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Techno-economic Analysis of SMR Deployment in the Estonian Power System

Energy production in Estonia has heavily relied on fossil fuels, namely 70% of electricity generation in 2019 was powered by oil shale. Estonia has committed to contribute to joint EU greenhouse gas reduction targets. Estonia's Ministry of Climate, in order to ensure preparedness and resilience to react to the impact of climate change, has set a target to reduce Estonian greenhouse gas emissions by 80% by 2050. Recognizing this, the Estonian government's Nuclear Energy Working Group report published at the end of 2023 indicated that introduction of nuclear power into Estonia's energy system could significantly contribute to achieving climate neutrality goals. A suitable nuclear power option to consider could be a small modular reactor (SMR) with a capacity of 300-400 MW. To further assess techno-economic aspects of the nuclear option, the IAEA's energy system assessment tool MESSAGE was applied. A case study is being developed to understand how an SMR would integrate into the Estonian energy system, including regional grid and market considerations. Existing and planned power generation technologies were analyzed, including seasonal electricity and heat demand. Several scenarios were simulated for the period up to 2050. The paper summarizes the results and conclusions of this analysis.

Country OR International Organization

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

YES

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