



***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  
Mr. Hermann Egger**

## *Content*

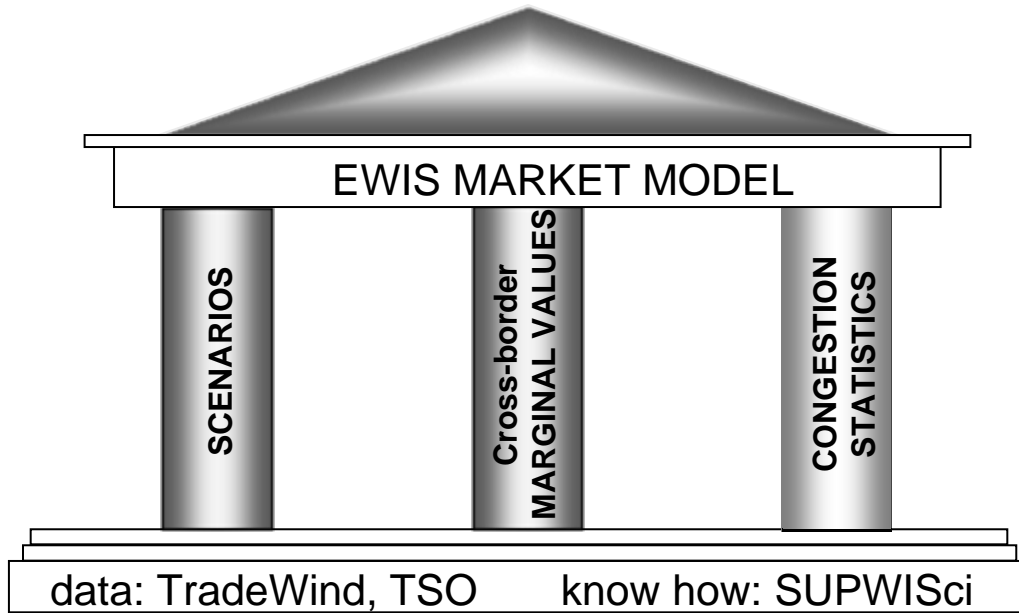
- Objectives, Tools and Methodology
- Year-round (statistical approach)
- Point-in-time
- Enhanced Network
- Summary



## Objectives

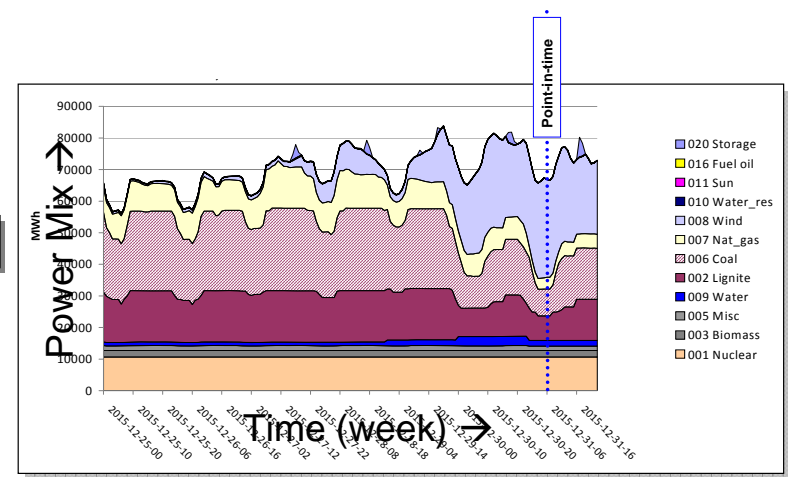
- For the EWIS 2015 analysis, the goal was to bring common pan-European recommendations on how to best integrate wind power in to the European grid
- To facilitate this, European-wide scenarios were derived to analyse the impact of wind generation on the future grid
- These scenarios and associated market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



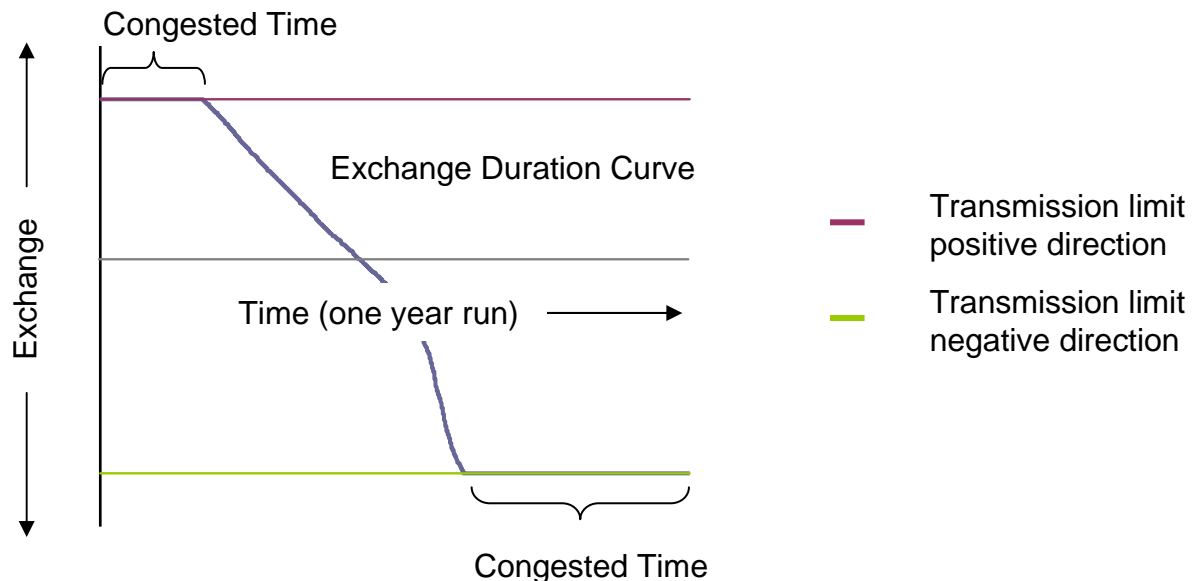
⇒ Results of Point-in-time scenarios are used for detailed network physics power flow calculations

## 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

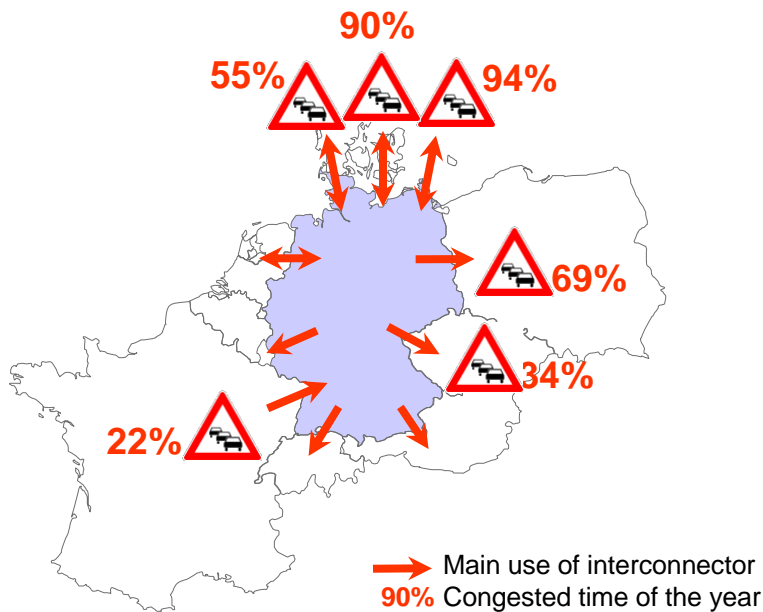


## Statistical approach

### - 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

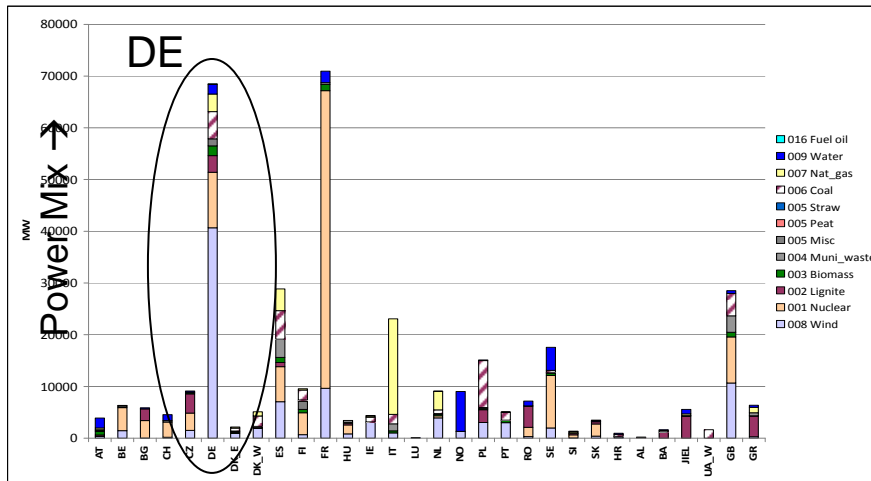
⇒ Connections to the south mostly used southbound



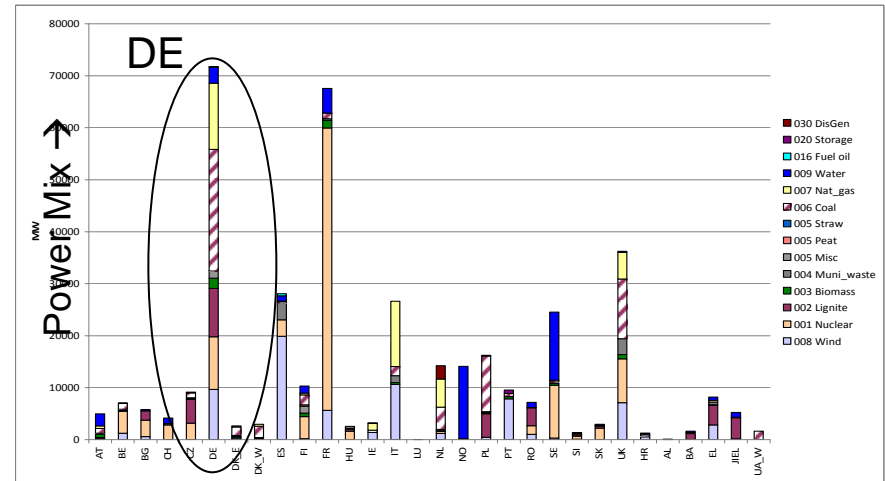
## Point-in-Time investigations - from the market perspective -

- 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



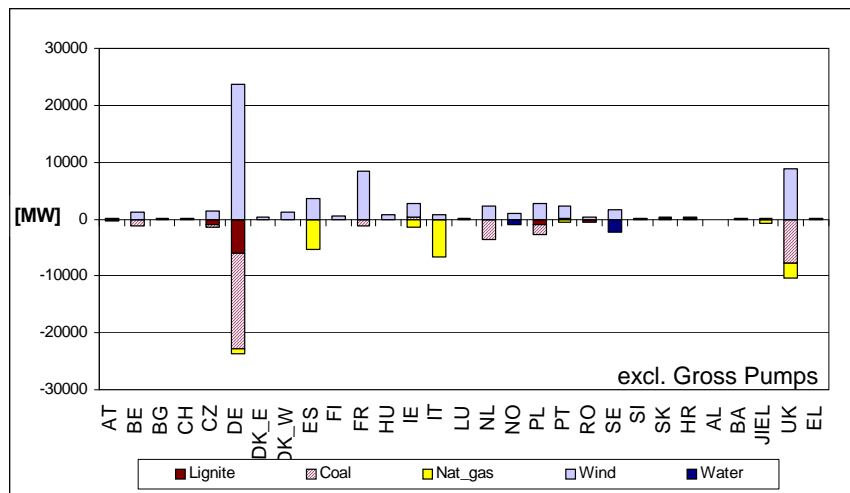
### High wind situation in south EU



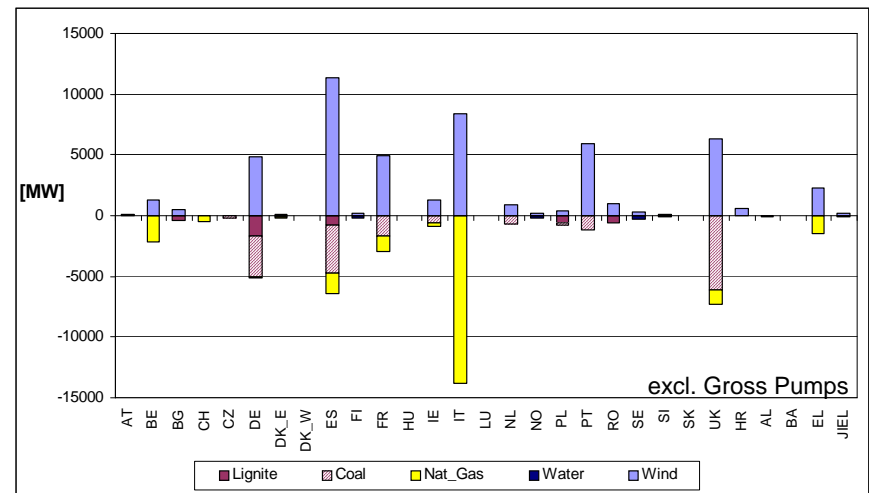
⇒ Surplus of wind power provides benefits...

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

High wind situation in north EU



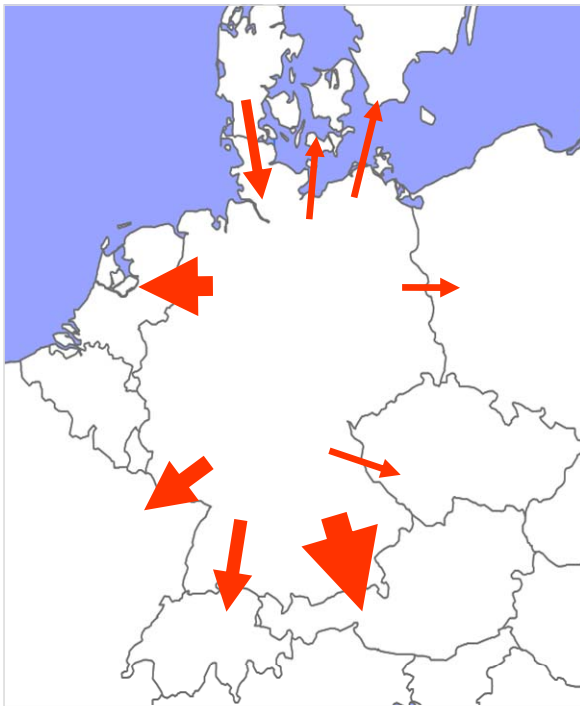
High wind situation in south EU



⇒ 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

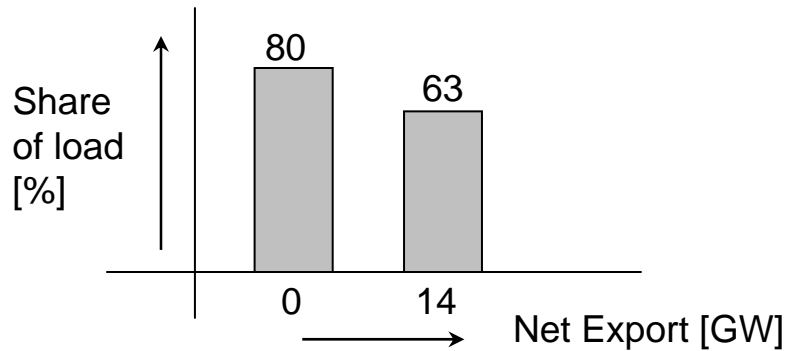
- Interconnectors: Cross border pinch-points
- Exports to all neighbours, except DK-W
- Transmission capacity: Fully loaded, exchange schedules at maximum capacity, except DK-W

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



## *Well interconnected markets support wind power integration*

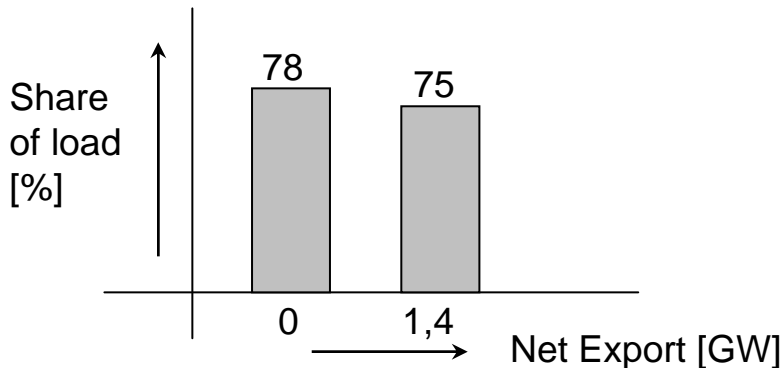
### High wind situation in north EU



### **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

## ***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 CO<sub>2</sub> 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.