Costing and Funding of RW Management and Disposal in Denmark

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Steps to Sharing, ERDO-WG & IAEA, Vienna 25th and 26th September 2019

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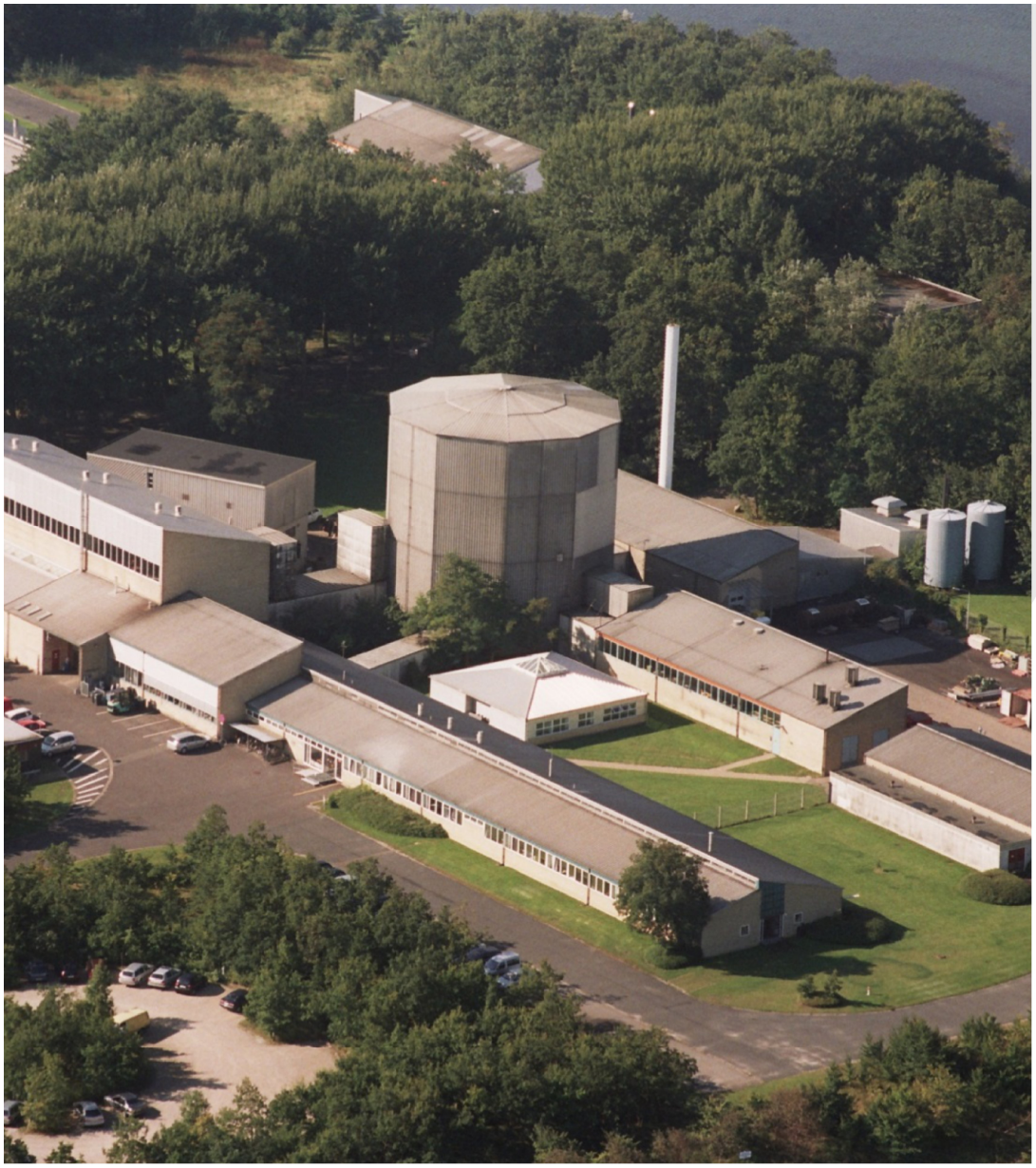

Risø history

- 1956-58: Risø National Laboratory was established
- Aim: To prepare for the introduction of nuclear power in Denmark
- 1976: Scope broadened to include research in other energy sources (wind, oil/gas)
- 1985: Parliament decided that nuclear power should not be introduced in Denmark – nuclear related research reduced
- 2000: DR 3 reactor closed; decomm. planning started

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DD

- Established in 2003 as a separate organisation under Ministry of Science, Technology and Innovation
- Tasks:
  - ❑ Decommission RNL to ”greenfield”
  - ❑ Receive, treat and store Danish radioactive waste
  - ❑ Assist in a long-term solution for waste

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DD

- Time frame for the decommissioning:
  up to 20 years from 2003
- Estimated total cost:
  ~1.8 billion DKK ~240 M€)
  (2018 price level)
- Including WM of operational, decommissioning and institutional waste, but
- Excluding costs for a long-term solution for the waste

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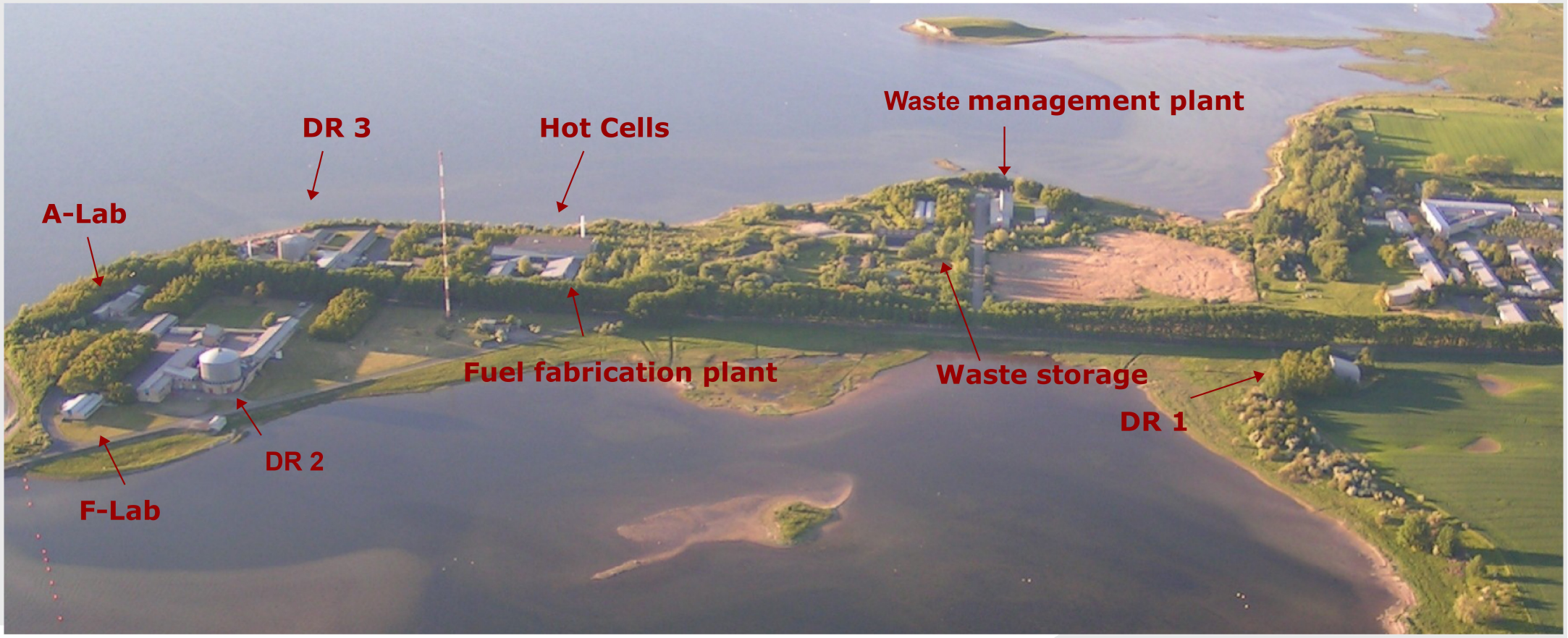
Location of DD facilities



Decom projects

- Reactor DR 1 ✓
- Reactor DR 2 ✓
- Reactor DR 3 - ongoing
- Hot Cell facility - ongoing
- Fuel Fabrication Plant - ongoing
- Waste Management Plant - in operation – decommissioning plan recently approved by authorities

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The Danish RW inventory

- Amount
  - 5-10.000 m^3
- Type:
  - Low- and intermediate level waste
  - Primarily short lived waste
  - A small amount of ‘special waste’ (irradiated RF) and long lived waste
- Origin:
  - Research, health sector, industry
  - Operations
  - Decommissioning

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Storage

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Storage (2)

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Repository process so far

2003: Parliamentary resolution B48

2008: Technical study of repository is presented -

2009: Parliament decides to initiate a pre-feasibility study

2011: Pre-feasibility study presented; 6 recommended sites

2012: Parliament decides to initiate studies of longterm storage

2013-15: Local area-studies & environ. assessment of 6 sites

2015: Technical study of longterm storage is presented

2016: Further analyses of longterm storage are presented

2018: Parliamentary resolution B90

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Parliamentary resolution B90, adopted unanimously 15th May 2018

Proposal for parliamentary resolution

on a long-term solution for Denmark's radioactive waste

The Danish Parliament notifies of its consent for the Government to implement a solution for Denmark's radioactive waste with the objective of upgrading the Danish Decommissioning storage facilities at the Risø peninsula and to prepare the localisation and implementation of a deep geological final repository to be in operation by 2073 at the latest.

https://ufm.dk/en/newsroom/issues/radio-active-waste/english-material/english_translation_of_danish_parliament_resolution_b90.pdf

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Policy for long term solution for the waste

Parliamentary resolution B90, May 2018:

Continued storage in the Risø area for up to 30-50 years. New, upgraded facility placed at a higher elevation than the present storages

A further investigation of the possibility of exporting the special waste (233 kg irradiated research fuel from our Hot Cells facility)

New investigations to find possible locations for a deep geological disposal – in previous studies, only surface and intermediate depth solutions have been investigated

Preparations for the waste to be disposed of in a deep geological disposal. A new political process including stakeholder involvement to be organised

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Financing of Danish RW programme

- State owned research facilities. Waste handling, decommissioning etc. 100% financed by the state.
- Upgraded storage facility and final repository to be financed 100% by state budget as well.
- Fee for handling of institutional waste from hospitals, universities etc. (does not cover all costs.)
  - ❑ Fixed price per kg solid waste and per liter liquid waste
  - ❑ Payment for waste handling, transport, equipment.
  - ❑ Administration fee.

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Upgraded storage facility (2017 price level)

- Without U ore, tailings and Hot Cell concrete:
  - 16,8-32,1 MEUR. Most likely price 21,8 MEUR.
- Including U ore, tailings and Hot Cell concrete:
  - 23-44 MEUR. Most likely price 30 MEUR.
- Costs to be assessed and detailed during design process.
- Estimated costs including ROI, operations and decommissioning: 1,1 bill. DKK (~ 147 MEUR).

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Final repository

- No estimated budget yet for geological repository.
- Geological survey started – 5 year project, budget 80 MDKK (2018 price level) (~ 10,7 MEUR)
- Previous estimated costs of near surface or intermediate depth repository: 300-600 MDKK (2011 price level) (~ 40-80 MEUR) depending on depth, design etc.

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