The safe management of SF and RW in SIMS Brussels, 22 October 2024

Input from Denmark

Danish Decommissioning
22 October 2024

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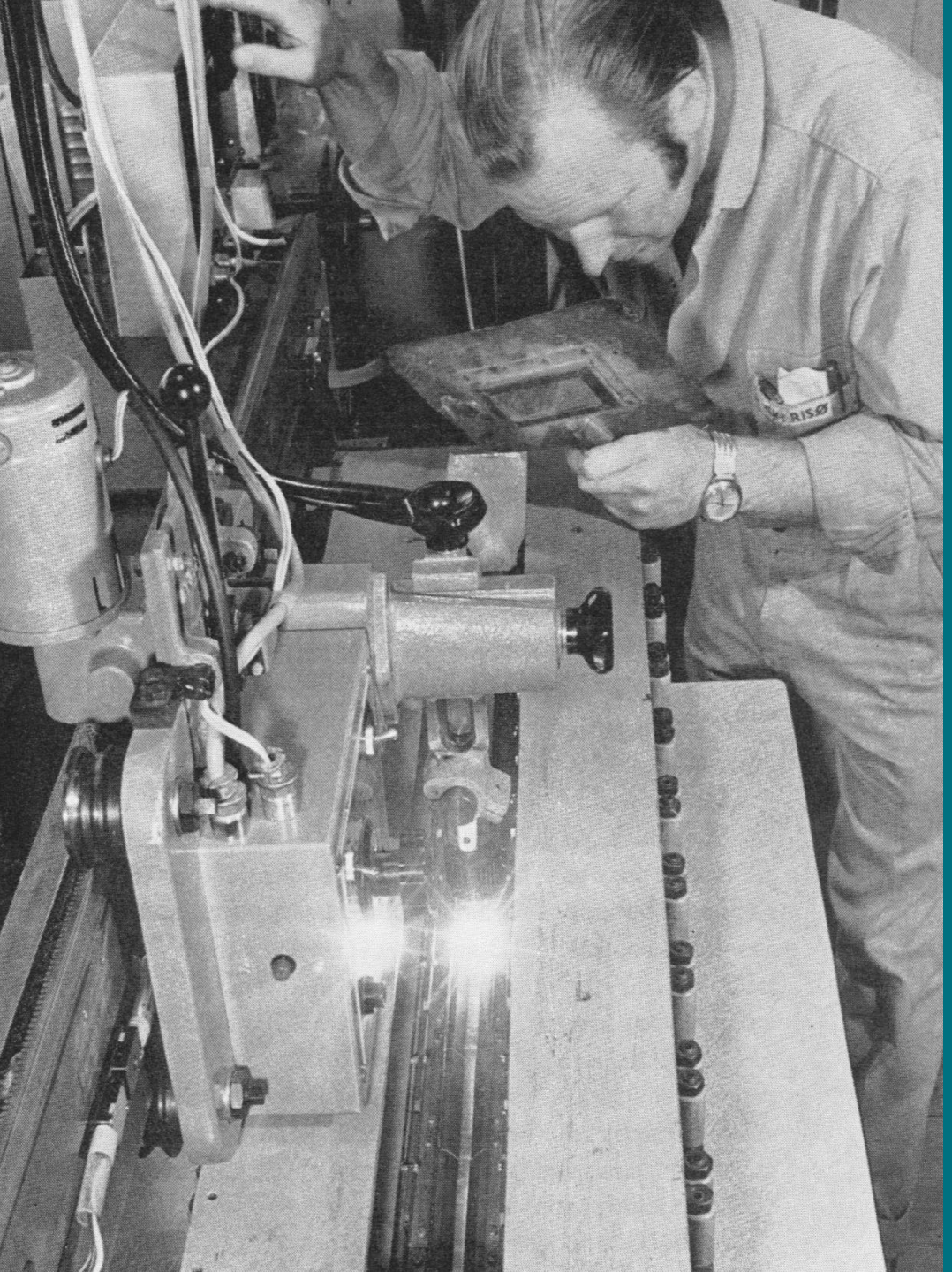

Brief history

- Established 1958.
- Six facilities: three research reactors, Hot Cell facility, Fuel Fabrication Plant, Waste Management Plant
- Parliamentary decision in 1985: no nuclear power.
- Decommissioning started 2003 based on Parliamentary Resolution. DEKOM established. State organisation under Ministry of Societal Resilience and Contingency (from August 2024).
- New Parliamentary Resolution 2018: upgraded storage facilities, final repository in 2073 at the latest.
- Dual track approach.
- Present focus: Finalising decommissioning, preparing upgraded storage facility (safety case, EIA), description of repository concepts

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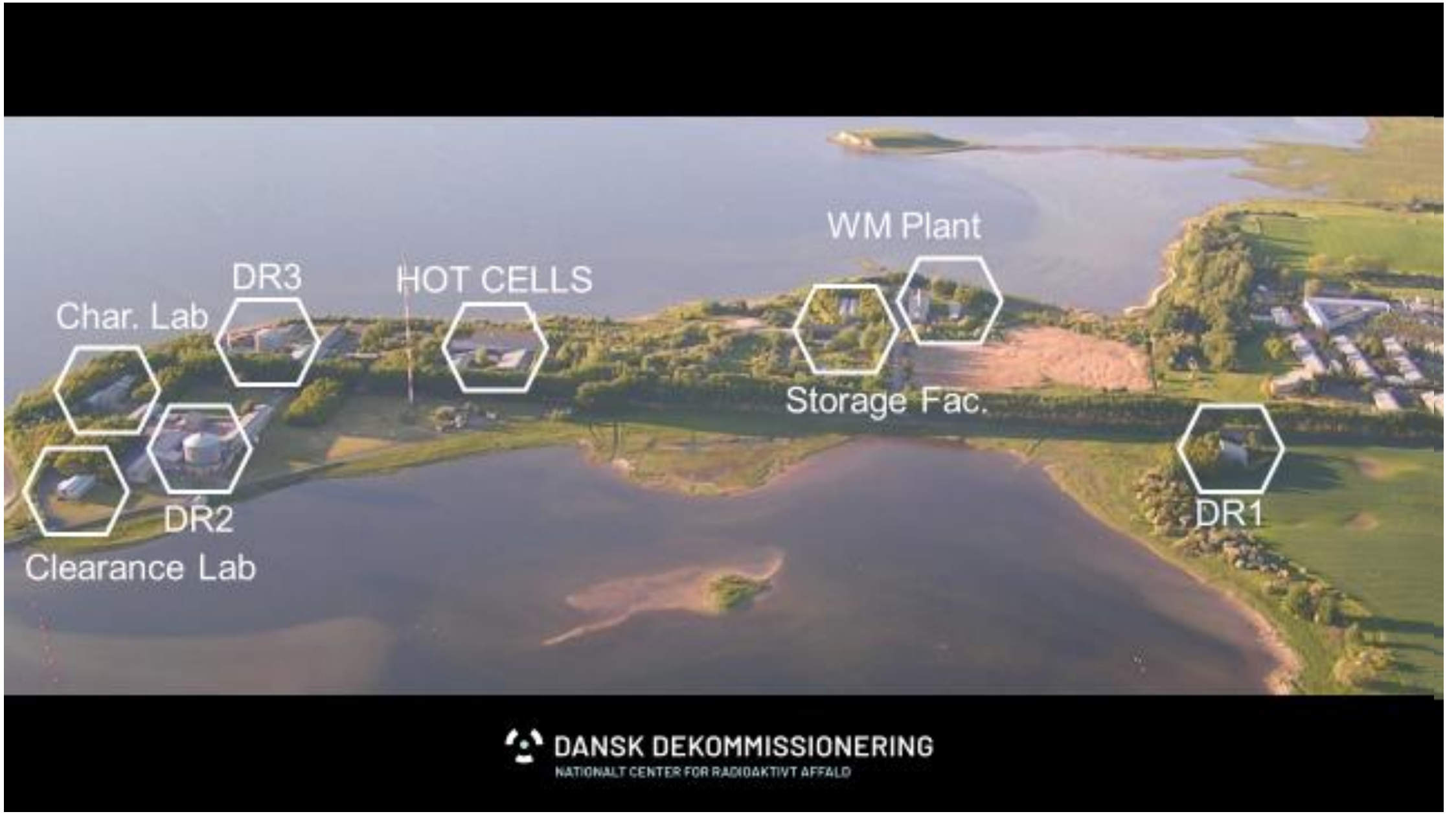
WM Plant
DR3
HOT CELLS
Char. Lab
Storage Fac.
DR2
DR1
Clearance Lab
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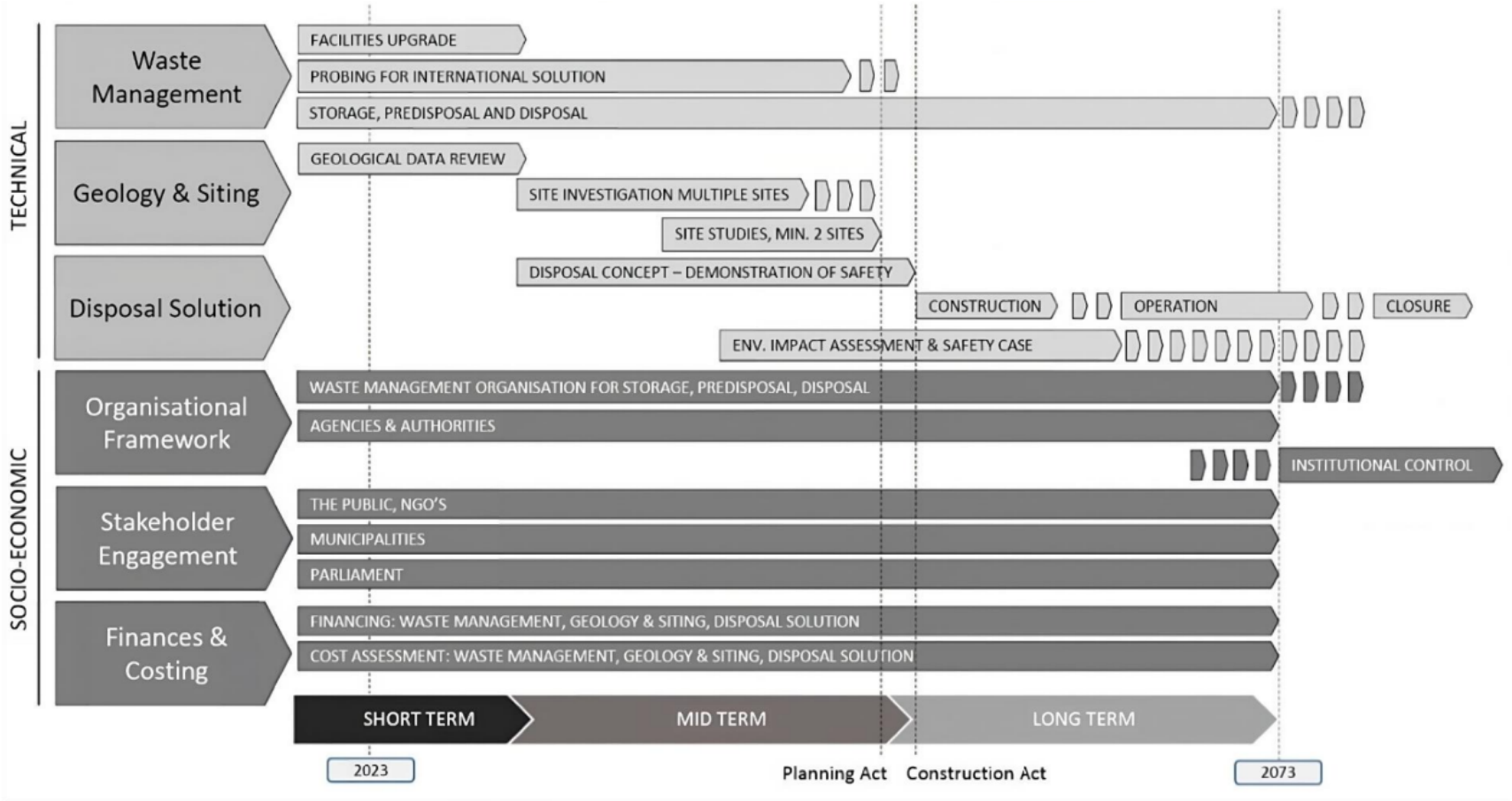
Time schedule from the National Programme



The Danish inventory

Low and intermediate level waste in total approximately **15,000 m³**. This also includes the following ILW-LL fractions:

- The so-called “special waste” consisting of 233 kg primarily spent research fuel from experiments in Risoe’s Hot Cell facility. The waste is now stored in 33 steel canisters, but is not sufficiently characterised or conditioned for final repository. It is expected that the total volume of the waste in conditioned form will be approximately 65 m³.
- The liquid core from the smallest Danish research reactor, DR 1. The volume of the core in solidified form is expected to be approximately 10 m³.
- Eventually a smaller number of DSRS.

Implementation plan – headlines
Recommendation from Artemis mission

- Phase 1: Preliminary studies (2021-2026)
  - Reports published by Geological Survey of Denmark and Greenland January 2022. https://www.geus.dk/om-geus/nyheder/nyhedsarkiv/2022/jan/evaluering
  - DEKOM presentation of possible repository concepts.
    - GDF, shallow repository combined with borehole or small GDF
  - Political process to be initiated.
- Phase 2: Location and planning (2027-2053)
- Phase 3: Construction and operation (2054-2067)

Fourth report under Council Directive 2011/70/Euratom (Delivered 23rd August 2024)

- Includes status for progress of the implementation plan.
  - Decommissioning developed largely as anticipated for the reporting period.
  - Planning of upgraded storage facility ongoing. Work mainly on finalising safety report and EIA. Project proposal for tender approved in 2023.
  - Geological Survey of Denmark and Greenland published reports with overview of Danish geology at a depth of 500 m. Further in situ studies needed to establish more detailed data.
  - Supplementary desk study on geological host environments for intermediate depth repository. Reporting by Q4, 2025.
  - Identification of possible disposal concepts.
  - Review of executive orders issued under The Radiation Protection Act.

Fourth report under Council Directive 2011/70/Euratom (2)

- Changed organisation structure in DEKOM in 2021, as part of the transformation from a decommissioning to a WM organisation.
  - Allocate more resources to development tasks and other new tasks following Parliamentary Resolution from 2018.
- Result of Artemis and IRRS missions in 2021 and 2022.
- https://www.sundhedsstyrelsen.dk/-/media/Fagperson/Straalebeskyttelse/Internationalt-samarbejde/4th-report-Council-Directive-2011-70-EURATOM-Denmark.ashx

Main challenges

- Unsufficiently characterised historical waste.
  - Special challenge relates to the ”special waste” and the liquid core.
  - Decision on NORM waste pending.
- Need for new WM facilities for characterisation, conditioning, packing etc.
- Many stakeholders – need for coordination at ministerial level.
- Need for more specialised regulatory requirements and guidance documents.
  - Artemis and IRRS recommendations.
- Small programme, limited knowledge base.
- Limited knowledge outside the Risoe area – makes the siting process more challenging.
  - Contact Fora appreciated by CSO.
  - Need for knowledge building in local communities as part of the siting process.

Needs and opportunities, international coop.

- Knowledge sharing in general, and specifically on characterisation methods and techniques, repository concepts and processes, public participation etc.
  - EURAD an excellent platform for cooperation and knowledge sharing, and knowledge transfer from advanced programs to SIMS.
    - EURAD Routes, KM (subtask leader). EURAD-2 ASTRA (shared solutions, DBD), KM and characterisation through participation of Technical University. Also valuable input from other WPs.
  - ERDO Association focusing on the potential in multilateral cooperation, both pre-disposal and disposal. (Sharing of knowledge, methods, technology and MNR. Both technical and political track.
  - ERDO cooperation with EU, IAEA, OECD, and US DOE.
  - ERDO projects on legacy waste characterisation and DBD potential.
  - IAEA project on DBD.
  - EU-C project on the potential in multinational cooperation.
  - Bilateral cooperation.
  - IAEA project on reuse of Ra-226 sources

Needs and opportunities (2)

- Sharing of facilities, both pre-disposal and disposal.
  - Economic and safety/security benefits.
  - Pooling of competences
  - More specialised MNRs – positive impact on siting process and safety.
- The potential in competence clusters, both national and international.
  - DEKOM as National Centre for Radioactive Waste, offering advisory assistance to other users of radioactive sources in the Danish society.
- International Group of Experts (SKB, NND, COVRA, Posiva Solutions, Zuidema Consult and MKG).
- EU-C role in facilitating closer cooperation among SIMS?

Questions?

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