

# **Aspirations for electrification: Does the future electricity demand profile matter for electricity supply? – Temporal aspects of energy system modelling**

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## **Abstract**

Electrification becomes the cost effective options to decarbonise energy system; and a large share of electricity is expected to be generated from intermittence renewable source. Electricity models covering a wide range of analytical approaches have been developed for evaluating future electricity supply options. A high level of temporal resolution has been incorporated to account for variability in electricity supply. However, the future electrifications depend heavily on sources of electricity supply. Therefore, the development of future electricity demand profile is highly uncertain, whereas electricity models often adopt historical demand profile for future electricity demand. The choice of technology at the demand and electricity supply options are highly interdependence, which raises questions about the most appropriate way to address these complexities. The complexity is increased further by the temporal variations in demand and supply, exacerbating the inherent mismatch between seasonal supply and demand. Energy system approaches have some advantages to address these shortcomings of electricity model because electricity demand and load profile/curve is determined endogenously. To show the system dynamic, we use the Swiss TIMES energy system model (STEM) with an hourly time resolution and generate some insights on: How does electricity demand profile evolve under different electricity supply option? How does electricity supply influences choice of end use demand technology?