

iKSNF, the Control Tower for the R&D Program of SNF Storage and Disposal

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Three government bodies, that is, the Ministry of Science and ICT (MSIT), Ministry of Trade, Industry, and Energy (MOTIE), and Nuclear Safety and Security (NSSC), jointly established the Institute for Korea Spent Nuclear Fuel (iKSNF) in December 2020 to secure the management technologies for spent nuclear fuel (SNF). The objective of iKSNF is to successfully conduct the long-term research and development program of the 「Development of Core Technologies to Ensure Safety of Spent Nuclear Fuel Storage and Disposal System」. Our program, known as the first multi-ministry program in the nuclear field of Korea, mainly focuses on developing core technologies required for the long-term management of SNF, including those for safe storage and deep geological disposal of SNF. The program comprises three subprograms and seven key projects covering the storage, disposal, and regulatory sectors of SNF management. Our program will last from 2021 through 2029, with a budget of approximately four billion USD sponsored by MSIT, MOTIE, and NSSC.

Keywords: Spent nuclear fuel, Storage and transportation, Deep geological disposal

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Letter to the Editor

Nuclear power has been a greatly-valuable energy source for several decades in Korea. According to the electric power statistics released by the Korea Electric Power Corporation, 24 operational nuclear reactors located in 5 different sites across Korea account for about 29% of electric power generation as of 2020. Considering the fact that the nuclear power supply rate is the second-highest after coal which takes up about 35% of the nation's power, nuclear power is certainly a solid tool to afford the rising electricity demand with significantly low carbon footage. As nuclear power remains to be one of the most affordable and eco-friendly energy sources among the technologies developed to date, it needs to be acknowledged as a vital part of the driving force that can steer the nation into the era of carbon neutrality.

For nuclear energy to play a bigger role in the Korean energy mix, there are multiple challenges to overcome and the most urgent matter to be addressed is the spent nuclear fuel (SNF) management issue. The management policy of SNF has been constantly deadlocked over three decades and it is one of the main elements repressing the promotion of nuclear energy. Under the Radioactive Waste Management Act and the Nuclear Safety Act, all SNF from nuclear reactors is stored in wet storage within nuclear power plants (NPPs) for an undecided period as there is no consolidated interim storage facility or final disposal facility constructed in Korea. With the increasing amount of SNF stored in NPPs, an additional dry storage facility should be constructed shortly to solve the limited wet storage capacity.

Resolving the radioactive waste management issue is necessary for the safe operation of NPPs and it requires a wide range of endeavors on the national level including putting up plans and measures to manage SNF backed up by the development of related technologies and infrastructures. Three government bodies, that is, the Ministry of Science and ICT (MSIT), Ministry of Trade, Industry, and Energy

(MOTIE), and Nuclear Safety and Security (NSSC), jointly established the Institute for Korea Spent Nuclear Fuel (iK-SNF) in December 2020 to secure the management technologies for spent nuclear fuel (SNF). The objective of iK-SNF is to successfully conduct the long-term research and development program of the 'Development of Core Technologies to Ensure Safety of Spent Nuclear Fuel Storage and Disposal System'.

Our program, known as the first multi-ministry program in the nuclear field of Korea, mainly focuses on developing core technologies required for the long-term management of SNF, including those for safe storage and deep geological disposal of SNF. The program comprises three subprograms and seven key projects covering the storage, disposal, and regulatory sectors of SNF management (Fig. 1). The main research contents of the key projects are as follows :

- Obtaining technologies to demonstrate the safety of SNF storage
 - Development of technologies to demonstrate the safety of SNF and storage system
 - Standardization of the safety information of the back-end fuel cycle/Establishing the SNF information system
- Demonstration of the SNF disposal safety and establishment of the related infrastructure
 - Development of technologies to evaluate site suitability for the selection of the SNF management facility
 - Development of technologies to demonstrate comprehensive safety at the conceptual level
 - Development of technologies to demonstrate the performance of SNF geological disposal system
- Establishment of fundamental safety regulations on the deep geological disposal system of SNF
 - Development of detailed regulatory requirements for deep geological disposal system
 - Development of the safety verification system for deep

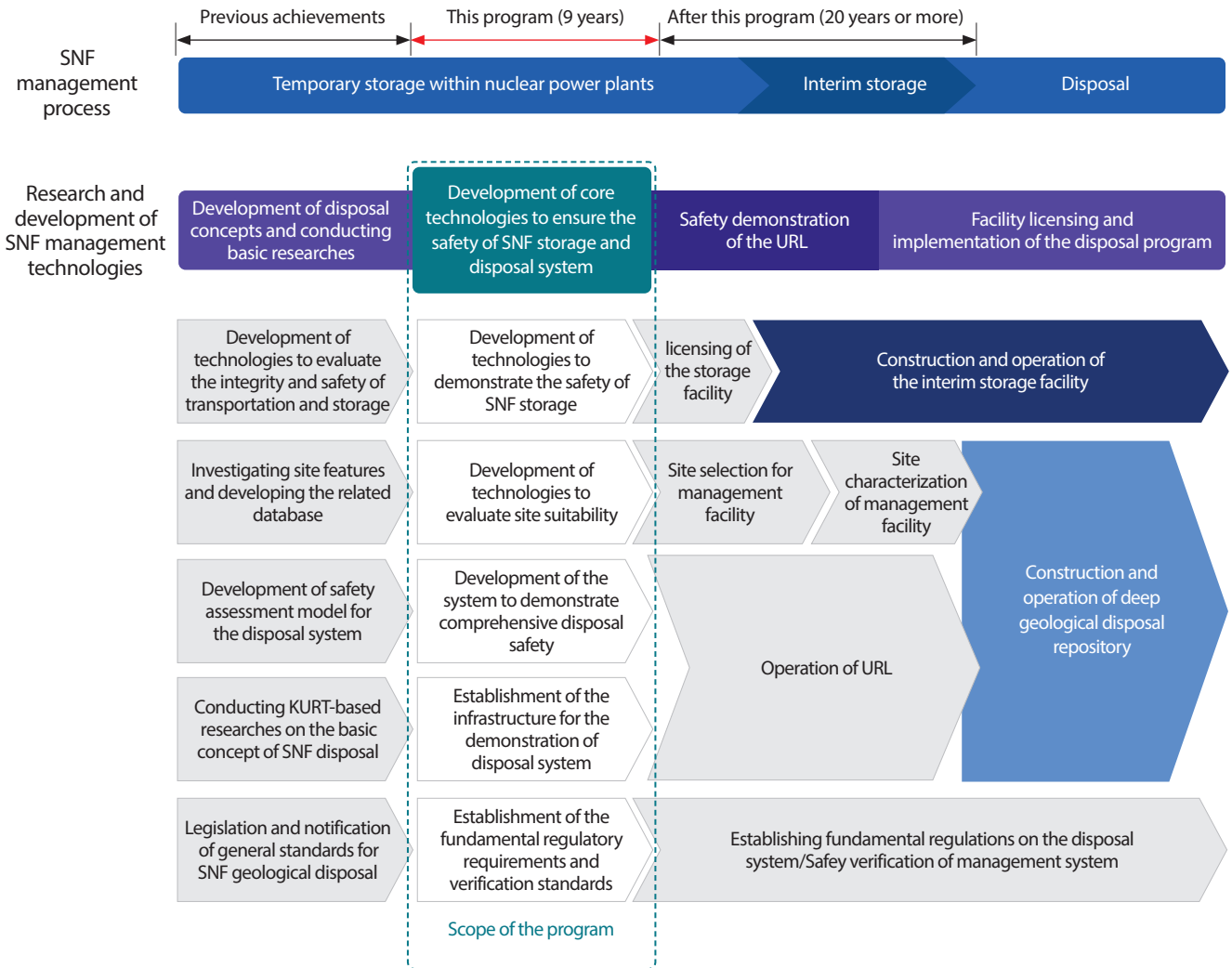


Fig. 1. Scope of the R&D Program [1].

geological disposal system

Our program will last from 2021 through 2029, with a budget of approximately four billion USD sponsored by MSIT, MOTIE, and NSSC.

We strive to take a crucial part in leading the technological breakthroughs for the safe management of SNF. As a latecomer in the SNF management field, we refer to both trial and error experiences of the leading countries, and more to apply the lessons learned when implementing our program. We plan to highly engage in international dis-

cussion and cooperation in the SNF management area to contribute to creating the outstanding performance of our program. In addition, we aim to grow into an R&D control tower in the SNF management field by developing superb technologies that can be utilized in near future. Accordingly, with the outcomes of our program, we can revitalize the industrial ecosystem of the SNF management field. We look forward to kicking off a subsequent project that will demonstrate the developed technologies in a generic URL (Underground Research Laboratory). When the relevant

act is enacted, site investigation technologies will also be applied to the site selection phase for the final geological disposal facility.

We believe that fulfilling our objective to develop key solutions and infrastructures for SNF storage and disposal will help nuclear power to be appreciated as green energy. We pledge to serve the nation at the frontier of technological development and do our utmost endeavor to achieve our goal to secure safety measures necessary for the management of SNF.

REFERENCES

- [1] Korea Institute of S&T Evaluation and Planning. 2019 Preliminary Feasibility Analysis Report on the R&D Program of Development of Core Technologies to Ensure Safety of Spent Nuclear Fuel Storage and Disposal System, KISTEP Report, 11-1721000-000464-01 (2020).