Value of Steel

Iron makes up approximately 30% of the Earth’s mass. Because of its rich reserves, steel can be mass produced at very low cost. Compared to other materials, the environmental impact of its production is extremely low and it has excellent recyclability. Steel can be recycled repeatedly and reborn as various products (closed-loop recycling) with little or no environmental impact, contributing to the sustainable growth of our society.

Life Cycle Assessment of Steel

Steel’s excellent recyclability contributes to the creation of a sophisticated value chain encompassing three components: Produce, Use, and Recycle. Steel products can be repeatedly reborn as various products. Therefore, it is important that the environmental impact of steel be assessed across its entire life cycle, including at the recycling stage. JFE Steel participates as a key member in an initiative led by the Japan Iron and Steel Federation (JISF) to quantify the environmental impact of the entire life cycle of steel products and developed the ISO/JIS standard* calculation methodology. Corresponding to this standard, materials with higher recyclability are found to have lower environmental impact such as on global warming.

*ISO 20915: Life cycle inventory calculation methodology for steel products (2018.11)
* JIS Q 20915: Life cycle inventory calculation methodology for steel products (2019.6)

Source: Mineral Commodity Summaries (2016)
Source: Steel Recycling Institute

*1 From mining raw materials to factory shipment.
*2 Comparison with other materials’ GHG emissions per unit weight, with steel as 1.
Steel Is Reborn as Various Products

Global average of annual consumption of steel is approximately 220 kg per capita. The long-term global demand for steel is expected to keep growing alongside the economic development of emerging countries.

Steel cans (FY2017)
- Steel cans 93%
- Aluminum cans 92%
- PET bottles 84%
- Glass bottles 71%
- Cartons 44%

Steel is a highly recyclable material that can be easily recovered and separated using magnets. It can be efficiently recovered, separated, and recycled into high-quality, high-functioning products over and over again through closed-loop recycling.

The Potential to Grow on a Global Scale

Global average of annual consumption of steel is approximately 220 kg per capita. The long-term global demand for steel is expected to keep growing alongside the economic development of emerging countries.

Steel demand
- 2015: 1.29 billion tonnes/year
- 2050: 2.13 billion tonnes/year

Steel is repeatedly reborn as various products, contributing to the sustainable development of daily life and the economy with the world’s top energy-saving, environmental technologies.

Potential for Evolution

Steel can be elongated two to three times more than aluminum at the same rigidity and is three to five times stronger at the same extended rate, making it the optimal material for new world-class structures such as TOKYO SKYTREE. And yet there is still potential for further evolution. The emerging needs of society will advance the development of steel and contribute to a productive future.

Comparison of Strength and Elongation between Steel, Aluminum, and Carbon Fiber

- Steel: Elongation 2 to 3 times, Tensile strength 600 MPa
- Aluminum: Elongation 2 to 3 times, Tensile strength 400 MPa
- Carbon fibers: Elongation 3 to 5 times, Tensile strength 1,600 MPa

Research: JFE Holdings