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## Performance Analysis of SMR Plant with Steam Heating for Multi-purpose Applications

SMR plants can be downsized by configuring fewer equipment and systems compare to conventional nuclear power plants. In addition, SMR plants have versatile applications beyond electricity generation, including hydrogen production, heat supply, etc. In this study, a virtual SMR plant was selected and the plant heat balance was modeled using PEPSE software. Based on the established heat balance model, the plant performance, power output and efficiency, were assessed based on changes in design conditions. Furthermore, a high-temperature steam heating model using an electric heater was implemented for the multi-purpose utilization of SMR, and also the plant performances were evaluated concerning the desired target steam temperature and the amount of extracted steam. This study confirmed a significant decline in plant performance with an increase in partial load operation ratio, and the absence of final feedwater heater enhanced the power output of the plant, but it was accompanied by a decrease in efficiency due to the lack of a regeneration cycle. Analysis showed that heating the extracted main steam using an electric heater led to a decrease in plant power output as both the amount of the extraction steam and target heating temperature increased. However, when the target steam temperature matched the extraction steam temperature, the plant electrical output decreased proportionally with the steam extraction quantity, with minimal impact on efficiency. This was attributed to the minimal load requirement of the electric heater.

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

YES

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