

SMALL POWER SODIUM-COOLED FAST NUCLEAR REACTORS

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Design studies of small power sodium-cooled fast reactor plants of 1.5 MW (e), 12 MW (e) and 170 MW (e) capacity have been performed.

The reactor plants are developed as universal energy sources for cost-effective generation of electric energy, process steam and district heating.

Main features enhancing the power unit cost effectiveness are the following:

- commercial production of standardized reactor plants under workshop conditions and delivery of ready-made reactor vessels;
- implementation of self-protection principles and use of passive systems in reactor plant;
- application of standardized equipment for turbine building, fabricated in compliance with rules for conventional (fossil-fired) power industry;
- utilization of turbine plants with high thermodynamic efficiency exceeding that of WWER-type plants.

The MBRU-1.5 and BMRU-12 reactor plants are supposed to use active cores operating without fuel assemblies replacement during the entire service life (30 years), BMN-170 reactor core is supposed to operate during 4 years at 1 year refueling interval.

Minimum personnel is needed to maintain the plant during the entire service life; their functions will be limited to periodic supervision of process parameters.

The main safety systems of the reactor plants are relied upon passive principles of operation:

- passive emergency shutdown cooling system provides for heat removal directly by reactor vessel air cooling under natural convection conditions;
- reactor emergency shutdown function is provided for by safety rods with active-passive principle of action.