Basic Policy on Research and Development of FBR Cycle Technologies over the Next Decade

Atomic Energy Commission
26 December 2006

The technologies for the fast breeder reactor and its fuel cycle (hereinafter referred to as the FBR cycle technologies) can not only achieve dramatically more efficient utilization of uranium resources but also burn minor actinide recovered through reprocessing of spent nuclear fuels. The latter can curb heat generation of high-level radioactive waste per unit of energy generation and reduce long-term potential for radiological impact on the environment. If such FBR cycle technologies can be available in a safe and economical manner comparable with the light-water reactor technology, they may permit large-scale and continuous utilization of nuclear energy, contributing to human beings' sustainable development as well as Japan's stable energy supply.

With a view to commercially introducing the technologies around 2050, Japan has proceeded with their research and development (R&D) activities, setting performance criteria in the areas of safety, economy and so on. The Framework for Nuclear Energy Policy decided by the Commission in October 2005 calls for evaluating the achievements of Phase II of the "Feasibility Study on the Commercialization of the FBR Cycle," which was completed in the 2005 fiscal year, and for working out a subsequent R&D policy without delay.

Based on the evaluation of the results of the Study, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has selected a combination of the sodium-cooled FBR with MOX fuel core, the advanced aqueous reprocessing process and the simplified pelletizing fuel fabrication as currently the most promising conceptual system of the FBR cycle technologies that has potential for satisfying the performance criteria through R&D efforts. The MEXT presented the Commission with a report titled "Research and Development Policy on FBR Cycle Technology" that arranged R&D plans to assess the feasibility of selected innovative concepts of technology essential to the realization of the system.

Considering this report and the report titled "Nuclear Energy National Plan" by the Ministry of Economy, Trade and Industry (METI), the Commission determines the following as the basic policy on R&D of FBR cycle technologies over the next decade, in line with the direction given in the Framework for Nuclear Energy Policy:

1. The MEXT, the METI and the Japan Atomic Energy Agency, an Incorporated Administrative Agency (hereinafter referred to as JAEA) shall team up and cooperate with electricity utilities, manufacturers and universities to promote R&D regarding the selected concept and produce by 2015 the conceptual designs of commercial and demonstration FBR cycle facilities that can satisfy performance criteria regarding safety, economic competitiveness, reduction of environmental burden, high efficiency in the utilization of nuclear fuel resources and enhancement of resistance to nuclear

proliferation, with R&D programs to be executed to realize them. These activities shall be promoted as the "FBR Cycle Commercialization R&D program." Since discussions starting around 2010 on the second nuclear fuel reprocessing plant are set to cover a strategy of transition from the light-water reactor cycle to the FBR cycle, the R&D program shall aim to provide scientific and technological knowledge contributing to the discussions.

2. The JAEA shall resume operations of the prototype FBR "Monju" in the 2008 fiscal year on the precondition of safety while promoting mutual understanding with local residents on the safety. The JAEA shall achieve its initial goals of demonstrating its reliability as an operational power plant and establishing sodium handling technologies, hopefully, within ten years or so. Later, it shall continue utilizing "Monju" for R&D activities for commercialization of FBR technology.

3. The Government and R&D organizations shall also promote the exploration and the proof-of-principle activities of innovative concepts for realizing alternative FBR cycle technologies as well as wide-ranging relevant basic and fundamental R&D activities, making the most of the potential of their basic and fundamental research divisions and universities, in addition to various research facilities including the experimental FBR reactor "Joyo."

4. The MEXT, the METI, the JAEA, electricity utilities and manufacturers shall develop and continuously revise a roadmap to the commercialization of the FBR cycle technologies in order to make it possible to promote effective and efficient R&D activities over a long time and facilitate the smooth transition to the stage of demonstration activities of the FBR cycle technologies, while playing their respective roles steadily under appropriate development arrangements. The roadmap shall specify requirements for the FBR cycle technology demonstration facilities, of which conceptual design is to be proposed in 2015, and the activities in the demonstration and the commercialization phases including a plan to achieve the construction of the demonstration facilities in the decade following that year, as well as the respective roles of all the parties concerned in each phase.

5. The Government and R&D organizations shall give consideration to the following matters in playing their respective roles:

(1) The Government and R&D organizations shall give full consideration to the assurance of safety in promoting R&D activities and also to the assurance of nuclear non-proliferation, taking account of the use of plutonium in these activities.

(2) They shall revise the performance criteria properly, paying due attention to future uncertainties, in accordance with updated prospects regarding future energy demand and supply and environmental constraints. They shall also modify R&D plans and their implementation in line with the revision. In addition, they shall try to secure fiscal funding for the promotion of the program.

(3) Around 2010, the Government shall evaluate achievements regarding R&D activities, the study of efforts for commercialization, and so on. Based on the evaluation, the

Government shall specify a more concrete R&D policy after that.

(4) The JAEA as the program's core R&D organization shall arrange Japanese and foreign experts' review of the R&D achievements from the viewpoint of the possibility to satisfy performance criteria. It shall also enrich both project and management review activities to reflect the results in R&D plans and their implementation.

(5) In promoting R&D activities, the Government and R&D organizations shall consider and realize systems for knowledge management within the Government and industry, including knowledge and information infrastructures that make it possible to effectively transfer and utilize the knowledge and experience accumulated through R&D activities for the commercialization of FBR cycle technologies. Regarding the management of knowledge in industry, in particular, they shall develop a system for nurturing capability for plant engineering including that for compiling performance and structure specifications of plants and their components, understanding that such capability will be developed to the levels that enable the industry to participate in the market through repetition of design and evaluation activities.

(6) They shall proactively work out and promote international R&D cooperation programs that could not only reduce R&D risks and costs but also bring opportunity to produce global-standard technologies, while separating areas for competition from those for cooperation.

(7) As the FBR cycle technologies development program is a long-term R&D program, they shall organize personnel exchanges between industry, R&D organizations and universities in order to develop and secure manpower that will undertake future activities.

(8) They shall steadily implement public hearings and public information activities to fulfill their accountability to the public about the R&D program that involves a large amount of government funds.

The Commission shall receive and confirm reports from the MEXT and the METI about progress in R&D, and efforts to design commercial and demonstration facilities, including the study of the roadmap to the commercialization and their evaluation. It shall review them, present opinions as needed and evaluate the appropriateness of this basic policy.

(End)