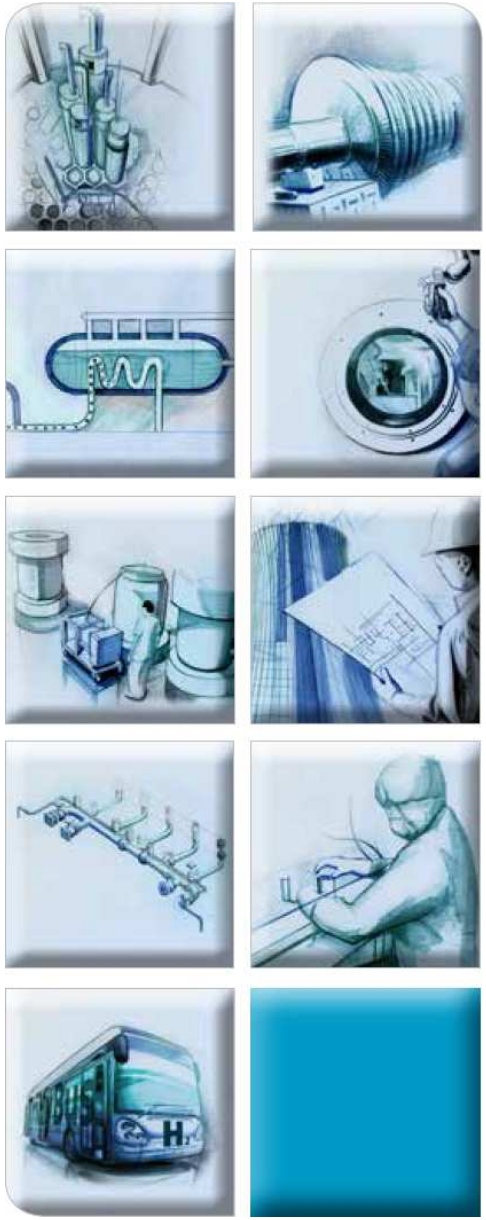

Nuclear Fission Research and Innovation Activities in the Czech Republic

Lubor Žežula

ÚJV Řež, a. s.

The NEA International Workshop on "Nuclear Innovation Roadmap" (NI2050)
Paris 7.- 8.7.2015

National Research, Development and Innovation Policy of the Czech Republic

National priorities of oriented research, experimental development and innovations

- R&D priorities are valid for the period up to 2030.
  - The government of the Czech Republic ratified the National priorities of oriented research, experimental development and innovations with its resolution of 19 July 2012 No. 552.
- **6 Priority Areas:**

1. Competitive knowledge-based economy
2. **Sustainability of energetics and material resources**
   - **2.1 Sustainable energetics**
3. Environment for quality life
4. Social and cultural challenges
5. Healthy population
6. Safe society

National priorities of oriented research, experimental development and innovations

Area: Sustainable energetics

R&D Targets in Subarea 1.2 Nuclear resources of the energy

1.2.1 Efficient long-term use of nowadays nuclear power plants

- Ensuring reliability and long-term efficient operation of existing nuclear installations (Gen II)
- Advanced materials and technologies for nuclear power sector (Gen III, Gen IV)
- Decommissioning of nuclear facilities (Gen II)

1.2.2 Support of the safety of the nuclear facilities

- Promoting safety safety of the nuclear facilities for regulator needs (Gen II and Gen III)
- Promoting safety of operating and planned nuclear facilities (Gen II and Gen III)

1.2.3 Research ensuring support of the construction and running of the new economically efficient and safe units

- Ensuring quality of documentation for licensing processes in the field of nuclear safety and ensuring the high quality necessary experts. (Gen II, Gen III)
- Ensuring increase reliability, durability and effectiveness of new nuclear facilities (Gen III)
- Developing procedures and evaluation methods to ensure a comprehensive view of the technical feasibility and economic efficiency of long-term operation for a minimum period of 60 years. (Gen III, Gen IV)

National priorities of oriented research, experimental development and innovations (cont.)

R&D Targets in Subarea 1.2 Nuclear resources of the energy (cont.)

1.2.4 Research and development of the fuel cycle

- Tools and methodologies for optimization and higher utilization of fuel (Gen II, Gen III)
- Progressive methods of disposal of spent nuclear fuel and radioactive waste (Gen II, Gen III)

1.2.5 Deposition of the nuclear waste and used fuels

- Support for licensing, verification and commissioning of RW technologies in new nuclear installations. (Gen III)
- Support for development of innovative technologies for the treatment and processing of radioactive waste. (Gen II, Gen III)

1.2.6 Research and development in the area of reactor of the Generation IV, mostly effective and safe fast reactors

- Integration of research organizations of the Czech Republic into international cooperation in the area of Gen IV. nuclear reactors (GFR (project ALLEGRO), LFR (project ALFRED) SCWR, V/HTR) within the SET Plan, the European technological platform SNETP and its European Industrial Initiatives (European Sustainable Nuclear Industrial Initiative – ESNII, Nuclear Cogeneration Industrial Initiative - NC2I) and Nuclear Generation II&III Association – NUGENIA.

National Research, Development and Innovation Programmes for Nuclear Fission R&D

TIP Programme (2009-2017)

- TIP (Technologies, Information Systems, Products) is Departmental Programme for Support of Industrial Research and Development of the Ministry of Industry and Trade .
- Industrial applied research and experimental development **including nuclear fission R&D.**

ALFA Programme (2011-2016)

- ALFA is research and development (R&D) programme run by the Technology Agency of the Czech Republic (TA CR).
- Applied research and experimental development in the field of advanced technologies, materials and systems**, energy resources (including nuclear fission R&D)** and the protection and creation of the environment and the sustainable development of transport.

EPSILON Programme (2015-2025)

- EPSILON is research and development (R&D) programme run by the Technology Agency of the Czech Republic (TA CR).
- For nuclear fission R&D can be used the Sub-programme 2 - **Energy and Materials** from total 3 sub-programmes

National Research, Development and Innovation Programmes for Nuclear Fission R&D

Competence Centres Programme (2012-2019)

- The Competence Centres Programme is research and development (R&D) programme run by the Technology Agency of the Czech Republic (TA CR).
- Establishment and operation of centres for research, development and innovation in advanced fields with high application and innovative potential **including nuclear fission R&D**.

DELTA Programme (2014-2019)

- DELTA Programme is programme for the support of collaboration in applied research and experimental development **including nuclear fission R&D** through joint projects and technological innovation agencies. The programme run by the Technology Agency of the Czech Republic (TA CR).

APLIKACE Programme (2015-2020)

- Part of the Operational Programme (OP) Enterpreneurship and Inovation for competitiveness (2015- 2020). The programme run by the CzechInvest Agency of the Ministry of Industry and Trade of the Czech Republic
  - Priority Axis 1: Promotion of research and development for inovations
- Acquirement new knowledge necessary for the development of new products, materials, technologies and services through the implementation of projects of industrial research and experimental development **including nuclear fission R&D**.

Infrastructure for Research, Development and Innovation in Nuclear Energy

LR-0 Research Reactor

- The LR-0 research reactor is a light-water, zero-power, pool-type reactor. It serves as an experimental reactor for measuring neutron-physical characteristics of VVER (Water-Water Energetic Reactor) type reactors.
- LR-0 reactor provides a scientific and technological facility for experiments
  - in the area of active zone physics and shielding of light water VVER (Temelín, Dukovany and other VVER type reactors),
  - experiments related to the storage of spent fuel from nuclear power plants and
  - providing advice for the nuclear power industry

Infrastructure for Research, Development and Innovation in Nuclear Energy

LVR-15 Research Reactor

- LVR-15 is a light water tank-type research reactor placed in a stainless steel vessel under a shielding cover. It has forced cooling, IRT-4M fuel and an operational power level of 10 MWt.
- The research reactor LVR-15 is used for
  - material research,
  - development and production of new radiopharmaceuticals,
  - irradiation services etc.

Infrastructure for Research, Development and Innovation in Nuclear Energy

SUSEN

- **The Sustainable Energy Project** (SUStainable ENergy, SUSEN)
  - is implemented as a **regional R&D centre** in Priority Axis 2 of the operational program Research and Development for Innovations (2007-2013 programming period) and
  - its objective is to act as a relevant research partner for cooperation within the sphere of application including the establishment of partnerships and cooperation with important European research centres.
  - its experimental facilities are located in Husinec-Řež and in Pilsen

Infrastructure for Research, Development and Innovation in Nuclear Energy

SUSEN (cont.)

- The project is built on four foundation piers represented by the following research programs further divided into research activities:
  1. Technological Experimental Loops (TEO)
     - **S-ALLEGRO** Loop for supporting ALLEGRO Project
     - **HTHL 2** Loop for supporting experimental V/HTR R&D
     - **SCWR** Loop for supporting experimental SCWR R&D
  2. Structural and System Diagnostics (SSD)
  3. Nuclear Fuel Cycle (NFC)
  4. Material Research (MAT)

National Research, Development and Innovation Programmes Financing for Nuclear Fission R&D

Targeted expenditures from state budget for nuclear energy R&D in 2011-2014

Year	2011	2012	2013	2014
Targeted expenditures (thousands CZK)	**359 132**	**487 886**	**545 365**	**497 229**
Percentage from Total budget for Targeted expenditures	2,88 %	2,88 %	3,73 %	3,63 %

- Targeted expenditures for Category „JE“ (nuclear energy) in primary, secondary, or tertiary branch from CEP database in thousands CZK
- The CEP has collected an information about R&D projects supported by different state and other public budgets, according to the R&D Act (Code number 130/2002).

Thank you for your attention