

The Aluminum Can Advantage Sustainability Key Performance Indicators

December 2020



Introduction

The Aluminum Association and Can Manufacturers Institute (CMI) are committed to providing up-to-date, complete and accurate information on aluminum beverage industry sustainability. To that end, our organizations are releasing a comprehensive report on key sustainability performance indicators (KPI) for one of our best-known and widely used consumer products – the aluminum can.

Aluminum beverage can recycling is vital to the nation’s recycling system and overall economy. It allows can manufacturers to make beverage containers in the most environmentally friendly and economical way possible. Using recycled aluminum in making a beverage can saves more than 90 percent of the energy needed to produce a beverage can with new, or primary, aluminum.¹

In addition, aluminum’s recycling profile and the high value of the material means that, unlike competing packages like glass and plastic bottles, most recycled cans are turned into new cans, making the aluminum beverage can a textbook example of the circular economy. The full aluminum can value chain – can manufacturers, consumers, aluminum recyclers, beverage brands and more – should be proud of the aluminum beverage can’s industry-leading U.S. recycling rate that averaged above 51 percent over the past 10 years.

This closed-loop process drives a virtuous cycle of high recycling rates, a large percentage of recycled content in the average aluminum can and an economically sustainable process that effectively subsidizes municipal recycling programs nationwide. However, recycling rates in the United States have been in decline in recent years.

The Aluminum Association, in partnership with our member companies – which are responsible for all of the aluminum can sheet production and most of the aluminum used beverage can (UBC) recycling in the United States – and in collaboration with CMI, which represents can makers and sheet manufacturers, has developed a series of KPIs, as well as comparative information, to provide a complete picture of the aluminum beverage can’s sustainability performance.

Key Performance Indicators

Industry Recycling Rate

Measures the amount of used aluminum can scrap recycled (melted to make new products) by U.S. aluminum producers as a percentage of cans shipped. This rate provides a measure of industry efficiency relative to overall can shipments. This rate includes both domestic and imported can scrap from foreign countries that is reclaimed by U.S. producers as well as used cans that are exported and recycled overseas. The rate is unique to the aluminum industry. It is worth noting that this rate for the aluminum can is similar to a net recycling rate since the numerator represents quantities of clean shredded scrap charged into melting furnaces.

Consumer Recycling Rate

Measures the amount of aluminum can scrap recycled domestically as a percentage of cans available for recycling in the United States. To provide a more accurate representation of U.S. consumer recycling behavior, the consumer rate excludes imported can scrap and also accounts for the movement of unfilled cans into/out of the United States. The rate is one indication of how well municipal recycling programs are performing nationwide, though it can still be impacted by year-to-year fluctuations in metal flows and commodity prices. Additionally, the rate provides an indication of how much aluminum can scrap is either landfilled, held in inventory, or has otherwise fallen outside the association's tracking system.

Recycled Content

Measures the proportion of recycled aluminum versus virgin aluminum in the average aluminum can. The recycled content measure is one indicator of environmental stewardship of the aluminum can.

Value of Material

Measures the dollar value per ton of aluminum can scrap. The value of material measure indicates the relative importance of different materials commonly found in the recycling bin to sustaining the financial viability of municipal recycling programs. The data is based on a two-year rolling average of commodity prices for competing material types.

	Aluminum Cans	Glass Bottles	Plastic Bottles (PET)
Industry Recycling Rate ²	55.9%	N/A	N/A
Consumer Recycling Rate	46.1%	39.6% ^{3,4}	20.7% ^{5,6,7}
Recycled Content	73%	23% ⁸	5.6% ^{9,10}
Value of Material ¹¹	\$1,210/ton	-\$21/ton	\$237/ton

Industry Recycling Rate

Background

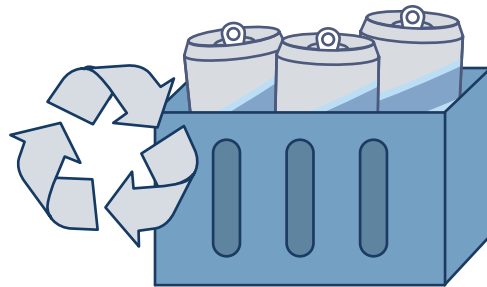
The industry recycling rate indicates the amount of aluminum can scrap recycled by U.S. aluminum producers as a percentage of finished cans shipped by the industry during a one-year time period. In basic terms, the rate provides an indication of industry stewardship and efficiency in managing the metal. This rate includes imported can scrap as well as used beverage cans that are exported and recycled overseas. Imports in particular have become an increasingly important feedstock for U.S. can recyclers in recent years. The quantity of scrap recycled is measured directly at the point where processed (e.g. contamination removed) UBCs are fed into melting furnaces. This means that the aluminum is truly recycled, not simply “available for recycling” – the standard for some material recycling rates.

Further, aluminum cans are most often recycled in a “closed loop” while glass and plastic are often downcycled into other products such as road pavement or carpet fiber. Though the recycled material in these cases is diverted into another product for some period, it will ultimately end up in the landfill. Aluminum, by contrast, is generally recycled directly back into itself and, accordingly, never has to end up in a landfill.

The industry recycling rate decreased in 2019 to 55.9 percent. This change was driven largely by production shifts within the industry in 2019 and falls below the 20-year average industry recycling rate of 58.8 percent.

Methodology

The industry recycling rate is based on survey input of UBC melting facilities including can sheet producers, can manufacturers and secondary producers of aluminum, representing nearly all can recycling activity in the United States.



The calculation to determine the rate is as follows:

$$\frac{(\text{Pounds of UBC Melted Domestically}^{12} + \text{Pounds of UBC Exports}^{13})}{\text{Pounds of Cans Shipped by U.S. Producers}^{14}} =$$

$$\frac{\text{Pounds of Cans Recycled by Industry}}{\text{Pounds of Cans Shipped by U.S. Producers}} =$$

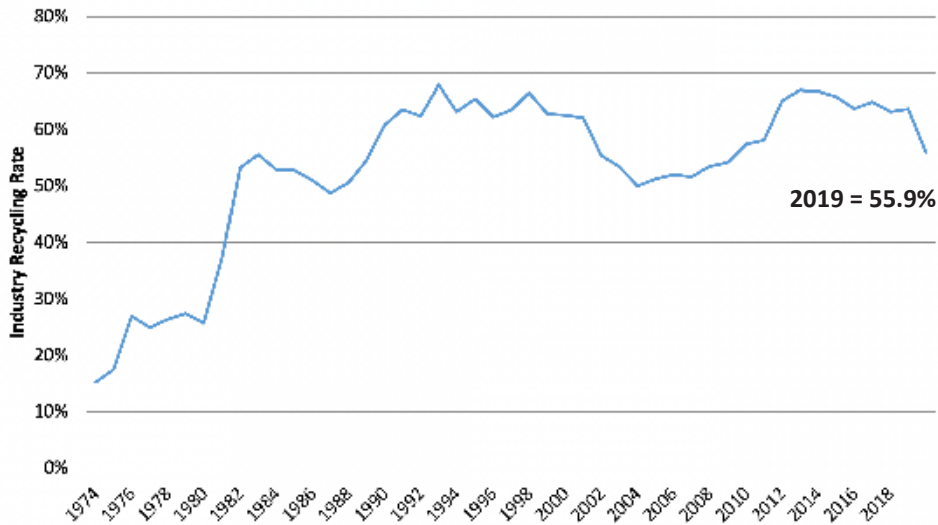
$$\frac{1.502.2 \text{ Billion Pounds of Cans Recycled}}{2.689.5 \text{ Billion Pounds of Cans Shipped}} = 55.9\%$$

Industry Recycling Rate Calculation History

	2011	2012	2013	2014*	2015*	2016*	2017	2018	2019
Pounds of UBC Melted Domestically (MMlbs)	1,669.2	1,664.0	1,658.4	1,637.2	1,480.1	1,541.6	1,615.80	1,577.0	1,416.5
+ Pounds of UBC Exports (MMlbs)	92.8	108.7	62.9	62.1	145.1	89.6	58.8	91.6	85.7
= Pounds of Cans Recycled (MMlbs)	1,762.0	1,772.8	1,721.4	1,699.4	1,625.2	1,631.2	1,674.6	1,668.6	1,502.2
/ Pounds of Cans Shipped by U.S. Producers (MMlbs)	2,708.4	2,644.0	2,581.3	2,555.7	2,528.7	2,529.2	2,645.7	2,622.6	2,689.5
= Industry Recycling Rate	65.1%	67.0%	66.7%	66.5%	64.3%	64.5%	63.3%	63.6%	55.9%

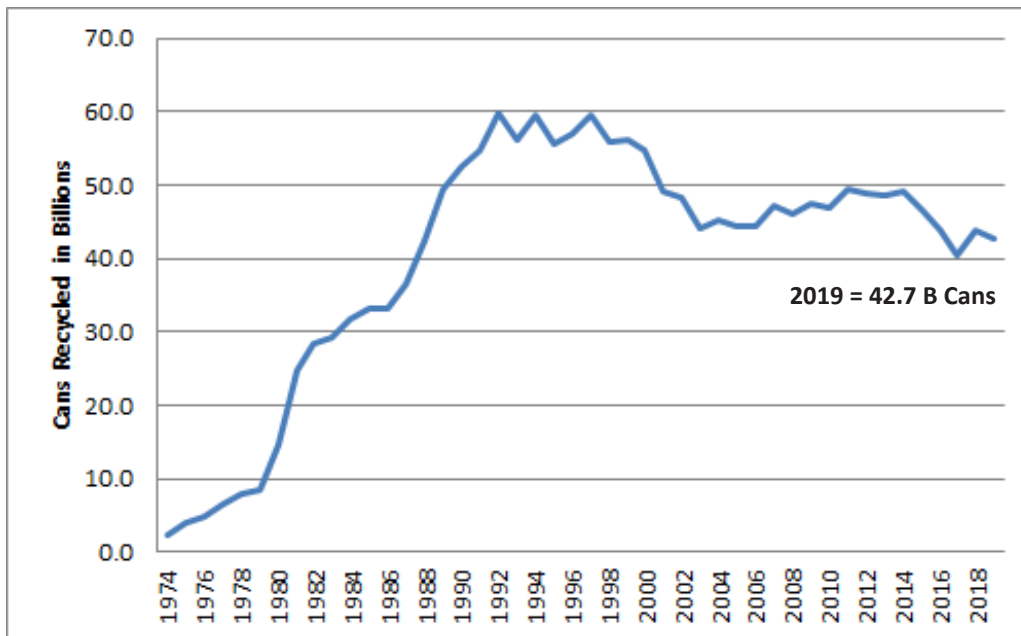
*Some data updated to reflect corrected reporting errors in prior year data sets.

Industry Recycling of Aluminum Cans Through the Years



The aluminum industry recycling rate was 15.4 percent when first reported in 1972. While the rate has dramatically improved over the last four decades, the 2019 industry recycling rate falls below the 20-year average industry recycling rate of 58.8 percent.

Number of Cans Recycled by U.S. Aluminum Industry



Since tracking began in 1972, the aluminum industry has recycled more than 2 trillion aluminum beverage cans.

Consumer Recycling Rate



Background

The consumer recycling rate provides a measure of the amount of domestic aluminum can scrap recycled as a percentage of cans available for recycling in the United States during a one-year time period. This rate excludes can scrap imported from foreign countries to provide a more accurate representation of consumer recycling behavior in the United States. The rate provides a snapshot of how well municipal recycling programs are performing nationwide though it can still be impacted by year-to-year fluctuations in metal flows and commodity prices. It also indicates the amount of aluminum can scrap that either finds its way to the landfill every year, was held in inventory or otherwise fell outside the AA's tracking system. This rate for the aluminum can is similar to a net recycling rate since the numerator represents quantities of clean shredded scrap charged into melting furnaces.

The consumer recycling rate for aluminum cans fell to 46.1 percent in 2019. The updated recycling rate is below the 20-year average of around 50 percent. Aluminum packaging represents only 3 percent of the weight but nearly half of the economic value of recyclable material generated by a typical single-family home.¹⁵ Further, multiple independent studies have concluded that aluminum is the only beverage container type in the bin that more than covers its cost of collection and processing in municipal recycling programs.

However, 50 billion cans – more than \$810 million worth of aluminum – were diverted from the recycling stream in 2019 and could otherwise have been responsibly recycled and made into new cans. This loss has a significant negative impact on the environment through wasted energy and resources, and on the economy through lost jobs.

Increasing aluminum can recycling rates is a concrete step that can save resources and energy, grow the economy and help shore up recycling systems of all types in the United States. Learn more in *Every Can Counts: An Aluminum Beverage Can Recycling Manifesto*.

Methodology

The consumer recycling rate is based on survey input from can sheet producers, can manufacturers and secondary producers of aluminum, representing nearly all can recycling activity in the United States.

One important methodology change in the 2018 report is the average weight of a representative aluminum can. The data is represented by the number of finished empty cans per pound. In the past, the cans were represented by the standard 12 fl oz. can, which represents the majority of cans shipped domestically. However, in rates after 2017, the cans are represented by the weighted average of all size cans shipped to the market. This change means the “average” can is now heavier due to the inclusion of larger size cans such as 16 fl. oz. and 24 fl. oz., etc. This has led to a minor decline in recycling rates for both the industry and consumer rates. This is because the total quantity of UBC scrap consumed during a year is measured by weight while the total shipment of cans is measured by the number of cans. The change in calculation methodology starts from the 2017 rates.

The calculation to determine the rate is as follows:

$$\frac{(\text{Pounds of UBC Melted Domestically}^6 + \text{Pounds of UBC Exports}^7 - \text{Pounds of UBC Imports}^7)}{(\text{Pounds of Cans Shipped by U.S. Producers}^8 - \text{Pounds of Exported Unfilled Cans}^7 + \text{Pounds of Imported Unfilled Cans}^7)} =$$

$$\frac{\text{Pounds of Cans Recycled by U.S. Consumers}}{\text{Pounds of Cans Shipped Corrected for Imports \& Exports}} =$$

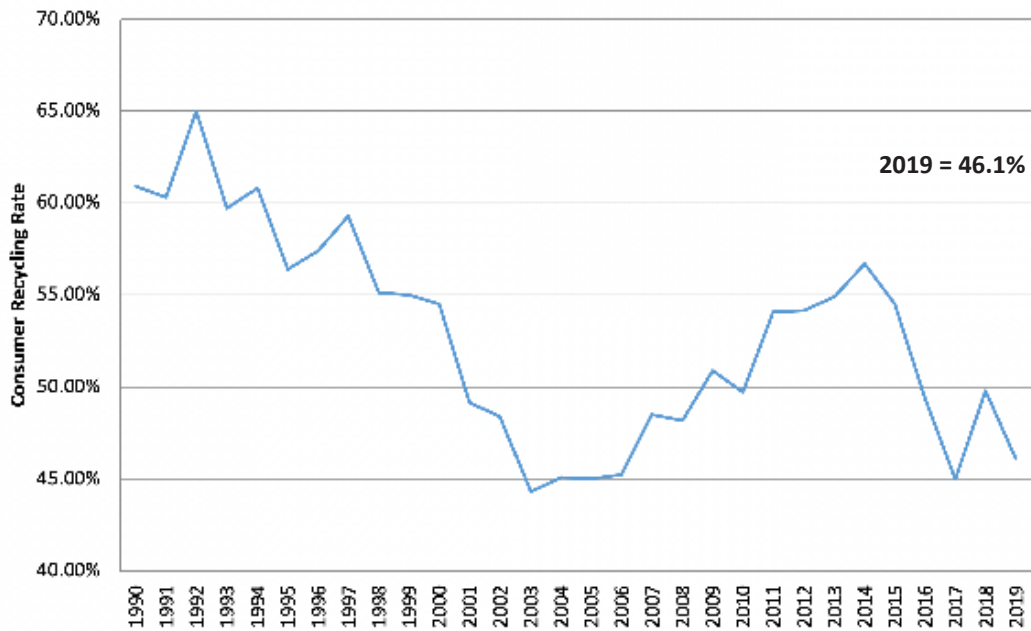
$$\frac{1.263 \text{ Billion Pounds of Cans Recycled by U.S. Consumers}}{2.741 \text{ Billion Pounds of Cans Shipped Corrected for Imports \& Exports}} = 46.1\%$$

Consumer Recycling Rate Calculation History

	2011	2012	2013	2014*	2015*	2016*	2017	2018*	2019
Pounds of UBC Melted Domestically (MMlbs)	1,669.2	1,664.0	1,658.4	1,637.2	1,480.1	1,541.6	1,615.80	1,577.0	1,416.5
+ Pounds of UBC Exports (MMlbs)	92.8	108.7	62.9	62.1	145.1	89.6	58.8	91.6	85.7
- Pounds of UBC Imports (MMlbs)	329.7	367.8	333.1	286.8	291.8	383.7	475.0	367.9	239.4
= Pounds of Cans Recycled by U.S. Consumers (MMlbs)	1,432.3	1,405.0	1,388.2	1,412.5	1,333.4	1,247.5	1,199.6	1,300.7	1,262.8
/ Pounds of Cans Shipped by U.S. Producers (MMlbs)	2,708.4	2,644.0	2,581.3	2,555.7	2,528.7	2,529.2	2,645.7	2,622.6	2,689.5
- Pounds of Exported Unfilled Cans (MMlbs)	76	70	67	82	101	61	11	6	7
+ Pounds of Imported Unfilled Cans (MMlbs)	16	20	15	17	17	26	23	54	59
= Pounds of Cans Shipped Corrected for Imports & Exports (MMlbs)	2,648	2,594	2,529	2,491	2,445	2,494	2,658	2,670	2,741
= Consumer Recycling Rate	54.1%	54.2%	54.9%	56.7%	54.5%	50.0%	45.1%	48.7%	46.1%

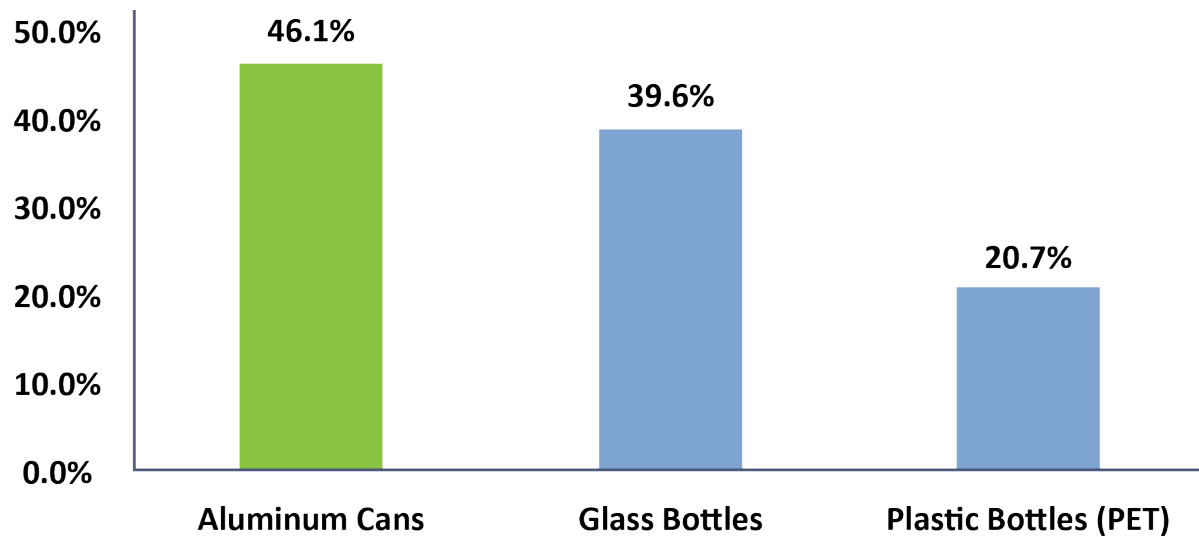
*Some data updated to reflect corrected reporting errors in prior year data sets.

Consumer Aluminum Can Recycling Rate Through the Years



Following a period of decline from the mid-1990s to early 2000s, the consumer recycling of aluminum cans recovered slightly over the past decade though challenges in the U.S. recycling system remain.

Recycling Rate for Competing Packaging Types



The aluminum can is by far the most recycled beverage container by consumers. The closed loop nature of aluminum can recycling, and the metal's inherent high value in the recycling stream, drive a virtuous environmental and economic cycle.

Recycled Content



Background

Recycled content data measures the proportion of recycled aluminum versus new or virgin aluminum in the average aluminum can. High recovery rates for aluminum along with the closed loop nature of can recycling truly sets the aluminum can apart as a sustainable package type. In contrast to glass and plastic bottles, a large percentage of the average aluminum can is made from recycled material.

The high recycled content in the average aluminum can is an indicator of environmental stewardship of the package.

The recycled content of the can contains metal from both post-consumer and post-industrial scrap sources. However, the calculation excludes internal run-around scrap metal (metal generated during a manufacturing process that is subsequently recycled on-site).

The association's recycled content figure follows the guidelines and definitions laid out by the Federal Trade Commission (FTC) "Green Guides" as well as UL Environment, an environmental label certification company. The approach also aligns with International Organization for Standardization (ISO) compliance according to the 14021 standard in section 7.8.1.

Methodology

The recycled content figure for the aluminum can is based on a survey of the five main producers of aluminum can sheet in the United States – Alcoa, Constellium, Logan, Novelis, and Tri-Arrows. These companies provide data to determine the composition of an average aluminum can. The survey is also part of AA's beverage can life cycle assessment (LCA) studies. Data is collected by asking the responders to report the total annual quantities of different source of metal inputs into can sheet ingot and can sheet productions as well as other inputs of material and energy, and releases of environmental emissions and wastes. The latest time periods for the survey were 2016 and 2017. The recycled content number is the average of the two time periods.

This survey is conducted by AA every 4 to 5 years. The previous figure was calculated using 2012 data and found a 70 percent total recycled content figure for the average aluminum can. This compares to an average of 23 percent recycled content for glass and 5.6 percent recycled content for plastic (PET) according to EPA estimates.⁴

Results from the latest aluminum can recycled content survey are reflected below
(when scaled into a full can without counting the internal scrap as a metal source):

12.99 grams (metallic weight of an average aluminum can):

3.57 grams = Primary aluminum¹⁶ = 27%

5.60 grams = Used beverage can (UBC) scrap = 43%

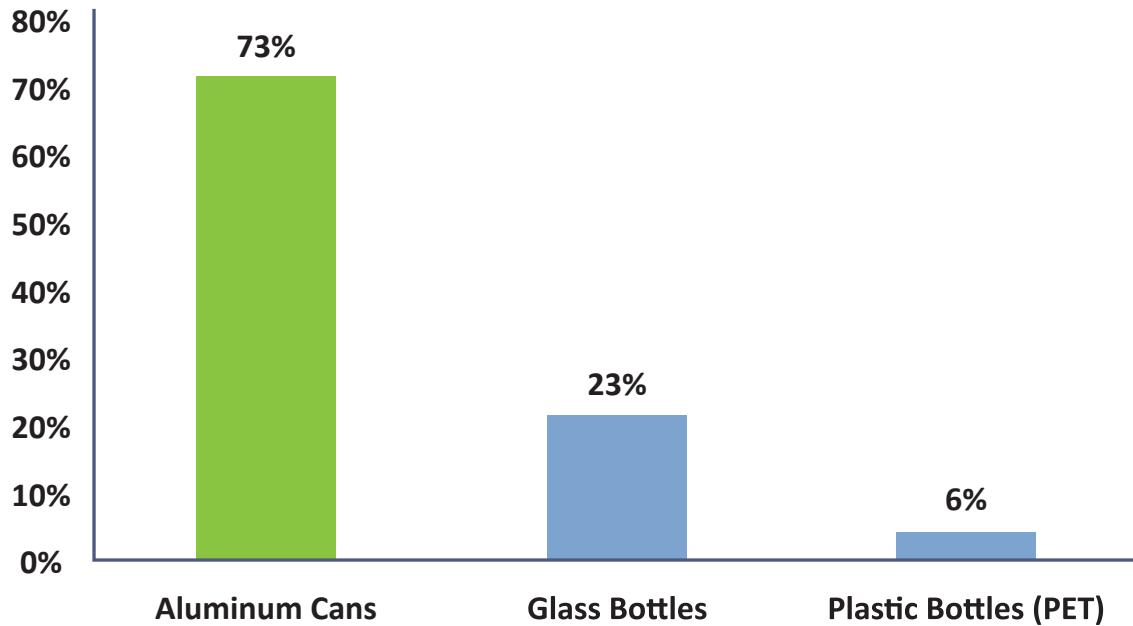
0.86 grams = Non-UBC post-consumer scrap¹⁷ = 7%

2.96 grams = Post-industrial scrap¹⁸ = 23%

Recycled Content = 73%

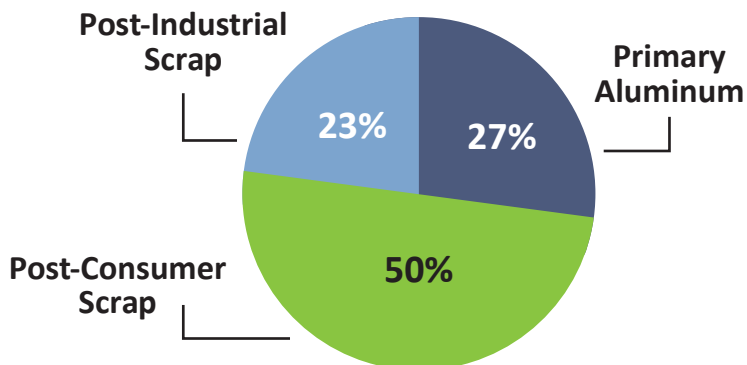
More detail on how aluminum cans are made, what source of metals are used, and on the calculation methodology is available at www.aluminum.org/sustainabilityreports.

Recycled Content for Competing Packaging Types



The high recycling rates and closed loop nature of aluminum can recycling mean that aluminum cans contain far more recycled content than competing packaging types. Unlike other package types, aluminum cans are most often recycled directly back into themselves not downcycled into new products which will ultimately end up in landfills.

Recycled Content of the Average Aluminum Can



By far the largest percentage of material in the average aluminum can is post-consumer scrap generated from the UBC recycling stream and other scrap sources. Another large percentage of recycled content comes from scrap generated during manufacturing processes.

Value of Material

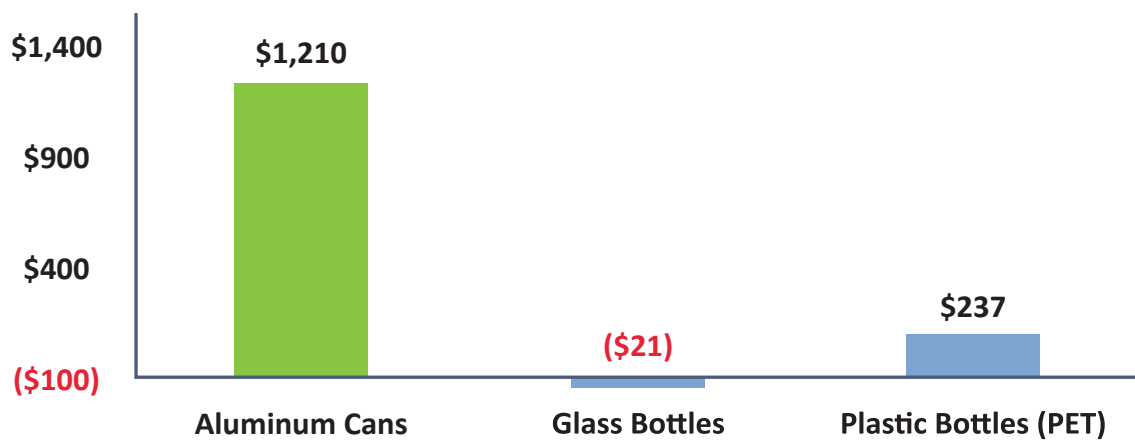
Background

The value of material data measures the dollar value of aluminum can scrap. Many municipal recycling programs rely on re-selling the material collected in curbside bins to help subsidize their programs. The high value of aluminum in the scrap stream means that, without it, very few curbside pickup programs would be financially viable.

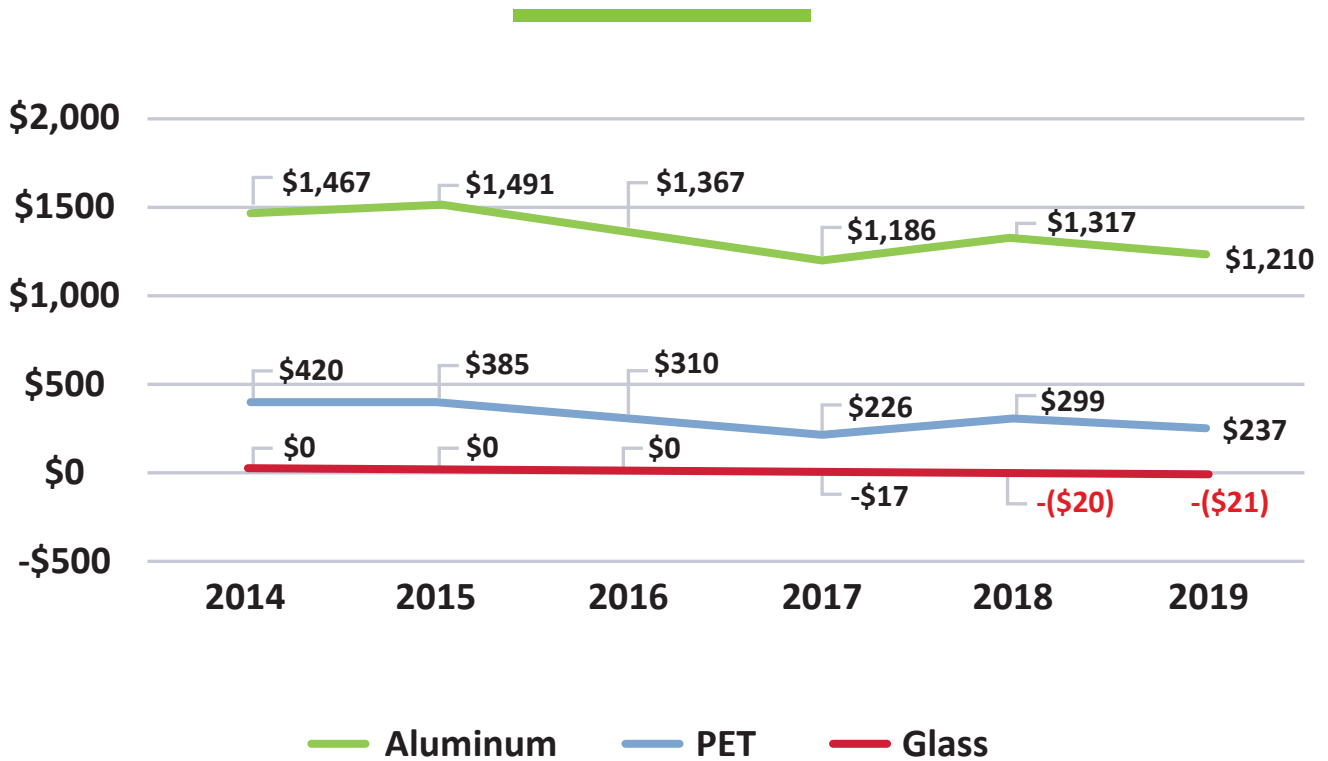
Methodology

This data is based on a two-year rolling average of commodity prices from February 2018 – February 2020 for various material types via <http://www.recyclingmarkets.net/>.

Value Per Ton of Competing Packaging Types



Beverage Container Recycling Value Per Ton Through the Years



Aluminum is by far the most valuable item in the recycling bin on a per-ton basis. It effectively subsidizes less valuable items like glass and plastic. Many municipal recycling programs would not be viable without aluminum in the recycling stream.

Citations

¹ http://www.aluminum.org/sites/default/files/LCA_Report_Aluminum_Association_12_13.pdf

² No equivalent data available for glass or plastic bottles.

³ Data for glass beverage and wine bottles via the Environmental Protection Agency (EPA) Advancing Sustainable Materials Management: https://www.epa.gov/sites/production/files/2019-11/documents/2016_and_2017_facts_and_figures_data_tables_0.pdf

⁴ This rate is for 2017. It is unknown whether the rate is a gross recycling rate or the equivalent of aluminum can's net recycling rate.

⁵ This rate is for 2018. It is an estimated net recycling rate that is similar to how the aluminum can's rate is calculated. The estimation is based on the 2018 gross recycling rate of 28.9% published by the Association of Plastic Recyclers (APR): https://plasticsrecycling.org/images/pdf/resources/reports/Rate-Reports/National-Postconsumer-Plastics-Bottle-Recycling-Rate-Reports/2018_UNITED_STATES_NATIONAL_POSTCONSUMER_PLASTIC_BOTTLE_RECYCLING_REPORT.pdf

⁶ NAPCOR and APR reported a gross PET bottle recycling rate of 29.2% and a net recycling rate of 20.9% for the year of 2017. Since a 2018 net recycling rate is yet available, our estimation used the same discount rate as 2017. The 2017 rates can be accessed here: https://plasticsrecycling.org/images/pdf/resources/reports/Rate-Reports/Reports-on-Postconsumer-PET-Container-Recycling-Activity/APR_NAPCOR_2017RateReport_FINAL.pdf

⁷ The use of net recycling rate for PET bottles in this KPI report is different from all of the previous reports, which were gross recycling rates for PET. This change is to make the rates for aluminum can and PET bottle truly comparable.

⁸ Data for glass bottle has not changed since the 2015 KPI report. Data for glass via the Environmental Protection Agency (EPA) Individual Waste Reduction Model (WARM): https://www.epa.gov/sites/production/files/2016-03/documents/warm_v14_containers_packaging_non-durable_goods_materials.pdf

⁹ Recycled content for PET bottle is estimated based on data from the NAPCOR and APR report for 2017. In 2017, a total of 333 million pounds of rPET was reported to be used for food and beverage bottle production: https://plasticsrecycling.org/images/pdf/resources/reports/Rate-Reports/Reports-on-Postconsumer-PET-Container-Recycling-Activity/APR_NAPCOR_2017RateReport_FINAL.pdf

¹⁰ This content is post-consumer content. Pre-consumer content for PET bottle is unknown.

¹¹ Data based on a two-year rolling average of commodity prices from February 2018 – February 2020 for various material types via <http://recyclingmarkets.net/>.

¹² Input weight of used beverage can scrap melted during the year. Figures derived from survey of aluminum mills and secondary producers conducted by Aluminum Association and Institute of Scrap Recycling Industries. Estimated full coverage. Includes imported UBCs since mills purchase scrap from scrap processors, brokers and traders who do not identify source.

¹³ Foreign Trade Division. U.S. Bureau of the Census, U.S. Department of Commerce. Trade statistics derived from U.S. Customs reports. HTS 7602000030: Aluminum beverage container scrap. HTS 7612901030: Aluminum cans of a capacity not exceeding 355 ml.

¹⁴ Survey of U.S. can manufacturers conducted by Can Manufacturers Institute. Reported shipments of aluminum beverage cans lagged one quarter. Estimated full coverage- Includes exports.

¹⁵ Recycling Partnership

¹⁶ Newly produced virgin aluminum and added alloying elements.

¹⁷ Non-UBC scrap from end-of-life products from other market sectors.

¹⁸ This includes scrap generated from the can manufacturing process and recycled back into the manufacturing process, as well as manufacturing scrap from other market sectors such as building and transportation.