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Research and Pilot Fast Neutron Reactors in Russian Federation as the Ground for Development of Worldwide Commercial Technologies

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As early as the exploration of nuclear energy based on the fission of heavy atoms, it became obvious that one of the key conditions for its future wide-scale application is nuclear breeding. For this purpose, in the middle of the last century, the Soviet Union started implementing an experimental infrastructure to develop and construct fast reactors. In a quick period of time the following test reactors were developed and commissioned: BR-1 (1955), BR-2 (1956) and BR-5 (1958). In 1961, a critical assembly BFS-1 was put into operation to simulate neutronic characteristics of fast reactors. In 1969, a fast test sodium-cooled reactor BOR-60 was commissioned having a steam turbine to produce electricity. The reactor is intended to test all the fast sodium reactor technologies. The same year, the world's largest critical assembly BFS-2 was constructed. For the next eleven years, commercial power reactors BN-350 (1973) and BN-600 (1980) were commissioned.
After the severe accident at the Chernobyl's 4th unit in 1986, the Soviet Union's intensive nuclear energy development program was suspended and the next following decades were devoted to the fundamental research in the reactor feasibility and safety as well as to the development of new reactor materials and design concepts.
Since the beginning of 1990s, the Russian Federation has conducted R&D and design activities to develop lead-bismuth- and lead-cooled fast reactors with inherent safety. The development activities related to the fast sodium reactors have been continued and, so far there was put into operation the BN-800 commercial power reactor with a hybrid core operating oxide and MOX fuel; the BN-1200 commercial fast sodium reactor project was developed as well.
Speaking about the test reactors, the BOR-60 lifetime has been extended till 2020 to continue the in-pile testing of the structural and fuel materials; a design of a new fast test reactor MBIR was developed and its construction has been started to further develop and experimentally support the wide-scale program for commercial power reactors of the next generation.

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