

## PowerACE - Agent-based simulation of the European electricity market

### Model purpose

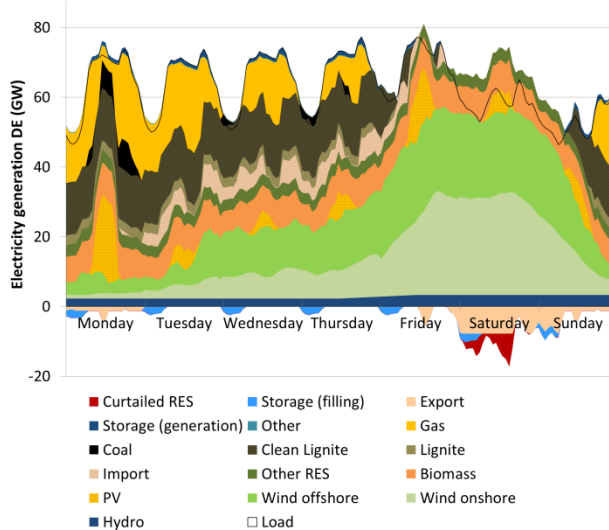
- Detailed analysis of hourly power prices and its formation under the consideration of market participants' behaviour in liberalized markets
- Analysis of electricity market design issues and its interactions
- Integration of renewable energy sources (RES) into the European electricity system
- Dispatch of power plant capacity
- Long-term investment in conventional capacity
- Simulation of flows between markets based on Net Transfer Capacities (NTC)

### Main characteristics

- Bottom-up electricity market model
- Simulation of different (sub)markets: day-ahead, intraday, reserve markets
- Temporal resolution: 8760 hours
- Spatial resolution
  - PowerACE-EU: EU-27+2 region
  - PowerACE-DE: detailed insights into the German market
- Individual modelling of the main actors in the electricity system: generators, traders, consumers
- Extensive databases for power plants, electricity demand and renewable energy sources (e.g. generation profiles based on detailed meteorological data)

## Exemplary Results from the report "Shaping our energy system - combining European modelling expertise":

### The electricity generation in Germany for a sample week in the year 2050



- In the future, mainly gas-fired power plants are built. After 2030, some lignite power plants using CCS-technology are constructed to replace capacities reaching the end of their technical lifetime.
- In 2050, situations will occur where the feed-in from RES exceeds demand, i.e. the sum of load, export and storage (filling).
- In order to balance offer and demand, renewable energies have to be curtailed. These situations, that occur due to the interaction of different factors, can be deeply analysed with PowerACE.

### Exemplary References

Genoese, M.; Genoese, F.; Fichtner, W.: Model based Analysis of the Impact of Capacity Markets, 9th International Conference on the European Energy Market, 2012.

Sensfuß, F.; Ragwitz, M.; Genoese, M.: The Merit-order effect: A detailed analysis of the price effect of renewable electricity generation on spot prices in Germany. Energy Policy, vol. 36, issue 8, August 2008.