

Shifting Winds of Power

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If you squint through the fog in the streets of Copenhagen you may be able to perceive twenty colossal 102-meter tall wind turbines merrily spinning away. Dubbed the “Middelgrunden Offshore Wind Farm”, the mesmerizing structures constructed in 2000 were part of the first commercial official offshore wind farm in the world. Just two decades later, offshore wind has skyrocketed in growth due to technological innovation, economies of scale, and widespread political motivation, positioning Denmark as a key leader in the field. Presented recently as the first “energy island” in the North Sea, Denmark recently outlined a roadmap to start the construction of another offshore wind project that would dwarf prior projects. Consequently, the announcement of Denmark’s metaphorical energy island, an offshore wind farm with storage capabilities, paves the way for Danish political and sustainability initiatives while inviting financial investment and technological growth in the offshore wind sector.

In order to understand how this project will impact Denmark and its neighbors, it is worth noting why Denmark has set its eyes on deeper waters. Summarized quickly, wind turbines are best utilized whenever they are spinning, making money for the developers or investors by providing energy to whoever is willing to pay. Translated into reality, companies attempted to find consistent and strong wind locations within current technology constraints. Up until now, locations offshore with little turbulence and high wind speeds have remained tantalizingly out of reach.

With an eye-watering cost of \$34

billion and an expected initial generation of 3 GW, enough to power 3 million homes (Denmark only has 2.7 million homes), the attached label of a megaproject is an understatement. With this in mind, the construction contracts naturally suit Vestas, a Danish company that is the world’s largest wind turbine manufacturer. This project is expected to deliver hundreds of well-paying jobs to the local workforce, an alluring prospect for any government. Also on the mind of the Danish government, industry leaders, and various other energy startups is the emergence of renewable to X technology.

Fundamentally, renewable to X takes renewable energy, often wind or solar power, and converts that temporary energy into a more permanent source, such as hydrogen or green biofuels. This developing field holds tremendous potential to assist in decarbonizing historically entrenched polluting areas such as shipping, aviation, and heavy-duty trucking, which require stable and reliable sources of energy, attracting attention and funding from a host of financiers. In Denmark, a recent pilot study supported by the government with around €17 million attempts to examine the feasibility of converting wind energy into hydrogen, to eventually transition the shipping industry into a sustainable future.

With the wind farm being strategically placed in high-wind resource areas and along the path of major shipping lanes, convenient refueling with eco-friendly fuels can cut logistical costs. This economic potential is coupled with the prospect of companies delivering on their sustainability promises,

such as the Danish shipping container giant Maersk aiming to have net-zero emissions in ocean operations by 2050. All of these factors bolster the financial feasibility of the project while catering to current industries unable to be pollution-free. Succinctly put by Danish Minister of Climate Dan Jørgensen, “Denmark should assume a global leadership role and be a first mover in regards to storage and energy conversion technologies.”

This groping for global leadership in an environment difficult to forecast even a year into the future may leave one wondering how the \$34 billion was invested recently in technology that was still in its infancy two decades ago. In fact, one of the largest consumers and producers of energy, the United States, has virtually ignored this developing field in offshore wind largely due to political ineptitude. Denmark, however, tells a different story of financial and political willingness. Crowned as the largest public investment by the Danish government in its history, at a 51% stake of the \$34 billion dollars put forward, the Climate Minister exhorts it as the “perfect compromise”. Tied in with growing corporate responsibility for environmental sustainability and the announcement that Denmark would phase out all oil and gas extraction by 2050, the pivot to renewable resources is creating an energy revolution.

The jostling for energy supremacy paints a future of energy islands being utilized as both bridges and barriers. For a country like Denmark, with political deals to sell wind energy to countries such as Germany, the Netherlands, and

Belgium, the bridging of power infrastructure brings a welcome sign of cooperation off the back of COVID struggles. Coincidentally, due to the current inability to store large quantities of wind power for later consumption, this technological facet locks in country agreements and prevents countries such as Denmark from amassing huge quantities of energy deposits as many other competitive national relationships do with fossil fuels. With the European Union’s announcement last November of plans for a 25-fold increase in offshore wind capacity, from a current level of 12 GW to 300 GW, the natural location of Denmark offers a goldmine of future development and political negotiation to Europe’s energy system, one of the largest in the world with 400 million customers.

With tensions emerging from the impacts of climate change and no shortage of local disputes, will energy islands soon be utilized as geopolitical pieces in strategic conditions? It does not take long to envision the South China Sea, Arctic shipping routes, or other contested international waters being pursued with the vision of harnessing not only the energy in the wind but also control over vital supply chains. All of these factors point to a clear consensus that Denmark and humanity are at the dawn of a new energy era. The energy island initiative by Denmark reinforces not only their technological dominance in the offshore wind process, but also the financial viability of large scale wind projects. Ultimately, Denmark has developed itself politically as a leader in sustainability while foreshadowing a future of geopolitical cooperation and competition in energy.