Senergy Econnect

Energising Renewables

European Grid Code Developments

By Dr. Sigrid M. Bolik

EU 27
20% renewable by 2020

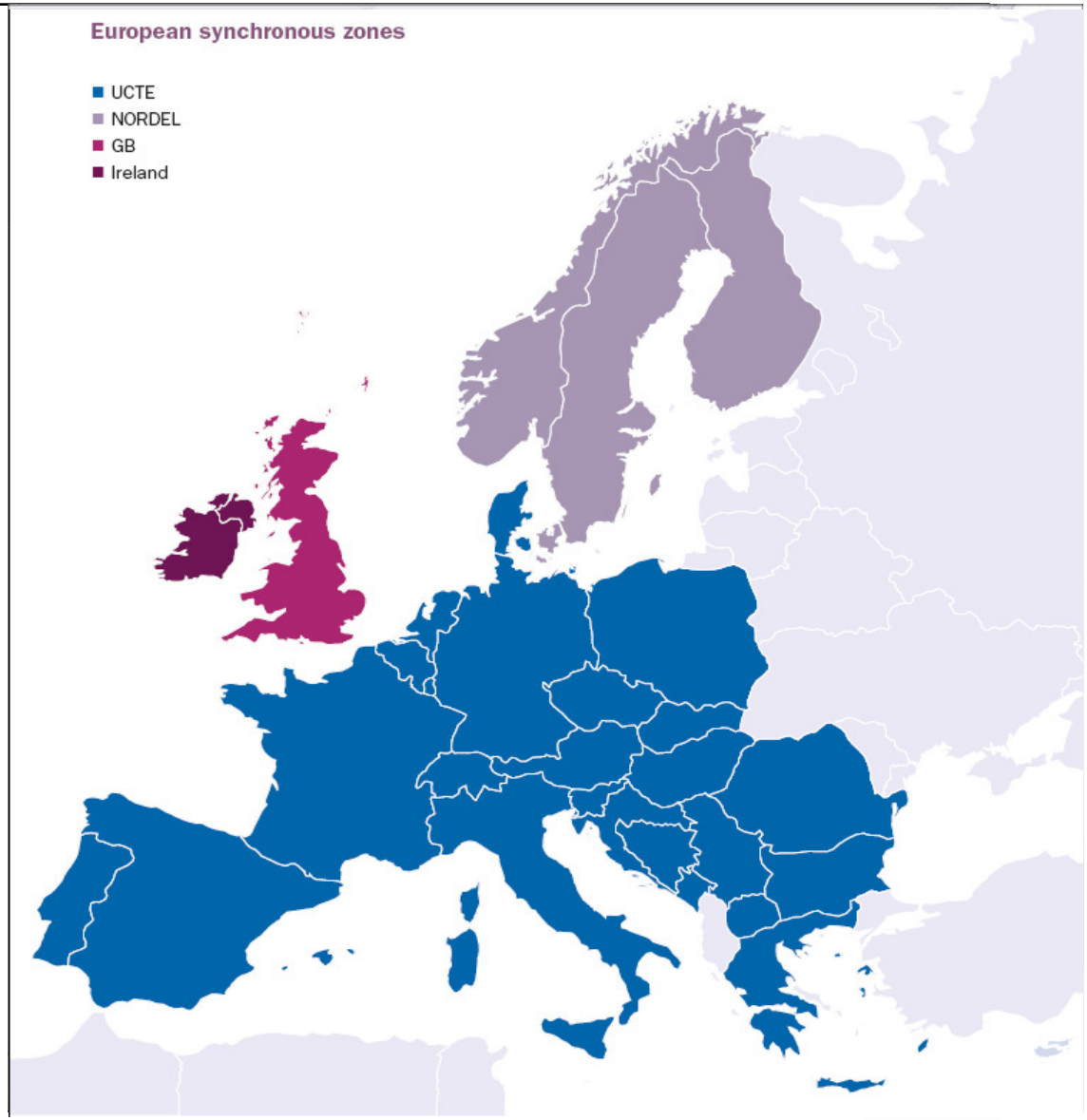
- European cooperation
- Increased integration of wind power into the network

Facilitators

EWIS

TradeWind

TradeWind



TradeWind & EWIS-study Objectives

To seek proposals for a generic and harmonised European wide approach towards wind energy issues addressing:

- operational/ technical aspects including grid connection codes,
- market organization
- regulatory/market-related requirements,
- common public interest issues
- general aspects impacting the integration of wind energy

TradeWind

"Wind power integration and exchange in the Trans-European Power Market"

- To formulate recommendations on market rules and interconnector allocation methods to support wind power integration
- Propose solutions to facilitate maximum exchange of wind electricity via markets
- Formulate recommendations to TSO's, generators, market parties, authorities, TEN-E

econnect

TradeWind & EWIS- Study
Study Basis

Jan 07 – Oct 09

- Medium penetration
- Short/medium term 2008-2015
- Detailed power system study
- Maintain frequency and voltage stability, secure operation of grid / risk assessment
- Harmonised grid connection requirements
- Market models and procedures

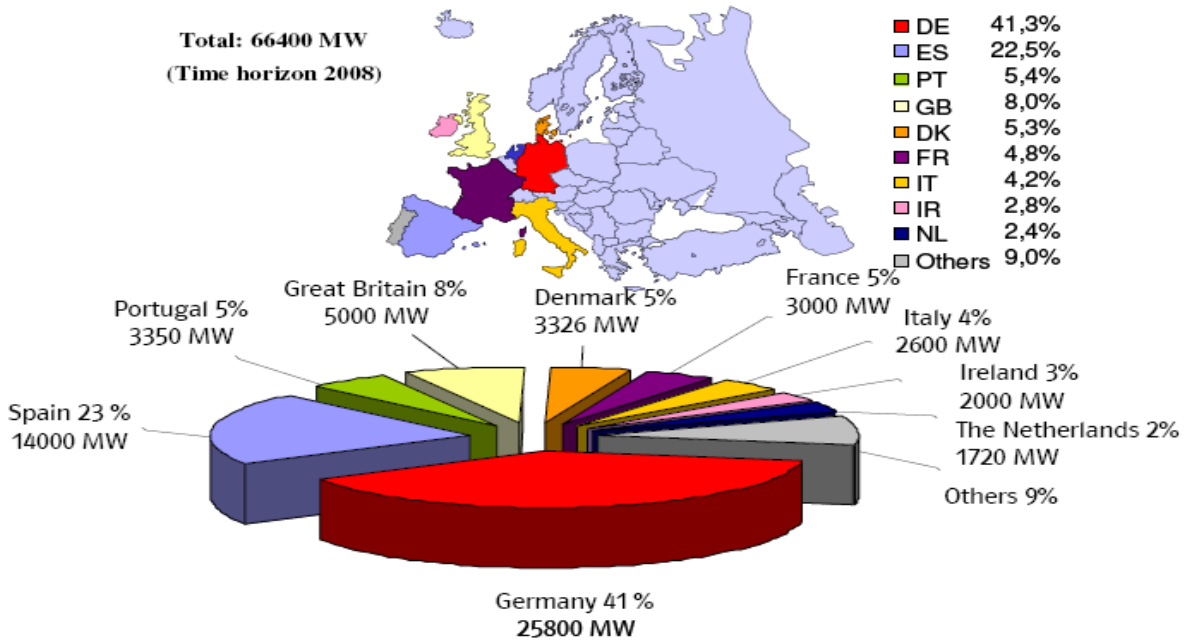
Nov 06 – Oct 08

- Large wind power penetration
- Short to long term 2030
- Wind power scenarios and generation
- Equivalent grid model
- Transmission infrastructure and operation
- Market rules and organisation

EWIS-Study
First Results

Present Situation (MS1) – First Results
Wind Power Integration all over Europe

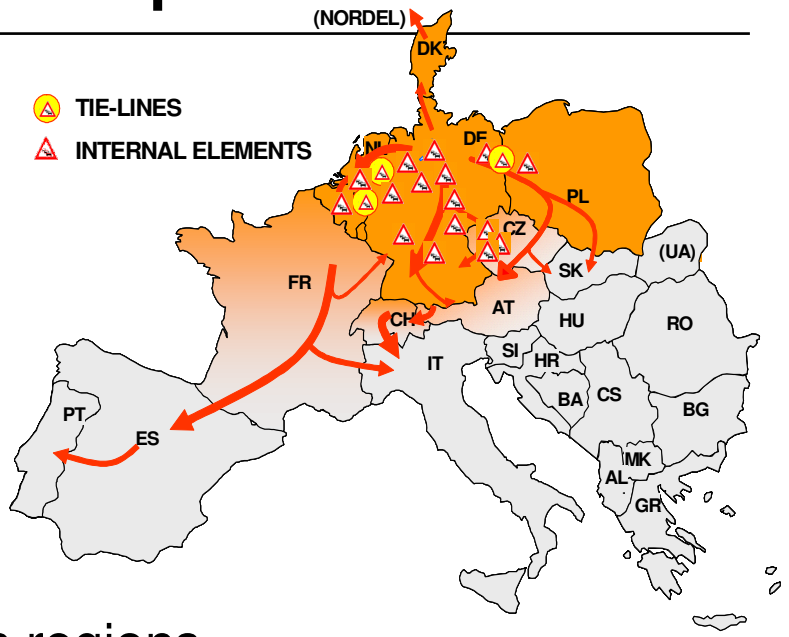
High wind power increase from 41 GW in 2005 to nearly 67 GW already in 2008 with a concentration in only 3 countries which represent more than 70% of the total installed capacity



**European Wind Integration Study (EWIS) Towards a Successful Integration of Wind Power into European Electricity Grids, Nordel Seminar, Jan 08*

EWIS - Study
1st phase results

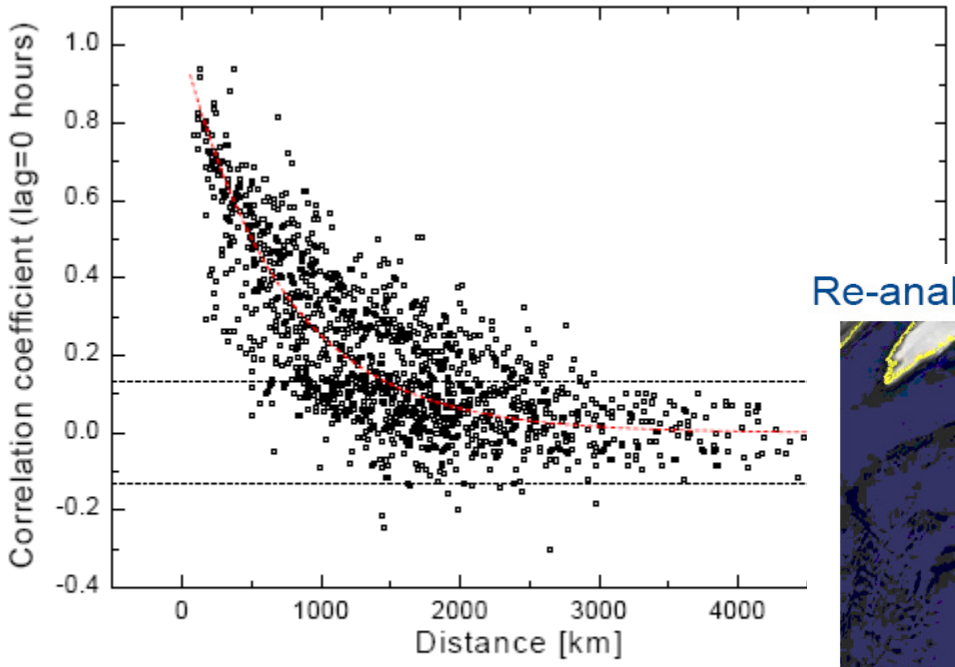
- High wind power production causes regional overloading of transmission lines
- EWIS confirmed the grid reinforcement already investigated on national level
- TSO started the necessary grid enforcements activities in those regions



- Congestion management:
  - •Power flow control by phase shifters in regions
  - • surplus of wind creates large temporary to neighbouring transmission systems
- FACTS devices for reactive power compensation planned
  - • increase voltage quality and decrease grid losses

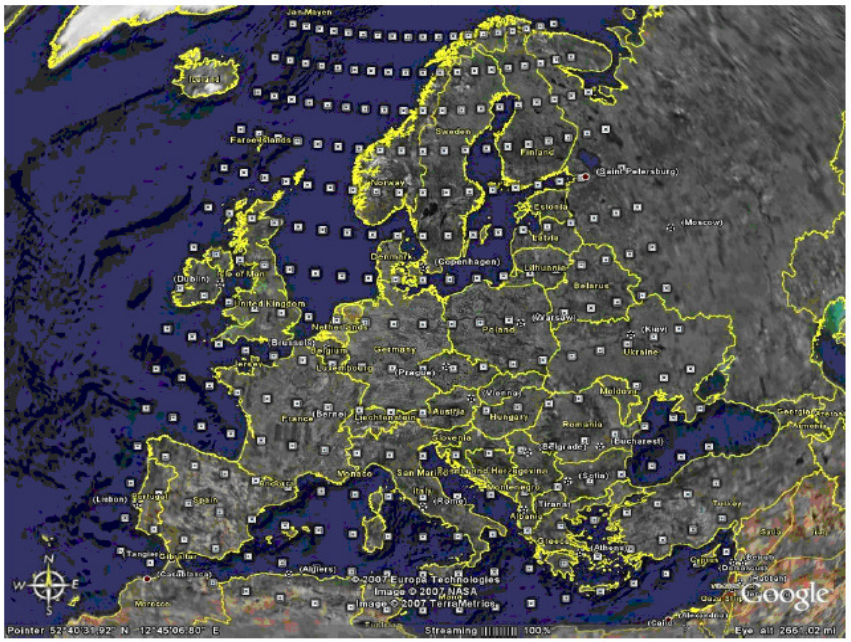
**European Wind Integration Study (EWIS) Towards a Successful Integration of Wind Power into European Electricity Grids, Nordel Seminar, Jan 08*

Averaging effect
Wind Speed Time series



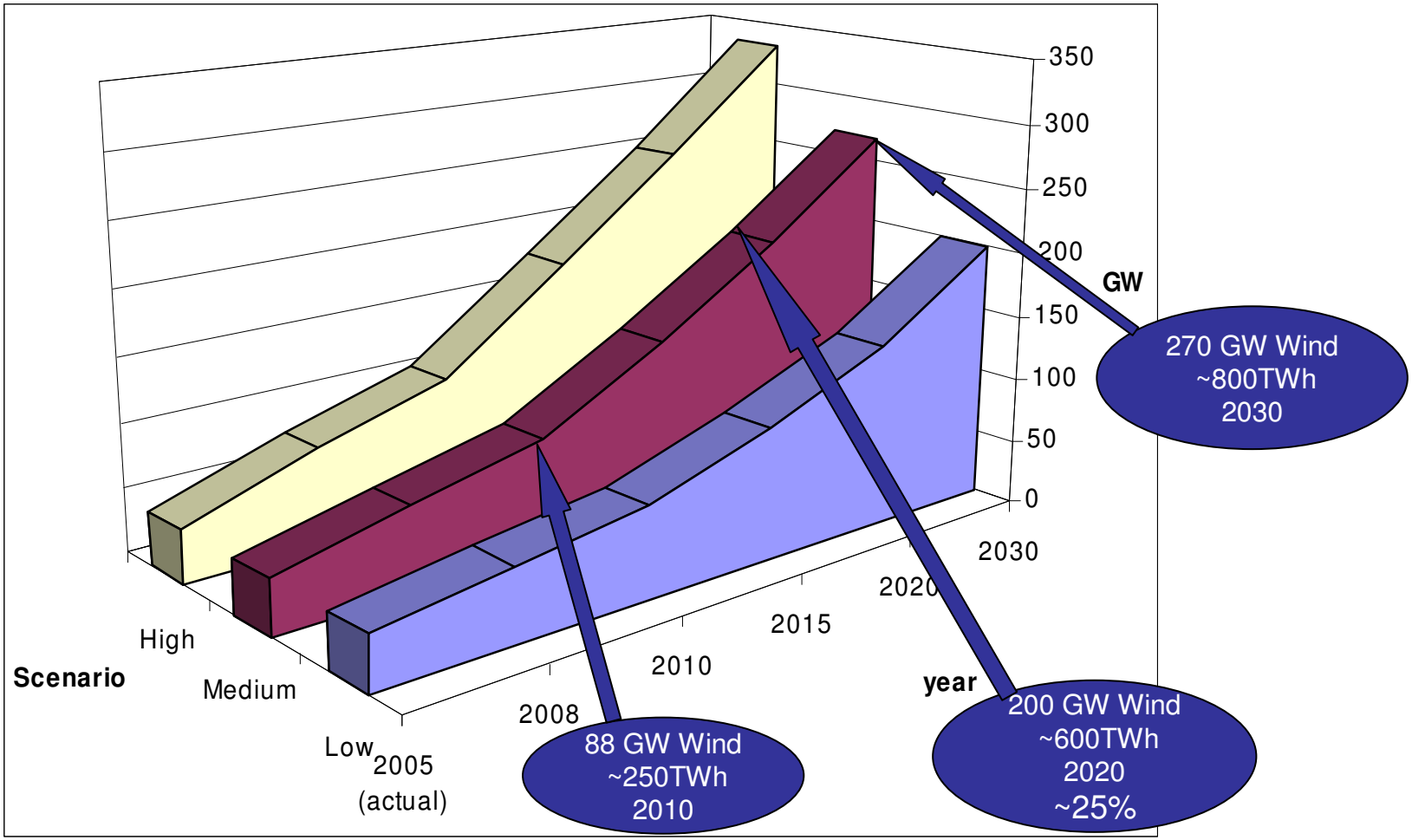
Source: Gregor Giebel (Risoe)

Re-analysis Data Points (RDPs) (2.5°, ΔX~180 km, ΔY ~280 km)



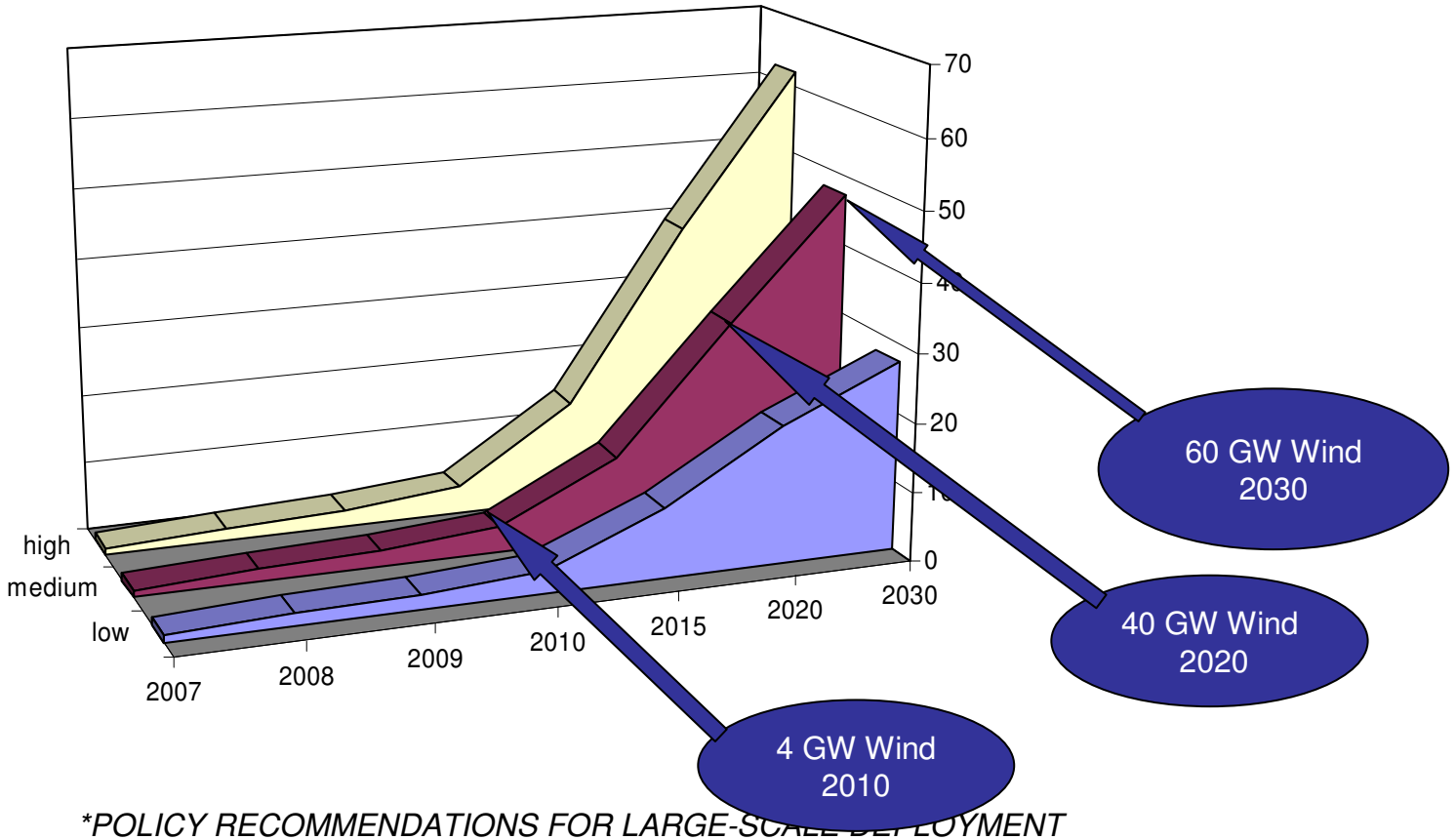
TradeWind results

Projected Wind Power Capacities



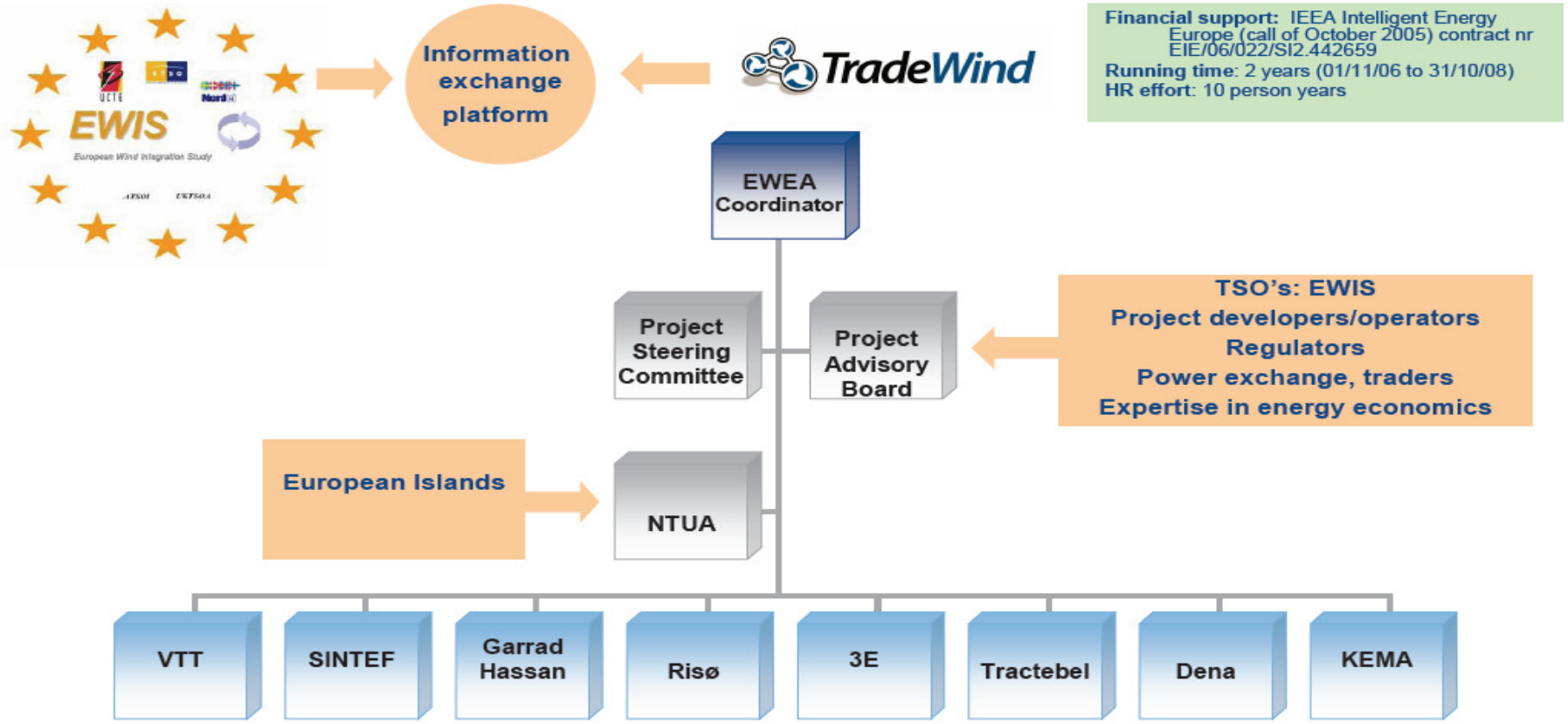
*EU Tradewind Work Package 2: Wind Power Scenarios
WP2.1: Wind Power Capacity Data Collection, April 2007

EU Offshore



**POLICY RECOMMENDATIONS FOR LARGE-SCALE DEPLOYMENT OF OFFSHORE WIND POWER IN EUROPE BY 2020*
Delivering Offshore Wind Power in Europe

TradeWind consortium

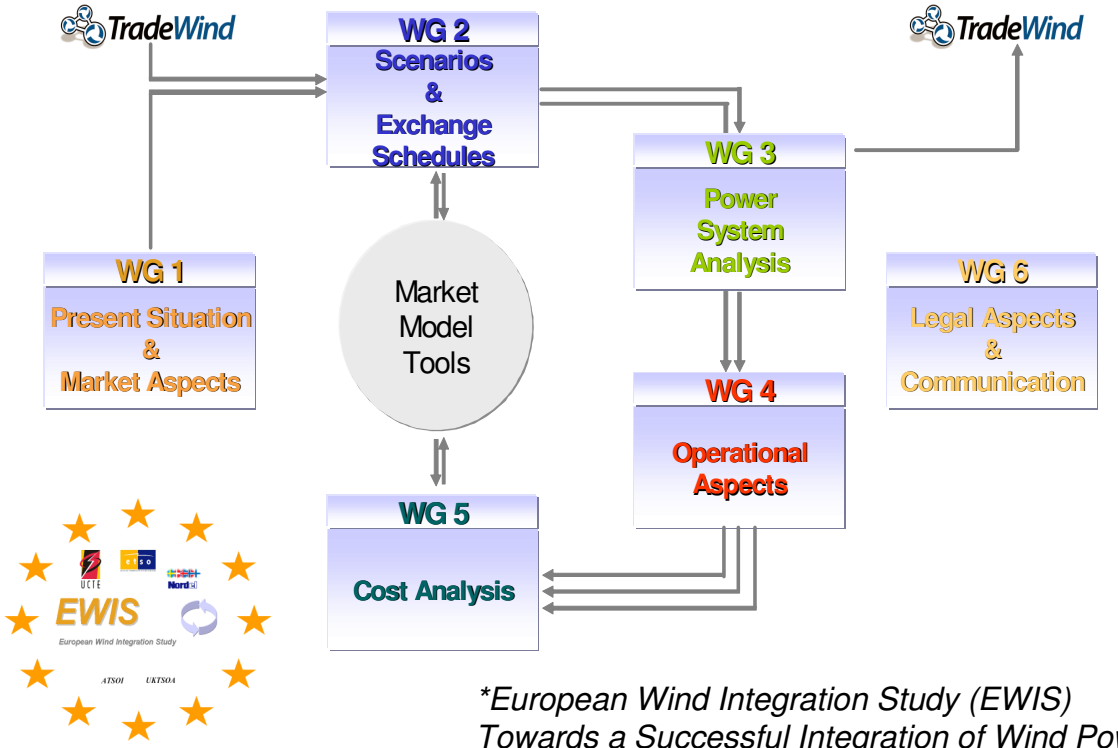


TradeWind
Project Approach

Phase 1 Preparation			
6 months	WP2 (GH) Wind power scenarios	WP3 (Sintef) Grid modelling and power system data	WP4 (Risoe) Identification of market rules
Phase 2 Simulation and analysis			
12 months	WP4 (VTT) Continental power flows	WP6 (Sintef) Grid scenario's	WP7 (3E) Analysis of market rules
Phase 3 Recommendations			
6 months	WP8 (EWEA) Recommendations for grid upgrade, market organisation and policy development		

EWIS-study

Lead transmission system operators	Country
Elia System Operator (Coordinator)	Belgium
ČEPS, a.s.	Czech Republic
Energinet.dk	Denmark
E.ON Netz GmbH	Germany
RWE Transportnetz Strom GmbH	Germany
Vattenfall Europe Transmission GmbH	Germany
EirGrid plc	Ireland
Hellenic Transmission System Operator	Greece
National Grid	United Kingdom
PSE-Operator	Poland
Red Eléctrica de España	Spain
Rede Eléctrica Nacionalis	Portugal
Réseau de Transport d'Electricité	France
TenneT TSO B.V.	Netherlands
Verbund – Austrian Power Grid AG	Austria



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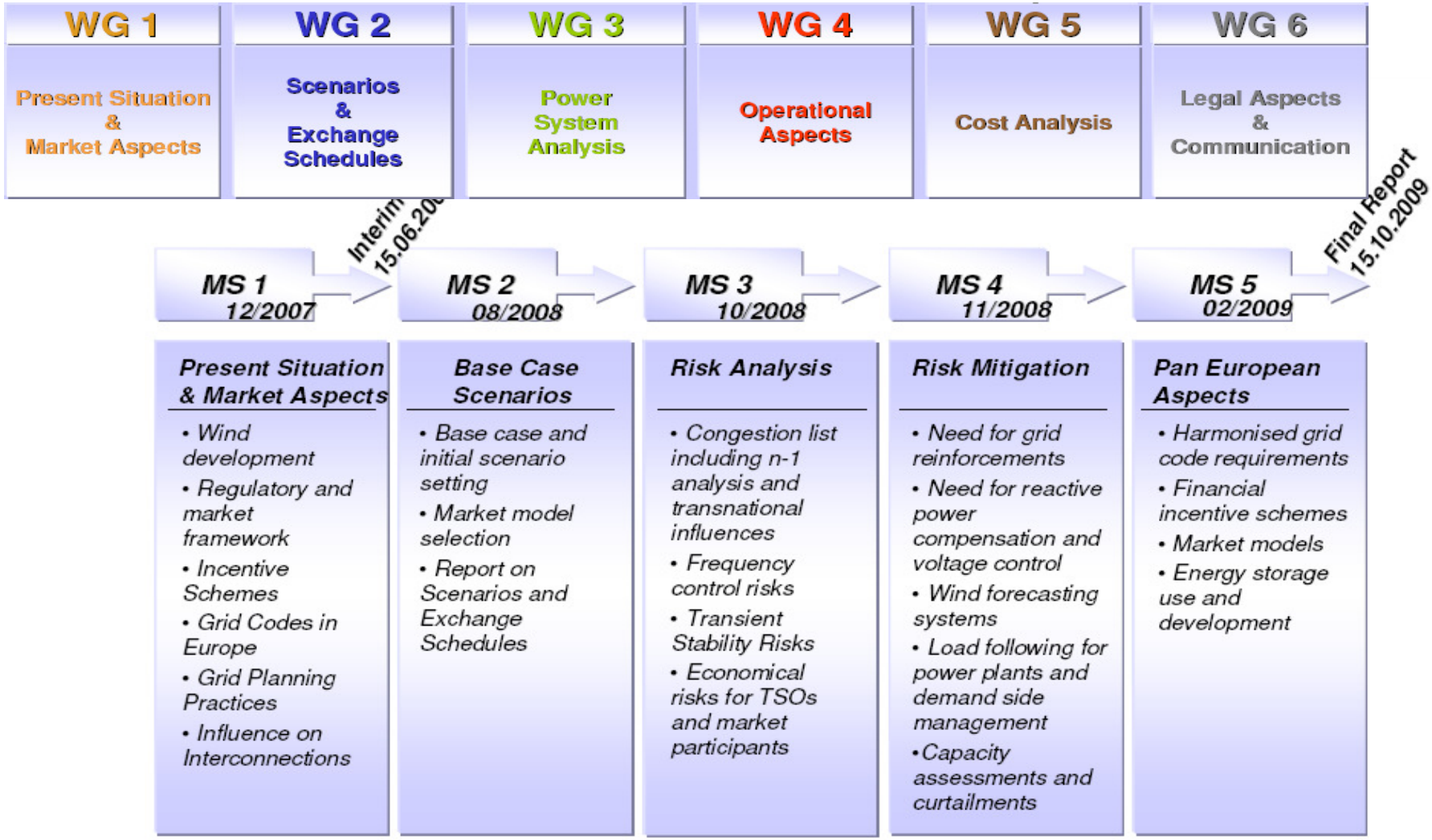
EWEA WG GCR

IEA Task 25

EWIS-Study



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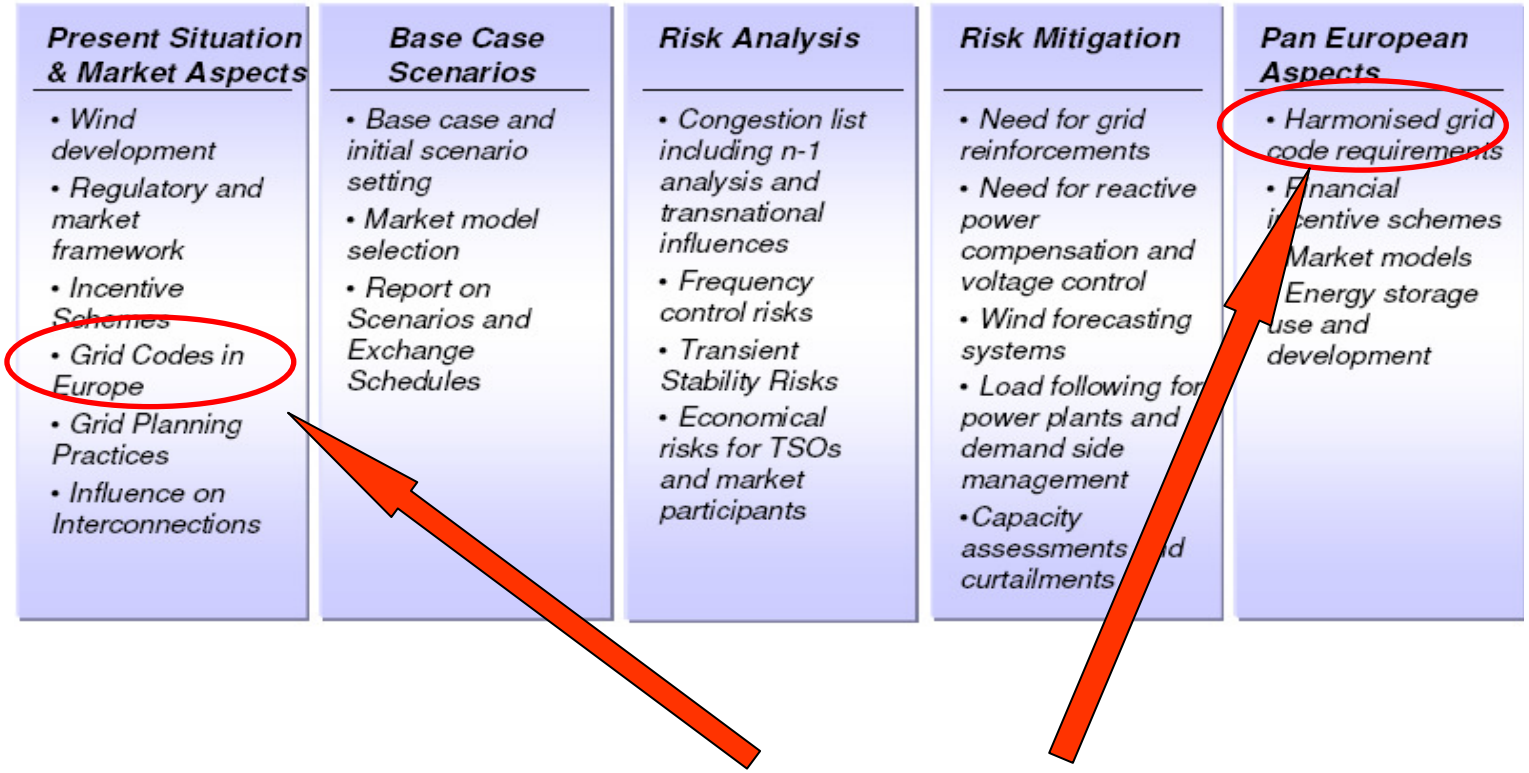
Wind Industry initiative
EWEA WG GCR



Wind industry position

EWEA WG Grid Code Requirments

Wind Industry initiative

EWEA Working Group Grid Code Requirements

- WG members:
  - Manufacturers

    Acciona Windpower, Alstom Ecotecnia, Enercon, Gamesa, GE Energy, Nordex, Repower, Suzlon, Siemens, Vestas

    ABB, Hansen, Pauwels, Converteam
  - Wind farm developers / operators

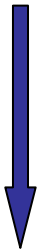
    Acciona Energia, EED, Iberdrola, RES Group
  - Consultants / service providers

    Windtest,Ecofys, Germanischer Lloyd, Garrad Hassan, E2Q, Econnect, FGH
  - Associations

    BWEA, AEE, VDMA, FEE, FGW, EWEA
- Established in 2007, produced a position paper beginning of 2008.
- Meeting with EWIS WG 3 12 Dec 08

Wind Industry initiative
EWEA WG GCR

- European Grid Code Requirements for Wind Power Generation
  - Grid Code Concerns:



    - Frequently changing
    - Different language than English
    - not comprehensive and clear
    - certification

  - Harmonised european grid code
    - An immediate complete technical harmonisation is not appropriate
    - WG proposes a two step approach:
      1) Structural harmonisation: common template
      2) Technical harmonisation: adapting existing national Grid Codes to the common template

Wind Industry initiative
Benefits and outlook

- Benefits:
  - For the manufacturers: common hardware and software platforms > reduced costs
  - For the developers: reduced costs from above
  - TSO's, especially in emerging markets as an aid for developing own Grid Code

- Technical basis for the requirements to be further developed in joint effort with TSO's (EWIS, IEA, TP Wind, FP7 etc.)
- Next step: EWEA to issue a Generic European Wind Grid Code
- This proposal for harmonisation will set a strong precedent for the rest of the world.

ERGEG

European Regulators Group for Electricity & Gas