



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

Workshop on innovative tools needed for  
future and stable system operation  
21th June 2012, Brussels

EWIS Results on Operational Challenges  
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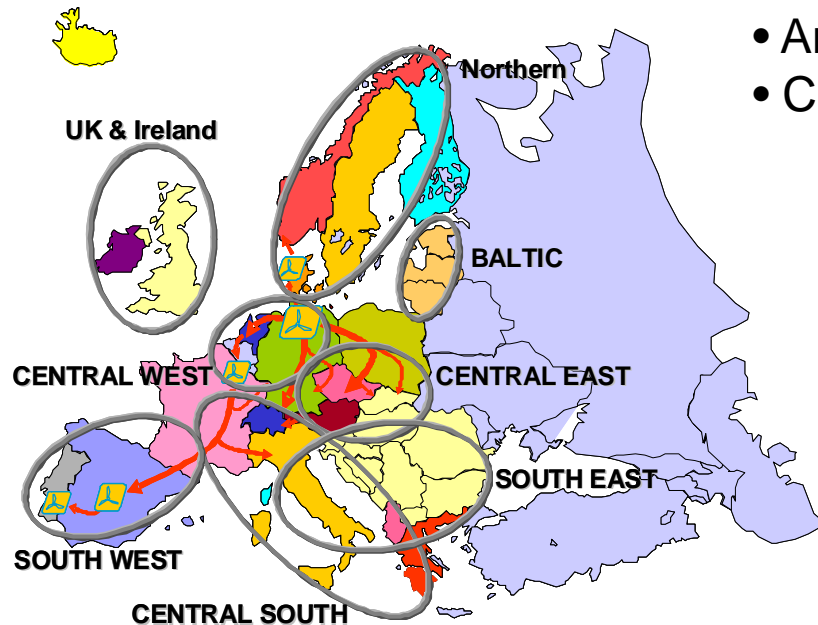


# Introduction



- Meeting EU renewable targets:
  - For this, the large-scale integration of wind energy is essential
- European electricity transmission networks developments
  - provide the route for the efficient transport of wind power from turbines to consumers
  - provide the means for efficiently managing wind variability by harnessing diversity and backup energy sources
- The EWIS project together with TradeWind is the first reference study on European level for wind power integration, initiated in 2007 by the European Transmission System Operators in collaboration with stakeholders to address the best way to progress
  - In particular, build upon the good work done by EWEA TradeWind

## *A Reference Study on European Level*



- An EC SmartGrids project (FP6)
- Close cooperation with external stakeholders
  - Network operators (TSOs and DSOs)
  - Wind power producers and wind turbine developers
  - Market participants
  - Relevant studies and working groups on Wind integration
    - TradeWind, IEA-Task 25, Greenpeace study, EC Working group for Offshore/ onshore grid development, EWEA WG Grid Codes, PLEF, Wind on the grid ...
- Consumers
- Regulatory representatives
- National Governments and authorities...

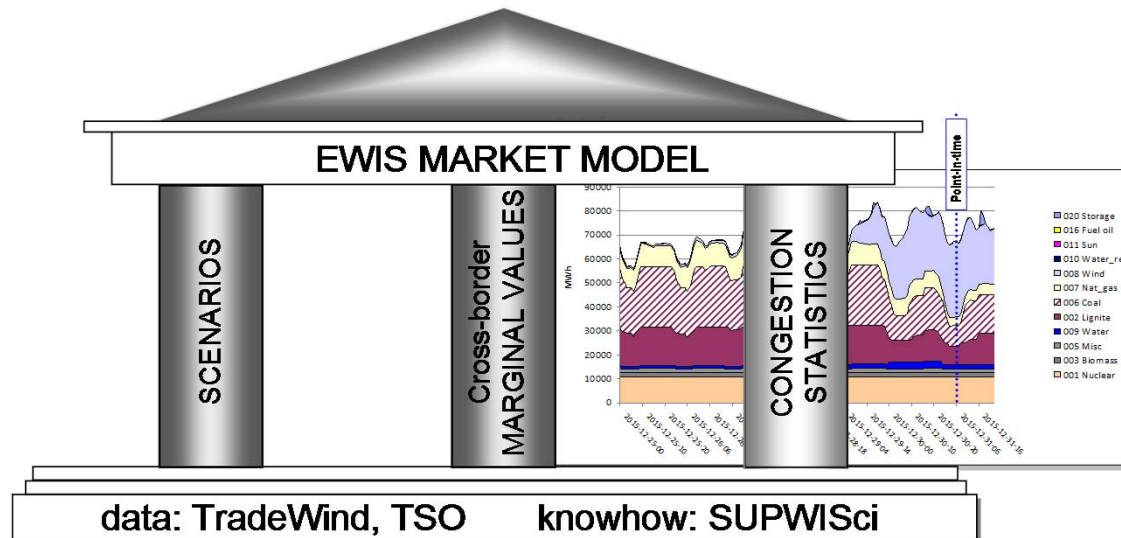
**accepted and supported by major European players...**

## *EWIS Final Report Cornerstones*

EWIS achieved important results for the integration of wind power in grid systems and for power network reliability based on the technical work finalized as scheduled on 15th of October 2009

- **Approach:** High Potential Market Model Partner
  - sustainable scenario approach based on year round and point in time
  - Challenge - Coupling between grid calculations – market calculations
- **Grid security, capability and flexibility**
  - Candidate reinforcement measures as an input to TYNDP
  - Pilot for flexible line management to enhance the existing grid
- **Operational Findings**
- **Harmonized requirements on European Level**
- **Quantification of costs & benefits**
  - EWIS studies identify wide range of integration costs for different locations
- **EWIS beyond 2015 results** as a starting point for detailed investigations of sustainable offshore grid infrastructure and offshore windpark cluster concepts e.g. for the time horizon 2020/2025

# European Wide EWIS Market Model



- The EWIS study is the first time that a year-round market analysis has been coupled with detailed representations of the networks
- The results from EWIS are relevant to prioritizing the reinforcement of network pinch-points and identifying beneficial additional measures to those already identified in National plans

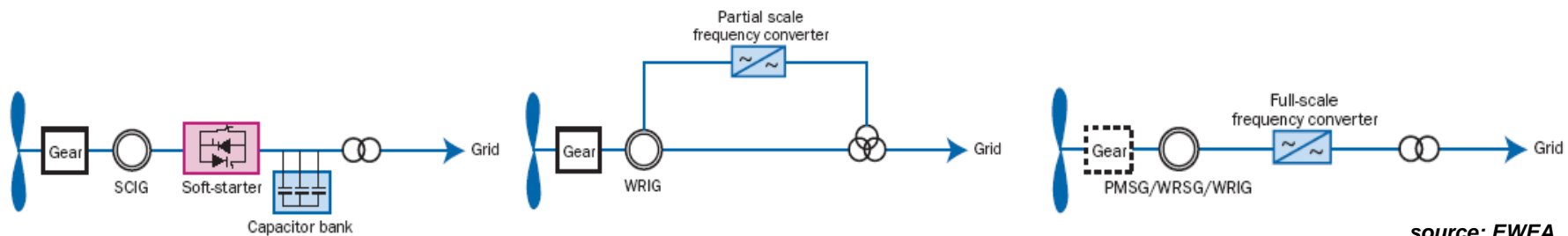
## *Grid Security, Capability and Flexibility*



- EWIS investigations found a significant potential for reducing congestion and maximising the use of existing transmission capacity
- Need to strengthen the existing grid with new grid infrastructure to maintain the existing level of system security
- The short term measures and candidate additional reinforcements identified by EWIS have been notified to the respective TSOs for further development and provided to ENTSO-E for inclusion into the ENTSO-E TYNDP



# Harmonized Requirements for Wind Turbines on European Level



source: EWEA

- EWIS technical analysis identified the need for Europeanwide and specific recognition of local issues
- EWIS has sought and obtained ENTSO-E agreement that Network Code work should progress as pilot. EWIS has provided basic inputs for the European Network Code development which are taken and have been further developed by ENTSO-E

## *Quantification of Costs and Benefits*



- EWIS developed a pan-European market model in order to improve power system economics to consider the present and the future development of wind support mechanisms and/or network access rules by year round simulations
- EWIS studies identified wide range of integration costs for different location



## *Operational Findings*



- While measures to strengthen transmission networks are being progressed in national development plans, EWIS assessments have also identified significant reliability and efficiency benefits that need to be achieved by enhancing operational arrangements
- Good experiences are already gained from inter TSO coordination such as coreso, CECRE, TSC, SEM, NOIS etc

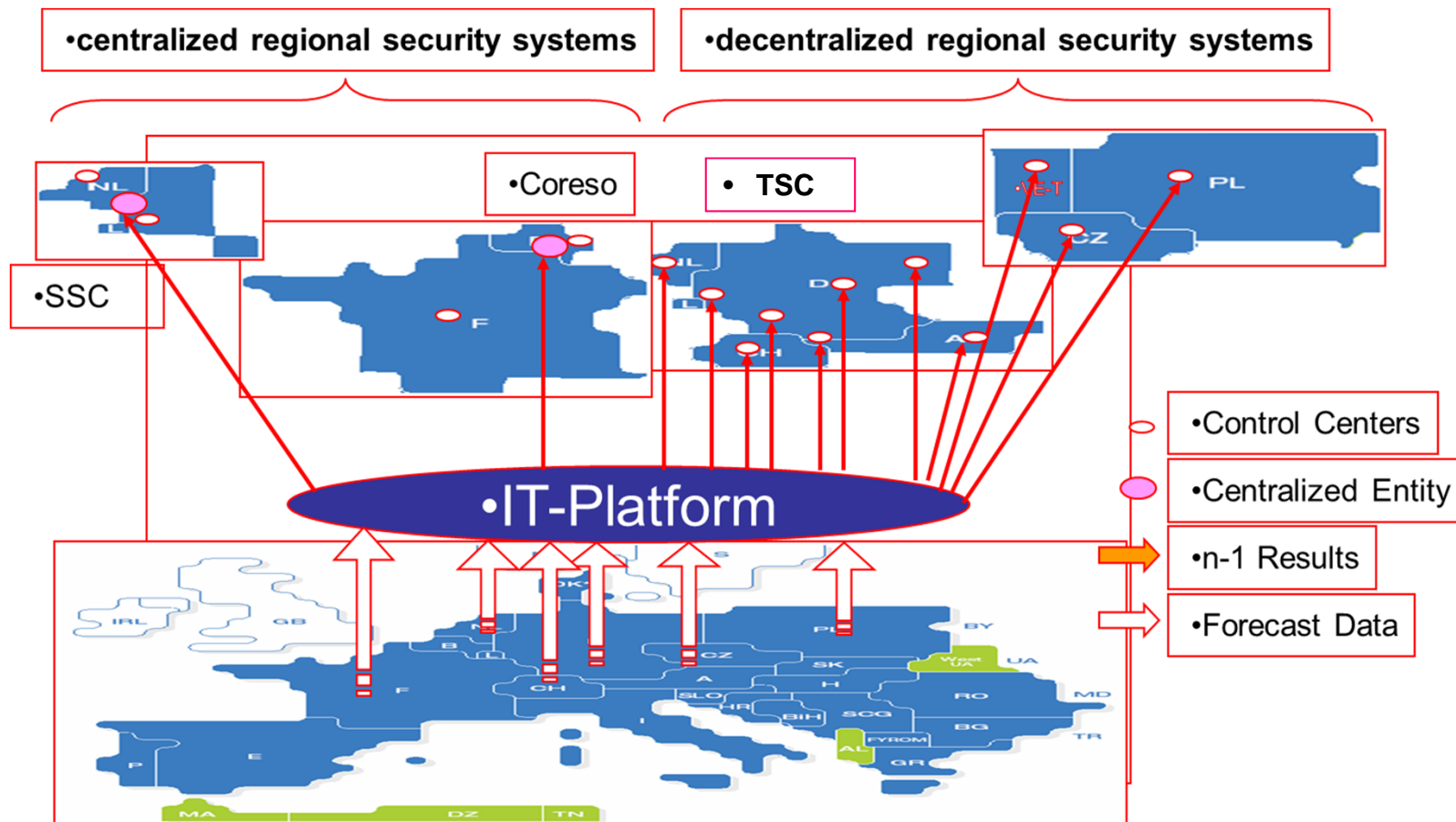


## *Operational risk mitigation*

### Coordination by TSOs on a regional and inter-regional level for congestion management and balance management

- Makes it possible to re-distribute the reserves, to reduce the risk of congestion and the risk of reserves that cannot reach their destination. When information is shared between TSOs, congestion in the transmission grid and on the border connections between control areas can be reduced.
- Sharing of real-time pan-European information (e.g. cross-border schedules, real-time cross-border flows, frequency) makes it possible, in case a critical situation is detected by one of the TSOs, that all the TSOs will be aware of this (so called Regional Awareness and Alarm System).
- Examples: Coreso, SSC, TSO Security Cooperation (TSC)

# TSO Security & Coordination



## *Operational risk mitigation*

### Sharing of operational planning information between TSOs (wind power forecast, grid layout)

- Risk of congestion in both transmission grids and on cross-border connections will be limited since better flow predictions can be made. Several countries use online weather forecast and the current weather situation for their predictions. In Germany forecast information and online measurements are shared between the four TSOs to enable its national inter-TSO equalisation scheme.

## *Operational risk mitigation*

### Better harmonisation of the regional market design

- Harmonisation of the regional market design can be implemented by the use of a commercial handbook, which has to be developed. When market designs are better harmonised, the risk of low to negative market prices and maximum prices will reduce. Furthermore, volatile market prices will be prevented and high balancing costs reduced.



## *Operational risk mitigation*

### Use of large scale energy storage (better use of existing storage or construction of new storage facilities)

- Large scale storage systems reduce the risk of imbalance and risks of control of wind energy in congested areas. Financially, storage systems can prevent volatile market prices because of their stabilizing influence. And, related to that, reduce the need for balancing in terms of less secondary reserve that is needed.

### Demand Side Management – Demand Side Response

- More and more, there is generation of electricity that can not be managed easily (e.g. wind and micro co-generators). In these situations management of demand can be helpful to provide a way to better match the electricity demand to the momentary wind power production, and therewith reduce the risk of control area imbalance.

## *Thank You For Your Attention*



**Detailed Presentations on ...**

**Market model & EWIS scenarios**

**Network strengthening findings**

**Operational findings**

**Quantification of costs & benefits**

**Policy findings and recommendations**

***[www.wind-integration.eu](http://www.wind-integration.eu)***