

## Feature Story 2: Tackling SDGs through Business Activities

### Initiatives for an advanced recycling-oriented society Graphite electrode-driven steel recycling

#### Basic approach

Graphite electrodes are best known as a key component of electric furnaces in which iron scrap is melted to be recycled into steel.

In the electric furnace system, electrodes are charged with a high current to cause an arc discharge, a heat source for melting iron scrap. The temperature of liquid steel can reach 1,600°C and that of the electrode tops 3,000°C. Graphite electrodes represent the only currently available industrial material to be functional under such extreme high-temperature conditions. Compared with the conventional blast furnace system, the electric furnace system can reduce CO<sub>2</sub> emissions per unit of crude steel output by 75%, giving rise to expectations for expanded usage of the system for steel production as a contributing factor to decarbonization endeavors. In this context, Showa Denko will work to ensure a stable supply of high-quality graphite electrodes while providing AI-enabled technical support for upgraded electric furnace operation processes, thereby helping popularize steel recycling practices and reduce CO<sub>2</sub> emissions attributable to steel production.



#### Challenge toward 2030 and Showa Denko's initiatives

Steel recycling represents a long-established, best practice resource recycling system. Electric furnaces produce no more than 30% of the world's total crude steel output at present, but the rate is expected to rise in the future. This outlook is particularly gaining traction in light of rising international calls for reducing GHG emissions to control climate change. Against this backdrop, Showa Denko boasts the world's largest graphite electrode production capacity. It manufactures the product at six plants across the world and delivers it to local markets (according to the local-production-for-local-consumption policy) in an effort to reduce distribution-related CO<sub>2</sub> emissions. The six plants, while working to achieve carbon neutral operations, help users raise the rate of electric furnace steelmaking by supplying graphite electrodes as well as providing support for upgraded steel recycling systems. Also, through the joint venture with AMI Automation, we will provide technical support for upgraded electric furnace operation processes, looking to lower the electrode consumption rate.

In pursuing the two major recycling projects described above, we seek to contribute to building the kind of advanced recycling-oriented society that is aimed at by the global community.

#### Challenges facing society

- Reduce CO<sub>2</sub> emissions related to steel production
- Build a sustainable, recycling-oriented society  
Raise the world's electric furnace-made steel rate from the current 30% to 35%
- Upgrade electric furnace operation processes to reduce CO<sub>2</sub> emissions related to steel production

#### Showa Denko's initiatives

- Ensure stable supply of high-quality graphite electrodes from six carbon neutral plants across the world
- Aim to go beyond carbon neutral and become carbon negative at Omachi Plant (power consumption ≤ hydropower output)
- Provide AI-enabled technical support to upgraded electric furnace operation processes to lower electrode consumption rate

