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Efficiency assessment of SMR development as a non-carbon energy source in the Russian electricity and district heat supply systems

The paper discusses economic and technical possibilities and limitations of the SMR development in large and small-scale power systems in Russia, incl. Arctic regions with distributed electricity and heat loads.
The results of the economic comparison of SMRs with alternative conventional and low-carbon (CCS) thermal power plants and RES are presented. The assessment takes into account the technological learning rates as well as the cost of integrating power plants into the power system.
The analysis of SMR competitiveness was extended to coal and gas co-generation (CHP) technologies, as well as to alternative combinations of heat boilers (fossil and electric) with various sources of electricity. The sensitivity analysis made it possible to estimate the target levels of SMR cost reduction and support measures (including carbon payments), which are necessary for their mass deployment.
Optimization of the low-carbon transformation of the Russian electricity and district heat supply systems allowed investigating the effective scales of SMR development on the horizon up to 2050. The optimization took into account various levels of carbon emission quotas. The impact of carbon payments on the efficiency of fuel substitution and the development of nuclear power, including SMRs, was also studied.

Country OR International Organization

Russian Federation

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Confirm that the work is original and has not been published anywhere else

YES

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