Welfare effects of cross border support for renewable energies in Europe: case study for France and Germany

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(1) Overview

The implementation of different support schemes across member states has led to a strong uptake in renewable energy sources (RES) production in the European Union (EU). While this development helps to achieve EU energy policy targets, it also creates new challenges. Two of the currently observed and most discussed challenges are i. the pressure of financing the support instruments and ii. the necessity to integrate growing shares of RES in the electricity market. As a response to those challenges energy policy is /needs continuously be adapted. At member state level this has led to the introduction of market components in RES support schemes to facilitate the market integration of variable RES. At EU level a set of mechanisms giving Member States the opportunity to cooperate through exploiting renewable energy resources across borders has been defined (EC, 2012) However, the cooperation mechanisms have so far been mostly discussed in the context of least cost policies for target compliance, which mostly neglected the interaction with the electricity market. The objective of this research is to bring those two dimensions together in order to provide a clearer picture of the benefits and distributional effects that cooperation across borders in renewable energy development has taking into account the interaction of RES support polies and market integration. France and Germany have recently agreed to increase their cooperation for the energy transition. The electricity markets in both countries are in the process of harmonization as part of the CWE market coupling. Thus France and Germany offer are valuable case study to research the effects of cooperation.

(2) Methods

For the purpose of this analysis a three step equilibrium model as proposed and developed by Saguan and Meeus (2011) will be extended and applied. Each country is represented by one zone that are connected by a single transmission line. The model takes into account the interactions between transmissions and generation investment decisions and the resulting impact on the electricity market. Thus with regards to the issues outlined above the model is capable to account for potential cooperation gains resulting from both the increased resource base and improved integration of variable RES in the electricity market. As the goal is to identify synergies and gains of cooperative RES target compliance, the input side of the model will be extended through the introduction of cost-resource curves for key RES options. For variable RES the curves will be resolved on an hourly basis in order to get a more detailed representation of the gains as well as distributional effects of cooperation.

(3) Results

Result will include both global welfare effects as well as distributional effects induced e.g. by changes in electricity prices. Welfare in each zone is compute das the sum of consumer and producer surplus and congestion revenue minus the RES premium (to cover the additional investment costs of RES) and transmission costs. By comparing the welfare of joint vs. purely domestic target compliance the cooperation gains can be calculated. Finally, taking both into account the gains of cooperation and the corresponding distributional effects some remarks on a fair cost allocation can be made.

References

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