Automotive Recycling Industry

Environmentally Friendly, Market Driven, and Sustainable

AUTOMOTIVE RECYCLERS ASSOCIATION
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Voice of the Recycling Industry
Institute of Scrap Recycling Industries, Inc.

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Today

The United States automotive recycling industry is continuously implementing creative ways to reuse components, reduce waste and increase recycling rates from the process of manufacturing vehicles through their end-of-life recycling.

A Vital U.S. Industry: Auto Recycling

The United States automotive recycling industry—a vital, market-driven industry with more than $32 billion in sales annually—plays a crucial role in the efficient, environmentally responsible recycling of end-of-life vehicles. Automotive recycling businesses employ over 140,000 people at more than 9,000 locations around the country.[1]

The Road to ReinCARnation

The primary goals of the automotive recycling industry are to harvest automobile components for reuse and to recycle the remaining valuable materials into specification-grade commodities that can be used in the manufacture of new basic materials such as steel, aluminum, plastic, copper, and brass.

Auto recyclers remove parts such as engines, transmissions, doors and bumpers for reuse in other vehicles. Other parts that can also be remanufactured include starters, alternators and water pumps. Batteries, catalytic converters, tires and some plastics are removed and their materials are recycled into new products. Fluids such as engine oil, coolant, and gasoline are carefully managed to prevent releases by storing them in double-walled tanks and/or secondary containment prior to being reused or recycled.

Once dismantled, the vehicle is sent to a shredding facility. These capital intensive plants are complex material separation operations. The shredder pulverizes the vehicle into fist-sized pieces of materials, which are then sent by conveyors to sophisticated separation technologies, including magnetic separation, eddy current, laser and infra-red systems. The metal recovered by these plants becomes raw material feedstock for steel mills, electric arc furnaces, aluminum and other non-ferrous metal smelters to manufacture a variety of products, including new vehicles.

How Recycled Products Become New Products

Through the recycling process, end-of-life vehicles (ELVs) are recycled into new vehicles, old consumer products are recycled into components of new vehicles, and parts of old vehicles are recycled into new consumer products. Typically vehicles in North America are composed of approximately 20% post-consumer recycled material by weight.[2] Everything from old carpet to blue jeans may end up in your new vehicle.

ELVs are recycled into new vehicles. Approximately 86% of a vehicle's material content is recycled, reused or used for energy recovery.[3] For example, used carpet becomes air cleaner assemblies and engine fan modules, and manufacturers build new tires with 10% recycled tire rubber material. Recycled tire rubber is also used in brake pedals or floor mats.

Old consumer products are recycled into components of new vehicles. For instance, milk jugs are recycled into auto trim, carpet and used clothing into sound-deadening material, and spent battery casings become splash shields. Recycled plastic bottles are used to make heating and air conditioning vent covers and engine oil level gauges. Nylon carpet is used in air cleaners and evaporative emissions systems. Additional post-consumer plastics are used in components like underbody shields, battery trays, fan shrouds, air conditioner housings and carpets.

ELVs are recycled into new consumer products. In particular, metals such as steel or copper from ELVs are melted down and reused for new consumer products, building construction, or put back into the production of new vehicles. For example, consumer batteries used in such household items as flashlights or cameras, are often made from recycled automotive metal.

Results

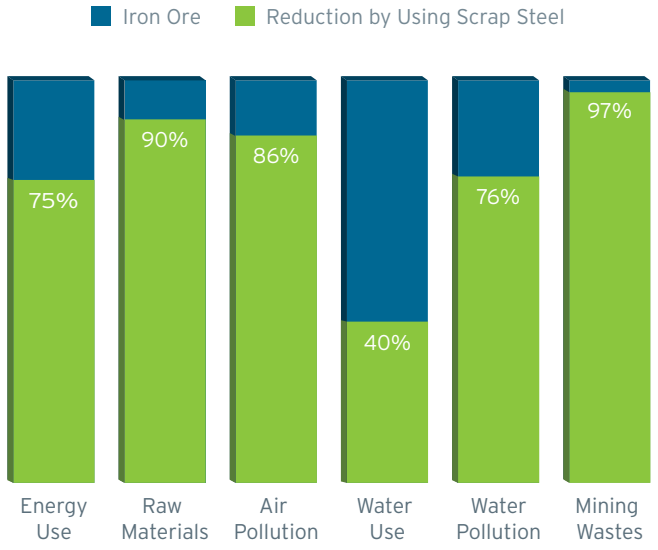
The automotive recycling industry also saves energy, conserves natural resources, reduces air and water pollution and greenhouse gas (GHG) emissions, and recycles environmentally sensitive substances including lead, mercury, oil and unspent fuel.

Using recycled scrap iron and steel reduces the use of virgin iron ore, among other environmental benefits. Every ton of new steel made from scrap steel conserves:[4]

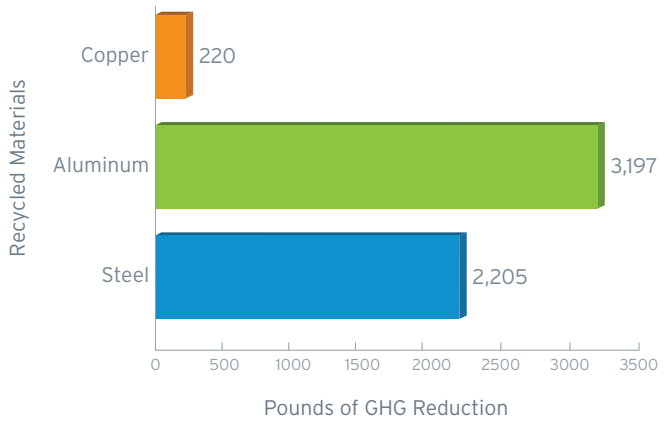
- 2,500 lbs. of iron ore
- 1,400 lbs. of coal
- 120 lbs. of limestone

By using recycled metals, CO_2 emissions are reduced in the manufacturing process. CO_2 is known to contribute to global warming as a GHG by intensifying the amount of heat retained by the atmosphere. Given the approximately 12.6 million vehicles recycled each year by the automotive recycling industry, GHG emissions are reduced by over 30 million metric tons per year.*

Benefits of Using Scrap Steel vs. Iron Ore[5]



Estimated GHG Reductions Per Vehicle Recycled



Estimated by the Fraunhofer Institute for Environmental, Safety and Energy Technology of Oberhausen, Germany.

The Automotive Recyclers Association (ARA) estimates that each year the industry collects and reuses or recycles:

- 100.8 million gallons of gasoline and diesel fuel
- 24 million gallons of motor oil
- 8 million gallons of engine coolant
- 4.5 million gallons of windshield washer fluid
- 96% of all lead acid batteries

Industry is working together to recycle mercury switches from 2002 Model Year and older ELVs. End of Life Vehicle Solutions Corporation, established by the auto industry, works with over 9,000 recyclers in this effort and has collected approximately 4 million switches to date, keeping 9,000 lbs of mercury out of the environment.[6]

Recycling is a perfect example of a sustainable industry; yielding environmental benefits while using market driven principles to create "green" jobs.

* Average number of vehicles retired per year in the U.S. (from 2001 – 2010, source Wards) is 12,607,000
Average metric tons of GHG reduction per year from recycling vehicles (12,607,000 *.95 * 2.57 = 30,779,991 metric tons per year)

Vehicle Recycling 101

Automobiles are Among the Most Recycled Consumer Products in the U.S.

Automobiles are among the most recycled commodities. Indeed, automobiles maintain a recycling rate of nearly 100 percent![7] Here's what happens to some common components of automobiles during recycling:

STEERING WHEEL
column can be dismantled and resold.

STEREO
can be removed and resold.

SEATS
can be removed and resold.

GAS TANK
can be removed and resold.

GAS
is drained for reuse.

SHEET METAL
can be removed and resold.

SHREDDERS PULVERIZE
the vehicle into fist-sized pieces at the rate of 4 vehicles per minute in the largest machines.

MAGNETS
are used to separate the ferrous (iron and steel) from non-ferrous (aluminum) metals. The recovered ferrous metals are recycled to produce new steel.

SEPARATION TECHNOLOGIES
such as eddy current, laser, infra-red, and flotation separation technologies are used to segregate the mixed non-ferrous metals into pure streams of materials which can then be sent for resmelting.

STEEL
is recycled at a rate of more than 18 million tons each year from end-of-life vehicles.[8]

Industry continuously works to optimize vehicle recycling, and searches for solutions that reduce landfill waste.

STARTER & ALTERNATOR
can be removed and resold or sent for remanufacturing.

BATTERY
can be resold or recycled.

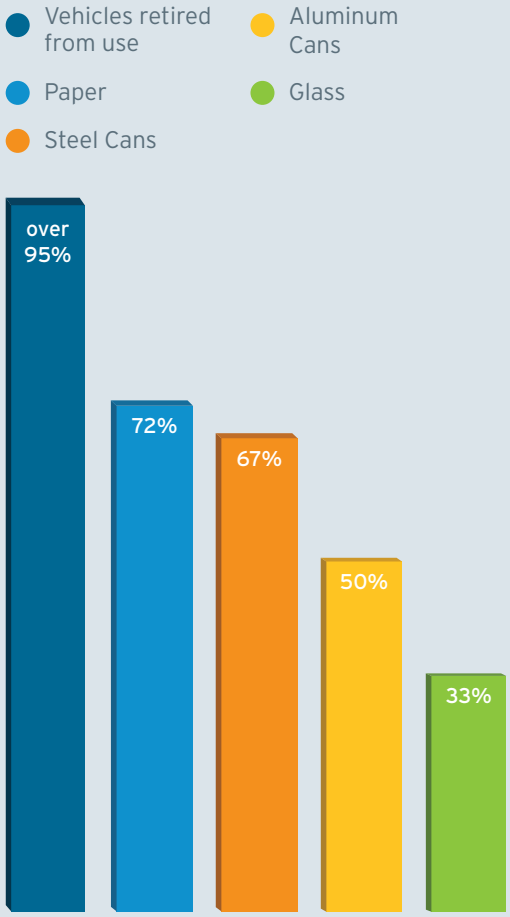
WINDSHIELD WASHER
fluid is drained for reuse.

COOLANT
is drained for reuse.

ENGINE & TRANSMISSION
can be dismantled, reconditioned, and resold.

TIRES
are reused depending on a visual inspection and tread depth evaluation. Worn tires can be recycled by shredding, cleaning, and processing into a variety of products including asphalt, playground surfaces and garden mulch. Additionally, worn tires can be used as a fuel for the beneficial recovery of energy.

2010 Recycling Rates[9]



Autos are among the most recycled consumer product. This chart reflects the recycling rate of autos compared with other commonly used products and materials.

Tomorrow

The automotive industry is constantly adapting its business model to support sustainability practices.

A Business Model to Support Sustainability

Automakers are working with industry partners to:

- Eliminate the remaining trace amounts of mercury in automobiles.
- Increase the use of recycled content and work to "upcycle" certain materials – that is, recycle it into uses with higher material and performance requirements than the virgin material. For example, work is being done to upcycle post-consumer laundry and milk bottles into blow-molded automotive components.
- Expand the use of renewable materials presently used and develop new materials and applications for other renewable materials, such as corn-based, compostable and natural-fiber-filled plastics.
- Support the recycling of new technologies such as high voltage batteries. The automotive industry has published dismantling manuals for these batteries[10] and is developing standards for labeling, transportation, testing, packaging, and recycling through Society of Automotive Engineers workgroups.
- Use life-cycle methodologies as guidance to reduce the environmental impacts from raw material extraction to ELV recycling.

The Automotive Recyclers Association (ARA) has established a program which implements best management practices across the industry (the Certified Automotive Recycler program[11]). Automotive recyclers follow these practices to prevent adverse impacts on the environment. For example:

- All batteries are removed and placed either in a covered storage area on an impervious surface or in plastic containers with lids.
- Engines and transmissions removed from vehicles to be resold are stored under a permanent roof on an impervious surface, or in an outdoor covered, weather-proof container.
- Remanufacturable and recyclable engines and transmissions are stored under a permanent roof on an impervious surface, or in an outdoor covered, weather-proof container or on an impervious surface that drains to an oil-water separator or equivalent treatment device.
- Spent solvents from parts cleaning systems are disposed of with an authorized processor. Wash water from water-based parts washers is either recycled or collected for disposal in an approved manner.
- Tires are removed and sent to approved recycling sites regularly, never having more than a semi-load of tires on site at any time.

ARA has long known its responsibility to recycle ELVs in an environmentally sustainable manner. It partnered with the U.S. Environmental Protection Agency in 2000 to establish an online portal that provides state-specific rules and regulations that automotive recyclers must follow to ensure that the ELV recycling process is done in a way that supports environmental sustainability. This portal, which is in its 3rd cooperative contract phase, is named the Environmental Compliance for Automotive Recyclers Center.[12]

ARA also has developed a Green Recycled Parts (GRPs)™ brand that promotes the reuse of original equipment manufacturer (OEM) parts from end-of-life vehicles. By using GRPs, automotive recyclers are reusing quality parts, thus preventing a mountain of waste from ending up in landfills, reducing the need for production of new parts and saving energy and vital resources.

The Institute of Scrap Recycling Industries (ISRI) has developed operating guidelines for shredder plants that are designed to protect the health and safety of everyone at the shredding facility and in the surrounding community and to protect the environment. ISRI also developed the concept of Design for Recycling®, a voluntary standard for manufacturers to follow when designing their products. Design for recycling calls upon manufacturers to reduce their use of hazardous or toxic materials, to design their products so that they are readily recyclable at the end of their useful lives, and to the maximum extent practicable, to increase their use of recycled materials in the manufacture of their products.

From the Past Into the Future

In the mid-1960s, over eight million obsolete automobiles lay waiting to be scrapped, mostly in tow lots , many of which were located near newly built roadways. Auto shredders, developed in the early 1960s, began to proliferate throughout the U.S. helping to rid the countryside of obsolete automobiles. This shredder technology helped recycle ELVs both in the U.S. and in the global arena.

As commodity prices increase and the world economy expands, additional demand for materials is being created. U.S. industry is ready to meet the challenge, delivering innovative, sustainable products while driving technology that will recover more materials from ELVs and protect the environment.

Footnotes

1. Information about the North American Recycling Industry provided by the Automotive Recyclers Association and the Institute of Scrap Recycling Industries.
2. Data provided by Alliance member companies.
3. SAE 2011 Paper "Vehicle Recycling, Reuse, and Recovery: Material Disposition from Current End of Life Vehicles"
4. American Iron and Steel Institute, see www.steel.org/~/media/Files/AISI/Fact%20Sheets/50_Fun_Facts_About_Steel.ashx
5. Norstar Steel Recyclers website at www.norstar.com.au/Recycling/Processing/Benefits.aspx
6. ELVS Mercury Switch Recovery Program Reporting at www.eqonline.com/services/ELVS-Mercury-Switch-Recovery-Program/annual-report.asp?year=all
7. Steel Recycling Institute website at www.recycle-steel.org/en/Steel%20Markets/Automotive.aspx
8. Ibid
9. Data from EPA's 2010 Municipal Solid Waste Reports found at www.epa.gov/osw/nonhaz/municipal/msw99.htm and Steel Recycling Institute (www.recycle-steel.org/en/Steel%20Markets/Automotive.aspx)
10. ELVS website at www.elvsolutions.org/battery_home.html
11. ARA website at www.a-r-a.org and click on the CAR prompt
12. ECAR website at www.ecarcenter.org.

Since 1943, the Automotive Recyclers Association (ARA) is an international trade association which has represented an industry dedicated to the efficient removal and reuse of automotive parts, and the safe disposal of inoperable motor vehicles.

ARA services approximately 1,000 member companies through direct membership and over 2,000 other companies through our affiliated chapters. Suppliers of equipment and services to this industry complete ARA's membership. ARA is the only trade association serving the automotive recycling industry in 12 countries internationally.

ARA aims to further the automotive recycling industry through various services and programs to increase public awareness of the industry's role in conserving the future through automotive recycling and to foster awareness of the industry's value as a high quality, low cost alternative for the automotive consumer. ARA encourages aggressive environmental management programs to assist member facilities in maintaining proper management techniques for fluid and solid waste materials generated from the disposal of motor vehicles.

To learn more about the ARA visit www.a-r-a.org
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Institute of Scrap Recycling Industries, Inc.

Voice of the Recycling Industry

ISRI, a Washington, DC, based trade association, represents more than 1,600 for-profit companies - ranging from small, family-owned businesses to large, multi-national corporations -- operating at more than 6,000 facilities in the United States and 30 countries worldwide. Our members are manufacturers and processors, brokers and industrial consumers of scrap commodities, including ferrous and nonferrous metals, paper, electronics, rubber, plastics, glass and textiles. ISRI's associate members include equipment and service providers to the scrap recycling industry. Manufacturers and sellers of equipment and services—such as shredders, balers, cranes, cargo transporters, computer systems and more—find value in promoting the scrap recycling industry through their membership in ISRI.

To learn more about ISRI visit www.isri.org
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The Alliance of Automobile Manufacturers is an association of 12 vehicle manufacturers including BMW Group, Chrysler Group LLC, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota, Volkswagen Group of America and Volvo Cars of North America.

To learn more about automotive recycling, visit www.autoalliance.org
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