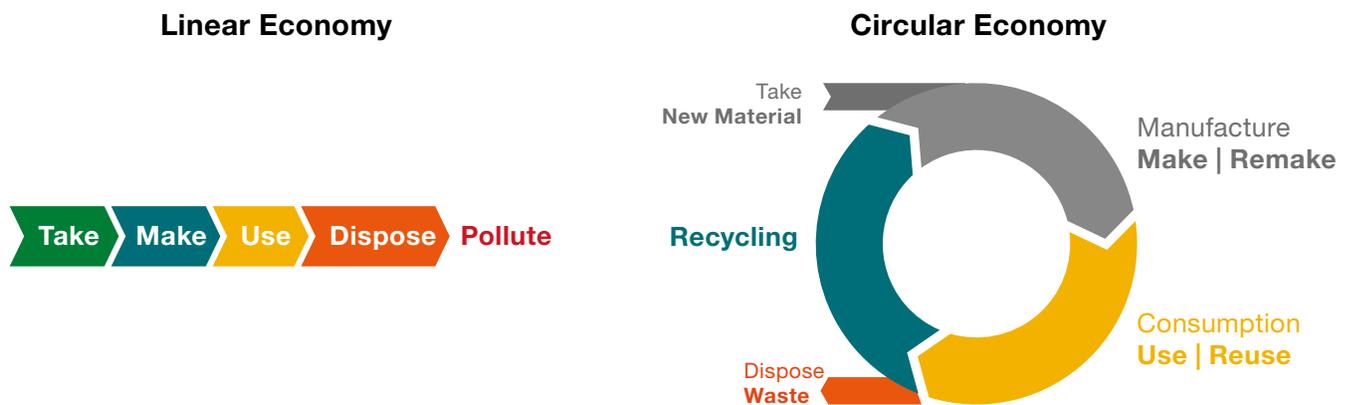


# Optimum Circularity

The Optimum Circularity pillar of our **Twentyby30 Program** is dedicated to optimizing our product circularity to move us toward a more **Circular Economy**.

## What is “Circular Economy”?

The Circular Economy model proposes to address the linear model of many industries today, sometimes known as “take-make-waste.” In the linear model, which has often been the status quo, materials are made into products, products are used and then at end of their useful life, they are discarded. This often results in the wasting of all the resources used to make the product, including the material components of the product and the energy and water used during its manufacture.



The Circular Economy model eliminates the concept of waste, constantly cycling materials back through the value chain for re-use. The model requires less energy, preserves natural resources, reduces emissions and can also produce long-term savings as less resources are used.

The Optimum Circularity Pillar of our **Twentyby30** program advances the Company’s Circularity Strategy throughout our value chain, building on the inherent circularity that comes with metal being an element, by:

- Eliminating any wasteful resource use (**Twentyby30 Goals #10 and #12**).
- Utilizing design and innovation to decrease the footprint of our products (**Twentyby30 Goals #11 and #18**).
- By extending our products’ lifecycle via increased recycling rates, as well as increasing the circularity of our products where market conditions make that possible, through increasing recycled content (**Twentyby30 Goals #12, #13 and #14**).

## Driven by design

The Circular Economy is based on three principles:



**Eliminate waste  
and pollution**



**Circulate products  
and materials**



**Regenerate  
nature**

Crown devotes, at a minimum, 50% of its research and development (R&D) spend on product circularity. Our technical experts focus on designing lighter-weight, less material-intensive products, which includes extensive testing of our products to use less resources to meet customer and consumer demand for sustainable products without sacrificing performance. Our design process involves making technical adjustments to our production processes at the individual plant level. It also consists of extensive testing for product safety and durability before products are made commercially available.



To help our customers remind consumers about the circularity of metal, we include the Metal Packaging Europe (MPE) Metal Recycles Forever and similar iconography logos on their packaging.

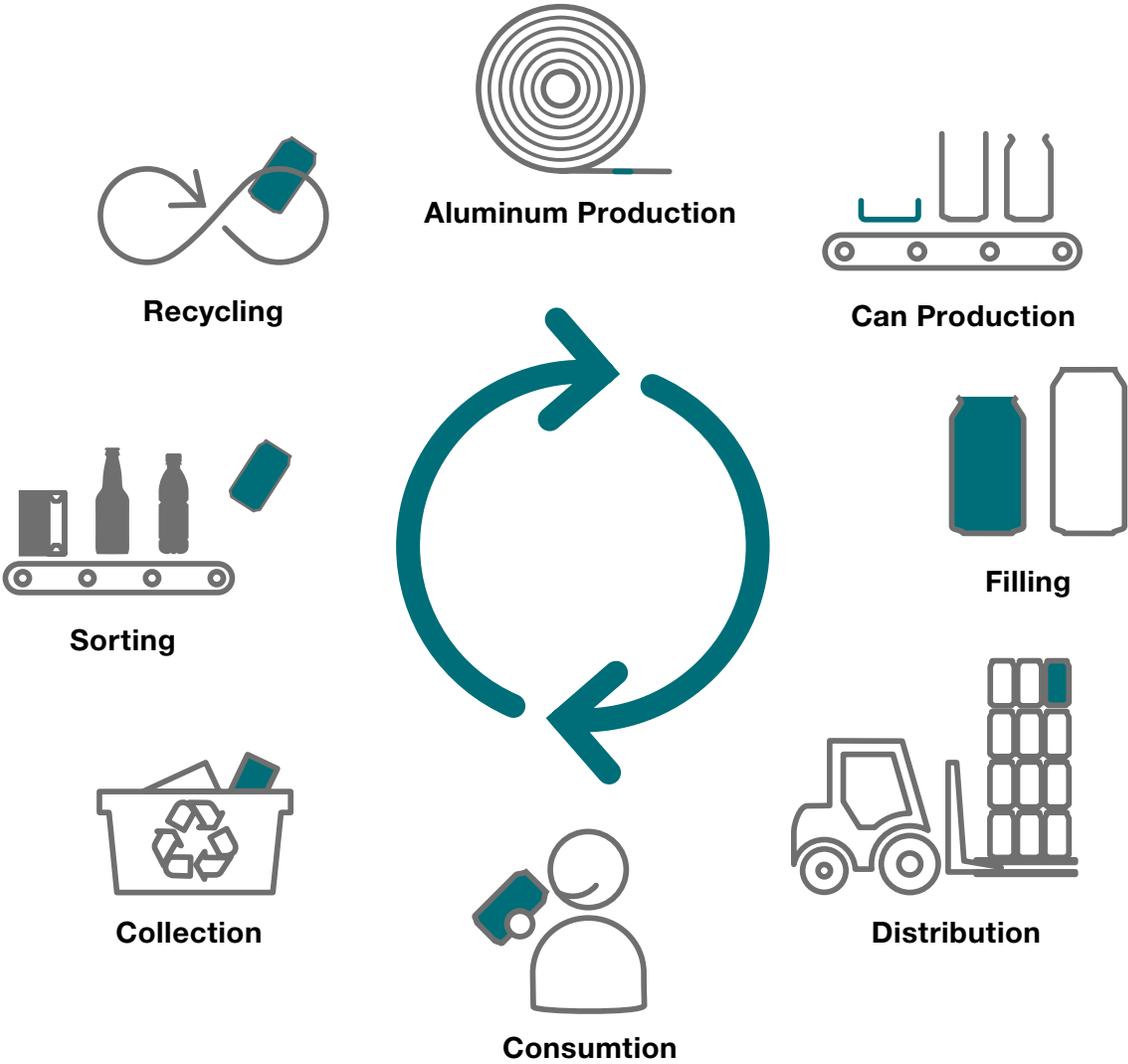
## Closed-Loop

Closed-loop circularity rates reflect the percentage of recycled material used to re-make beverage containers. Circularity rates depend on market conditions and vary globally. In the U.S., with the high level of Used Beverage Can (UBC) collection for use in can manufacture and therefore a high level of recycled content in cans (73% with latest figures), the circularity rate is very high.

Metal as an element is recognized by British Standard Institution (BSI) standard 8905:2011 as a permanent material as it can be recycled again and again with no loss of properties. For example, aluminum cans, once in the recycling system, can be recycled into any other aluminum products. The high value of aluminum means that there is a high incentive to recycle aluminum cans even where formal recycling systems are not in place.

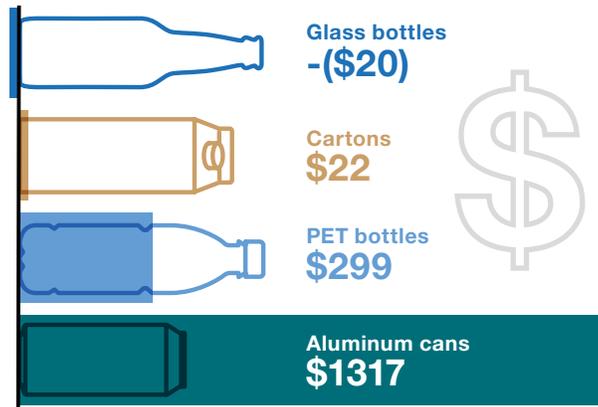
For example, in the U.S., it is clear to see this reflected in the value per ton of recyclable material, compared to other packaging formats.

# The Circular Economy for the Aluminum Beverage Can

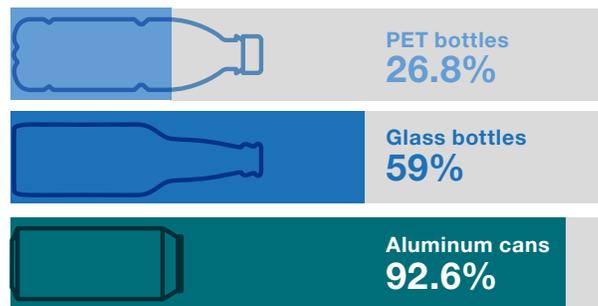


## How does the aluminum can's circularity compare with other packaging formats?

### Value Per Ton of Recyclable Material (The Aluminum Association 2021 data)



### U.S. Closed-Loop Circularity Rates for competing Packaging Types



Source: [https://www.aluminum.org/sites/default/files/2021-11/KPI\\_Report\\_2021.pdf](https://www.aluminum.org/sites/default/files/2021-11/KPI_Report_2021.pdf)

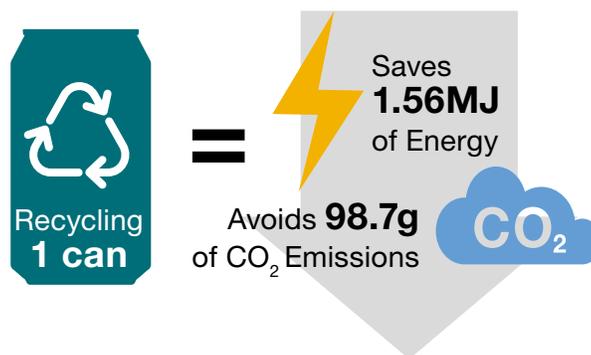
## Life Cycle Assessment

Life Cycle Assessment (LCA) is a method of examining all the environmental impacts directly attributable to any one product or service throughout its full life cycle, from cradle to cradle, and how it impacts the environment (ISO 14040:2006). The boundary conditions and assessed aspects of the LCA account for the key areas where impact can be directly influenced. Depending on the boundary conditions utilized, it can consider every phase of the product's life, including raw material extraction, hazardous substances, greenhouse gas (GHG) emissions, energy use, water use, material use, waste generation and recycled material usage, manufacturing process, distribution, use and end-of-life. The result is a quantification of impact that allows producers to consider how their products link to sustainability, ecological impact and human health. Our goal in sharing life cycle data is to transparently convey the circularity of our products.

Relevant life cycle phases, including the end-of-life factors in LCAs are particularly important for metal packaging, because metal, as an element, is infinitely recyclable and therefore the impact of metal packaging is reduced as recycling rates increase. That is why increasing consumer recycling is one of the key opportunities to reduce the cradle-to-grave environmental footprint of aluminum beverage cans in the future.

Our LCAs are carried out in accordance with ISO 14001 international standards. Additionally, we also conduct LCAs in accordance with Product Environmental Footprint (PEF), a standard particularly pertinent for European markets. Our Transit Packaging Division ensures accurate storage of data for LCA purposes as per ISO 14001 requirements, in all relevant sites. See 2021 Life Cycle Assessment of North American Aluminum Cans: <https://www.aluminum.org/sites/default/files/2021-10/2021AluminumCanLCAReportFullVersion.pdf>.

### Benefit of Recycling One average aluminum can:



## What is Crown Doing to Support Circularity?

### Circular Economy in Practice

A Circular Economy is a resilient system, underpinned by a transition to renewable energy and materials, that is good for people, the environment and business.

**We joined the [Ellen MacArthur Foundation](#) to reflect our commitment to work toward a more Circular Economy. Though the Ellen MacArthur Foundation, we are completing our first Circulytics assessment in 2022.**



Crown Supports Global Recycling Research and in collaboration with industry groups such as the [Can Manufacturers Institute](#) (CMI), where we support the funding of improvement technologies at Material Recycling Facilities (MRF) in partnerships across the value chain. Per CMI, “up to 25% of cans are missorted at the MRF into the bales of other commodities such as plastic PET bottles and mixed paper.” The funding of improvement technologies at MRFs increases can capture, which helps boost recycling rates of aluminum cans, which in turn can boost the recycled content of our products.



## Sources:

Aluminium Beverage Can LCA (Released May 2021, US study)

[https://www.aluminum.org/sites/default/files/2021-11/2021\\_CanLCA\\_Summary.pdf](https://www.aluminum.org/sites/default/files/2021-11/2021_CanLCA_Summary.pdf) and

[https://www.aluminum.org/sites/default/files/2021-11/KPI\\_Report\\_2021.pdf](https://www.aluminum.org/sites/default/files/2021-11/KPI_Report_2021.pdf)

Aluminium LCA Toolkit

<https://www.aluminum.org/sites/default/files/2021-10/Can%20LCA%20Digital%20Toolkit%20-%20TECHNICAL%205.25%20FINAL.pdf>

Aluminium KPIs

[https://www.aluminum.org/sites/default/files/2021-11/2021\\_KPI\\_Member\\_Digital\\_Toolkit.pdf](https://www.aluminum.org/sites/default/files/2021-11/2021_KPI_Member_Digital_Toolkit.pdf)

European Recycling Rates

<https://www.european-aluminium.eu/media/3401/european-aluminium-mpe-alubevcan-2019-recycling-rate-press-release-16-december.pdf>

Steel Cans, CMI

[https://www.cancentral.com/sites/cancentral.com/files/public-documents/CMI\\_OnePager\\_10Reasons\\_Metal%20Cans%202021.pdf](https://www.cancentral.com/sites/cancentral.com/files/public-documents/CMI_OnePager_10Reasons_Metal%20Cans%202021.pdf)

Closed-Loop Packaging Format Comparison:

[https://www.aluminum.org/sites/default/files/2021-11/KPI\\_Report\\_2021.pdf](https://www.aluminum.org/sites/default/files/2021-11/KPI_Report_2021.pdf)

Benefits of Recycling 1 Can:

<https://www.aluminum.org/sites/default/files/2021-10/Can%20LCA%20Digital%20Toolkit%20-%20TECHNICAL%205.25%20FINAL.pdf>