한국원자력환경공단
KOREA RADIOACTIVE WASTE AGENCY

Communication on the Technical Reliability of Geological Disposal: Experience in Korea

KORAD 한국원자력환경공단

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Geological Disposal over 60 Years

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- Geological disposal refers to the disposal of radioactive waste in a disposal facility located underground in a stable geological formation (IAEA SSG-14)

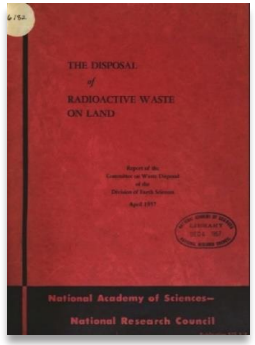
- Since a geological disposal concept was proposed by the National Academy of Sciences in 1957, significant efforts have been put in to develop a safe and reliable disposal system over 60 years

- At the moment, the deep geological disposal has been recognized as a permeant management method of high-level waste (HLW) and spent fuel across the world

    - The IAEA provides a mature set of safety standards and technical guidance on the geological disposal, and EC Directive 2011/70 describes the deep geological disposal as the safest and most sustainable option

- The first deep geological repository for spent fuel is expected to be operated soon in Finland, and other advanced programmes have made significant progress in siting

- The deep geological disposal: technically feasible and reliable solution for the management of HLW and spent fuel in terms of safety



National Academy of Sciences, USA (1957)

[EC DIRECTIVE 2011/70/EURATOM]

23. Deep geological disposal represents the safest and most sustainable option as the end point of the management of high-level waste and spent nuclear fuel considered as waste
24. It should be an ethical obligation of each Member State to avoid any undue burden on future generation in respect of spent fuel and radioactive waste including any radioactive waste expected from decommissioning of existing nuclear installation.

Geological Disposal Programme in Korea

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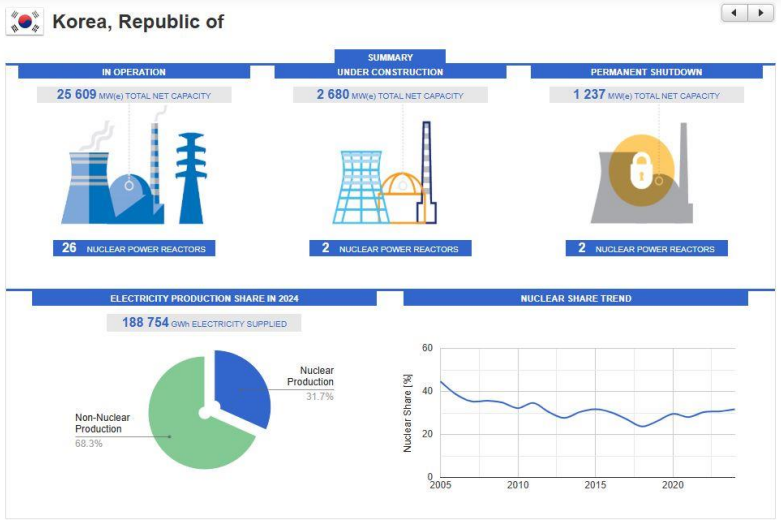
- 26 nuclear power reactors are in operation, 4 reactors are under construction and 2 reactors have been shut down as of October 2025
- Approximately, 30% of total electricity comes from the operation of NPPs in Korea
- A Special Act on HLW Management came into effect in March 2025, and the Act stipulates key milestones in HLW management
  - An interim storage facility and a deep geological repository for HLW shall be operational no later than 2050 and 2060, respectively
  - A generic underground research laboratory (URL) shall be constructed out of a disposal site
  - A generic URL site was successfully selected in December 2024



Source: PRIS, IAEA
October 2025

Communication on Technical Reliability

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- As I mentioned before, an international community has put in time and enormous efforts over 60 years on a deep geological disposal system
- Its safety and reliability have been well thought out, but its long-term safety remains a concern among the public
- Well-organized communication approach and tools are in needs to ensure its technical reliability
- Approach to communication
  - Openness and disclosure of technical information
  - A generic URL programme - Seeing is believing
  - Training and professional development
  - International cooperation

Openness and Disclosure of Technical Information

- KORAD recognizes that **openness and full disclosure of technical information** are a critical factor in ensuring public trust and reliability in the HLW management

- Technical information is fully disclosed throughout an entire management process in accordance with legal requirements

  - Long-term plans and key milestones including National Basic Plan for HLW Management and National Plan for HR Development

  - Waste inventory and spent fuel storage systems

  - Research and development: A long-term R&D roadmap and research reports

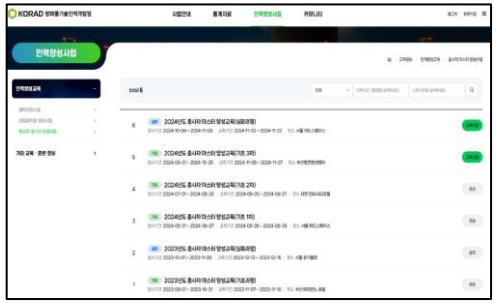
  - Public outreach activities

Generic Underground Research Laboratory

- Based on KORAD experience on the operation of LILW disposal facilities, KORAD is aware of important roles of the generic URL
  - The generic URL provides scientific and technical basis for implementing a deep geological disposal programme
  - The generic URL is a useful tool for public outreach: what DGR is like and how to achieve the long-term safety of a deep geological disposal facility
  - The public and stakeholders would like to experience the underground environment where DGR would be built and see a geological disposal system for better understanding
  - The generic URL could be also used for hands-on training and professional development of young generations
- KORAD successfully selected a site to build a new generic URL in crystalline body in December 2024 and plans to operate it in part in 2030

Training and Professional Development

- Considering a long time frame of a deep geological disposal programme, a strategic approach for training and professional development is also a key for reliability
  - National plan for HR development regarding HLW management
  - An estimate of the number of technical experts we need in the future
  - HR management system
  - Needs-driven programmes for undergraduates, graduates and young professionals in nuclear industry – social science, geology, environmental studies and nuclear engineering
  - Feed-back to the training and professional development programmes from participants and senior experts



International Cooperation

- International collaboration strengthens the understanding and reliability of a deep geological disposal programme
  - Joint R&D including scientific and engineering research in URL, the development of performance assessment codes and access to data – HotBent in GTS and Horonobe International Project
  - Bilateral knowledge and information sharing – Czech Republic, Finland, France, Japan, Sweden, Switzerland, USA
  - Multi-national collaborative activities such as IAEA and OECD/NEA meetings, conference, publication of technical documents and peer review service
  - Site visits of stakeholders – Onkalo, Horonobe, Beishan, Bure, GTS
- In addition, the international collaboration enhances public confidence in a geological disposal programme

Thank you for your attention