



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

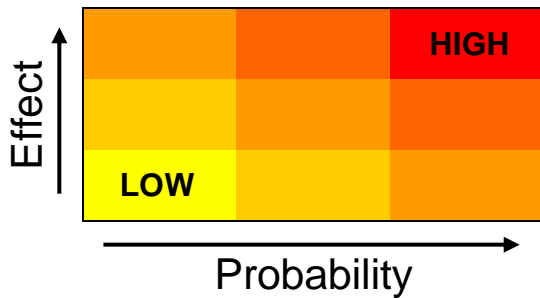
**EWIS Concluding Discussion
13th April 2010, Brussels**

**Operational Findings
Mr. Dennis Klaar**

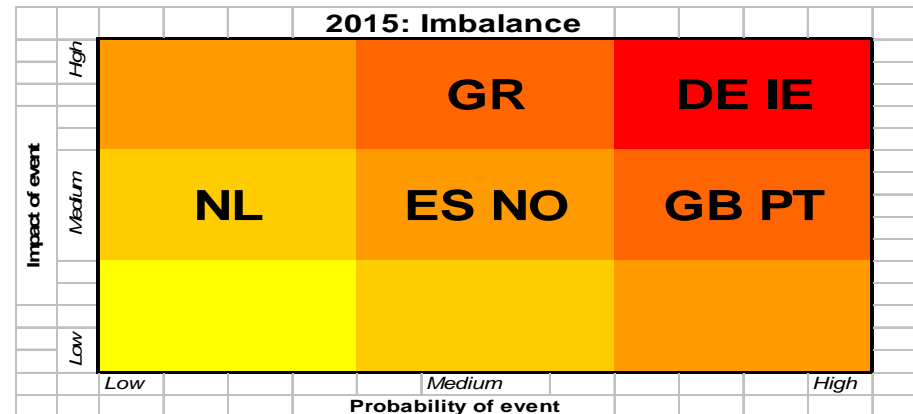
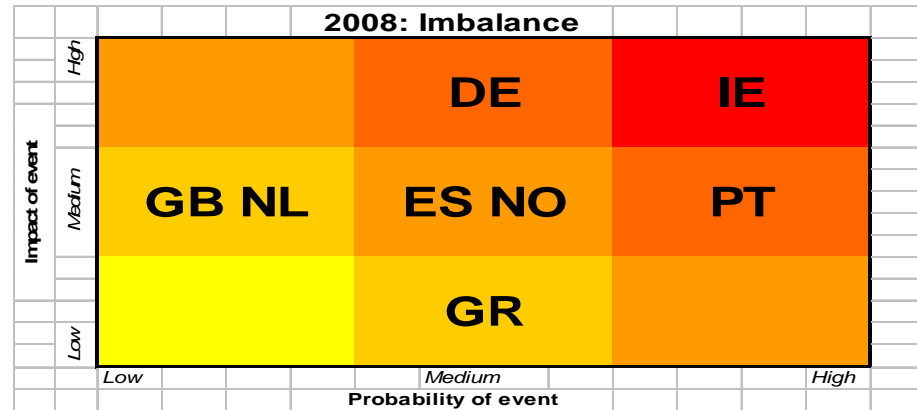


Operational risk assessment

Probability x Effect = Risk



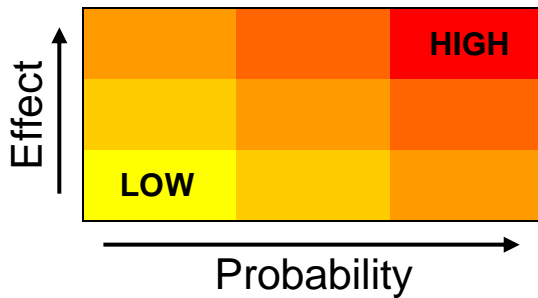
Risk development 2008 -> 2015



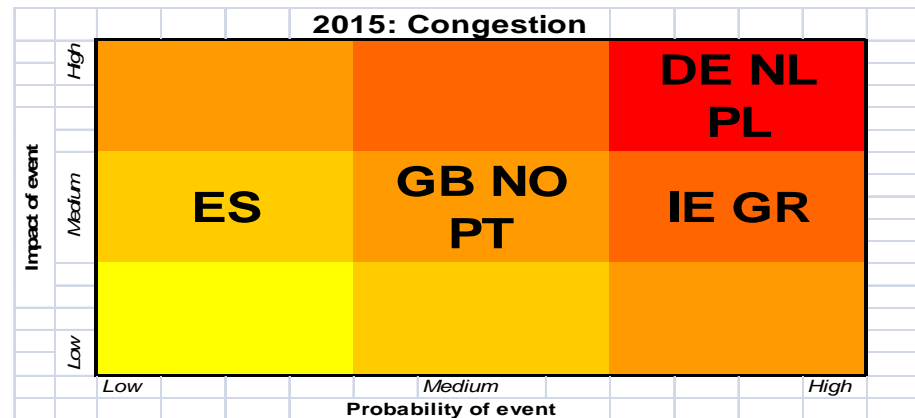
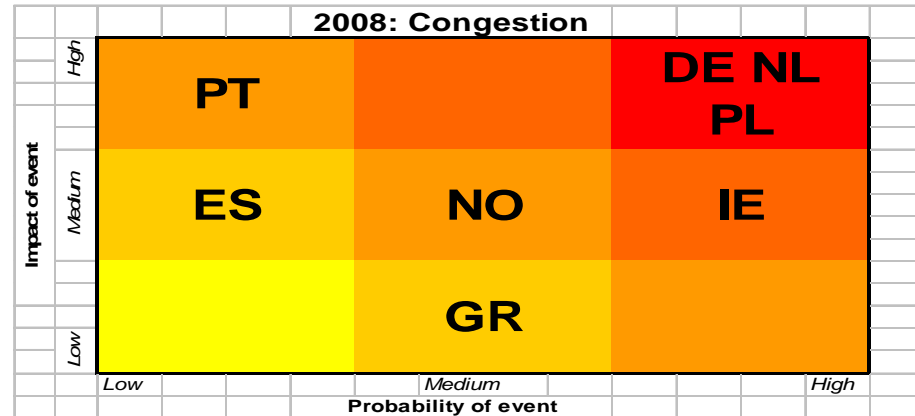


Operational risk assessment

Probability x Effect = Risk



Risk development 2008 -> 2015



Operational risk mitigation

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

- Monitoring and anticipating critical situations in the grid
- Redistribution of reserves
- Coordinating countermeasures (e.g. phase shifters coordination, cross-border redispatch)
- Challenge: mechanism for sharing and recovery of cost for countermeasures
- Preventing and/or reducing congestion and area imbalance
- Examples: Coreso, SSC, TSO Security Cooperation (TSC)

Operational risk mitigation

Sharing of operational planning information between TSOs

- Sharing of pan-European information (wind power forecast)
- Improving power flow predictions in the grid
- Improving outage scheduling
- Enabling flow-based capacity assessment
- Preventing congestion and area imbalance
- Maximization use of available capacity

Operational risk mitigation

Wind power management in case of jeopardized system security

- Controllability of active power of wind power plants
- Preventing and/or reducing area imbalance and congestion
- Example in Spain: Renewable Energy Source Control Centre (RESCC) connected to Control Centre for Renewable Energies (CECRE)



Operational risk mitigation

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

- Controlling wind energy in congested areas
- Reduction of needed secondary reserve
- Preventing and/or reducing area imbalance and congestion
- WG 5 has made cost investigations for DE, NL, ES and the Alps region



Operational risk mitigation

Demand Side Management

- More volatile generation of electricity in the grid
- Matching of electricity demand to momentary power production
- Preventing and/or reducing of area imbalance



Operational risk mitigation

Better harmonization of the regional market design

- Reducing low to negative market prices and maximum prices
- Preventing volatile market prices
- Reducing high balancing costs