

Research and development of nuclear fuel for fast neutron reactor

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The following topics are considered in this presentation:

The main issues of nuclear power are connected with spent nuclear fuel management, radioactive waste management and limited stocks of uranium.

Rosatom's strategy of two-component nuclear energy system with closed nuclear fuel cycle based on fast reactors is presented.

The map of Rosatom's fuel company TVEL activity shows the key points of research and development of traditional and innovative types of nuclear fuel.

The main directions of fast reactor fuel activity under TVEL coordination are considered in this report:

Construction and commissioning of industrial BN-800 MOX fuel plant in Krasnoyarsk. The main result achieved during last years is the loading into the BN-800 core the first batch of MOX-fuel assemblies manufactured on fully automatized production lines.

Main elements of the Rosatom strategic project «Proryv» aimed on creating a new technology platform for the nuclear industry with a closed NFC. A Pilot Power Supply Complex (ОДЭК/ODEK) including the U-Pu nitride fuel fabrication-refabrication module (MFR) and a lead-cooled fast reactor BREST-OD-300 are under construction on the TVEL's enterprise at Seversk site.

The following key ways of research and development of fast reactor nuclear fuel are also presented in the report:

- the BN-600 reactor: adoption of a new steel type as a fuel rod cladding material to increase the duration of the reactor fuel campaign;
- the BN-800 reactor: transition to the core fully loaded by MOX fuel and subsequent adoption of a new material of fuel rod cladding to ensure longer fuel campaign;
- the Chinese CFR600 fuel. Development of control and protection system assemblies, appropriate FA and CPSA mock-ups testing, adjustment to FA and CPSA fabrication;
- experimental justification of U-Pu nitride fuel for BREST-OD-300 and BN-1200 reactors. Development and manufacturing of experimental fuel assemblies with U-Pu nitride fuel at Seversk pilot line to irradiate in the BN-600 reactor. The results of reactor tests and PIE will be used to justify the performance of BREST-OD-300 and BN-1200 fuel assemblies with nitride fuel;
- development of sodium-cooled BN-1200 reactor core and assemblies with U-Pu nitride and oxide nuclear fuel;
- development of lead-cooled BREST reactor's core and assemblies with U-Pu nitride fuel;
- development and implementation of new structural materials for fast neutron reactors.

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