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Large Scale Integration of Renewable Power Sources into the Vietnamese Power System

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The Vietnamese Power system is expected to expand considerably in upcoming decades. Power capacities installed are projected to grow from 39 GW in 2015 to 129.5 GW by 2030. Installed wind power capacities are expected to grow to 6 GW (0.8 GW 2015) and solar power capacities to 12 GW (0.85 GW 2015). This goes hand in hand with an increase of the renewable penetration in the power mix from 1.3% from wind and photovoltaics (PV) in 2015 to 5.4% by 2030. The overall potential for wind power in Vietnam is estimated to be around 24 GW. Moreover, the up-scaling of renewable energy sources was formulated as one of the priorized targets of the Vietnamese government in the National Power Development Plan VII.

In this work, we investigate the transition of the Vietnamese power system towards high shares of renewables. For this purpose, we jointly optimise the expansion of renewable generation facilities for wind and PV, and the transmission grid within renewable build-up pathways until 2030 and beyond. To simulate the Vietnamese power system and its generation from renewable sources, we use highly spatially and temporally resolved historical weather and load data and the open source modelling toolbox Python for Power System Analysis (PyPSA).

We show that the highest potential of renewable generation for wind and PV is observed in southern Vietnam and discuss the resulting need for transmission grid extensions in dependency of the optimal pathway. Furthermore, we show that the smoothing effect of wind power has several considerable beneficial effects and that the Vietnamese hydro power potential can be efficiently used to provide balancing opportunities.

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