

# Safe final disposal of spent nuclear fuel in Finland

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# Posiva Oy

- Mission: safe and cost efficient final disposal of spent nuclear fuel of its owners
- Owners: Teollisuuden Voima Plc and Fortum Plc
- 90 employees
  - in addition, 100 external person years and 150 construction workers
- Turnover EUR 110 million (2022)
- Subsidiary Posiva Solutions (est. 2016) sells expertise on the final disposal of SNF

# Complete Nuclear Waste Management on one island – Olkiluoto, Finland

## Interim storage for spent fuel

Spent nuclear fuel brought from the plant unit cools down in water pools

## Final disposal of spent nuclear fuel ONKALO®

The construction is ongoing and the application for operating license has been submitted 30.12.2021

## Repository for operational waste (LILW repository)

Repository for low and intermediate-level radioactive Waste, in operation since 1992

## Final disposal of the decommissioning waste of the power plant

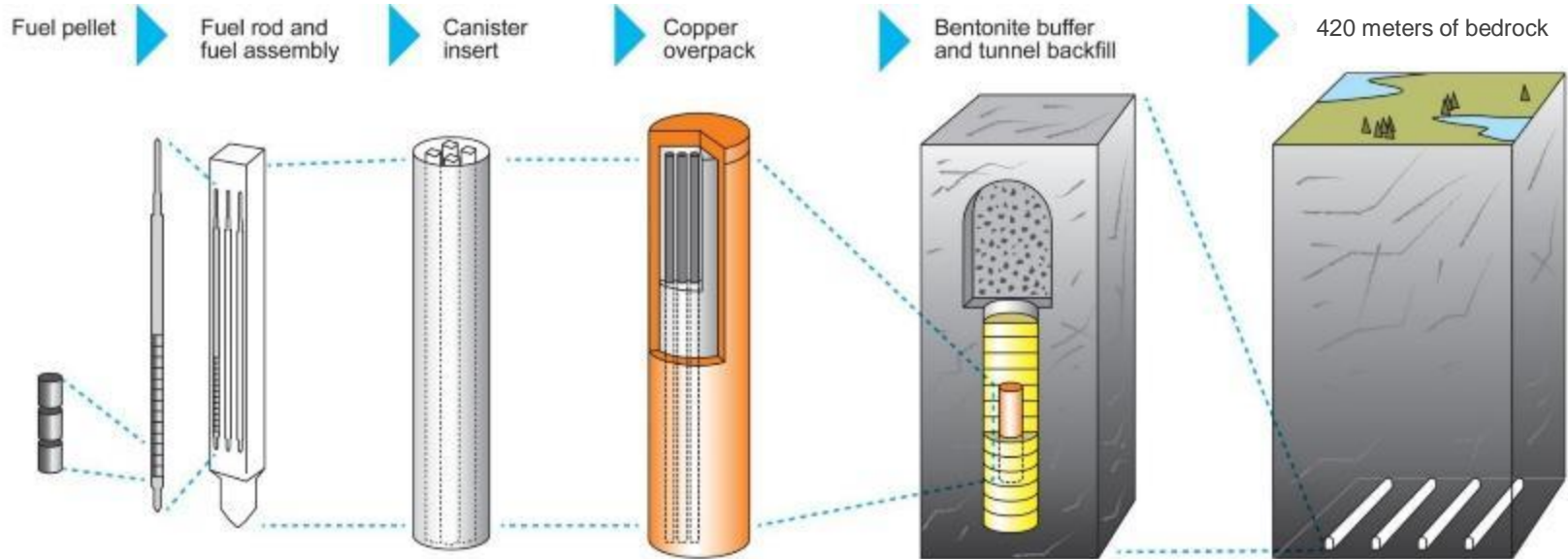
Reservation for the radioactive decommissioning waste of the power plants

# The safe final disposal will be started first in the world in ONKALO®



# Only safe final disposal is possible

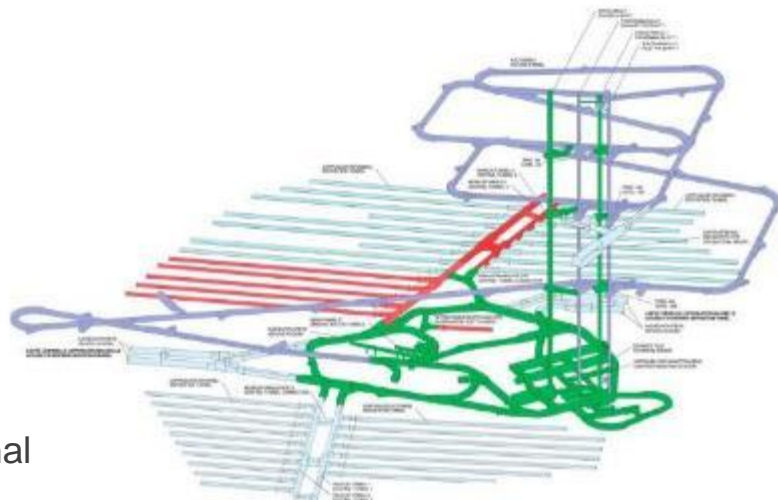
The principle of final disposal:  
Several release barriers back up each other and ensure long-term safety.



# Investigations in ONKALO®

Since 2004, we have:

- investigated the bedrock in great detail
- developed rock construction methods
- implemented tens of tests and demonstrations
- drilled dozens of test holes above ground and underground



ONKALO has been designed to be a part of the final disposal facility



Approx. 6.5 km of excavated access tunnels and vehicle access

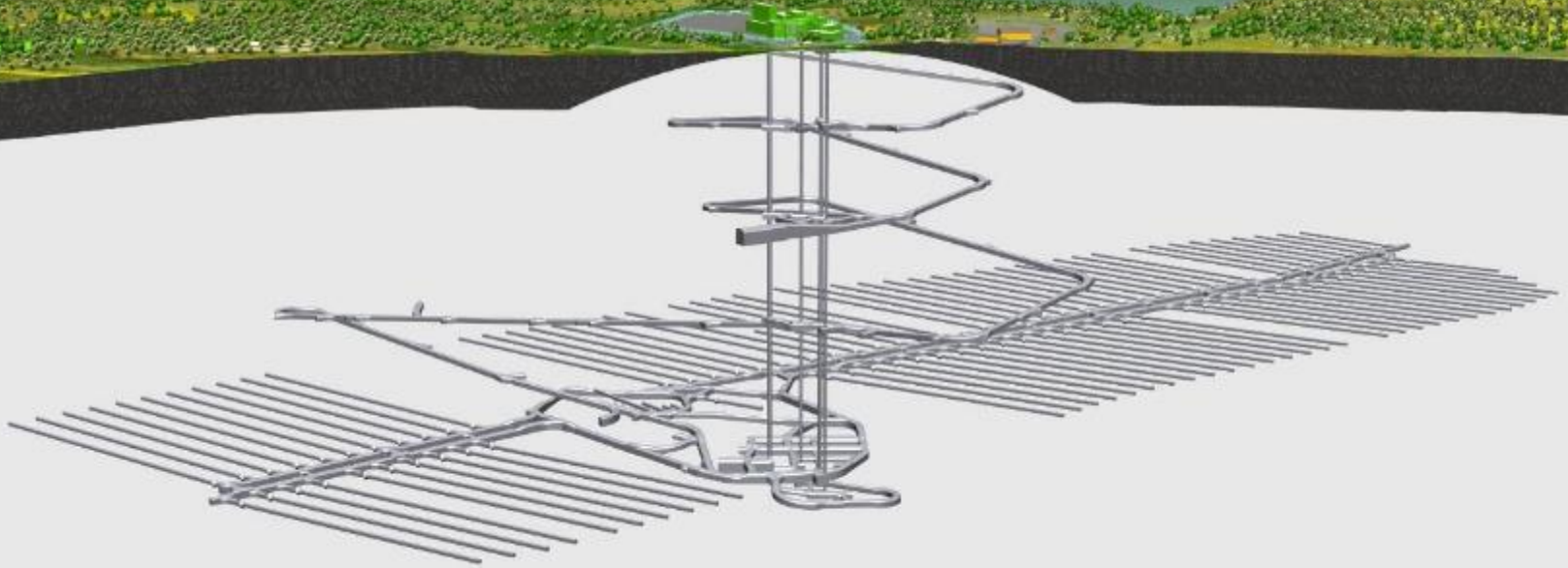


Demonstration facilities –420 m



Technical rooms –437 m

# Final disposal facility around 2120



- Repository capacity is 6500 tU (about 3250 canisters)
- Depth of the tunnel system -400-450 m and the footprint is about 2 km<sup>2</sup>
- Construction and operating time approximately 100 years
- The total excavation volume is about 2 million m<sup>3</sup>
- Total tunnel length about 50 km

# Project status above ground



# Construction site of the encapsulation plant

April 2021



# Operation of the encapsulation plant

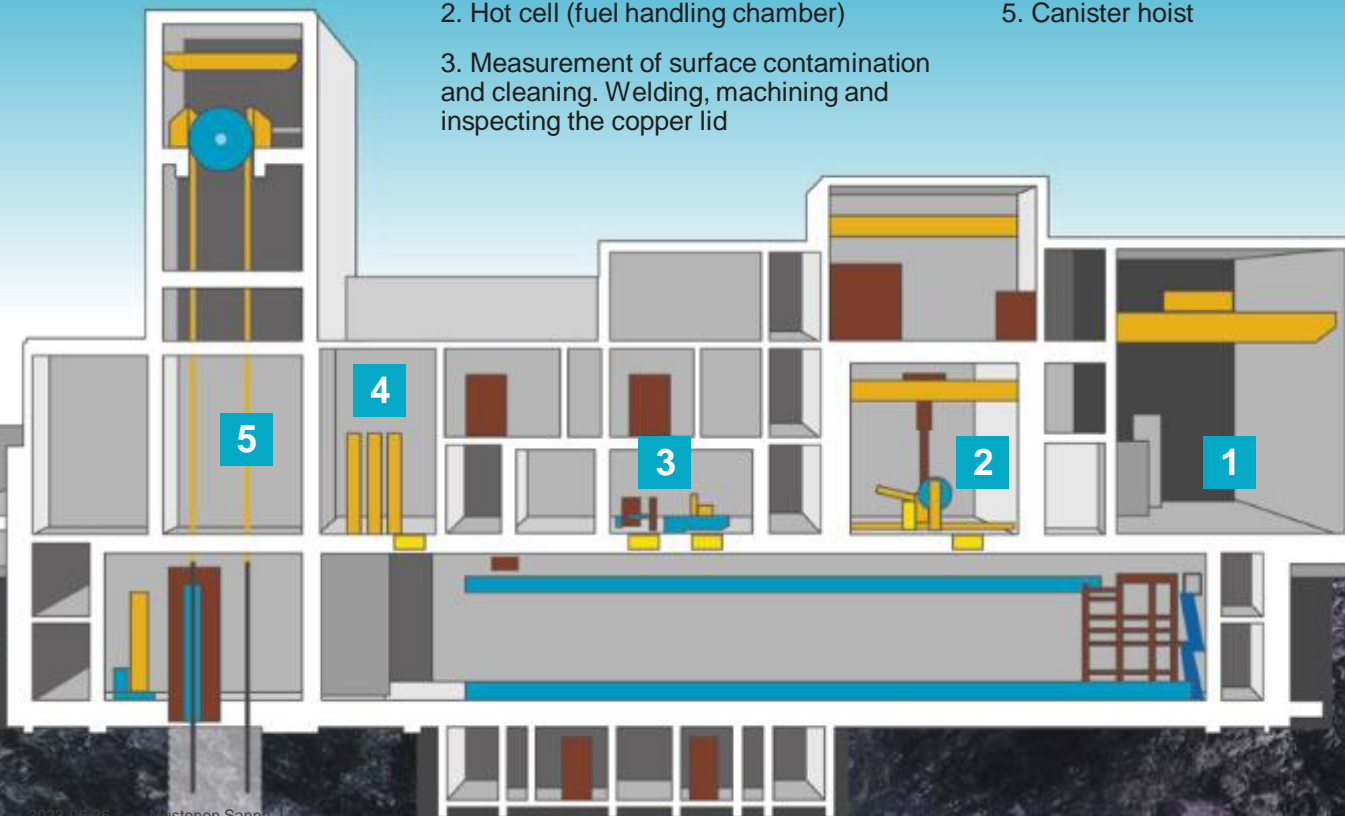
1. Reception of fuel and storage of the transport cask

2. Hot cell (fuel handling chamber)

3. Measurement of surface contamination and cleaning. Welding, machining and inspecting the copper lid

4. Reception and storage of empty disposal canisters

5. Canister hoist



# Construction site of the encapsulation plant

May 2022

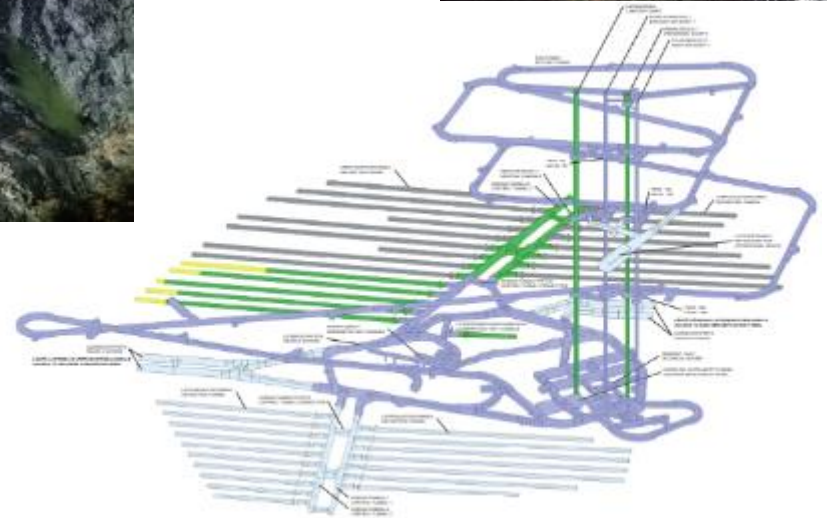


# The Encapsulation Plant building is ready and equipment installation is ongoing



# Project status underground

# Tunnel construction

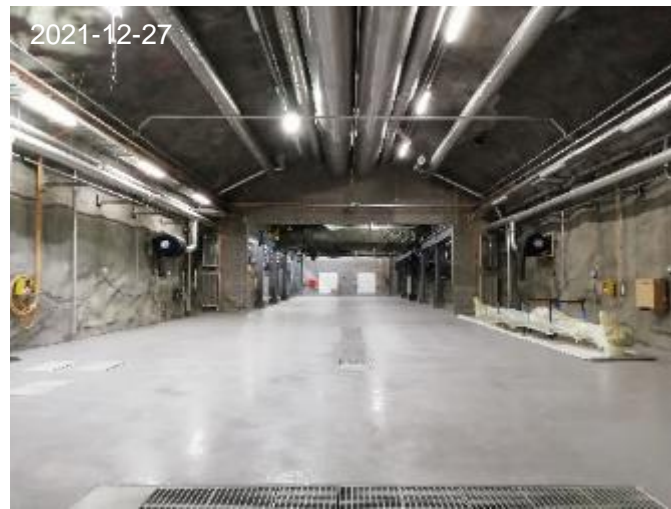
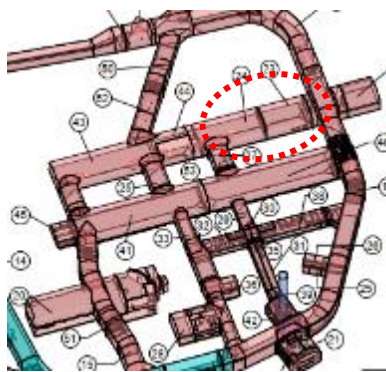


# Shafts

- Personnel shaft
- Canister shaft
- Two shafts for ventilation



# Technical rooms: maintenance and repair





# Spent fuel transport

Transfer from the TVO's spent fuel storage to the encapsulation plant (2 km) in a standard cask:

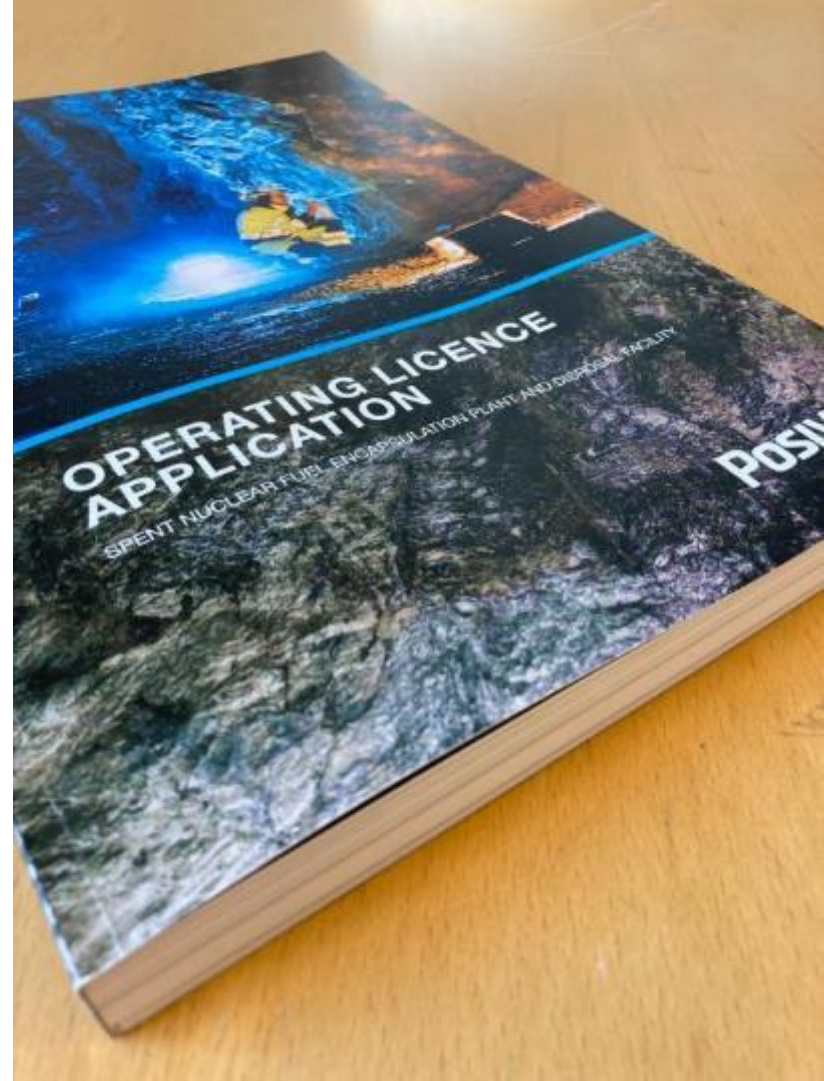


From Loviisa NPP (300 km away) spent nuclear fuel will be transported either by road or sea.

**World's first Operation license application  
for a DGR was submitted 30.12.21**

# The Operating Licence Application was submitted to Finnish authorities 30.12.2021

- 17 000 pages e-document containing all needed information to grant a permit for a nuclear facility
- Posiva's internal schedule to submit the application was held.
- 2022 and H1/2023 are planned to be used to reply to STUK's and other authorities' questions.
- H2/2024 considered to be the earliest time to receive the approval to start disposal.



# Trial Run of Final Disposal 2023 - 2024

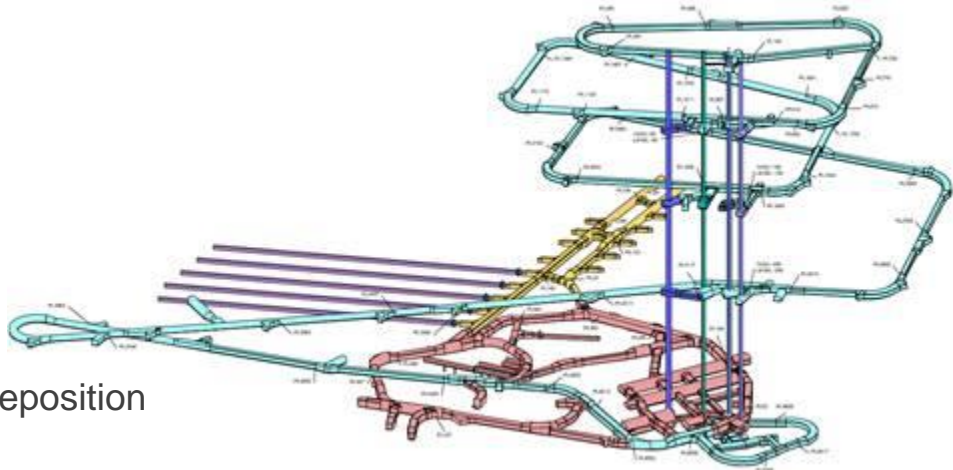
# Trial Run of Final Disposal in 2023 - 2024

The Trial Run is the final phase of Posiva's preparing for the operation of the DGR. It will be carried out with the methods, procedures, equipment and personnel to be used in the operation phase

- fuel transports
- encapsulation
- final disposal
- retrieval of a "damaged" canister back to the encapsulation plant

Consists of 4 canisters and about 70 m of deposition tunnel as well as the plug for the tunnel.

**There is also an opportunity for WMO's to participate and learn how the entire disposal process functions. Discuss with Posiva's experts and gain insights to benefit own national program.**



# Public acceptance

# Everyone is an important stakeholder



# Municipal veto-voting

According to the Finnish law, every municipality where a nuclear facility is proposed, has a veto-right in the decision-in-principle -process.



Vote in Eurajoki municipality council in 2000:

- 20 YES
- 7 NO



# Ratification of Decision in Principle in the Parliament

## 18 May, 2001



### Decisive arguments in the Parliament:

- “Aiming at final disposal is a better solution than just resorting to interim storing”
- “Option for retrievability of waste canisters must be maintained”
- “The present generation has to accept responsibility for nuclear waste”

# Three “shafts of success”

## Trust and transparency

– it takes years to earn the trust, and only minutes to lose it – we do not risk this under any circumstances

Independent and trusted authorities.

Clear processes, responsibilities and roles.

People’s own good, long experience of reliable, employing, tax-paying and transparent nuclear industry

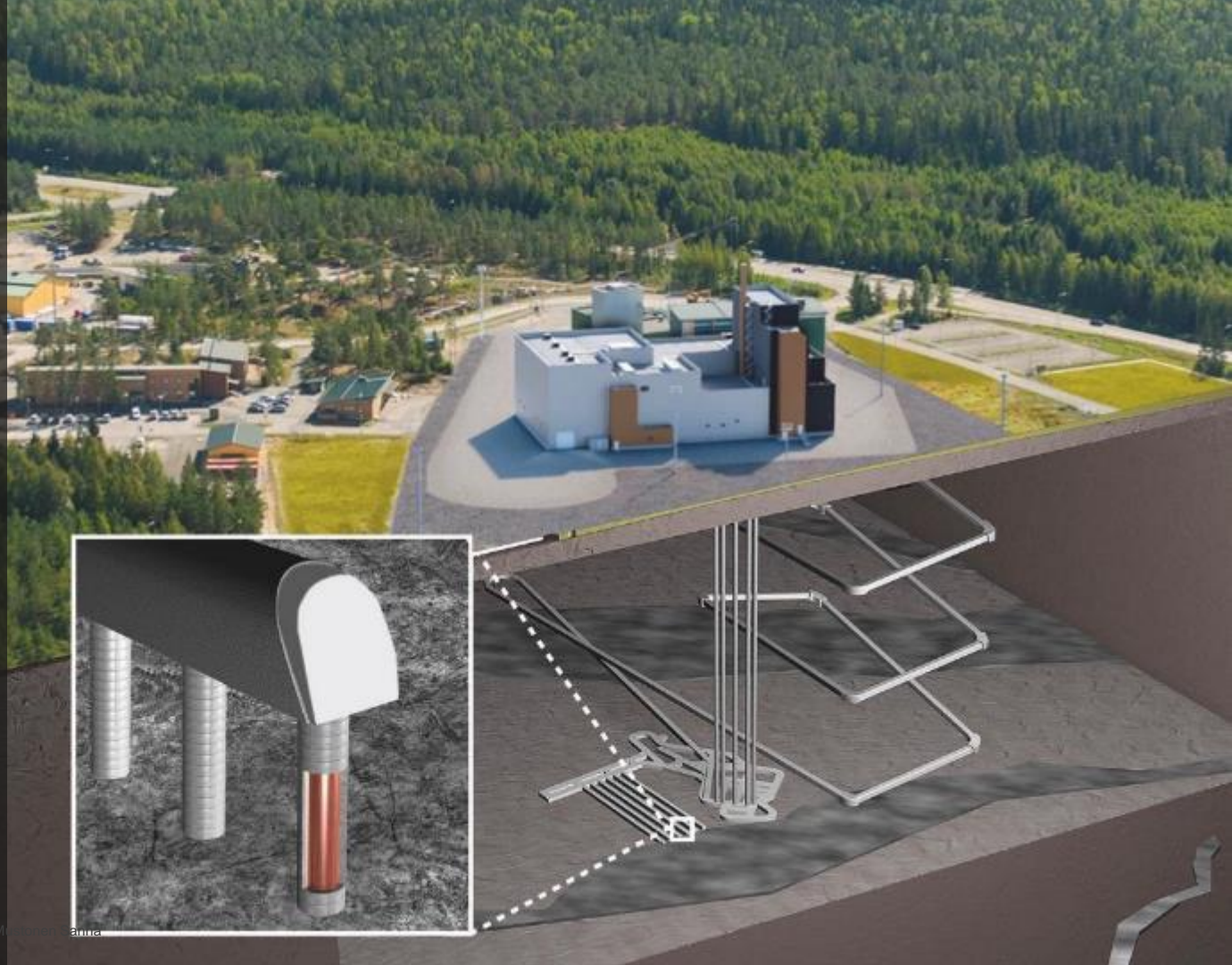
## Public acceptance of deep geological disposal of spent nuclear fuel

We have a solution  
for the final disposal  
of spent fuel



We have a significant  
role in climate protection  
as a part of the lifecycle of  
sustainable  
nuclear energy

#wehaveasolution





” Posiva’s ONKALO® is a game changer.

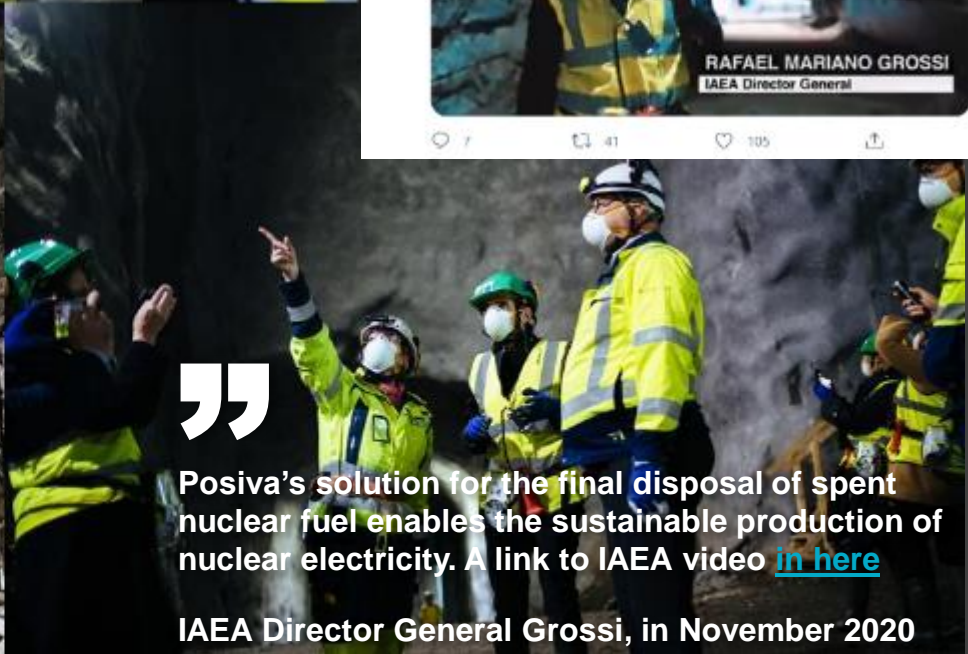


” Posiva’s personnel and network are making history with the work that they do.

12.4.2021

Makkonen Jari

Public



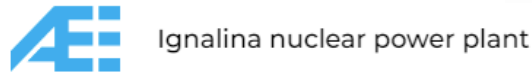
” Posiva’s solution for the final disposal of spent nuclear fuel enables the sustainable production of nuclear electricity. A link to IAEA video [in here](#)

IAEA Director General Grossi, in November 2020

# Posiva Solutions' capabilities to support the Client



# Posiva Solutions' Reference Clients



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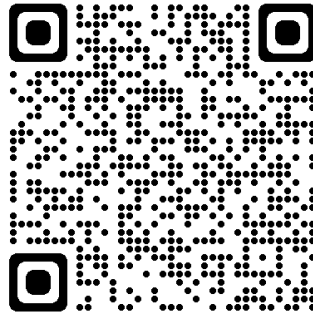
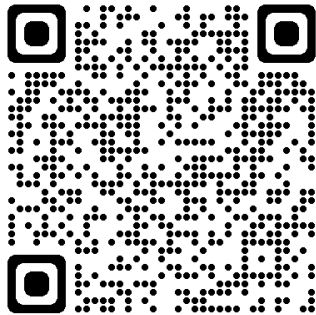


**Posiva**  
Solutions

## Posiva Solutions



Posiva Solutions provides tailored expert services adding value to spent nuclear fuel disposal programmes.





# Posiva

Solutions

Protecting the biosphere