



STEEL SUSTAINABILITY IN THE CONSTRUCTION MARKET

The National Institute of Standards and Technology notes that “steel has become one of the most reliable, most used and most important materials of the age.” As an advanced engineered material, steel is the material of choice by engineers and architects because of its strong performance characteristics, durability, reliability, versatility in design and consistency as a product.



Structural steel produced in North America typically contains 90 percent or more recycled steel. Steel framing itself contains a minimum of 25 percent recycled steel and is continually and completely recyclable. While many other products can only be downcycled into a lower-quality product, steel can be recycled over and over again and remade without any loss of quality. While many construction sites may have large amounts of construction and demolition waste to dispose, using steel will minimize that problem as it can be easily recycled responsibly. When steel construction products have outlived their current intended use, they can be recycled into new steel to be used for any variety of new products. Today’s steel beam can become tomorrow’s refrigerator, soup can or car door. Structural steel mills also recycle nearly all of the water they use in a closed loop system. Less than 70 gallons of water is consumed in the production of one ton of structural steel.

Steel’s attributes, including its inherent durability and recyclability, make it vital to modern society. The North American steel industry is committed to manufacturing innovative products and implementing processes that achieve environmental, social and economic sustainability.

Life cycle assessments (LCAs) have been conducted comparing steel-framed buildings to wood-framed buildings in different parts of the country and have demonstrated that steel buildings can result in lower environmental impacts than functionally-equivalent wood buildings. In addition, a peer-reviewed study comparing hot-dip galvanized (HDG) steel coils produced in North America, primarily used in the construction and automotive sectors, to the same product produced in China and shipped to the North American market found that the coil sourced from China results in nearly 50 percent higher GHG emissions.



As a building material, steel can meet the sustainability requirements in standards such as the International Green Construction Code, and in green building rating systems like U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED), where steel products can help earn points toward LEED v4 certification.



Steel has a vital role in infrastructure through replacement and new construction of bridges, roadways, guideways and utility structures. Infrastructure also includes the energy grid, energy development and transmission, water infrastructure and public safety — all of which uses steel. Steel for short span bridges is lighter than other materials and can provide a savings of up to 25 percent in total superstructure costs, partially due to the fact that heavier equipment may not be needed to set the girders.

Steel can also be reused after a long service life — one county in Ohio saved \$51,000 in superstructure costs by using repurposed beams that were removed from a previous steel bridge taken out of service. Steel utility poles are about 50 percent lighter than wood, reducing transportation costs and making them easier to handle on the job site. And EnergyStar-qualified metal roof products can lower roof temperature by up to 100 degrees, significantly reducing a building's peak cooling demand.

Steel Sustains. For more information on steel's sustainable properties and performance, please follow us on social media @AISISteel, @EnviroMetal, @BuildUsingSteel or contact Mark Thimons, AISI Vice President of Sustainability (mthimons@steel.org).





#SteelSustains

SUSTAINABILITY IN STEEL RECYCLING



Steel is 100 percent recyclable, which means it can be recycled into the same material of the same quality again and again. A steel beam can become another steel beam, or a refrigerator, car door or roof panel. When you buy steel you are buying recycled. In addition to being continually recyclable, steel's durable characteristics enable many common products to be reused.

Steel recycling is important to the circular economy as it conserves valuable resources and diverts useful materials from going to landfills. Millions of tons of steel are diverted from waste streams to recycling streams every year due to steel's magnetic properties that make it easy to separate from solid waste.

Domestic steel mills recycle their own steel scrap, as well as scrap from downstream product manufacturing processes and end-of-life products, to conserve energy, emissions and natural resources. There are typically 60 to 80 million tons of steel scrap recycled per year into new steel products in North America. In the past 30 years, more than one billion tons of steel scrap have been recycled into new steel by the North American steel industry. On average, the United States processes enough ferrous scrap daily, by weight, to build 25 Eiffel Towers every day of the year!

Steel's attributes, including its inherent durability and recyclability, make it vital to modern society. The North American steel industry is committed to manufacturing innovative products and implementing processes that achieve environmental, social and economic sustainability.



Recycling the steel from a single car reduces greenhouse gas emissions by an equivalent of consuming more than 150 gallons of gasoline. Recycling a single refrigerator reduces the resulting greenhouse gas emissions by 215 pounds of CO₂. Each year, the steel industry recycles steel from about 12 million appliances. Even recycling one steel food can conserves enough energy to light a 10-watt LED light bulb for more than 24 hours. Spread this over the 20 billion steel cans that are recycled each year and the savings are astounding.



Through recycling, the steel industry saves enough energy to supply the annual electricity needs of more than 18 million homes. A single ton of steel recycled conserves 2,500 pounds of iron ore, 1,400 pounds of coal and 120 pounds of limestone.* The steel industry's need for steel scrap is a job creator, supporting more than 531,000 scrap recycling jobs and generating more than \$110 billion in economic activity.

Steel Sustains. For more information on steel's sustainable properties and performance, please follow us on social media @AISISteel, @EnviroMetal, or contact Mark Thimons, AISI Vice President of Sustainability (mthimons@steel.org).

**Updated statistics on this data point will be available in late 2020.*





SUSTAINABILITY IN STEELMAKING



Steel is the EnviroMetal™. Producing a ton of steel today in North America requires less than half the energy that was needed to produce a ton of steel 40 years ago, resulting in a 50 percent reduction in greenhouse gas (GHG) emissions. This means that a single ton of steel produced today, compared to 1980, would save the GHG emissions equivalent to driving a car for 2,000 miles. The American steel industry has been nationally recognized for its energy efficiency and greenhouse gas emission reductions by the U.S. Environmental Protection Agency and the U.S. Department of Energy.

Steel's inherent characteristics make it an ideal fit for a sustainable circular economy. Steel is the most recycled material in the world. Once produced, steel can be continually recycled into new steel products — a steel beam can become another steel beam, or a refrigerator, car door or roof panel. Millions of tons of steel are diverted from waste streams to recycling streams every year due to steel's magnetic properties that make it easy to separate from solid waste. Steel's durability allows steel products to be reused or remanufactured at the end of their initial lives. The life cycle costs of stainless steel, due to its combination of corrosion resistance and durability, also increases the lifetime of many products.

A single wind tower may contain up to 200 or more tons of steel and, because a wind turbine generates essentially emission-free electricity, the emissions created from producing a steel tower are offset in only about six months.

Steel builds solutions. As the world's most important engineering material, steel can be found in products that we use every day and make a sustainable world possible: buildings, cars, bridges, water distribution, energy transmission, trains, road infrastructure, home appliances, canned food, computers and more. Steel is enabling tomorrow's renewable energy as a critical component in the structure of wind, solar and tidal renewable energy systems. Steel supports renewable energy systems, literally. A single wind tower may contain up to 200 or more tons of steel and, because a wind turbine generates essentially emission-free electricity, the emissions created from producing a steel tower are offset in only about six months.

Steel is Innovative. As a result of sustained investments in research and product development, there are more than 3,500 steel grades available. Approximately 75 percent of these modern steels have been developed in the past 20 years. Technological advancements in these steel grades promote environmental, social and economic sustainability. Stronger and more ductile steel grades have allowed for lighter weight components for today's automobiles, resulting in better fuel efficiency and lower GHG emissions. For example, between 2012 and 2018, there was a net increase of Advanced High Strength Steel/Ultra High Strength Steel of approximately 120 pounds per vehicle, replacing lower grade steels and saving weight.

Steel is our future. In addition to the steel industry's renowned performance in reducing its carbon footprint, the industry continues to look boldly toward the future. The steel industry is working together on initiatives

to develop breakthrough steelmaking technologies to further reduce the industry's GHG emissions by more than 50 percent, revolutionizing the way steel is made. The industry is investing in a new flash ironmaking process, developed in conjunction with the U.S. Department of Energy, Berry Metal Company and the University of Utah. This process stands to greatly reduce the amount of CO₂ and other emissions by replacing coking coal with small amounts of natural gas in the iron reduction process. Work is also underway on other projects to enhance steelmaking efficiencies, including technologies to continuously measure the thickness of steelmaking co-products to improve product quality.

Steel is vital to the economy. The steel industry directly employs 387,000 workers and supports nearly two million American jobs in total. This provides nearly \$520 billion in economic output and generates \$56 billion in federal, state and local taxes.

Steel Sustains. For more information on steel's sustainable properties and performance, please follow #SteelSustains on social media @EnviroMetal and @AISISSteel, or contact Mark Thimons, AISI Vice President of Sustainability (mthimons@steel.org).

