



Input Paper for the 14th SET Plan Conference 2020

"Making the SET Plan fit for the EU Green Recovery"

The SET Plan contribution to the Offshore Renewable Energy strategy

Setting the scene

The 14th Conference of the Strategic Energy Technology Plan (SET Plan) will take place on 23 - 24 November 2020. Since 2008, this EU energy research and innovation initiative is key in further shaping and implementing energy technology policy across Europe. In 2015, the launch of the Energy Union saw the SET Plan incorporated as the Energy Union's fifth pillar on 'Research, Innovation and Competitiveness' and, through the Communication "Towards an Integrated Strategic Energy Technology (SET) Plan", the Integrated SET Plan set ambitious R&I targets in each of its 10 priorities, to address the objectives of the Energy Union.

Today, the European Green Deal, with the 2050 decarbonisation strategy as well as the recovery plan for Europe set a new scene, requiring the SET Plan to quickly adapt to the new political objectives and challenges. National and European green R&I policies need to follow the pace in order to lower the cost of low-carbon energy and to contribute to the implementation of the new energy system. The role of the European Commission is to support Member States and Associated Countries in better aligning their clean energy R&I approaches and funding programmes to the European policies and goals. Therefore, this year's conference will focus, among others, on three main European energy policy initiatives under the European Green Deal for 2020, namely the Energy System Integration Strategy (next to the Hydrogen Strategy), the Offshore Renewables Energy Strategy and the Renovation Wave.

All SET Plan Implementation Working Groups (IWG) have been asked to contribute on a voluntary basis to any of these policy papers, answering the following question:

"How is your work within the IWG contributing to the development and implementation of the three strategies, taking into consideration the #NextGenerationEU package?"

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IWG contributions to the Offshore Renewable Energy strategy

- IWG Photovoltaics
- IWG Offshore Wind
- IWG Ocean Energy
- IWG Batteries
- IWG Industries
- IWG Bioenergy and Renewable Fuels

The offshore renewable energy strategy is a new EU initiative with great potential for reaching the climate neutrality target of the EU Green Deal and has concrete objectives: the offshore wind capacity for example has to increase from the current 12 GW in EU27 to up to 300 GW of offshore wind and 60 GW of ocean energy 2050. However, offshore renewable energy sources (such as bottom-fixed and floating wind, wave and tidal) come with their own set of challenges and opportunities and deserve further research and innovation to foster and improve offshore renewable energy. This strategy assesses the potential contribution of such renewables and proposes ways forward to support the long-term sustainable development of this sector.

When it comes to Research and Innovation, this Strategy is willing to increase R&I in both emerging technologies as well as for optimising more mature technologies. Energy coming from the oceans makes offshore renewable energy a cornerstone of the clean energy transition in the EU and several IWGs contributes to its implementation.

The **IWG Offshore Wind** is dedicated to accelerating R&I for offshore wind energy. To do so, this IWG is currently working on an updated Implementation Plan for Offshore Wind which identifies four main challenges related to the EU Green Deal for offshore wind energy including: bringing floating wind to commercialization, further cost reductions and increasing the value of both fixed bottom and floating offshore wind to the energy system, circularity of offshore wind farms to increase sustainability and innovations adapted to varying weather conditions.

The updated Implementation Plan targets includes the required annual installed capacity of wind power and grids towards 2030 to achieve the target of 300GW offshore wind in EU27 by 2050. The range in the cost reduction targets for bottom fixed and floating offshore wind reflects the effect of high and low installation scenarios. The less installed capacity the slower the price will drop.

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The Updated IP highlights:

- The progress we have made (surpassing targets before the ink was dry; floating changing from something we had to insist on to something that is now widely perceived as the next frontier that will be conquered)
- Building on a dedicated EC strategy for offshore energy
- Stronger regional cooperation: from the north sea to the rest of Europe
- Better use of existing roadmaps (ETIPWIND, JP WIND, IEA WIND)
- Updated targets to reflect the development (including grid and more focus on installation)
- Emphasizing the role of social science and humanities in offshore wind energy

It is expected that, in the context of the offshore renewable energy strategy, the following R&I areas will have particular relevance:

1. Floating wind power is essential for energy independence and will create significant jobs if the right training and skills development are ensured
2. Mature circularity of offshore renewables is key to enable a sustainable growth of the sector and address issues of critical raw materials
3. Grid development including the hub&spoke concept current under investigation in the form of energy islands will be key to a successful scale-up of offshore wind.

The SET Plan Implementation Plan for offshore wind 2020 is focusing on maintaining European Leadership and global competitiveness in offshore wind and are fully aligned with the European offshore renewable energy strategy. In particular, the emphasis on floating wind power, circularity and grid development is reflected in the priority actions as well as the lighthouse initiatives proposed as part of the SETWind project. Furthermore, addressing regional opportunities and challenges is key.

The **Ocean Energy IWG** is key in meeting the 2050 targets and can be a reliable partner (as tidal stream's energy production is 100% predictable) to other offshore renewable energies as offshore wind. This IWG has set up 11 technology development actions in order to improve ocean energy and meet targets such as the development of cost competitive ocean energy technologies.

Three objectives are proposed for the sector to be included in the strategy:

- To set a goal for 100MW of Energy Generation Capacity by Wave and Tidal technologies by 2030.

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- To reduce LCOE €0.10/kWh for both technologies through large-scale deployment as per SET Plan objectives by 2030 for tidal energy and by 2035 for wave energy.
- To make Europe a global leader with 100GW installed by 2050.

Meeting the targets for ocean energy require demonstration projects. The proposed demonstration projects will reduce costs remarkably, but private investors still need certainty that a revenue support at national level will bring in order to unlock subsequent commercial projects and reach the SET Plan targets. In order to do so, the next steps are to draft of a clear plan specifically targeted at generating the first 100MW of Ocean Energy production in Europe and to appropriately channel European R&I funding for ocean energy technology development and other funding sources for large-scale deployment. Critical of the ocean energy IWG is to also and create an EU Insurance and Guarantee Fund covering the technological risks of innovative offshore renewables.

Other issues such as unlocking market potential in EU islands, flexibility and integration with other offshore renewables (Wind and PV) to stabilise grid and storage, and environmental impacts and social acceptance are key to unlock the impact of the offshore strategy. The **Photovoltaics IWG** is contributing to this Strategy by further developing the rapidly emerging technology and application of floating PV (FPV) into an options applications offshore. FPV. Offshore PV offers large additional deployment potential compared to 'onshore' PV and floating PV for inland waters. It can be employed near-shore, on coastal waters, and more remotely. Due to its modularity, it also offers many synergies and opportunities for combinations with wind energy generation, energy conversion, storage and transport as well as with other functions like sea farming (e.g. algae).

The **Batteries IWG** also has its share when contributing to this strategy as adding batteries to offshore wind parks will help to balance demand and supply of power while providing frequency regulation services and thereby supporting the addition of further renewable energy to the grid. Furthermore, research has showed that co-locating several technologies as wind or solar plus storage is interesting from a competitive point of view, meeting the Green Deal objective of economic and sustainable growth. The next step when it comes to R&I for this IWG is to develop battery software solutions to fully harness the benefits of the battery storage and offshore wind combination.

The **Industry IWG** underlined that access to cost competitive renewable electricity is an opportunity for several energy intensive industry sectors to be integrated in their process. Furthermore, offshore electricity production also creates an opportunity for the nearby localisation of electrolyzers for

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hydrogen production, including the possible reuse of the existing infrastructure of depleted natural gas fields.

IWG Bioenergy and Renewable Fuels: offshore electricity production (solar and wind) can be used as source for renewable hydrogen production and for renewable fuels (electro-fuels), an option for the storage of variable renewables. Aquatic biomass (macroalgae or seaweed), cultivated in near-shore marine waters, offers great perspectives for using large potentially available resources and widening the feedstock base. Macroalgae can be used for the production of biomethane and biofuels via various biological and thermochemical conversion processes as well as for the production of chemicals with high economic value, food and feed. Microalgae can also be a suitable feedstock for bio-hydrogen production via photo fermentation or dark fermentation by means of a pure or mixed culture of hydrogen-producing bacteria or via a combination of dark, photo fermentation and anaerobic digestion. Intermediate bioenergy carriers, e.g., bio-oils, torrefied pellets produced in modular small units near-shore from local biomass residues and wastes can also store off-shore generated renewable energy and used in a flexible way to stabilize the electricity grid or supply renewable energy to heat, cool and transport in downstream central production units.

Next Steps / Recommendations

- Increase the ambition for levels of offshore renewable energy generation in line with the (upcoming) offshore renewable energy strategy;
- Ensure reaching these ambitions by enhancing IWGs collaboration, exchanging expertise and implementing common projects.

Questions for discussion

- How can we facilitate cooperation on R&I on floating applications, while ensuring that multiple EU countries (also those without a coastline) benefit from it?
- How can we support ocean energy demonstration projects throughout Europe?