ELTRAMOD – Electricity Transhipment Model

Model purpose

- Fundamental system analysis
- Integration of renewable energy sources (RES) in the European electricity market
- Flow calculation based on Net Transfer Capacity (NTC)
- Trade-off between grid and storage expansions
- Optimal dispatch of power plant capacity

Main characteristics

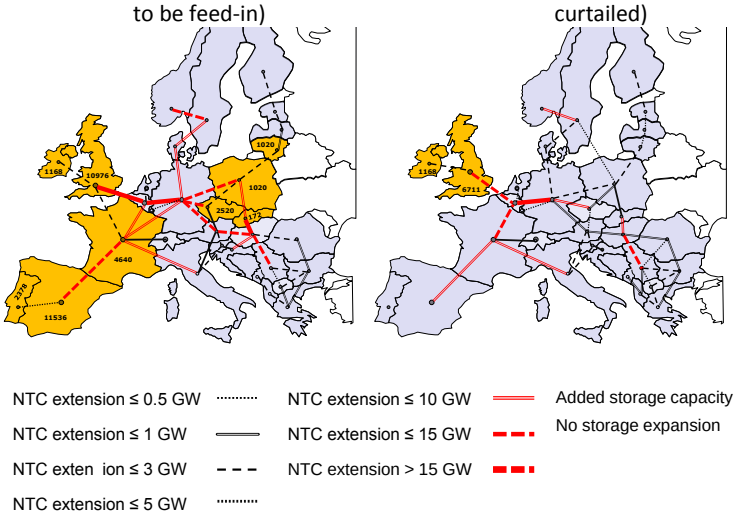
- Bottom-up electricity market model
- Temporal resolution of 8760 hours
- Calculation of the cost-minimal generation dispatch and investments in additional transmission lines and storage facilities
- Country specific time series of wind and PV feed-in
- Net Transfer Capacity from ENTOS-E (European Network of Transmission System Operators for electricity)

Exemplary Results:

Influence of RES feed-in obligation on investments in new grid and storage capacities

RES feed-in obligation
(every unit of available RES needs to be feed-in)

RES curtailment
(the surplus of RES can be curtailed)



- Feed-in priority for RES significantly influences investments in NTC and storage capacities
- Regardless of the presence of feed-in obligation, investments in additional NTC are needed
- In the midterm grid expansion, rather than storage expansion, is necessary to integrate the increasing RES generation
- The requirement for additional storage capacity becomes important beyond 2040 when the penetration of RES will reach approx. 80%

Exemplary References

Energy System Analysis Agency: Shaping our energy system - combining European modelling expertise, Brüssel, 2013.

Gunkel et al.: Storage Investment or Transmission Expansion: How to Facilitate Renewable Energy Integration in Europe?. VDE-Kongress Smart Grid - Intelligente Energieversorgung der Zukunft, 2012.

Müller, T.; Gunkel, D.; Möst, D.: Renewable curtailment and its impact on grid and storage capacities in 2030, Enerday Conference, Dresden 2013.

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