National Research and Innovation activities in Hungary in the field of Nuclear Fission

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Background

- The long term use of nuclear energy is part of the National Energy Strategy (published in 2011)
- In Hungary, the four existing VVER-440 will operate (2000MW total) until 2030. Two new units will be commissioned from 2025 (Rosatom).
- The safe operation of the GenII and III light water reactors should be supported until 2080.
- In parallel, the strategy of management of spent fuel should be formulated, and the preparation for decommissioning the old units after 2040 should start in the near future.

The National Nuclear Technology Platform

In order to reach the goals and better organize the research in the field of nuclear energy, the Sustainable Atomic Energy Techology Platform was formed in 2010, after the European SNETP. Vision report and Strategic Research Agenda were also published.

The three pillars of the Technology Platform (and the nuclear research) in Hungary:

- Ageing of structural materials
- Spent fuels and radioactive waste management
- Advanced modelling and simulation (multiphysics)

Cat. 414: The budget of the program is around 20 Mio€ (≈200ppy work) for 5 years. The State will support the program from 2015 with 6.3 Mio€ for four years. Other financial support got from PaksNPP is 0.4 Mio€/year and the Safety Authority with similar budget.

Nuclear research on the long run

Two main challenges of nuclear energy is the supply of fresh fuel and the advanced reprocessing of spent fuel.

The deployment of fast reactor could give solution towards the end of the century.

MTA EK participates in the **ALLEGRO** project since 2010, aiming at construct a gas cooled fast spectrum demonstrator reactor in the Central European region. (next decade)

The **„V4G4 Centre of Excellence”** was formed in 2013 among the participants and MTA EK will host the research on advanced fuel.

A „Fuel Institute” will be constructed with the necessary infrastructures (hot cells).

GFR Centre of Excellence „V4G4”

A Centre of Excellence for GenIV studies formed among the Central European members (HU, SK, CZ and PL) in 2013

- The four legs of the Centre will be :
  - fuel research (HU),
  - design and safety (SK),
  - helium technology (CZ),
  - Materials reseach and industrial use of high temperature coolant (PL).

The preliminary budget of the Fuel Lab in Hungary is around 100Mio€ *(category 413)*

Nuclear research on the long run

In addition to the fuel laboratory, a *decommissioning and waste management laboratory* will be established. The aim is to prepare the decommissioning of the operating units and provide scientific and technical support for the radwaste management. The concept will be inserted in the training and education action plan. The expected budget is around 10-30Mio€ (cat 4143)

The Budapest Research Reactor

First start-up in 1959

- 2 MW EK-10 (1959/1967)
- 5 MW VVR-SM (1967/1986)
- 10 MW VVR-M2 (1992/2023?)

Thermal flux is about 10^{14} n/cm^2/s

Horizontal beams with a

Cold Neutron Source

Budapest Neutron Centre - user system, open for EU researchers

Vertical channels

- isotope production, material irradiations

The licence is valid until 2023.

Other existing infrastructures *(cat. 414)*

- Severe accident facility: CODEX (Core degradation experiment)
- Pressure vessel external cooling: CERES facility
- Radiation ageing of structural materials: BAGIRA facility

- The operation and the maintenance cost is less than 1Mio€ for the facilities above.

Thank you for your attention!