



Development, Review and Implementation of Strategies Spent Fuel Management

Päivi Mäenalanen, 12.9.2023



Spent Fuel Management

National Policy

- Basic principles for SFM

Strategy

- The main choices for SFM options

Programme

- How in detail the strategy is implemented
- Milestones

Implementation Programme

Council Directive 2011/70/Euratom, Article 12

- Overall objects of national policy for SF management
- Milestones and timeframes for achievement of milestones
- Inventory and estimates for future inventories
 - Location, classification
- Concepts or plans and technical solutions for SF from generation to disposal
 - Storage type: wet or dry
 - Is recycling an option?
 - Disposal concept, siting, research involved
 - Possible co-operation with other countries
- Concepts or plans for the post-closure period of a disposal facility
 - Including period during which appropriate controls are retained and the means to be employed to preserve knowledge of that facility in the longer term;
- Research, development and demonstration activities
- Responsibility for the implementation of the national programme and the key performance indicators to monitor progress towards implementation;
- Assessment of the national programme costs and the underlying basis and hypotheses for that assessment, which must include a profile over time;
- Financing scheme(s) in force;
- Transparency policy or process: Public acceptance
- if any, the agreement(s) concluded with a Member State or a third country on management of spent fuel, including on the use of disposal facilities.

Development of National Strategy and Implementation Programme

- Overall update regularly: every Nth year
 - Eg: R&D programs of licencees every 3rd year
- Milestones defined: update and detailed planning based on them
 - Eg. Disposal starts in 20 years: siting and design of the concept should be started now
 - Decommissioning starts in 20 years: the overall plan of decommissioning principles is needed now, more detailed planning how to perform decommissioning 5 years before decommissioning is started
- Updates and development if new facilities are introduced or changes in actual or planned SFM options
- Legislation and regulations up-to-date: milestones for updating
 - Eg. If disposal starts in 20 years, basic requirements for safety design should be in place already now
 - Competence within regulator early enough to be able to formulate regulations

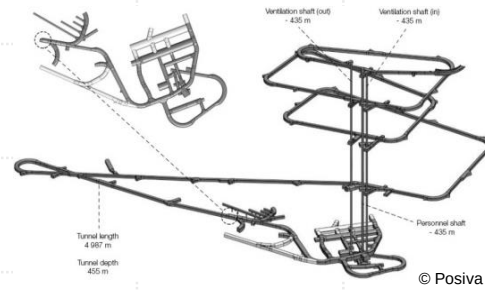
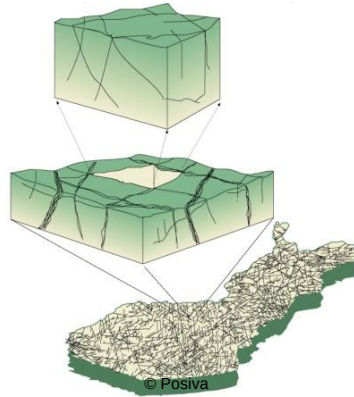


Examples of National Programmes

- [Management of spent nuclear fuel and radioactive waste in Finland \(tem.fi\)](#)
- [https://tem.fi/documents/1410877/86271436/Management+of+spent+nuclear+fuel+and+radioactive+waste+in+Finland.pdf](#)
- All EU Countries:
- [Radioactive waste and spent fuel \(europa.eu\)](#)
- [https://energy.ec.europa.eu/topics/nuclear-energy/radioactive-waste-and-spent-fuel_en#national-programmes-and-reports](#)

Milestones

40 years of
development
and oversight

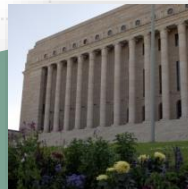


Test operation,
commissioning



2016- 2022

Application for the
operating license
2021



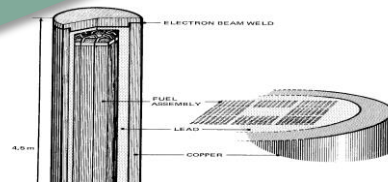
2001 - 2015

Construction
license

Decision-in-
Principle

Late 1970' - 2000

Government decision 1983:
Disposal facility construction
license 2012
Operation in 2020





Record keeping

- During operation: licensee is responsible to keep the information on:
 - How much waste is stored and where: inventory
 - How much and what type of waste will be produced in future
 - Design information of facilities
- After the closure of disposal facility: responsibility transfers to the state
 - What information and how it should be stored?
 - Besides the technical data, should justification for social acceptance also preserved for future generations?



Competence building (example)

- R&D programme of the licensees requested every 3 years
- State level research programmes: KYT, SAFER
- State participation in international research programmes
- Nuclear Safety and Nuclear Waste Management Course (6 weeks through the year)
 - Annualy 100 participants
 - Organized jointly by licensees
 - Under supervision of the Lappeenranta University of Technology



Reviews of the National Program

- Self reviews: National reports for Euratom Directive and Joint Convention
- Joint Convention national report writing every three years: <https://urn.fi/URN:ISBN:978-952-309-488-8>
 - Reporting of the requested subjects in spent fuel management, might reveal possible gaps in spent fuel management program
 - Q&A-step of the reports gives possibility for peer review and learning from others
 - Possibility to develop national program
 - Review meeting: presentation in country groups and discussion may also give ideas to develop the national program and SF management
 - Challenges, suggestions, good practices
 - Reporting their development in next round
- Expert reviews by IAEA IRRS and ARTEMIS



Photographed by: Mairi Viere/MEAE

ARTEMIS Mission to Finland

- Self review report during spring 2022
- ARTEMIS mission in the end of 2022
- 6 suggestions, 2 recommendations, 1 good practice
 - *complexity of regulation and management of all radioactive waste*
 - *early preparation of initial decommissioning plans for all facilities that generate radioactive waste (Cyclotrons)*
 - *disposal capacity is available for the anticipated future inventory of disused sealed radioactive sources*
 - *capacity building:*
 - *need for redundancy in competence*
 - *planning against the demands and challenges that are expected*
- https://stuk.fi/documents/150192312/154500071/artemis_finland2022_final_report.pdf/72f600ae-0599-5ede-b384-f32d1952b013/artemis_finland2022_final_report.pdf?t=1684073197222
- Each suggestion and recommendation have a responsible person at STUK or regulator who will plan corrective actions and implementation: Internal follow-up on yearly basis