

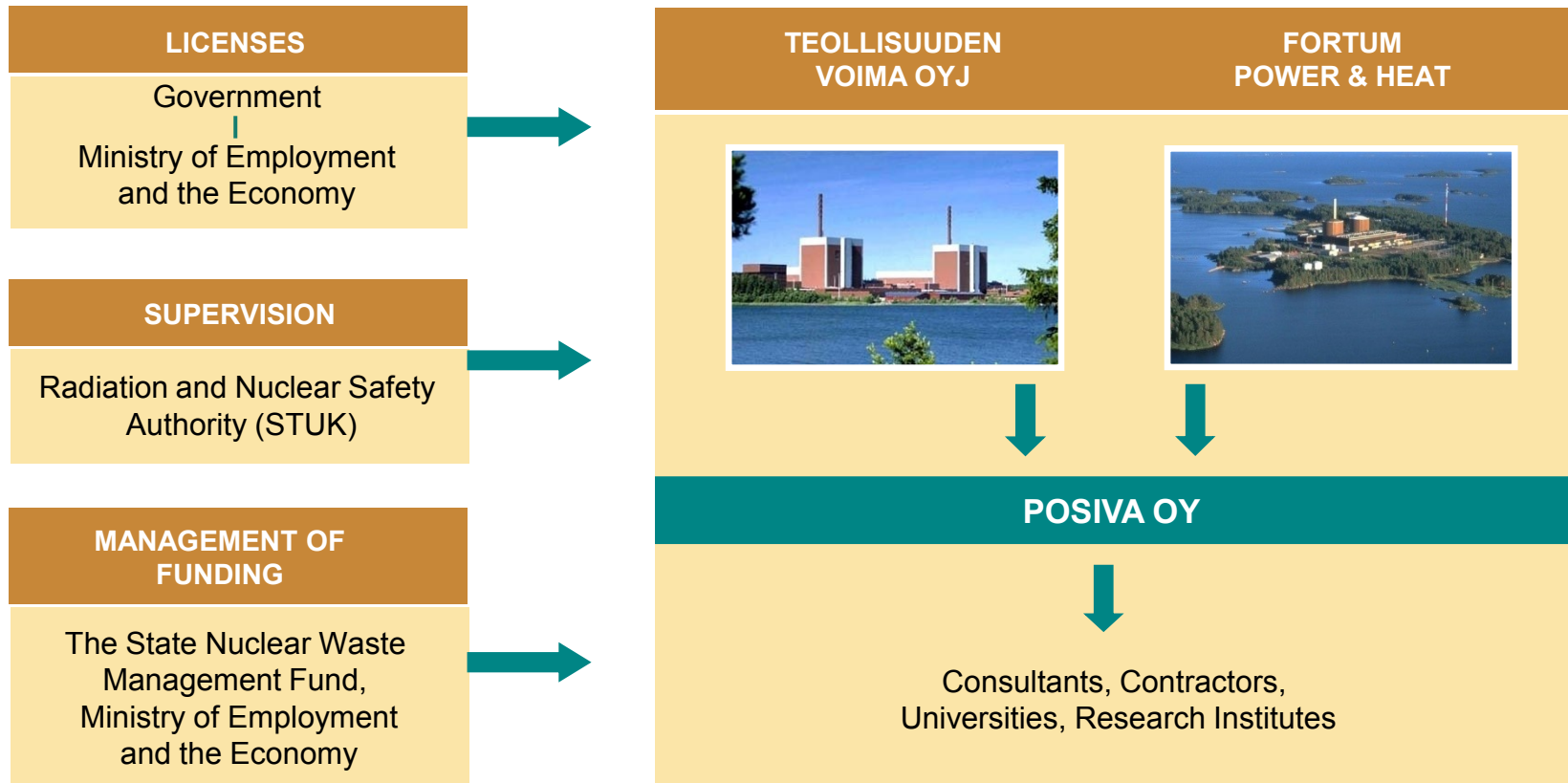
Nuclear Waste Management and Posiva

Tiina Jalonen

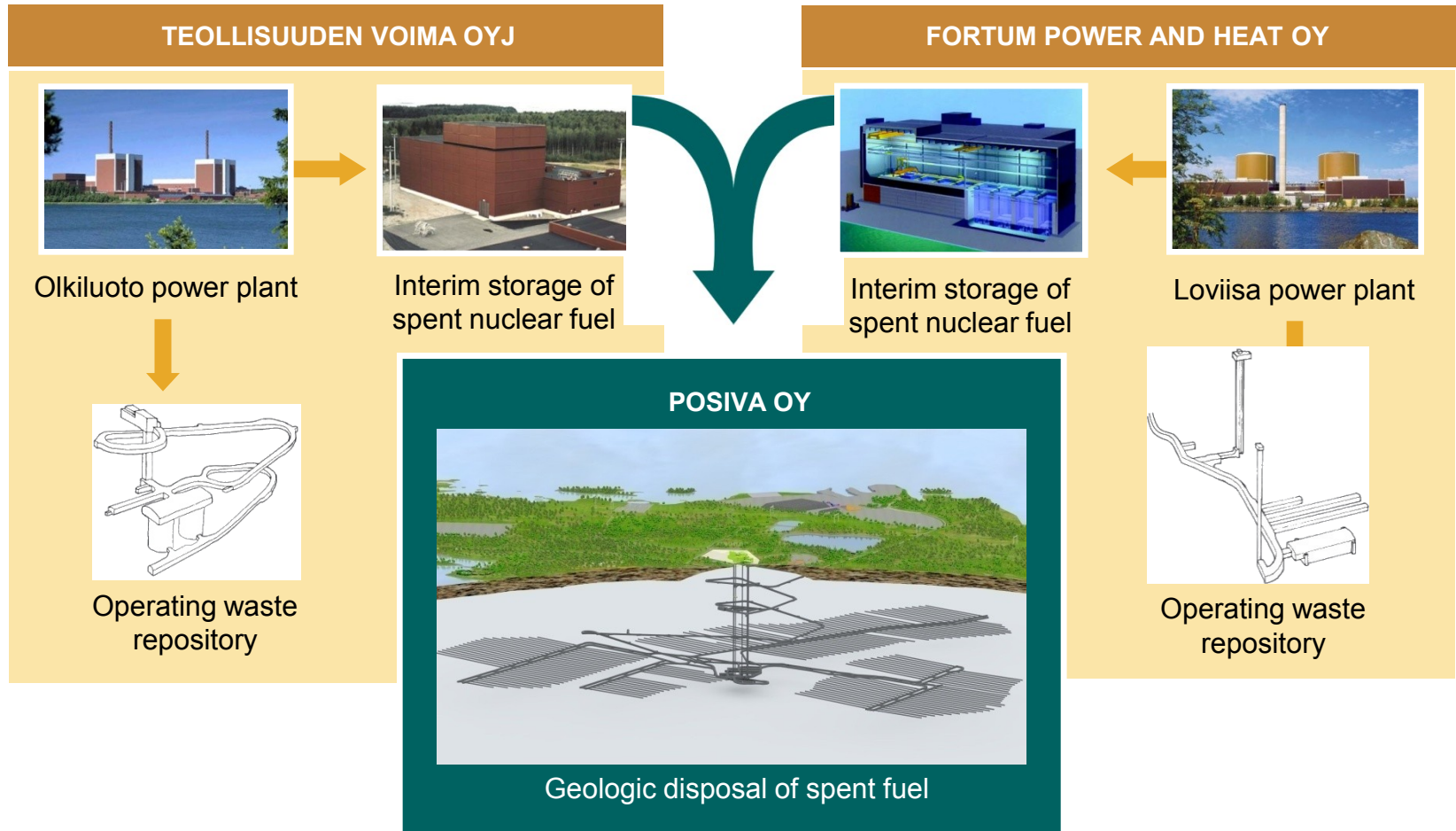
Posiva Oy

Director, Development

Nuclear waste management in Finland



Organisation for Radioactive Waste Management of TVO and Fortum



General design conditions for the repository

Fortum

Loviisa 1-2
operation 50 y



1000 tU



TVO

Olkiluoto 1-2
operation 60 y



2500 tU



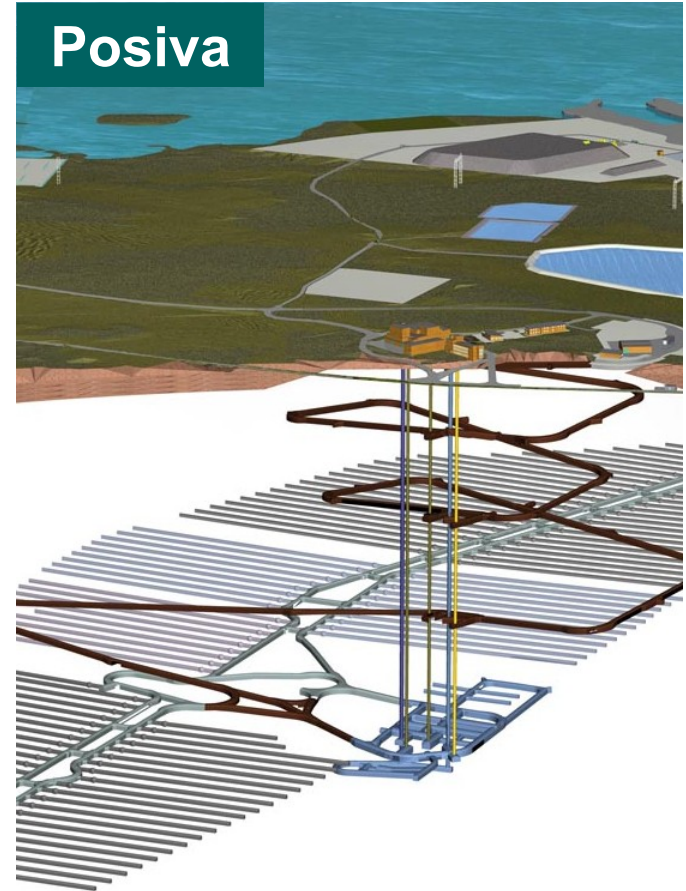
Olkiluoto 3
operation 60 y



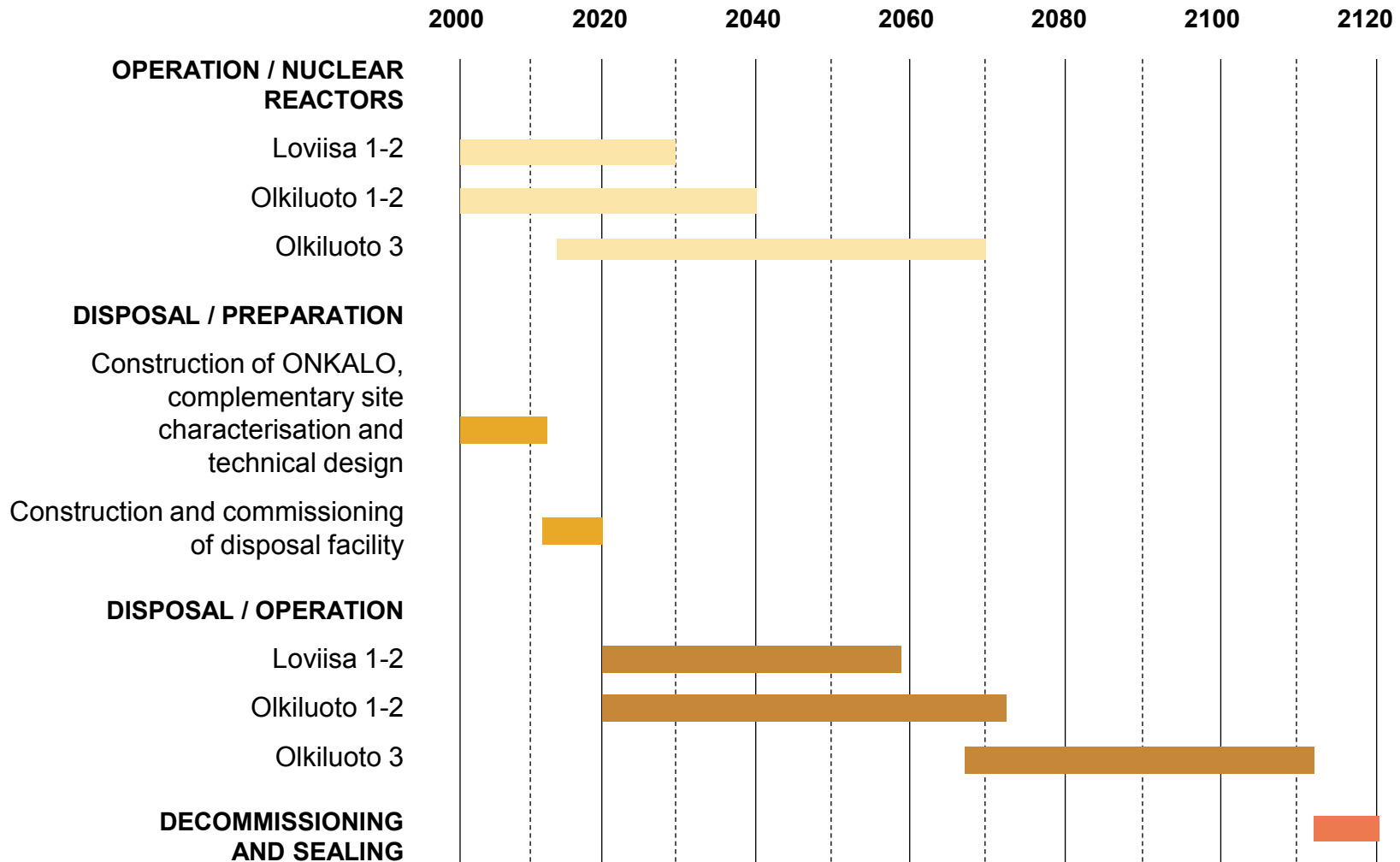
2000 tU



Posiva



Design basis: timetable

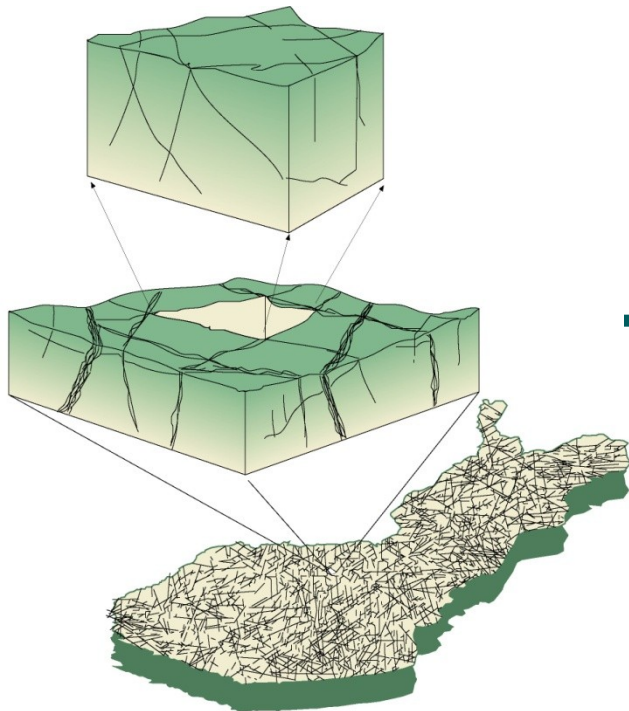


The Repository Site



Site Selection Research Programme 1983-2000

Site identification
1983-1985

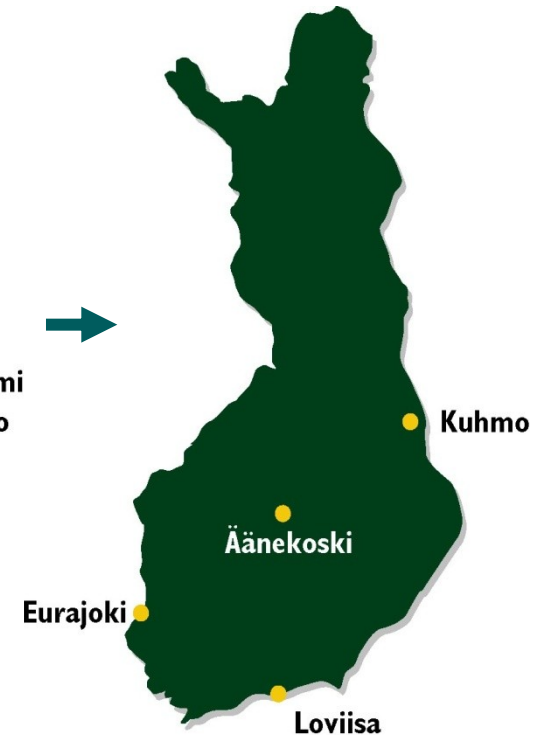


More than 100 candidate sites were identified

Preliminary site characterisation
1986-1992



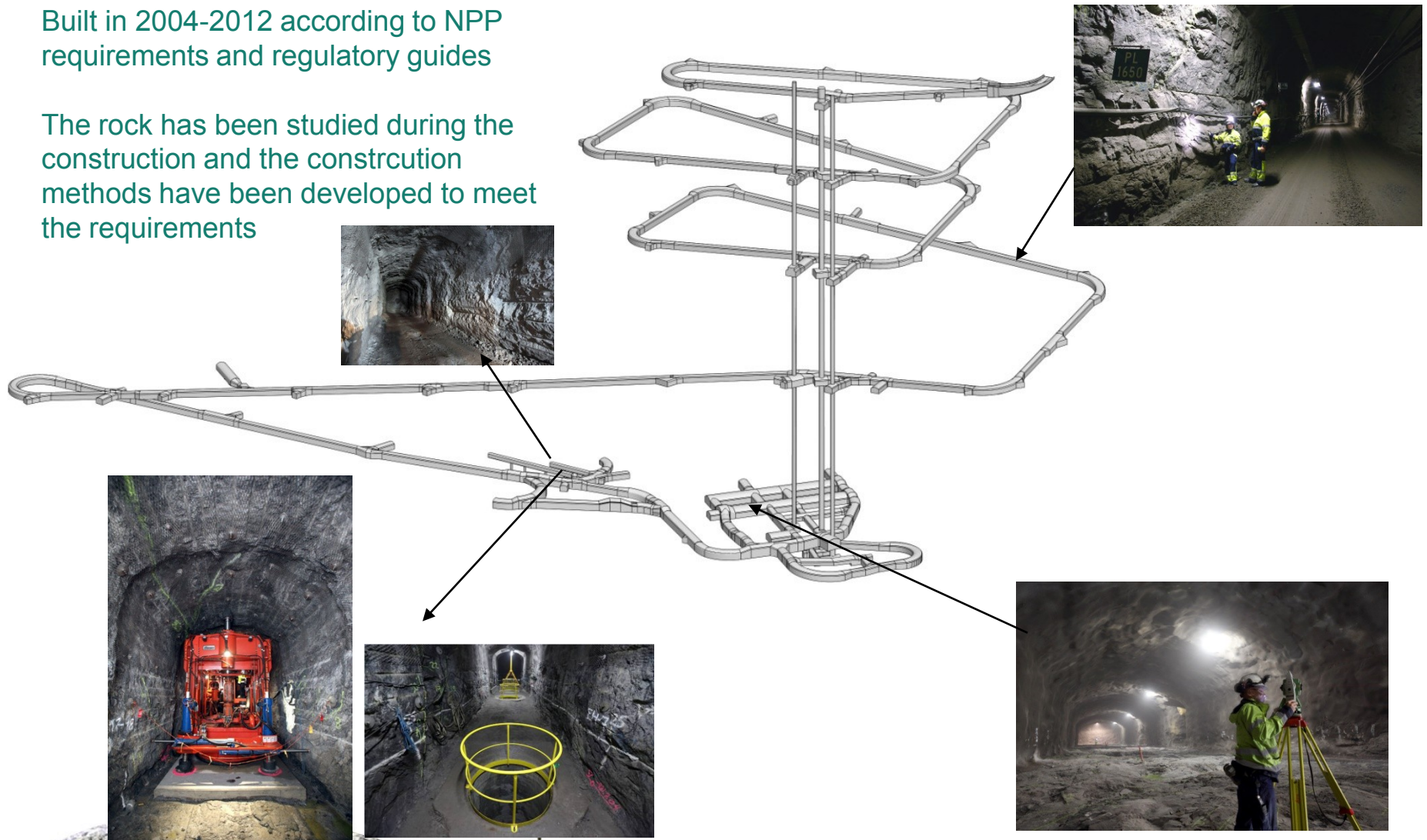
Detailed site characterisation
1993-2000



URCF ONKALO

Built in 2004-2012 according to NPP requirements and regulatory guides

The rock has been studied during the construction and the construction methods have been developed to meet the requirements



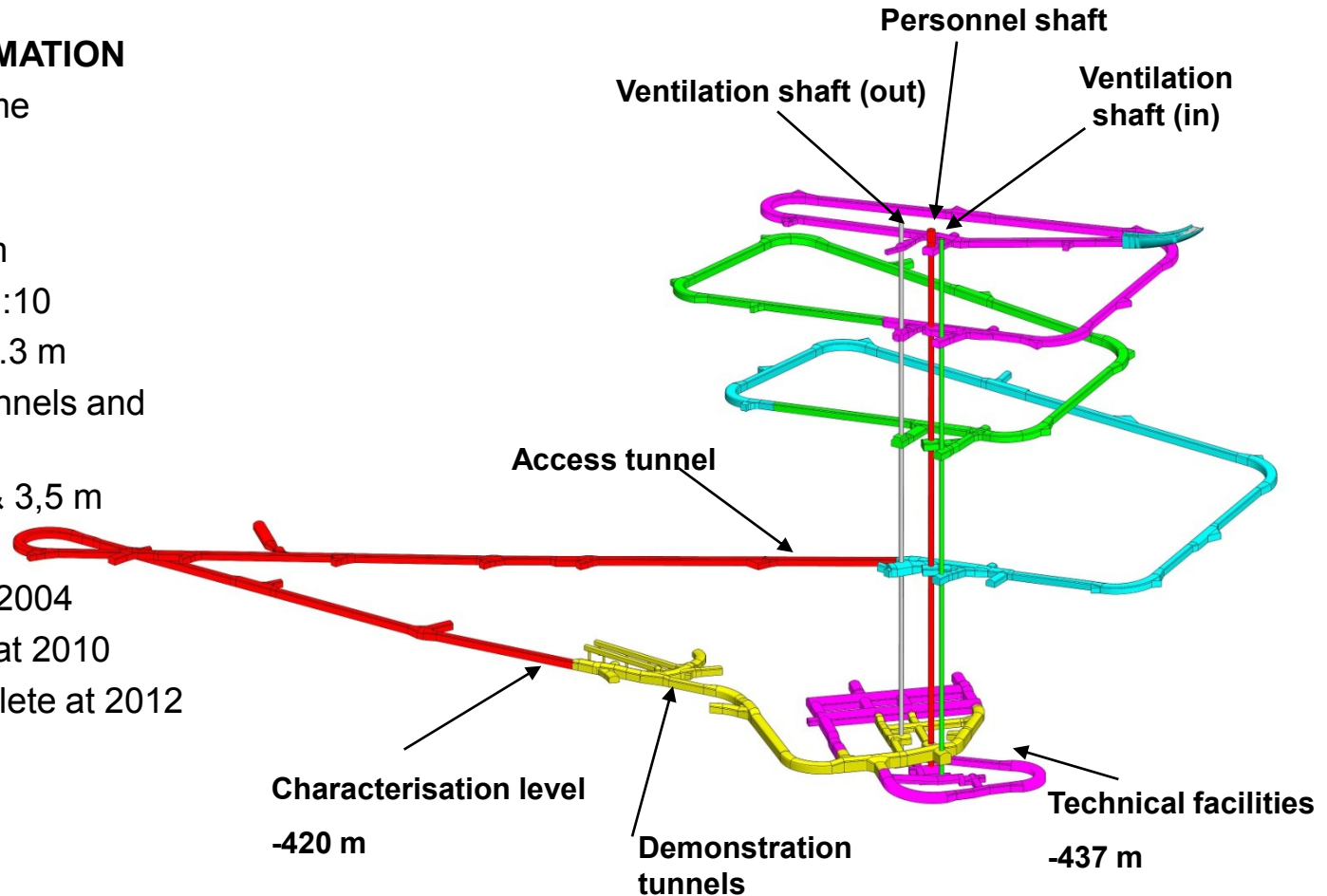
ONKALO layout and technical information

TECHNICAL INFORMATION

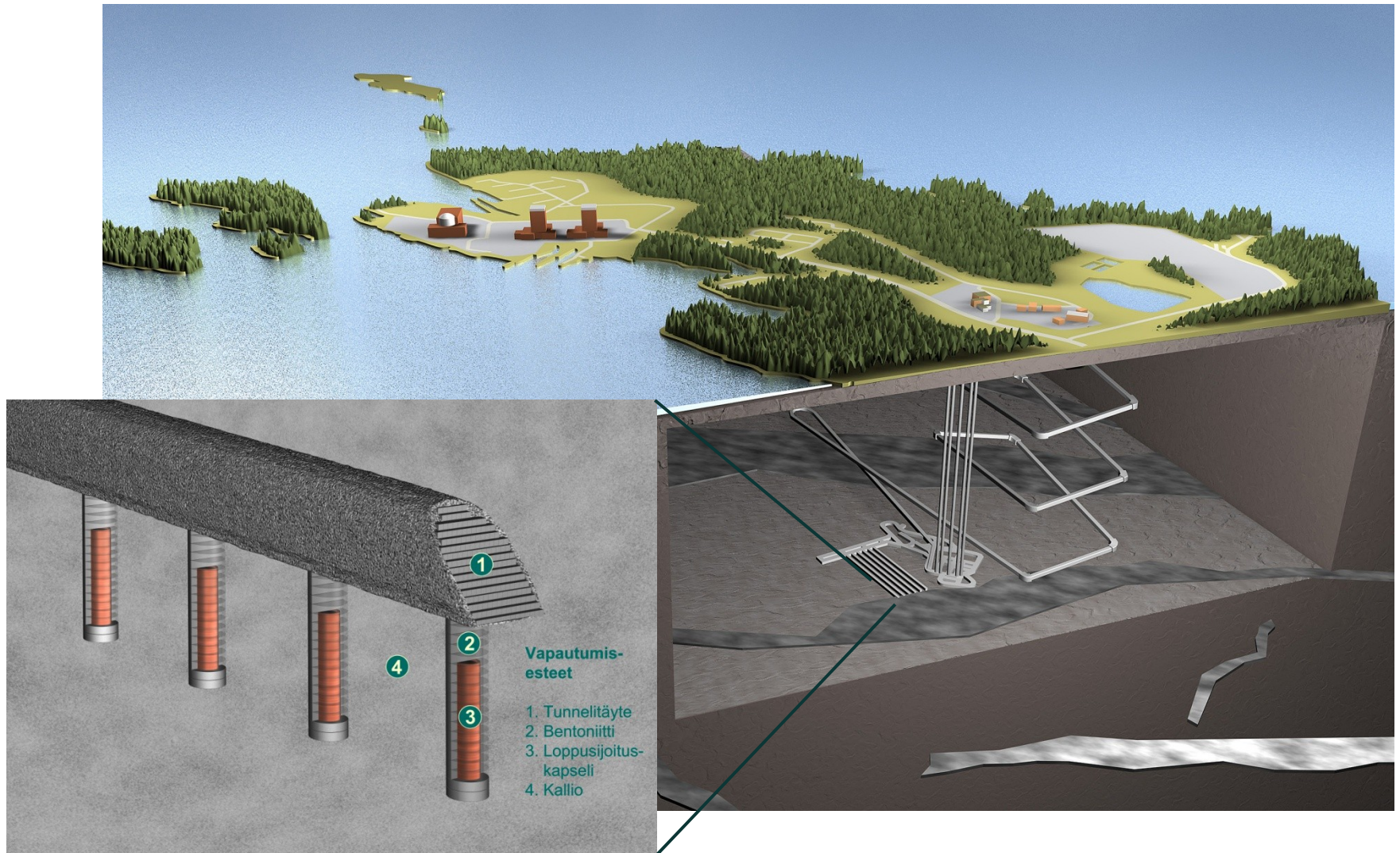
- Excavation volume 365,000 m³
- Access tunnel
 - Length 5 km
 - Inclination 1:10
 - Size 5.5 x 6.3 m
- Total length of tunnels and shafts 9,5 km
- Shafts 3.5, 4.5 & 3,5 m

TIME-TABLE

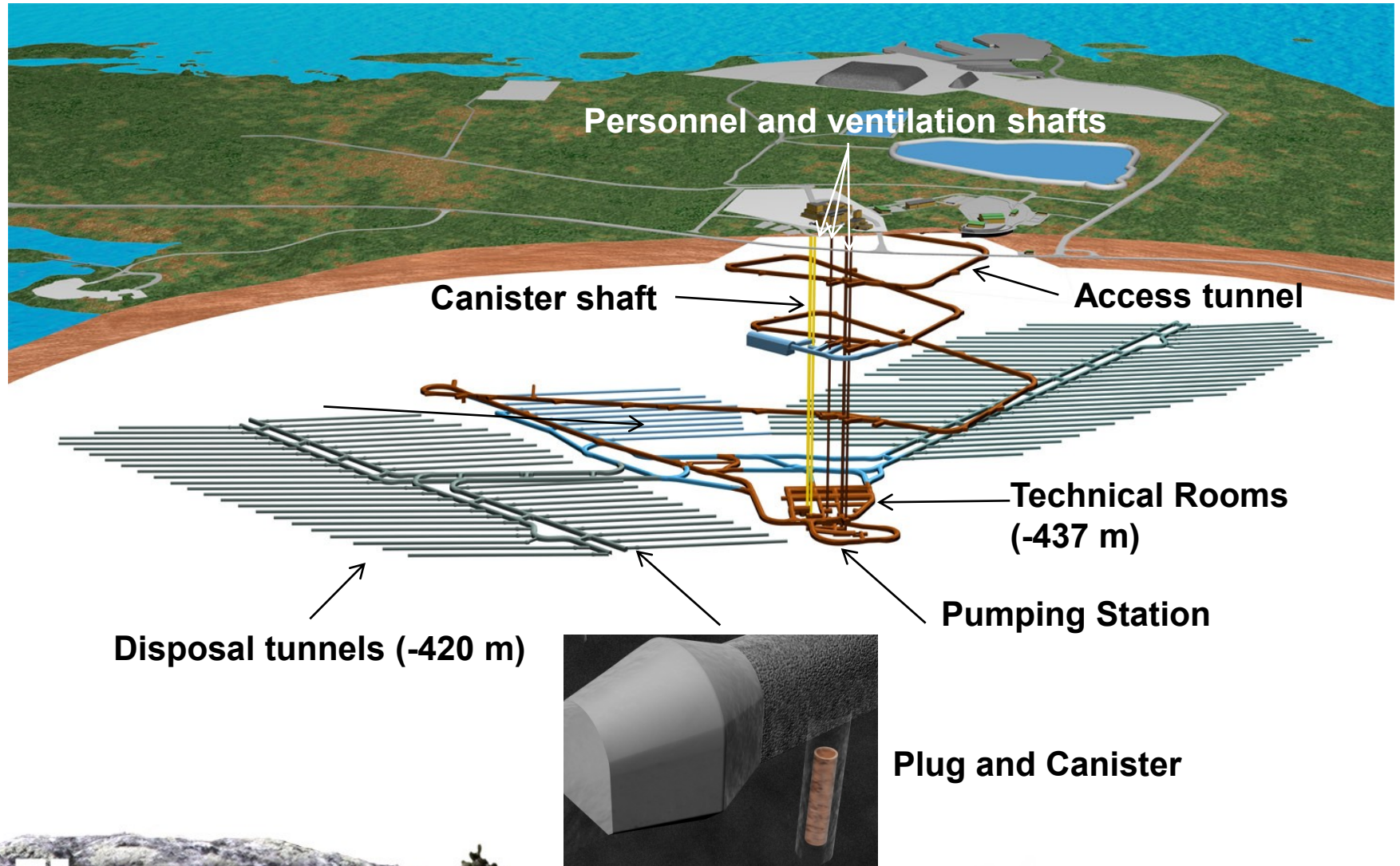
- Start summer at 2004
- Research depth at 2010
- excavation complete at 2012



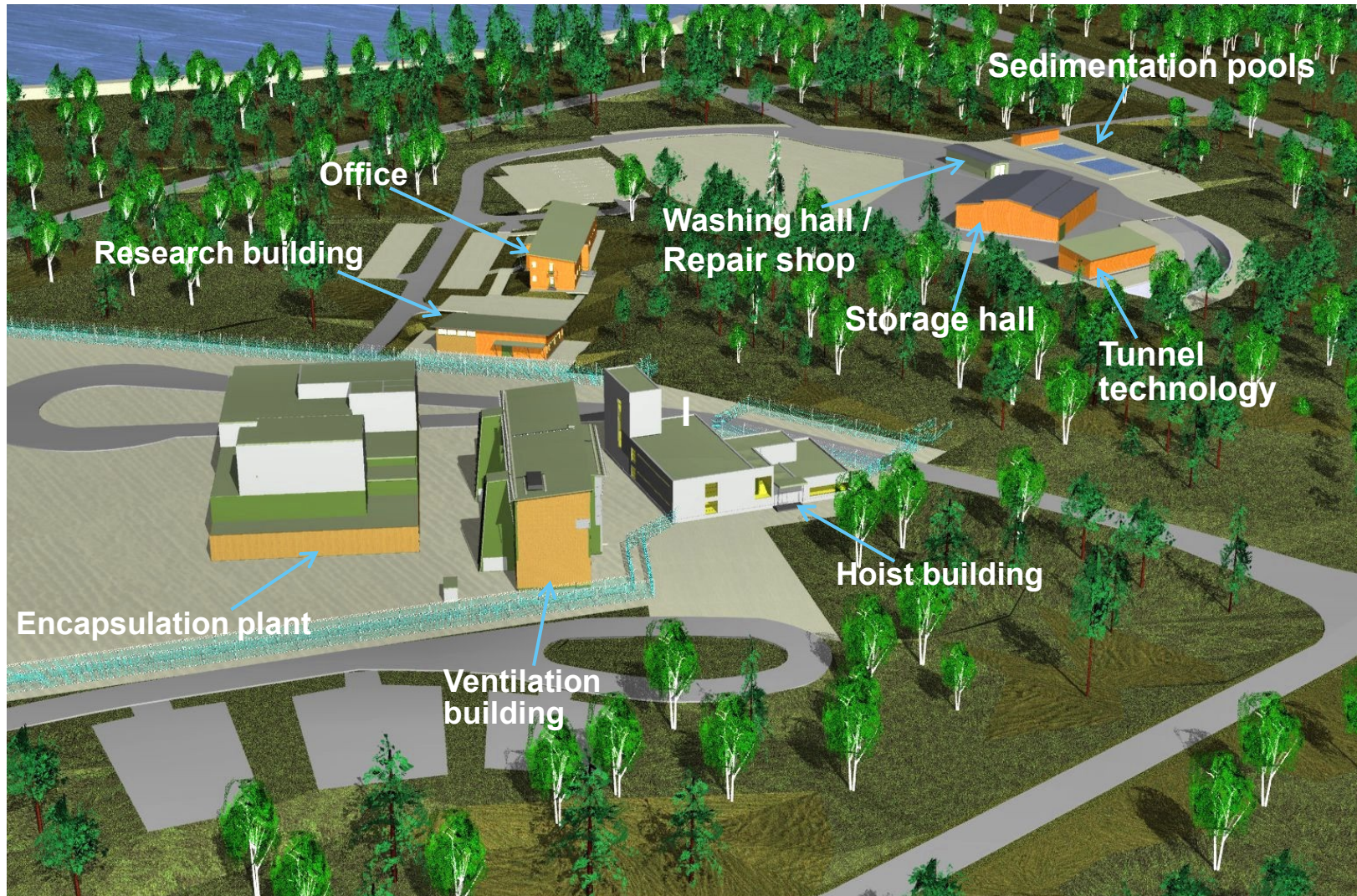
The Finnish Disposal system



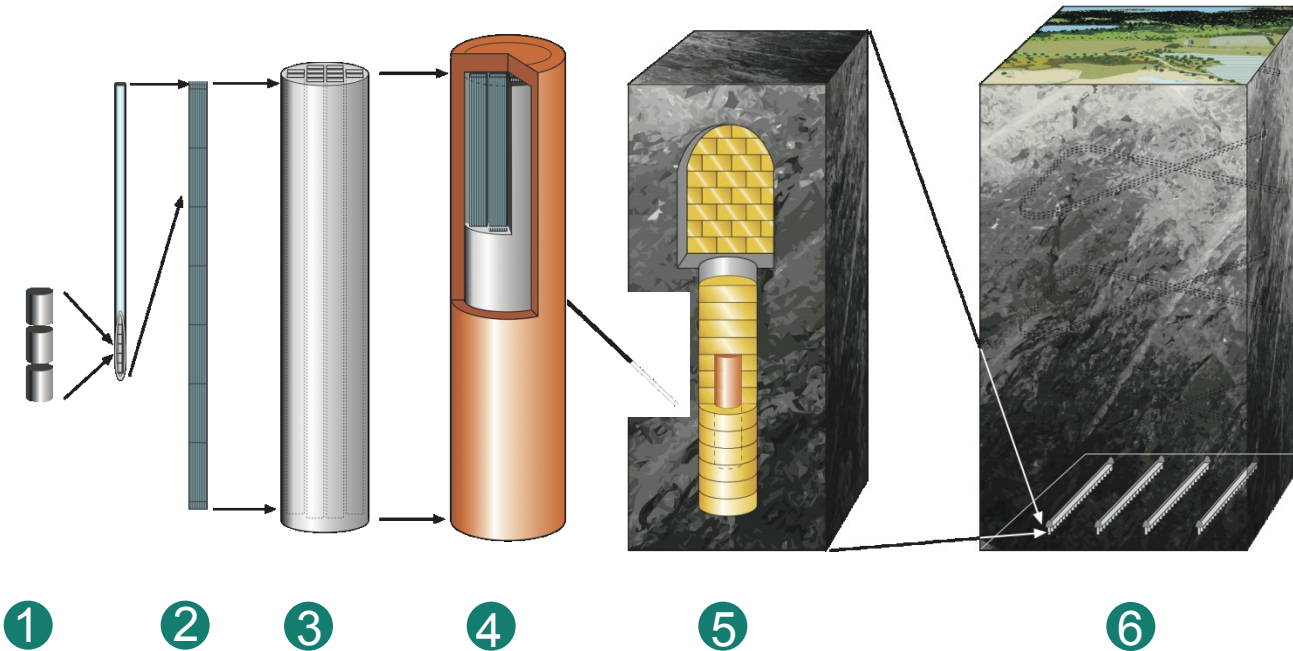
Deep repository



Disposal facility at Olkiluoto



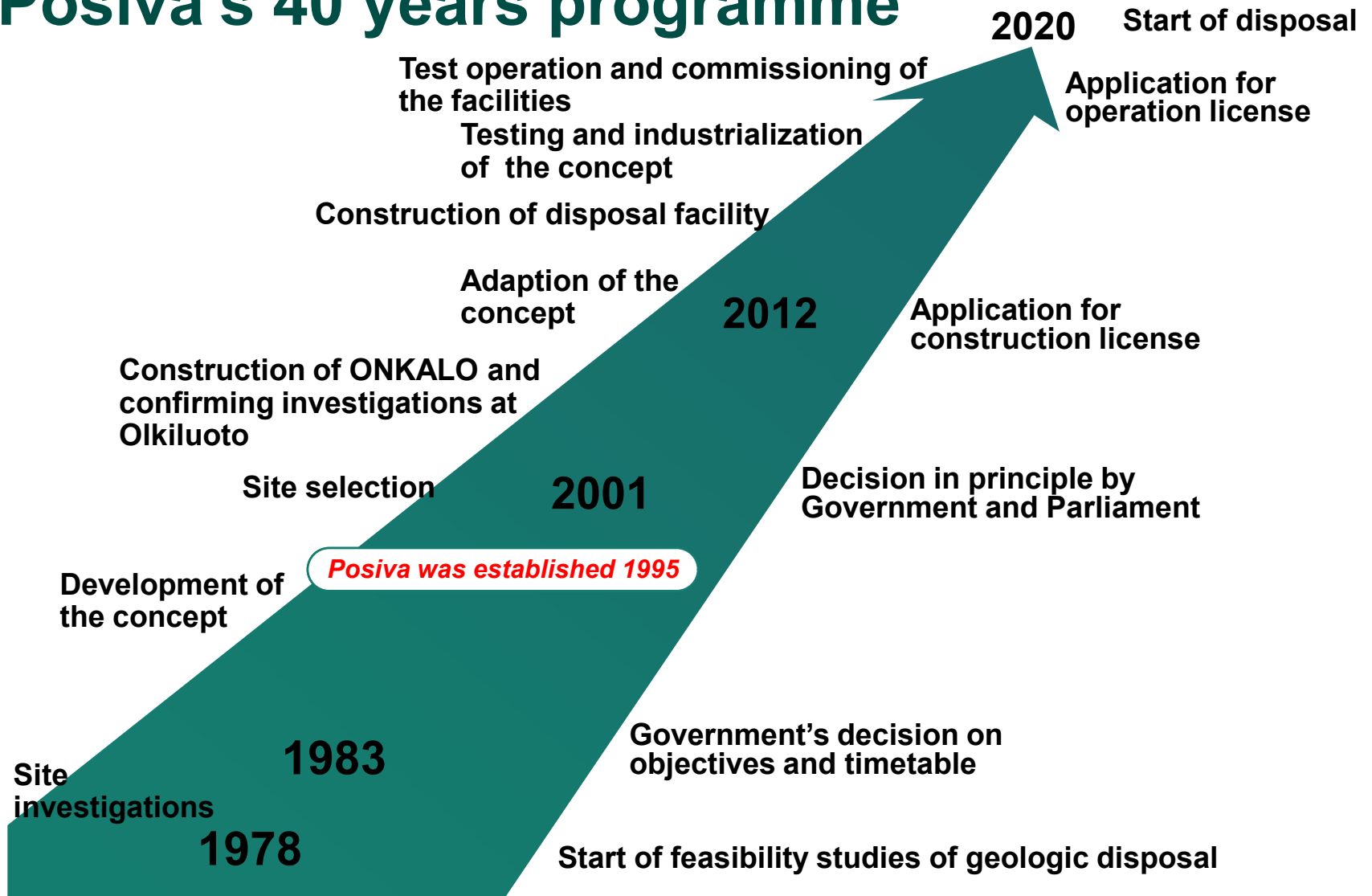
The principle of final disposal



- 1** Fuel pellet
- 2** Fuel assembly
- 3** Canister insert
- 4** Canister overpack
- 5** Bentonite and tunnel backfill
- 6** 400–700 metres of bedrock

Several release barriers back up each other and ensure long-term safety.

Posiva's 40 years programme



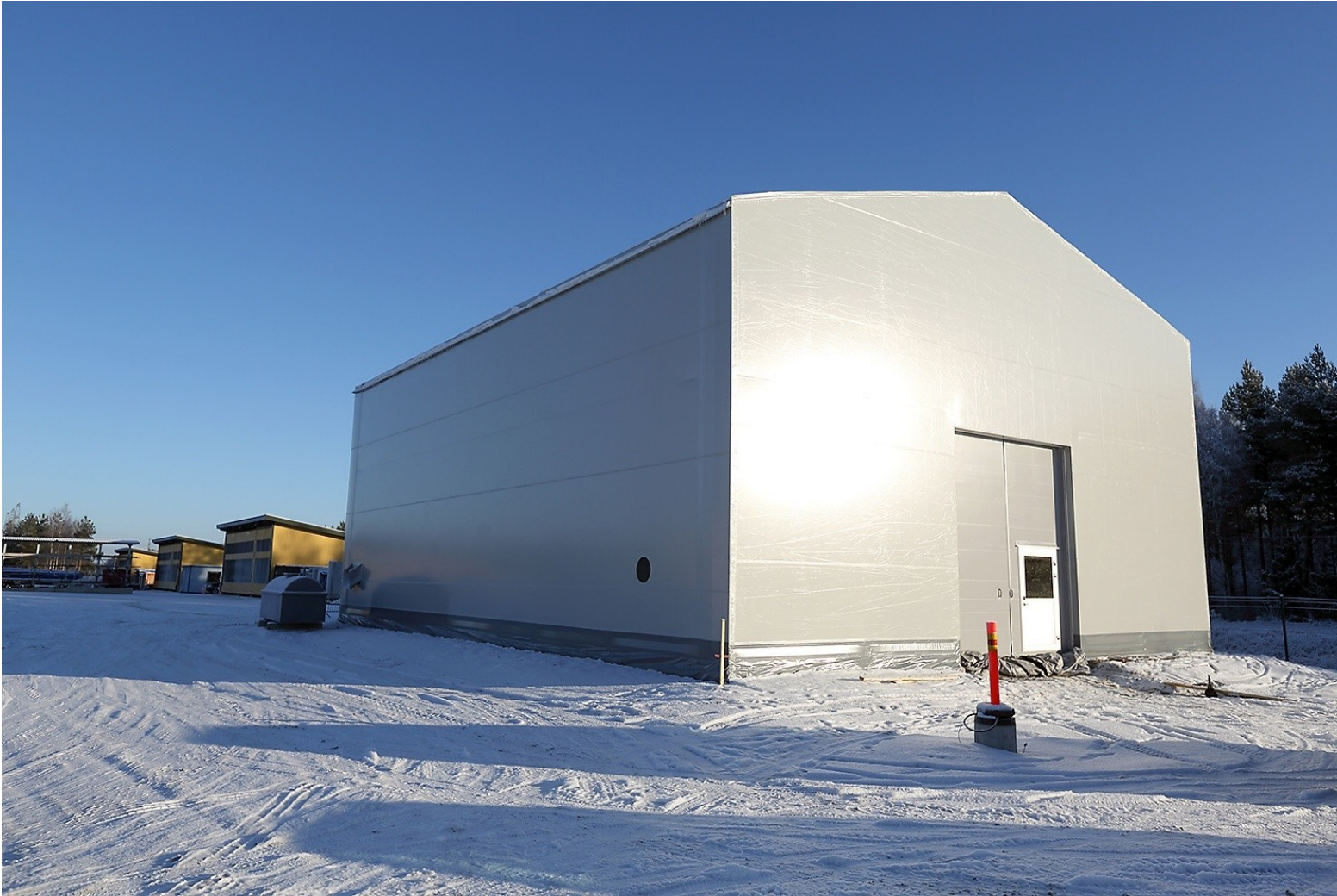
Posiva's Application for the construction licence of the encapsulation plant and the repository

- Posiva submitted the application to the Ministry of the Employment and the Economy (MEE) at the end of 2012
- Handling of the application is in an active phase
 - New nuclear safety regulations came into force on the 1st of Dec. 2013
 - STUK is asking from Posiva for supplementary information and updated documentation on several topics with various DLs
 - Posiva has in June 2014 submitted to STUK an assessment on how the new regulations are fulfilled

The starting of the construction of the encapsulation plant and the repository

- Posiva is expecting the MEE to grant the construction license in 2015
- Before starting the construction work, STUK will make inspections on the readiness, knowledge and sufficiency of Posiva's organization
- The actual construction is scheduled to start in 2015

Facility for tests



”Deposition hole” at the facility



Finishing the concept

- Although Posiva has submitted the application for the construction license and is preparing to start the construction, there are still open safety related issues
 - There is a common understanding between STUK and Posiva, that this is not an obstacle of granting the license, as long as Posiva has credible plans for solving the open issues
 - Posiva has submitted to STUK an overall research, development and demonstration (RD&D) programme which describes, how Posiva plans to address the feasibility and performance of the disposal concept

Key performance issues

- Copper corrosion
- Buffer erosion
- Canister mechanical strength (during earth quake)

Key feasibility issues

- Reaching the requirements set for the repository and for the Engineered Barrier System (EBS)



Installation of the EBS

- Fulfilling the requirements on density in installation of the buffer and the backfill
 - Acceptable variation in density defines the required installation tolerances
 - Handlind of inflowing water during installation



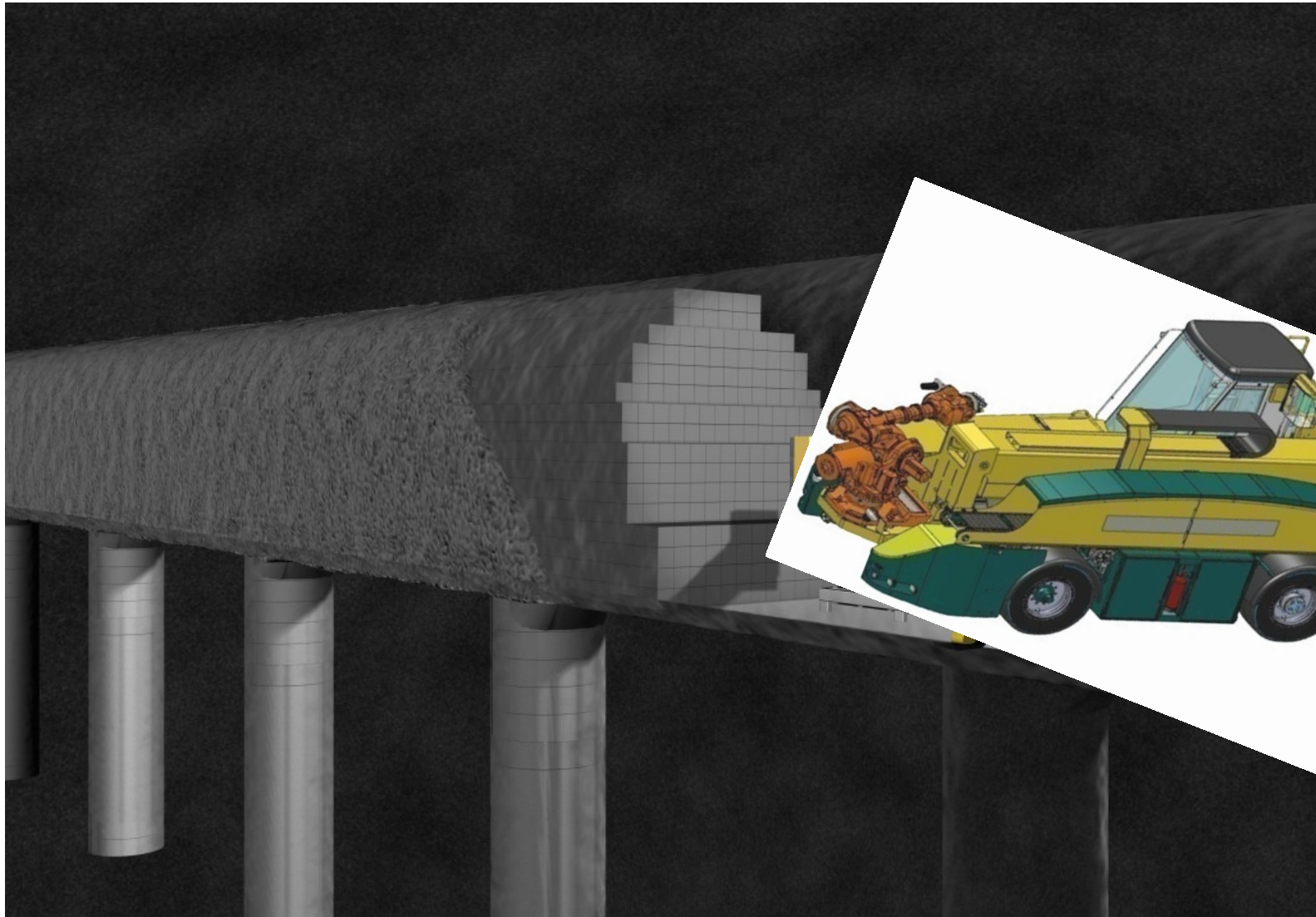
Canister installation vehicle in Olkiluoto



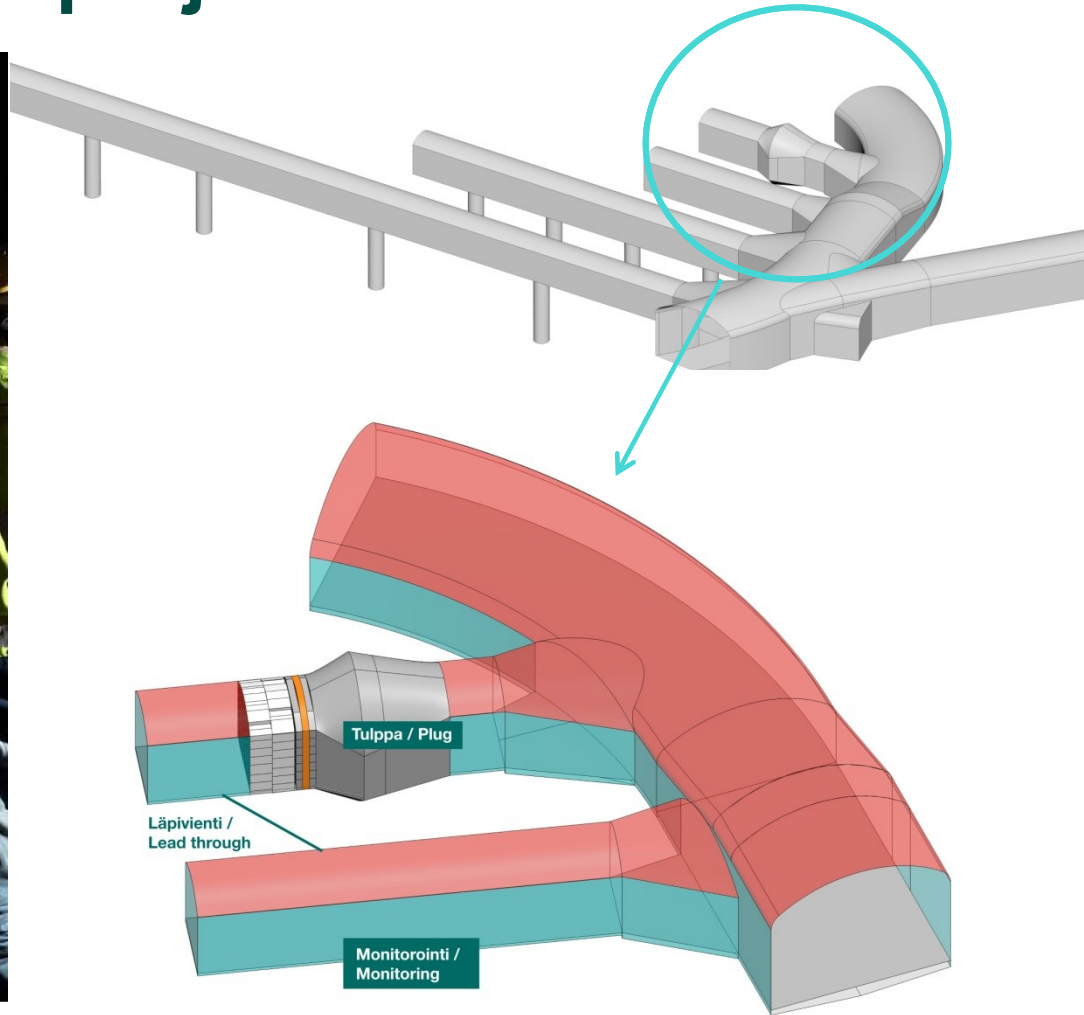
Emplacement of canister into the deposition hole



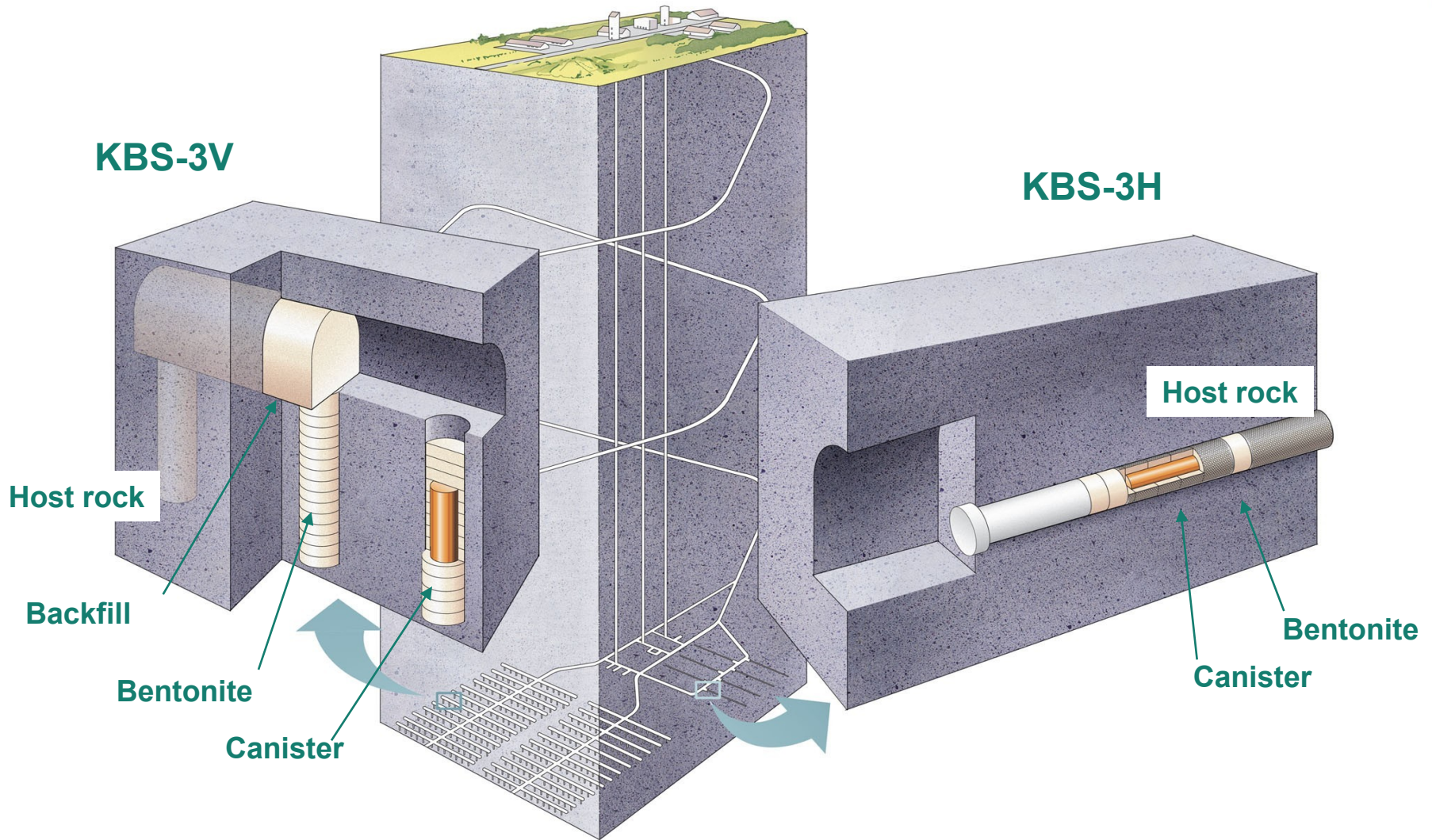
Backfill



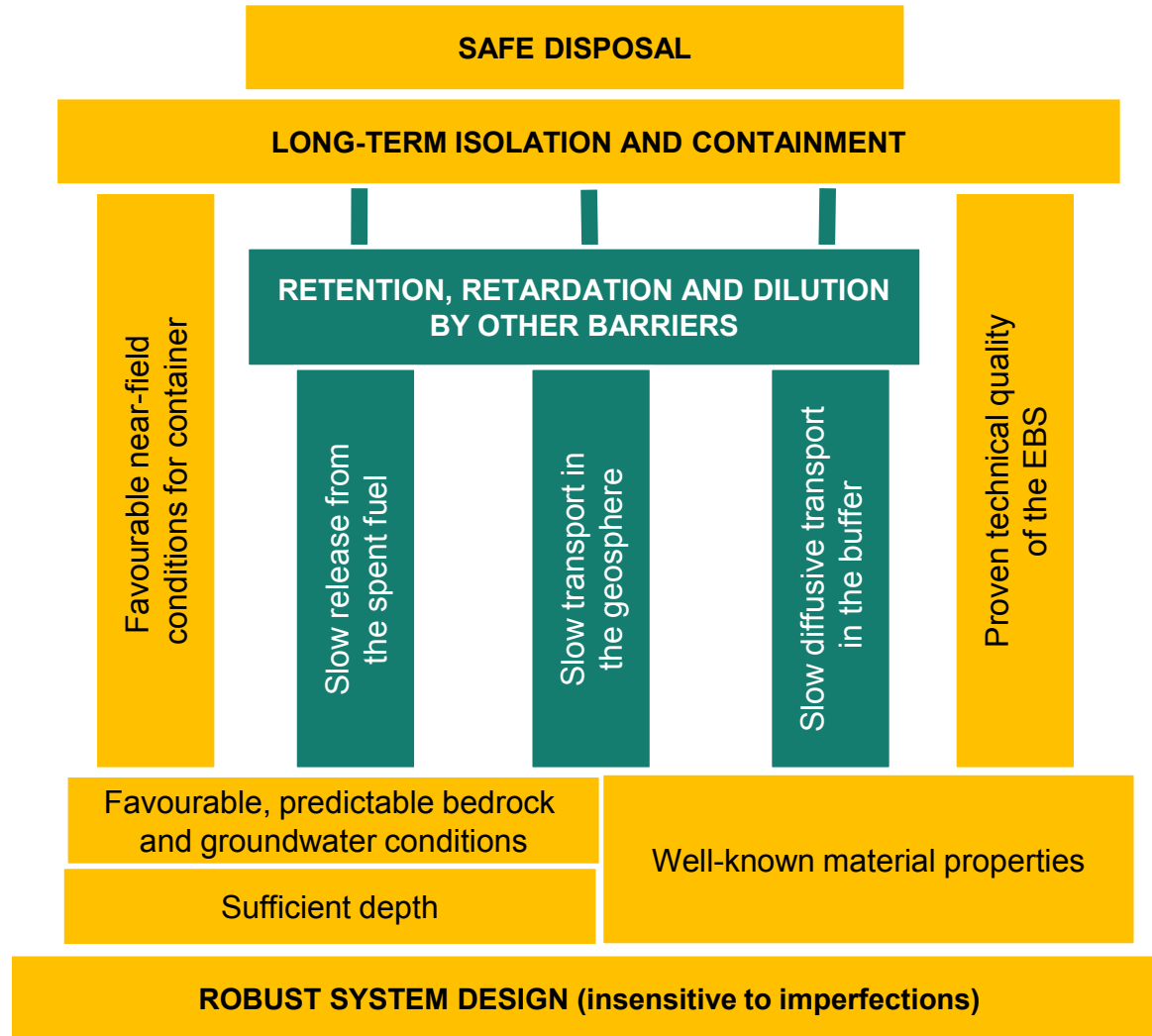
Preparations for the plug test POPLU as part of EURATOM project DOPAS



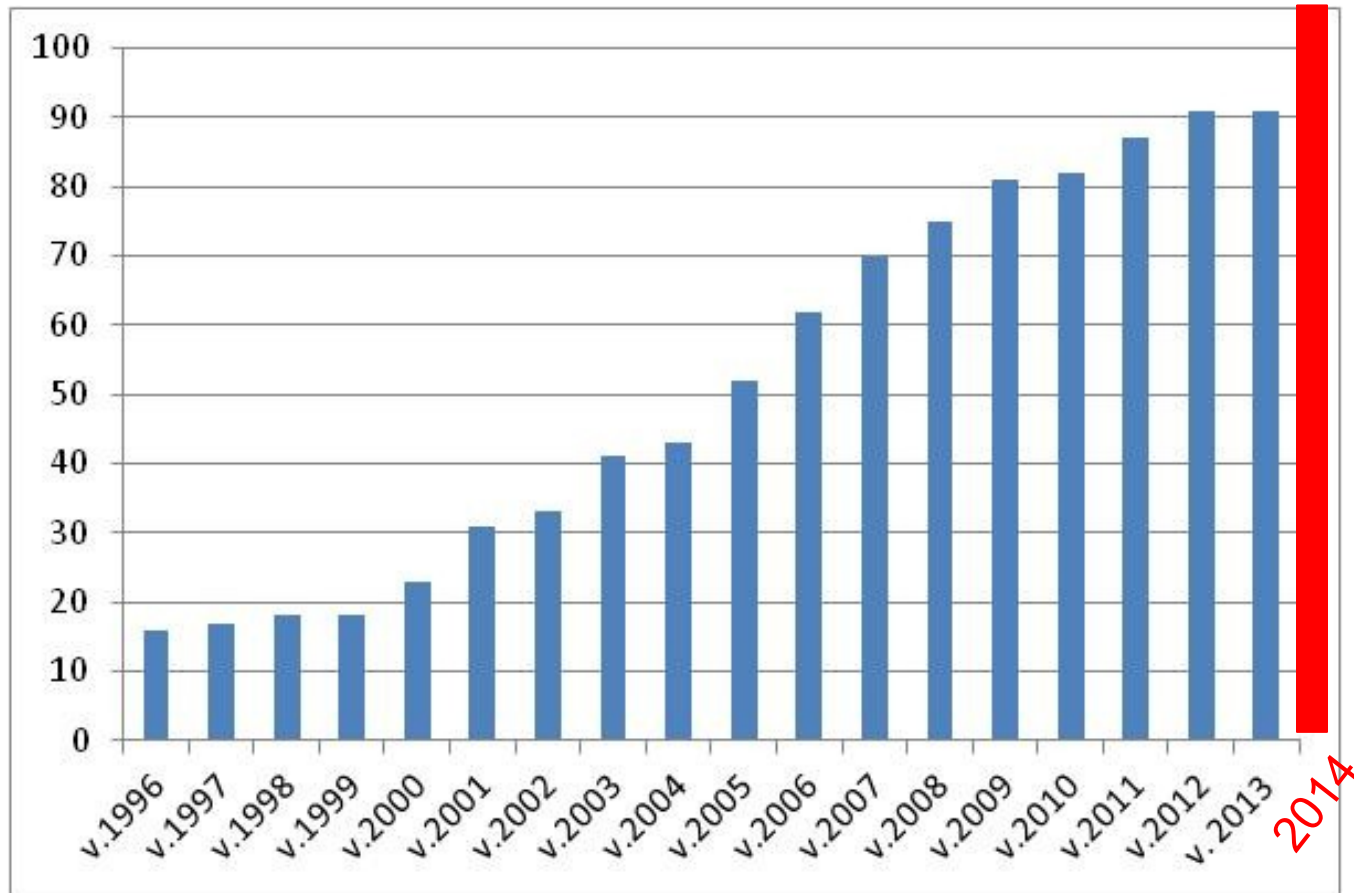
KBS-3 disposal concept alternatives



Safety concept



Posiva's personnel



Main Achievements in 35 Years in Radioactive Waste Management

- Repositories for LLW/ILW have been in operation since 1990s
- Geologic disposal of spent fuel at Olkiluoto has been accepted in the decision making process in 1999 - 2001
- Based on the decision an underground rock characterisation facility ONKALO has been excavated (2004-2012) at the selected site for the confirmation of site properties
 - STUK has supervised the construction of ONKALO
- Disposal concept KBS-3 has been developed to a mature stage for licensing
- Construction license application has been submitted to Government in 2012
 - Expectations are that construction of encapsulation plant and deep repository could be commenced in 2015

Kiitos

