The Establishment of the 4th 5-year Korean National Nuclear R&D Plan

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1. Introduction

"Comprehensive Nuclear Energy Promotion Plan (CNEPP)" is the integrated Korean national plan to boost the development of every aspects of nuclear fields. It is established every five years according to the Atomic Energy Promotion Act (AEPA) of Korea. The 5-year nuclear R&D plan (hereafter "5-year plan") shall be established as the follow-up partial plan for nuclear R&D areas such as future nuclear reactor systems, nuclear safety, radioactive-waste management, medical & industrial applications of radiation and technology innovation for NPPs.

This paper describes the basic approaches taken for the establishment of the 5-year plan and discusses how the 'Logic model' worked for the systematization of the planning.

2. Approaches

The 5-year plan is established based on the article 9 and 10 of the AEPA. The five directions constrain the 5-year plan are as follows:

- Be consistent with the national policy
- Reflect the domestic and international environmental changes on nuclear R&D
- Identify and promote the R&D fields and technologies
- Restructure the existing R&D program
- Establish the performance-based projects management system

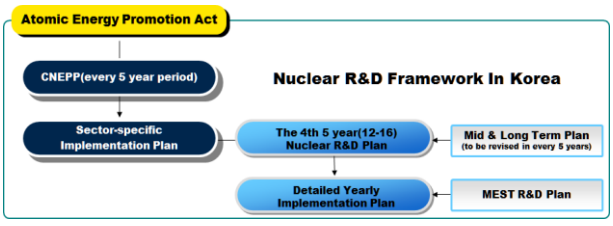

Fig. 1. National Nuclear R&D Framework of Korea.

2.1 Framework of Planning

Two phase approach was taken: one for the program planning and the other for the project planning. At the program planning phase, six Professional Subcommittees devised the technical programs to be implemented in the technical areas of Nuclear safety, Next generation (Gen-IV) nuclear system, Nuclear fuel cycle, Radiation technology, Core technology, Infrastructure & Human resources. At the project planning phase, the technical programs were reviewed and adjusted to the research projects by the Technology Assessment Committees (TACs), which consist of four R&D fields. Finally the Planning and Coordination Committee reviewed and approved the draft plan prior to the submission to the Ministry of Education, Science & Technology (MEST).

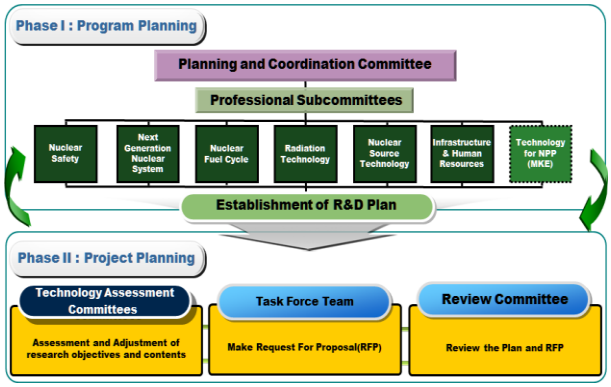

Fig. 2. R&D Planning Organizational Chart.

2.2 Methods of Planning

"Logic models" have been used as tools for program planning, management and evaluation [1]. "Logic models" is a graphic display or a map of the relationship between a program's resources, activities and intended results, which also identifies the program's underlying theory and assumptions [2]. Ideally, "Logic models" provides stakeholders with a program management tool that helps clarify goals and relationships, strives for consensus, identification gaps in knowledge, exploration of alternative approaches and an analytic framework [3].

Systematic planning process and methodology were developed and applied using the models. The models depict the inputs, the activities, and the outputs and they are composed of 3 major steps of pre-planning, planning, and review & decision as "inputs". The activities for pre-planning step are Investment Portfolio Analysis, R&D Outcome Analysis, Paper & Patent Analysis, R&D Environment review, R&D demand investigation.

For the planning step, activities were carried out to make a plan. Lastly for the review and decision step, after gathering various opinions of the hands-on researchers and experts, the 5-year plan was completed through such in-depth reviews and adjustment procedures.

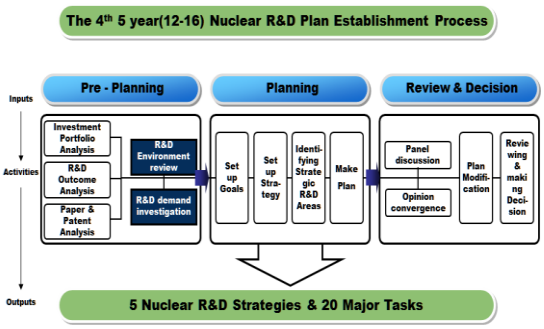

Fig. 3. Nuclear R&D Planning Process with "Logic models".

3. Results and Discussion

A new strategic plan reflecting the priorities of the CNEPP has been established and approved by the General Committee for research and development of the Ministry of Education, Science & Technology (MEST).

The overarching mission of , the 5-year plan is to "strengthen national status of nuclear and radiation technology through the research and development of leading technology". The framework of the plan efforts to ensure national energy safety and security and was designed to deliver results along five strategic goals:

• Maintain the highest level for nuclear safety research,

• Develop the core/fundamental technology for future nuclear energy systems,

• Develop the environmentally friendly fuel cycle technology,

• Explore a new materials and technologies through the advancement of radiation technology, and

• Strengthen the nuclear innovation research and develop the nuclear human resources.

Within these goals, there are 20 major initiatives designed to achieve the goals. Table 1 shows that the strategic themes are supported by each initiative.

Table 1. 20 Major Initiatives.

	Initiatives
Strategy goal 1	(1) Development of a severe accident mitigation technology (2) Development of site risk assessment & management technology (3) Development of structural integrity enhancement technology for long term operation NPPs (4) Development of the preparedness system of the radiological environment protection and nuclear accident (5) Development of core technology of HWR safety enhancement and evaluation
Strategy goal 2	(1) Design and technology demonstration for SFR (2) Development of key technologies for nuclear hydrogen (3) Regulatory framework research for licensing of future reactors
Strategy goal 3	(1) Development of Pyroprocessing technology (2) Development of HLW long-term management system (3) Development of decommissioning, decontamination, and reuse technology for nuclear facilities (4) Development of core/common technology in nuclear fuel cycles
Strategy goal 4	(1) Development of higher value-added radiation technology (2) Development of medical/biological radiation technology for advanced diagnosis and therapy (3) Establishment of infrastructure for utilization of radiation and RI
Strategy goal 5	(1) Development of innovative and elementary nuclear technology (2) Development of high-risk, high-return nuclear technology (3) Basic Research for nuclear strategic R&D field (4) Establishment of research equipment and facility (5) Promotion to global and high-quality nuclear human resources

3. Conclusions

The effectiveness of nuclear power as the viable answers for energy resources and environmental issues is well recognized over the world. Many countries expecting high economic growth have plans to introduce the nuclear power. However in order to meet the needs, the nuclear power should have higher safety and reliability, as well as high proliferation resistance and the sustainability, which comes with the efficient use of resources and reduction of environmental burden.

As to the radiation technology, the urgent need is to create a new radiation market by promoting the integrated radiation treatments and by developing critical element technologies of radiation applied areas, such as the development of a functional new material for both medical and industrial purpose.

This paper describes how the needs and requests for the nuclear technology have been incorporated into the solid national nuclear R&D plan. It discusses two phase approach and the organizational structure to deal the plan and the logic models developed to systemize the planning processes. The "Logic models" enabled to identify and predict overall flow of information regarding the intermediate and final results of planning process.

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