Technical Review Special Edition: Nuclear Energy

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

In recent years, the global energy environment has been changing remarkably. In light of the growing importance of energy security and stable energy supply, soaring resource prices, and the movement toward the realization of a carbon-neutral society, the importance of nuclear energy has increasingly been recognized. Because of this, countries around the globe are now making major shifts toward its utilization. At the United Nations Framework Convention on Climate Change (COP28) held in December 2023, the use of nuclear energy was stipulated in an agreement document among participating countries for the first time. This resulted in 22 countries, including Japan and the U.S., issuing a joint declaration to “triple the world’s nuclear power generation capacity by 2050.”

In Japan, the Cabinet approved the “Basic Policy for the Realization of GX (Green Transformation)” in February 2023, in which the government policy to make maximum use of nuclear energy for the purpose of simultaneously ensuring a stable energy supply and achieving economic growth as well as taking measures against climate change. As the pillar of the policy, the restart of existing nuclear power plants, extension of their operational life, development and construction of next-generation advanced reactors, and the nuclear fuel cycle were presented. Currently, the 7th Strategic Energy Plan is being discussed in the national committee. We recognize that it is essential to make maximum use of nuclear energy moving into the future, as the demand for domestic electricity is expected to expand due to the increase in the demand for data centers with the spread of generative AI and further electrification expansion. It remains our hope that nuclear energy will be positioned as an even more important power source in the Strategic Energy Plan than it has been in the past.

Japan has few fossil resources and limited suitable sites for renewable energy. Therefore, it is obvious that nuclear energy, which is large-scale, stable, and carbon-free, is of extremely high utility value. We believe that the primary purpose of our Nuclear Energy Systems is to enrich low-resource Japan with nuclear technology and contribute to the prosperity of domestic industry and GDP growth by maximizing the sustainable use of nuclear energy. To achieve this, development and achievement of advanced technological capabilities is imperative.

Our Nuclear Energy Systems has been providing comprehensive support to electric power companies in their safety measures installation works, safety improvement evaluations, and other efforts for existing plants that have been restarted in Japan. We will continue to support the restart of existing plants and promote initiatives to realize safe and stable operation after restarting. We will also work to establish a fuel cycle that contributes to the effective use of resources and the reduction

of the volume and harmfulness of high-level radioactive waste for the sustainable use of nuclear energy.

Furthermore, toward the development and construction of next-generation advanced reactors indicated in the GX Basic Policy, we will promote the development of an advanced light water reactor (SRZ-1200) with the world's highest level of safety, and contribute to the realization of carbon neutrality and stable energy supply through bringing it to practical use earlier. In addition, looking further ahead, we will develop small light water reactors, fast reactors, high-temperature gas-cooled reactors, and other reactor types to meet the diversified needs of society in the future.

This special edition introduces, with the main theme of advanced nuclear reactors, our latest approaches to the advanced light water reactor (SRZ-1200), small light water reactor, fast reactor, high-temperature gas-cooled reactor, micro reactor, and fusion reactor. In addition to the development of the above types of reactors for the future, we will introduce a wide range of innovative initiatives regarding existing light water reactors and fuel cycle, and new initiatives regarding application of DX and digital technologies.