



Denmark: a model for offshore wind expansion

As Europe transitions to sustainable energy, Denmark stands out as a leader in offshore wind power, driven by strategic investments and technological advancements. Its commitment to sustainability and innovation has positioned the country as a global pioneer, offering valuable insights for emerging markets like Southeast Asia, where the push for renewable energy is gaining momentum. Drawing on its experience in the North Sea as a testing ground for wind energy solutions, Denmark serves as a model for other regions aiming to accelerate their renewable energy transitions.



Denmark's leadership is not a mere coincidence; it is the culmination of decades of calculated planning, technological advancement, environmental stewardship and technological refinement. The journey began with the world's first offshore wind farm, Vindeby, which was inaugurated in 1991, setting a precedent for future development. Since then, the country has continually refined its offshore wind capabilities, establishing a blueprint for other countries seeking to find, or further their green credentials.

Geographical advantages

Success has been achieved by taking advantage of its strategic position in the North Sea, with access to several significant wind corridors. For more than three decades, Denmark has shown continuous improvements to its wind power capabilities, now aiming to produce 12.9 GW of energy from offshore wind by 2030.

It is not just the geographic advantages of shallow waters and strong winds that have made that possible. It has been facilitated by a commitment to developing the necessary infrastructure and regulatory frameworks to support them.

'Danish ports have invested billions over the last 20 years to develop the necessary infrastructure to support these larger offshore wind projects,' says Sebastian Jonsson, Managing Director of GAC Denmark, which provides critical offshore support and marine services to offshore wind projects across the North Sea.

Big plans

Such foresight has enabled the country to address the increasing complexity and scale of modern offshore wind developments through smart investment strategies that focus on long-term energy goals. That includes the launch of its largest ever offshore wind tender, in April 2024, for six wind farms with a capacity of at least 6 GW, with prospects of another 10 GW to be added. It's a major project, which is expected to need up to EUR13 billion (US\$14 billion) in capital investments to get off the ground.

Denmark is now building what will become its largest offshore wind farm when it comes online in 2027. Costing over EUR1.2 billion (US\$ 1.3 billion), the Thor wind farm will consist of 72 wind turbines capable of producing 15 MW of capacity each for a total of more than 1,000 MW.

'Such proactive investment is not just about today; it's about securing Denmark's energy future and ensuring that it can meet the demands of tomorrow,' Jonsson notes.

Smoothing the process

The Danish Energy Agency has developed comprehensive frameworks that facilitate the smooth licensing and construction of offshore wind farms. These regulations not only streamline the approval process but also promote transparency and predictability for investors.

'Regulatory clarity is essential for attracting investment in offshore wind projects,' Jonsson asserts. 'When investors know what to expect, they are more likely to commit their resources, and this is why the region has become a reliable location for offshore wind investment.'

Innovation

Moreover, the Danish government has continued to invest in research and development to advance wind turbine technology and improve the efficiency of offshore wind farms. In September this year, Innovation Fund Denmark signed a deal with the US Department of Energy to invest US\$4.2 million in improving floating offshore wind energy mooring and anchoring technologies to help advance the industry and make the technology more viable for other countries.

'Innovation is at the heart of Denmark's success,' Jonsson adds. 'By continuously improving and investing in our technologies, we can maximise energy output and minimise costs, and foster greater collaboration with partners all over the world.'

'That is the key to staying competitive in this rapidly evolving sector. It's not just about making the turbines more effective and robust, but by making the entire project side of things smoother for all players involved, from local governments to offshore developers to logistical support networks.'



Sebastian Jonsson



Cooperation

The country's commitment to international cooperation in renewable energy has fostered knowledge sharing and collaboration with other countries. Initiatives like the North Sea Wind Power Hub aim to create an integrated offshore power grid connecting several countries around the area, enhancing energy security and facilitating the transition to renewable energy across Europe.

Jonsson says: 'Such collaborative projects are vital to enable us to share energy transition on a global scale.'

Lessons

The lessons learned by Denmark's offshore wind sector are particularly pertinent for Southeast Asia, a region rich in offshore wind potential that needs to transition to renewable sources to meet its growing energy demands and combat climate change. The Danish approach is characterised by a favourable natural environment, solid regulatory frameworks, and international cooperation can offer a clear roadmap for nations aspiring in the region seeking to develop their offshore wind capabilities.

Countries such as Vietnam, the Philippines, and Thailand are recognising the potential of offshore wind to contribute to their energy mix. But to replicate Denmark's success, they must make the necessary investments in building local expertise and infrastructure.

People power

Jonsson notes that wind energy is fundamentally 'a people's business', necessitating local expertise and experience to foster a robust supply chain. In the nascent stages of development, international collaboration and imported expertise are often essential. This includes training programmes to cultivate a skilled workforce capable of managing and operating offshore wind projects.

'Knowledge transfer from established markets will be crucial in helping these nations develop their offshore wind capabilities efficiently and effectively,' Jonsson notes. 'Denmark has long been more than willing to share its experiences to facilitate this growth and ensure other countries can take advantage of their wind resources in the same manner that we have done.'

A robust supply chain is a must to meet the logistical challenges of wind turbines and farms that are becoming bigger in size and scope. The increasing complexity of offshore wind projects demands meticulous planning and coordination. This is something countries in Southeast Asia must keep in mind from the early stages of building the support mechanisms for such projects, as they do not have the logistical capabilities of their European counterparts.

Keys to success

'Every offshore project has its own unique set of challenges,' explains Jonsson. 'But there are some things every country needs for successful, on time, and on budget offshore wind development. Finding the right partners,

ensuring logistical support, and sufficient space and vessels to move and store parts such as wind blades are imperative.

'Above all is experience. Such development does not happen overnight. Denmark has more than 30 years of experience in supporting offshore wind projects and our industry is collaborating with countries all over the world to bring our knowledge to make these projects run smoothly. This is only a short-term fix so if countries in Southeast Asia, in particular, are looking to become market leaders, they need to ensure they build the experience today to support themselves tomorrow.'

Partnerships

International collaboration in the offshore energy sector is nothing new to GAC Denmark.

A recent undersea pipeline project in the Baltic Sea, which it managed on the Danish side in collaboration with Germany, Sweden and the United Kingdom, underscores the importance of international cooperation in navigating the complexities of the offshore energy sector.

Collaboration between public and private sectors, alongside international partnerships, is vital for accelerating offshore wind development globally. Moreover, partnerships between industry leaders and governments are essential in overcoming the challenges associated with offshore wind development. By fostering a collaborative environment, stakeholders can share best practices, streamline processes, and enhance project efficiency.

'We must work together to identify and address the barriers to offshore wind development,' confirms Jonsson. 'By pooling our resources and expertise, we can further accelerate the transition to renewable energy not just close to home but around the world. Such cooperation will be particularly important as Southeast Asian nations seek to scale up their offshore wind initiatives in the coming years.'

'The time for action is now. With the right investments and partnerships, Southeast Asia can establish itself as a global leader in offshore wind energy.'

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