

Technical Review Special Edition: Nuclear Power

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Welcome to this special edition of our technical review featuring nuclear power.

Climate change presents a great societal threat to us all, as we continue to witness and experience abnormal weather events and disasters of extreme severity. At the 21st Conference of Parties (COP21), Japan adopted the Paris Agreement and thereby in 2016 committed to reduce greenhouse gas emissions by 80% toward the ultimate goal of a carbon-free society by 2050. In October 2020, the Prime Minister of Japan declared that Japan would become carbon neutral by 2050. This declaration further reinforces Japan's commitment to the world to ensure the proactive reduction of greenhouse gas emissions.

Renewable energy is increasingly widespread as a distributed electrical power source, but its generation is subject to daily, if not hourly, changes in weather conditions making it unpredictable. To realize a carbon-free society, nuclear power is the “ace” among all other global warming countermeasures as being a carbon-free, large-scale, stable energy source. For Japan, a country with scarce energy resources, nuclear power is also important from a long-term perspective in terms of energy security. The level of importance given to nuclear power is expected to further increase as less efficient, greenhouse gas emitting, coal-fired power generation is phased out in Japan.

Nevertheless, the confidence of Japanese citizens in nuclear power has faltered following the Great East Japan Earthquake. As a nuclear power plant manufacturer, we believe our company, Mitsubishi Heavy Industries, Ltd. (MHI), should sincerely face the Fukushima Daiichi Accident. We strive to further increase the safety and reliability of nuclear power plants and are obliged to contribute to the safe and stable supply of electricity. In such a context, we are conducting the following four efforts:

- As the only domestic Pressurized Water Reactor (PWR) manufacturer, MHI has made every effort to support electric power companies, aiming for increased safety of existing domestic plants. Through our efforts, MHI has realized the restart of nine PWRs and we will continue our overall support toward the restart of additional PWR plants and early installation of “Specialized Security Facilities”. At the same time, we will contribute to restoring the confidence of Japanese citizens in nuclear power by supporting Boiling Water Reactor (BWR) electric power companies, and thereby realizing the stable supply of electricity.

For restoring social confidence in nuclear power, the key issue is the stabilization of the Fukushima Daiichi Nuclear Power Station. MHI is supporting this effort and we will devote every effort to developing the technologies necessary to retrieve fuel debris safely. The

associated technological hurdles are quite high for this task, but we are confident that we can successfully carry out these efforts.

- We believe that the early establishment of the nuclear fuel cycle is necessary for nuclear power to truly take root in this country to ensure the stable supply of electricity over the long-term by recycling uranium resources. Therefore, we are offering overall support toward the completion of the Rokkasho Reprocessing Plant and a MOX Fuel Fabrication Plant, and will also continue to develop fast reactors along with the policy of our national government in order to establish the nuclear fuel cycle, including the fast reactor cycle.
- The first domestic PWR was Mihama Nuclear Power Station Unit 1, which started operation in 1970. A total of 24 PWRs have been placed into operation since that time and have positively contributed to the stable supply of electricity for Japan. Following the Fukushima Daiichi Accident, decommissioning projects are moving ahead at eight PWRs. In such a situation, the construction of new or additional nuclear power plants is indispensable to ensure the stable supply of electricity in the future, along with the achievement of Japan's carbon-free goals. Based on this belief, we are developing the next-generation PWR that will serve as large-scale, stable electric power sources for Japan. Development of next-generation PWR aims to maintain economic efficiency, dramatically improve safety, reliability, and minimize the risk of accidents, all while coexisting with renewable energy generation sources.
To address the diversifying needs in the future, we are currently working on the development of Small-PWR (power generation reactor/ship propulsion reactor), High Temperature Gas-cooled Reactor (HTGR), and Micro-Reactor. From an even longer-term perspective, we are also manufacturing complicated major equipment for the ITER project using the world's most advanced manufacturing technologies to contribute to nuclear fusion research and development.
- Leveraging the technologies we have accumulated through our efforts in the nuclear power field, we are also advancing into new areas. To date we have developed and delivered products such as an evacuation simulation system, a plant inspection robot with explosion proof features, and clean air shelters (Me-CAS) for medical institutions, in order to contribute positively to our society.

This special edition introduces our approach at taking advantage of and using our vast array of accumulated technologies as the leading company in the nuclear power field. Our efforts will contribute to the realization of a carbon-free society through application and integration of our technologies in a variety of areas which are most beneficial to society.