

## Technical Review Special Edition: Plants & Infrastructure Systems

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Welcome to this special edition of our technical review featuring Plants & Infrastructure Systems.

Global warming is one of the critical environmental issues that the world should unite to solve. The importance of initiatives to achieve a carbon-neutral society with net-zero emissions of greenhouse gases (GHGs) is increasing day by day. With IT and digital technologies developing dramatically, there is a growing need from society and customers in all business fields for the products and services to be automated, manpower saving and become infallible even without skill.

This edition introduces our latest products and developments in Plants & Infrastructure Systems, which aims to contribute to a sustainably growing world while responding to environmental issues and social needs.

Presented in the commercial ships business are: the solution technologies necessary to achieve zero emissions from vessels, which is underway under the International Maritime Organization's (IMO's) target of carbon net zero by 2050; the product development of gas handling technology; the LNG-fueled ferry "Sunflower Kurenai" and the liquefied CO<sub>2</sub> carrier "EXCOOL," which serves as a safe and inexpensive means of CO<sub>2</sub> transportation in the Carbon dioxide Capture, Utilization and Storage (CCUS) value chain.

In the metals machinery business, we are expanding our product lineup to meet the industry's decarbonization needs of the metal machinery industry, which is called the "hard-to-abate" industry because of the difficulty to reduce CO<sub>2</sub> emissions. Following the previously introduced technology related to the hydrogen-based direct reduction of iron ore, this edition presents the technologies that are indispensable to Green Steel project. That is, active power feeder system for feeding electric furnaces, and the endless hot rolled coils in which original thermal energy of the liquid steel is used instead of fossil fuel to reduce GHG emissions.

The demonstration of CO<sub>2</sub> capture from flue gas of waste incineration facility for use in methanation, and the Hybrid Bag Filter<sup>®</sup> made of Polytetrafluoroethylene, for waste incineration plants are described in relation to the environmental systems business whose goal is to achieve a resource circular society.

In addition, related to machinery systems business, the reports pertain to: the manufacturing technology of accelerating cavities in the electron accelerator for the synchrotron radiation facility that works as a tool to develop new materials and unravel microscopic phenomena or those occurring

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within an extremely short time; our initiatives to enable autonomous buses to become part of mobility services to build a safe and secure social infrastructure; and the sequel to the previously introduced Facility Engineering.

Lastly, presented in addition to the electric propulsion system to electrify ocean mobility are the system development cases in which DX is utilized in such a way that it can set off a great change in society. These include: the integrity management system using digital twin for large floating structures; the reinforcement learning-based control technology to stabilize fuel supply to the stoker furnace; and the ride experience system to evaluate comfort of automated guideway transit using VR technology.

Plants & Infrastructure Systems will continue its journey to achieving a carbon-neutral society and building safe and secure social infrastructure through providing wide range of products and services by leveraging the strengths of each business. We appreciate your continued support.