European Wind Integration Study (EWIS) Towards a Successful Integration of Wind Power into European Electricity Grids

EWIS Concluding Discussion
13th April 2010, Brussels

Approach and Scenarios
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ewis
european wind integration study

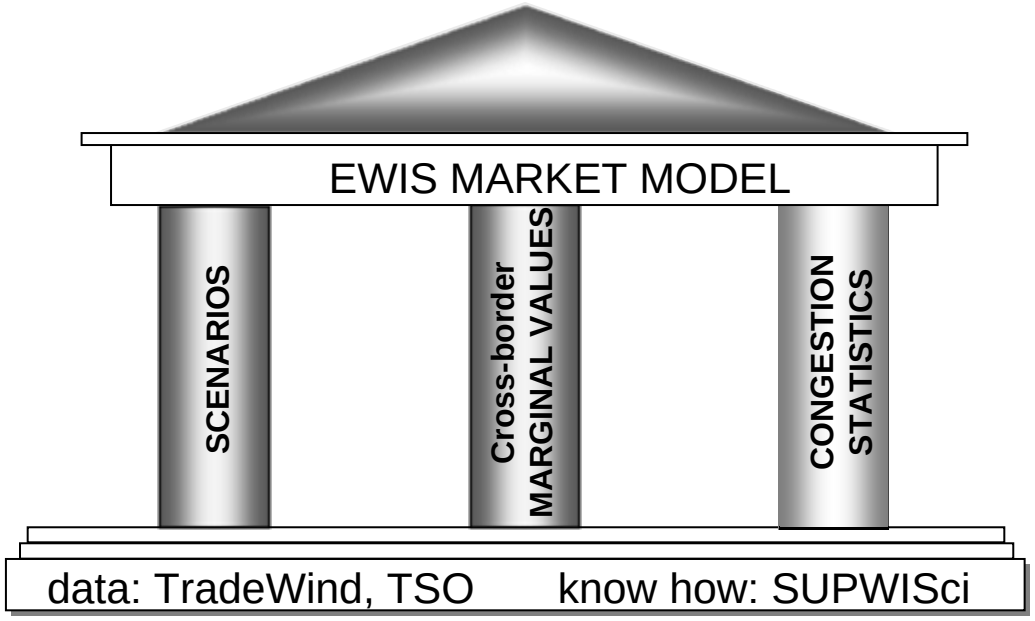
Content

- Objectives, Tools and Methodology
- Year-round (statistical approach)
- Point-in-time
- Enhanced Network
- Summary

Objectives

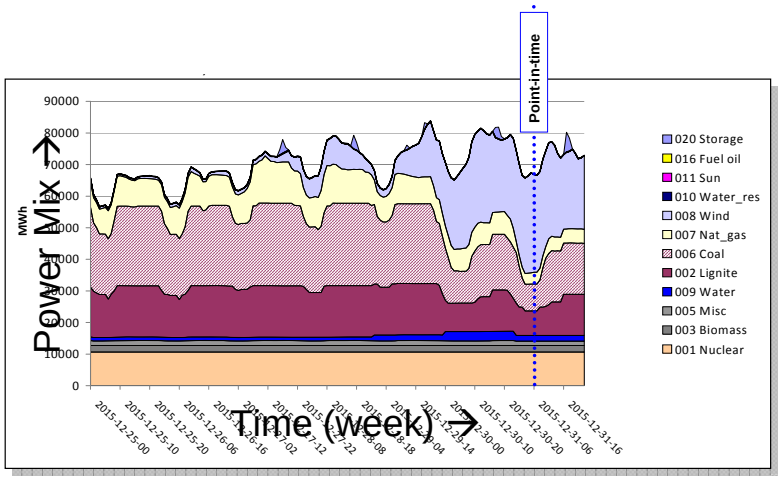
- For the EWIS 2015 analysis, the goal was to bring common pan-European recommendations on how to best integrate wind power in to the European grid
- To facilitate this, European-wide scenarios were derived to analyse the impact of wind generation on the future grid
- These scenarios and associated market simulations enabled the assessment of
  - wind power production,
  - production from conventional power plants and the
  - exchange schedules

European Wide EWIS Market Model



Point-in-time snapshot scenario analysis in the context of Year-round runs

- Statistics of cross-border congestion
- Marginal values for reinforcements
- Cost analysis



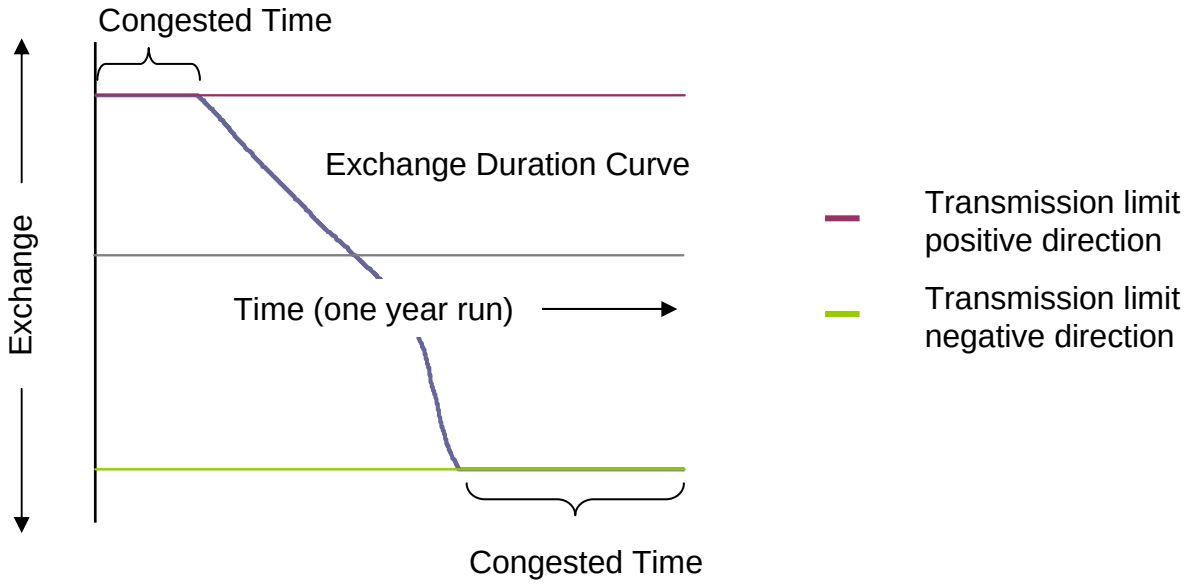
⇒ Results of Point-in-time scenarios are used for detailed network physics power flow calculations

Statistical approach

Year-round runs of the market model with PTDF-approximated cross-border flows

- permit a statistical analysis of congestion on borders
- offers information concerning which options may be economic to reinforce.

Time field of observation

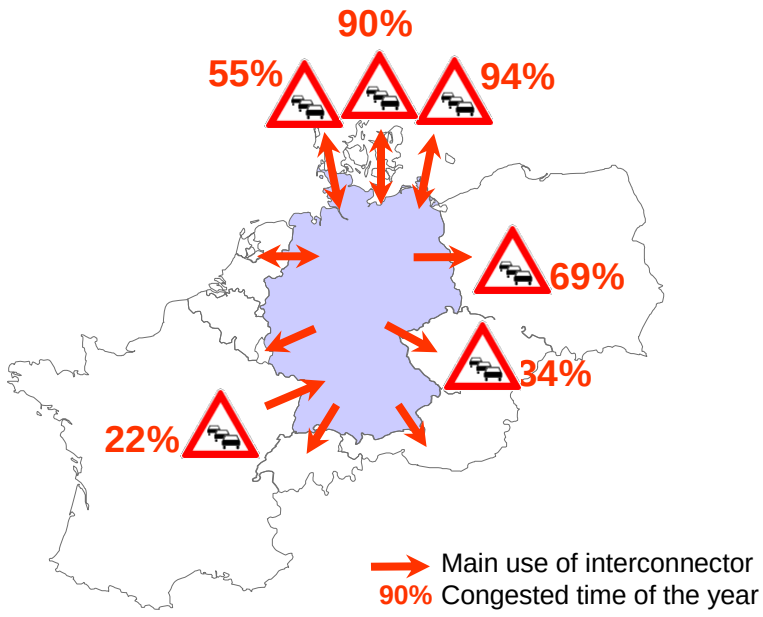


Statistical approach

- Results of the Market Model i.e. for Germany -

DE – Nordic interconnectors

⇒ Transit from Germany to Denmark, Norway and Sweden



- Exchange partly not wind driven
- High exchange schedules at low NTC limits on DC connections
- DK and SE: Day/night volatilities with potential for wind power regulatory
- PL and CZ: Physical flows result from market driven southbound transit
- Mitigation measures on PL and CZ borders would increase inner German transit and DE-AT exchange

DE-AT and DE-CH interconnectors

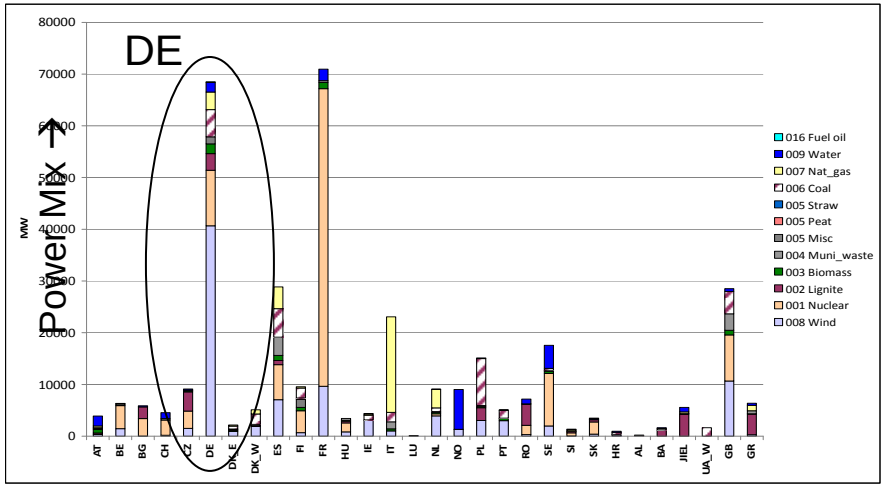
⇒ Connections to the south mostly used southbound

Point-in-Time investigations

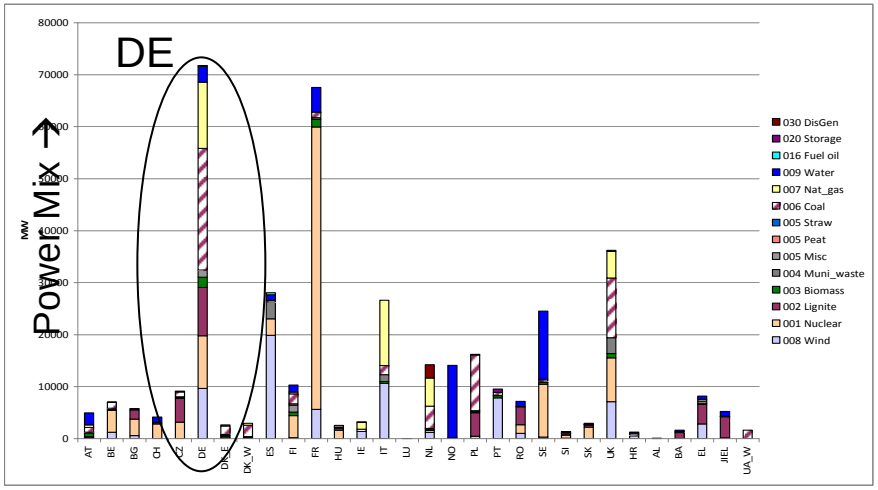
- from the market perspective -

- The integration of wind power 2015 is achieved through a massive adjusted dispatch of generation
- The surplus of wind power expected in 2015 will be balanced widely within the market areas described in 2015 scenarios

High wind situation in north EU



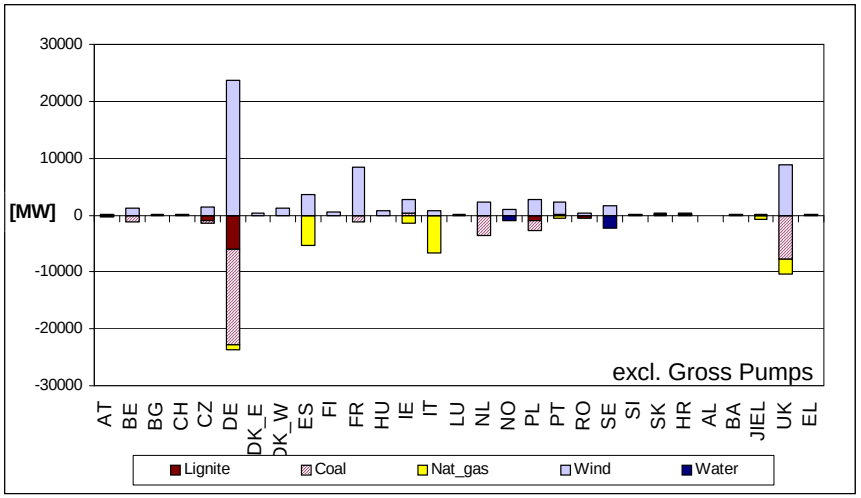
High wind situation in south EU



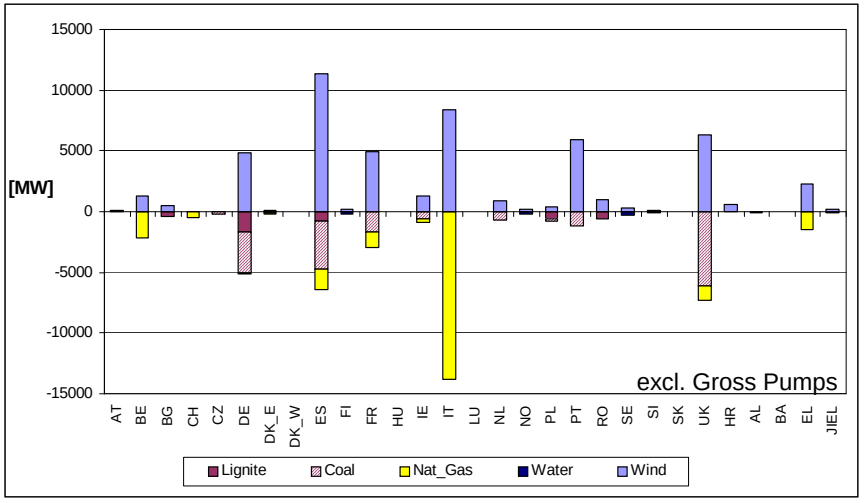
⇒ Surplus of wind power provides benefits…

...avoiding emissions: Point-in-Time investigations from the market perspective underline that

High wind situation in north EU



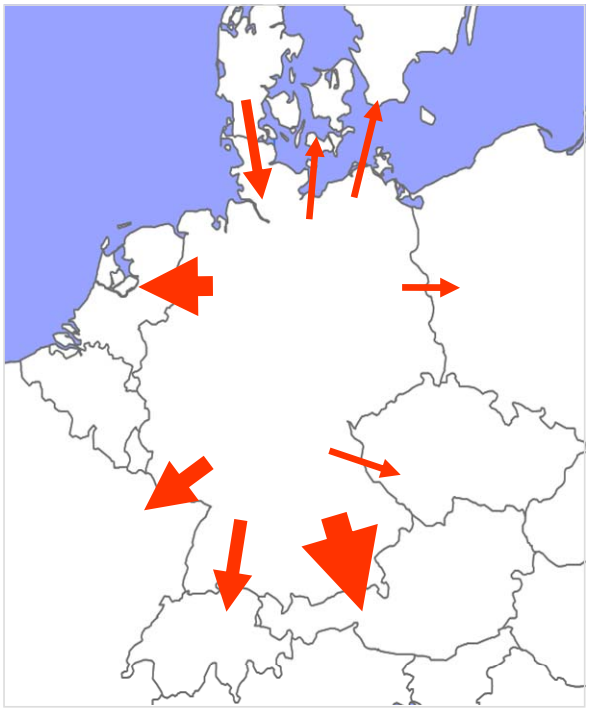
High wind situation in south EU



⇒ CO2 emitting coal and gas production will be displaced partly

Point-in-time approach
- Results of the Market Model -

- Wind power installations expected in 2015 in some areas are significant in terms of national load, i.e. ES up to 78%, DE up to 80%, and DK-W above 100%



Analysis of exchange schedules on interconnectors at a high wind situation in northern Europe

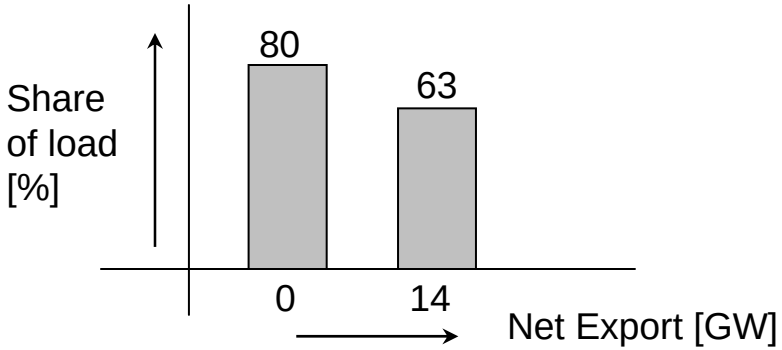
Germany

- Interconnectors: Cross border pinch-points
- Exports to all neighbours, except DK-W
- Transmission capacity: Fully loaded, exchange schedules at maximum capacity, except DK-W

⇒ Effects of wind to be checked on increased cross-border capacities

Well interconnected markets support wind power integration

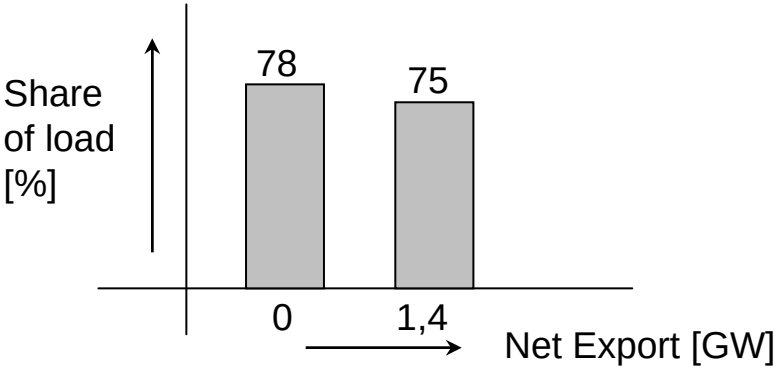
High wind situation in north EU



i.e. Germany

- High wind power penetration 80% [1]
- 40,7 GW wind power at 50,7 GW national load
- Gas, coal and lignite substituted
- Net exports to neighbours 14 GW

High wind situation in south EU



i.e. Spain

- High wind power penetration 78 % [1]
- 22,4 GW wind power at 28,7 GW national load
- Gas, coal and nuclear substituted
- Wind power curtailment 2,4 GW
- Net exports to neighbours 1,35 GW (France, max.)

[1] share of wind power production/load

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Summary: The EWIS investigations from the market perspective underline

- The surplus of wind power expected in 2015 will be balanced widely within the market areas described in the scenarios
- The integration of wind power 2015 is achieved through a massive adjusted dispatch of conventional generation

⇒ Parts of the CO2 emitting coal and gas production will be displaced

⇒ Few areas require wind curtailment.

- Well interconnected markets support wind power integration
- Benefits of a potential network enhancement are seen as useful

⇒ EWIS economic analysis identified candidate measures

⇒ Further work focusing regional demands is required.