastics Council

2013 EPA authorizes plastics recycling from shredder aggregate

2014 ISRI establishes Circle of Safety Excellence™

2015 ISRI Forms Alliance with OSHA

ISRI Chapters

Paper Stock Industries

Scrap Tire Processors

The 19 regional and two national chapters of ISRI provide recyclers, scrap consumers, and recycling equipment and service providers with local news and with meetings and events designed to strengthen business locally. They hold regular meetings, dinners, golf outings, and other social events to bring members of the industry together in an environment in which they can learn and help one another while also having some fun. For many ISRI members, it is not an exaggeration to say that their closest and oldest business relationships began at the chapter level.

ISRI Awards

ISRI has an annual awards program that recognizes excellence in a number of areas, including: member contributions, product design, safety, and youth public awareness.

Lifetime Achievement Award

ISRI's Lifetime Achievement Award is presented each year in recognition of an individual's or individuals' life-long dedication and leadership in the recycling industry and commitment to ISRI.

The Design for Recycling® Award

ISRI's highest award is given annually to recognize the proactive steps made by a manufacturer who has incorporated Design for Recycling® principles into its products and manufacturing processes.

Transportation Safety Awards

These annual awards reflect the value and importance that the industry places on vehicle safety by recognizing the top performers in the field, both at the company and individual levels.

Youth Video and Poster Contest Awards

Co-presented with JASON Learning, ISRI presents these national awards for its annual video and poster contest featuring recycling-related themes to students in grades K-12.

Youth Video & Poster Contest

ISRI Institute of Scrap Recycling Industries, Inc.

JASON Learning

For more information about ISRI Awards, visit ISRI.org/awards.

Upcoming ISRI Events

2016

Commodities Roundtable Forum
Chicago, IL | September 19-21

Fall Board & Governance Meeting
Salt Lake City, UT | November 3-5

ISEC Fall Conference
St. Louis, MO | October 25-27

2017

ISRI Convention & Exposition
New Orleans, LA | April 22-27
www.ISRIconvention.org

4th Annual Safety Stand-Down Day | June 14

Summer Board and Governance Meeting
Washington, DC | July 16–19

Commodities Roundtable Forum
Chicago, IL | September 6-8

Fall Board and Governance Meeting
Washington, DC | October 15–18

2018

ISRI Convention & Exposition
Las Vegas, NV | April 14-19

Commodities Roundtable
Chicago, IL | September 5-7

2019

ISRI Convention & Exposition
Los Angeles, CA | April 6-11

Commodities Roundtable
Chicago, IL | September 11-13

2020

ISRI Convention & Exposition
Las Vegas, NV | April 25-30

Commodities Roundtable
Chicago, IL | September 16-18

2021

ISRI Convention & Exposition
San Diego, CA | April 17-22

Chapter II: How the Scrap Recycling Industry Works

Overview of the Scrap Recycling Industry

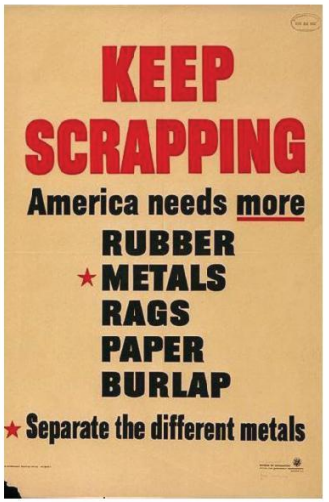
The use of scrap dates back to the beginning of human existence itself. Since the dawn of civilization and the earliest attempts at manufacturing, humans have recognized the intrinsic value of scrap and the benefits associated with using and re-using existing products to create new goods. The modern, capital-intensive, and global scrap industry we know today evolved from humble origins.

1921- Ohio Magnet lifting railroad car compon
Central Pacific Railroad (Denver, CO)...Ohio Magneti

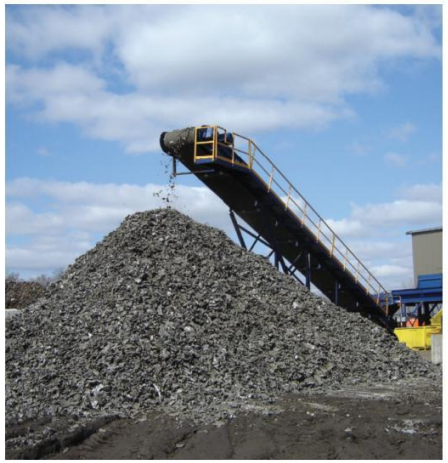
In the early days of recycling, scrap peddlers would typically buy and trade relatively small quantities of used household items, used farm equipment and other goods, and today's scrap processors and brokers have certainly retained that entrepreneurial spirit.

As manufacturing ramped up and became more complex in response to society's expanding needs, scrap recycling took on even greater importance, adapting not only to market drivers, but also shifting priorities in the context of our finite natural resources.

In the second half of the 20th century, the scrap recycling industry continued to grow, becoming more innovative, competitive, and capital-intensive. Today, the scrap recycling industry utilizes a wide range of capital equipment including high-tech shredders, shears and balers, as well as the optical scanners, X-rays, and air jets that are used to separate recycled materials. In the last several decades, the introduction of containerization and the surge in commodities demand from China and other developing economies helped to create an even more globalized scrap marketplace.



As a result, more than 800 million metric tons of scrap metal, recovered paper and fiber, plastic scrap, used electronics, and other scrap commodities are consumed globally each year. As the world's largest supplier of scrap, the United States processed more than 130 million metric tons of scrap commodities in 2015, providing vital raw materials to manufacturers and helping to fuel global growth.



Keep reading for more information about how the scrap industry works and has evolved in response to changing market dynamics. But first, let's review what we mean when we're talking about scrap.

Volume of Scrap Material Processed Annually in the U.S. *(metric tons)*

MATERIAL	2015
Iron and Steel	67,000,000
Paper	47,210,000
Aluminum	5,014,000
Copper	1,784,000
Lead	1,166,000
Zinc	120,000
Plastics (bottles)	634,000 (2014)
Electronics	+5,000,000 (est.)
Tires (# of tires)	122,000,000

What is Scrap and Where Does it Come From?

What's important to remember is that, unlike waste, scrap is a commodity, processed into tradable and highly valued specification-grade products that manufacturers use as raw material inputs to make new products. There are two major sources of scrap supply. **Obsolete scrap** comes from a wide range of used products including end-of-life cars and trucks, old newspapers and magazines, used appliances, demolished buildings, used beverage containers, consumer goods, and much more.

In addition, scrap generated by the manufacturing process, also known as **prompt, prime, or new scrap**, comes in a variety of forms including metal clippings, stampings, and turnings, to name just a few. Because new products are continually entering the marketplace, scrap recyclers need to be extremely innovative in order to keep up with commodity and end-use market developments. Broadly speaking, scrap can be grouped into categories including: ferrous scrap, which includes items made from iron and steel like old automobiles and machinery; nonferrous scrap made of other metals such as aluminum, copper, lead, zinc, nickel, and tin; electronics scrap including used TVs, computers, cell phones, and other electronic equipment; and nonmetallic scrap such as recovered paper and fiber, plastics, rubber and tires, glass, and textiles.

How is Scrap Processed?

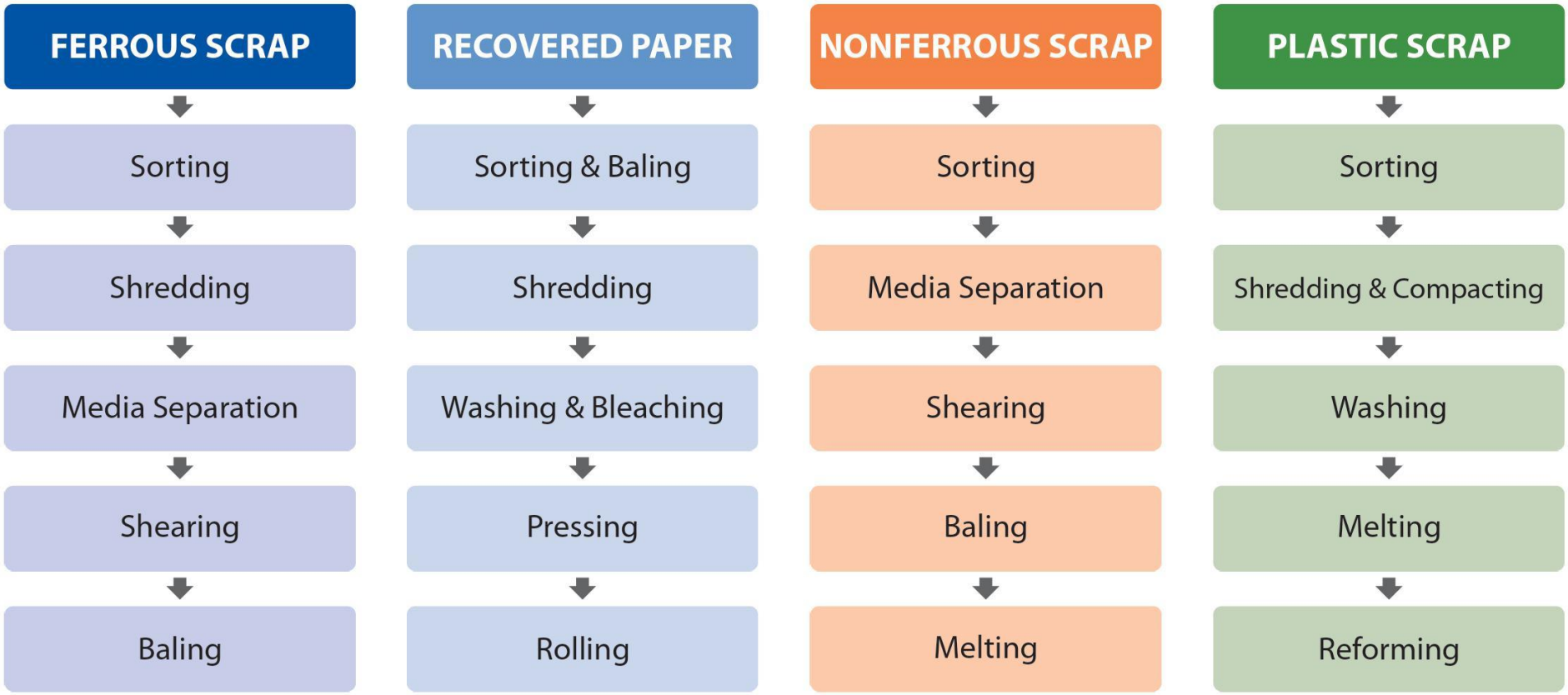
The scrapyard has been at the heart of the modern scrap industry and it's where most metal scrap goes for processing. While it has been said that no two scrapyards are exactly the same given the range of plant sizes, locations, layouts, equipment, and commodities processed, scrapyards do have some distinguishing characteristics. Unlike junkyards and other facilities in the recycling supply chain, scrapyards not only receive and handle recyclables, scrapyards also process scrap into commodity-grade material using a range of capital equipment.

Typically, deliveries at a scrapyard will be weighed on a scale upon arrival and will then be moved, sorted, and processed using equipment such as forklifts, trucks, and cranes for transport, as well as balers, shears, wire choppers, shredders, and other tools for processing. While scrapyards vary considerably in size and layout, key variables that affect a plant's efficiency include maintaining a smooth flow of traffic and minimizing the number of times that material is handled. While scrapyards have often been located near major manufacturing centers, scrap recycling facilities today are located all across the United States and throughout the world.

In addition to outdoor recycling plants, an increasing number of high-tech facilities with advanced sorting systems for processing plastics, electronics, recovered paper, and other commodities are located indoors.

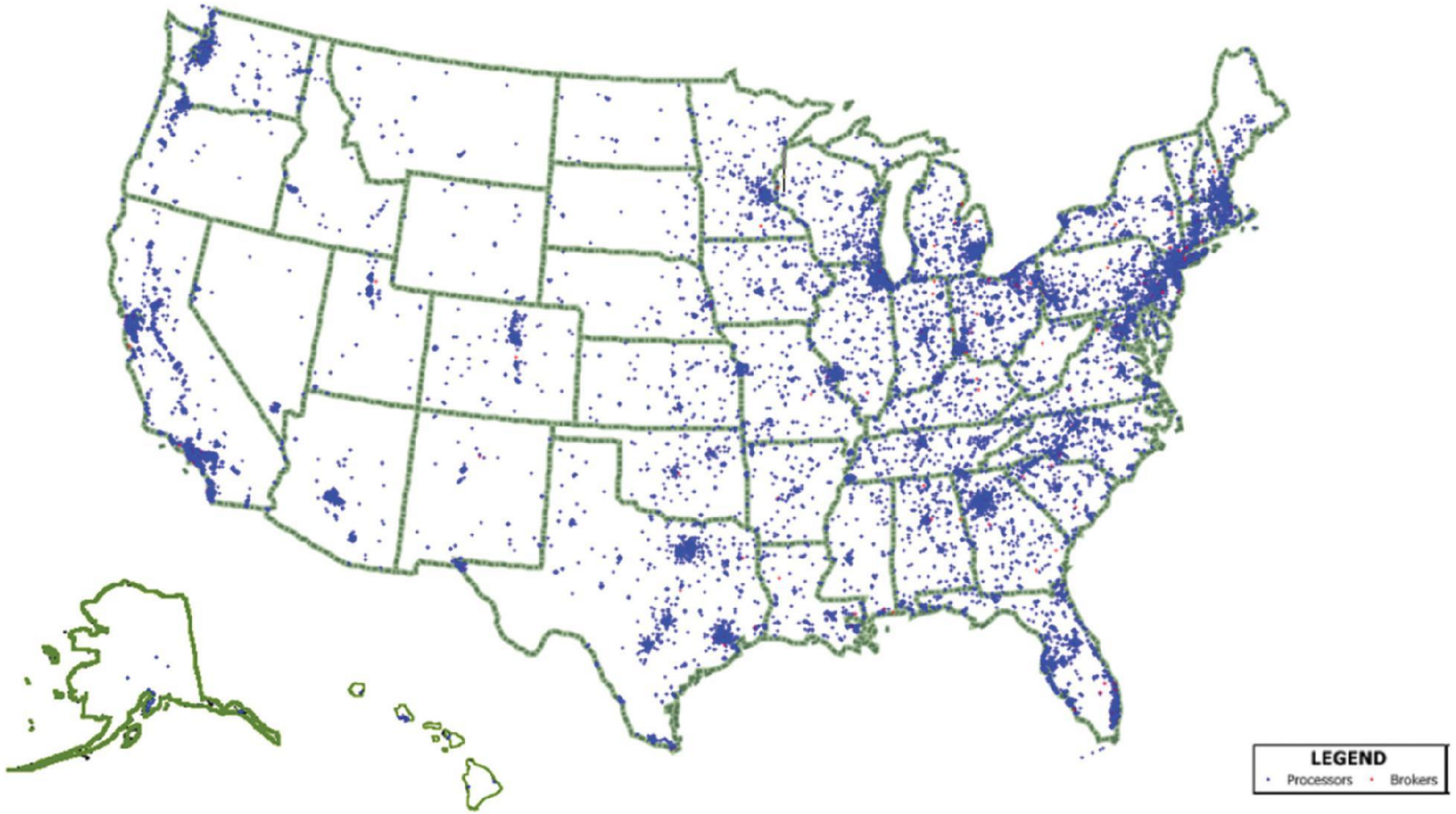
Stages of Scrap Processing

Although the process of transforming used materials into commodity-grade scrap can take a wide variety of routes depending on the commodities, equipment, and personnel involved, some typical steps include:



Where Are U.S. Scrap Recycling Facilities Located?

U.S. Census Bureau data show that there are more than 8,000 recycling facilities operating in the United States.



How Is Scrap Transported?

The three most common modes of domestic scrap transport are by truck, rail, and barge, in addition to intermodal shipments that use more than one mode. Each mode of shipments has its own costs and benefits.

While shipping via trucks can be a high per-unit cost option, trucks are a significant mode of domestic transport for scrap, especially for intra-regional scrap flows. Shipment by rail can be a less costly option per ton than trucking and railcars have a greater tonnage capacity than trucks, although during times of tight railcar availability this mode of transport can be less predictable. In the U.S., according to figures from the Association of American Railroads, more than 36 million tons of scrap and waste materials originated on Class I railroads in 2015.

Barges and domestic waterborne shipments are a third major mode of transport for scrap. While adverse weather conditions can significantly impact barge traffic, barges are often the lowest-cost option on a per unit basis.

The containerization of scrap shipments opened overseas markets to a much wider range of U.S. scrap processors, although a large portion of U.S. scrap exports are still shipped as bulk (unpackaged) cargo. In 2015, the U.S. exported more than 37 million metric tons of scrap around the world. According to data from the United Nations Comtrade database, 190 million tons of scrap valued at more than $80 billion were exported globally in 2015.

How Is Scrap Consumed?

Scrap dealers and brokers sell scrap commodities to a wide range of consumers at home and abroad such as paper mills, plastic manufacturing plants, steel mills, foundries, copper wire and brass mills, secondary aluminum smelters, and other customers.

Manufacturers prize scrap as a raw material input due in part to the cost and energy savings associated with using scrap. For example, domestic steelmakers rely on iron and steel scrap to make roughly two out of every three pounds of steel produced in the U.S. Producers of copper and copper alloy products are also heavily reliant on scrap. According to figures from the U.S. Geological Survey, the contained copper provided by old and new copper scrap accounted for nearly 47 percent of total U.S. apparent copper consumption in 2015. Metal scrap can practically be melted and re-melted an infinite number of times to make products and parts for everything from cell phones to automobiles, bridges, and buildings. Manufacturers also rely on scrap commodities to produce a wide array of nonmetallic goods including

new paper and cardboard products, plastic containers, playground surfaces, and much more. And while overseas markets have been a growing source of demand for U.S. scrap, it's worth remembering that most of the scrap that gets processed in the U.S. is also consumed domestically.

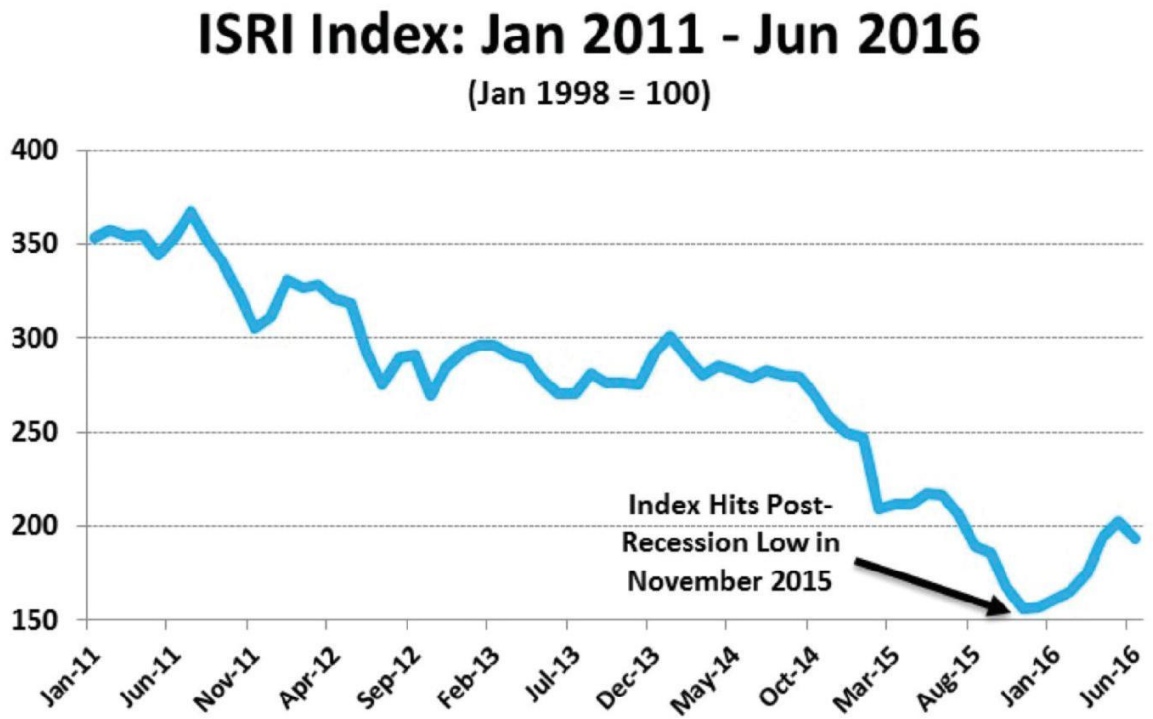
According to ISRI estimates, in 2015 over 70 percent of the more than 130 million metric tons of recovered paper, plastic, rubber, metal, glass, textiles, and other scrap commodities that were processed in the U.S. was consumed at home. As scrap recyclers strive to meet rising consumer demands and improve their operational, quality, environmental, health and safety, and management systems, the use of third-party certifications has been on the rise.

How Scrap Commodity Markets Work

Like primary commodities, scrap prices are subject to many of the same market forces and thus have been experiencing similar price volatility. And like other commodities, the market for scrap is increasingly global. Scrap has become a key feedstock utilized in manufacturing new products worldwide and supplies a significant amount of global raw material needs. As a world-traded commodity, scrap becomes less dependent on local supplies and markets every day.

Scrap material moves to where demand directs it regardless of its original location. But there is a critical difference between how primary commodity and scrap commodity prices are determined. Unlike primary commodities that can have large inventory swings, the scrap trade is also a volume business. Scrap recyclers do not buy scrap inherently expecting to hold it until prices increase. They buy scrap to meet their customers' monthly requirements.

Prices are based on a marketplace made up of consumers who use these recycled materials to manufacture steel, aluminum, copper, paper, electronics, glass, and rubber products, among others. Scrap processors purchase scrap from thousands of sources each day to keep up with expected consumer demand. After acquiring and then processing scrap into specification grade material, scrap processors deliver the material based on current market conditions dictated by the customer. Customers have orders to fill and thus buy scrap. Consequently scrap processors are viewed as the price taker, not the price setter, hence the phrase, "Scrap is bought, not sold."



The ISRI Index is a weighted index of ferrous scrap, copper scrap, aluminum scrap, and recovered paper and fiber prices. Scrap prices and supply are closely connected as prices provide the incentive to bring recycled materials to the marketplace. When the ISRI Index fell to the lowest level since the Great Recession in November 2015, supplies were constrained, placing a floor under the market and setting the stage for a price recovery in the first half of 2016. Given the cyclical nature of commodity markets and industrial production, it should come as no surprise that the scrap industry faces similar business cycles.

ISRI Specifications

ISRI's scrap specifications are internationally-recognized guidelines used by buyers and sellers of recycled materials and products including nonferrous and ferrous scrap, glass cullet, paper stock, plastic, electronics, and tire scrap.

Dating back to the early 1900s, ISRI specifications are intended to assist the trading of scrap commodities and are regularly reviewed and updated to reflect the expanding range of commercially recyclable materials. Recently approved additions to ISRI specifications have covered electronics scrap plastics, lead-free and leaded brass solids and turnings, and plastic automotive bumper covers.

ISRI specifications serve both as broad guidelines and as a starting point in discussions between scrap buyers and sellers in the U.S. and around the world. Parties to a transaction may specify particular variations or additions to these specifications as are suited for their specific transactions but any deviation from the standard specifications should be mutually agreed to and so stipulated in writing by the parties to the transaction.

The specifications are published in the ISRI Scrap Specifications Circular. For more information on ISRI's scrap specifications, including rules governing the procedures for the addition, amendment, or withdrawal of specifications, and a specification development flowchart, visit ***ISRI.org/Specs***.

National Association of Waste Material Dealers

STANDARD OF PACKING OF WOOLEN RAGS

Circular No. 1, adopted June 16, 1914

1. MIXED SOFT WOOLENS:
   This stock must be packed free from Linseys, Delaines, Cloth, Felt Boots and Unskirted and foreign material.
2. MIXED SKIRTED CLOTH:
   Produced by ripping rough cloth. This stock must be packed free from Satinets, Linseys and Felt Boots.
3. MIXED ROUGH CLOTH:
   This stock must be free from all Skeletons, Satinets, Linseys and Felt Boots.

Tare on the above grades must not exceed 5% on the net weight.

The Use Of Third-Party Certification

The recycling industry has seen a dramatic increase in the adoption of third-party certifications. The marketplace is pushing recyclers to become certified through programs like RIOS™ - The Recycling Industry Operating Standard (**www.rioscertification.org**) - to improve health and safety, ensure environmental compliance, meet customer demands, and secure a competitive advantage.

Set to launch a new version of the standard at the end of 2016, RIOS™ is a management system certification that is designed specifically for recyclers. The revised standard will integrate state-of-the-industry practices focused on Quality, Environmental, and Health and Safety, while also ensuring that RIOS™ is compatible with other standards. Similar to the original version of RIOS™, the updated system is designed to apply to recycling facilities that deal in any commodity.

RIOS™ will also a launch a new RIOS™ Implementation Guide, which is a tool that will allows a facility to implement their QEHS management system on their own, at their own pace. Additionally RIOS™ offers webinar and training videos to help a facility get through the process. Long before a facility is certified they will begin to see health and safety and environmental improvements, which for many facilities has meant real, measurable financial benefits.

Recyclers and refurbishers that handle electronics and are pursuing R2 certification can most effectively meet the Provision 1 requirement of that standard by becoming RIOS™-certified. Not only will that facility have the requisite certified EHS management system, but they will have a certified, recycling industry specific quality management system, all for lower cost than the other available options.

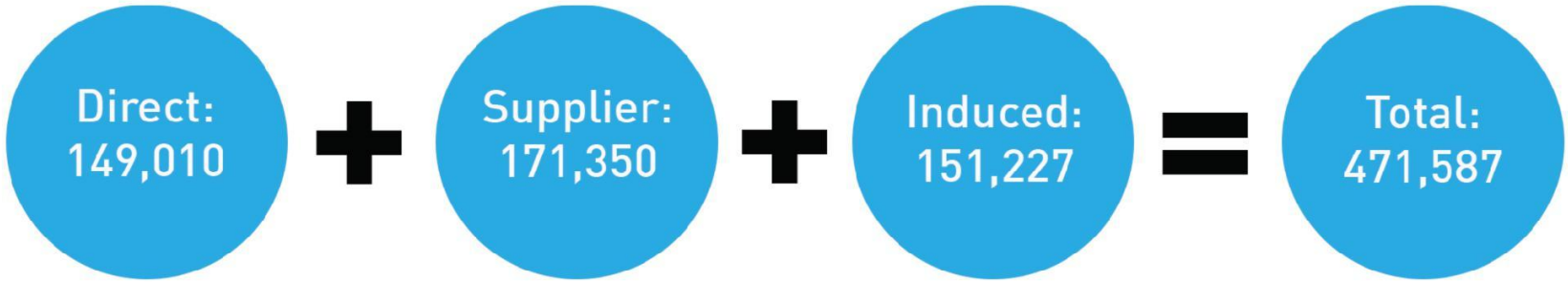
Chapter III: The Benefits of Scrap Recycling

Economic Benefits

Recognized as one of the world's first green industries, the scrap recycling industry creates and supports jobs while also having a positive impact on the environment. In 2015, the independent economic consulting firm of John Dunham and Associates performed an economic impact analysis to document the size and scope of the scrap recycling industry in the United States as well as its significant contribution to the U.S. economy in terms of employment, tax generation, and overall economic benefit.

The study found that the U.S. scrap recycling industry is a thriving economic engine and job creator. Specifically, the study found that the people and firms that purchase, process, and broker recycled materials to be manufactured into new products in America support 471,587 well-paying jobs in the United States and generate more than $105.8 billion annually in economic activity.

According to the Dunham study, U.S. scrap processors and brokers directly employed nearly 150,000 people in 2015 and indirectly supported nearly 323,000 jobs. These workers earned $30.8 billion in wages and benefits, while the industry paid $11.2 billion in direct federal, state, and local taxes, excluding state, and local sales taxes.



Environmental Benefits

In addition to generating significant economic benefits, the scrap recycling industry is a pivotal player in environmental protection, resource conservation, and sustainable development. The industry recycled more than 130 million metric tons of materials in 2015, transforming outdated or obsolete scrap into useful raw materials needed to produce a range of new products. In so doing, scrap recycling:

- Reduces the need to mine for new ore, cut down more trees, and otherwise deplete our natural resources;
- Produces significant energy savings as compared to using virgin materials, thereby reducing greenhouse gas emissions; and
- Reduces the amount of material being sent to landfills, saving the land for better uses.

While market forces provide the incentives to recycle and consume scrap material, scrap recycling offers real sustainable solutions for balancing economic growth and environmental stewardship.

Not only does recycling conserve our limited natural resources, it also reduces greenhouse gas emissions by significantly saving the amount of energy needed to manufacture the products that we buy, build, and use every day. The energy saved by recycling may then be used for other purposes, such as heating our homes and powering our automobiles.

Energy Savings

Recycling saves impressive amounts of energy which, in turn, reduces greenhouse gas emissions. According to figures from the U.S. EPA's Greenhouse Gas Equivalencies Calculator, the 130 million metric tons of commodities recycled in the U.S. last year saved the CO_2 equivalent of 410 million tons of greenhouse gas emissions, equal to the energy use of more than 43 million homes for one year.

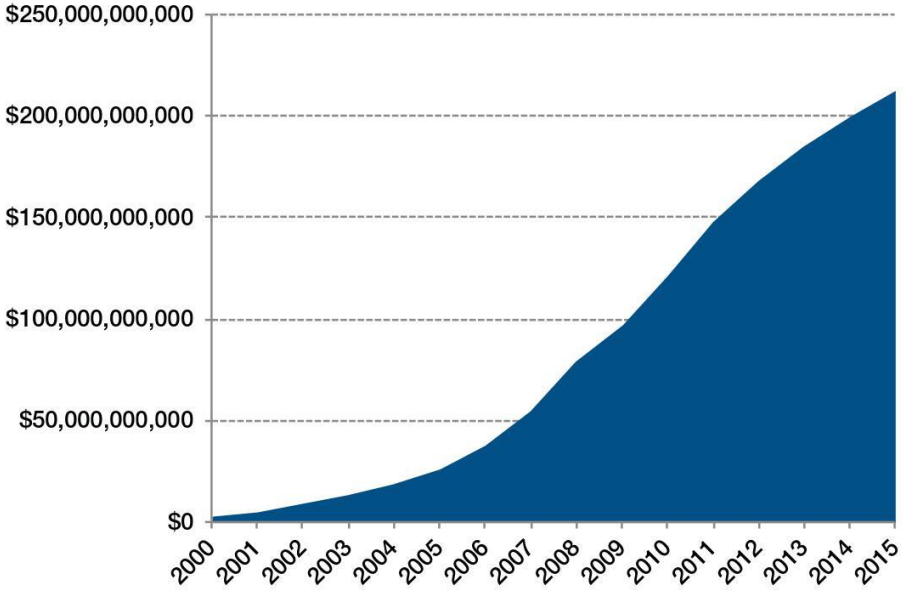
RECYCLING	REDUCES GREENHOUSE GAS EMISSIONS BY (CO_2 EQUIVALENT)	WHICH IS THE ENERGY EQUIVALENT OF
1 CAR	8,811 lbs.	450 gallons of gasoline
1 REFRIGERATOR	566 lbs.	29 gallons of gasoline
1 COMPUTER & CRT MONITOR	404 lbs.	21 gallons of gasoline
1 WASHING MACHINE	397 lbs.	20 gallons of gasoline
4 TIRES	323 lbs.	17 gallons of gasoline
1 TELEVISION	81 lbs.	4 gallons of gasoline
10 LBS. OF CORRUGATED	40 lbs.	2 gallons of gasoline
1 TON PET BOTTLES	3380 lbs.	173 gallons of gasoline

Source: Bureau of International Recycling, U.S. EPA Durable Goods Calculator, GHG, Equivalencies Calculator, WARM Calculator, Popular Mechanics

Scrap Exports And Our Trade Balance

Rising global demand for scrap is not only good for the environment, it also provides a useful outlet for our excess scrap supply. U.S. export sales of scrap also significantly benefit the U.S. trade balance. According to figures from the U.S. Census Bureau and U.S. International Trade Commission, the United States exported more than 37 million metric tons of scrap commodities valued at $17.5 billion in 2015. Recovered paper and ferrous scrap exports typically represent the bulk of U.S. scrap exports by volume, accounting for more than 31 million metric tons combined last year, while nonferrous and precious metal scrap have some of the highest per-unit scrap values. Major export destinations for U.S. scrap last year included China ($6 billion), Canada ($2 billion), South Korea ($1 billion), Turkey ($930 million), Mexico ($920 million) and India ($900 million). Did you know that since 2000, net exports of U.S. scrap have made a positive contribution to our balance of trade amounting to more than $210 billion?

Cumulative Impact of Net U.S. Scrap Exports on U.S. Trade Balance Since 2000 ($)



Source: US Census Bureau/US International Trade Commission

Chapter IV: Scrap Commodities

Iron and Steel

Iron and steel scrap, also referred to as ferrous scrap, comes from end of life products (old or obsolete scrap) as well as scrap generated from the manufacturing process (new, prime or prompt scrap). Obsolete ferrous scrap is recovered from automobiles, steel structures, household appliances, railroad tracks, ships, farm equipment, and other sources. The largest single source of obsolete ferrous scrap in the United States is used vehicle scrappage, which is closely related to new car sales. According to figures from the U.S. Bureau of Economic Analysis, light vehicle sales rose to more than 17.4 million units in 2015, the highest annual level on record and a very positive indicator for the future supply of obsolete ferrous scrap.

In addition to obsolete scrap, prompt scrap, which is generated from the manufacturing process, accounts for approximately half of the ferrous scrap supply.
Home or "runaround" scrap, which is also generated by manufacturing, is typically consumed at the same mill at which it is generated and therefore is not usually processed by the scrap recycling industry.

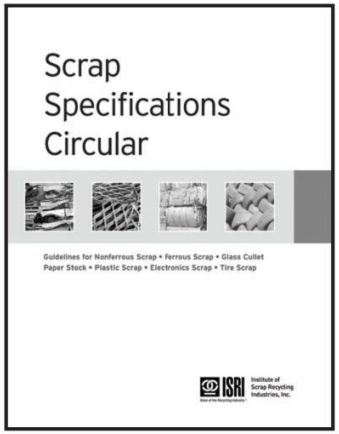
Today, ferrous scrap is the most recycled material in the United States and worldwide. In the U.S. alone, the U.S. Geological Survey estimates that 67 million metric tons of iron and steel scrap were purchased in 2015. While domestic ferrous scrap market participants have been facing heightened competition for available feedstock in recent years, expanding economic output in general and the recently improving conditions in the automotive and construction sectors in particular should bode well for future ferrous scrap supply and demand.

How Is Ferrous Scrap Prepared?

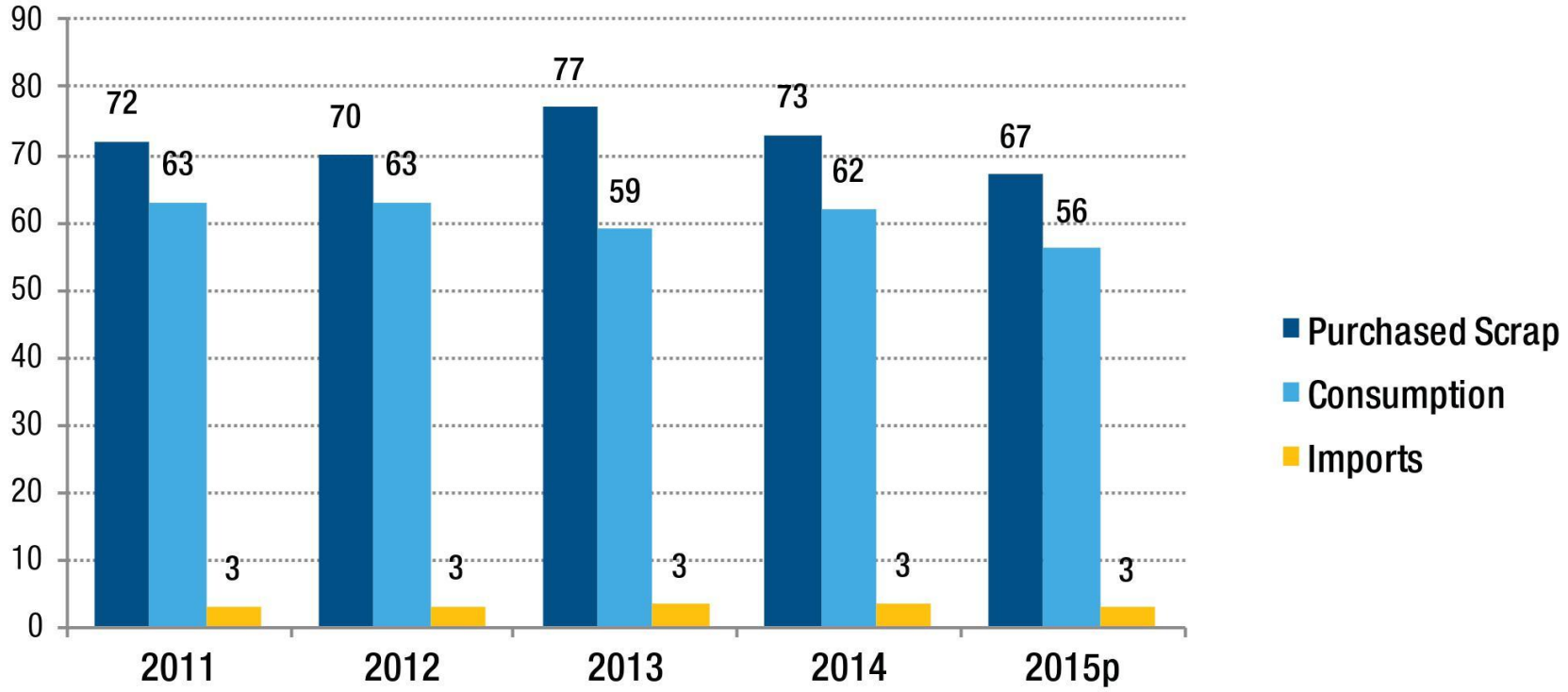
While a small proportion of unprepared obsolete ferrous scrap can be directly used by consumers, the vast majority of purchased iron and steel scrap is sorted and processed by the scrap recycling industry. As indicated earlier, scrapyards use a variety of processes including sorting, shearing, shredding, torching, and baling to sort and prepare ferrous scrap to commodity-grade specifications.

The process of shredding, which was developed in the late 1950s, allows for whole cars, appliances, and other end-of-life products to be quickly shredded into fist-size pieces of metal, greatly increasing scrap processors´ ability to handle large items and to separate nonferrous material. By 2014, more than 300 shredders were in operation in North America, up from just 120 shredders in the early 1970s as scrap recyclers made significant investments in capital equipment. Since then, more challenging market conditions have impacted the number of shredders in operation and shredder capacity utilization rates.

In addition to shredded, ferrous scrap can be grouped by prime scrap (including busheling, bundles, and clips), cut grades such and heavy melting steel, and foundry and miscellaneous grades such as machinery cast. To assist members with the buying and selling of their materials, ISRI has developed standard specifications for scrap commodities including more than 100 ferrous scrap specifications. ISRI´s "specs" are regularly updated and published in the *ISRI Scrap Specifications Circular*. See page 18 for more information, or visit ***ISRI.org/Specs.***



U.S. Ferrous Scrap Purchases, Consumption, and Imports*
2011 - 2015 (million mt)



Trade data exclude stainless steel and alloy steel scrap

Source: U.S. Geological Survey, U.S. Census Bureau, ISRI Estimates

Old Cars Can Become A New Bridge

The steel in cars can be recycled and used to build other things, like bridges.

Did you know:

- Recycling one car saves more than 2,500 lbs. of iron ore, 1,400 lbs. of coal, and 120 lbs. of limestone.
- Steel is the most recycled material in the United States. On average, the U. S. processes enough ferrous scrap daily, by weight, to build 25 Eiffel Towers every day of the year.
- Recycling steel requires 60% less energy than producing steel from iron ore.
- By using ferrous scrap rather than virgin materials in the production of iron and steel, Carbon Dioxide emissions are reduced by 58%.

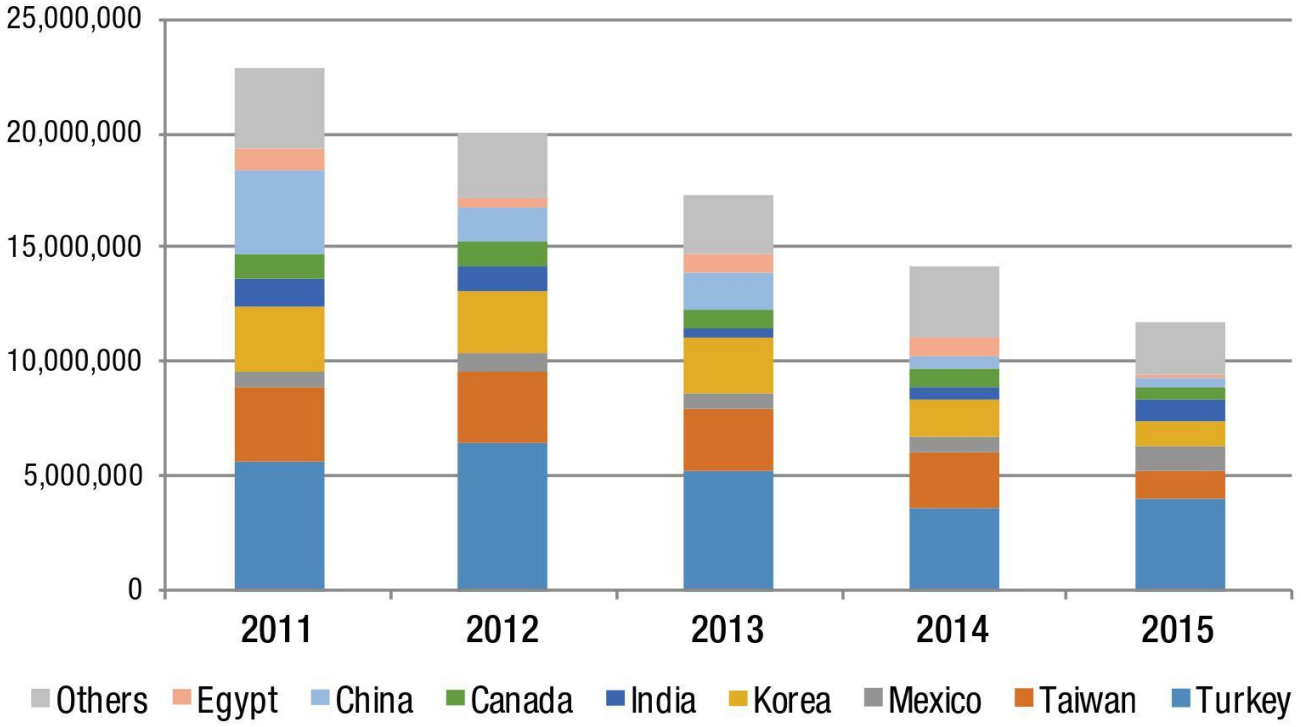
Source: JASON Learning/ISRI

U.S. Ferrous Scrap Exports

Thanks to our large industrial base and existing supply of obsolete scrap, the U.S. is the world's leading ferrous scrap exporting country. Key export markets for ferrous scrap in recent years have included Turkey, Taiwan, Mexico, South Korea, India, and Canada. In 2015, the U.S. exported 11.7 million metric tons of ferrous scrap (excluding stainless and alloy steel scrap) valued at $3.1 billion to nearly 75 countries worldwide. Slower global economic growth, diminished Chinese demand for ferrous scrap imports and falling commodity prices have all impacted U.S. ferrous scrap export volumes since 2011.

U.S Ferrous Scrap Exports by Major Destination, 2011 - 2015

metric tons



Source: U.S. Census Bureau/U.S. International Trade Commission

Nonferrous Metals

Nonferrous metals, including aluminum, copper, lead, nickel, tin, zinc, and others, are among the few materials that do not degrade or lose their chemical or physical properties in the recycling process. As a result, nonferrous metals have the capacity to be recycled an infinite number of times.

While in terms of volume, nonferrous scrap made up just 6 percent of the total quantity of material recycled in the United States last year, by value ISRI estimates that nonferrous metal scrap — including highly valued precious metal scrap — accounted for more than half of total U.S. scrap recycling industry earnings in 2015. More than 8 million metric tons of nonferrous scrap valued at approximately $32 billion was processed in the United States last year from a wide array of consumer, commercial, and industrial sources: everything from copper and precious metal circuitry in electronic devices, to soft-drink containers, automobile batteries and radiators, aluminum siding, airplane parts, and more.

Nonferrous scrap is then consumed by secondary smelters, refiners, ingot makers, foundries, and other industrial consumers in the U.S. and more than 70 countries worldwide. These consumers rely on nonferrous scrap as a competitive, environmentally-friendly and energy-efficient input to make brand new products, continuing the nonferrous metal life cycle. The BIR estimates that almost 40 percent of the world's demand for copper is met using recycled material, while more than 80 percent of the zinc available for recycling is eventually recycled. Keep reading for more information about nonferrous metal scrap recycling.

Aluminum

Aluminum holds the distinction of being both the youngest and the most widely used among all the base nonferrous metals in the U.S. Aluminum is known to be a lightweight, ductile, malleable, and corrosion resistant metal, making it a popular choice with manufacturers. As with other nonferrous metals, aluminum is also inherently recyclable and recycled aluminum is highly valued as a raw material input for new aluminum production. In 2015, USGS figures show aluminum metal recovered from purchased new and old scrap in the United States totaled about 3.46 million metric tons.

Aluminum can be recycled from a wide range of obsolete products including used beverage containers, aluminum siding, old radiators, used wire and cable, automobile and truck wheels, as well as end of life vehicles and airplanes. ISRI estimates that aluminum recovered scrap represented more than 50 percent of total U.S. apparent aluminum consumption in 2015. In addition, the U.S. exported more than 1.5 million metric tons of aluminum scrap worldwide last year. See below for more information about U.S. aluminum scrap consumption, product lifecycles and global trade.

The U.S. Aluminum Industry

YEAR	ALUMINUM RECOVERED FROM SCRAP (MT)	TOTAL ALUMINUM USAGE (MT)	ALUMINUM SCRAP EXPORTS*(MT)
2011	3,110,000	5,099,000	2,125,000
2012	3,430,000	5,768,000	2,034,000
2013	3,480,000	6,196,000	1,867,000
2014	3,640,000	6,230,000	1,716,000
2015	3,460,000	6,719,000	1,554,000

** Includes UBC's and Remelt Secondary Ingot.*

U.S. Aluminum Scrap Consumption

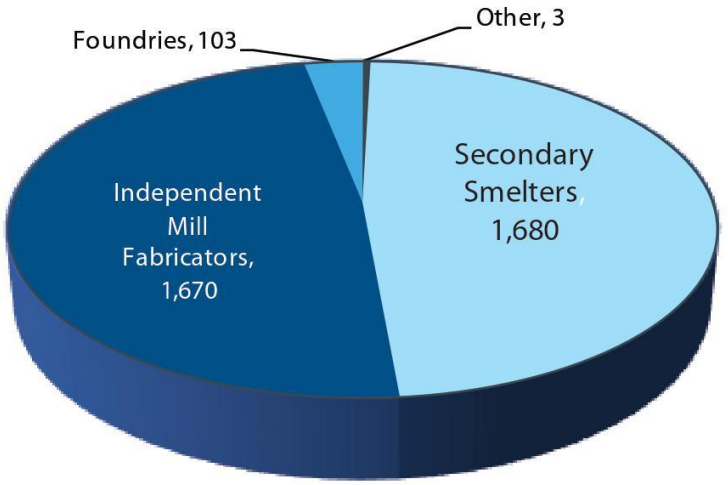
Of the more than 3.4 million tons of aluminum recovered from purchased scrap in the United States last year, USGS estimates that about 54 percent came from new (manufacturing) scrap and 46 percent from old scrap (discarded aluminum products). The aluminum recovered from old scrap, such as aluminum cans and other obsolete products was equivalent to about 30 percent of total U.S. apparent consumption of aluminum, according to the USGS figures.

By type of consumer, the government statistics show that secondary smelters, which use aluminum scrap to create a variety of new aluminum and aluminum alloy shapes including ingots, sows, and other products, were the largest consumers of domestically purchased aluminum scrap last year, recovering more than 1.68 million metric tons of aluminum by metallic content.

The next largest consumers of aluminum scrap in 2015 (in order) were independent mill fabricators (1.67 million metric tons), foundries (103,000 metric tons), and other consumers (3,000 metric tons).

U.S. Aluminum Scrap Consumption by Consumer Type, 2015

(thousand mt, metallic content)



From One Can to Another

In this process, empty soda pop cans are recycled to make new cans.

Did you know:

- A used aluminum can is recycled and back on the grocery shelf in as little as 60 days.
- If all aluminum scrap processed in the United States were used solely to produce soda cans, the lined-up cans would stretch 25 million miles – the distance from Earth to Venus.
- Each year, United States domestically-recycled aluminum cans save the energy equivalent of 26 million barrels of gasoline – America's entire gas supply for three days.
- Of an estimated total 700 million tons of aluminum produced in the world since commercial manufacturing began in the 1880s, about 75% is still in productive use as secondary raw material.

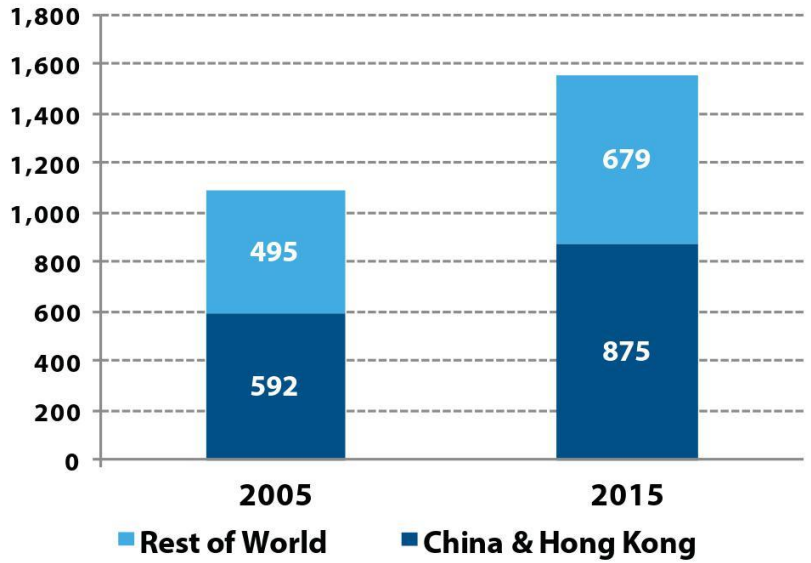
Source: JASON Learning/ISRI

Aluminum Scrap - U.S. Exports

Given the tremendous energy savings associated with using aluminum scrap – which can reach up to 95 percent compared with primary metal, global demand for aluminum scrap has rising sharply over the last decade. U.S. exports of aluminum scrap – including used beverage containers and RSI (aluminum alloy), increased from less than 1.1 million metric tons in 2005 to nearly 1.6 million metric tons in 2015 according to trade data from the U.S. Census Bureau and U.S. International Trade Commission.

China has been a key driver of global demand for aluminum scrap and remains the largest overseas buyer of aluminum scrap. Including Hong Kong (which is still treated as a separate export destination in official U.S. trade data), the U.S. exported nearly 875,000 mt of aluminum scrap to China in 2015, accounting for 56 percent of total U.S. aluminum scrap exports.

U.S. Aluminum Scrap Exports to China & Hong Kong and Rest of World, 2005 and 2015 (thousand metric tons)



Source: U.S. Census Bureau/U.S. International Trade Commission

Copper

Copper was one of the first metals used by humanity, with archaeological evidence indicating its use more than 10,000 years ago. Today, copper remains a vital commodity used in construction, electrical equipment, transportation, consumer goods, and other products. Copper scrap is used at smelters and refineries to produce refined copper and is used at the semi-fabrication stage to produce copper rods, bars, wire, and other semi-fabricated shapes, which are transformed into power cables, plumbing tubes, and other end-use products.

According to the U.S. Geological Survey, in 2015 old scrap provided 160,000 metric tons of copper and purchased new scrap – derived from fabricating operations – contributed 670,000 metric tons of contained copper. Major consumers of copper and copper alloy scrap in the United States last year included brass mills (79 percent), smelter, refineries, and ingot makers (15 percent), and chemical plants and miscellaneous manufacturers (6 percent).

In 2015, ISRI estimates that copper scrap usage in the United States represented 34 percent of total U.S. apparent consumption of refined copper. Globally, the International Copper Study Group has estimated world copper recycling input rates of between 33-35 percent in recent years, while the overall recycling efficiency rate (the efficiency with which old and new scrap are collected and recycled) has regularly exceeded 60 percent. The Bureau of International Recycling estimated that global consumption of copper scrap exceeded 10 million metric tons in 2011, although more recent data from ICSG indicate global copper scrap consumption of less than 9 million metric tons per year.

The U.S. Copper Industry

YEAR	COPPER RECOVERED FROM SCRAP (MT)	TOTAL COPPER USAGE (MT)	COPPER SCRAP EXPORTS (MT)
2011	780,000	2,380,000	1,243,000
2012	820,000	2,420,000	1,189,000
2013	810,000	2,410,000	1,155,000
2014	820,000	2,380,000	1,045,000
2015	830,000	2,450,000	954,000

Copper and Copper Alloys

There are literally hundreds of different types of copper and copper alloys that use tin, lead, zinc, and other metals to form metal alloys. These metals can be subdivided into several main categories including:

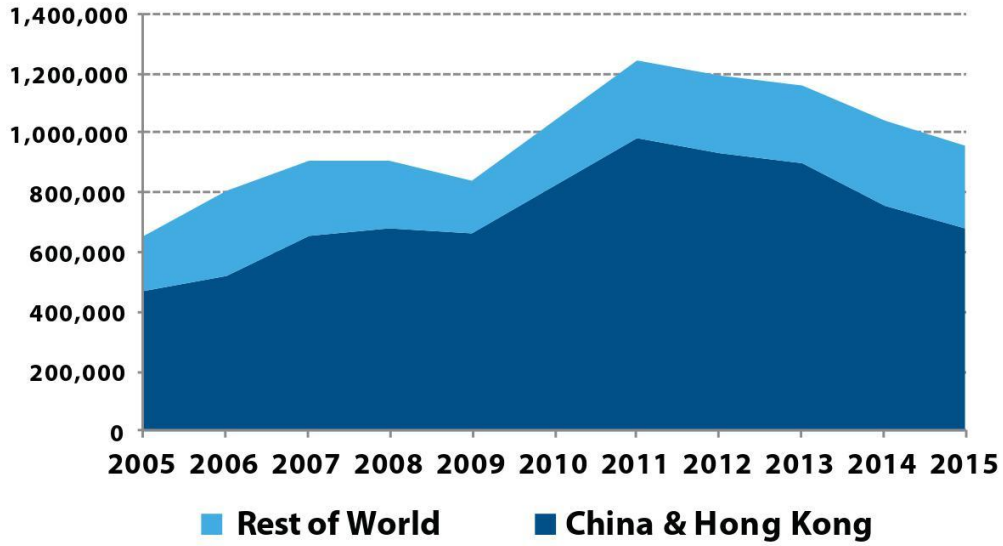
- Coppers
- High-copper alloys
- Brasses
- Bronzes
- Copper nickels
- Copper-nickel-zinc alloys
- Leaded coppers
- Special alloys

Scrap processors have become experts at identifying different types of copper and copper alloy products in order to better ascertain their worth. ISRI specifications with names like Berry, Birch/Cliff, Druid, Honey, Ocean, and Pales cover a wide range of red metal products such as bare and insulated wire, light copper, refinery brass, red brass, yellow brass, brass ammunition, clippings, radiators, tubes, and more. As new products and alloys enter the recycling stream, ISRI specifications are continually being updated to reflect today's marketplace. In recent years, ISRI's Nonferrous Division and Board of Directors, in conjunction with other industry associations and market participants, developed and approved a range of new copper and copper alloy scrap specifications including Ebulent (Lead-Free Bismuth Brass Solids), Ecstatic (Lead-Free Bismuth Brass Turnings), Nascent (Leaded Brass Scrap Turnings), and Niche (Leaded Brass Scrap Rod Ends and Forgings). For the full listing of ISRI nonferrous specifications, please visit ***ISRI.org/specs***.

Copper Scrap - U.S. Exports

In 2015, the United States export 682,000 metric tons of copper and copper alloy scrap to mainland China and Hong Kong valued at $1.7 billion. China and Hong Kong accounted for 71 percent of all U.S. copper scrap exports by volume last year. Other important overseas markets for U.S. copper scrap export sales in 2015 included Canada ($246 million), Germany ($170 million), South Korea ($133 million), Japan ($85 million), Belgium ($77 million), and India ($64 million). Figures from the United Nations Comtrade database indicate the value of global exports of copper scrap from all reporting countries exceeded $14.4 billion in 2015.

Volume of U.S. Copper Scrap Exports to China & Hong Kong and Rest of World, 2005 - 2015 (metric tons)



Source: U.S. Census Bureau/U.S. International Trade Commission

Nickel and Stainless Steel

According to the U.S. Geological Survey, nickel is a transition element that exhibits a mixture of nonferrous and ferrous metal properties. In metal circles, it's much less common for nickel to be examined on its own than as an element of corrosion-resistant alloys such as austenitic stainless steel. And no wonder, 18-8 varieties of stainless steel (named for their 18 percent chromium and 8 percent nickel content) account for large quantities of nickel consumption and also serve as an important scrap source for nickel. USGS figures show that 45 percent of the primary nickel consumed in the U.S. in 2015 went into stainless and alloy steel production, followed by nonferrous alloys and superalloys (43 percent), electroplating (7 percent), and other uses (5 percent).

Nickel, hi-temp, and stainless steel scrap comes in a variety of forms including wrought solids, clips, and turnings that are covered under ISRI specs from Aroma to Zurik. The process of recycling stainless scrap can include numerous steps, including sorting, baling, shearing, media separation, and melting. According to USGS, about 102,000 tons of nickel was recovered from purchased scrap in 2015, while 1.34 million metric tons of home and purchased stainless steel scrap were consumed in the U.S. last year.

The U.S. Nickel Industry

YEAR	NICKEL RECOVERED FROM SCRAP (MT)	TOTAL NICKEL USAGE (MT)	STAINLESS SCRAP EXPORTS (MT)
2011	88,800	213,000	646,000
2012	92,400	218,000	623,000
2013	88,800	200,000	643,000
2014	102,000	239,000	548,000
2015	101,900	226,000	520,000

Global Stainless Steel Production

STAINLESS AND HEAT RESISTING STEEL, METAL SHOP PRODUCTION (INGOT/SLAB EQUIVALENT)

Year 2015 in '000 metric tons

Region	Qrt 1	Qrt 2	Qrt 3	Qrt 4	Year
Western Europe/Africa	2,007	2,058	1,673	1,780	7,518
Central + Eastern Europe	64	69	65	61	259
The Americas	768	685	693	601	2,747
Asia w/o China	2,366	2,318	2,392	2,385	9,461
China	5,015	5,852	5,371	5,324	21,562
World	**10,220**	**10,982**	**10,195**	**10,152**	**41,548**

Provided by: International Stainless Steel Forum, Brussels

Lead and Zinc

Zinc and lead are the two most widely used nonferrous metals after aluminum and copper. Although lead has been used for centuries as a building material and to produce

ceramic glazes, leaded glass and crystal, paints, or other protective coatings, lead's emergence as an important industrial metal in the modern ages dates from the development of storage battery technology in the mid-19th century. The recycling of automotive-type batteries spawned a viable secondary lead smelting industry in the United States. In 2015, the U.S. Geological Survey reports that lead-acid batteries again accounted for about 90 percent of domestic lead use.

Other uses of lead include rolled and extruded products, shot and ammunition, alloys, pigments and compounds, and cable sheathing. USGS figures show that 1.12 million metric tons of secondary lead was produced in the U.S. last year – an amount equivalent to 69 percent of apparent domestic lead consumption, of which the vast majority was recovered from postconsumer scrap.

The U.S. Lead Industry

YEAR	LEAD RECOVERED FROM SCRAP (MT)	TOTAL LEAD USAGE (MT)	LEAD SCRAP EXPORTS (MT)
2011	1,130,000	1,540,000	31,000
2012	1,110,000	1,500,000	26,000
2013	1,150,000	1,700,000	34,000
2014	1,130,000	1,670,000	36,000
2015	1,120,000	1,620,000	46,000

Source: USGS, Census Bureau, ISRI Estimates

According to USGS, zinc metal is mostly used as a coating to protect iron and steel from corrosion (galvanized metal), as alloying metal to make bronze and brass, as zinc-based die casting alloy, and as rolled zinc. Zinc is also consumed in the form of zinc compounds by the rubber, chemical, paint, and agricultural industries, among others. In the United States, USGS figures show that about 37 percent (or 65,000 metric tons) of the refined zinc produced in the United States was recovered from secondary materials.

Zinc scrap can come from a range of sources including old and new die-cast zinc, new zinc clippings, drosses from galvanizing, skimmings, and ashes. Steelmaking dusts and zinc-coated steel scrap also remain rich sources of recoverable zinc. Prices for scrap zinc, such as galvanizing drosses, were frequently quoted as a percentage of the LME price. Other scrap items – such as die cast – are frequently quoted in cents per pound.

The U.S. Zinc Industry

YEAR	PROCESSED ZINC SCRAP* (MT)	TOTAL ZINC USAGE (MT)	ZINC SCRAP EXPORTS (MT)
2011	220,000	946,000	86,000
2012	240,000	902,000	90,000
2013	238,000	935,000	88,000
2014	166,000	965,000	71,000
2015	120,000	960,000	55,000

**Secondary slab zinc production + zinc scrap exports.*

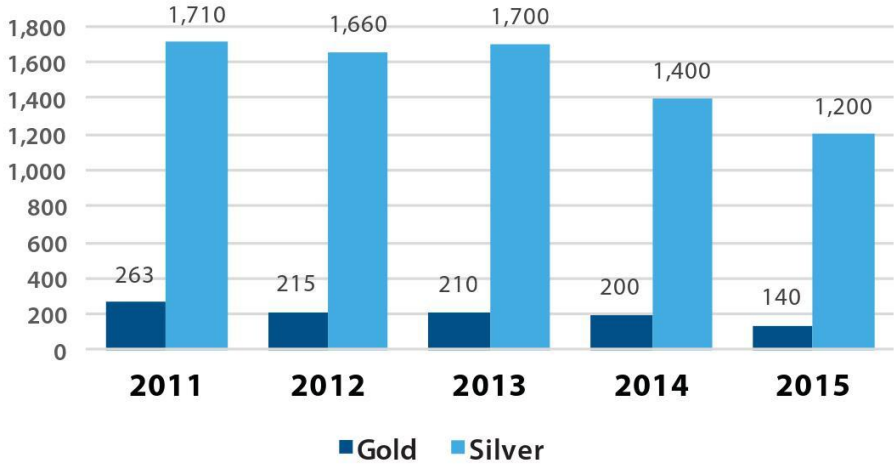
Precious Metals

Precious metals such as gold, silver, and platinum have long been valued as stores of wealth and for use in producing coinage, jewelry, and decorative arts. Today, precious metals are used in a wide range of applications including electronic and communications equipment, spacecraft, and jet aircraft engines and can be found in everything from cell phones to catalytic converters.

Given the relative scarcity and high per-unit values of precious metals, they continue to be recycled at a high rate of recovery. The U.S. Geological Survey estimates that 140 tons of new and old gold scrap and 1,200 tons of silver scrap were recycled in the United States in 2015, slightly less than the reported levels in 2014.

In addition, Census Bureau data indicate that more than 16,100 mt of precious metal scrap were exported from the U.S. in 2015 valued at nearly $3.9 billion. See below for the recent trend in U.S. secondary production (production from new and old scrap) of gold and silver since 2011 according to the USGS:

U.S. Secondary Production of Silver & Gold, 2011 - 2015 (metric tons)



Source: U.S. Geological Survey

Average Annual PGM Prices

($/troy ounce)

YEAR	2011	2012	2013	2014	2015
PLATINUM	1,725	1,555	1,490	1,388	1,080
PALLADIUM	739	649	730	810	690
RHODIUM	2,204	1,275	1,069	1,174	970
RUTHENIUM	166	112	76	65	48
IRIDIUM	1,036	1,066	827	556	530

Source: U.S. Geological Survey

Recovered Paper and Fiber

Recovered fiber, also known as recovered paper and board, is one of the most widely recycled materials in the world. Since 1990, Americans have recycled more than 1.1 billion tons of recovered fiber as the recovery rate for paper and paperboard in the U.S. nearly doubled to reach 66.8 percent in 2015.

The paper recycling segment of the scrap recycling industry collects, sorts, and processes the recovered fiber into specification grade products that were valued at nearly $7.7 billion in 2015. These products are sold and transported to paper mills at home and worldwide for production into new packaging, office paper, tissue, newsprint, and a multitude of other paper products. In the United States, more than three-quarters of paper mills rely on recovered fiber to make some or all of their products due in part to recovered paper's significant cost and energy savings. In addition, the paper and fiber recovered in the U.S. helps to meet growing overseas demand: recovered paper valued at more than $3.1 billion was exported to more than 65 different countries last year, generating tremendous environmental benefits and energy savings while significantly helping our balance of trade.

The U.S. Recovered Paper and Fiber Industry

YEAR	NEW SUPPLY (SHORT TONS)	RECOVERED (SHORT TONS)	RECOVERY RATE
2011	79,444,000	52,767,000	66%
2012	78,498,000	51,092,000	65%
2013	78,954,000	50,128,000	63%
2014	78,206,000	51,171,000	65%
2015	77,895,000	52,040,000	67%

Paper Grades

Recovered paper can be grouped into several main categories including:

OCC: An acronym for old corrugated containers, OCC contains a rippled middle layer that is sandwiched between two layers of linerboard. Mills use old corrugated containers to make new recycled-content shipping boxes, as well as recycled paperboard for product packaging.

ONP: Before your daily newspaper becomes old newspaper, or ONP, that is ready for recycling, it goes through several name changes. It begins life as newsprint, defined as the paper purchased and used by newspaper publishers. Once printed, it is called newspaper, which is shipped to distributors and newsstands. Only after being distributed to customers does it become ONP. Mills primarily use ONP to make new newsprint and in recycled paperboard and tissue, among other grades.

Mixed Paper: Mixed paper is a broad category that often includes items such as discarded mail, telephone books, paperboard, magazines, and catalogs.

High-Grade Deinked Paper: This grade is made of high-grade paper such as letterhead, copier paper, envelopes, and printer and converted scrap that has gone through the printing process. It must first be deinked before it can be reprocessed into high-grade paper products such as printing and writing papers or tissue.

Pulp Substitutes: Also high-grade papers, pulp substitutes are often shavings and clippings from converting operations at paper mills and print shops. Mills can use pulp substitutes in place of virgin materials to make high-grade paper products.

Old Newspapers Can Become New Again!

Newspapers go through a paper recycling process so that trees don't have to be chopped down to make new paper, protecting the environment.

Did you know:

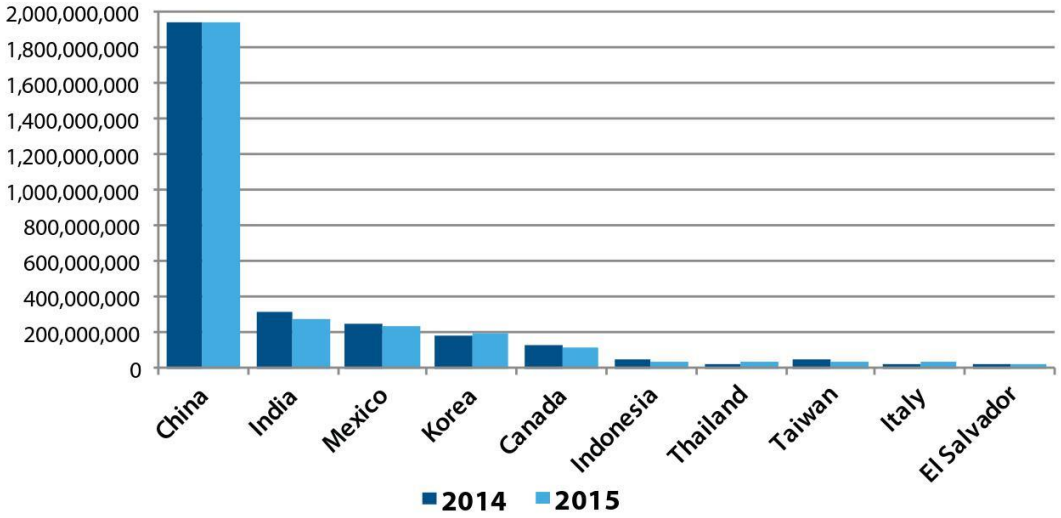
- Since 1990, Americans have recycled more than 1.1 billion tons of recovered paper.
- Nearly 77% of all U.S. papermakers use some recovered paper to make everything from newspaper to paper packaging to office paper.
- In 2015, the United States recovered more than 52 million tons of paper; that's 335 lbs. of paper for every person in the country.
- Recycling one ton of paper saves 3.3 cubic yards of landfill space.

Source: JASON Learning/ISRI

Recovered Paper - U.S. Exports

In addition to being consumed by domestic paper mills, the paper and fiber recovered in the U.S. helps to meet growing export demand as well. In 2015, the U.S. exported nearly 21.6 million short tons of recovered paper and fiber valued at more than $3.1 billion. By grade, corrugated exports accounted for 49 percent of all U.S. recovered paper and fiber exports last year, followed by mixed paper and old newsprint exports. China is the largest export market for U.S. recovered paper, with recovered paper export sales to mainland China alone valued at $1.9 billion in 2015.

U.S. Paper Stock Export Sales by Major Destination, 2014 & 2015 ($)



Source: U.S. Census Bureau/U.S. International Trade Commission

U.S. PAPER STOCK EXPORTS *(short tons)*	JAN-DEC 2015
CORRUGATED	10,641,583
HIGH GRADE DEINKING	670,196
MIXED	4,702,576
PRINTED NEWS	2,209,421
PULP SUBSTITUTES	967,261
OTHER	2,389,524

Plastics

The manufacture and distribution of plastics is everywhere. Between 2004 and 2014, the global production of plastics grew from 225 million tons to 311 million tons. With the explosive growth in the manufacture of plastics comes the need to ensure that these materials are recycled in an environmentally responsible manner once they reach the end of their useful lives. PlasticsEurope reports that 7.7 million tons of plastics were recycled globally in 2013, including more than 3.5 million tons of post-industrial and post-consumer plastic scrap that were recycled in the U.S., according to ISRI estimates. **Post-consumer** plastic scrap commodities including plastic bags, bottles, tubs and other products are generated by businesses and consumers, have served their intended end use and have been separated or diverted from the solid waste stream for the purpose of recycling. Similar to prime or prompt scrap in the metals industry, **post-industrial** plastic scrap is generated by the plastic manufacturing process prior to consumption by end-users and is a highly valued raw material input for producing new plastic products. Recycling of engineered and industrial plastics present tremendous opportunities that demonstrate plastics recycling today is "Bigger Than the Bin."

From an environmental perspective, recycled plastic can provide enormous benefits over the use of its virgin counterparts. For example, plastic lumber made with scrap plastic bags, and other materials, conserves trees and eliminates the need to use hazardous chemicals to treat wood that will be used outdoors.

According to the U.S. EPA, plastic recycling results in significant energy savings (an estimated 50–75 MBtus/ton of material recycled) compared with production of new plastics using virgin material.

Despite the ubiquity of plastics, plastic recycling is still a young industry. The technology to cost-effectively sort and recycle plastics has been developed in just the past 25 years.

While it is important that consumers recycle the plastic containers that hold food, beverages, and household cleaners as well as other plastics that arise in the home, recycling of engineered and industrial plastics is vital. Engineered and industrial plastics are typically high grade materials used as components in all types of equipment. They may be the sprocket wheel in an electric motor or the imitation wood that adorns your vehicle interior. Engineered and industrial plastics are used as internal and external components of everything from refrigerators to computers, automobiles to boats, and medical equipment to sheet materials used in construction.

While one can picture so much opportunity for growth in plastics recycling, there are many challenges that confront this nascent segment of the recycling industry. It is incumbent upon us to educate manufacturers about the merits of using plastics made from scrap and for those same manufacturers to Design for Recycling®, giving due consideration during the design stage to their products end-of-life. These challenges are not insurmountable and plastic recyclers are providing leadership to overcome them.

U.S. Plastic Bottle Recycling

YEAR	TOTAL U.S. BOTTLES COLLECTED *(mmlbs)*	BOTTLES ON U.S. SHELVES *(mmlbs)*	GROSS RECYCLING RATE
2004	1,003	4,637	21.6%
2005	1,170	5,075	23.1%
2006	1,272	5,424	23.5%
2007	1,393	5,683	24.5%
2008	1,451	5,366	27.0%
2009	1,444	5,149	28.0%
2010	1,557	5,350	29.1%
2011	1,604	5,478	29.3%
2012	1,718	5,586	30.8%
2013	1,798	5,764	31.2%
2014	1,812	5,849	31.0%

Source: NAPCOR

Plastic Scrap Specifications

In order to accurately reflect what plastic scrap commodities are being traded in the marketplace, ISRI has been updating our plastic scrap specifications. Following consultation with other industry associations and market participants, ISRI's Plastics Division has updated our plastic scrap specs on bulky ridges, tubs and lids with and without bulky, mixed color HDPE buckets, mixed color HMW HDPE drums, mixed sorted and unsorted bottles and containers, and most recently for plastic auto bumper covers. Additional plastic scrap specification updates are in the works. For more information about ISRI's plastic scrap specs, visit ***ISRI.org/specs***.

Name: Post Consumer TPO Plastic Automotive Bumper Covers

Description: This grade consists of painted auto bumper covers removed from motor vehicles.

Product: Post-Consumer Auto Part

Source: Post-Consumer material generated by collision or refurbishment centers or automobile dismantlers.

Contamination: The following parts must be removed from the bumper cover: head lamps, tail lamps, grills, emblems, rub strips, reflectors, and any other components attached to the bumper. Everything attached to the bumper cover should be removed before baling.

Contamination should be limited to small metal parts such as clips, bolts and screws.

No TPU or RIM Plastic allowed.

General: Refer to the "General Information" section for more information.

Plastic Scrap Exports

Global demand for plastic scrap is impacted by the relative prices of primary resins and plastic scrap, which in turn are influenced by the volatility in natural gas and crude oil markets, among other factors. By volume, plastic scrap has become one of the most important globally traded scrap commodities. According to figures from the United Nations Comtrade Database, more than 13.6 million tons of plastic scrap valued at nearly $5.4 billion were exported by all reporting countries in 2015. Of that total, the United States exported more than 2 million tons of plastic scrap last year, generating more than $810 million in export sales. Although the United States shipped plastic scrap to more than 90 countries around the world last year, China and Hong Kong together accounted for $540 million, or 67 percent of the total. Other major export destinations for U.S. plastic scrap last year included Canada ($86 million), India ($58 million), Indonesia ($23 million), Taiwan ($18 million), Mexico ($16 million), and Vietnam ($15 million). Given the large volume of cross-Pacific trade flows, it should come as no surprise that the majority (~56 percent) of U.S. plastic scrap exports departed from West Coast ports last year.

U.S. Plastic Scrap Exports by Major Destination in 2015

Country	Volume (metric tons)	Value (US$)
China	855,392	$313,285,840
Hong Kong	606,178	$226,882,816
Canada	242,246	$86,158,552
India	92,413	$57,741,875
Indonesia	48,019	$22,994,334
Taiwan	51,040	$17,606,336
Mexico	21,663	$15,893,337
Vietnam	44,875	$14,987,743
Korea	9,722	$10,039,794
Malaysia	34,853	$8,751,170
El Salvador	6,505	$5,985,919
Guatemala	3,047	$2,824,937
Ireland	83	$2,756,503
Australia	817	$2,523,010
Dominican Republic	2,726	$2,382,180
All Other:	**23,548**	**$19,454,163**

Source: U.S. Census Bureau/U.S. International Trade Commission

Household Plastic Can Be Recycled Over and Over Again in Manufacturing

Since 1950, the global production rate of plastic has grown steadily, and all signs point to continued growth. Because of this, there is a need to ensure that plastics are recycled when they reach the end of their useful lives so that we can protect our natural resources. While we are all familiar with the recycling of food, beverage, and other common plastic household containers, plastic recycling goes far beyond that. Engineered and industrial plastics are found in all types of products, from cars to refrigerators, and these plastics are being recycled every day as well.

Source: JASON Learning/ISRI

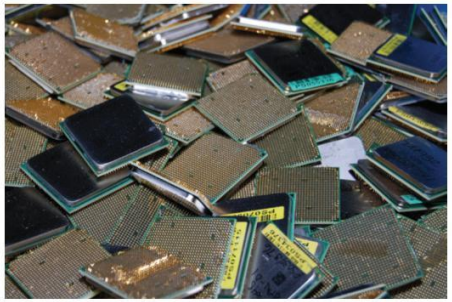
Electronics

The U.S. electronics recycling industry has shown tremendous growth over the past decade. This maturing segment of the scrap recycling industry provides a boost of approximately $20.6 billion, including exports of $1.45 billion, to the U.S. economy (up from less than $1 billion in 2002) and employs more than 45,000 full time employees (up from 6,000 in 2002).

A study published by the U.S. International Trade Commission in 2013 found that the U.S. electronics recycling industry processed more than 4.4 million tons of used and end-of-life electronics equipment annually, not including white goods. Of the used electronic products collected, the study found that 83 percent are reused and recycled domestically — including scrap steel, aluminum, copper, lead, circuit boards, plastics, and glass. ISRI estimates that the volume of electronics recycled in the United States now exceeds 5 million tons per year.

Sophisticated technology has helped electronics recyclers become highly efficient at recycling material into valuable, specification-grade commodities which re-enter the manufacturing stream as the basis for new products. For example - one metric ton of electronic scrap from personal computers contains more gold than that recovered from 17 tons of gold ore.

Electronics recyclers repair, refurbish, and resell functioning electronics equipment as used products into domestic and international markets. Companies also provide a number of logistical services, like collection, storage, and transportation as well as scrubbing hard drives of sensitive personal and commercial data.



The industry is driven by equipment collected from businesses and commercial interests, comprising up to 75 percent of the market on a volume basis. The electronics recycling industry is poised to meet the anticipated increased demand for more used products and specification grade commodities.

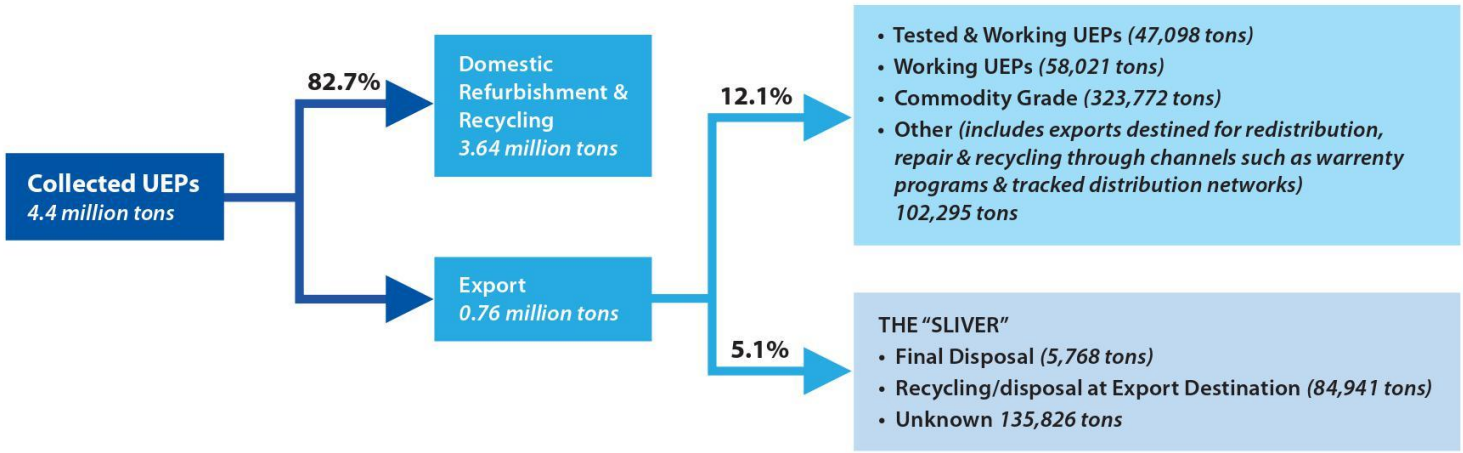
Your Old Computer Can Become New Again

The U.S. electronics recycling industry annually processes more than 5 million tons of used and end-of-life electronics equipment – cell phones, TVs, computers, copiers, fax machines, music players, copiers, and even iPads! More than 70 percent of the electronics collected and recycled here in the U.S. can be sorted and used as ingredients in the manufacture of new products. Shredding or otherwise processing the electronics makes available the valuable materials contained within them – including steel, copper, aluminum, plastic, and glass. The rest are refurbished and resold as functioning electronic equipment both here in the U.S. and internationally.

Source: JASON Learning/ISRI

Flow of Used Electronic Products (UEPs)

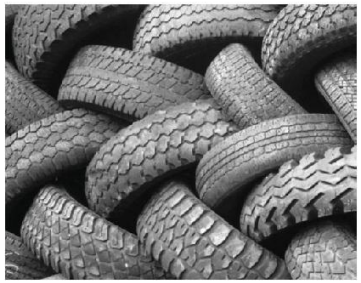
In February 2013, the U.S. International Trade Commission (USITC) released its study on ***Used Electronic Products: An Examination of U.S. Exports***, the most comprehensive report on the collection and export of UEPs that found more than 80 percent of the UEPs collected in the U.S. were recycled, reused or refurbished domestically while only 17 percent of UEPs were being sent for export. A subsequent report released by the Massachusetts Institute of Technology (MIT) Materials Systems Laboratory and the U.S. National Center for Electronics Recycling (NCER) in 2013 indicates that more than 90 percent of used electronics collected for recycling within the U.S. remain in the U.S. for processing and are not exported. Taken together, the USITC and MIT/NCER studies provide irrefutable evidence that used electronics products are being reused and recycled in America, not "dumped" into developing countries as proponents of export controls have argued for years.



Source: U.S. Census Bureau/U.S. International Trade Commission, ISRI

Tires and Rubber

In 2015, 122 million tires were processed by the U.S. recycling industry according to *Scrap Tire News*. In the past, scrap tires — generated when an old, worn tire is replaced with a new tire — were often dumped illegally in lakes, abandoned lots, along the side of the road, and in sensitive habitats. Today, scrap tires are playing a much different role as an important part of the manufacturing process. The tire and rubber recycling industry supported nearly 8,000 jobs and had a total output estimated at more than $1.65 billion in 2015 according to John Dunham & Associates. Scrap tire rubber is used in the manufacture of new tires, playground surfaces, equestrian mats, and rubberized asphalt among other products. Other cutting-edge manufacturers are combining scrap tires with materials such as scrap plastic to produce flower pots, roofing tiles, and auto parts.



A tire is a highly engineered and extensively designed product that is meant to be virtually indestructible under a variety of conditions. Because of this, tires were difficult to recycle, but that has changed. Tire recyclers have invested millions of dollars in technologies and equipment to recycle tires, allowing scrap tires to play an important role in strengthening our economy and protecting our environment.

At tire recycling facilities, the main piece of equipment is the tire shredder, which uses powerful, interlocking knives to chop tires into smaller pieces. Shredding a tire at room temperature using such knives is called ambient shredding. Tires can also be shredded through a cryogenic process that uses liquid nitrogen to freeze them at a sub-zero temperature. Such temperatures cause the physical properties of the tires to change dramatically and become very brittle. The tire is placed in an enclosure in which powerful hammers smash the tire apart.

Cryogenic grinding is used to make fine crumb rubber powders that are then used in products such as synthetic turf. The non-rubber portions of the tire also are recycled. For example, the steel beads that give the tire its shape and structure are recovered by recyclers and processed into specification grade product used by steel mills for the production of new steel.

Scrap tire rubber is a highly sought material. In 2015, 1.2 billion pounds of crumb rubber produced from 62 million tires were used in the creation of new products ranging from sidewalks to horse tracks. Tire recycling is an economically-sound, environmentally-friendly activity that can contribute to the reduction of a product's overall carbon footprint. In fact, the use of recycled rubber in molded products provides a substantial carbon footprint advantage over the use of virgin plastic resins, having between four and 20 times lower carbon footprint.

The future for tire recycling is strong. Applications for scrap tire rubber — such as rubberized asphalt — have become recognized for their preferable properties and is gaining in prominence and widespread use. Many states already use rubberized asphalt when they design, reconstruct or repair their roadways and it is used for several simple and straightforward reasons: it can cost less, provide safety benefits and last longer than conventional asphalt.

Your Old Tires Can Help Build the Newest Highways

Each year, Americans generate approximately 300 million scrap tires. In the past, scrap tires — generated when an old, worn tire is replaced with a new tire — were often dumped illegally in lakes, abandoned lots, along the side of the road and in sensitive habitats. Today, scrap tires are playing a much different role as an important part of the manufacture process with more than 90 percent recycled and reused annually. Rubber from scrap tires is used in the manufacture of landscaping mulch; playground mats and athletic surfaces; molded products such as railroad ties, flowerpots, garden hoses, welcome mats; and rubberized asphalt used in the paving of roads. Cutting-edge technologies are even being developed to allow scrap tires to be used in the manufacture of new tires!

Source: JASON Learning/ISRI

Glass

Glass is made from readily available domestic materials, such as sand, soda ash, limestone, and "cullet," the industry term for furnace-ready scrap glass. Glass can be recycled again and again with no loss in quality or purity. In 2013, 41.3 percent of beer and soft drink bottles were recovered for recycling, according to the U.S. EPA. Another 34.5 percent of wine and liquor bottles and 15 percent of food and other glass jars were recycled. In total, 34 percent of all glass containers were recycled, equivalent to taking 210,000 cars off the road each year.

For every ton of glass recycled, more than a ton of raw materials is saved, including 1,300 lbs. of sand, 410 lbs. of soda ash, 380 lbs. of limestone, and 160 lbs. of feldspar. Recycled glass is substituted for up to 70 percent of raw materials used in making new glass. An estimated 90 percent of recovered glass is used to make new glass bottles. Manufacturers benefit from recycling in several ways: it reduces emissions and consumption of raw materials, extends the life of plant equipment (such as furnaces) and saves energy. Glass recycling creates no additional waste or byproducts.

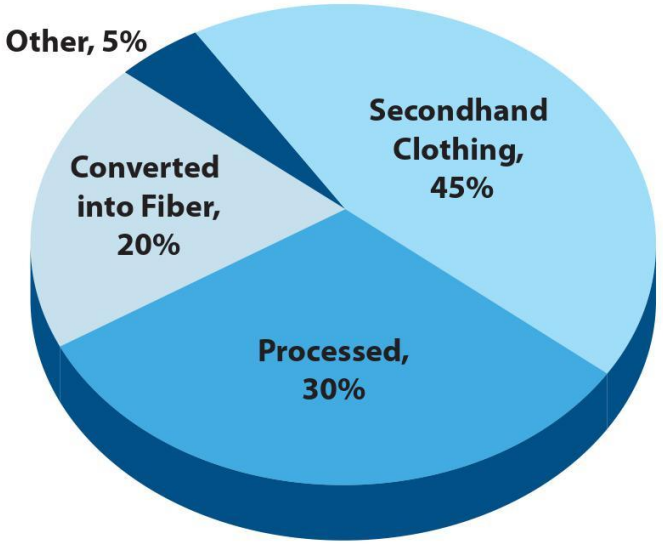
Glass manufacturers are requiring more and more high-quality recycled container glass to meet market demands for new glass containers. Color-sorted, contaminant-free recycled glass helps ensure that these materials are recycled into new glass containers. While curbside collection of glass recyclables can generate high participation and large amounts of recyclables, drop-off and commercial collection programs are also effective at yielding high-quality container glass.

Textiles

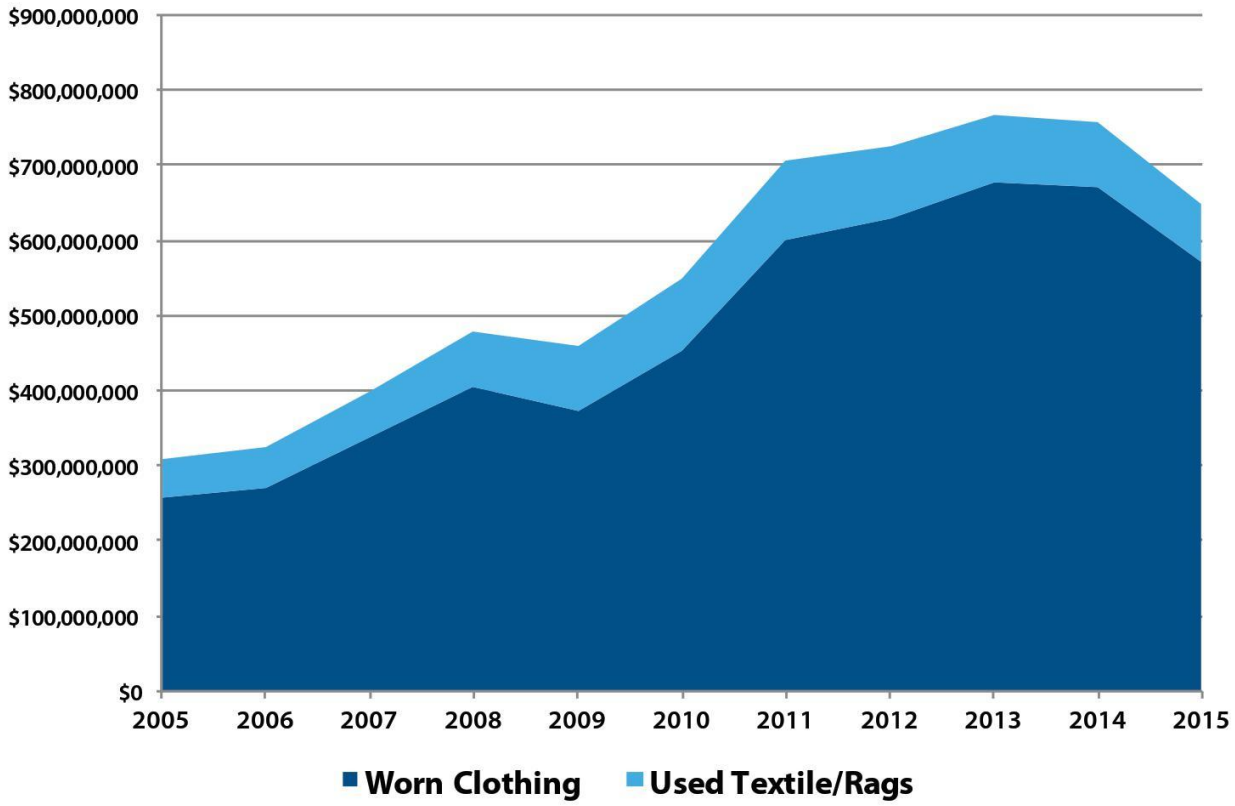
Textile recycling is a dynamic sector of the recycling industry that processes billions of pounds of cotton, wool, synthetic, and synthetic-blend products each year. These scrap materials come from a number of sources, ranging from apparel and home furnishing manufacturers, to textile mills and consumers.

In recent years, 2 million tons of clothing and textiles have been recovered from individuals (post-consumer) and manufacturers (pre-consumer) in the United States each year that are recycled as new raw materials for the automotive, furniture, mattress, coarse yarn, home furnishings, paper, and other industries. This translated to about 12 lbs. of textiles per person in the Unites States. Demand for used textiles and clothing is growing rapidly overseas as well. According to figures from the Census Bureau, the value of U.S. exports of used textiles and clothing increased from $310 million in 2005 to nearly $648 million in 2015.

Used clothing collected from households is graded into a number of categories. Garments in good condition are exported for resale in parts of the world where new clothing is not affordable for many. This trade provides employment not only among the exporting nations, but also in the importing countries.



FAS Value of U.S. Used Textile and Clothing Exports, 2005 - 2015 ($)



Source: U.S. Census Bureau/U.S. International Trade Commission

Chapter V: The Global Scrap Marketplace

The Expanding Scrap Marketplace

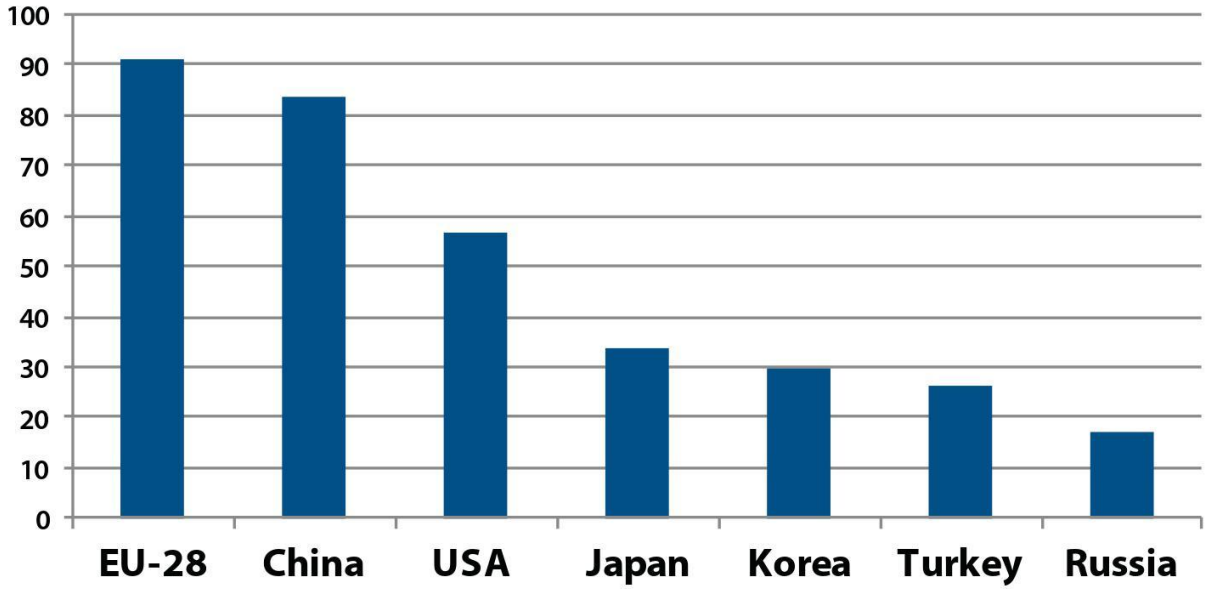
The scrap market has become increasingly global in nature in recent decades. Figures from the United Nations Comtrade Database show that in 2015 alone, exports of all scrap commodities from reporting countries approached 190 million metric tons valued at more than $80 billion (See Appendix D). While the United States is the largest exporter of recycled commodities in the world and China is the world's dominant consumer of commodities (including scrap), the scrap marketplace is far from bilateral, stretching to virtually every corner of the globe.

The globalized scrap market is a function of enhanced transportation and technological systems, the rising world population and increased urbanization, as well as the heightened awareness of the benefits of using scrap commodities given the Earth's limited natural resources. Those benefits include not only the relatively lower price of scrap as compared to most other raw material inputs, but also the resulting energy savings and environmental benefits about which manufacturers and society at large are becoming increasingly mindful. As a result, global scrap usage is expected to register continued growth in the decades ahead as the confluence of demographic, climate, sustainable development, market, and technological changes provide even greater incentives to use recycled goods.

As one example, figures from the Bureau of International Recycling (BIR) show that between the years 2011-2015, steelmakers and other consumers the world over consumed more than 2.8 billion tons of ferrous scrap. Of the 555 million metric tons of ferrous scrap consumed last year, the BIR reports that European Union countries consumed just over 91 million metric tons (mt), followed by China (83.3 million mt), the U.S. (over 56 million mt) and Japan (33.6 million mt). But the growth in global scrap usage is not limited to any one commodity, industry, or region. BIR figures also show that more than 36 million tons of nonferrous scrap were

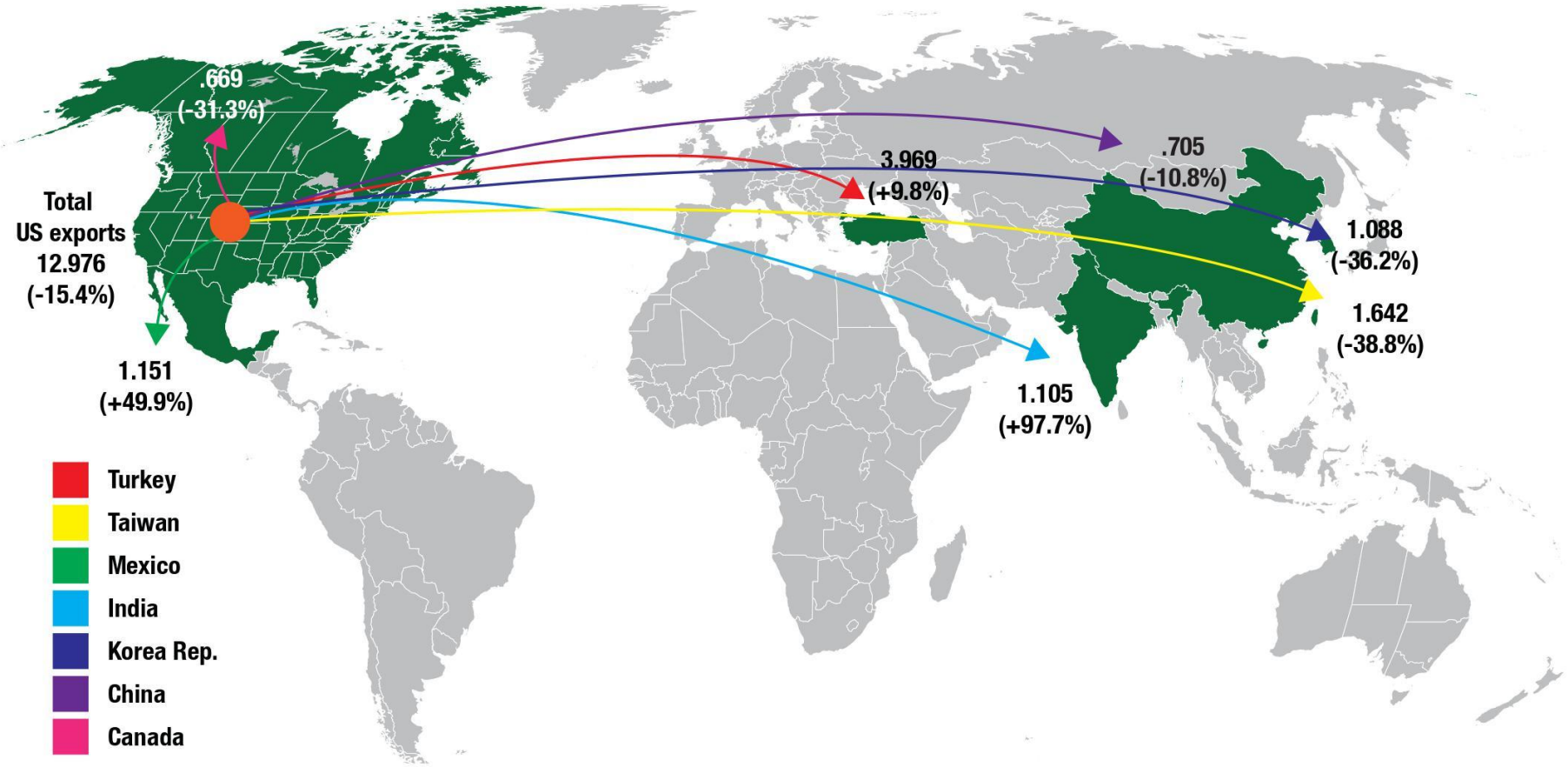
consumed globally in 2011 and 233 million tons of recovered paper and fiber worldwide were consumed in 2012. In addition, PlasticsEurope reports that 7.7 million tons of plastic scrap were consumed globally in 2013. The following charts provide updated snapshots of where recycled commodities are being shipped and consumed by the major scrap commodities and markets around the globe.

Ferrous Scrap Use by Major Consumer, 2015 (million metric tons)



Source: Bureau of International Recycling

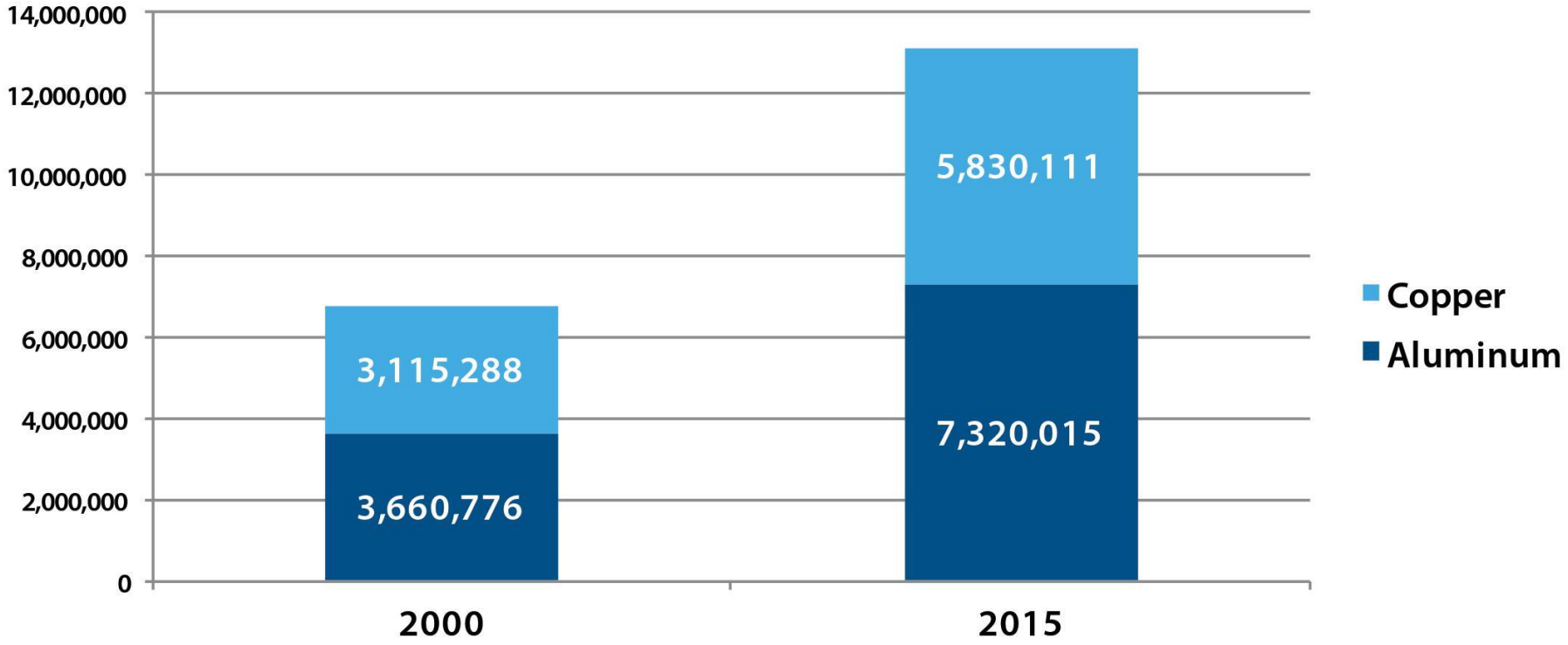
Ferrous Scrap Exports from the U.S.
(including stainless steel and alloy steel scrap)



Source: Bureau of International Recycling

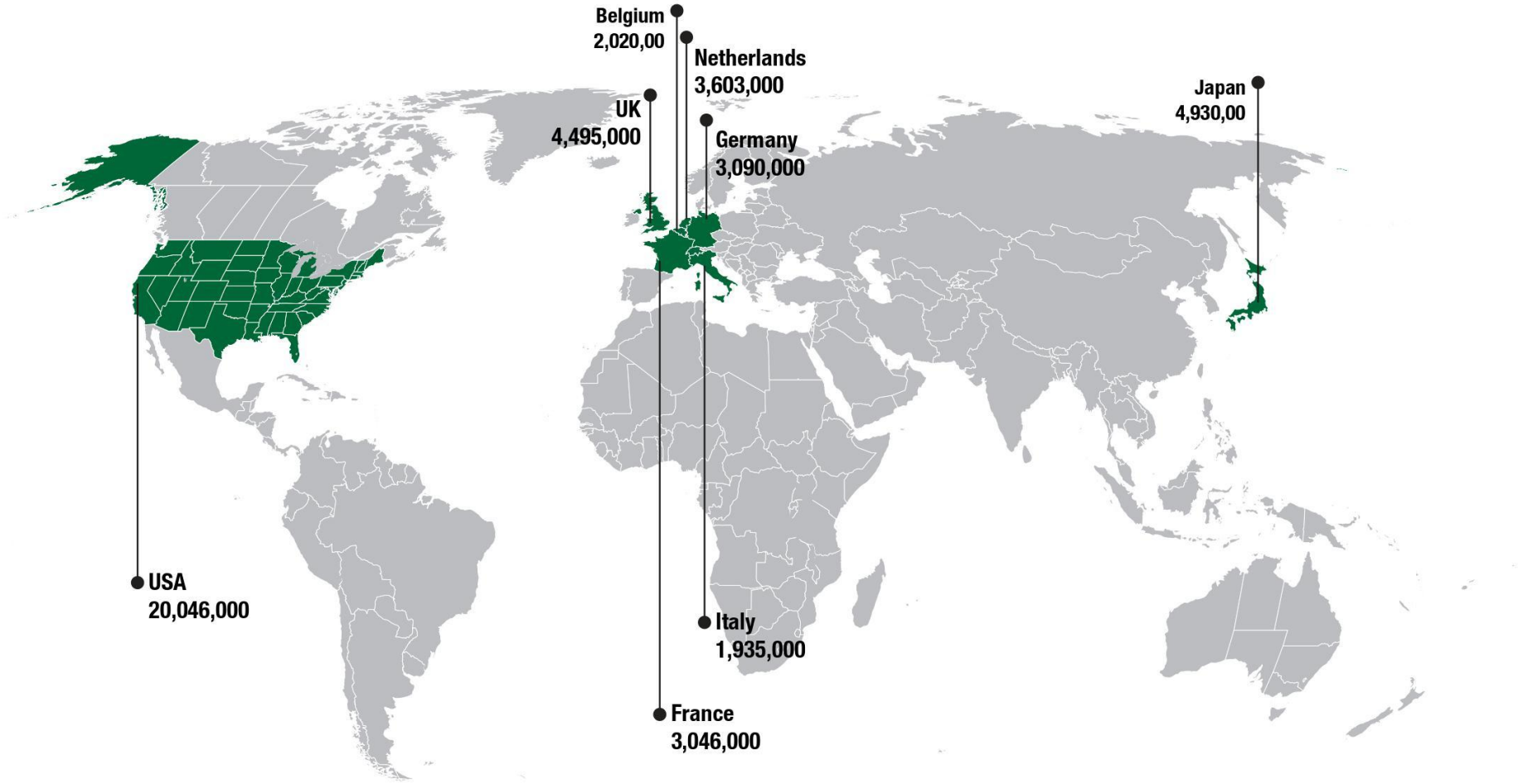
Trends in Global Nonferrous Scrap Trade

Global Copper and Aluminum Scrap Exports, 2000 and 2015 (metric tons)



Source: UN Comtrade Database

World's Major Exporters of Recovered Paper



Source: Bureau of International Recycling

Major Importers of Plastic Scrap, 2015

IMPORTER	GROSS WEIGHT (MT)	TRADE VALUE (US $)
CHINA	7,354,366	$4,183,374,345
HONG KONG	2,864,748	$1,046,583,842
NETHERLANDS	526,920	$212,385,318
GERMANY	486,765	$183,038,964
USA	393,777	$234,985,821
BELGIUM	259,728	$129,050,707
MALAYSIA	249,941	$62,114,517
CANADA	249,189	$87,609,150
TAIWAN	221,499	$83,534,303
INDIA	185,746	$94,235,362
SWEDEN	179,521	$16,100,773
ITALY	153,112	$92,741,265
PORTUGAL	146,385	$22,484,777

Source: U.N. Comtrade Database

Chapter VI: Statistical Appendices

Appendix A: Historical Production, Recovery, and Consumption Data

U.S. Iron & Steel Scrap Production, Producer Stocks, & Apparent Consumption from Purchased & Home Scrap, 1941 - 2015 (*metric tons*)

Year	Production	Stocks	Apparent consumption
1941	53,000,000	3,380,000	54,000,000
1942	57,000,000	5,730,000	55,000,000
1943	56,000,000	5,330,000	56,000,000
1944	55,000,000	4,010,000	56,000,000
1945	51,000,000	3,560,000	51,000,000
1946	45,000,000	3,080,000	45,000,000
1947	56,000,000	4,020,000	55,000,000
1948	61,000,000	5,860,000	59,000,000
1949	47,000,000	5,120,000	49,000,000
1950	62,000,000	4,920,000	63,000,000
1951	69,000,000	3,960,000	70,000,000
1952	65,000,000	6,260,000	63,000,000
1953	70,000,000	6,490,000	70,000,000
1954	57,000,000	6,670,000	56,000,000
1955	74,000,000	6,540,000	74,000,000
1956	77,000,000	6,730,000	73,000,000
1957	68,000,000	8,120,000	67,000,000
1958	52,000,000	8,700,000	51,000,000
1959	60,000,000	9,070,000	60,000,000
1960	60,000,000	8,430,000	60,000,000
1961	58,000,000	8,000,000	58,000,000
1962	60,000,000	7,690,000	60,000,000
1963	67,000,000	7,210,000	68,000,000
1964	76,000,000	6,740,000	77,000,000
1965	83,000,000	6,930,000	82,000,000
1966	84,000,000	7,430,000	83,000,000
1967	84,000,000	7,070,000	77,000,000
1968	85,000,000	7,150,000	79,000,000
1969	91,000,000	5,940,000	86,000,000
1970	84,000,000	6,960,000	78,000,000
1971	81,000,000	7,710,000	75,000,000
1972	91,000,000	7,410,000	85,000,000
1973	103,000,000	6,430,000	94,000,000
1974	105,000,000	7,630,000	96,000,000
1975	84,000,000	7,950,000	75,000,000
1976	90,000,000	9,060,000	82,000,000
1977	89,000,000	8,490,000	84,000,000
1978	93,000,000	7,510,000	90,000,000
1979	99,000,000	7,910,000	90,000,000
1980	85,000,000	7,270,000	76,000,000
1981	83,000,000	7,360,000	77,000,000
1982	56,000,000	5,820,000	51,000,000
1983	62,000,000	5,270,000	56,000,000
1984	67,000,000	4,770,000	60,000,000
1985	71,000,000	4,630,000	64,000,000
1986	69,000,000	3,940,000	60,000,000
1987	72,000,000	4,390,000	62,000,000
1988	79,000,000	4,130,000	70,000,000
1989	75,000,000	4,290,000	68,000,000
1990	80,000,000	4,300,000	69,000,000
1991	69,000,000	4,100,000	62,000,000
1992	71,000,000	3,800,000	63,000,000
1993	76,000,000	3,700,000	68,000,000
1994	78,000,000	4,100,000	70,000,000
1995	79,000,000	4,200,000	72,000,000
1996	77,000,000	5,200,000	71,000,000
1997	79,000,000	5,500,000	73,000,000
1998	76,000,000	5,300,000	73,000,000
1999	72,000,000	5,450,000	70,800,000
2000	76,000,000	5,320,000	74,600,000
2001	73,000,000	4,910,000	70,100,000
2002	73,000,000	4,930,000	69,500,000
2003	73,000,000	4,410,000	65,000,000
2004	73,000,000	5,400,000	66,500,000
2005	73,000,000	4,970,000	65,600,000
2006	71,000,000	4,210,000	64,600,000
2007	77,000,000	4,140,000	64,000,000
2008	84,000,000	4,340,000	67,600,000
2009	80,000,000	3,070,000	53,500,000
2010	76,000,000	3,330,000	59,700,000
2011	82,000,000	3,980,000	62,800,000
2012	80,000,000	4,160,000	63,100,000
2013	86,000,000	4,200,000	59,000,000
2014	88,000,000	4,400,000	62,000,000
2015(p)	81,000,000	5,800,000	56,000,000

Source: U.S. Geological Survey

U.S. Primary Refined Copper Production, Old and New Copper Scrap Recovery, 1941-2015 (*metric tons*)

Year	Primary production	Copper from Old Scrap	Copper from New Scrap
1941	1,270,000	374,000	285,000
1942	1,280,000	387,000	454,000
1943	1,250,000	388,000	597,000
1944	1,110,000	414,000	448,000
1945	1,010,000	451,000	462,000
1946	797,000	369,000	360,000
1947	1,050,000	457,000	416,000
1948	1,010,000	459,000	424,000
1949	842,000	348,000	299,000
1950	1,130,000	440,000	446,000
1951	1,100,000	416,000	430,000
1952	1,070,000	376,000	443,000
1953	1,170,000	390,000	480,000
1954	1,100,000	369,000	393,000
1955	1,220,000	467,000	430,000
1956	1,310,000	425,000	419,000
1957	1,320,000	403,000	361,000
1958	1,230,000	373,000	350,000
1959	996,000	429,000	417,000
1960	1,380,000	390,000	401,000
1961	1,410,000	373,000	397,000
1962	1,460,000	377,000	459,000
1963	1,450,000	383,000	501,000
1964	1,500,000	430,000	562,000
1965	1,550,000	466,000	671,000
1966	1,550,000	485,000	725,000
1967	1,030,000	438,000	614,000
1968	1,300,000	472,000	633,000
1969	1,580,000	522,000	726,000
1970	1,600,000	457,000	675,000
1971	1,440,000	404,000	685,000
1972	1,700,000	416,000	765,000
1973	1,700,000	441,000	808,000
1974	1,500,000	439,000	781,000
1975	1,310,000	335,000	547,000
1976	1,400,000	380,000	659,000
1977	1,360,000	410,000	675,000
1978	1,450,000	502,000	746,000
1979	1,520,000	604,000	948,000
1980	1,220,000	613,000	824,000
1981	1,540,000	592,000	816,000
1982	1,230,000	518,000	670,000
1983	1,210,000	449,000	634,000
1984	1,170,000	461,000	659,000
1985	1,060,000	503,000	636,000
1986	1,070,000	477,000	649,000
1987	1,130,000	498,000	716,000
1988	1,410,000	518,000	789,000
1989	1,480,000	548,000	761,000
1990	1,580,000	536,000	775,000
1991	1,580,000	533,000	667,000
1992	1,710,000	554,000	722,000
1993	1,790,000	543,000	748,000
1994	1,840,000	500,000	827,000
1995	1,930,000	443,000	874,000
1996	2,010,000	428,000	891,000
1997	2,070,000	498,000	967,000
1998	2,140,000	466,000	956,000
1999	1,890,000	381,000	949,000
2000	1,580,000	358,000	955,000
2001	1,630,000	316,000	833,000
2002	1,440,000	208,000	842,000
2003	1,250,000	207,000	737,000
2004	1,260,000	191,000	774,000
2005	1,210,000	183,000	769,000
2006	1,210,000	151,000	819,000
2007	1,270,000	162,000	772,000
2008	1,220,000	159,000	700,000
2009	1,110,000	138,000	639,000
2010	1,060,000	143,000	642,000
2011	992,000	153,000	649,000
2012	962,000	163,000	645,000
2013	960,000	170,000	640,000
2014	1,050,000	180,000	640,000
2015p	1,000,000	160,000	670,000

Source: U.S. Geological Survey

U.S. Primary Aluminum Production and Secondary Production from Old and New Aluminum Scrap, 1941-2015 (*metric tons*)

Year	Primary production	Secondary production old scrap	Secondary production new scrap
1941	280,400	39,100	57,800
1942	472,700	37,800	140,000
1943	834,600	30,000	255,000
1944	704,000	20,800	275,000
1945	449,100	24,800	246,000
1946	371,900	82,100	170,000
1947	518,900	149,000	164,000
1948	565,200	86,800	173,000
1949	547,000	40,500	124,000
1950	651,900	69,000	152,000
1951	759,300	70,000	196,000
1952	850,000	64,000	212,000
1953	1,136,000	72,000	263,000
1954	1,325,000	60,000	224,000
1955	1,421,000	91,000	285,000
1956	1,523,000	88,000	300,000
1957	1,495,000	89,000	315,000
1958	1,421,000	73,000	249,000
1959	1,773,000	94,000	313,000
1960	1,827,000	86,000	311,000
1961	1,727,000	142,000	299,000
1962	1,921,000	152,000	377,000
1963	2,098,000	144,000	449,000
1964	2,316,000	147,000	494,000
1965	2,498,000	186,000	566,000
1966	2,693,000	170,000	635,000
1967	2,966,000	159,000	638,000
1968	2,953,000	164,000	740,000
1969	3,441,000	181,000	862,000
1970	3,607,000	179,000	728,000
1971	3,561,000	196,000	757,000
1972	3,739,000	227,000	795,000
1973	4,109,000	240,000	886,000
1974	4,448,000	276,000	887,000
1975	3,519,000	305,000	816,000
1976	3,856,000	371,000	963,000
1977	4,118,000	482,000	974,000
1978	4,358,000	522,000	996,000
1979	4,557,000	557,000	1,060,000
1980	4,654,000	617,000	960,000
1981	4,489,000	758,000	1,030,000
1982	3,274,000	782,000	884,000
1983	3,353,000	820,000	953,000
1984	4,099,000	825,000	935,000
1985	3,500,000	850,000	912,000
1986	3,037,000	784,000	989,000
1987	3,343,000	852,000	1,130,000
1988	3,944,000	1,050,000	1,080,000
1989	4,030,000	1,010,000	1,040,000
1990	4,048,000	1,360,000	1,030,000
1991	4,121,000	1,320,000	969,000
1992	4,042,000	1,610,000	1,140,000
1993	3,695,000	1,630,000	1,310,000
1994	3,299,000	1,500,000	1,580,000
1995	3,375,000	1,510,000	1,680,000
1996	3,577,000	1,570,000	1,730,000
1997	3,603,000	1,530,000	2,020,000
1998	3,713,000	1,500,000	1,950,000
1999	3,779,000	1,570,000	2,120,000
2000	3,668,000	1,370,000	2,080,000
2001	2,637,000	1,210,000	1,760,000
2002	2,707,000	1,170,000	1,750,000
2003	2,703,000	1,070,000	1,750,000
2004	2,516,000	1,160,000	1,870,000
2005	2,481,000	1,080,000	1,950,000
2006	2,284,000	1,580,000	2,800,000
2007	2,554,000	1,660,000	2,450,000
2008	2,658,000	1,500,000	2,130,000
2009	1,727,000	1,260,000	1,570,000
2010	1,726,000	1,250,000	1,540,000
2011	1,986,000	1,470,000	1,640,000
2012	2,070,000	1,440,000	1,830,000
2013	1,946,000	1,650,000	1,830,000
2014	1,710,000	1,440,000	1,830,000
2015p	1,600,000	1,660,600	1,949,400

Source: U.S. Geological Survey

U.S. Paper and Paperboard Supply, Recovery, and Recovery Rates, 1990 - 2015 (*1,000 tons*)

Year	Supply	Recovered	Recovery Rate
1990	86,796	29,112	33.5%
1991	85,071	31,201	36.7%
1992	88,273	33,954	38.5%
1993	91,538	35,460	38.7%
1994	95,718	39,691	41.5%
1995	95,971	42,189	44.0%
1996	94,529	43,076	45.6%
1997	99,557	43,989	44.2%
1998	101,183	45,077	44.6%
1999	105,316	46,818	44.5%
2000	102,810	47,311	46.0%
2001	97,395	46,996	48.3%
2002	98,949	47,645	48.2%

Year	Supply	Recovered	Recovery Rate
2003	98,018	49,255	50.3%
2004	101,884	50,187	49.3%
2005	99,613	51,272	51.5%
2006	100,665	53,314	53.0%
2007	97,007	54,325	56.0%
2008	89,838	51,822	57.7%
2009	78,711	50,036	63.6%
2010	81,784	51,545	63.0%
2011	79,444	52,767	66.4%
2012	78,619	51,092	65.0%
2013	78,761	50,128	63.6%
2014	78,206	51,171	65.4%
2015	77,895	52,040	66.8%

Source: American Forest & Paper Association

Appendix B: Historical Scrap Trade Flows

Volume of U.S. Ferrous, Copper, Aluminum, Recovered Paper, and Plastic Scrap Exports, 1996-2015 (*metric tons*)

YEAR	FERROUS SCRAP (EX-STAINLESS AND ALLOY STEEL SCRAP)	COPPER SCRAP	ALUMINUM SCRAP	RECOVERED PAPER	PLASTIC SCRAP
1996	7,465,620	392,739	320,324	6,523,811	234,726
1997	7,599,661	379,546	337,525	6,844,342	218,469
1998	4,531,315	307,052	428,274	7,394,598	243,649
1999	4,698,123	314,967	419,112	7,552,294	348,583
2000	4,484,041	485,473	576,250	9,948,423	464,486
2001	6,404,593	533,842	580,019	9,573,899	645,874
2002	7,907,550	510,966	613,421	10,367,174	642,576
2003	9,372,593	688,977	576,951	12,659,543	685,779
2004	9,557,465	713,807	660,202	12,844,738	734,408
2005	10,803,591	657,861	1,087,171	14,619,679	843,720
2006	11,174,549	803,121	1,481,024	15,941,340	1,045,848
2007	13,749,753	906,511	1,546,374	18,127,139	1,375,681
2008	18,865,413	908,130	1,981,644	18,255,326	1,593,703
2009	20,011,795	842,573	1,657,606	19,142,093	2,020,770
2010	18,655,187	1,041,918	1,917,112	18,879,239	2,040,483
2011	22,885,833	1,242,556	2,124,719	21,076,745	2,127,877
2012	19,996,949	1,189,395	2,034,200	20,253,446	2,011,095
2013	17,296,847	1,154,931	1,866,512	19,076,945	1,909,535
2014	14,226,781	1,044,054	1,716,125	19,211,627	2,172,382
2015	11,696,223	954,610	1,549,983	19,657,759	2,043,124

Source: U.S. Census Bureau/U.S. International Trade Commission

FAS Value of All U.S. Scrap Exports to Major Destinations, 2005-2015 ($%)

Countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
China	$3,994,720,559	$6,526,839,773	$7,357,930,116	$7,628,585,502	$7,135,801,404	$8,579,027,849	$11,517,609,175	$9,524,137,281	$8,760,212,657	$7,138,055,476	$6,003,854,623
Canada	$1,602,872,781	$2,395,850,281	$3,045,144,780	$4,061,707,827	$2,660,761,708	$3,054,266,624	$3,712,525,264	$2,783,300,916	$1,961,964,785	$2,192,477,589	$1,951,751,620
Korea	$710,490,069	$783,352,015	$1,369,346,423	$2,002,050,261	$1,385,165,573	$1,630,421,826	$2,147,151,125	$1,857,673,818	$1,549,056,694	$1,318,312,650	$955,082,321
Turkey	$303,441,290	$573,384,305	$915,408,897	$2,015,077,082	$901,992,636	$1,535,938,668	$2,441,040,815	$2,513,345,163	$1,890,263,757	$1,278,444,845	$931,600,483
Mexico	$657,780,558	$717,171,165	$681,906,093	$929,908,499	$604,700,675	$1,010,886,186	$994,400,528	$977,068,716	$843,376,519	$950,894,044	$919,701,246
India	$397,361,464	$365,408,371	$646,757,890	$667,692,615	$761,033,530	$774,310,348	$1,043,730,402	$1,041,351,123	$772,849,850	$850,527,782	$903,604,944
Switzerland	$41,650,691	$123,959,311	$435,450,149	$1,729,421,850	$3,266,331,393	$5,096,799,332	$703,696,142	$969,304,368	$214,466,755	$145,526,173	$841,663,813
United Kingdom	$531,476,564	$548,013,384	$1,317,655,524	$1,835,738,961	$695,241,422	$1,137,287,476	$1,391,289,322	$818,651,841	$839,917,910	$800,324,165	$629,042,064
Taiwan	$340,376,736	$571,748,929	$1,070,563,193	$1,564,657,602	$913,242,575	$1,380,142,072	$1,901,848,875	$1,704,911,887	$1,391,853,946	$1,190,293,425	$595,920,976
Germany	$290,569,513	$651,314,641	$922,558,675	$935,527,809	$378,861,932	$685,392,762	$1,035,851,351	$948,168,453	$1,177,957,090	$788,465,375	$551,891,588
Italy	$192,950,826	$295,989,817	$343,465,663	$412,412,794	$341,635,950	$677,161,983	$917,722,615	$757,677,163	$649,653,998	$596,460,297	$547,942,402
Japan	$248,573,995	$475,965,851	$876,234,150	$1,052,599,756	$308,249,227	$553,144,540	$659,030,469	$508,335,352	$557,419,930	$633,894,840	$480,832,078
Hong Kong	$235,368,994	$402,780,242	$536,695,132	$804,020,636	$617,273,425	$631,710,372	$548,972,561	$434,306,558	$426,050,326	$382,179,152	$385,787,308
Belgium	$71,245,667	$138,656,955	$227,735,460	$278,626,014	$237,646,523	$350,222,284	$394,341,103	$427,426,787	$320,232,446	$260,612,978	$225,035,349
Pakistan	$15,549,188	$22,451,784	$77,403,147	$76,340,799	$103,970,501	$93,600,780	$146,281,950	$189,115,119	$180,501,173	$185,777,129	$166,918,034
Subtotal :	$9,634,428,895	$14,592,886,824	$19,824,255,292	$25,994,368,007	$20,311,908,474	$27,190,313,102	$29,555,491,697	$25,454,774,545	$21,535,777,836	$18,712,245,920	$16,090,628,849
All Other:	$934,415,108	$1,316,404,115	$2,252,641,962	$3,085,835,016	$1,566,815,236	$2,434,803,902	$3,066,703,587	$2,271,236,970	$2,084,742,394	$2,233,525,826	$1,412,603,284
Total	**$10,568,844,003**	**$15,909,290,939**	**$22,076,897,254**	**$29,080,203,023**	**$21,878,723,710**	**$29,625,117,004**	**$32,622,195,284**	**$27,726,011,515**	**$23,620,520,230**	**$20,945,771,746**	**$17,503,232,133**

Source: U.S. Census Bureau/U.S. International Trade Commission

Appendix C: Historical Scrap Price Indexes

Producer Price Indexes for Selected U.S. Ferrous Scrap Grades, 1988-2015

YEAR	FERROUS METAL SCRAP	HEAVY MELTING SCRAP	CUT PLATE AND STRUCTURAL	CAST IRON SCRAP
1988	164.4	152.6	156.3	132.3
1989	162.5	150.0	150.3	136.4
1990	154.2	147.0	143.9	135.5
1991	137.1	131.9	128.9	123.8
1992	130.3	124.8	119.2	116.1
1993	159.8	157.6	148.5	127.1
1994	179.6	173.5	167.1	149.3
1995	187.8	180.1	174.7	157.5
1996	176.4	172.6	173.6	145.4
1997	174.5	174.1	170.3	144.0
1998	148.5	150.9	156.1	131.2
1999	126.9	125.9	133.0	106.2
2000	132.7	128.3	138.0	100.0
2001	110.9	105.6	122.1	87.6
2002	130.3	123.8	137.5	100.1
2003	169.2	160.5	173.2	115.5
2004	300.9	268.9	298.2	192.3
2005	269.2	251.7	282.7	175.9
2006	310.1	301.4	310.3	178.0
2007	371.3	351.1	345.0	201.3
2008	513.0	480.3	495.5	265.8
2009	299.1	301.1	290.9	203.5
2010	483.2	478.9	472.3	262.5
2011	579.5	587.1	586.7	296.3
2012	505.3	540.2	521.3	274.2
2013	468.5	513.2	491.8	262.7
2014	483.1	521.7	503.2	281.7
2015	316.2	323.7	327.5	217.5

Source: U.S. Bureau of Labor Statistics

Producer Price Indexes for Selected U.S. Nonferrous Scrap Grades, 1988-2015

YEAR	NONFERROUS METAL SCRAP	COPPER BASED SCRAP	NO. 2 COPPER WIRE	ALUMINUM BASED SCRAP	USED BEVERAGE CAN SCRAP
1988	163.0	167.6	181.4	181.3	189.2
1989	180.3	190.9	210.3	169.2	175.7
1990	169.3	192.5	202.0	143.5	140.8
1991	149.5	180.5	190.1	119.2	118.2
1992	144.5	173.2	183.2	115.3	115.1
1993	126.8	144.3	149.5	109.0	108.2
1994	155.0	164.8	175.7	146.3	151.1
1995	191.8	205.2	221.0	178.6	185.0
1996	165.3	175.2	180.6	148.3	151.2
1997	175.2	168.3	173.2	166.1	163.1
1998	148.9	123.6	124.9	138.5	140.8
1999	148.3	115.0	118.2	137.6	137.1
2000	175.8	131.0	135.9	152.7	159.7
2001	168.2	120.0	123.1	134.6	141.6
2002	152.5	116.7	122.9	134.2	133.8
2003	166.0	133.0	145.9	142.9	143.4
2004	211.3	193.9	218.1	164.9	168.3
2005	243.1	262.8	295.4	179.0	187.9
2006	347.9	451.9	534.1	232.4	253.9
2007	389.2	507.8	580.7	231.3	255.7
2008	387.9	516.9	573.0	229.6	256.9
2009	279.8	392.5	452.1	140.3	160.8
2010	398.4	573.2	671.4	203.5	216.9
2011	457.0	667.4	781.3	225.8	251.1
2012	424.3	630.9	717.0	199.6	217.6
2013	407.9	606.9	692.3	190.4	209.2
2014	412.5	553.9	650.7	204.0	232.6
2015	351.1	445.3	512.4	176.7	191.9

Source: U.S. Bureau of Labor Statistics

Producer Price Indexes for Selected U.S. Recovered Paper Grades, 1988-2015

YEAR	RECOVERED PAPER	OLD NEWSPAPER	CORRUGATED	PULP SUBSTITUTES & DE-INKING
1988	115.6	110.6	94.1	131.9
1989	98.9	57.3	67.8	136.1
1990	87.4	48.0	62.2	120.0
1991	76.4	47.0	62.0	96.8
1992	74.0	43.2	54.6	98.8
1993	73.1	49.1	54.1	95.3
1994	115.7	110.7	121.3	107.5
1995	189.7	234.5	194.1	148.9
1996	79.0	54.9	82.4	80.0
1997	90.9	52.0	100.5	91.9
1998	80.9	58.3	72.7	86.8
1999	102.1	80.4	82.3	94.3
2000	157.1	120.8	98.8	152.2
2001	82.7	74.8	53.7	95.4
2002	96.2	91.8	79.9	97.8
2003	109.5	100.9	81.2	117.8
2004	128.5	118.2	107.2	128.4
2005	128.3	116.0	101.4	128.8
2006	128.4	111.3	105.9	133.4
2007	195.6	149.2	164.9	185.7
2008	194.5	162.3	145.7	207.5
2009	123.7	97.7	77.1	127.7
2010	219.2	131.2	161.0	222.7
2011	251.0	170.1	179.1	246.8
2012	192.6	117.7	136.2	181.4
2013	188.7	104.2	132.4	169.8
2014	177.5	88.7	120.7	182.3
2015	150.5	79.5	98.8	166.7

Source: U.S. Bureau of Labor Statistics

Appendix D: Global Scrap Exports by Commodity

by Volume (metric tons) and Value (US$), 2015

Commodity	Volume (mt)	Value (US$)
Ferrous scrap	81.5 million	$25.5 billion
Recovered paper	55.4 million	$8.4 billion
Nonferrous scrap		
• Aluminum scrap	7.3 million	$10.1 billion
• Copper scrap	5.8 million	$14.5 billion
• Lead scrap	1.1 million	$410 million
• Nickel scrap	123,000	$529 million
• Tin scrap	72,000	$82 million
• Zinc scrap	350,000	$462 million
• *Other nonferrous metal scrap*	224,000	$1.9 billion
Plastic scrap	13.8 million	$5.4 billion
Rubber scrap	1.2 million	$554 million
Other scrap (textiles, glass, precious metals, etc.)	23 million	$12.5 billion

Source: UN Comtrade Database

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