



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

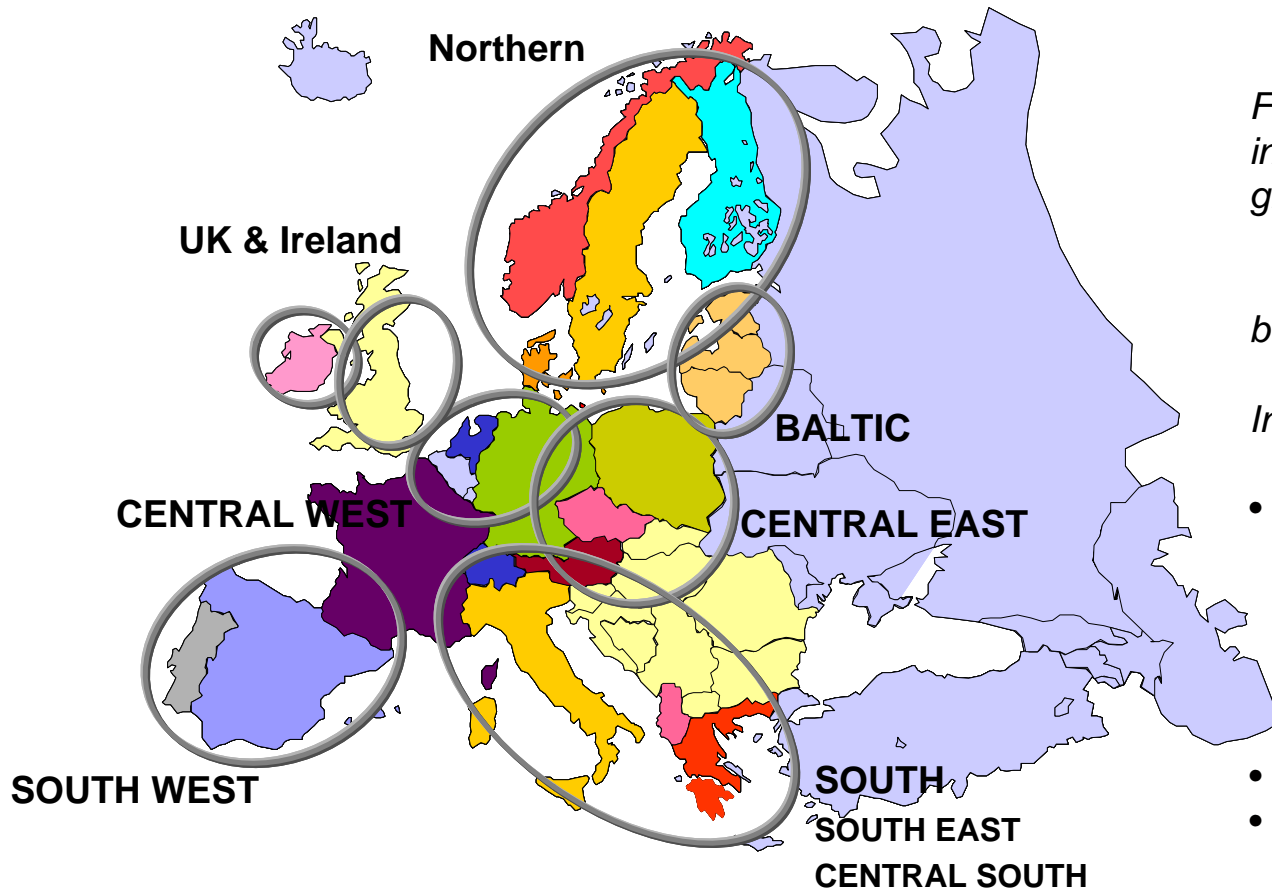
**EWIS Concluding Discussion  
13th April 2010, Brussels**

**Network Strengthening findings  
Mr. Peter Van Roy**

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- Regional Approach
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# Power System Analysis Regional Approach



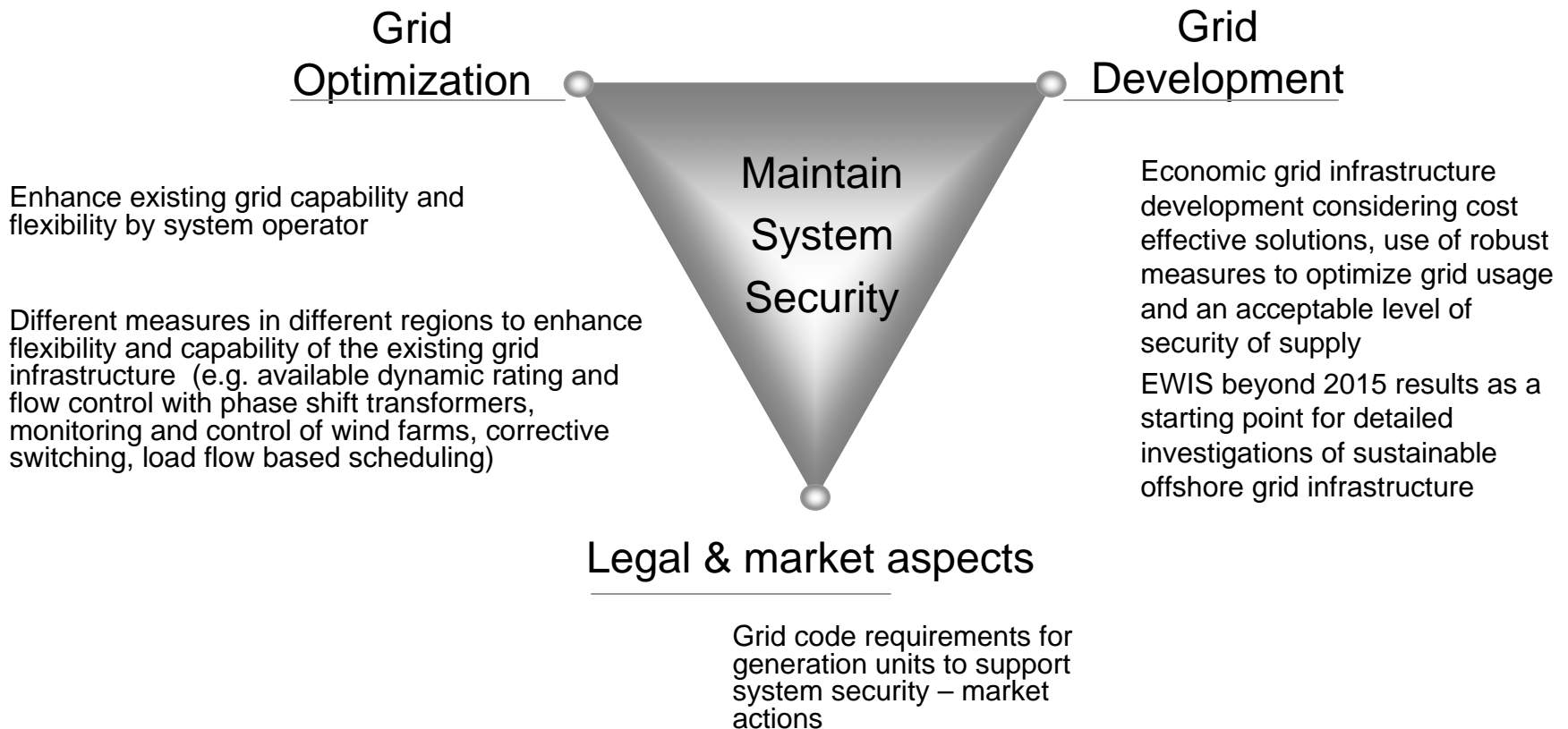
*Finding situations which indicate regional or global impacts...*

*bottom up process...*

*Input for market/grid model:*

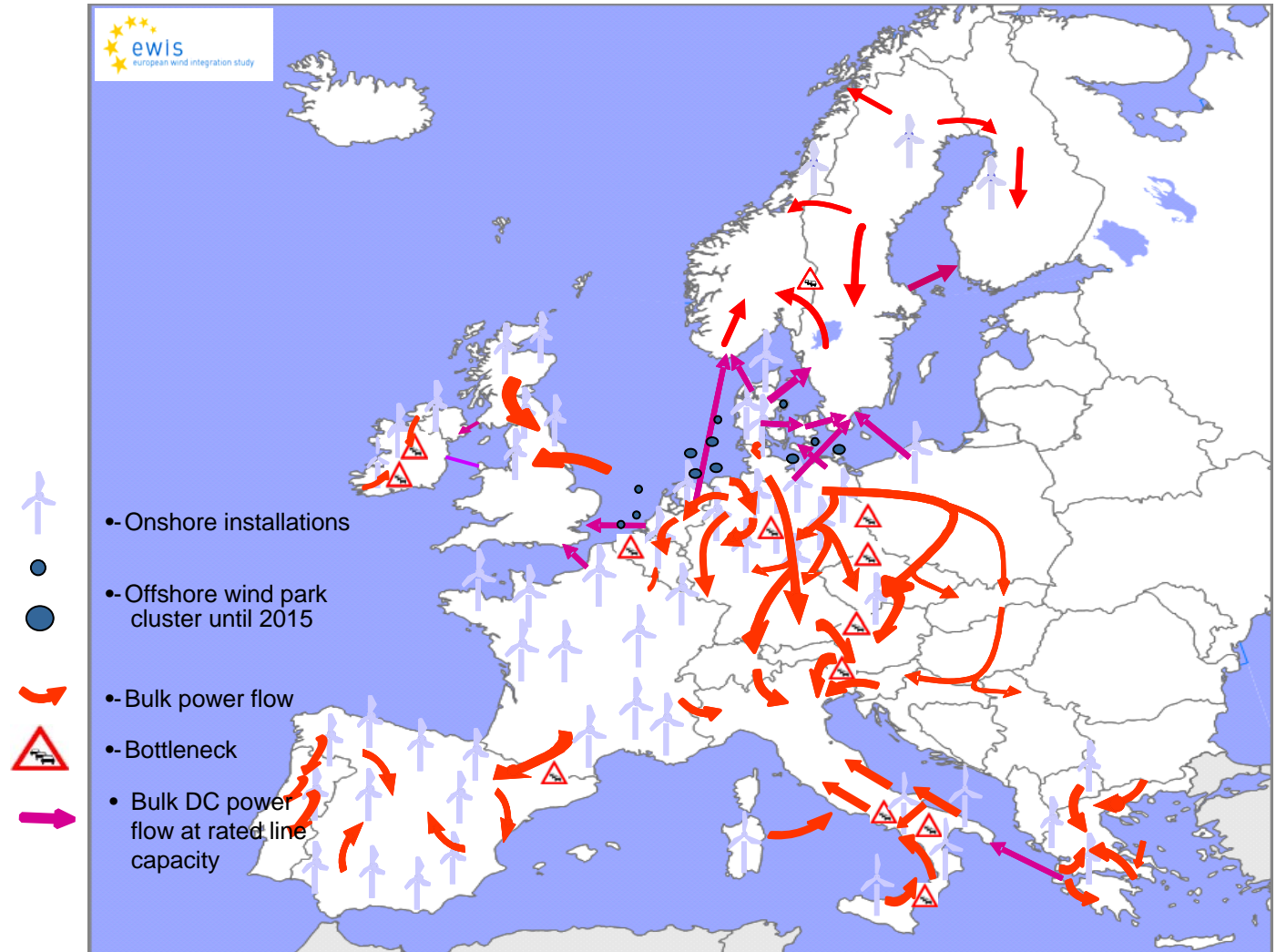
- *Cooperation to existing studies*
  - *UCTE IPS/UPS study*
    - *Dynamic data*
  - *TradeWind study (EWEA)*
    - *Wind scenarios*
  - *...*
- *Regional models 2013*
- *Questionnaire for 2015*  
*(data provided by indiv. TSOs)*
- *Model upgrade for 2015*

# Relationship of Technical Issues



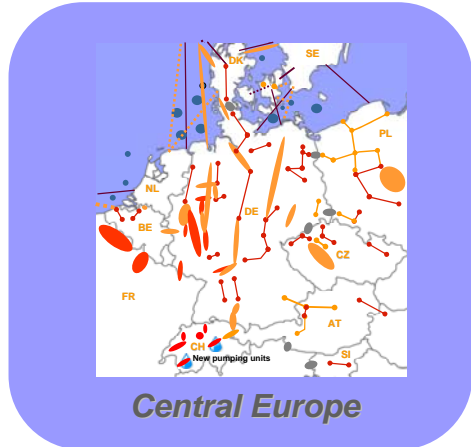
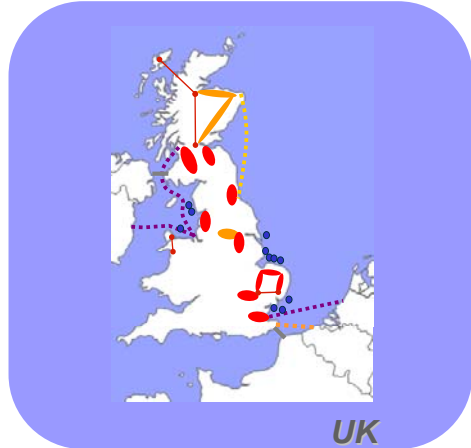
# 2015 Risk Analysis

- 1) Existing planned network developments generally sufficient for high wind scenarios in south of Europe; but
- 2) Additional risk mitigation measures and reinforcements needed to accommodate high wind conditions in Northern Europe.



# Network strengthening

## Confirm existing + identify additional



- Longer-term measures ~€10.5b (€120/kW wind i.e. ~€4/MWh)

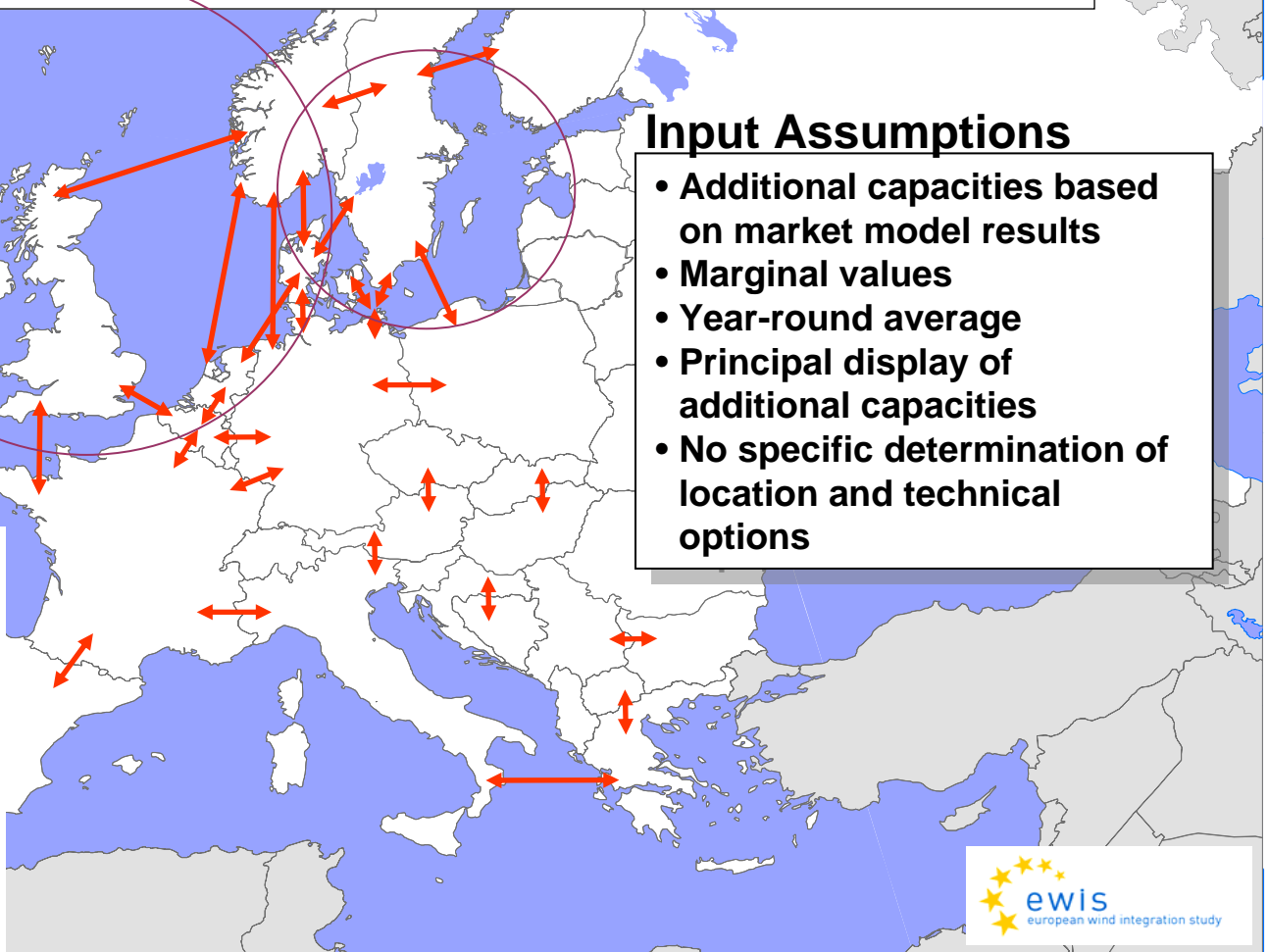
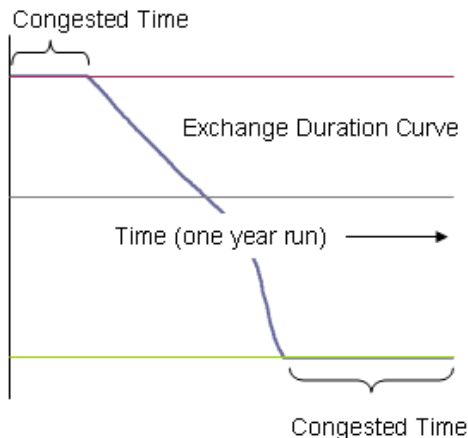


## Effects of wind modelled on increased cross-border capacities

- Enhanced Network Scenario 2015 and beyond -

### Input Assumptions

- Additional capacities based on market model results
- Marginal values
- Year-round average
- Principal display of additional capacities
- No specific determination of location and technical options

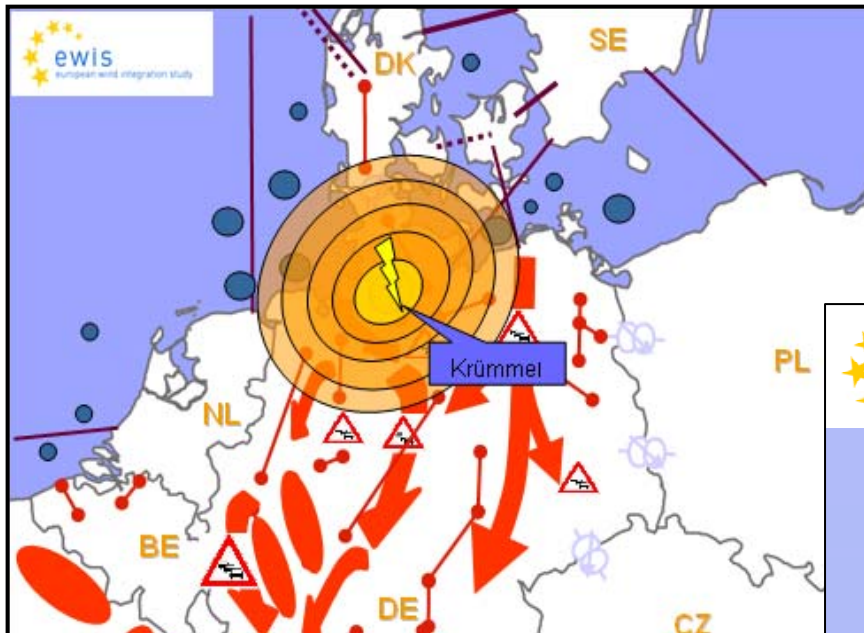


## *Priority areas for immediate action*

1. ENTSO-E TYNDP
  - EWIS findings and recommendations for the future European wide coordinated planning of the electricity grid within ENTSO-E
  
2. Progress urgently needed grid infrastructure projects in existing national grid development plans
  - Permitting procedures for grid investments have to be accelerated
  
3. Start to analyze for the longer term (2020/2025) potential of Offshore grids interconnecting wind farms and countries across the sea and including the implications on Onshore grids.

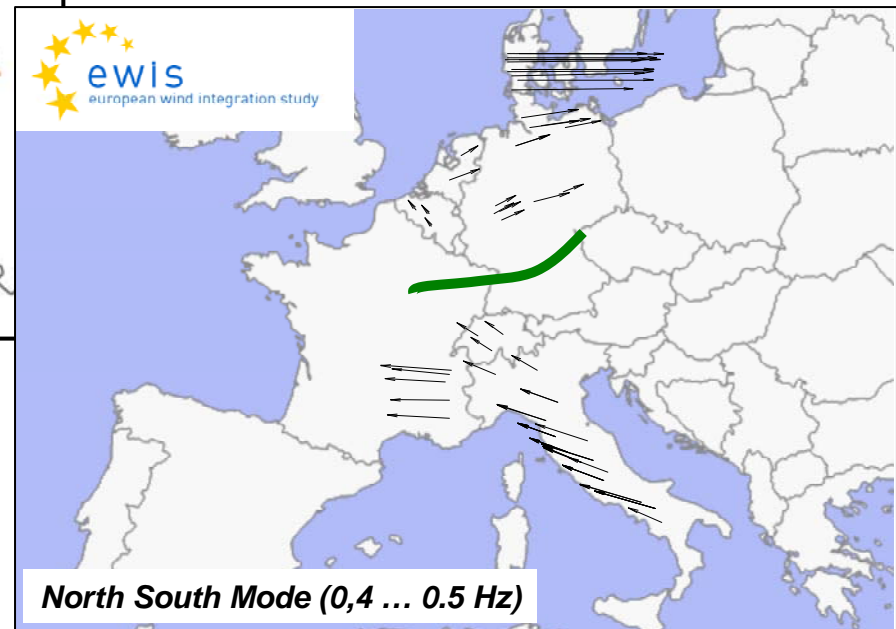


# Stability & security assessments



- Security achieved with expected fault ride through performance

- Stability measures (stabilisers, etc) adequate but increasingly important as enhanced line ratings exploited



# *Wind Network Compatibility*

The following objectives summarize the need for grid codes

- Definition of technical standards for grid connectivity for the prevention of large outages of wind power generation and voltage collapse caused by wind turbines.
- Adequate FRT requirements, which could also include support to the voltage restoration, and reconnection conditions when tripping
- Provision of voltage and frequency control
- Establishment of mechanisms for monitoring and control in real time of wind power by the TSO and fulfillment of grid code compliance
- Repowering capabilities and treatment of the non-compliant wind generation in case of system faults and security management measures in emergency cases.