Remarks on Special Issue on Environmental Technology for the Steel Industry

Shuhei ONOYAMA
Representative Director and Executive Vice President

This special issue reports several environmental infrastructure technologies that we have been developing in recent years under the title of "Environmental Technology for the Steel Industry." Nippon Steel Corporation started reducing environmental burdens in the very early stage of its history. In this century, Nippon Steel has been contributing to solving global environmental problems, strongly demanded by society, in particular, through promoting three ecological initiatives (eco-process, eco-products, and eco-solution).

Nippon Steel has been reporting its environmental activities up to the present day both internally and externally every year since the issue of the Sustainability Report in 1998, which was a first in the steelmaking industry in Japan. However, regarding environmental infrastructure technologies that support such activities, only three issues have been published: "Special Issue on Iron and Steel Slag (2014)" as Nippon Steel & Sumitomo Metal Technical Report, which was the former title of Nippon Steel Technical Report; "Basic Endeavor toward the Circulative Economic Society (2002)"; and "Special Issue on Environmental Management (1996)" as Nippon Steel Technical Report. This new Nippon Steel Technical Report introduces environmental infrastructure technologies that have not been put together in one issue, and also reports some of our research and development activities for reducing CO_2 emissions that have been rapidly gaining social attention.

The steel industry in Japan has been establishing the integrated steelmaking process with blast furnaces whose energy efficiency is the highest in the world, and has been applying the technologies to other countries around the world for many years, contributing to reducing energy use and CO_2 emissions globally. In order to make further contributions, the Japan Iron and Steel Federation set out a long-term vision for climate change mitigation through the "Zero-Carbon Steel Challenge" in November 2018 ahead of other countries in the world. In FY2020, three companies having blast furnaces and the Japan Research and Development Center for Metals (JRCM) started a project for "technology development toward realizing zero-carbon steel" under the New Energy and Industrial Technology Development Organization (NEDO). Thus, the roadmap for realizing zero-carbon steel is being developed.

Under such circumstances, the former Japanese Prime Minister Yoshihide Suga announced in October 2020 that the Japanese government would aim for carbon neutrality by 2050. Nippon Steel also announced its vision—it would aim at reducing CO_2 emissions by 30% by 2030 (compared to those in 2013) and achieving carbon neutrality by 2050.

The steel industry has long been using carbon to reduce iron ore as its business and thereby it inevitably has been releasing CO_2. Therefore, in order to realize a carbon neutral world, steelmaking companies need to establish new steelmaking technologies that are completely different

from those in the past. The hurdle to achieve this is very high. To that end, naturally, a wide variety of elemental technologies are required and thereby many steady basic studies need to be performed for a long term.

Nippon Steel has been developing various world first technologies as a company that aims at achieving carbon-neutral steelmaking. This special issue first introduces the direction of its research and development toward zero-carbon steel, which is one of the four keys in the Nippon Steel Group's mid- and long-term business plan that was released in March 2021. This paper also reviews Nippon Steel's efforts for environmental protection highly valued by society, and introduces generic technologies for CO_2 emissions reduction and environmental risk management with integrated works with blast furnaces as their basis.

To achieve carbon-neutral steelmaking, more and more new elemental technologies need to be established from this point forward. This special issue introduces such technologies. I would appreciate guidance and encouragement from parties both inside and outside of the company with the issuance of this special issue as an opportunity to develop higher-level technologies and solutions to problems in the whole of society.