

Interconnection as Climate Policy? Assessing the impact of the EU 15% interconnection target on CO₂ Emissions with PyPSA-Eur

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Extended Abstract

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Abstract Summary

This paper assesses whether the European Union's target of achieving 15% cross-border electricity interconnection by 2030 can ease the mitigation of CO₂ emissions. Using the open-source Python for Power System Analysis (PyPSA)-Eur modeling framework, we develop a large-scale linear optimization model of power systems of France, Germany, Belgium, the Netherlands, and Luxembourg. The model endogenously optimizes generation, storage, and transmission capacities under technical constraints, while incorporating policy constraints in the form of both a minimum interconnection requirement and alternative CO₂ emission caps. Our results show that implementing the interconnection target alone yields only marginal carbon reductions relative to the baseline. Although 15% is not cost-optimal for each country, significant changes in electricity generation and decreases in Greenhouse Gas (GHG) emissions are obtained with enhanced cross-border interconnections. Grid development significantly facilitates deeper decarbonization by enabling higher renewable penetration, reducing flexible fossil-based generation, and reshaping cross-border electricity flows.

Presenting Author Biography

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