

**RELIABLE REACTOR SYSTEMS AND CONCEPTS
OF THE NEXT IV GENERATION AFTER 2030**

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The international community for the generation of new energy technologies has marked the list of reliable reactor systems and concepts of the next IV generation after 2030 (International Forum – Generation IV (GIF), the IAEA project on innovative nuclear reactors and fuel cycles (INPRO) and a number of other projects). This list includes: reactors cooled by lead alloys (LFR); liquid salt reactors (MSR); sodium liquid cooled reactors (SFR); supercritical water-cooled reactors (SCWR) (25°MPa, 280-580°C); high-temperature gas-cooled reactors (HTGR); particle accelerator-driven subcritical assembly systems (ADS). The most general ideas that can be found in conceptual projects in various combinations are as follows: 1) The temperature at the exit from the reactor is much higher than in modern reactors - 600-1200°C. Thanks to this, it is possible to generate hydrogen, environmentally friendly fuel in thermochemical and electrochemical cycles. 2) Accelerator-driven systems (ADS) are the most likely candidates for G-IV. Subcritical reactors, with a neutron reproduction coefficient k - 98%, can be successfully used with external neutron sources of the accelerating type. The necessary 2% of neutrons will be generated by beams of protons (or electrons) on a metal target. Uranium, tungsten and other materials are being considered as possible target candidates. 3) Metal melts (Pb, Pb-Bi eutectic (PBE), Na) are suitable as attractive heat carriers. In contrast to gas coolants (for example, He), metal melts work effectively at low pressure. Pb and PBE are particularly interesting because they are not as chemically aggressive as Na in case of leakage. 4) Liquid fuel in the form of molten salts of metal fluorides is considered as a promising alternative fuel in some projects. The use of liquid fuel simplifies the fuel cycle, its preparation and processing. Promising reactors have advantages in economy, safety, reliability and non-proliferation of nuclear materials.