

# Fennovoima's plan for the disposal of spent nuclear fuel

Tuomo Huttunen  
Finnish Energy



Finnish Energy Industries

# Nuclear waste management in Finland



Finnish Energy Industries

# Final Disposal

- Established in 1995, Posiva Oy is an organization responsible for the final disposal of spent nuclear fuel of the owners (TVO and Fortum) in Finland. In 2015, Finnish Government granted Posiva the construction license for the final disposal facility in Olkiluoto (Eurajoki).



# Interim storage of spent fuel

- Each year, a part of the nuclear fuel in the reactor core is replaced by fresh fuel
- The spent fuel is stored:
  - During the first years, in a pool inside the reactor building
  - After that the fuel is transported to an interim storage where it is stored at least 40 years (pool or dry storage)
  - After that the fuel can be transported to final disposal facility
- During the period of interim storage, the fuel has cooled and its radioactivity has decreased to 1/1000 of the original activity

Pool storage



Dry storage

# Transporting the fuel

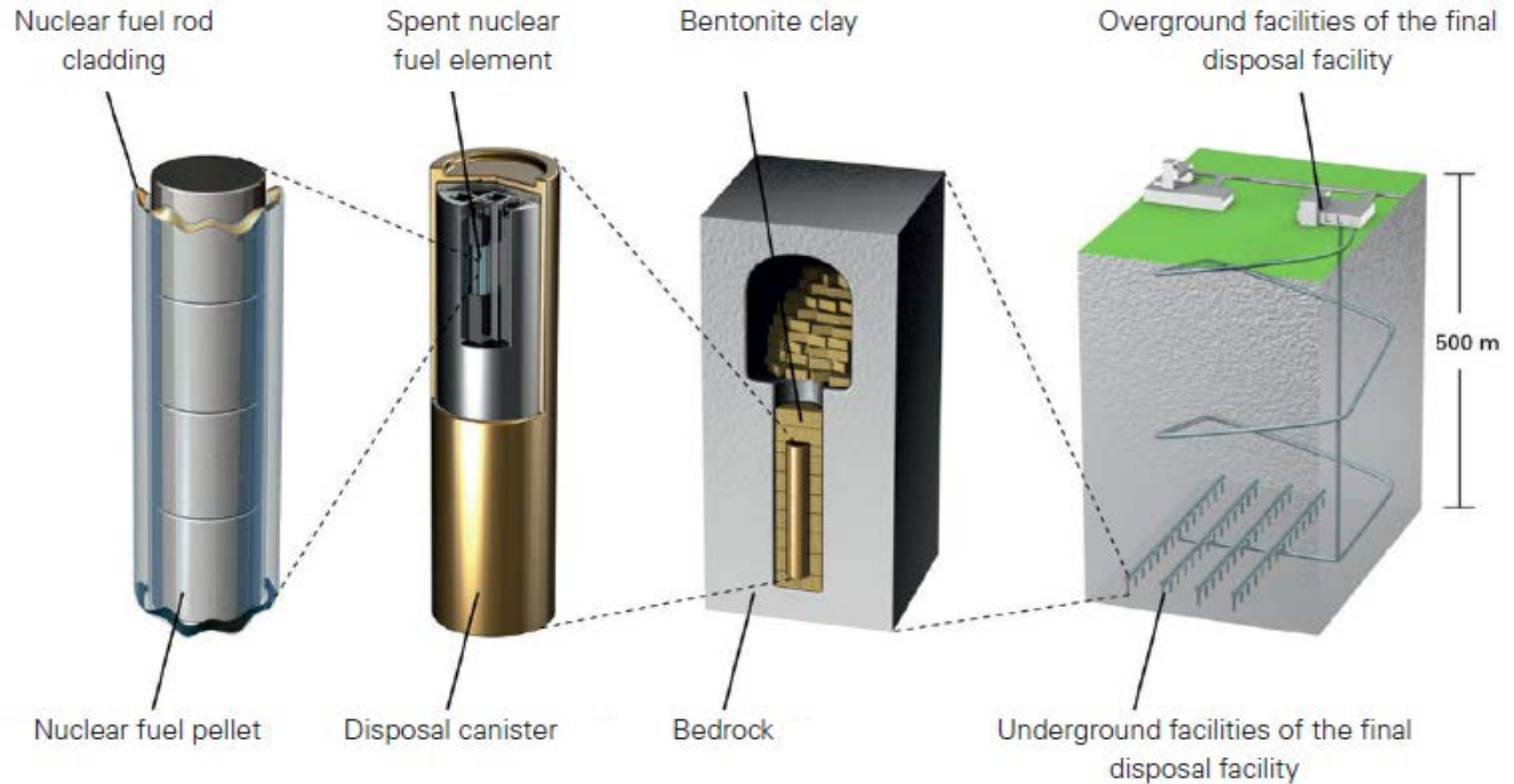
Photos: SKB

- Fuel can be transported to and from the site via many alternative routes:
  - Road
  - Railway
  - Sea
  - Combination of above routes
- Uranium fuel is transported to the site once a year
  - Fresh fuel is not particularly radioactive -> No special protective measures required
- Spent fuel will be transported from the site after it has been cooled for decades
  - Radioactive transportations are strictly regulated
  - Final disposal of Fennovoima's fuel earliest in 2090's



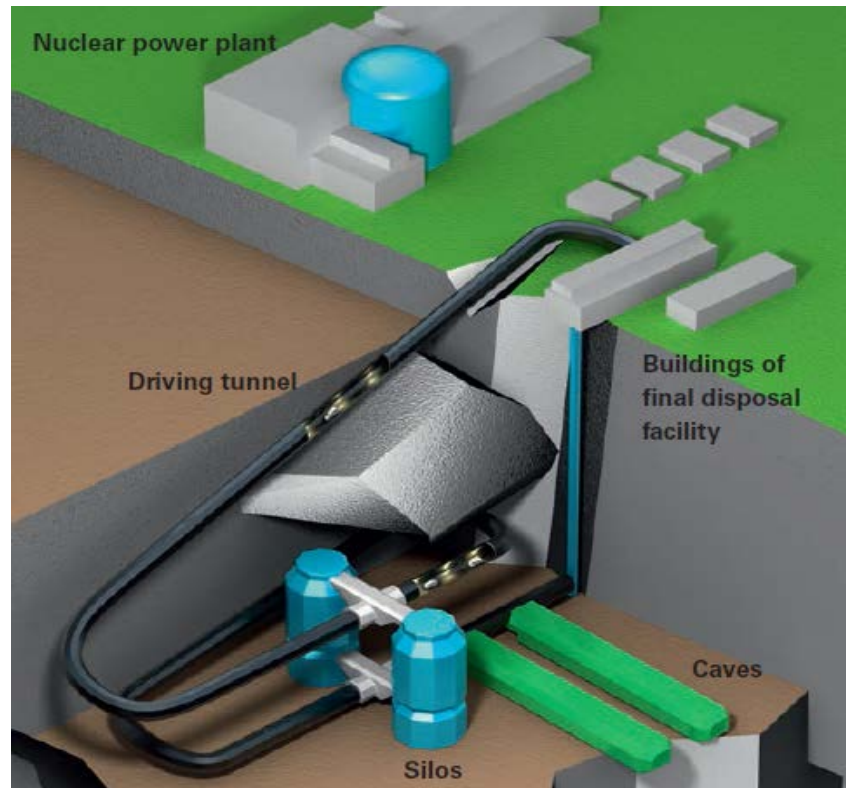
# Spent fuel final disposal concept in Finland and Sweden

Image: SKB



# Low and intermediate level waste

- For low and intermediate level waste, Fennovoima will construct an operating waste repository in the bedrock of the power plant area (at depth of around 100 m)
- Similar storage facilities in Olkiluoto and Loviisa



# Nuclear power is fuel-efficient

- Nuclear power plant with a thermal output of 3200 MW (like AES-2006) uses
  - 1500 tons in 60 years
- A coal power plant of the same size would use around 3 000 000 tons of fuel each year
  - A truckful of coal (60 tn) each 10 minutes
- Each nuclear fuel assembly is typically used 3 to 6 years in the reactor



© TVEL

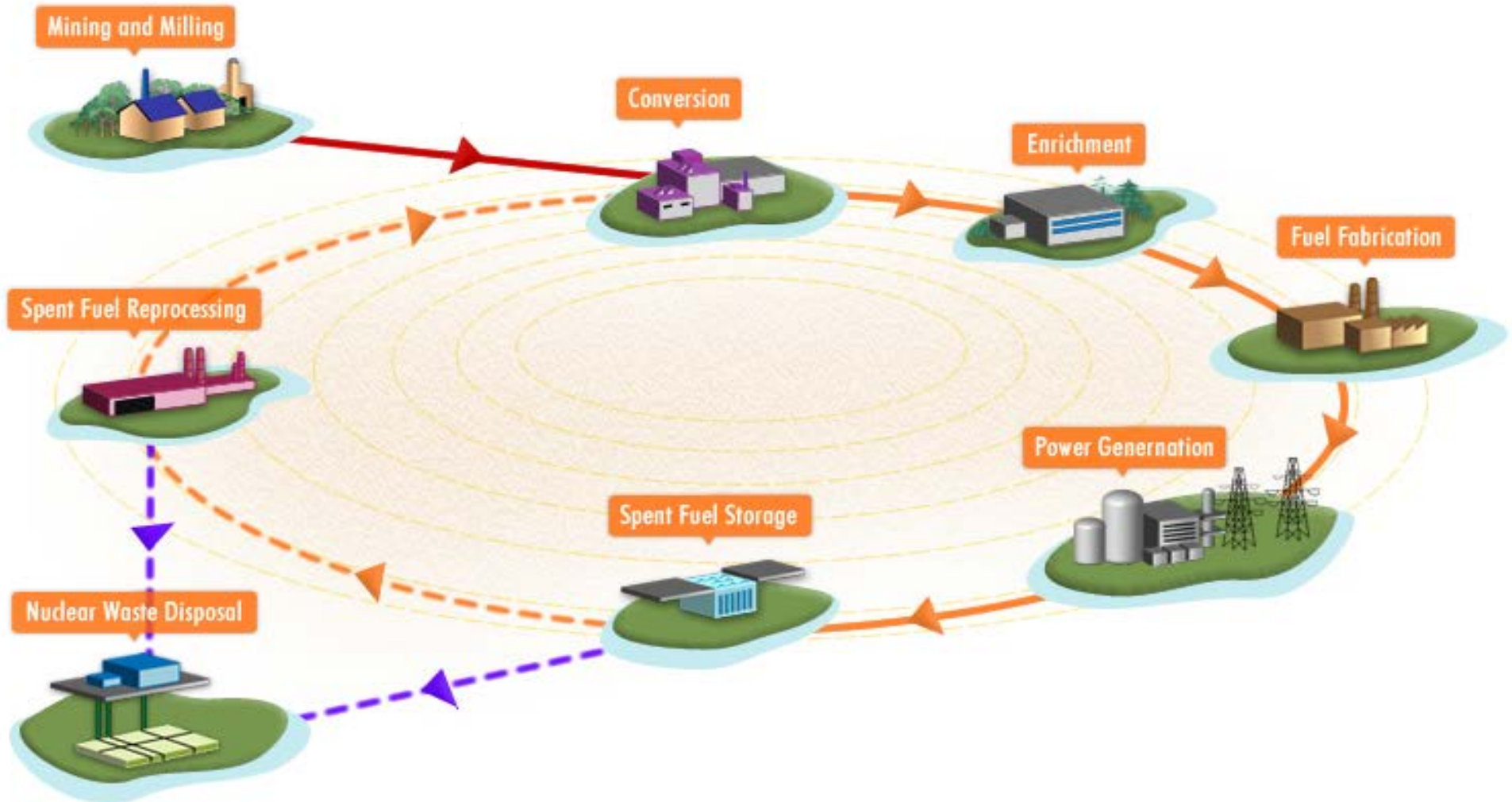


# Current status of spent fuel

- All spent nuclear fuel in the world is currently stored in interim storage facilities
- The first final disposal facility for spent fuel will start the operation in Olkiluoto, Finland
  - Estimated start of the operation ~2020
  - Geological final disposal in the bedrock
  - Similar final disposal process is estimated to start in Sweden (Forsmark) ~2025
- Fennovoima's spent fuel disposal will occur earliest in 2090s
  - Fennovoima plans to use the concept developed in Sweden and Finland (KBS-3), taking into consideration the technological development in the following decades
  - The final disposal facility requires a separate EIA and licensing process, regardless the location



# Nuclear fuel cycle



# Final disposal of Fennovoima's spent nuclear fuel



## By end of June 2016, Fennovoima must

- A) Present an agreement with Posiva's owners
- B) Draft an Environmental Impact Assessment (EIA) programme over its own final disposal facility.
- Actual location of the final disposal site will be clarified later
- Fennovoima will start final disposal in the 2090s at the earliest.