European Wind Energy Technology Platform (TPWind)

The Working Groups of TPWind

Work Program Proposal

Working Group 3 - Wind Energy Integration

Prepared by the TPWind Secretariat

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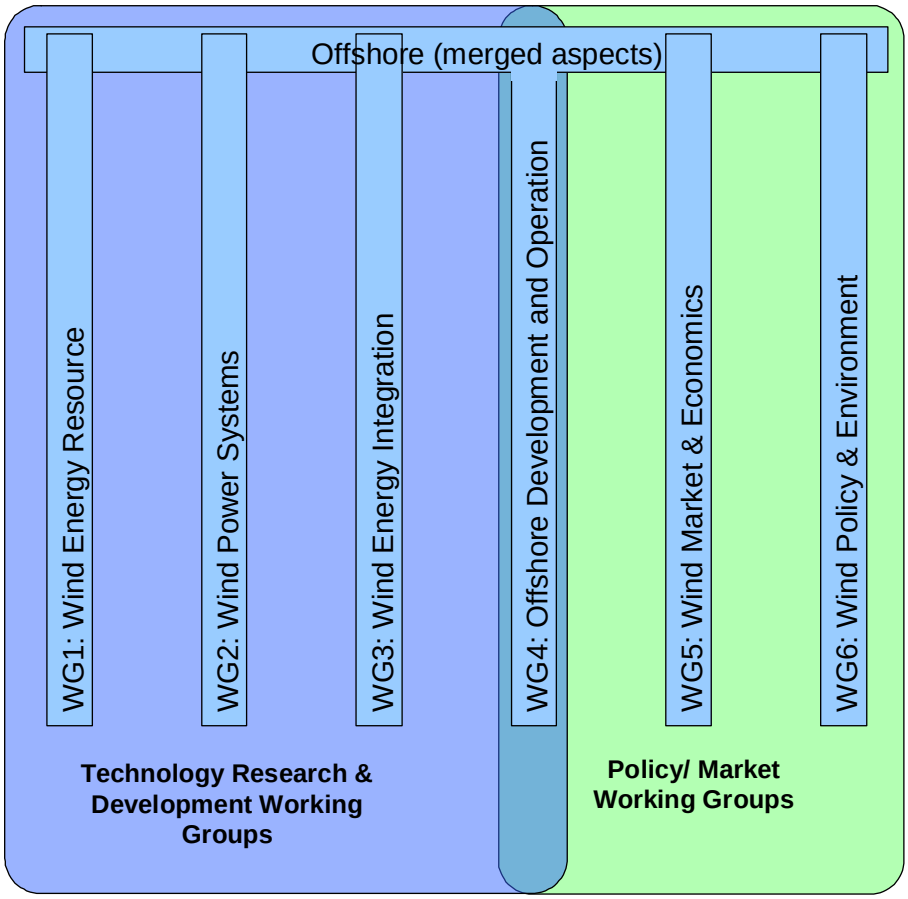
Introduction

As endorsed during the Second Steering Committee meeting of the European Wind Energy Technology Platform (Milan, May 9th 2007) the Working Groups of the Platform are:

- WG1: Wind Energy Resource,
- WG2: Wind Power Systems,
- WG3: Wind Energy Integration,
- WG4: Offshore Development and Operation,
- WG5: Wind Market and Economics,
- WG6: Wind Policy and Environment.

Moreover, it has been decided that each Working Group is dealing both on onshore and offshore aspects. The WG4 is focused on offshore-specific aspects.

In the following, a short description of the foreseen topics covered by each Working Group is provided, enabling to select the right experts for each Working Group.



WG3: Wind Energy Integration (J. Buddenberg)

The scope of this Working Group work extends from the single (large) wind farm level (onshore and offshore) to the large-scale integration in the power system level. The layout and basic structure of the grid need to be adapted to large amounts of variable electricity supply. However not only the physical design of the grid should be the focus but also the evaluation of the impact of energy management measures, which might increase the capacity of the grid. This aspect will make necessary a close interaction with the TP smart grids. Key areas in this thematic may include: *Grid codes/communication standards, Grid structure and planning, Grid operation and energy management (prediction tools, probabilistic capacity planning, storage facilities), Energy market integration (converting stochastic wind energy production into energy market products, providing additional grid services to TSO´s and DSO´s)*

Grid codes/communication standards:

In Europe, different technical specifications exist for grid integration of Wind Turbines. This does not only relate to the electrical specifications (grid codes), but also to communication and management standards of Wind Turbines/Parks and related facilities.

Standardization of electrical specifications might reduce manufacturing and implementation cost of wind farms and improve the planning processes of wind farms and grid connections (plug and play).

Similar advantages could be generated by standardization of communication and management interfaces of Wind Turbines and related facilities. This would improve the energy management processes and the interoperability of wind farm and grid.

Grid structure and planning:

The objective to archive large-scale wind integration into the power system needs an integrated approach towards grid technology, grid planning, grid structure and grid management.

On the European level the question of transport capacity between the wind rich regions and consumption centers will be important. Particular emphasis should be put on the interconnection capacities between the countries and offshore connections, particularly in the North Sea region (integration of offshore wind). Therefore, grid technologies for transportation of electricity with large volume over long distance might be needed.

Considering a probabilistic approach for grid management, the grid topology might substantially differ from today, and the capacity of grids on all levels might be substantially increased. This could take advantage of smart grid technology and new options for storage. Therefore, the impact and capabilities of smart grids and storage

possibilities (fast-response/small-volume to longer-response/large-volume) should be evaluated further.

Grid operation and energy management:

Nowadays, there is a strong focus on the design of planning and operation tools for the European TSOs. These tools are designed for electrical system operation under stochastic demand and production (still well-forecasted) conditions. In the long run this "centralized" approach alone might lead to a dead end. Indeed, the system is putting full control only on wind park management, and might not manage the overall energy system in an optimized way.

Therefore, systems combining energy management systems at TSO and DSO level should be taken into account. Smart grid technologies, in combination with prediction tools, storage facilities and demand side management might lead to new opportunities to increase the integration potential. In this context, tools for predicting wind farm output within a period of maximum 48 hours need to be much more accurate than the present ones. In addition, a need for both large scale and regional forecast will be necessary for advanced grid operation and energy management systems.

Energy market integration:

Beside the need to improve the physical integration of wind energy, tools and management systems of integrating stochastic wind energy into the existing energy markets will be necessary. Again, advanced forecast systems in combination with improved storage possibilities and management measures are the basis to achieve this objective.

This Group will work closely with WG 5, related to Market & Economics. The technical and economical aspects of systems will then be taken into account, in order to enable the integration of the wind energy production on the grid and into the electricity Market.