Updates for **HLW Management** Program in Korea

June 2026

KORAD
한국원자력환경공단

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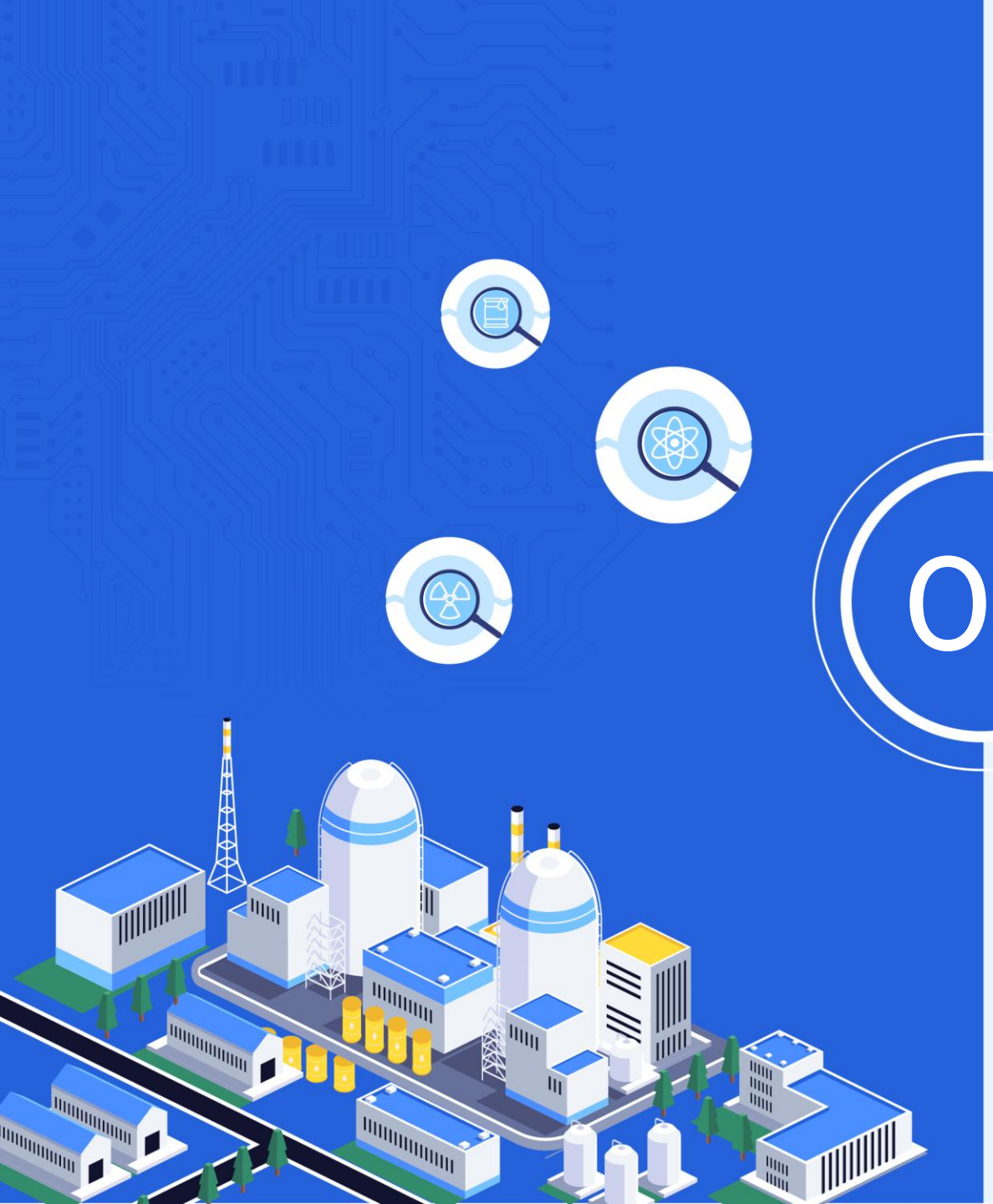
CONTENTS

HLW Management Program in Korea



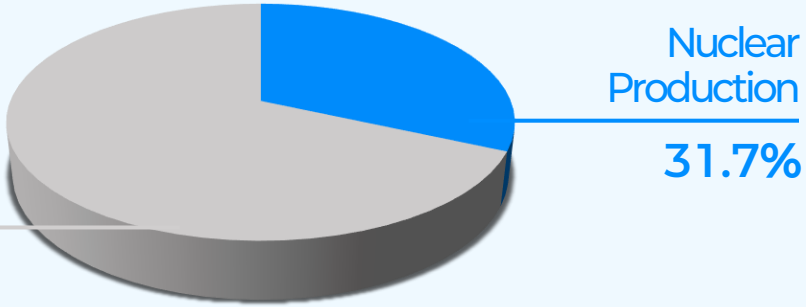
01

Updates for HLW Management Program

Nuclear Power & SNF Inventory

01 Nuclear Power and SNF Inventory

Electricity Production Share



188,754GWh Electricity Supplied by Nuclear Power

Nuclear Power Plants in Korea

In Operation	Under Construction	Permanent Shutdown
		
26 Reactors	2 Reactors	2 Reactors

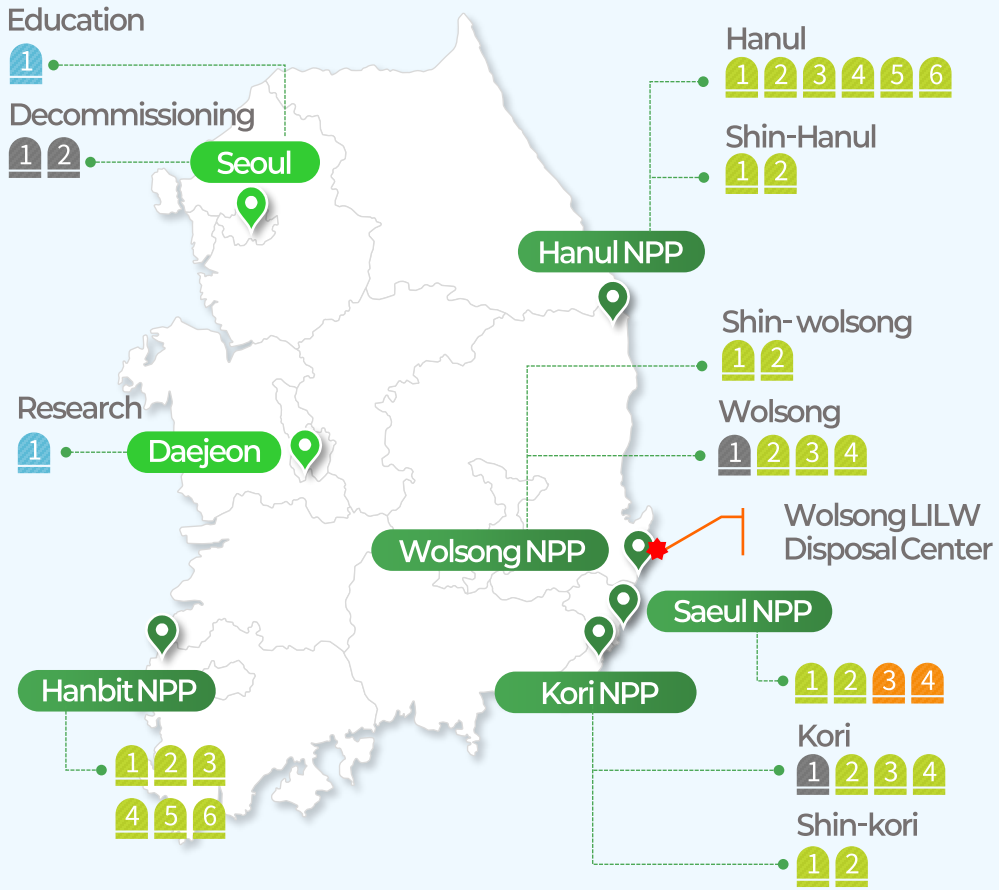
Government's Nuclear Policy

- The government has announced that two new large nuclear power plants will be constructed by 2038 in order to meet the growing electricity demand in the future.
- In addition, the first SMR is planned to be built by 2035s.

01 Nuclear Power and SNF Inventory

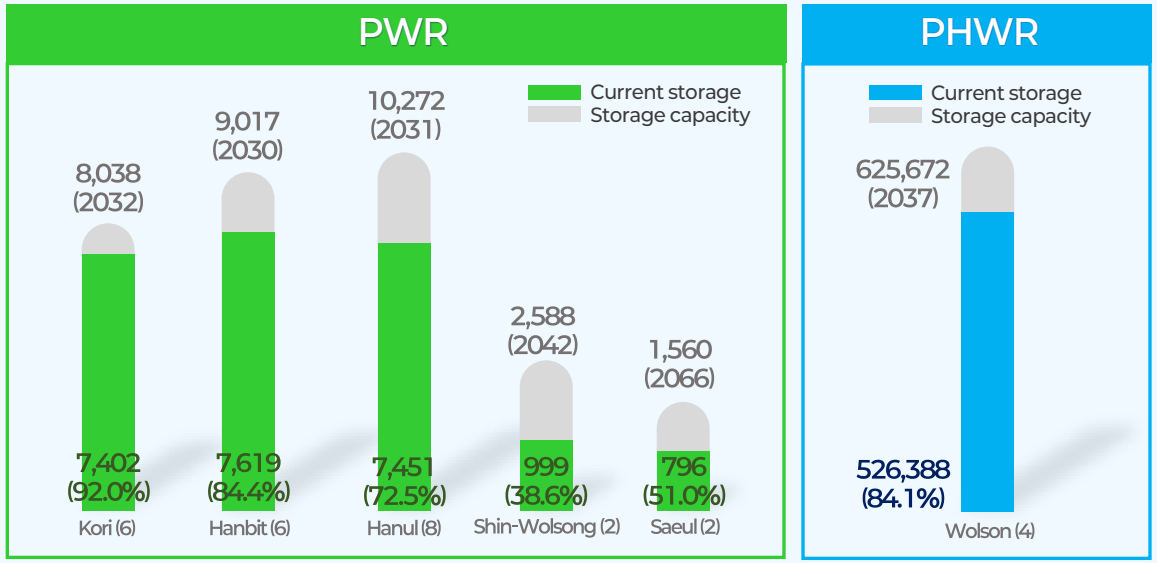
Nuclear Power Plants Map

As of Feb. 2026



SNF Inventory

As of Sep. 2025



- Most of SNFs generated from NPPs are stored at the on-site pool and/or the on-site dry storage facility.
- Worse yet, the capacity of most on-site interim storage facilities is nearly full.
- Given the circumstance, construction and operation of CISF and DGR is one of the urgent tasks.

02

Updates for HLW Management Program

RM Framework

02 RM Framework

Legal Framework

Act	Radioactive Waste Management Act (2008)	Special Act on HLW Management (2025)
Enforce-ment Decree	Enforcement decree of the radioactive Waste Management (2009)	Enforcement decree of the Special Act on HLW Management (2025)

Separation of Law

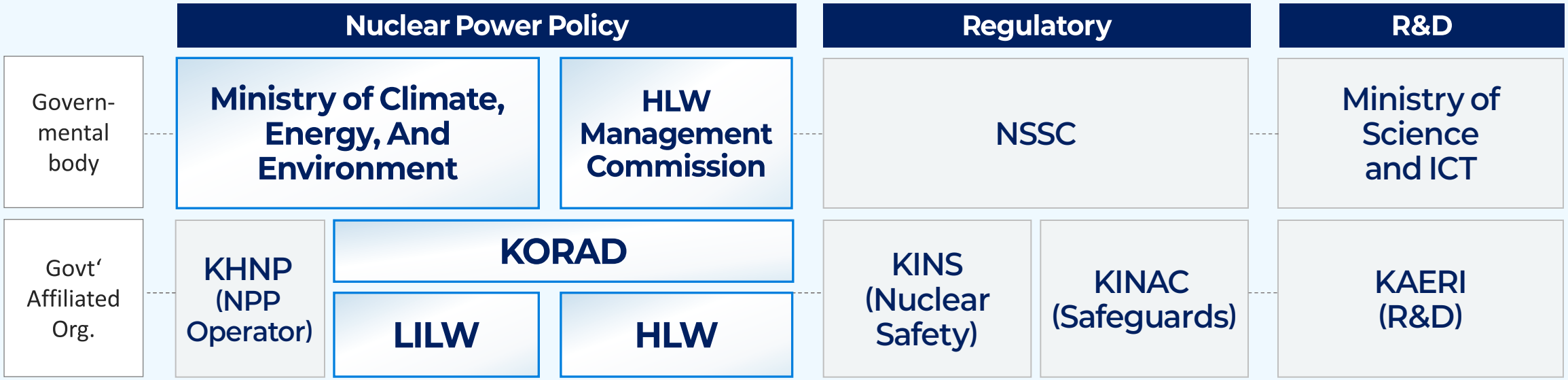
- Due to the Public sentiment, it was difficult to promote LILW disposal project in the 1990s. To this end, the government decided to separate the law from HLW project to build LILW disposal facilities first.

Special Act on HLW Management (Mar. 2025)

- Governance: A dedicated commission for HLW management shall be created
- Facility deadline: An interim storage facility by 2050 and a DGR by 2060

02 RM Framework

Organizations



- Two different government agencies supervise KORAD since the enactment of HLW Management Act in 2025.
- The Ministry of Climate and Environment supervises KORAD's LILW business, while the HLW Management Commission is in charge of KORAD's HLW business.

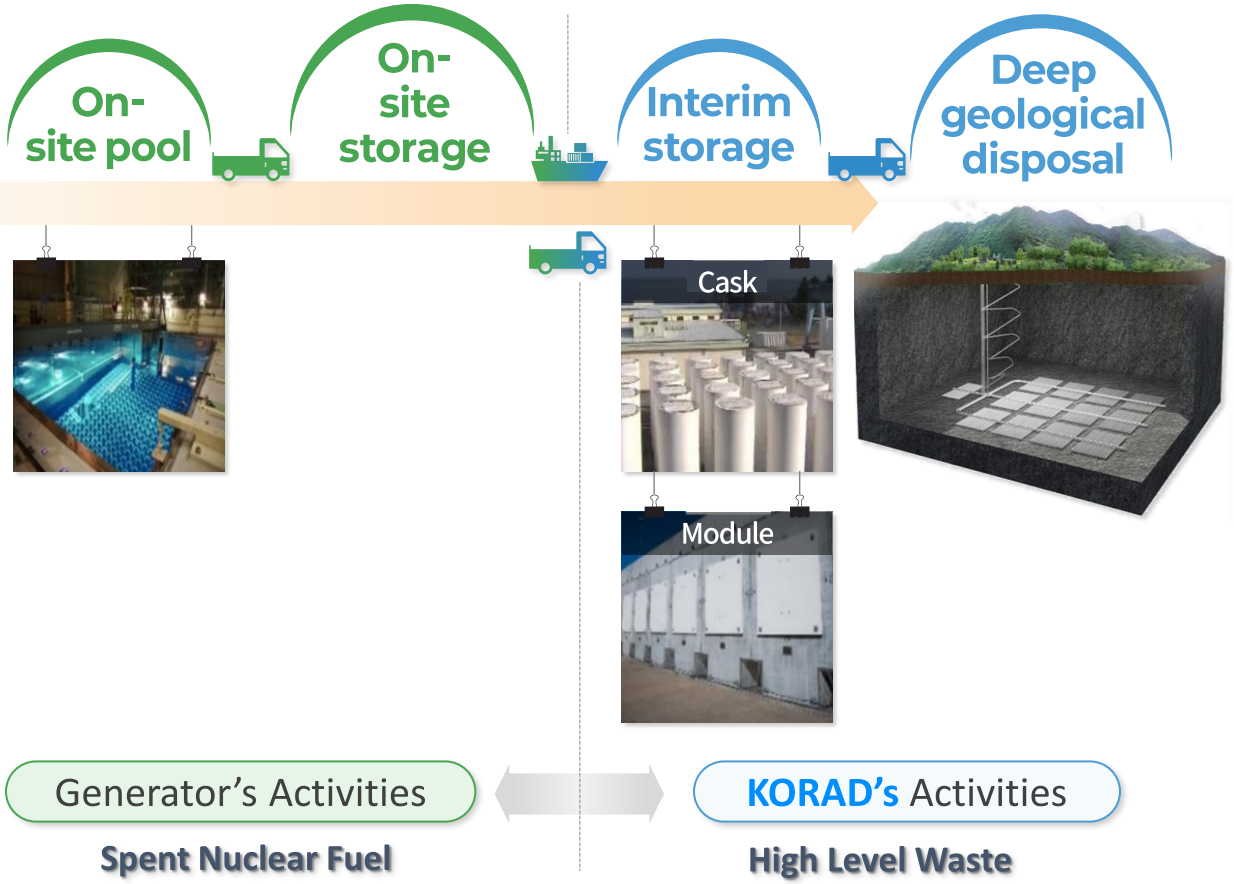
02 RM Framework

HLW Management Roadmap

- The national plan for HLW Management, set by the Ministry and undated every 5 years includes the Roadmap
- The 2nd national plan drawn up in 2021 stipulates that 13 years are expected for a site selection process, and the host community is granted veto rights during the site selection process
- The interim storage facility and the DGR are planned to be constructed at the same site

02 RM Framework

HLW Management Procedure



- SNFs generated from NPPs are stored at the on-site pool and/or the on-site dry storage facility
  - PLWR SNFs are stored at the on-site pool, and they will be moved to the on-site dry storage facility
  - PHWR SNFs are stored at the on-site pool and the on-site dry storage facility
- A SNF generator is responsible for the management of SNF at the nuclear power plant site
- KORAD takes for the transportation, off-site interim storage, and disposal of SNF

03

Updates for HLW Management Program

HLW Repository Siting

03 HLW Repository Siting

Key Transitions

Shift to **executable implementation**

Legal foundation via Special Act

Urgency from **2030s storage saturation**

5-Stage Process

5-Stage Process

Timeline: 9-13 years in total
Initial screening to final confirmation

Transitioning to a technical, legal, and social siting implementation.

03 HLW Repository Siting

Exclusion Screening Criteria

GIS-Based Nationwide Screening

Integrating geological, environmental, and social datasets

Geological Stability

- Active Faults
- Seismic/Volcanic Zones
- Unstable Rock

Environmental Protection

- Flood-Prone Areas
- Water Resource Zones
- Protected Ecosystems

Social Constraints

- High Population Density
- Limited Accessibility
- Reduces licensing risk

03 HLW Repository Siting

Investigation Framework

Detailed criteria serve as favorable characteristics for site suitability

Basic Investigation

(3-5 Years)

Identify approx. 3 candidate sites via surface-based testing

Deep Geological

(3-4 Years)

Confirm repository depth suitability & isolation performance

6 Key Areas

- Geology
- Rock Mechanics
- Hydrogeology
- Geochemistry
- Solute Transport
- Ecosystem

03 HLW Repository Siting

Safety Assessment Framework

Progressive Safety Assessment: Preliminary Detailed Final

Assessment Items	Evaluation Criteria	Expected Deliverables
Geological Stability	Fault inactivity, rock mass integrity, structural stability	**Site Descriptive Model (SDM)**
Engineered Barriers	Canister anti-corrosion, buffer swelling capacity	**Barrier Performance Report**
Radionuclide Transport	Low permeability, high retardation factor, flow path	**Migration Analysis Model**
Multi-barrier Performance	System robustness, defense-in-depth verification	**Integrated System Assessment**
Long-term Safety	**Compliance with regulatory dose & risk limits**	**Final Safety Case (Licensing)**

03 HLW Repository Siting

Domestic Lessons

Social Legitimacy

Technical safety needs strong public trust.

Transparency

Open criteria prevent procedural collapse.

Global Best Practice

Stepwise Process

Iterative decisions reduce uncertainty

Voluntary Siting

Consent-based strategy ensures acceptance

Integrated Governance

HLW Committee

Decision & Oversight

KORAD

Implementation

NSSC / KINS

Regulatory Review

Local Govt.

Consent & Participation

2050 **Interim Storage** starts operation

2060 **Geological Disposal** starts operation

04

Updates for HLW Management Program

URL Project

04 URL Project

Prerequisites

Any radioactive materials WON'T be emplaced in the generic URL

- Rock type: Crystalline rock
- The local government which hopes to apply for the project should propose a site and provide basic infrastructure free of charge, based on the agreement of both provincial and municipal councils

Public hearings

Siting Process

A call for site proposals was released, and a project briefing was held for local governments.

Taebaek City submitted an application in response to the call for site proposal

An independent committee was created to evaluate site suitability

The Committee confirmed siting factors, and KORAD held public hearings on the project

KORAD carried out preliminary site investigations for the proposed site

Based on the results of preliminary site investigations, the Committee evaluated the site suitability and concluded that the site is suitable for the generic URL

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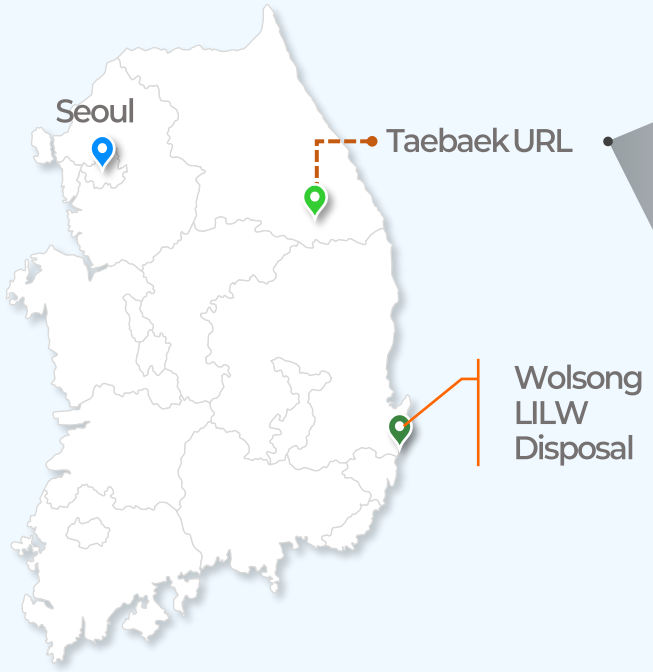
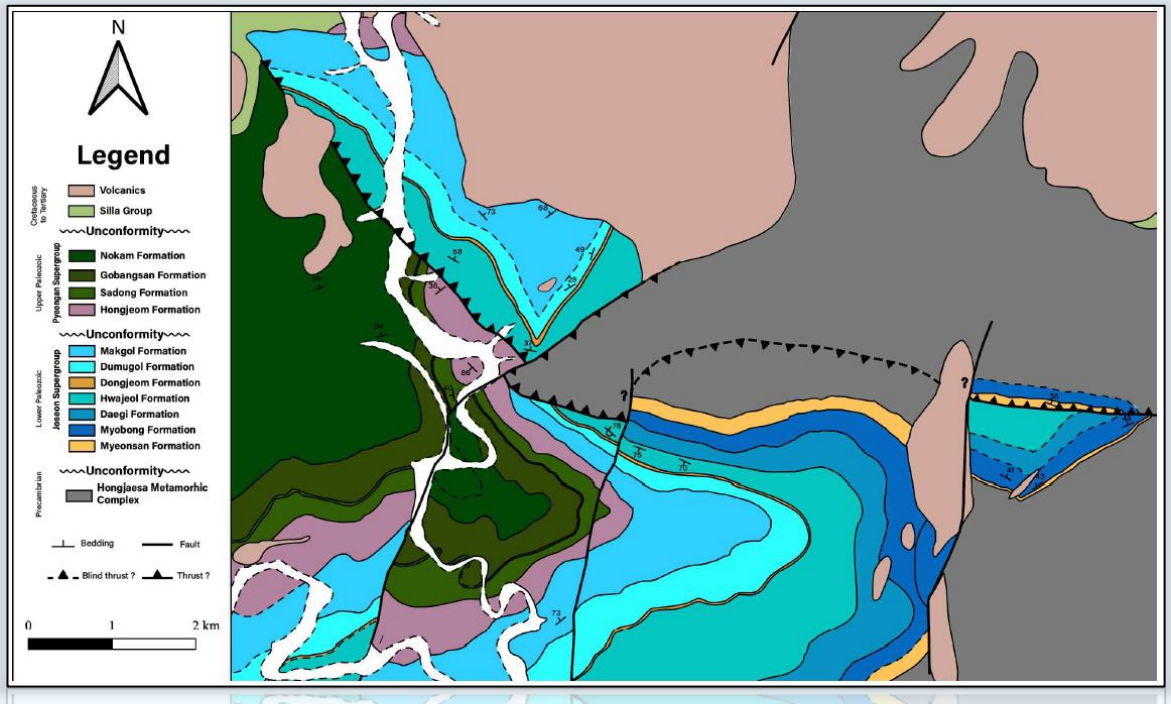
Taebaek City : Site for Generic URL

Location and geological setting



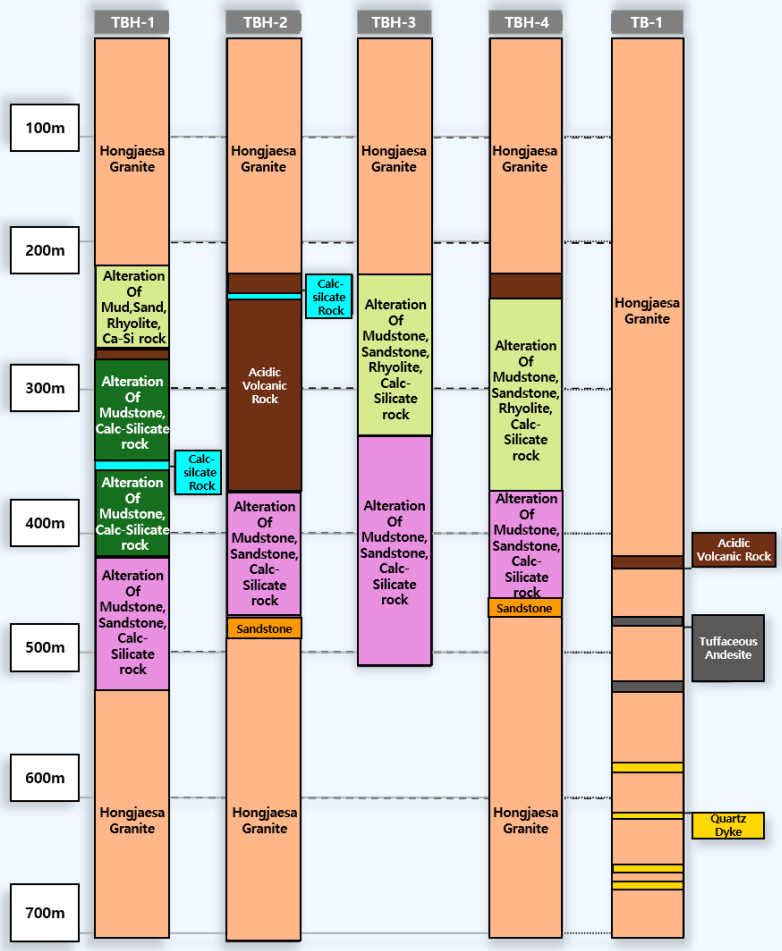
Taebaek City is located in a mountainous region in the northeast of South Korea and was once a coal mining region



Taebaek City is primarily characterized by the distribution of Hongjaesa Granites (grey color), Sedimentary rocks, Acidic Volcanic rocks. The Hongjaesa Granites are considered to be the host rock of the generic URL

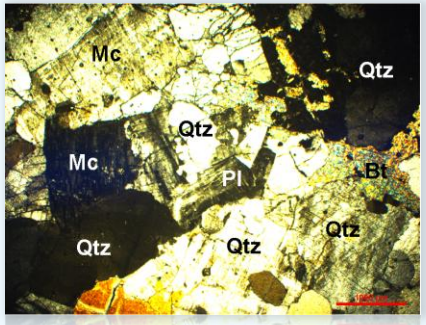
04 URL Project

Preliminary Site Investigation



- A single unit of crystalline rock is distributed down to a depth of approx. 800m, it is expected that the thickness of this distribution increases toward the South-East
- Based on ^{14}C analysis, the estimated age of the groundwater is approx. 10,000 years, which is significantly older than the national average of ca. 6,000 years
- The pH Level: ca 9

Precambrian Hongjaesa Granite



04 URL Project

Project Timeline

2023

Project planning

2024

Site Selection

2025

Preparatory Work

2026

Detailed review of the project

Licensing, Construction R&D at shallow depth

2029-2032

Detailed Site Investigation Facility Design Review

2027-2029

Project briefing for the local governments

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Implications

The generic URL is one of legal requirements under the Special Act and has been recognized as **an important tool for implementing a deep geological disposal programme.**

In Korea, there have been many unsuccessful attempts in the past to site HLW management facilities. However, although the generic URL has been recognized as one type of a HLW management facility, a generic URL site has been successfully selected by KORAD, the implementation organization. This represents a crucial moment for HLW management in Korea.

05

Updates for HLW Management Program

R&D Activities for HLW Disposal

05 Overview of R&D

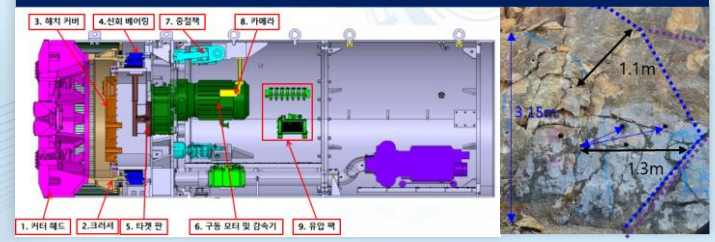
Approach

- HLW Management Commission is a control tower of HLW R&D
- KORAD is in charge of implementing HLW disposal R&D
- National-level scientific and technical capacity building is also an important consideration in R&D
- Cutting-edge technologies will be applied in R&D including AI application in performance assessment and geological characterization
- Results of current R&D activities will be applied in the generic URL
- International cooperation is one of priorities in R&D

On-going R&D Topics

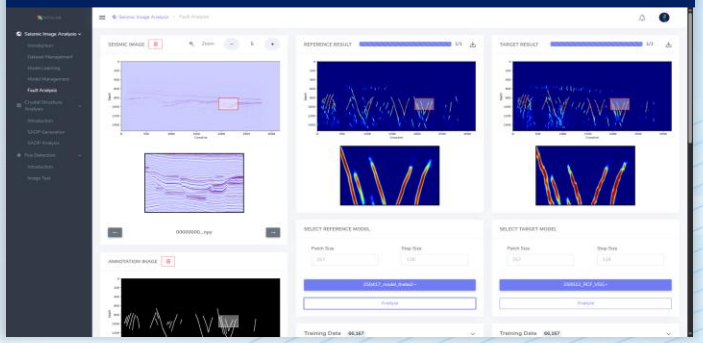
- Evaluation of long-term geological stability
- Site characterization methodology
- Conceptual design of a geological disposal system
- Development of in-house performance assessment programme
- Evaluation of a geological disposal system in the condition of high temperature
- Performance evaluation of various EBS materials
- Excavation methods to minimize excavation damaged zone and others

Excavation methods: TBM and D&B



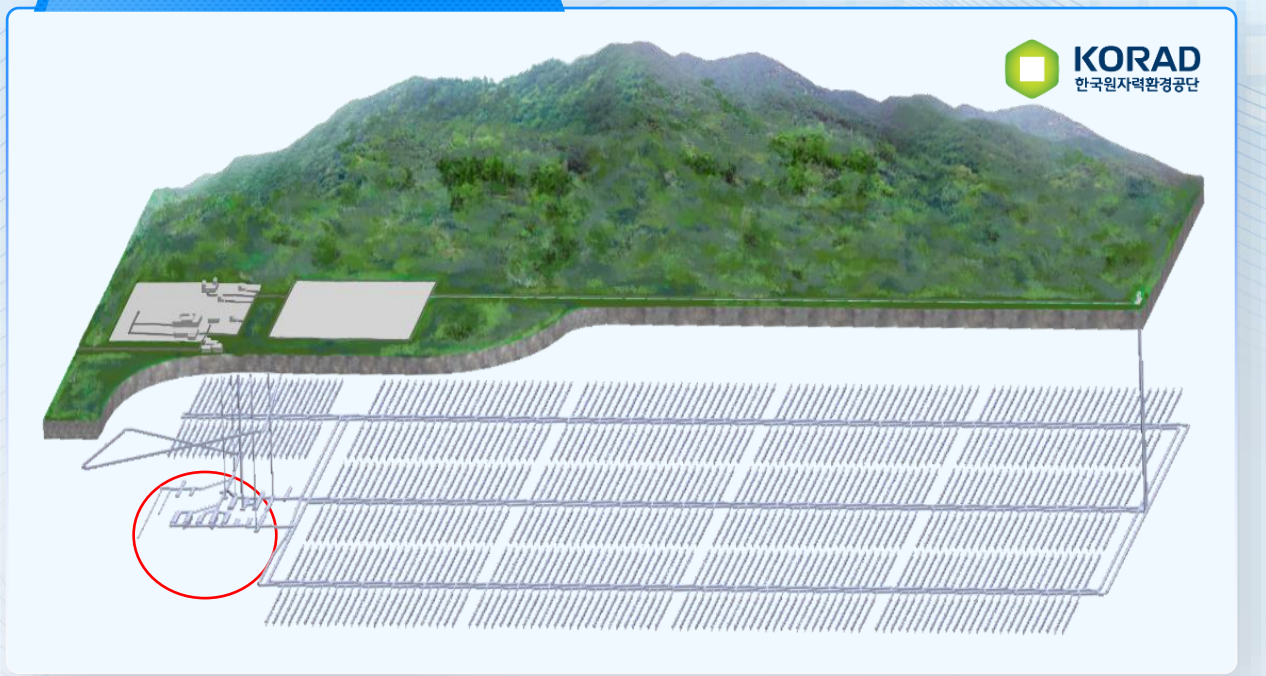
EBS experiments: canister and buffer

AI application in analysis of geological data



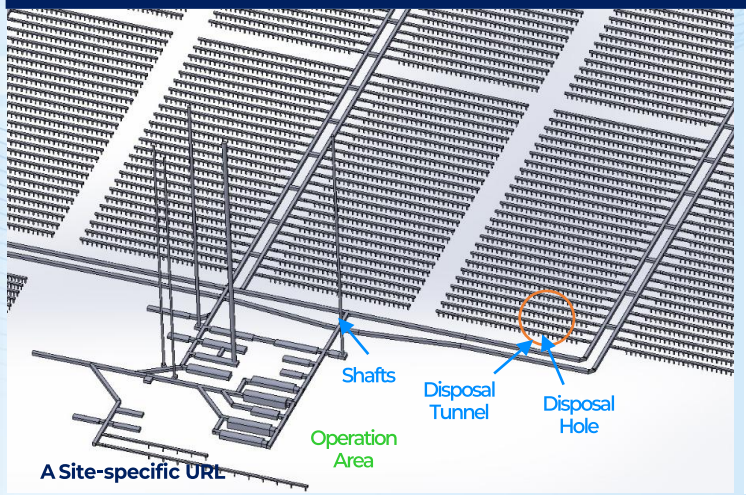
05 Conceptual Design of Deep Geological Repository

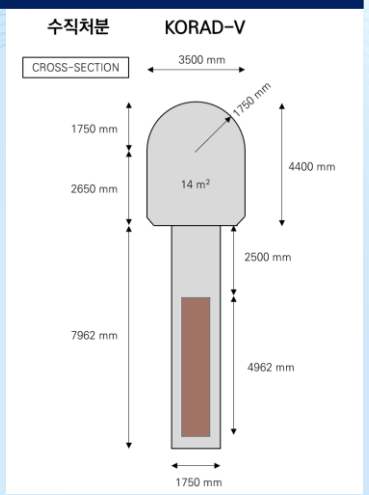
KORAD Concept



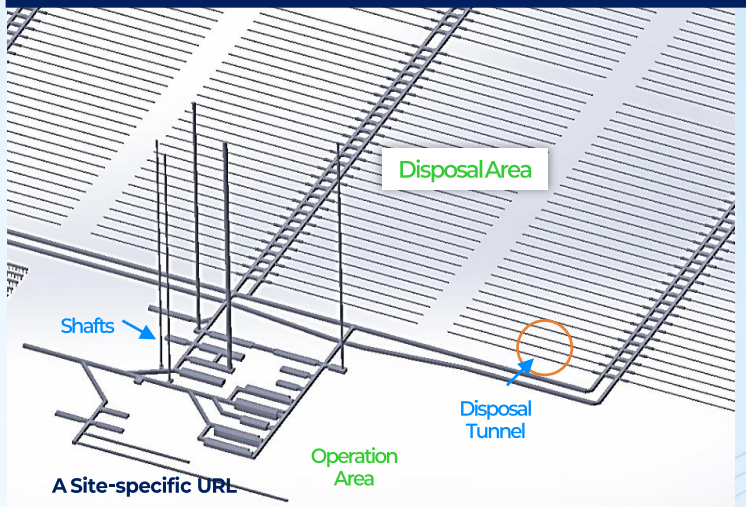
Emplacement Option	Vertical / Horizontal
Inventory	PWR and CANDU Fuels based on National Energy Plan
Key considerations	Long-term Safety, Operational Efficiency, Cost Effectiveness, Stepwise Expansion

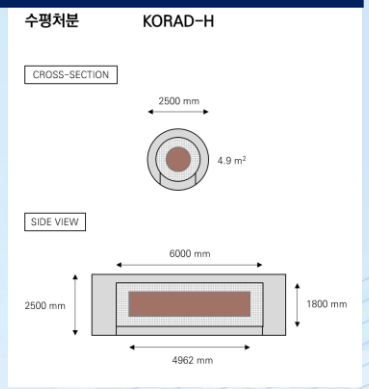
Vertical Emplacement





Horizontal Emplacement



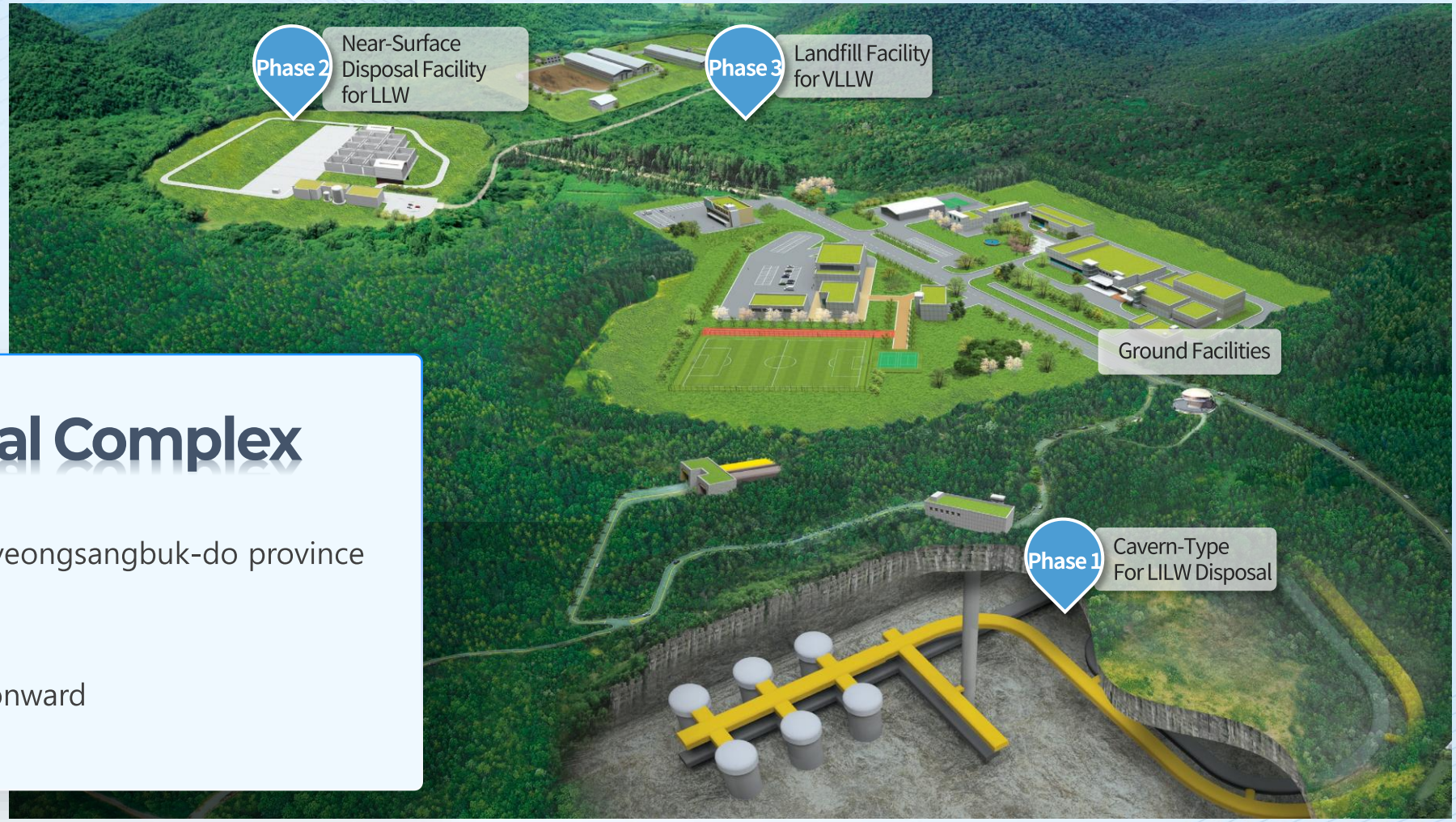


06

Radioactive Waste Management Program

LILW Management

06 LILW Management



LILW Disposal Complex

- Location : Gyeongju-si, Gyeongsangbuk-do province
- Capacity : 800,000 Drums
- Site Area : 2,060,000 ㎡
- Operation : 2015 Aug. – onward

Phase 2 Near-Surface Disposal Facility Is Ready to Open

- Type : Near Surface Disposal
- Capacity : 125,000 Drums
- Disposal Vaults : 20 Units
- Construction : 2012 Jan. – 2025 Dec.
- Multiple Barrier System (5 layers) applied

KORAD will contribute to protecting the public health and preserving the environment by safe and efficient management of HLW.

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