



# Decommissioning status and challenges in Finland

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# Content

- Legislative framework – updated Nuclear Energy Act and Decree in force from 1.1.2018
- Decommissioning license
- Main decommissioning related challenges in Finland
- Preliminary conclusions from the safety review of the license application of VTT

# Nuclear Energy Act 7 g § sets the basic safety principles for the decommissioning of a nuclear facility

- Decommissioning of the nuclear facility shall be taken into account in the design of the nuclear facility and also during operation
- Decommissioning plan is required in connection with construction and operation license applications and shall be updated every 6 years, if not otherwise required in license conditions. The final decommissioning plan is required for the decommissioning license application.
- Decommissioning of a nuclear facility shall be performed in accordance with the safety requirements and with a decommissioning plan approved by the Radiation and Nuclear Safety Authority (STUK)
- Dismantling the nuclear facility and other measures taken for the decommissioning of the facility may not be postponed without due cause
- Funding is secured for waste management including decommissioning



# Decommissioning License is added into the Nuclear Energy Act 20 a §

- When the operation of a nuclear facility is ended, the licensee shall apply for the Decommissioning License. The license application shall be submitted to the authorities in time to ensure that they are able to review the application while the Operating License is still in force
- The Decommissioning License application shall contain two parts: 1) Decommissioning License Application to the Government (33 a § and 34 a §) and 2) Documentation to STUK for approval (36 a §)
- The Ministry of Employment and Economy asks for a statement from STUK about the decommissioning license application

# The documentation provided to STUK for approval

(Nuclear energy degree 33 a §)

- 1) the final decommissioning plan;
- 2) risk assessment for the decommissioning;
- 3) the final safety analysis report;
- 4) a classification document, which shows the classification of structures, systems and components important to the safety of the nuclear facility, on the basis of their significance with respect to safety;
- 5) a quality management programme ;
- 6) the Technical Specifications;
- 7) a summary programme for periodic inspections for the structures, systems and components important for safety during decommissioning;
- 8) plans for the security and emergency arrangements;
- 9) a description on how to arrange the safeguards that are necessary to prevent the proliferation of  nuclear  weapons;
- 10) administrative rules for the nuclear facility;
- 11) a programme for radiation monitoring in the environment of the nuclear facility;
- 12) a description of how safety requirements are met; and
- 13) a programme for the management of ageing.
- 14) In addition to documents 1-13 any other document required by regulatory authority

# Decommissioning plan

- Nuclear facility shall have a decommissioning plan, which should be detailed enough and respond to the design and current state of the nuclear facility. At the minimum the decommissioning plan shall contain:
  - 1) Selected decommissioning strategy and justification for it
  - 2) Planned decommissioning phases and the project time schedule
  - 3) General description of the decommissioning and nuclear waste management methods;
  - 4) Cost estimation for the decommissioning and nuclear waste management
  - 5) Planned end-state
- The Ministry of Employment and Economy shall ensure that the plan is technically possible, follows the safety principles and cost estimates are reliable. STUK is asked to give statement about the decommissioning plan.

# The Decommissioning License may be granted according to 20 a §, if

1. The nuclear facility and its decommissioning plan meet the safety requirements laid down in Nuclear Energy Act and appropriate account has been taken of the safety of workers and the population, and environmental protection;
2. The methods available for the decommissioning and to the nuclear waste management are sufficient and appropriate;
3. The applicant has sufficient expertise available and, in particular, the competence of the staff and the organisation of the nuclear facility are appropriate for the decommissioning;
4. The applicant is considered to have the financial and other prerequisites to engage in operations safely and in accordance with Finland's international contractual obligations; and
5. The planned decommissioning activities fulfil the general safety principles laid down in Nuclear Energy Act.

# The end of the decommissioning

- Nuclear facility is decommissioned, when the Licencee has proven to STUK that the buildings and environment are clear from radioactive materials.
- When the decommissioning of a nuclear facility has been brought to completion and all waste has been removed from the site, the licensee shall submit to STUK for approval an application for the clearance of the site and any buildings therein.
- When STUK has noted that the building and environment are clear, Licensee can apply for an order on the expiry of his waste management obligation with the Ministry of Employment and the Economy



# Challenges in the decommissioning in Finland

- Updated Nuclear energy act and decree contains basic requirements for the decommissioning planning, but the detailed requirements are not yet updated (e.g. it is not very clearly defined in the safety guides, what should be presented in the decommissioning plan and what in FSAR, more clear requirements are probably needed to define what activities related to decommissioning can be done under operating license and for what activities the decommissioning license is required)
- Detailed technical requirements concerning decommissioning are missing from the guidance (not very clear yet, if these are even needed)
- No experience on regulatory oversight of the decommissioning project

# Licensing for decommissioning of research reactor FiR 1

- Environmental Impact Assessment (EIA) was conducted in 2014 –2015
- Operation license application for decommissioning was send to state council at the end of June 2017
- The first batch of the licensing documentation required by STUK was delivered at the end of June 2017. The last licensing document, plans for the security arrangements during decommissioning, was delivered to STUK at September 2018
- VTT aims to update its operation license application still with
  - updated time schedule of the decommissioning project
  - list of nuclear materials remaining in VTT's operation application
  - updated information on nuclear waste management plans for spent nuclear fuel and nuclear waste
- STUK's safety review and statement to the Ministry of Economic Affairs and Employment is planned to be ready in March 2019

# Final decommissioning plan of FiR 1

- The Final Decommissioning plan for FiR 1 reactor was sent to STUK for approval at the end of June 2017
- Main decommissioning principles:
  - Final decommissioning plan: 2017 (approved as part of operating licence application)
  - Strategy: immediate dismantling
  - End state: brown field
  - Spent fuel management: 1) the first option is to return the fuel back to USA by spring 2019. 2) the second option is interim store the spent fuel in Finland and return it back to USA later. 3) the third option is final disposal in Finland
  - Nuclear waste management: storage and final disposal in Loviisa NPP site (estimated amount for disposal is about 100 m<sup>3</sup> packed waste), contract negotiations are on-going

# Requirements raised up during the licensing documentation handling

- VTT has to provide detailed description of the spent fuel transfer arrangements for approval to STUK separately and apply license for the transportation according nuclear energy act and degree and YVL D.2
- VTT has to provide the FSAR of decommissioning phase for STUK for approval at latest six months before the decommissioning phase starts
  - currently there is only preliminary draft available for the decommissioning phase
  - STUK had several detailed comments and requests for more detailed descriptions of the dismantling activities, radiation safety arrangements, nuclear waste management plans and working area arrangements

# Preliminary conclusions from the safety review of STUK

- VTT fulfills all the safety requirements in permanent shutdown state.
- For the decommissioning phase the plans must still be updated in the following areas:
  - Radiation safety protection arrangements and instructions
  - Spent fuel management has to be resolved until the dismantling of the research reactor can be started. If spent fuel cannot be sent back to USA in reasonable timeframe, VTT shall have licensed interim storage for spent fuel until the dismantling of the research reactor can be started
  - VTT has to develop and describe in more detailed radioactive waste handling methods (including also arrangements for free-release) for all different waste streams
  - Low and intermediate level wastes shall have licensed interim storage until the dismantling of the research reactor can be started
  - VTT has to ensure that it will have competent resources available for the decommissioning phase especially if the decommissioning phase is delayed with several years.

# Preliminary conclusions from the safety review of STUK

- VTT has to ensure that it has competences and instructions in place for the suppliers selection and management until decommissioning phase starts



