

WG3 Wind Integration

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Main priorities

- q Wind power plant capabilities
- q Grid planning and operation
 - § accelerated/improved extension and reinforcement
 - § Improved/ optimised operation of existing grid
- q Energy and power management
- q Energy markets

Agenda proposal

q 11-12:30

§ Issues from Nov meeting to research actions,
short/medium/long term

q 14-16

§ Budget. Impacts. Demos. Infrastructure, ...

q 16:30-18

§ Links between WGs/questions from secretariat.

§ Comments to the text

q Division to groups needed?

Wind power plant capabilities - issues

- q Ancillary services
 - § FRT, active power /voltage control
 - § Possibility to support black start
- q What elements should be included in grid codes –
 - § What can be complied by wind farms
 - § What is necessary for the system operation
 - § Compliance testing
 - § Validation (models and testing)
 - § Harmonisation
- q Economic and financial impacts of providing ancillary services by wind farms – costs and benefits
- q IT needs – online information to TSOs

Wind power plant capabilities – R&D actions

- q Grid code requirements for cost effective and reliable power system
 - § Define Grid codes requirements directly applicable to WT technology, Terminology and concepts.
 - § Circumstances and system characteristics under which each capability is required,
 - § Determine means of verification of specific capabilities and methods of proving compliance
 - § Improved methods for standardised IT services to TSO (real time data, control functions, forecasting)
- q Fault-ride-through
 - § Monitoring and prediction of voltage dips,
 - § How fast and what the reactive support should be, (different connection points)
 - § Detailed simulation and field measurements to find out what happens at WT/WF connection point during symmetrical and unsymmetrical grid fault, better understanding on the influence of requirements upon WT electrically and mechanically
 - § Define and standardise the method for compliance validation (measurement/simulation)

Grid planning, extension and operation - issues

Accelerated extension and reinforcement, Transmission adequacy

- q Transmission capability the main barrier.
- q Strong planning, early forecasting of bottlenecks
- q Transmission technology
- q European wide planning, interconnections,
- q Accelerated permitting and construction of transmission routes
- q Planning transmission for low capacity factor resource
- q Maintaining security and reliability

Improved operation

- q European wide operation, TSO collaboration in a coordinated way
- q Development of operational tools and techniques to take account wind characteristics
- q IT and data acquisition (online and operational data)
- q Predictions for local grid operation (no smoothing effect): improvements needed
- q wind power management as integral part of grid operation
- q SmartGrid

Models/simulation tools

- q Validation, implementation, on-going process with requirements and models, generic WT/WF models

Grid planning and operation – R&D actions

- q Improved operation, interoperability
 - Short term - Development of operational tools and techniques for data acquisition (online and operational data, wind characteristics),
 - Short term - wind power prediction tools for (local) grid operation.
 - Medium term · European wide operation, TSO collaboration,
 - Medium term · European wide DSA
 - Medium term · Wind power management as integral part of grid operation.
 - Long Term SmartGrids – merging of Transmission and Distribution
- q Accelerated and sustainable extension and reinforcement, transmission adequacy
 - Medium term Transmission technology,
 - Medium term · European wide planning, interconnections,
 - Medium term · Maintaining security and reliability,
 - Medium term · Consideration of expected European wide wind power development and long term forecasting of transmission bottlenecks
 - Long Term Planning transmission for low capacity factor resource.
- q Models/simulation tools
 - Short term Validation, implementation, ongoing process with requirements and models, generic WT/WF models.
 - Medium term Tools for dynamic calculations of the interconnected European power system.

Energy and power management - issues

- q Increasing the flexibility in the system – generation, demand, storage
 - § Flexibility in DSM / Transport sector, flexible demand options
 - § CHP and heating sector and heat storages (heat pumps, electrical boilers)
 - § Large hydro power (reservoirs, pumped hydro)
 - § Storage options: amount, economic value of. long term needs, system operation (not dedicated backup to wind), plug-in vehicles, all RES system
 - § Virtual power plants – dealing with variability
- q IT, on-line knowledge for TSOs, collect and use in management,
- q Probabilistic methods for decision tools, (distributed) dispatch, using predictions and uncertainties of wind
- q Prediction improvement: improvements especially for extreme cases still needed. Integrating and implementing forecasting, operational, constantly updating information
- q Variability of wind and forecast errors different time scales - Simulations European level – Future power systems 2020-2030 - models/tools with wind
- q Rules and regulations different in different countries – R&D on what is really needed for reliability
- q Wind power and microgrids

Energy and power management – R&D actions

q System operation

- § Optimized use of prediction systems for power system operation. Integrating wind power forecasting in operational tools, constantly updating information and with uncertainty estimates. Improvements to forecasting that are needed from system operation point of view, especially for extreme cases,
- § Artificial Intelligence and probabilistic methods for decision tools, (distributed) dispatch, using prediction and uncertainties of wind power, adapted to the competitive market,
- § European dimension of energy management systems to benefit from smoothing of wind variations and international balancing resources
- § IT, online knowledge for TSOs, collect and use in management,
- § Investigate solutions for load management and flexible operation,
- § Rules and regulations are different in different countries – R&D on what is really needed for reliability.

q Long term planning

- § Long term wind energy forecasts for portfolio planning,
- § Long term planning tools: Simulations of future power systems 2020/2030 models/tools. Impacts of wind at different time scales at European level,
- § Specific analysis of small and large scale electric systems, the impact and operation of a system with high wind penetration,
- § Investigate synergies between wind power and microgrids.

Market operation - issues

- q Development of international and local market place for wind
 - § Gate closure, predictions, imbalances
 - § also for ancillary services
- q Markets to incentivise demand side and flexibility
- q Wind power in the market: tradable, exchangeable, transparent, like other energy
- q Interface for small producers to market participation
- q Price fluctuations, impacts of wind on the market prices

Energy markets – R&D actions

q Market rules

§ Market rules and design development for international and local market place to accommodate wind power: Gate closure, predictions, imbalances, markets also for ancillary services, to incentivise demand side and flexibility.

q Market modelling

§ Demonstration of virtual power plants in market environment generating predictable and controllable demand/generation profiles. Market nomination tools would be needed allowing to integrate wind power and other generation, demand and storage from all over Europe to a tradable product.

§ Price fluctuations, impacts of wind on the market prices and on conventional generation technology investments.

q Market access

§ Interface for small producers to market participation: IT tools, legal framework, costs and market designs should enable market access for electricity from small wind power producers. Market rules