

EERA Joint Programme on Wind Energy - Input paper on SET Plan proposed targets for offshore wind energy

This document gives the viewpoint of EERA JP Wind on the "ISSUES PAPER No.1: Initiative for Global Leadership in Offshore Wind" (9 October 2015) by the European Commission. In addition to having been discussed among all EERA JP Wind members, which is currently more than 40 public research organizations, the Issues paper has also been discussed with industry (EWEA). EERA JP Wind and EWEA both agree to the proposed targets to reduce the levelised cost of energy (LCoE) for fixed offshore wind to less than 10 ct€/kWh by 2020 and to less than 7ct€/kWh by 2030. It should however be noted that this is more ambitious than the national targets set out in some countries (e.g. Germany). The future ambitions for installed capacity and the development in the market will of course also be crucial in achieving the targets.

The SET Plan objective of Europe being number 1 in renewable energy is very important and onshore wind energy will be a key deliverer in order to achieve this. To illustrate this point - according to Navigant - offshore was 2 percent of the accumulated installed capacity from onshore by the end of 2014. Hence onshore should not be neglected and it could be addressed in a separate Issues Paper at a later stage. We suggest it would be good to expand the goals in the SET-plan to include onshore wind energy, too. It is important to also set ambitious targets for onshore and stimulate the technology development and maintain/increase the international competitiveness of European developed and manufactured wind turbine technology. To reduce LCOE by 30 percent onshore towards 2030 would be an adequate, feasible and motivating target, both for industry and academia.

In the following we will comment on the targets/priorities and how EERA JP Wind sees the next steps in order to achieve the ambitious targets for offshore wind energy.

Recommendations on the priorities/targets proposed in the issues paper

We (EERA JP Wind) generally find the proposed targets relevant, ambitious and motivating. The overall goal of global leadership in offshore wind can only be achieved by Europe continuing in developing new knowledge and innovation, and by strong supply chain and continued technology deployment. The clear stand to develop not only bottom-fixed offshore wind technology, but also floating is being welcomed as it widens the offshore deployment domain and increases the potential for success.

EERA JP Wind finds the specific targets on LCOE for bottom-fixed and floating ambitious, however achievable.

The Issues Paper focus a lot on deeper waters (floating, 50+ meters), which is indeed important. However, also shallow waters (like 30 meters) have challenges when it comes to 10+MW Wind Turbines, which is the future for offshore.

We suggest it could also be mentioned which interest rate and lifetime shall be assumed in the calculations, e.g. 5 % and 25 years. Also, we suggest the years (2020, 2030) to refer to date for final investment decision (FID) rather than the completion date.

We find mixing the LCOE targets with a specific target on reliability and capacity factor misleading. These are both elements of the LCOE, and while reliability (or availability) is a technology measure, capacity factor mixes technology and siting. We suggest these explicit targets on reliability and capacity factor shall be listed separately or can be omitted.

It would also be adequate if a bullet could be added stating that as a long term goal (2050) the LCOE for floating offshore wind turbines shall be at level with bottom fixed ones and at grid parity.

Comments and recommendations on the priorities/targets and gaps/barriers in the Issues paper

The list of elements involved in addressing the targets (developed in the SET Plan Integrated Roadmap) provides many worthwhile research topics, and the actions listed in the annex of the Issues Paper include important element for both the “Advanced Research Programme” and the “Industrial Research and Demonstration Programme” are mentioned. As mentioned earlier EERA JP Wind will be happy to analyse and discuss these target and actions in order to update it as part of developing the implementation plan in stage 2. A few specific comments are given in the short annex to this document.

The proposed, ambitious targets are associated with high reliability, superior performance and low maintenance equipment which should provide much more cost-effective and innovative installations, maintenance, and logistics, etc. We agree to the importance of this. However, as an overall recommendation we propose to add a more clear focus on medium to long-term research to ensure adequate knowledge generation beyond 2020 and 2030.

Hence, a new action on »wind energy fundamentals« – should be developed and implemented as an ambitious medium- to long-term Research Programme. The point of departure here is to do research which maximises production and minimises costs. To identify the targeted research needed for this a thorough analysis is needed and EERA JP Wind will be glad to engage in this together with industry in the coming months. However, based on our existing work plans and results from recent and ongoing national and European projects, it is possible to point to some of the relevant topics in order to enable 2030 and later targets: Atmospheric and wake flows, aerodynamics, validated integrated modelling, control, condition monitoring, materials and design approaches. The present design approach has been taken from the traditional building and machine sector and is not reflecting an actual risks assessment in wind energy projects. To be able to do this we need thorough analysis of uncertainties in external conditions and to quantify knowledge (regarding e.g. material properties and component reliability) and to adopt a system engineering approach.

We suggest including the following research elements under »Production value chain performance/cost competitiveness«:

- Asset management (optimising operation of the offshore wind farms and clusters of which)
- Data sharing between wind farms and wind farm operators as prerequisite for further improvement in modelling and development.

Regarding the mentioned elements, the target on top-head mass might be irrelevant for cost reduction of the wind turbine, as shown in InnWind.eu. Lowering the head mass may be most

relevant for floating wind turbines. Regarding the target on better quality materials and components, note that knowledge of how to fully exploit the materials' capabilities and reducing the safety factors that account for uncertainties in modelling and estimating behaviour is equally important for cost competitiveness.

To achieve global leadership for Europe on offshore wind requires further integration of research groups and research infrastructures among public research institutes and universities. This is exactly what EERA JP is set out to do. We hope the new SET Plan Governance and a more strategic, targeted approach to achieve its objectives and targets will enable the EERA JP Wind to reinforce our role as a real implementing pillar of the SET Plan for medium to long term Research and Innovation priorities.

Next steps and considerations for stage 2 “Establishment of a joint implementation plan

EERA JP Wind looks forward to engage in stage 2 of the proposed process. We will do so as an important first activity of the European Technology and Innovation Platform (ETIP) on Wind Energy together with EWEA and other relevant stakeholders. This document will also be discussed with relevant MS Representatives in each of the countries, where EERA JP Wind has members.

As mentioned, the annex with concrete targeted R&I actions from the Integrated Roadmap is a good starting point. However, an important next step would be to analyse and update the priorities and targets developed a couple of years ago. EERA JP Wind will do that as part of the update exercise of its Strategy and Roadmap, which will be done in the coming 6 months.

This will be essential in order to provide strategic recommendations and contribute to future updates of the SET Plan Integrated Roadmap to the SET Plan Steering Group. Furthermore this process will also provide an updated gap analysis of the existing and planned European research efforts and ensure alignment and point to new relevant topics and targets, and prepare and mobilise the research community for implementation of specific actions if requested by the SET Plan Steering Group.

Annex: Specific comments to relevant actions from the 'Towards an Integrated Roadmap' document of the SET Plan

We have the following preliminary comments to the topics listed in the annex:

Advanced research programme:

- A new action dealing with obtaining the knowledge and models that will enable the innovation and development for 2030 and later should be included with a scope that includes developing better models and new knowledge on atmospheric and wake flows, aerodynamics, aeroacoustics, validated integrated modelling, control, condition monitoring, materials and risk-based design approaches should be added. The deliverables should include:
 - a deliverable on validated design methods for 10-20 MW WTs (flexible rotors operating in highly fluctuating (turbulent) wind fields)
- Under 'new turbines' the following subtopics should be added:
 - Advanced aero-elastic models to design the innovative large, flexible rotors
 - Inflow field characterization using remote sensors to large heights (up to 300m)
 - Improved modelling and validation of materials and components should be added. The objective in this case is the uncertainty in prediction of response (including strength) in a turbulence driven environment, the knowledge of which is currently lacking.
 - Turbine and wind farm control with focus on technologies that enable site-specific adaption through control parameters.
 - Focus on operation & maintenance costs, including reliability, materials and risk-based design methods.
- Under 'resource assessment' the uncertainties are very well described regarding the need to be reduced from the wind condition side. Similar uncertainties, nevertheless, are involved in the estimation of component response and behavior.

Industrial research and demonstration programme:

- As mentioned earlier, onshore is still the main driver on the global market, hence here R&D is still important in order to support this technology as well. The upscaling trend has its limits onshore and WTs in the size of 1-4 MW would probably be preferable due to logistics, esthetics and public acceptance. New innovative concepts for 1-4 MW turbines with little visual and acoustic impact could therefore be interesting and ensure the competitive strength for the European industry.

Innovative and market-uptake programme:

- The present market design does not take in to account the real value of onshore wind energy to the energy system. Therefore we need to develop more appropriate market designs for variable renewable energy sources.
- Also public acceptance issues differ onshore and offshore and technological solutions and best practices shall be addressed