

Putting the heat on electricity markets: on heat wave impacts and spillovers

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November 2019

Abstract

The European electricity system is currently subject to several major trends. First and foremost, European market integration leverages the potential for efficiency gains but demands closer cross-border cooperation. Second, international efforts to mitigate climate change are driving the energy transition towards a low carbon energy system. Third, while being the major sector in European climate change mitigation, the electricity system is also susceptible to climate change impacts. Most prominently, heat waves are expected to become more frequent and more severe and can affect electricity demand, supply and transmission.

In our paper, we address the combination of these different drivers. To this end, we combine a numerical model of the European electricity system with high temporal and spatial resolution with empirical estimates on heat wave impacts. We disentangle the effects of heat-related impacts on different components of the electricity system and show that the high interconnectedness of the European system leads to spillover effects to countries which are not directly affected by a heat wave. Furthermore, our results indicate that heat wave impacts on electricity demand, supply and transmission mutually reinforce each other.