

Transition towards a renewable European electricity system

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Propositions Accompanying the Dissertation

Transition Towards a Renewable European Electricity System

What are the Implications for the Power Technology Mix,
Pan-European Power Trade and the Electricity Market?

By Iulia Falcan

1. The electricity and heat sector is the largest contributor to greenhouse gas emissions. At the same time, it benefits from the most mature clean energy technologies, which may support its relatively rapid transition towards a low-carbon alternative.
2. Due to the wide variation in weather patterns across Europe, relying on unrestricted power trade can reduce by almost half the total system cost of an entirely renewable European power system, compared to a case of autarky. (Thesis, Chapter 2)
3. Most of the cost reduction associated with a pan-European power system occurs in the early stages of the integration of different power systems. (Thesis, Chapter 2)
4. In a cost-optimal, pan-European electricity system, most of the installed capacity of wind and solar power generation technologies are located in only just a few countries. (Thesis, Chapter 2)
5. An increasing share of wind power in the electricity mix is associated with a decrease in day-ahead electricity prices. (Thesis, Chapter 3)
6. The volatility of wholesale electricity prices increases, as the share of wind power in the electricity mix increases. Furthermore, the magnitude of this effect increases, with a growing share of wind power in the electricity mix. (Thesis, Chapter 3)
7. The downward effect of electricity from renewable power technologies on domestic prices spills over to the prices of neighboring countries, only in the presence of a sufficiently well-developed cross-border electricity interconnector. In the opposite case, the uptake of renewable energy in one country may lead to increased price divergence. (Thesis, Chapter 4)
8. At the EU level, the two separate goals of an Energy Union – whereby electricity flows unrestricted and consumer welfare is increased - and increased share of renewable energy, have historically been addressed separately. A coordinated approach would greatly benefit both. (Thesis, Chapter 4)