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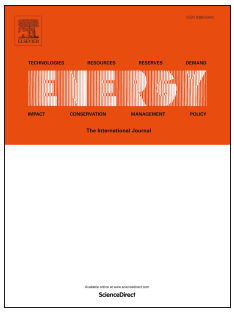

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Adding Value to EU Energy Policy Analysis Using a Multi-Model Approach With an EU-28 Electricity Dispatch Model

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Abstract

The European Council has agreed ambitious EU climate and energy targets for 2030, including a 40% reduction in greenhouse gas emissions compared to 1990 levels and a minimum share of 27% renewable energy consumption. This paper investigates the challenges faced by the European power systems as the EU transitions towards a low carbon energy system with increased amounts of variable renewable electricity generation. The research here adds value to, and complements the power systems results of the PRIMES energy systems model that is used to inform EU energy and climate policy. The methodology uses a soft-linking approach that scrutinizes the power system in high temporal and technical detail for a target year. This enables generation of additional results that provide new insights not possible using a single model approach. These results point to: 1) overestimation of variable renewable generation by 2.4% 2) curtailment in excess of 11% in isolated member states 3) EU interconnector congestion average of 24% 4) reduced wholesale electricity pricing and few run hours raising concerns for the financial remuneration of conventional generation 5) maintenance of sufficient levels of system inertia in member states becomes challenging with significant penetrations of variable renewable generation.

Highlights

- Develops a multi-model framework to quantify impacts of increased RES-E in the EU
- Builds an EU-28 PLEXOS power systems model with high technical & temporal resolution
- Quantifies interconnector congestion, electricity curtailment and wholesale electricity prices
- Identifies concerns for conventional generation in an energy only market

Keywords

Energy systems modelling; Power systems modelling; Soft-linking; Renewable energy