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Seawind Ocean Technology: producing green hydrogen from floating offshore wind turbines

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The European Union (EU) has set its targets for Green House Gas (GHG) reduction and a pathway reaching carbon neutrality by 2050. In this sense, decarbonizing the power sector becomes essential in order to reach the EU´s goals. The production and use of energy account for around 75% of the EU´s GHG emissions, leading to a critical need of power the energy system with clean energy sources.[1] What is more, innovative technologies like floating offshore wind are key to provide clean energy for green hydrogen production and is expected to lead the electricity generation by sources in the EU sustainable development scenario (Shown in Figure 1).

Seawind Ocean Technology is a Dutch-based Original Equipment Manufacturer (OEM) developing integrated, floating offshore wind generations units. The company follows an innovative and unique two-bladed with teetering hinge turbine head configuration and a choice of materials for the totality of the entirety of the floating wind turbine that ensures resilience, efficiency in terms of material and energy use and low, if any, environmental impacts on marine habitats. Seawind's floating offshore wind turbines have a unique circular economy approach, bringing on-site assembly with the aim of involving the local communities in a just transition. Seawind´s turbines have 25% less material in the turbine construction, lowering the carbon footprint of each turbine and targeting to a reduction in pollutive mining activities. In addition to this, the construction-assembly approach of Seawind has low installation and maintenance costs with no requirement for heavy-vessels and machinery for installation and maintenance.

Seawind's unique and innovative approach is in the choice of technology and materials, which are such in order to perform optimally in deep sea conditions, including cyclonic areas. In this context comes the selection of the efficient, resilient and ideal-for-sea-conditions '2-bladed with teetering hinge' technology (fully patented internationally) for the turbine's head. Equally so, the choice of concrete for the turbine's floating foundation doubles the lifetime of the foundation, has less CO2 emissions (compared to steel) and no negative impacts on marine habitats. These turbines are resilient against extreme weather and have an increased unit longevity of 25 + 25 years. As a result, Seawind is developing highly efficient energy generation units while decreasing its waste production by reducing the materials used. Seawind calculates that all carbon emissions associated with the materials, assembly and 25-year operation of its 6 MW floating wind turbine model are offset in less than six months of operation, i.e. 24 ½ years of negative carbon emissions.

Currently, Seawind is developing the production of green hydrogen using electricity produced offshore from its floating wind turbines. The unlocking of competitively priced green hydrogen

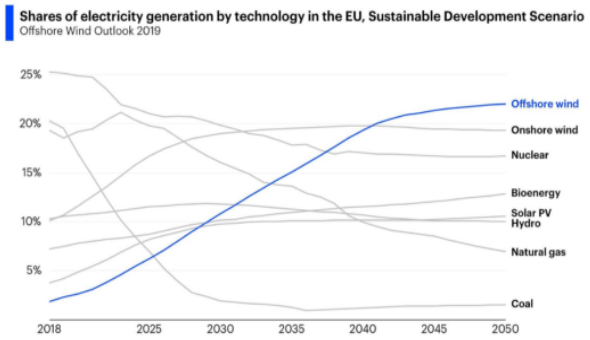
[1] (European Commission, 2021)

can be a game-changer for sustainability and a major enabler of the closely related circular economy. In this sense, Seawind has forecasted a LCOE that will be 25-30% compared to other projections (shown in figure 2), boosting the mass deployment of electrolyzers for green hydrogen production and contributing to clean energy large-scale storage providing secure, affordable and abundant energy.

Furthermore, floating offshore wind technologies have a greater load factor because of the largely constant and high wind speeds in deep waters. This uninterrupted flow of clean energy increases the suitability of Seawind's floating offshore wind technology for green hydrogen production, tackling the challenges of expensive electricity cost of renewable energy and low load factor, thereby making green hydrogen a competitive fuel to support the global energy transition towards net zero. Green hydrogen production via electrolysis is a major challenge but primarily a unique opportunity for floating offshore wind and Seawind in particular. The production of cost competitive green hydrogen from electricity generated from wind turbines located in deep and ultra-deep waters will enable long-term energy storage. It will also contribute to accelerating the 'hydrogen economy', a major enabler for 'net zero' for industrial energy use and transportation especially in the aviation and maritime sectors, where electrification does not really provide credible alternatives.

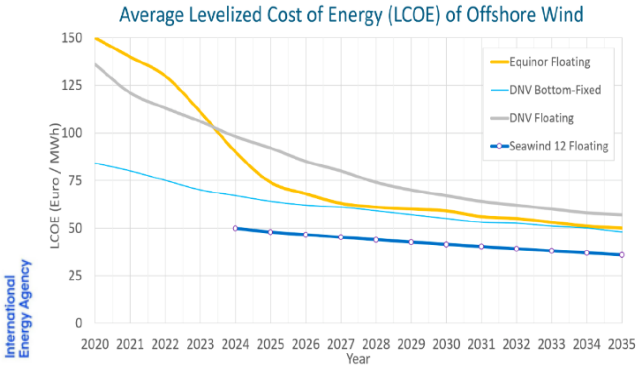
Finally, the opportunities of floating offshore wind electricity and green hydrogen production are ideal for large islands, such as Crete, where energy demand is expected to increase but not at the expense of the environment and the associated local economy and society. On the contrary, Seawind's business model favoring local content and jobs, and sustainable development would be the right solution for preserving the island's beautiful habitats on land and at sea while also providing green and affordable energy for all.

Figure 1. Forecast of the leading electricity generation technologies in the EU in the IEA SDS



Source: IEA´s Offshore Wind Outlook 2019

Figure 2. Seawind 12 floating offshore wind turbine´s LCOE in the future market.



Source: Seawind´s Information Memorandum, DNV and Equinor.

Key words: floating offshore wind, green hydrogen, sustainability, green islands.