

THE ALUMINUM ASSOCIATION

# Aluminum Agenda: Aluminum 101

## The Miracle Metal



Aluminum is an essential element of modern life. Virtually everyone uses aluminum every single day. You're likely never more than six feet away from a piece of aluminum – from the cars and airplanes that transport us, to the eyeglasses that help us see, the computers and phones we use, the roofs above our heads, the foil and cans that protect our food, even the zippers on our clothes.

### U.S. ALUMINUM INDUSTRY'S ECONOMIC IMPACT

The U.S. aluminum industry is a key element of the nation's manufacturing base. Strong, lightweight and recyclable, aluminum is a material uniquely suited to meet the needs and challenges of the 21<sup>st</sup> century. From increasing vehicle fuel efficiency to green building products to sustainable packaging, aluminum is well positioned in the U.S. and global markets.

#### Today, the U.S. aluminum industry:

- Directly employs more than **164,000 good paying unionized and non-unionized jobs** and indirectly supports an additional 535,000 workers.
- Directly generates more than \$92 billion in economic output and indirectly generates an additional \$136 billion in economic output.
- Generates nearly **\$228 billion in economic output**.
- Has committed or invested more than **\$10 billion in domestic manufacturing** since 2013.



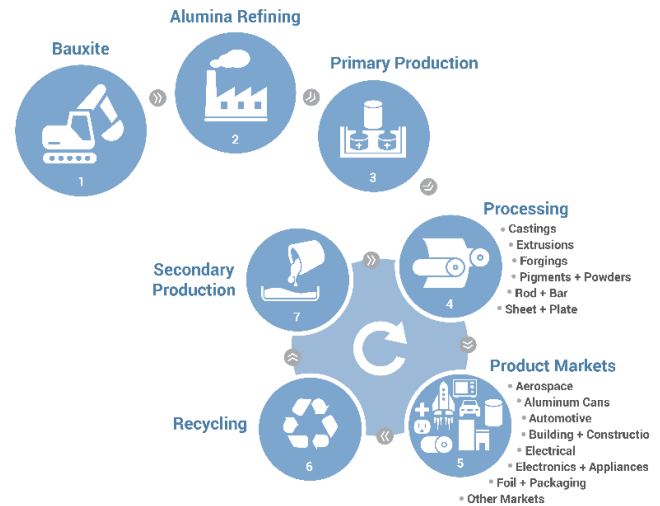
### THE ALUMINUM PRODUCTION PROCESS

Aluminum is the most abundant metal in the earth's crust and is equally abundant in our everyday life—from kitchen foil to beverage cans to airplanes to automobiles. The modern aluminum production process from bauxite mining to refining to production to recycling has changed the way the world operates.

### HOW ALUMINUM IS MADE

**Primary production** is the process through which new aluminum is made (versus secondary production, in which existing aluminum is recycled into new products). Aluminum originates from bauxite, an ore typically found in the soil of various tropical and subtropical regions. Once mined, aluminum within the bauxite ore is chemically extracted into alumina, an aluminum oxide compound, through the Bayer process. In a second step, the alumina is smelted into pure aluminum metal using an electrolytic (Hall-Héroult) process.

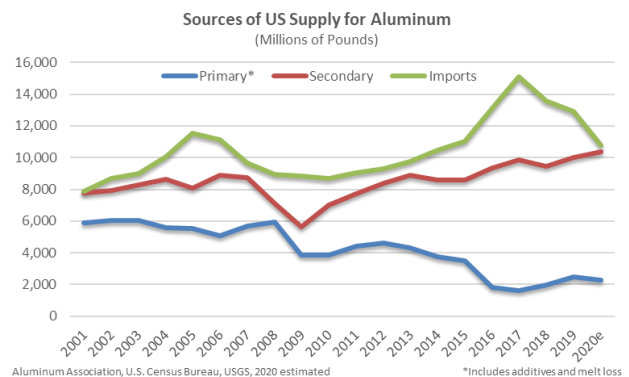
Between the production of aluminum from bauxite to well-known end products like buildings and beverage containers lies **processing**. The processing of aluminum – using castings, extrusions and mill products – allows the industry to support end users to innovate with new designs and emerging technologies. The most common "semi-fabricated" aluminum products are castings; extrusions; forgings; pigments & powder; rod & bar; and sheet & plate.











Aluminum is infinitely recyclable and nearly 75% of all aluminum ever produced is still in use today.

**Secondary production** is the process of recycling aluminum scrap into aluminum that can be used again—an environmentally sound process that is around 95% more energy efficient than primary production. The increased adoption of recycled aluminum in manufacturing has created significant economic and environmental wins for both industry and consumers. More than 80% of U.S. production today is in making recycled (or secondary) aluminum. This compares to 20 to 30% recycled production in the 1980s.

Aluminum is all around us, making our everyday lives easier and more efficient. It is used in literally hundreds of consumer applications – from kitchen foil and beverage cans to the highest-end vehicles. Aluminum sent us to Mars, leads to greater fuel-and cost-efficient vehicles, increases energy efficiency in buildings and facilitates productivity through our iPads, smartphones and laptops. And that's just the tip of the iceberg. In the coming decades, demand for aluminum is projected to grow significantly as the industry continues to help make good products great and great products even better.



ALUMINUM PRODUCT MARKETS							
							
<b>AUTOMOTIVE</b>	<b>BUILDING &amp; CONSTRUCTION</b>	<b>AIRCRAFT &amp; AEROSPACE</b>	<b>NEW &amp; INNOVATIVE MARKETS</b>	<b>FOIL &amp; PACKAGING</b>	<b>ELECTRONICS &amp; APPLIANCES</b>	<b>ALUMINUM CANS</b>	<b>ELECTRICAL</b>
One of the fastest-growing automotive materials, aluminum makes vehicles safer, more energy efficient and better-performing.	Aluminum is one of the most durable, energy efficient and sustainable building materials, helping builders gain LEED certification.	Modern air and space flight would not be possible without the development of lightweight but high strength aluminum alloys.	Aluminum is the most widely used material in modern solar panels, accounting for more than 85% of most solar photovoltaic components.	Highly versatile aluminum can be thin and bendable like kitchen foil, or rigid and durable	Aluminum is a showcase material in some of the most popular consumer electronics today, from the Apple iPhone to the latest flat-screen TVs.	Aluminum beverage cans contain far more recycled content than glass or plastic and save huge amounts of energy in transportation and refrigeration.	Lightweight aluminum wire and cable has high conductivity and allows utilities to run transmission lines with far fewer supporting structures.