

The Future of Application of Nuclear Technologies in the Republic of Serbia

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Ministry of Science and Technological
Development

- WATER, ENERGY, HEALTH,
AGRICULTURE, BIODIVERSITY

- Socio-economics of Application of Nuclear
Technologies

- Although it is not a nuclear power plant country, a significant nuclear component, together with a full scope of the radiation related issues, determines the infrastructure of the Republic of Serbia. Defined role of use of nuclear technologies only for peaceful purposes and for the benefit of civil society, with a strong national commitment is considered as a useful reference for prioritization and focusing.

- The Government considers nuclear techniques as the important component of the national policy in science and technology, contributing to the national development programme, a vehicle of triggering dynamics of technological and economical development in the country.

In compliance with the national plans and programmes for development, the main directions for action are the following:

- ***Regulatory body functions and upgrading radiation and nuclear safety***
- ***Decommissioning and radioactive waste management***
- ***Upgrading radiotherapy and nuclear diagnostics services***
- ***Environmental monitoring***
- ***Nuclear technology and techniques***

VIND Programme Overview

- Largest cross-cutting programme in IAEA
 - More than 20 technical experts
 - Nuclear Energy, Nuclear Safety/Security, Safeguards, Legal, TC
- Three Key Projects
 - Repatriate Spent Fuel to Russia
 - Improve Radwaste Management
 - Decommission RA Reactor

Safety remains the first priority! .

Spent Fuel Repatriation Project



2.5 metric tonnes of metallic uranium in LEU plus 13 Kg of HEU
8030 spent fuel elements in Vinca spent fuel pool;
15 cm x 4 cm each;
fits in hand or pocket
Poor storage conditions;
estimated at least 30% of storage containers are leaking

Improve Radwaste Management



Waste stored in two existing 'hangars;' poor condition. More capacity needed for fuel repatriation and decommissioning.

Storing nearly 4000-5000 excess and disused sealed sources, many of which are Category I (very high activity); security poor.

Three facilities will be built to support this need: modern storage facility, secure source storage facility, waste processing facility.

New Waste Storage Facility



Environmental monitoring

- **Environmental monitoring** of radioactivity and system of radiation protection is regulated by the law and performed by the state authorities.
- Improvements in environmental monitoring, including waterborne and airborne pollutants, as well as ground migration of radionuclides are required.
- Effective and efficient ***emergency preparedness system*** and interactive response network mechanism in place are indispensable.

Food and Agriculture

- Nuclear Techniques in Crop Improvement
- Nuclear Techniques in Crop Protection
- Improving Livestock Productivity and Health
- Food Safety

Towards Sustainable Land and Water Management

- ^{137}Cs , ^7Be , ^{210}Pb to assess both erosion and sedimentation rates
- Water resources

Health

- Nuclear medicine – diagnostic applications, nuclear medicine imaging and non-imaging functional studies
- Molecular nuclear medicine techniques
- Radiopharmacology and Radioimmunotechnology

Health

- Treating cancer –radiotherapy machines
- High dose rate brachytherapy
- Dosimetry and medical radiation physics

- *Profiling of genes and proteins*
- *Stem-cell therapeutic*

Radioisotopes in medicine

- The sustainability of radioisotope supply or "isotope security" ^{99}Mo - $^{99\text{m}}\text{Tc}$
- PET isotopes

Delivering the Benefits of Nuclear Sciences and Applications

- Research
- Managing and Preserving Nuclear Knowledge through Training and Education
- Meetings
- Laboratory Activities – Centers of Excellence

EURATOM

- Electricity production from nuclear energy
- Radioactive waste management
- Radiation protection
- Nuclear safety
- Euratom safeguards

Seventh Framework Programme: Euratom

- For each of the three thematic areas of research - fusion energy, nuclear fission and radiation protection - there are specific objectives, which determine a series of activities to be carried out in the next four years.

Joint Research Center

[ECURIE \(European Community Urgent Radiological Information Exchange\)](#)

[EURDEP \(EUropean Radiological Data Exchange Platform\)](#)

[ENSEMBLE](#)

[REM group of the DG Joint Research Centre Institute for Environment and Sustainability](#)

- In FP7 Euratom there are two associated specific programmes, one covering indirect actions in the fields of **fusion energy research** and **nuclear fission and radiation protection**, the other covering direct actions in the **nuclear field** undertaken by the Commission's **Joint Research Centre (JRC)**.

Nuclear fission and radiation protection:

- research is aiming to establish a sound scientific and technical basis for the safe long-term management of long-lived radioactive waste, to promote an even safer, more resource-efficient and competitive exploitation of nuclear energy and to ensure a robust and socially acceptable system of protection of man and the environment against the effects of ionising radiation.

The JRC's nuclear actions under FP7:

- **Nuclear waste management, environmental impact and basic knowledge**
- Spent fuel characterisation, storage and disposal
- Partitioning, transmutation and conditioning
- Basic actinide research
- Nuclear data
- Medical applications from nuclear research
- Measurement of radioactivity in the environment
- Knowledge management, training and education
- - **Nuclear safety**
- Nuclear reactor safety
- Nuclear fuel safety in power reactors operating in the EU
- Safe operation of advanced nuclear energy systems
- - **Nuclear security**
- Nuclear safeguards
- Ensuring that no undeclared nuclear operations are carried out
- Open source information collection on nuclear non-proliferation
- Combating illicit trafficking of nuclear materials, including nuclear forensic analysis.

- We hope that The Future of Application of Nuclear Technologies in Serbia is bright.