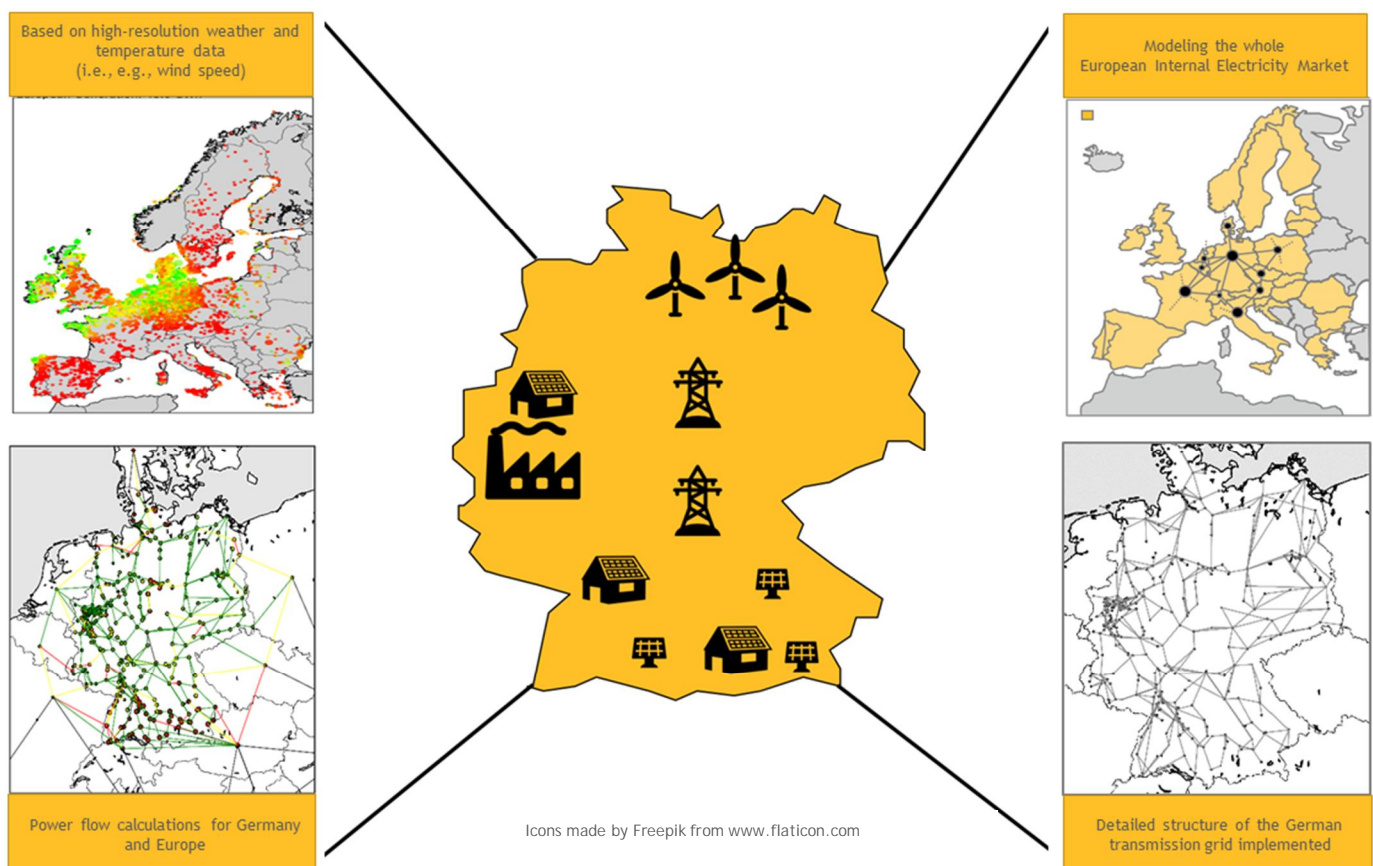


DIMENSION-GRID

The model

Extending the established ewi investment and dispatch model DIMENSION, DIMENSION-GRID allows to consider grid restrictions and power flow constraints in the context of simulating the market outcome in European power markets as well as quantifying the resulting redispatch needs. In more detail, nodal (more than 500 transmission grid nodes in Germany) information regarding electricity demand, generation capacities, renewable energy profiles and the corresponding grid infrastructure (grid nodes and transmission lines) is processed to dynamically simulate hourly trade volumes using flow-based market coupling. DIMENSION-GRID is based on high-resolution DC-load flow calculations.



As results we obtain the market solution (prices, electricity generation by energy source, trade volumes, etc.) and the resulting power flow within the German transmission grid as well as between the market areas considered. Grid restrictions and the respective bottlenecks determine the redispatch needs. The corresponding costs can be simulated. The implemented flow-based market coupling complies with the procedure to determine cross-border available transmission capacities applied by the transmission grid operators in practice.

DIMENSION-GRID

Possible applications

Dynamic simulation of power trading

DIMENSION-GRID enables to simulate the influence of flow-based market coupling on trade volumes and prices in the European internal electricity market. The respective methodology has been applied by transmission grid operators in „Central Western Europe“ (Germany/Austria, France and the Benelux) since mid-2015 and allows to consider dynamic processes and structures within the electricity sector.

Analysis of price zone customizations

DIMENSION-GRID offers the opportunity to conduct a quantitative analysis of the effects of different bidding zone layouts on the resulting electricity generation, trade volumes and prices. Through a detailed representation of real grid structures within Europe, the occurrence of local bottlenecks as well as price differences between different bidding zones can be analyzed.

Simulation of redispatch volumes and costs

In a two-stage simulation framework, DIMENSION-GRID allows the derivation of redispatch volumes and costs. For this purpose, a power flow simulation based on the previously derived market outcome may be conducted taking into consideration grid restrictions.

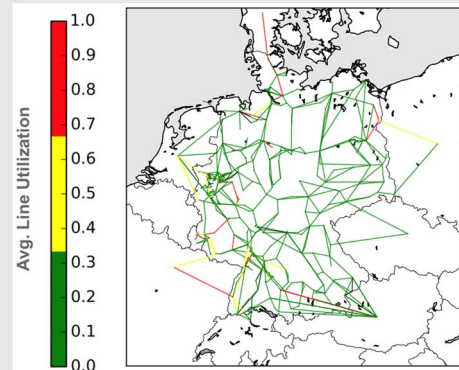


Fig.1: Exemplary analysis of grid utilization in the German transmission grid

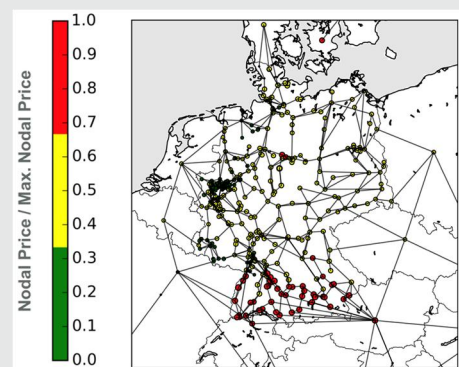


Fig.2: Exemplary simulation of nodal electricity prices in Germany

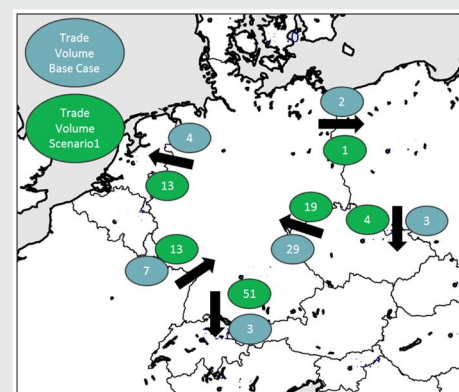


Fig.3: Exemplary simulation of electricity trade volumes in Germany and neighboring countries according to the flow-based market coupling procedure

Have we sparked your interest? Please feel free to contact:

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