The siting process for a deep repository for spent nuclear fuel in Sweden

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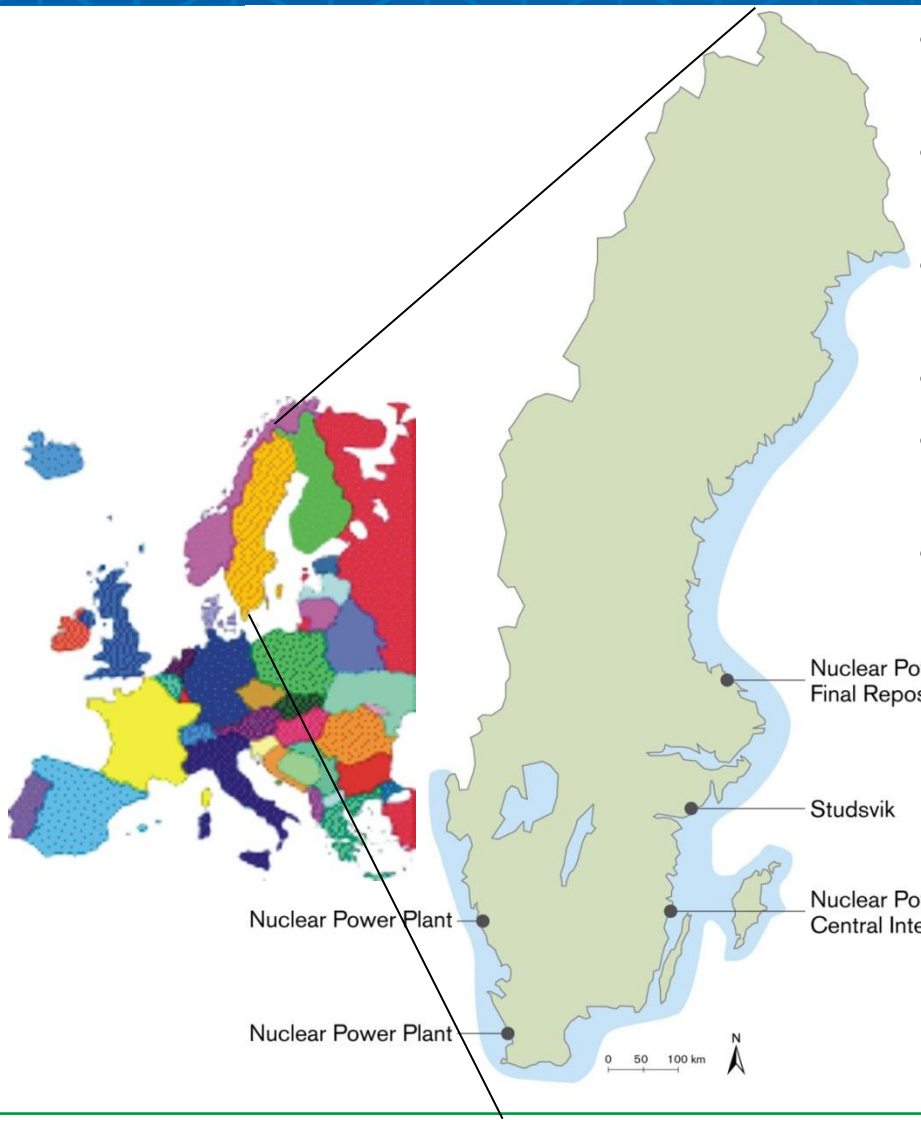
Idaho Falls 28 August 2023

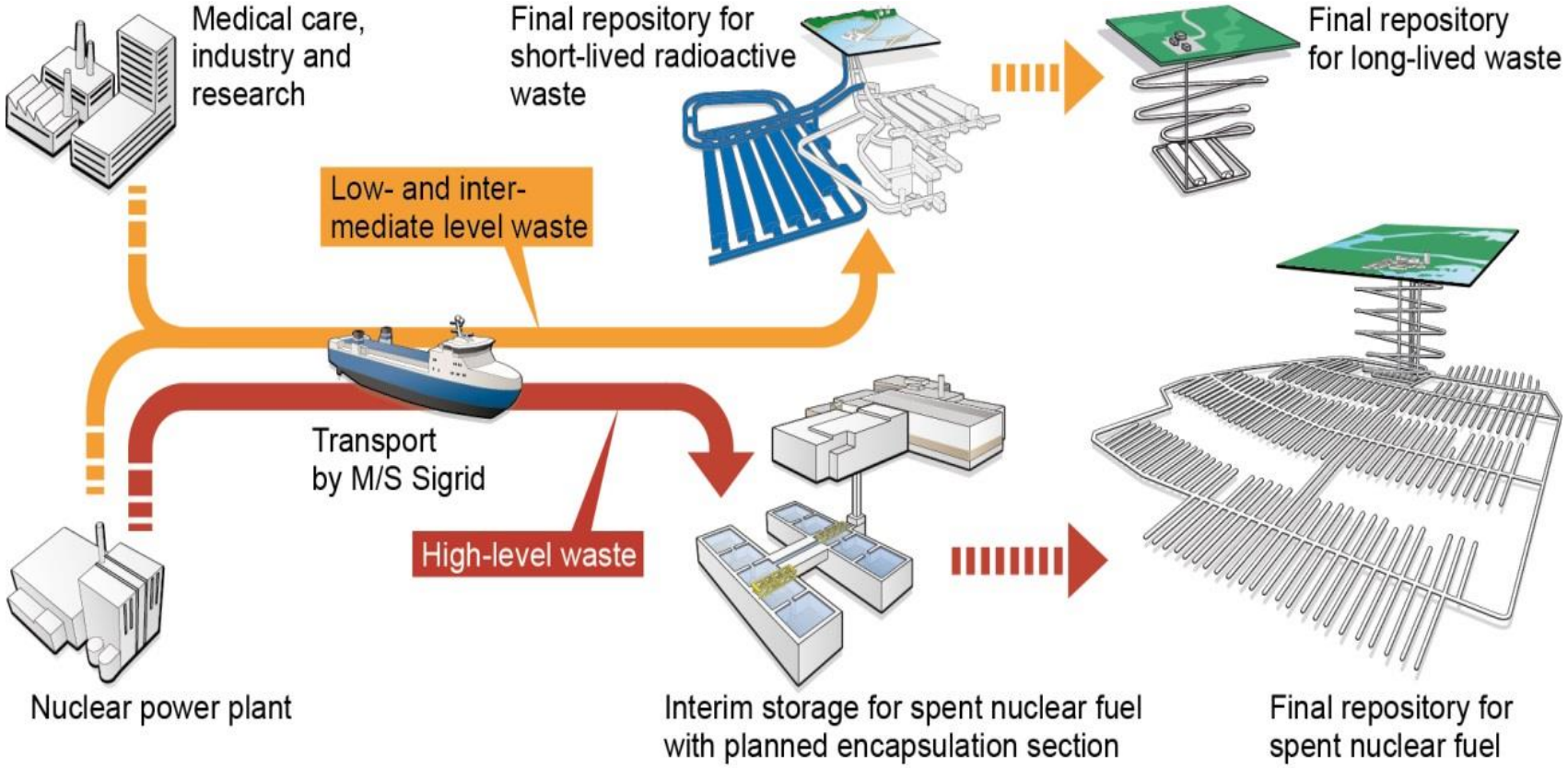
Starting points



- Nuclear power activities started in the 1960ies. Early plans for 24 reactors
- 12 reactor units at 4 sites started between 1972 and 1985. 50% of electricity
- Nuclear power under critical discussion since mid-1970s
- Referendum on nuclear power in 1980
- Slow face-out in progress. 6 reactors after 2020
- Waste high on the agenda for the last 40 years

- Early plans, reprocessing abroad, no waste return, LLW to be sea dumped

The Swedish back-end system



Basic principles and general direction decided early (mid-70s)
Implementation as needed

Ongoing licensing: Deep geological repository for spent fuel at Forsmark
Encapsulation plant at Oskarshamn
Extension of short-lived repository for decom. waste at Forsmark

Clear responsibility and financing

SKB's owners:

VATTENFALL

FORSMARKS KRAFTGRUPP

Sydkraft Nuclear Power AB

okg
- ett företag i E.ON koncernen

Financing:

About 0.04 SEK per kWh of nuclear electricity

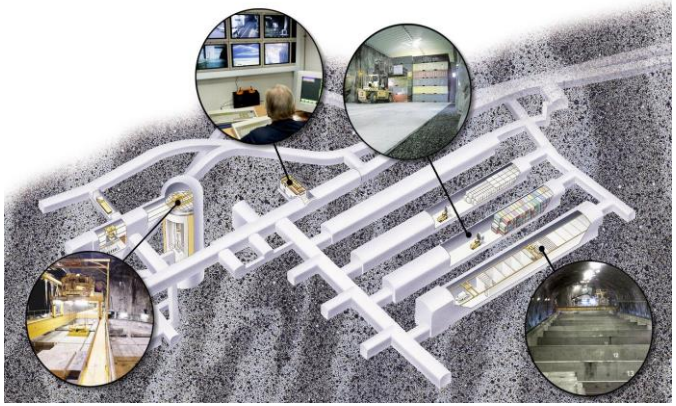
Around 80 billion SEK in 2021

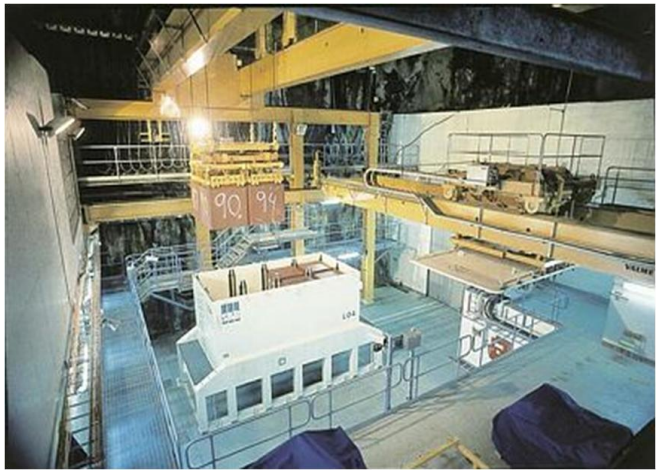
Available funding key to conduct planned programme

SKB Mission

- To safely handle, store and dispose of all spent fuel and radioactive waste from the Swedish nuclear power plants
  - To develop, build and operate all facilities and systems needed for the safe management of all wastes
  - To perform the necessary research and development to show the feasibility of the technology applied and the short and long term safety of the facilities
  - To perform the siting activities for the facilities and the corresponding information activities
  - To develop a long term planning for all activities and calculate the corresponding costs (every three years)
  - SKB is thus fulfilling the legal responsibilities of the NPP owners.
  - SKB is also disposing waste from other activities in Sweden, e.g. hospitals and research, on contract.

Final Repository for Short-lived Radioactive Waste, SFR

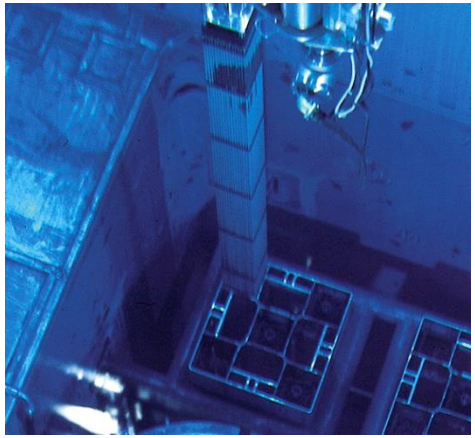




Early repository design – possible to optimize system

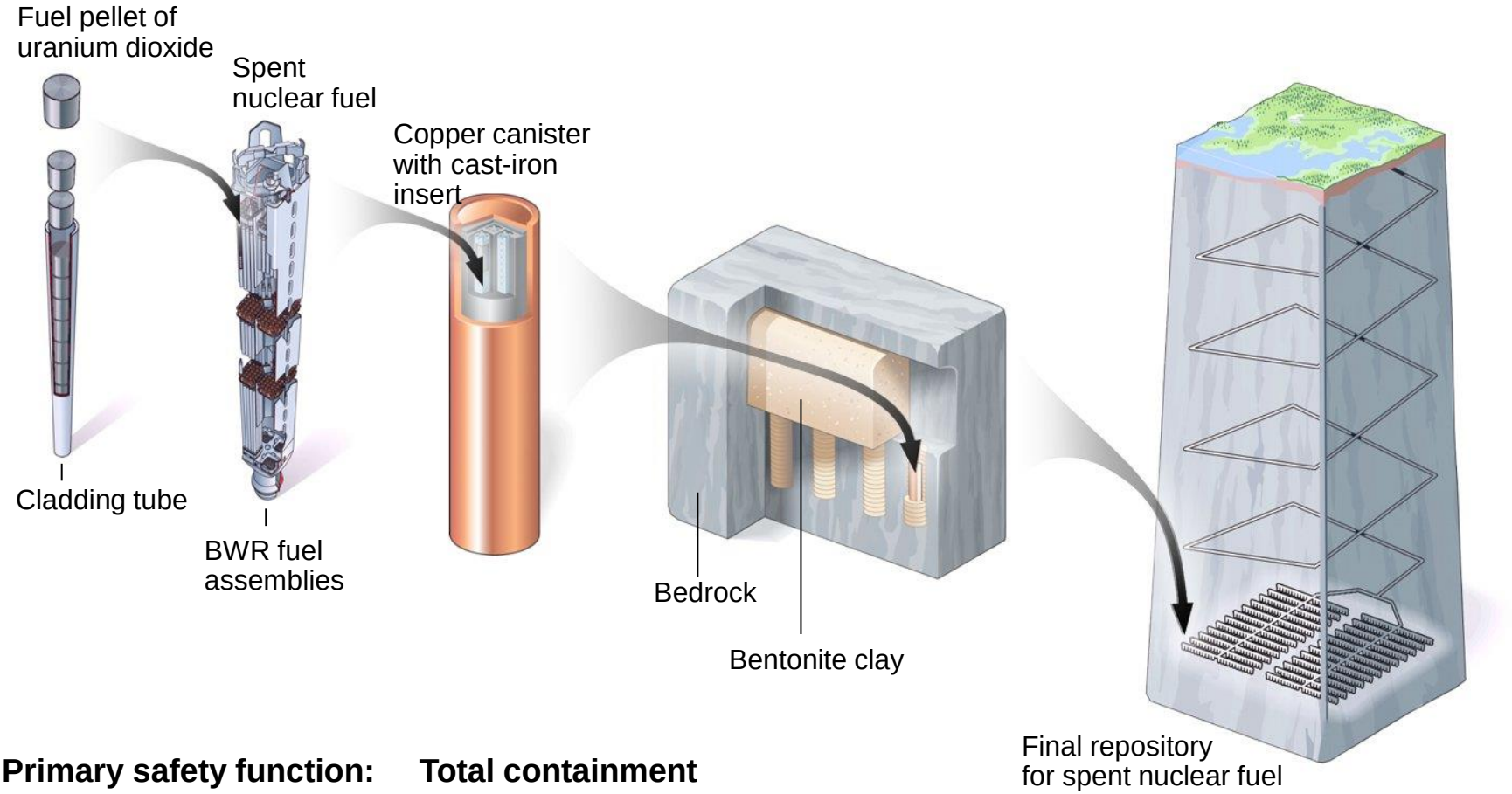
Sea based transport system

Central Interim Storage Facility for Spent Nuclear Fuel, Clab



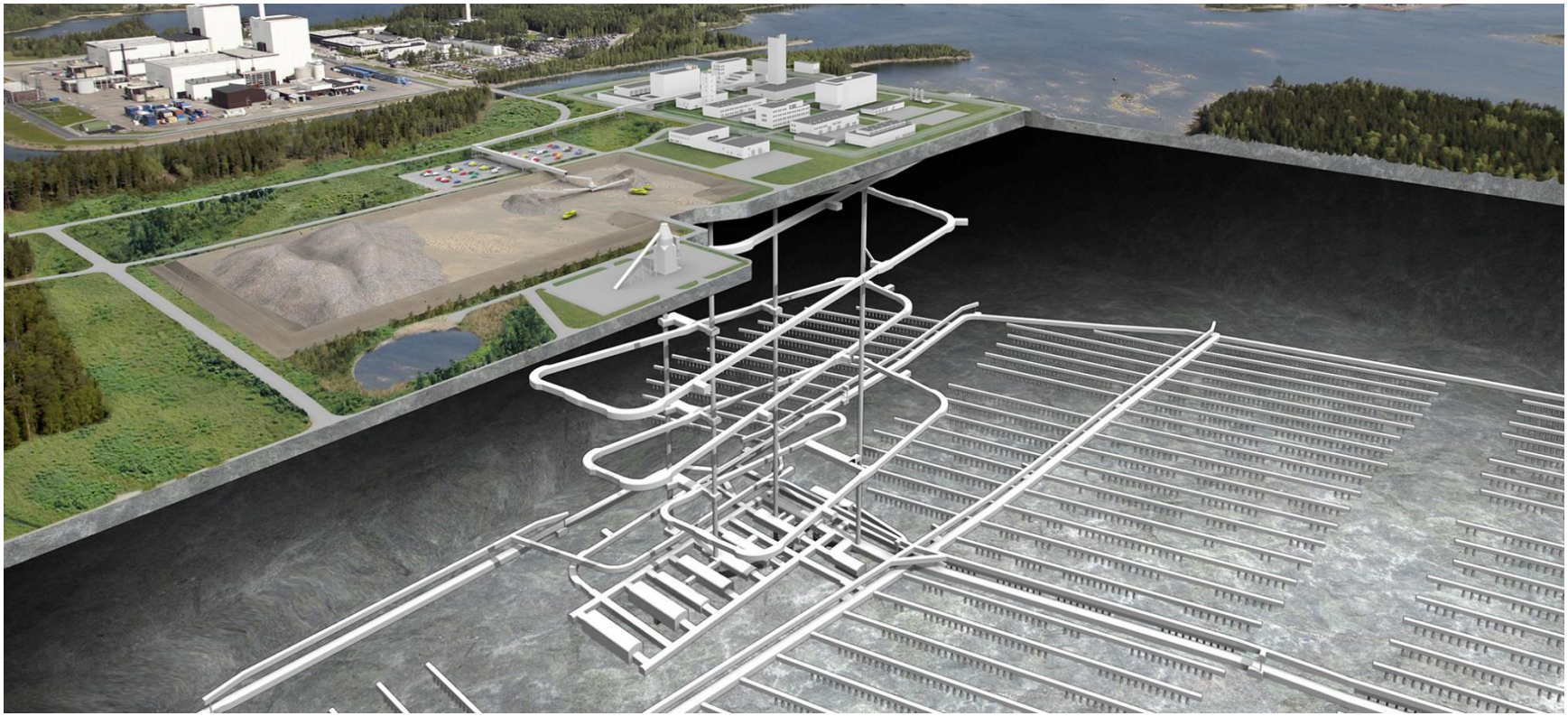
Interim storage provides flexibility

The KBS-3 method for disposal of spent nuclear fuel

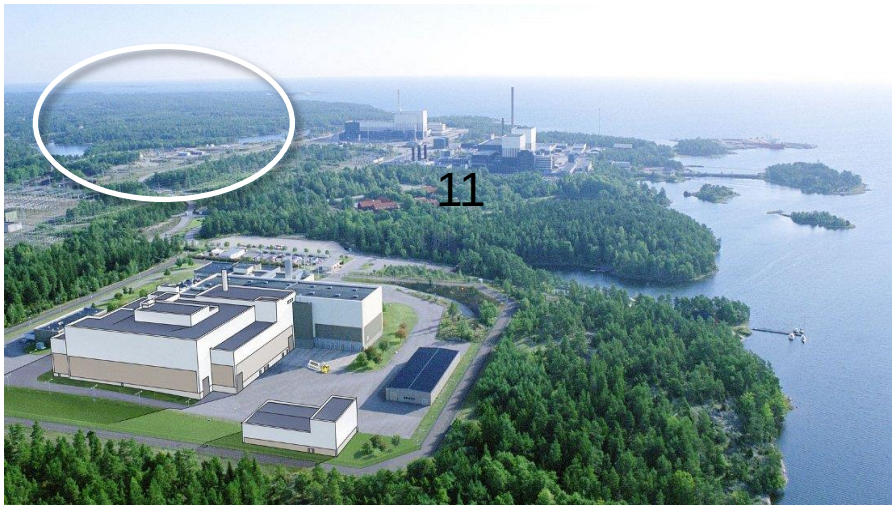


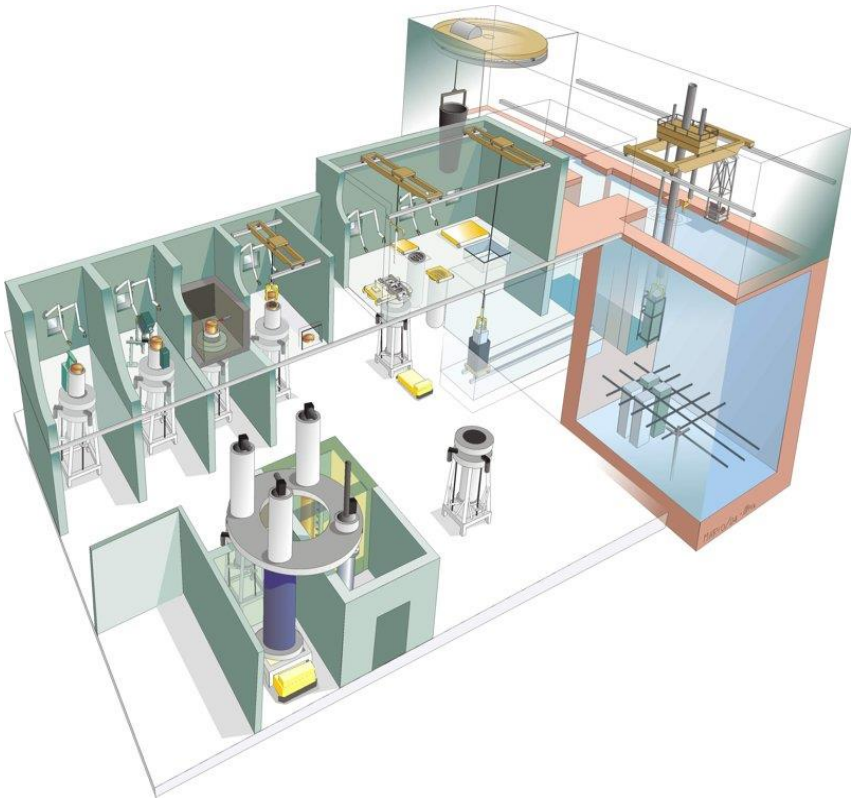
Primary safety function: Total containment
Secondary safety function: Retardation

The planned Spent Fuel Repository at Forsmark

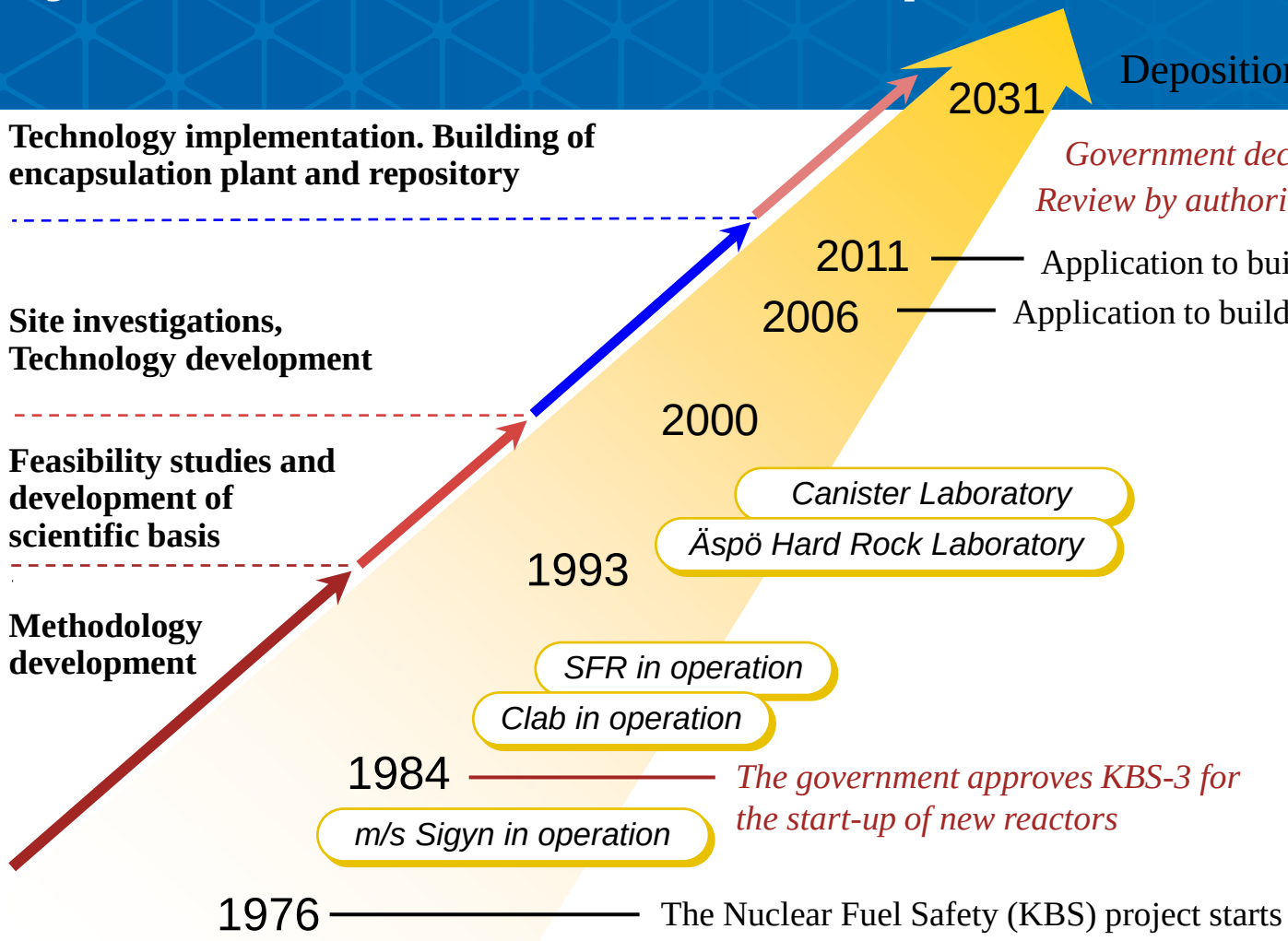


Encapsulation plant will be connected to the Clab facility





40 years of research, development and siting



Development and siting of repository takes time. Includes important RD&D.

RD&D programmes basis for Government decisions on future development

RD&D 2016

RD&D 2013

RD&D 2010

RD&D 2007

RD&D 2004

RD&D 2001

RD&D 1998

RD&D 1995

RD&D 1992

R&D 1989

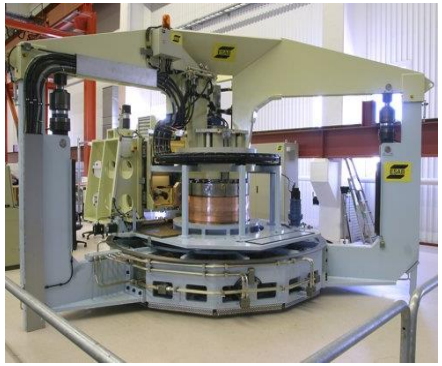
R&D 1986

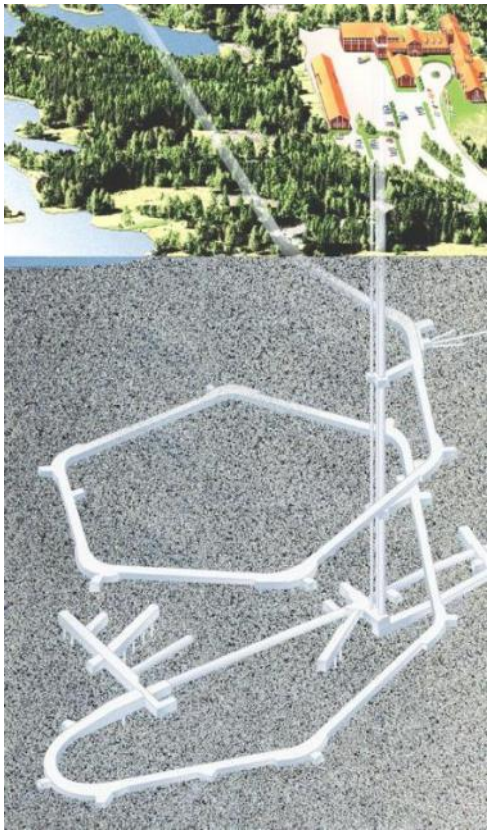
R&D 1984

Recurrent RD&D programmes provides a chance to adapt to experiences and to communicate with stakeholders.

SKB laboratories essential for improved scientific understanding and technical development

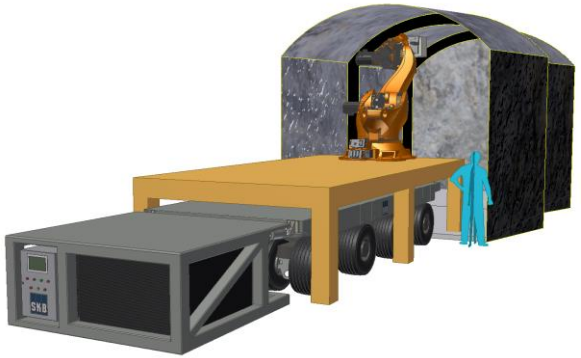
Canister laboratory, in operation since 1998





Äspö Hard Rock Laboratory, in operation since 1996

Bentonite laboratory, in operation since 2007



Siting of a repository for spent nuclear fuel

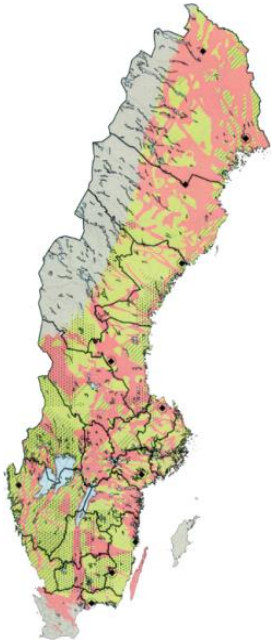
Knowledge accumulation

Siting process

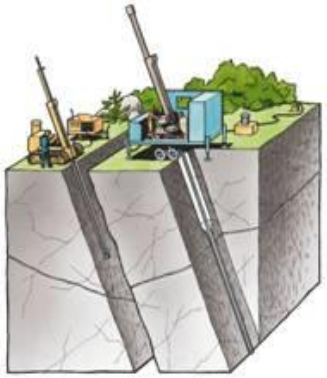
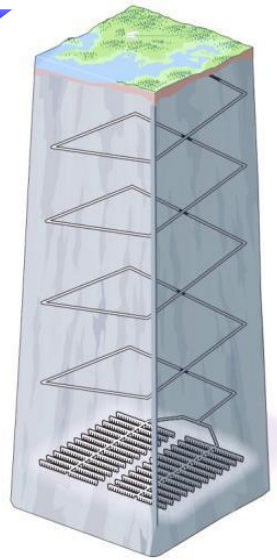
Hultsfred
Malå
Nyköping
Oskarshamn
Storuman
Tierp
Älvkarleby
Östhammar

Oskarshamn (Laxemar)
Östhammar (Forsmark)

Decision on site
2009



Study sites
1977-1985

General siting studies
1997-1999

Feasibility studies
1992-2000

Site investigations
2002-2007

Licensing
ca. 2011-2022

Construction
ca. 2023-2030

Understanding the geology first step in implementation
Siting a controversial facility –> Hosting a requested facility

Important components in building trust

- Your project has to be explained in an understandable way to the public**s**
- Understand all dimensions of your project; scientific, social, political and ethical
- Openness on challenges and potential impacts
- Open ears to local concerns and views, even critical ones

Desired result

- Turn a national challenge into a local interest to contribute
- Keep a positive attitude

Trust and safety are key factors for success

Key factors for success

- Define the responsibilities and rights of the waste producers and explain the role allocated to each stakeholder (the way one organises the nuclear waste management is key)
- Be sure to define clear responsibilities for implementation and financing
- Understand the importance of a trustworthy regulator being present in the siting process
- Define your siting process in advance
- Get the public involved early in developing that process and gain their trust by taking into account their relevant expectations
- Make sure your Scientific/engineering approach is stepwise, adaptive and iterative
- Be open about the challenges as well as the advantages of the project in your dialog with all stakeholders under the siting process
- Use your best experts with communicative skills
- Expect opposition
- Acquire patience, building trust takes time


Thank you for your attention!