

Steady Implementation of FaCT Project

–Assessing Innovative FBR Cycle Technology–

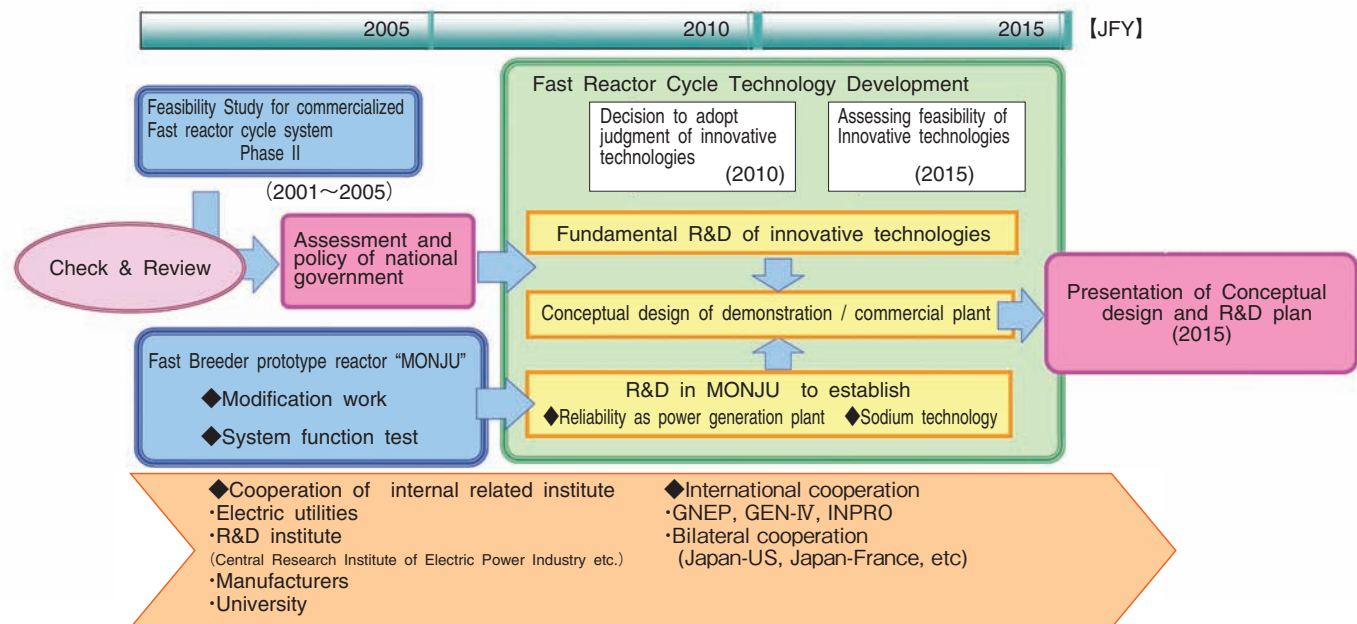


Fig.1-1 Fast Reactor Cycle Technology Development - FaCT Project -

The fast breeder reactor (FBR) cycle is designated as a key technology of national importance in the The Third Science and Technology Basic Plan, this being a technology that contributes to political objectives such as compatibility between the environment and economic growth, and the enhancement of industrial competitiveness to survive in international markets. Aiming for the start-up of a demonstration fast reactor (FR) around 2025 and its introduction on a commercial basis before 2050, Japan Atomic Energy Agency (JAEA) is now promoting its "Fast Reactor Cycle Technology Development (FaCT)" project, supported by the government's assessments and policy, specifically now carrying out a "Feasibility Study on commercialized fast breeder cycle system (FS)" (Fig.1-1).

This FaCT project is developing a combination of the sodium-cooled FBR utilizing oxide fuel, advanced aqueous reprocessing, and the simplified pelletizing fuel fabrication, the technologies presently seen to have the best practical prospects for fostering economic competitiveness, safety, efficient use of resources, reduction of environment load, and non-proliferation, based on their performance in existing facilities.

To scales these technologies up to commercial levels, it is necessary to realize innovative technologies within the above conceptual framework and to assess their performance. In the FaCT project, design studies reflecting the R&D results of the prototype FBR "Monju" and experimental studies for the innovating technologies will be implemented in order to decide on which of the innovative technologies to adopt by 2010 and to present conceptual designs of commercial and demonstration fast reactor cycle facilities along with development plans to realize them by 2015.

FBR System

The commercialization of FBR system still faces challenges; it needs to improve its economy, safety and reliability.

These challenges are, for example, the development of high-performance materials, structures and components which will reduce the facility volume and component size, simplify

cooling systems, make the reactor vessel compact, optimize thermal hydraulic properties, and decisively ensure recriticality prevention in case of core disruption. The frontline of this R&D will be introduced in Topic 1-1 to Topic 1-7.

Fuel Cycle System

Major issues facing the fuel cycle system include the safety and controllability of innovative processes, and the development of components with outstanding performance in operation, durability, and reparability. Issues facing fuel reprocessing include the development of crystallization technology that enables most uranium in a solution of spent fuel to be recovered in solid form and a recovering process for minor actinides. Issues facing fuel fabrication that have just recently arisen include the development of denitration and conversion techniques, fundamental technology to simplify the pellets fabricating processes, as well as technologies to remotely treat thermogenic substances. The achievements of this R&D will be introduced in Topic 1-8 to Topic 1-11.

Plan for Execution of the Project

A domestic development framework for R&D of the demonstration reactor, in which responsibility, authority, and engineering functions are concentrated, was established in 2007 to implement effective development. Under this framework, the R&D and the design study have been performed with the collaboration of electric utilities and manufacturers. Further, for the fuel cycle, JAEA has conducted preliminary examination and investigation a second fuel reprocessing plant from around 2010 sponsored by the Japanese government.

To lessen development risks and achieve global standardization, an R&D collaboration agreement was concluded by three nations: Japan, France, and the US, for the sodium-cooled FBR demonstration/prototype reactors. Furthermore, multilateral international partnerships such as GENEP are being vigorously pursued.