

Uranium Stewardship in Vattenfall

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Vattenfall Group

- ***An European energy company***
- No 4 in Europe (Electricity generation & sale)
- Net sales 2007: 15 168 M€
- About 5,8 million customers
- 32 400 employees (about 8000 in Sweden)
- Electricity production 2007: 167,6 TWh
 - Nuclear: 51,3 TWh
 - Hydro: 36,6 TWh
 - Fossil: 77,7 TWh
 - Wind: 1,3 TWh
 - Biofuels 0,6 TWh
- Heat Generation 2007: 36,2 TWh

Vattenfall in Europe

Germany (F, N, H)

Sweden (N, H, W)

Finland (H, F)

Poland (F)

Denmark (F, W)



(F=Fossil; N=Nuclear; H=Hydro; W=Wind)

Nuclear Power in Vattenfall

- Generation: Vattenfall is the owner and operator of four NPPs organised as separate companies:
 - Ringhals AB (71 % Vattenfall)
 - **3 PWR & 1 BWR (3550 MWe)**
 - Forsmark Kraftgrupp AB (66 % Vattenfall)
 - **3 BWR (3100 MWe)**
 - Kernkraftwerk Krümmel GMBH (50 % Vattenfall)
 - **1 BWR (1260 MWe)**
 - Kernkraftwerk Brunsbüttel GMBH (66 % Vattenfall)
 - **1 BWR (800 MWe)**
- Nuclear Fuel: Vattenfall Nuclear Fuel AB:
 - A separate company 100% owned by Vattenfall
- Back-End: SKB
 - A separate company 56 % owned by Vattenfall

Uranium Stewardship in Vattenfall

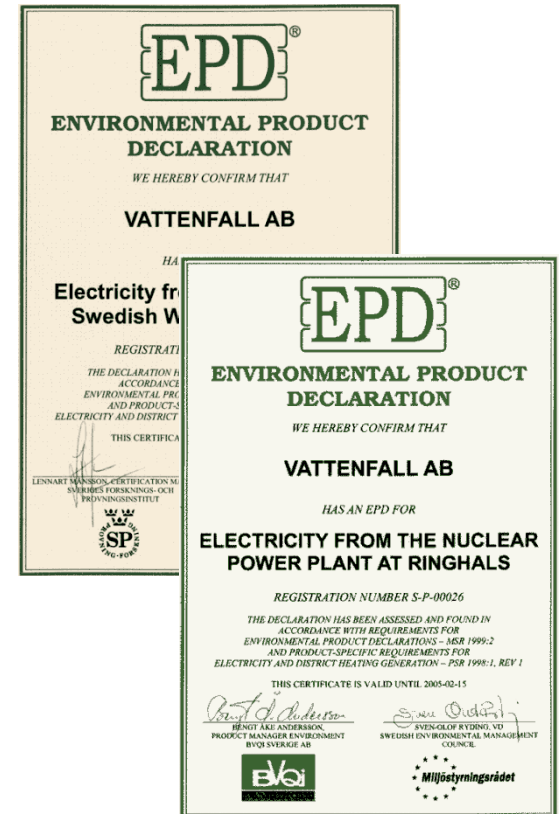
- One of the five ambitions of Vattenfall group is to be :
Number one for the Environment
- Vattenfall assumes Corporate Social Responsibility as defined in UN Global Compact
- We have performed “life-cycle analyses” of all types of electricity generation
- Environmental compliance is applied in all phases of nuclear generation:
 - Procurement
 - Generation
 - Back-end

Procurement of nuclear fuel

- All suppliers of nuclear fuel (Uranium, Conversion, Enrichment and Fabrication) are qualified by Vattenfall Nuclear Fuel in respect to environmental issues:
 - Permits for their operations
 - Environmental Management System (ISO 14001 or equal)
 - Policies with regard to the environmental issues
 - Radiation Protection according to ICRP 60
 - Waste treatment
 - Emissions to air, soil and water
 - Working environment
 - Etc. etc
- Qualification is done by “questioner” followed by site visits
- The compliance to the system is monitored by regular “audits”

Generation

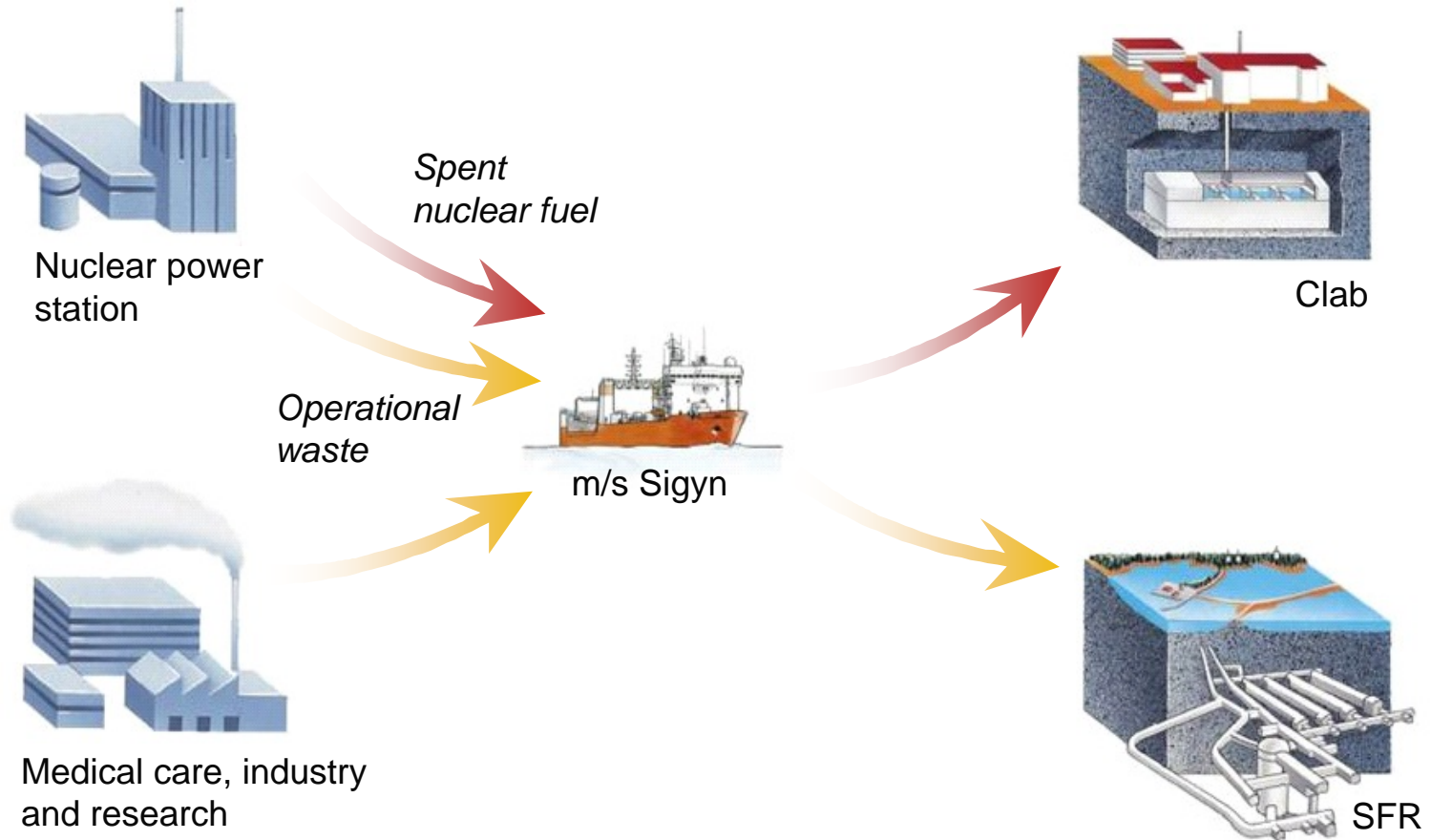
- All nuclear facilities in Sweden are certified according to environmental standard of ISO 14001
- Environmental Product Declaration (EPD) is done for these facilities:
 - EPD is an study done by an independent organisation to find out the impact to the environment per each KWh of generation
 - EPD is a valuable tool for our electricity customers to calculate the total impact of their productions on the environment
 - EPD is also an evidence for continuous improvement



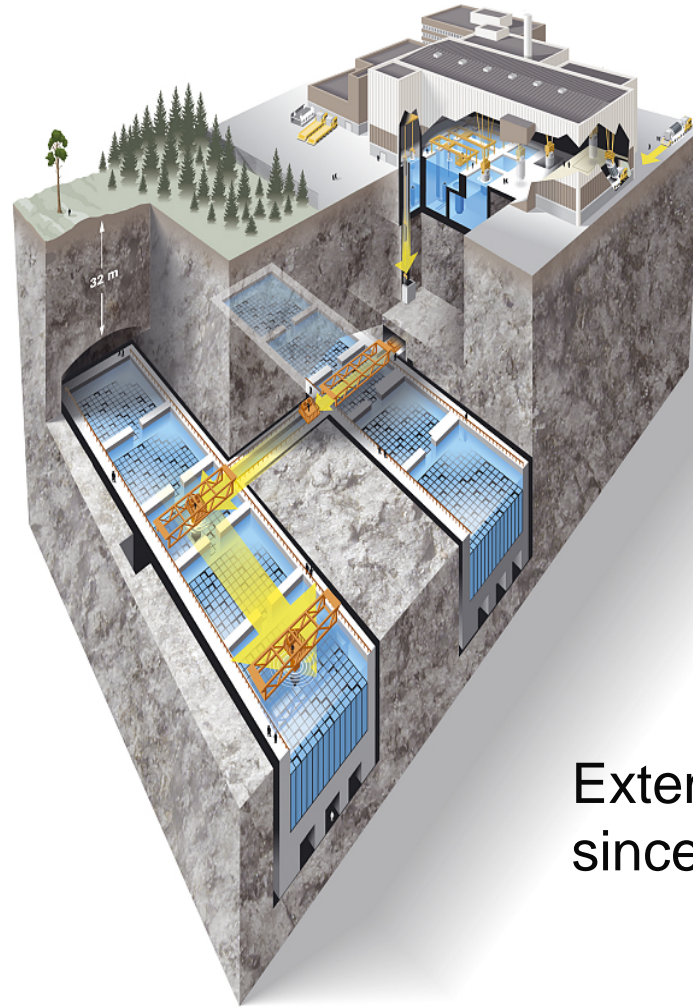
Back-end

- Since 70s there is a clear methodology and decision how to dispose of radioactive wastes in Sweden
- Final disposal of the spent fuel was chosen
- A separate company owned by nuclear operators, [\(SKB\)](#) , was established to handle the radioactive waste in Sweden
- Nuclear operators are paying to a “fund” each year to finance the projects
- Repository for interim storage of spent fuel is in operation
- Repository for final storage of operational waste is in operation
- Final repository for spent fuel is planned to start operation in 2022
- SKB has it's own ship for the transportation of the wastes
- All existing facility are licensed according to ISO 14001

SKB's system in operation



Clab – Central Interim Storage Facility for Spent Nuclear Fuel

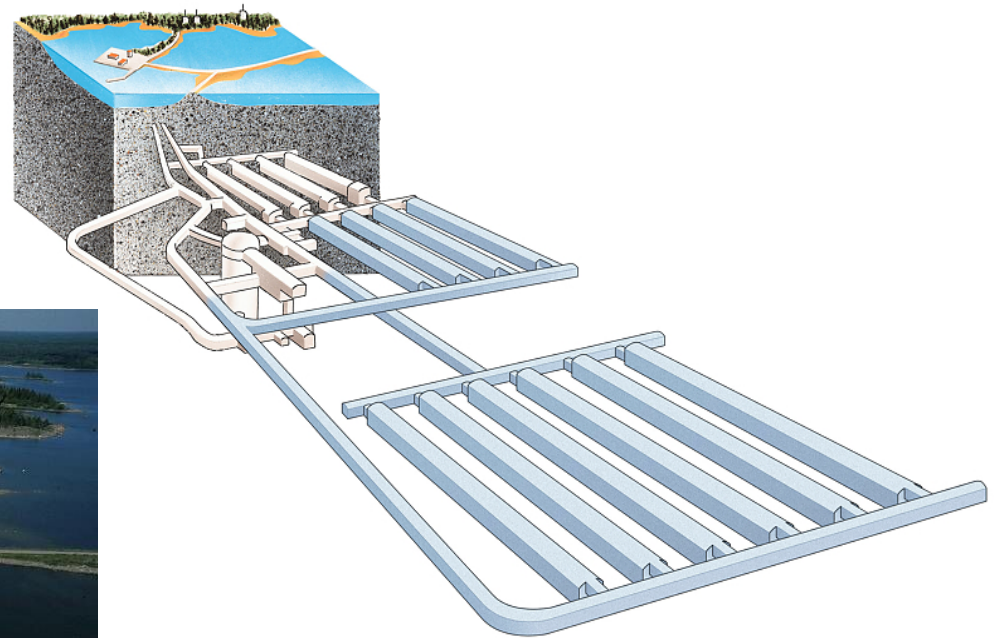


In operation
since 1985

Extension in operation
since 2008

SFR: Final repository for operational radioactive wastes

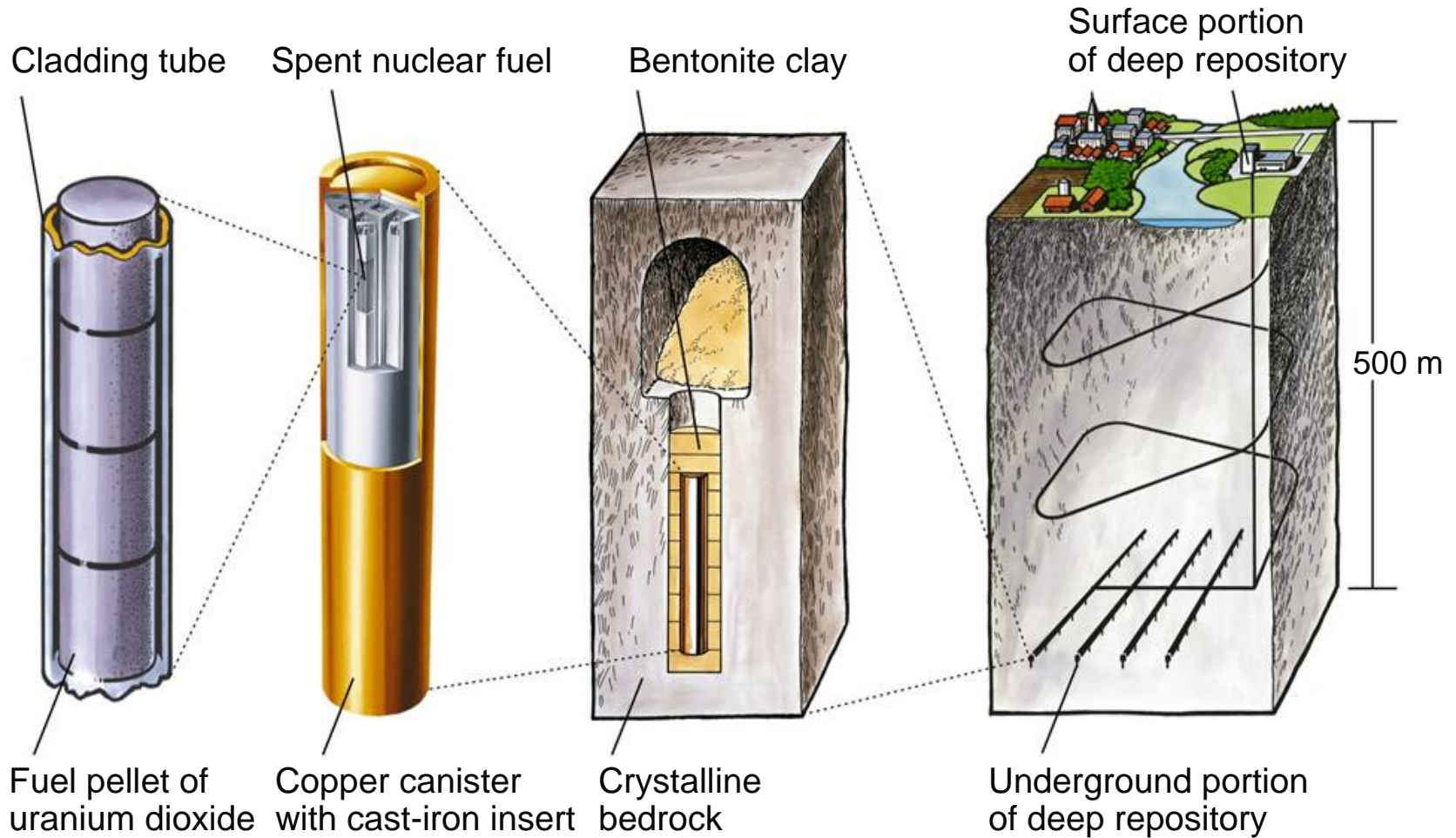
In operation since 1988



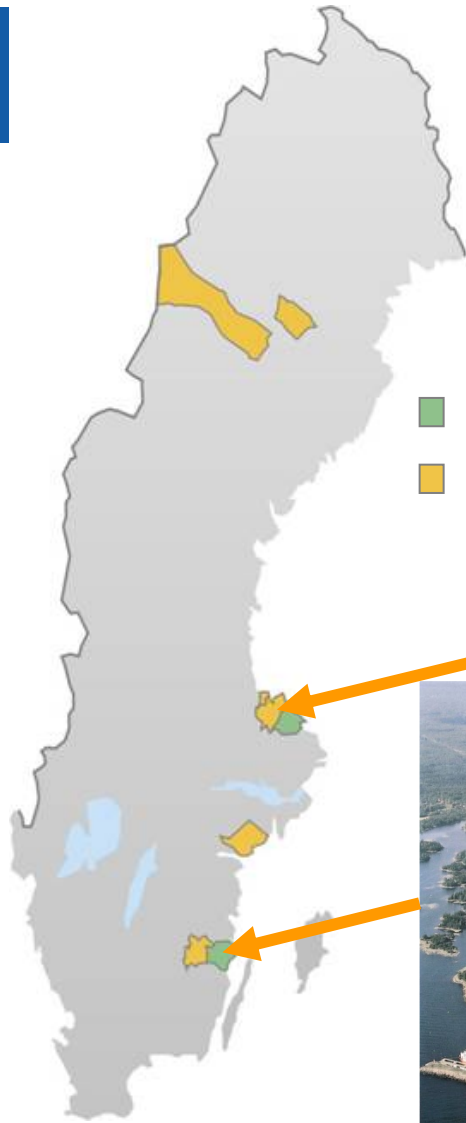
Planned extension 2007-2020

Swedish system for disposal of spent fuel : KBS

Safety barriers



Site investigations



- Site investigations, ongoing
- Feasibility studies, completed

Östhammar



Oskarshamn



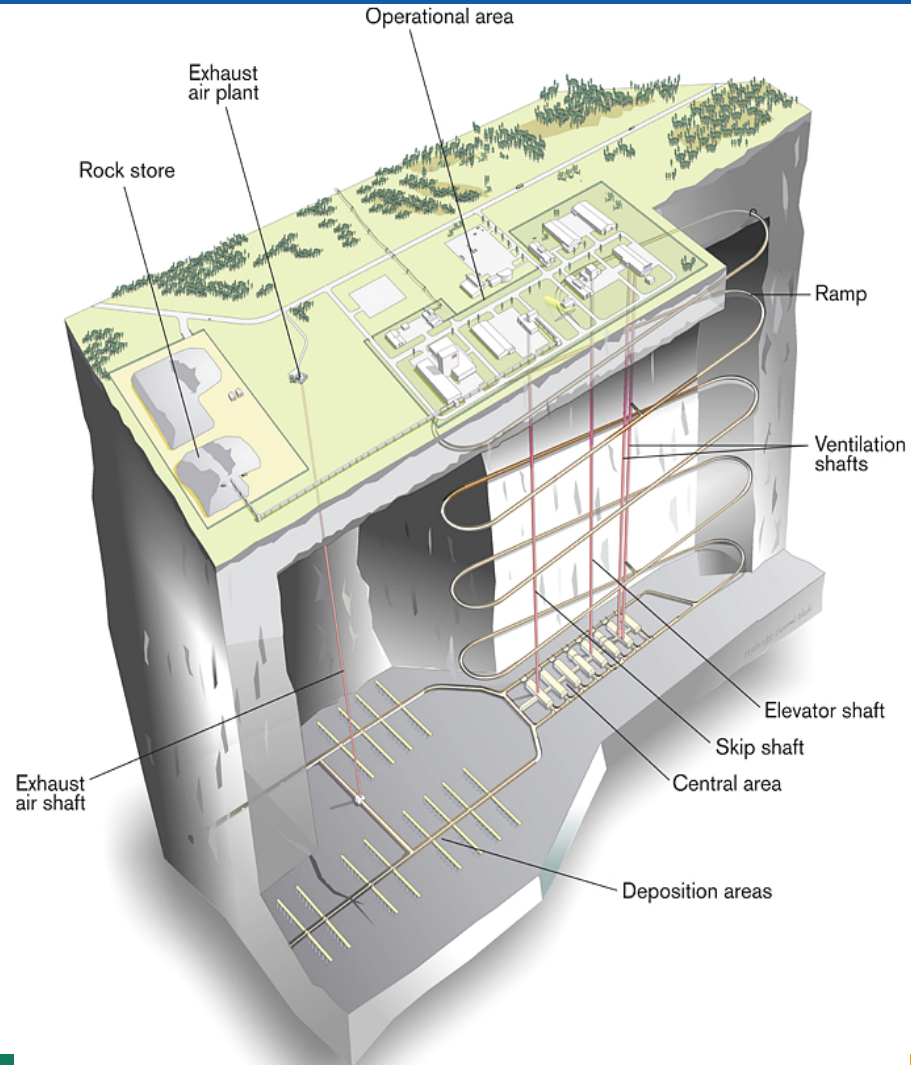
Site Selection: 2009

Final Repository

Licence application: 2010

Start: 2022

Full capacity: 2028



The nuclear waste fund

0.01 SEK per kWh
of nuclear electricity



The nuclear operators have been paying for the costs according to the law



Around 40 billion
SEK in 2008

Thank you for your attention!

Questions?