Estonian Nuclear Energy Working Group

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Ministry of Education and Research, ESTONIA

IAEA-ORNL hosted Dialogue Forum
March 2023
In 2021, electricity consumption in Estonia was 8.5 TWh a year. It is predicted that by 2030 our annual electricity consumption will be around 10 TWh.

- Installed capacity 2337 MW.
- It is possible to connect units up to 350 MW (electricity output) into the Estonian grid.
The Government has decided to stop generating power from oil shale by 2035 and achieve climate neutrality by 2050.
In 2019, private company Fermi Energia initiated a debate on potential use of Small Modular Reactors in Estonia.

WG was established with a Government’s mandate by the Ministry of the Environment on 20th of April 2021.

Information on WG activities and protocols of the meetings are publicly available: https://envir.ee/kliima-ja-keskkonnakaitse/kiirgus/tuumaenergia-tooruhm
Members of the working group are high level representatives (Secretary General, Deputy Secretary General, Head of Department) of following ministries and authorities:

1. Ministry of the Environment
2. Ministry of Finance
3. Ministry of Justice
4. Ministry of Economic Affairs and Communications
5. Ministry of Social Affairs
6. Ministry of Education and Research
7. Ministry of Foreign Affairs
8. Ministry of the Interior
9. Ministry of Defence
10. Environmental Board
11. Consumer Protection and Technical Regulatory Authority

Chair of the WG: Secretary General of the Ministry of the Environment, Mr. Meelis Münt
Tasks of the WG

• The WG presented its interim report to the Government at the end of September 2022.

• Interim report is a mapping of the current situation in Estonia (regulatory framework, human resources) and provides an overview of the necessary activities that are necessary for the introduction of nuclear energy.

• **Final comprehensive report is due in December 2023.**

• The final report is going to formulate recommendations whether or under what conditions nuclear power plant could be built in Estonia.

19 nuclear infrastructure issues to be covered in the WG’s final report
Nuclear Power Programme timeline

April 2021

WG established

September 2022

Interim Report

December 2023

Final Report

II.Q (?) 2024

End of Phase I. – Decision in principal in the Parliament

2024-2035

Implementation of Phase II. – competences, regulator, legislation, construction

2035+

Phase III – electricity production
Sub-Working Group (SWG) on spatial planning

In January 2022, a sub-working group on spatial planning was established to coordinate the activities related to the preliminary site survey for the nuclear power plant and final disposal facility for spent fuel.

Members of the SWG:

| Ministry of Finance (Chair of the SWG) | Ministry of Economic Affairs and Communications, |
| Ministry of the Environment, Environmental Board, Ministry of the Interior, Ministry of Defense, | Consumer Protection and Technical Regulatory Authority, |
| | Estonian Geological Survey, |
| | Estonian Chamber of Environmental Associations |
| | The Association of Estonian Cities and Municipalities |
SMR asukohavaliku põhistseenaariumi alad
Sub-Working Group on nuclear security and emergency preparedness

• To be formed on February 21, 2023, in order to analyse internal security aspects and emergency preparedness related to the potential nuclear power programme.
• Members of the SWG:

<table>
<thead>
<tr>
<th>Ministry of the Interior – Chair of the SWG</th>
<th>Environmental Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Defense</td>
<td>Ministry of Foreign Affairs</td>
</tr>
<tr>
<td>Police and Border Guard Board</td>
<td>Consumer Protection and Technical Regulatory Authority</td>
</tr>
<tr>
<td>Rescue Board</td>
<td>Ministry of Economic Affairs and Communications</td>
</tr>
<tr>
<td>Internal Security Service</td>
<td>Republic of Estonia Government Office</td>
</tr>
<tr>
<td>Foreign Intelligence Service</td>
<td>Tax and Customs Board</td>
</tr>
<tr>
<td>Ministry of Environment</td>
<td></td>
</tr>
</tbody>
</table>
Analyses, strategies and surveys

• Preliminary site selection survey for the nuclear power plant and final disposal facility for spent nuclear fuel (March 2023).
• Nuclear security analysis and emergency preparedness (December 2022).
• Expert analysis of the Finnish nuclear regulator STUK for the WG interim report (November 2022).
• Public surveys on Nuclear Energy awareness and support (February 2022, February 2023, April 2023, November 2023)
• Development of a communication strategy (META Advisory, November 2022).
• Human resources development strategy for the WG and mapping of the regulatory framework (March 2023).
• Mapping of the legal framework and updating the draft nuclear law - (March 2023, June 2023)
Recommended organization of regulator

Diagram:
- Director General
  - Legal
  - Advisory Committee
  - Deputy DG Regulatory Operations
    - Programme office
      - Nuclear safety
      - Radiation Safety
      - Nuclear Security & Safeguards
  - Deputy DG Corporate Support
    - HR
    - Training
    - Finance
    - Purchasing
    - IT
    - Documents & records
    - Quality management
    - Stakeholder relations
# Regulatory staff target in each Phase*

<table>
<thead>
<tr>
<th>Function</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Post Milestone 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project development</td>
<td>Construction &amp; Commissioning</td>
<td>Operation</td>
</tr>
<tr>
<td>Nuclear Safety</td>
<td>5</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Radiation Protection</td>
<td>2</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Nuclear Security</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Safeguards</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Programme office</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Corporate support (Finance, procurement, HR, training, IT, information management, quality management, stakeholder engagement, admin/clerical)</td>
<td>8</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Legal</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Management</td>
<td>5</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>83</strong></td>
<td><strong>62</strong></td>
</tr>
</tbody>
</table>

*Climate and Radiation Protection Dept current staff not included*
## Benchmarks for owner/operator staffing

<table>
<thead>
<tr>
<th>NPP</th>
<th>Reactor Type</th>
<th>Generation Capacity</th>
<th>Operator staff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current operating NPP in USA &amp; Europe</td>
<td>LWR</td>
<td>All</td>
<td>732 (median)</td>
</tr>
<tr>
<td>Krško, Slovenia</td>
<td>PWR</td>
<td>688 MWe</td>
<td>644</td>
</tr>
<tr>
<td>Pt Lepreau, Canada</td>
<td>CANDU-6</td>
<td>690 MWe</td>
<td>850</td>
</tr>
<tr>
<td>Borssele, Netherlands</td>
<td>PWR</td>
<td>485 MWe</td>
<td>400</td>
</tr>
<tr>
<td><strong>Proposed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPG DNNP</td>
<td>BWRX-300</td>
<td>300 MWe</td>
<td>210</td>
</tr>
<tr>
<td>GE Hitachi</td>
<td>BWR</td>
<td>300MWe</td>
<td>75-150 onsite staff</td>
</tr>
<tr>
<td>Rolls Royce</td>
<td>PWR</td>
<td>470 MWe</td>
<td>302 assigned to single unit</td>
</tr>
<tr>
<td>Nuscale Voygr</td>
<td>iPWR</td>
<td>928 MWe</td>
<td>270</td>
</tr>
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</table>
Analyses and activities planned for 2023

• Analysis on radioactive waste management (Breitenstein-Solutions, June 2023)
• Safeguards analysis (Proxion Plan OY, June 2023)
• Radiation protection (STUK, July 2023)
• Validation of Fermi Energia analyses on supply chain, financing, procurement, nuclear fuel cycle etc.
• Nuclear Energy seminar for the members of the public (November 2023)
• Implementation of communication plan and capacity building activities

IAEA INIR mission preparations:
• Preliminary self evaluation report (SER) – April 2023
• Pre-INIR mission – 6-8 June, 2023
• Final SER – August 2023
• INIR mission – 23-31 October, 2023
<table>
<thead>
<tr>
<th>Nr</th>
<th>Design</th>
<th>MW(e)</th>
<th>Type</th>
<th>Vendor</th>
<th>Country</th>
<th>Exp. completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NUWARD</td>
<td>×170</td>
<td>PWR</td>
<td>EDF, CEA, TA</td>
<td>France</td>
<td>2030</td>
</tr>
<tr>
<td>2</td>
<td>UK SMR</td>
<td>470</td>
<td>PWR</td>
<td>Rolls-Royce and Partners</td>
<td>UK</td>
<td>2030</td>
</tr>
<tr>
<td>3</td>
<td>NuScale VOYGR</td>
<td>×77</td>
<td>PWR</td>
<td>NuScale Power Inc</td>
<td>USA</td>
<td>2027</td>
</tr>
<tr>
<td>4</td>
<td>BWRX-300</td>
<td>270-290</td>
<td>BWR</td>
<td>GE-Hitachi</td>
<td>USA, Japan</td>
<td>2028</td>
</tr>
<tr>
<td>5</td>
<td>SC-HTG</td>
<td>272</td>
<td>HTGR</td>
<td>Framatome, Inc</td>
<td>USA</td>
<td>2033</td>
</tr>
<tr>
<td>6</td>
<td>Integral MSR</td>
<td>195</td>
<td>MSR</td>
<td>Terrestrial Energy Inc</td>
<td>Canada</td>
<td>2030</td>
</tr>
</tbody>
</table>
International cooperation

- IAEA - Division of Nuclear Power, Nuclear infrastructure Development section, Department of Technical Cooperation, Division for Europe.

- STUK (Finnish Radiation and Nuclear Safety Authority) – consultations and interim report review services.

- USA – FIRST Program (coordinated by Department of State) for nuclear capacity building.

- Canada – MoU between Canadian Nuclear Safety Commission and Estonian Environmental Board

- France, Japan, Germany - negotiations on potential cooperation
Thank you for your attention!

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