# Toward Commercialization of the Fast Reactor Cycle System

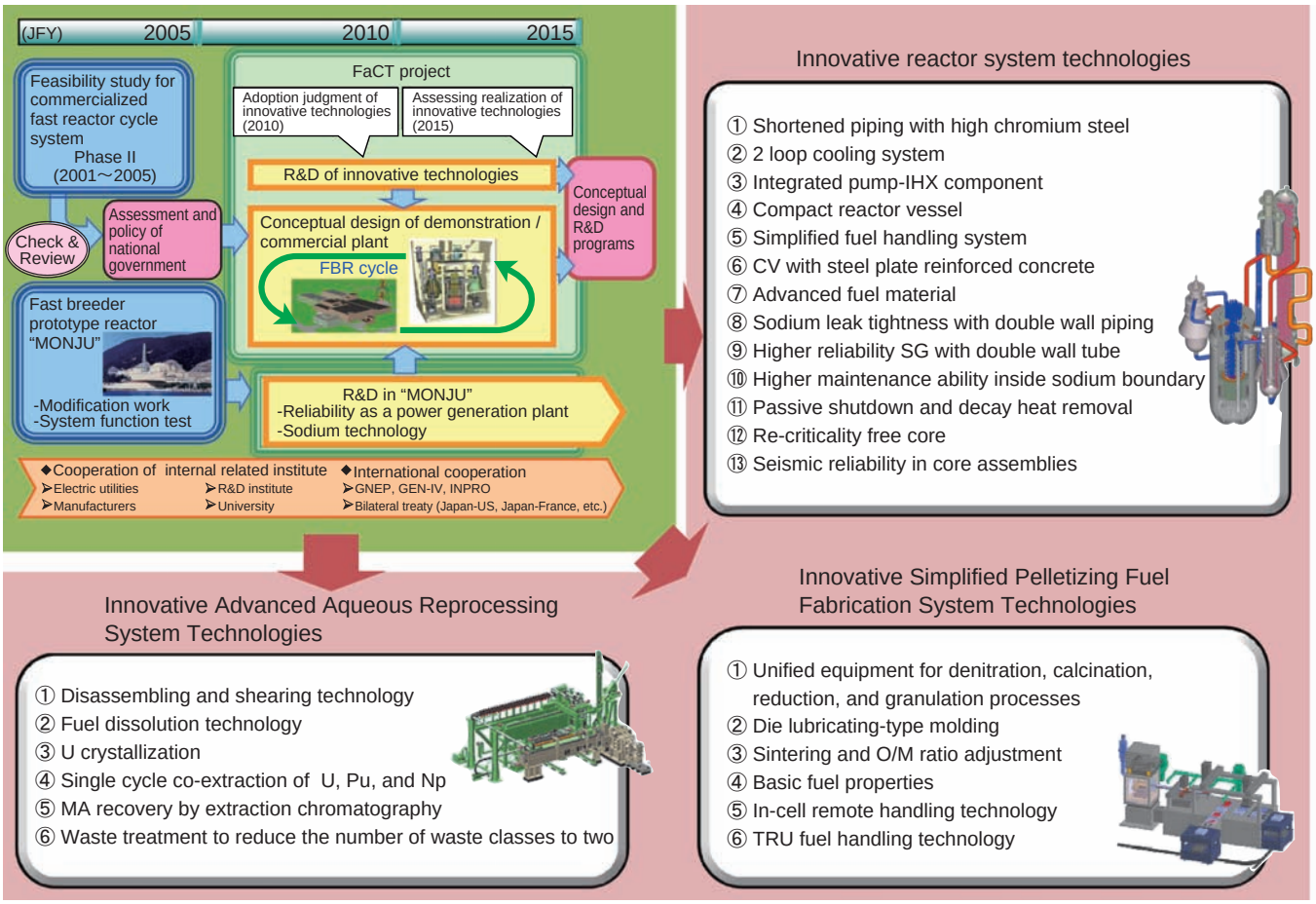


**Fig.1-1 Fast Reactor Cycle Technology Development (FaCT Project)**
With the aim of starting up a demonstration fast breeder reactor (FBR) around 2025 and introducing it on a commercial basis before 2050, we are now carrying out experimental studies of innovative technologies and design studies. The FaCT project will be implemented in order to decide on which innovative technologies to adopt by 2010 and to present conceptual designs of commercial and demonstration FBR cycle facilities, along with development plans to realize them, by 2015.

With the collaboration of electric utilities and manufacturers, we are now promoting the Fast reactor Cycle Technology (FaCT) development project in order to introduce the commercialization of the Fast Breeder Reactor (FBR) cycle system (Fig.1-1).

As the main concept in the FaCT project, we are developing a combination of a sodium-cooled FBR cycle system utilizing oxide fuel, advanced aqueous reprocessing, and simplified pelletizing fuel fabrication. In FY2009, we advanced the prospects of technologies for the reactor system, the reprocessing system, and the fuel fabrication system. The summary of each topic shown after the next page is as follows.

In the system design of the demonstration reactor and the commercial reactor, the design study and related R&D for the Japan Sodium-cooled Fast Reactor (JSFR) are advancing. We devised the sodium/water boundary concept to improve the reliability of the FBR cooling system (Topic 1-1). In the core design, we evaluated the feasibility of core design methods to enhance nonproliferation characteristics (Topic 1-2).

In terms of developing innovative technologies related to reactor systems, experimental studies on eliminating severe power burst events in core disruptive accidents have been conducted for advancing safety (Topic 1-3), and eddy current simulation technology for detecting defects was developed as a maintenance technology (Topic 1-4).

With regard to innovative technologies development related to reprocessing systems, mechanical disassembly technology for FBR spent fuel was successfully carried out (Topic 1-5). The application of an extraction chromatography system for minor actinides recovery was examined (Topic 1-6). Regarding fuel fabricating system technological development, we investigated the applicability of granulation technology for fuel pellet production (Topic 1-7). We have been analyzing irradiation behavior and the physical properties of FBR fuel (Topic 1-8, Topic 1-9). Furthermore, in the pyrochemical reprocessing process, which was another reprocessing concept (a FaCT project sub-concept), minor actinides were found to be recoverable by a metal electro-refining method (Topic 1-10).

In basic research to support the FaCT project, we discovered a magnetic measurement method whereby irradiation damage is detectable (Topic 1-11), and also a technique to control the chemical activity of liquid sodium by atomic interaction with a nanoparticle surface (Topic 1-12).