Next-Generation Nuclear Reactors of Japan

	Main Coolant	Main Fuel	Size	Characteristics	Issues to Solve	Related Development Plans and Research Reactors
Innovative Light Water Reactor	Light water (ordinary water)	Uranium-235	Large	• Highly mature technology, and highly predictable, including regulatory processes • Passive safety systems and measures against external events (semi-underground construction) further enhance safety • Severe-accident countermeasures (core catchers, gas collection, etc.) reduce impact to outside of the power plant	• Requires large initial investment • Financial risks if construction becomes prolonged	● SRZ-1200 Mitsubishi Heavy Industries, Ltd. ● HI-ABWR Hitachi GE Vernova Nuclear Energy, Ltd. ● iBR Toshiba Energy Systems, Ltd.
Small Modular Reactor	Light water (ordinary water)	Uranium-235	Small	• Core is small, and cooling is by natural circulation • Accidents can be kept to small scale • Short construction time and small initial investment	• Its small scale makes it difficult to achieve economic results • Safety regulations, etc. need development	● BWRX-300 Hitachi GE Vernova Nuclear Energy, Ltd.
High-Temperature Gas-Cooled Reactor	Helium gas	Uranium-235		• Coolant is helium which is stable at high temperatures (no exploding hydrogen) • Resistant to high temperatures so meltdowns do not occur • 950°C heat can be utilized (can be used for hydrogen production, etc.)	• Energy density and improvement of economic efficiency • Technical challenges such as stable clad fuel reprocessing	◆ High Temperature Engineering Test Reactor (HTTR) Japan Atomic Energy Agency
Fast Reactor	Sodium	Uranium-235 Plutonium-239	Small to Large	• Natural cooling and containment by natural convection of metallic sodium • Amount and hazard-level of radioactive waste are reduced • Effective use of resources can be expected	• Technical challenges such as keeping sodium stable and under control • Issues with seismic isolation technology and fuel manufacturing technology	◆ Experimental fast reactor "Joyo" Japan Atomic Energy Agency
Nuclear Fission Reactor	Light water (ordinary water) Helium gas Liquid metal	Deuterium Tritium		• No chain reaction occurs, and in the event of failure the reaction stops • Amount of radioactive waste is very small	• Difficulty of maintaining plasma, and development and design of main equipment (much time is needed to make it practical for use) • Technical challenges of safely containing tritium and building social consensus • Energy density and economic viability need improvement	◆ ITER (International Thermonuclear Experimental Reactor) (France) ITER International Fusion Energy Association ◆ Nuclear Fusion Experimental Device "JT-60SA" National Institutes for Quantum Science and Technology

● Development Plan Reactor ◆ Research Reactors

Source: Prepared from materials from the Innovative Reactor Working Group of the Advisory Committee for Natural Resources and Energy, of Japan's Ministry of Economy, Trade and Industry