

## ELMOD – Electricity Market Model

### Model purpose

- Analysis of market design issues
- Influence of renewable energy sources (RES) on the European transmission grid
- Congestion management
- Load flow analysis

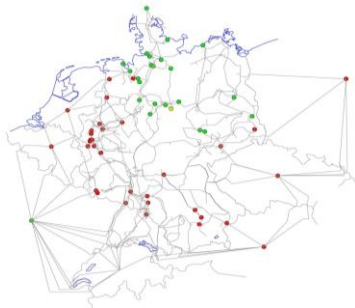
### Main characteristics

- Bottom-up electricity market model
- DC load flow based transmission grid model
- Temporal resolution up to 72 h (representative hours)
- Scenario-based series of wind and PV feed-in for characteristic hours

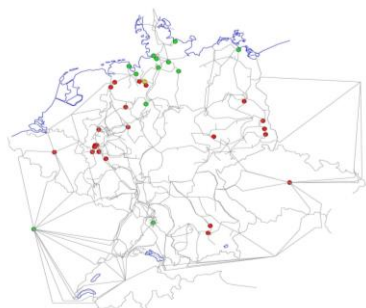
### Exemplary Results:

#### Congestion Management in Germany - The Impact of Renewable Generation on Congestion Management Costs (Kunz 2011)

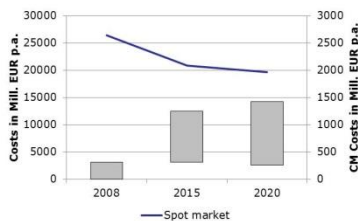
Without grid extension and topology optimizing



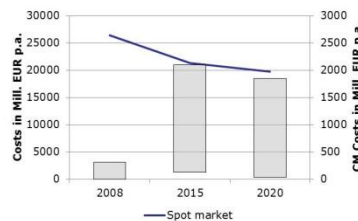
With grid extension



Without grid extension



With grid extension and nuclear phase-out



- National congestion management is not sufficient to ease all network congestion
- Even topology optimisation cannot completely eliminate the need for re-dispatching power plants
- Congestion management costs will increase up to 2020
- Integration of higher RES shares and proposed power plant investments reduce system dispatch costs, but increase the need for congestion management
- Change of market design and congestion management regime results in benefits and reduces the need for transmission expansion

### Exemplary References

Kunz, Friedrich (2011): "Congestion Management in Germany-The Impact of Renewable Generation on Congestion Management Costs.", appears in the Energy Journal or download as Working Paper (WP-EM-46) at [www.ee2.biz](http://www.ee2.biz).

Leuthold, Florian; Weigt, Hannes; Hirschhausen, Christian: A Large-Scale Spatial Optimization Model of the European Electricity Market, Journal of Network and Spatial Economics, 2010.

Weigt, Hannes; Jeske, Till; Leuthold, Florian; von Hirschhausen, Christian: Take the long way down - Integration of large-scale North Sea wind using HVDC transmission, Energy Policy, Vol. 38, Issue 7, July 2010, Pages 3164-3173.