



Strål
säkerhets
myndigheten

Swedish Radiation Safety Authority

Status of the decommissioning activities in the Nordic countries

Nordic Nuclear and Radiation Risk Estimates -
Advances and Uncertainties
Stockholm, 15 – 16 January 2019

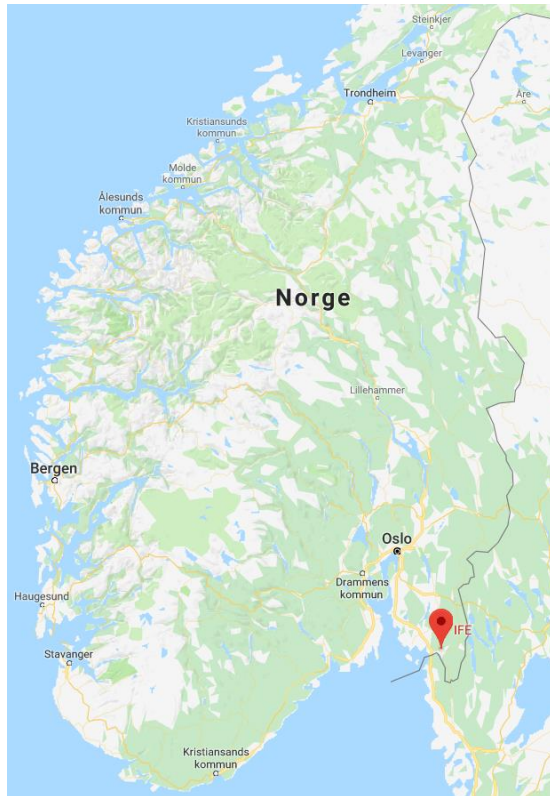
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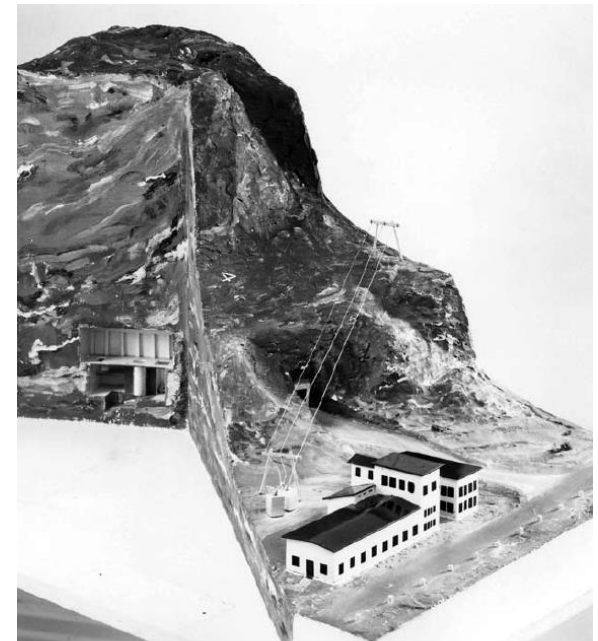
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Decommissioning in Norway



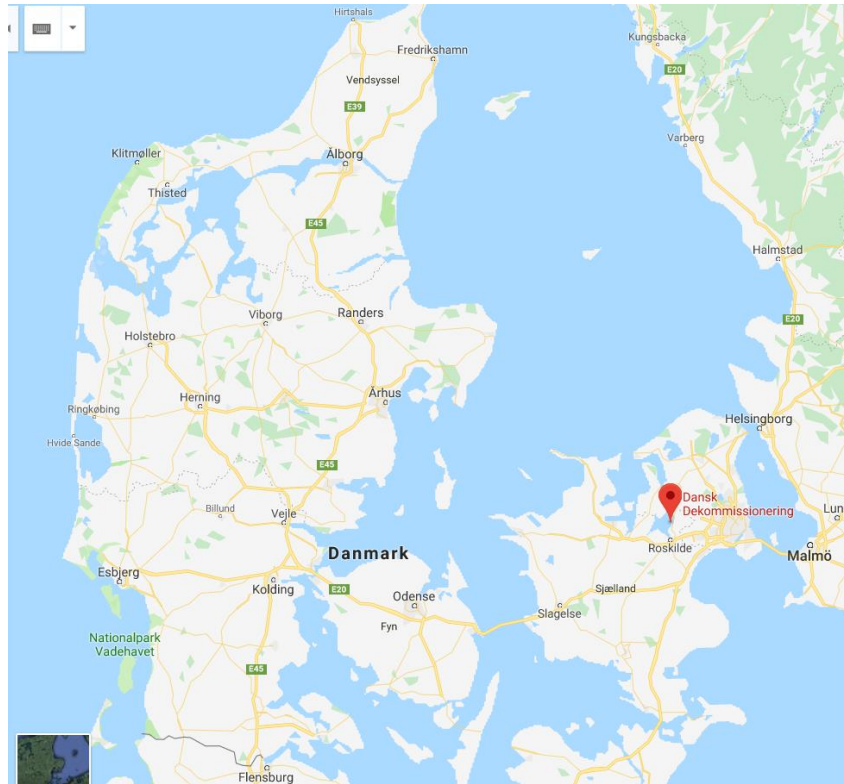
- Halden Boiling Water Reactor (1958 – 2018)
- IFE's Board of Directors decided to permanently shut down the reactor in June 2018



Model showing the reactor hall inside the mountain.



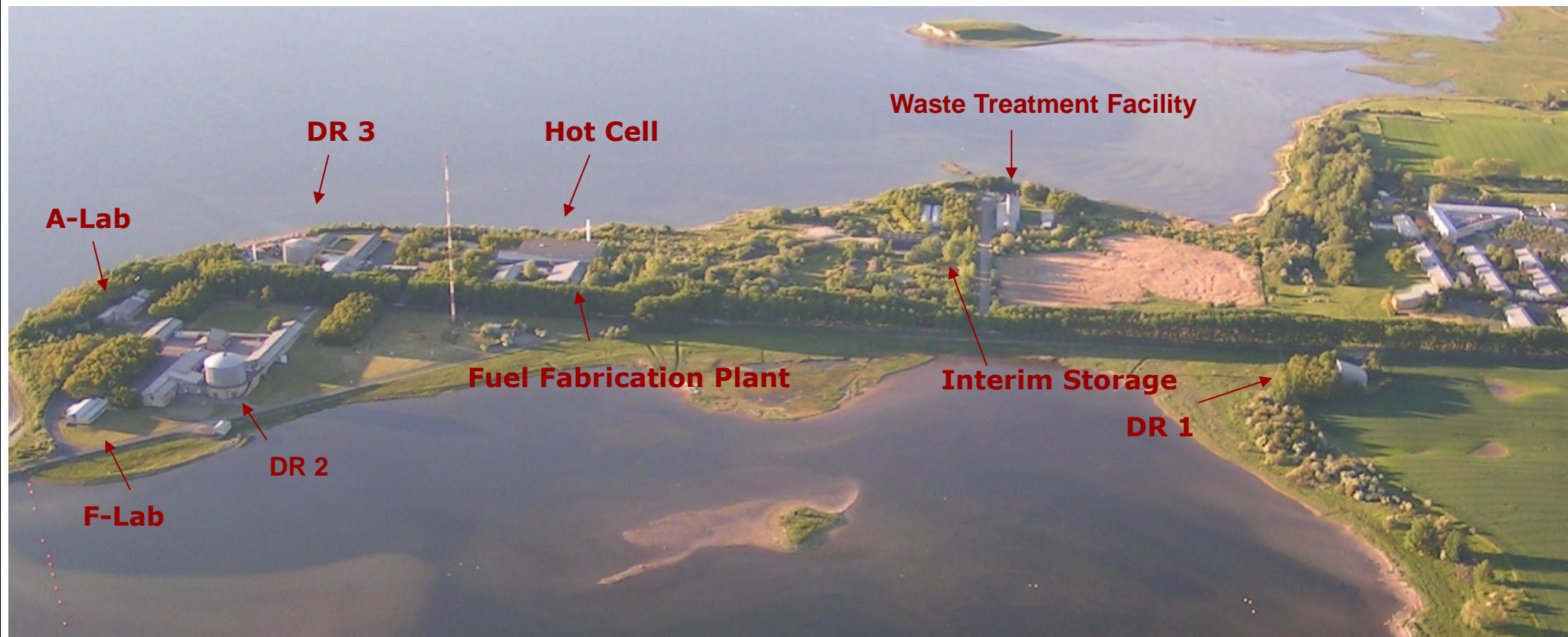
About Danish Decommissioning



- DD was founded in 2003 under the Ministry of Science, Technology, and Education
- It is tasked to:
 - Decommission the nuclear facilities in Risø to "greenfield"
 - Receive, treat and store radioactive waste from other Danish institutions
 - Construct and operate for up to 50 years a new interim storage facility
 - Work towards a long-term solution for the final storage of radioactive waste in Denmark, i.e. construct a final geological repository until 2073



Location of Danish Decommissioning's facilities



Martin Amft (SSM)
2019-01-16

Information provided by Dansk Dekommissionering



Decommissioning in Denmark

- ➔ DR 1 ✓
- ➔ DR 2 ✓
- ➔ DR 3 – *ongoing*
- ➔ Hot Cell – *ongoing*
- ➔ Fuel Fabrication Plant – *decommissioning completed in 2015, contamination in basement to be removed in 2020*
- ➔ Waste Treatment Facility – *planning for decommissioning*



NPPs and repositories in Finland

Hanhikivi Site - Fennovoima

- Construction License application for VVER (AES2006)

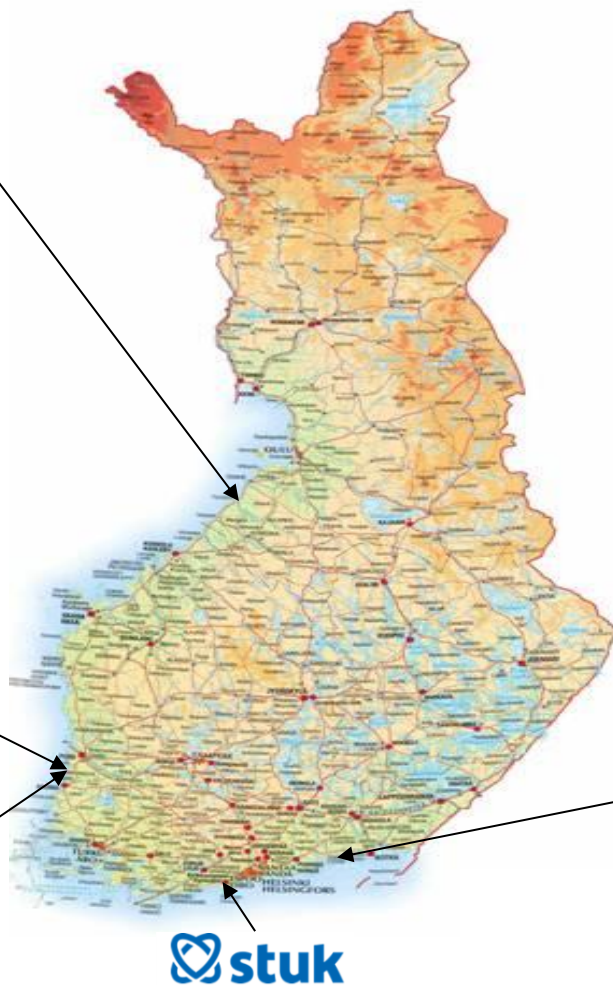
Olkiluoto NPP - TVO

- 2 operating units - ABB BWRs
- OL3 (EPR) under commission
- Interim Spent Fuel Storage
- LLW/ILW repository



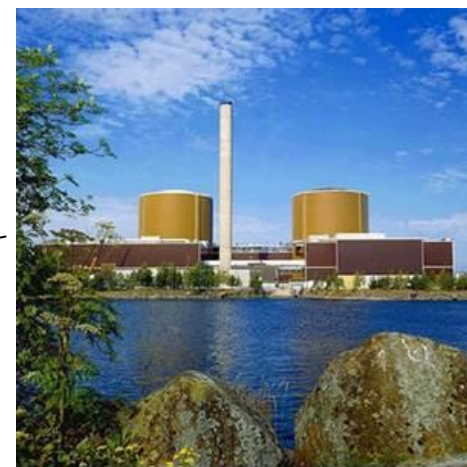
Olkiluoto - Posiva

- SF repository



Loviisa NPP - Fortum

- 2 operating units – VVERs
- Interim Spent Fuel Storage
- LLW/ILW repository

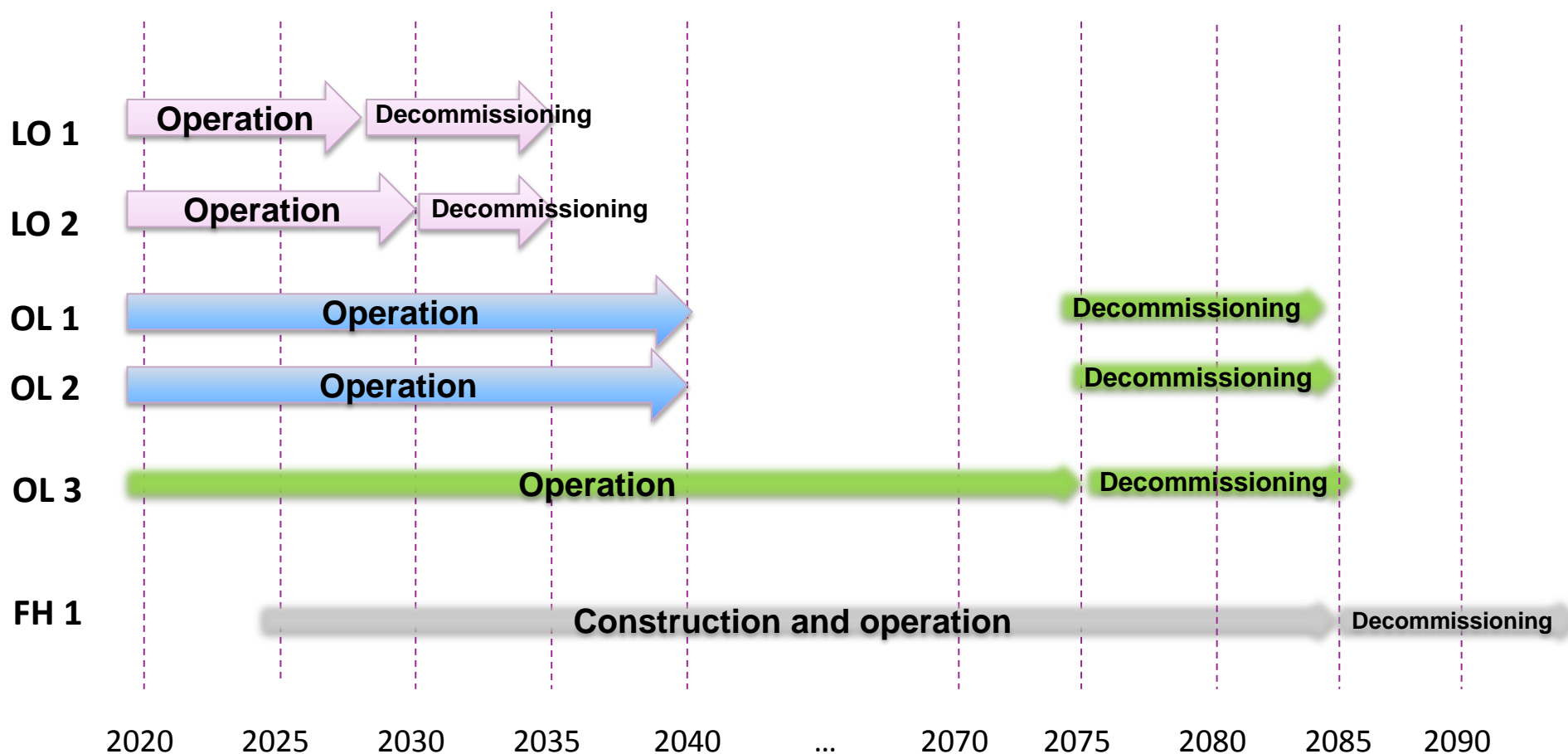


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Information provided by STUK



Decommissioning of NPP's in Finland





Decommissioning plans for operating NPP units

- Loviisa 1 and 2
 - Decommissioning strategy: immediate dismantling
 - End state: brown field
 - Spent fuel management: interim storage at the plant site and final disposal in Olkiluoto
 - Nuclear waste management: repository for LLW/ILW at the plant site
- Olkiluoto 1 and 2
 - Decommissioning strategy: deferred dismantling
 - End state: brown field
 - Spent fuel management: interim storage at the plant site and final disposal in Olkiluoto
 - Nuclear waste management: repository for LILW at plant site

Nuclear Facilities in Sweden



Boiling Water Reactor



Pressurized Water Reactor



Other facilities

Westinghouse Electric Sweden AB

Fuel fabrication plant (facility)

Ranstad

Ranstad Industricentrum AB

Former Uranium mining and milling facility

Ringhals NPP

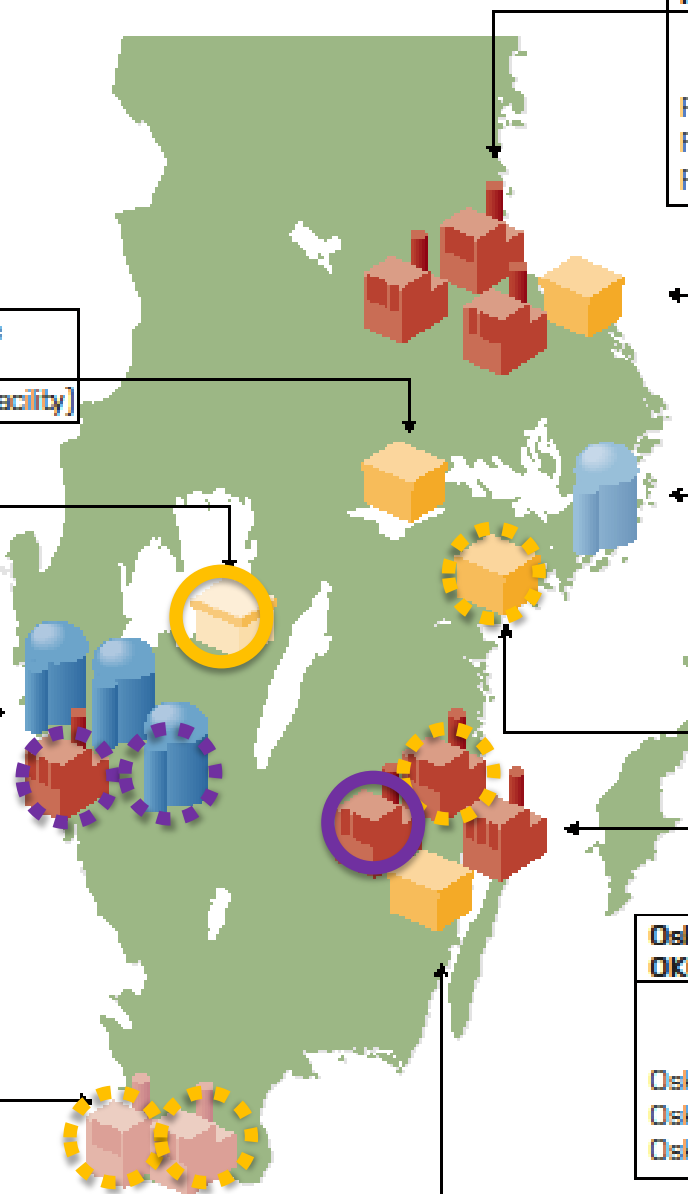
Ringhals AB

	Capacity MW(th)	In operation since
Ringhals 1	2 540	1976
Ringhals 2	2 660	1975
Ringhals 3	3 144	1981
Ringhals 4	2 783	1983

Barsebäck NPP

Barsebäck Kraft AB

	Capacity MW(th)	In operation
Barsebäck 1	1 800	1975–1999
Barsebäck 2	1 800	1977–2005



Forsmark NPP

Forsmarks Kraftgrupp AB

	Capacity MW(th)	In operation since
Forsmark 1	2 982	1980
Forsmark 2	3 253	1981
Forsmark 3	3 300	1985

SFR

Swedish Nuclear Fuel and Waste Management Co (SKB)

Final repository for radioactive operational waste

Ågesta PHWR

Vattenfall AB

Capacity MW(th)	In operation since
80	1964–1974

Studsвик Nuclear AB, AB Svafo, Cyclife Sweden AB

Facilities for fuel and materials testing, waste management and storage including two shut-down material test reactors

Oskarshamn NPP

OKG AB

	Capacity MW(th)	In operation since
Oskarshamn 1	1 375	1972
Oskarshamn 2	1 800	1975
Oskarshamn 3	3 900	1985

CLAB

Swedish Nuclear Fuel and Waste Management Co (SKB)

Central interim storage facility for spent nuclear fuel



Decommissioning in Sweden (1/2)

- Half of the original NPP fleet, seven units, will be under decommissioning in 2-3 years
- Asap after shutdown: defueling and transport of SNF, control rods, and core instrumentation to CLAB
- Immediate dismantling with (onsite) interim storage of (V)LLW and ILW
- End-state of the sites: brown field for industrial usage / energy production



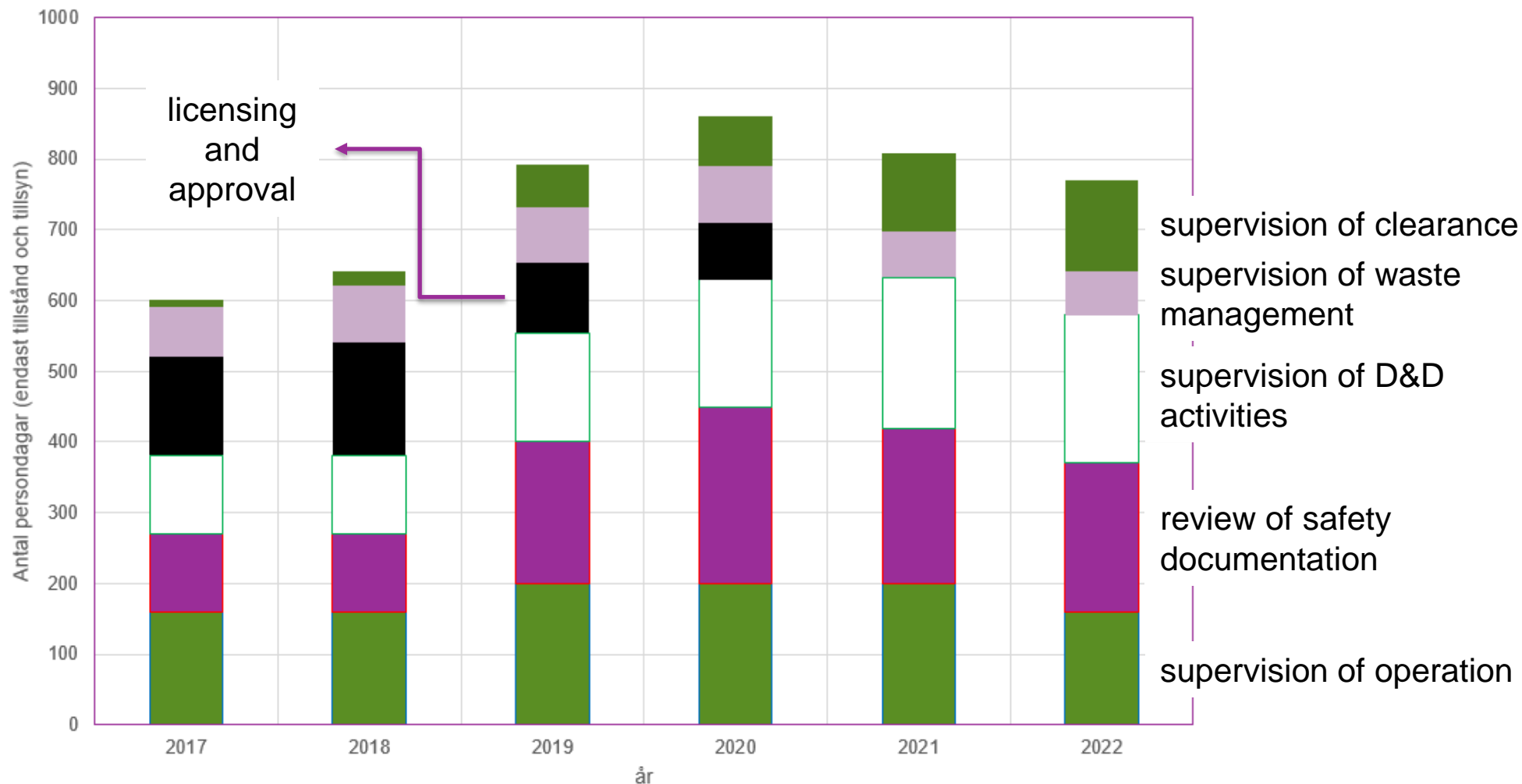
Decommissioning in Sweden (2/2)

- “fleet approach” to decommissioning of Uniper’s NPPs
 - Sequential D&D of Barsebäck units 1&2 and Oskarshamn units 1&2
 - D&D managed by departments within the licensee’s organisation
 - Oskarshamn unit 3 continues operation during D&D of units 1&2

- planned “fission” of the Ringhals site
 - new licensee (Vattenfall) for D&D of Ringhals units 1 and 2
 - Ringhals units 3 and 4 continue operation with current licensee

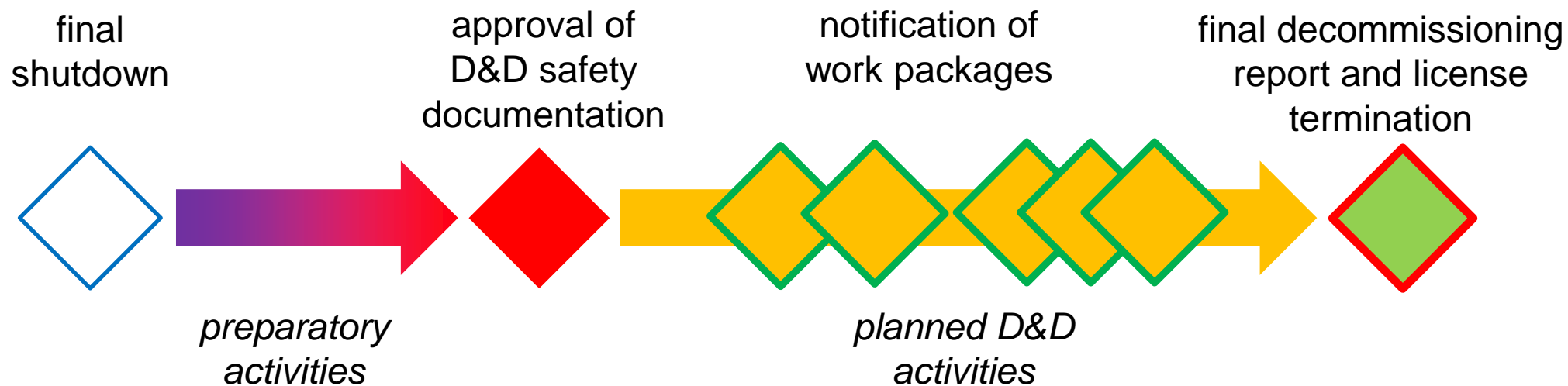


Preparation for decommissioning at SSM





The generic regulatory scheme for decommissioning in Sweden





D&D documentation: application for approval and notification





purpose of work package notifications





Practical challenges for SSM (1/2)

1. timely recruitment and training of new staff to supervise four large-scale D&D projects in parallel
2. reviewing and approving four D&D applications within <18 months
3. reviewing license transfer application for Ringhals units 1 and 2
4. timely review and approval of waste type specifications



Practical challenges for SSM (2/2)

5. adapting supervision procedures for D&D
6. reviewing and approving clearance of structures, building, and areas on four different sites
7. knowledge management and transfer during 2030 and ~2040



Announcement

6th Decommissioning Seminar

13 - 14 March 2019 in Stockholm

Topics:

- waste management during D&D (1.5 days)
- D&D of small (non-nuclear) facilities (0.5 days)

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Thank you for your attention!

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