The challenge for congestion management – reporting on TradeWind insights

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TradeWind objective and scope

• Objective:
  Formulate recommendations on market rules and new interconnections to accommodate 300 GW wind capacity in 2030 (incl. 120 GW offshore): 30% of electricity demand

• Scope: EU-27 (incl. UCTE, Nordel, GB, Ireland)
Transmission congestions are analysed on an hourly basis

- Approach: Hourly Optimal Power Flow (OPF) calculations for a full year
  - Perfect market conditions - cheapest generation dispatched first
  - No inter-temporal constraints
- Modeling difficulties with large system → aggregation
- NTC values (winter 2007-2008) used to define cross-country used throughout study
- Internal line constraints accounted for only in Germany and Austria
A link was established between the TradeWind and the EWIS project.

Wind scenarios for 2015

UCTE study „model“
Spatial and time resolution of EWIS and TradeWind

Network resolution

- Full network
- Zones (areas)
- Zones (countries)
- Copperplate

Analysed timesteps

- Single point in time
- Critical situations
- Full year
- Several years

AC loadflow incl. dynamics

Optimal Power Flow

Unit commitment and dispatch

Our mission: A sustainable energy supply for everyone
The transmission constraints were analysed with respect to their economic sensitivity

Sensitivity:
Change of operational cost as a result of incremental change in transmission capacity

Source: TradeWind, WP 6
Bottleneck costs show differences in operational cost induced caused by of limited transmission capacities

Average cost of energy
2030 scenarios with stage 2 grid upgrades

- Bottleneck cost (€/MWh)
- Copperplate model cost (€/MWh)

Source: TradeWind, WP 6
Conclusions

• Internal congestions tend to have high sensitivities
• Availability of high quality data sources (transmission and generation) is crucial for successful modeling
• Minimum year round simulations are required for appropriate economic assessment of transmission
• In the 2030 scenario 42 identified transmission projects break even at an average of 475 Million € investment cost\(^1\)
• A rough analysis reveals that a North sea offshore grid has overall positive economic effects.\(^1\)

1) Analysis based on operational cost analysis
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TradeWind reports and papers can be downloaded at: www.trade-wind.eu