

SPECIAL REPORT

A WORD
ABOUT WIND

EMERGING OFFSHORE MARKETS

Q1 2019

INTERVIEW:
LM WIND
POWER'S
DUNCAN BERRY

- / POLITICAL RISK IN TAIWAN, THE US AND TURKEY
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- / WE TALK TO PHILIPPE KAVAFYAN FROM MHI VESTAS



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EDITORIAL



By Richard Heap, editor-in-chief

As people in the European offshore wind industry went about their Christmas parties in mid-December, many were also watching an exciting event on the other side of the Atlantic. On 13th and 14th December, US state Massachusetts held an auction for the right to build projects of 4.1GW in three zones in its waters.

There are two reasons this auction received huge interest from European revellers.

The first is that European firms won big. The successful bidders were Equinor; EDPR and Shell's 50:50 joint venture Mayflower Wind; and the 50:50 Vineyard Wind tie-up between Copenhagen Infrastructure Partners and Iberdrola's subsidiary Avangrid. This clearly shows that European giants will play an important role in US offshore wind and are battling for an early foothold.

And the second reason is the fierce competition. These European players didn't win by default. Each of them ended up paying \$135m for the right to build a wind farm in the 390,000-acre area, which means the state sold the rights for \$405m – nine times the previous record paid in a US offshore leasing round: \$42.5m by Equinor in 2016.

The result was exciting for those working in offshore wind in the US too. It showed that the industry has arrived, and has the chance to build a group of projects that will be vital to growing a supply chain. Experienced players with strong balance sheets are betting on delivering projects at competitive prices.

And remember, this follows a 20-year power purchase agreement that Vineyard Wind

won from Massachusetts in mid-2018 at a levelised cost of energy of \$65/MWh. This was another stunning result given that Europe only went sub-€100/MWh in 2016.

These ambitious bids are the result of a combination of factors. The first is the strides that firms throughout the supply chain are making to continue driving down the cost of technology. We spoke to Duncan Berry, chief executive at LM Wind Power (see page 4), and MHI Vestas chief executive Philippe Kavafyan (see page 7) about exactly this.

The second reason is the strong market fundamentals: the US has energy-hungry load centres on the coasts, which want to buy electricity from renewables (see page 10). And this has led to the third reason behind current excitement in the US offshore sector: there is political support at both state and federal levels for growing offshore wind.

But this is where we see a challenge where the US – or indeed, any other promising market – could come unstuck. Offshore wind farms are long-term projects that don't match short-term political cycles, and investors need long-term certainty.

Our concern is that bidders in emerging markets are competing very aggressively in the hope that their bids will be justified by the evolutions in technology. We can't tell yet if these bids will prove sensible or not, but we do know that companies are working with slim margins and that their projects could easily be derailed if they are hit by unexpected or retrospective policy changes.

As Jérôme Guillet, managing director at financial advisory firm Green Giraffe told us, there is a risk that offshore PPA prices are falling too quickly outside Europe: "You're getting European-type prices but not European levels of risk yet," he said. However, he is confident that companies in offshore wind have proven they can deal with these issues: "The industry has been pretty good at solving problems up until now."

The industry will find the job of solving those problems easier if they can work with a fixed set of rules. Therefore, the lesson for US politicians is simple: honour the deals you've made now if you want the offshore wind sector to flourish. You've seen in Taiwan how sensitive investors can be to such changes (see page 8). Don't bring the party to an abrupt end. ■

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A WORD ABOUT WIND

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Cover image: LM Wind Power

A professional portrait of a man with dark hair and glasses, wearing a dark suit, light blue shirt, and red tie. He is smiling and looking directly at the camera.

BLADE RUNNER

LM Wind Power's Duncan Berry met Richard Heap to discuss new offshore markets, the integration into General Electric, and the evolution of turbine blades

“India will be bumpy but we’ll likely get there. Japan will take a while but it’ll be steady. Our view when we’re making long-term investments is to make sure we are well-placed to provide a supply chain into those emerging markets.”

This is how Duncan Berry, chief executive at LM Wind Power, explained the blade manufacturer’s offshore wind expansion strategy during a session at our Financing Wind Europe conference in London on 1st November. In the last few years, the firm has been focused on expanding its manufacturing base in new and growing offshore markets in China, France, India and Turkey, as well as the onshore sector.

A Word About Wind caught up with Berry after the session to find out more about the company’s expansion plans in both the offshore and onshore markets, as well as the progress on integrating LM into General Electric following the €1.5bn acquisition that concluded 18 months ago, in April 2017. He also discussed blade innovations.

Berry explained LM has on average opened one new factory a year to serve both the “completely global” onshore market and offshore wind, which is becoming global. We have all seen the growth of the offshore industry in Taiwan, the US and elsewhere.

He says: “In 2018, we opened one in France, where the focus has been on offshore. We opened a big one in India three years ago and one in China 18 months ago, both for onshore. We also opened in Turkey in 2017. The next one will be an offshore plant in China, and we have a couple of other markets which we’re looking at.”

For Berry, the impact of Chinese developers and manufacturers on offshore wind is one the most important emerging trends, as they increasingly compete with existing global players: “We supply most of the major Chinese OEMs and, by some metrics, it is already one of the biggest offshore wind markets. In a couple of years’ time, it will be the biggest by any metric,” he says.

LM hosted senior delegations from China each month in the last year as they seek to learn about technology and market risk.

Integrating into GE

Berry was appointed chief executive at LM in March 2018 after ten years in various

roles at parent firm GE, including overseeing the integration after the €1.5bn buyout.

He started at GE as chief executive of GE Money Home Lending, a specialist lender in the UK with \$15bn assets, and was then operations leader at GE Capital Americas and chief executive at GE Capital Australia & New Zealand.

He joined GE Renewable Energy in 2016 to help define the firm’s strategy in the offshore wind sector, and has led the integration of LM into GE since the transaction was announced in October 2016. He then moved to LM full-time when the deal closed in 2017: “The great thing about renewables is that it’s growing, there’s been a lot of investment, but there’s a lot that needs to happen. It’s still a very young market, and even the people who’ve been around for a long time, they’re still learning.”

We are now coming up to the two-year anniversary, in April 2019, of the completion of that deal, so does that mean the integration process is now complete?

Berry says the process has three elements: the financial side, including bringing more GE business into LM; the ‘nuts and bolts’, which includes harmonising systems including IT; and the cultural side. He says the first bit is now completed, the second bit “largely done”, and that the third element – the culture – is taking longest.

He says: “The important thing with any integration, and what makes it work or not, is the cultural side. Culture and people always take time. The desire has been to keep

LM at arm’s length and keep the management team... and a cultural assimilation has happened with people working together and moving between parts of the business.”

The work on the 12MW Haliade-X platform launched by GE in March 2018, with its 107-metre LM-designed blades, is an example of where the teams have worked closely.

But he adds there is still work to be done on the cultural side, not just after this deal but also because GE concluded a €12.4bn power buyout with Alstom in 2015. In blades, GE bought specialist Blade Dynamics in 2015; and, in January 2019, GE announced it was to move GE Power’s solar, storage and grid operations into GE Renewable Energy.

“In GE’s renewable energy division you’ve got LM, you’ve got people who came from Alstom, people who came from GE. You’ve got a real mix of people and, being very frank, it’s never easy and I’m sure others who have been through mergers have felt the same,” he says.

Since the deal was announced, Berry has spent a great deal of time seeking to dispel one of the theories that abounded when the takeover was announced: that becoming part of GE would restrict the amount of work LM would do with GE’s rivals.

He says: “I want to be clear as it’s a topic that customers bring up... We haven’t lost a single customer since the acquisition, and I think they’re comfortable with not just the technical ways we are protecting their data, but also the spirit of it and the trust. I think that concern has gone away.”



China shop: Blade manufacturing in Qinhuandao, China

He says it helps that GE has established similar precedents in other businesses, like its Avionics business that also sells to companies such as Rolls-Royce too.

Technology trends

The global growth of the wind industry is not the only reason behind LM's expansion. Berry says that technological innovation, including on blades, was needed to reduce the cost of turbines at wind farms, and is leading to faster growth among blade firms than others in the market. He argues that there are two main reasons for this.

The first is that turbine makers want more flexibility around their blade-buying and design strategies: "All of them want to buy blades as well as manufacture them themselves, and they all have different views as to how they want to treat the design side of it... I expect that outsourcing trend to continue as the market globalises. You have to think about the landed cost and therefore a footprint of production in different places."

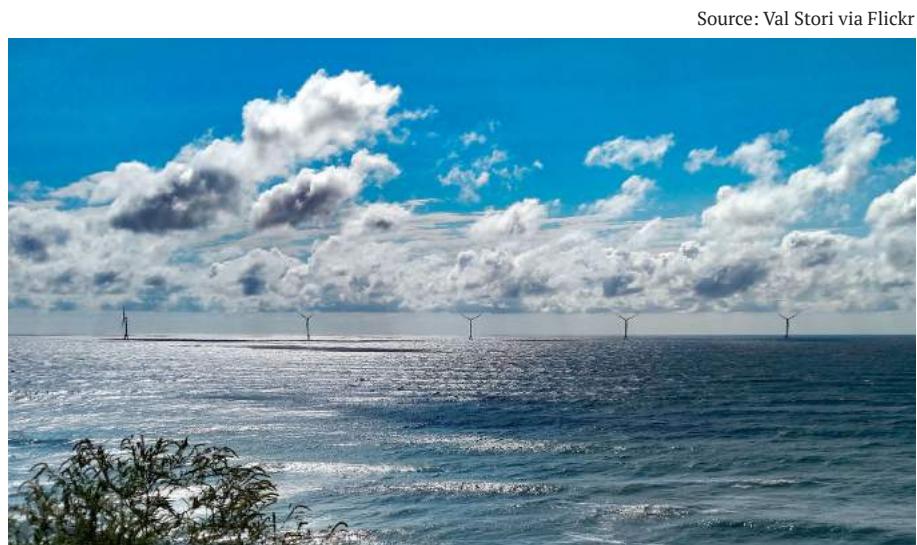
The second reason is that blade designs are becoming more complex as developers seek to deliver their projects at ever-lower costs and using larger turbines. The Haliade-X platform is set to require blades that measure 107 metres each, which are being developed by LM. That trajectory requires innovation from blade specialists.

"For example," he says, "we've just developed two-piece blades for onshore wind. You're seeing more hybrid or carbon-content blades, or different lower-cost materials coming in... The value of the blade, both in economic terms and strategic terms to the OEM, is going up," he says.

Its split-blade was partially designed with the team from Blade Dynamics, which is also looking at how to take modular blades from an idea to a physical product. They both work with GE's global research centre.

In Berry's view, this need to cut the cost of blades and turbines is a bigger driver of technological innovation than the presence of rivals, where the closest player with global operations is TPI Composites. There are also smaller regional players in Brazil, China and India, but they don't have the global footprint to be a direct competitor.

"We see the auction prices just like everyone else does, and that is putting pres-



Block Island: Deepwater used GE's Haliade turbines on the pioneering US project

sure on the supply chain," he says. "If the blade is 25%-30% of the turbine cost, then that means we have to work very hard on reducing our production cost and making the most efficient product."

In the offshore sector, he says that talking to utilities and being transparent about the technology is key during the bidding process. He says that all of the turbine makers – GE, MHI Vestas, Siemens Gamesa – are working closely with utilities, which means that firms throughout the supply chain, including LM, have to be transparent too.

"You don't win a project without the person bidding having an intimate knowledge of the turbine," he says. This gives more clarity on how to optimise the supply chain and, with the complexity of offshore turbines, there are plenty of savings to be made.

"If you're not prepared to be transparent and share anything, you've got no chance of getting those deals across the line, and that's what helps get deals done," he argues.

This has been an important issue in Europe, where there is non-stop pressure to deliver cost reductions. Governments are among those driving this, through processes such as Contracts for Difference in the UK and zero-subsidy auctions in the Netherlands. But transparency will be key in Asia and the Americas too as firms fight hard for deals.

Offshore wind in the US

So what is Berry's view on the US market?

GE has taken an early advantage in the US by supplying turbines for the country's first offshore wind farm, the 30MW Block Island

Source: Val Stori via Flickr

that is made up of five Haliade turbines that were developed by Alstom.

But LM also sees potential to work in the US by partnering with MHI Vestas, which announced its US headquarters in Boston in January, and Siemens Gamesa.

Berry says he was at first sceptical about US offshore wind, but that state support for auctions has shown that he was too conservative. This is currently driving growth.

"One of the first meetings I had in the offshore wind industry was with Deepwater Wind, and the first discussion we had was we went through the economics of why offshore wind made sense in the northeast of the US," he says. "If you look at the grid infrastructure, there's a huge economic incentive for offshore wind to play a role. That is not the issue at all. There's plenty of juice there."

However, he says that securing permitting, and winning political support at federal and local level, will be the main hurdles for the expansion of US offshore wind.

He says: "That's really the challenge, but it's happening and, once people see it working, the Americans in that environment are very good at the last-minute deal. There are lots of deals that get done at five minutes to midnight in the US, and that's how it is. I think it'll perform on the upside."

Each of these regions – North America, Europe and Asia – will need tailored turbine solutions to realise their offshore potential. For companies like LM, that means there's plenty of work yet to be done. ■



INTERVIEW: PHILIPPE KAVAFYAN, CEO, MHI VESTAS

By Richard Heap

MHVestas chief executive Philippe Kavafyan explained the offshore turbine manufacturer's approach to global growth at our Financing Wind Europe conference in London on 1st November. As you'd expect, the firm is highly active in new offshore markets in Asia and North America alongside established strongholds, including the UK.

We have seen plenty of examples of these global plans in recent months.

In January, the company announced it was setting up its US office in Boston, after it was named preferred supplier in November for the 800MW Vineyard Wind project by Copenhagen Infrastructure Partners and Avangrid Renewables. The US arm of MHI Vestas is being led by Jason Folsom, who moved to the company in November after ten years at Siemens Gamesa, and Vineyard Wind is due to be operational by 2021 – although some permitting meetings have been delayed by the Trump shutdown.

The company has also secured orders in the emerging Taiwanese market. In March, it was named preferred supplier to CIP and China Steel Corporation for schemes of 1.5GW in the Asian nation's waters, and it plans to use its operations in Taiwan as an export hub for the rest of the region.

However, that market is in a state of flux as the government has recently committed to a 5.7% cut in 2019 feed-in tariffs.

Staying competitive

But Kavafyan added that MHI Vestas was not planning to expand in every offshore market. He said it was not looking to go

into China, for example, and added that he did not want emerging markets to come at the expense of established nations.

"When we go global, we need to stay competitive... We focus on Taiwan, we focus on the US, we focus on Japan, but by no comparison would I give up the UK – 50% of my business." He highlighted Belgium, Germany and the Netherlands too.

In an interview with A Word About Wind after the session, Kavafyan went into more detail about the firm's strategy, including how it plans strike a balance as more nations welcome offshore wind. He said there had been no major shift in strategy since he took over as chief executive from Jens Tommerup, who stepped down in May 2018.

"The enthusiasm for the globalisation, we have it."

Unsurprisingly, he said Europe was still at the heart of the MHI Vestas approach.

"There is no radical shift... The first projects have been successful, the technology and the platform is established and recognised. The second phase is how we leverage that position in the core market that are very strong still: the UK and northern Europe. We believe that we have a workhorse to deliver a massive quantity of offshore in these areas, where we can do more of the same and reduce the cost even further."

Recent deals in Europe include the firm order of the company's 9.5MW platform at the planned 950MW Moray East wind farm,

which is being developed by a consortium led by utilities EDP Renewables and Engie. The focus on huge European projects makes sense as they are being built where offshore wind already has a strong business case.

MHI Vestas has recently raised its investment in production facilities in the UK's Isle of Wight, and plans to use a similar regional hub approach in Asia and the US. However, he adds that manufacturers, and companies throughout the supply chain, will also need to work hard to make sure their operations and technology are optimised for conditions in those markets.

He does expect significant growth globally: "Everywhere we went, we've seen faster and bigger interest for offshore wind. In Europe or the UK, we may feel like the topic is not new, but I don't think we estimate enough the consequences of making offshore wind competitive. It is a potential mainstream technology for the energy transition."

This interest from governments around the world is certainly exciting, but firms would also be wise to not blindly chase growth in these markets at the cost of established powerhouses. Political upheaval in Taiwan and the US in recent months highlights the distance between politicians' appetite and completed projects; and businesses will need to adapt the lessons learnt in Europe.

"There is knowledge and experience that we need to replicate in new areas," he says. "The expectation in terms of the cost of offshore wind is going to be very quickly the level we reached in Europe. How do you accelerate the learning curve and build similar productivity in Taiwan, the US or, tomorrow, in Japan? For us, that's the real question."

It's one he isn't alone in asking. ■

WHY DO INVESTORS NEED TO BE WARY OF POLITICAL RISK?



Source: MHI Vestas

Offshore wind is one of the largest untapped energy sources on Earth. To date, there are offshore wind farms with total capacity of around 22GW in operation globally and the vast majority of that is in Europe (around 87%), followed by China (around 13%).

But there are huge projections for how far this could grow.

Wood Mackenzie has predicted that offshore wind in Europe could exceed 47GW by 2027, with 43GW in Asia and 10GW in the US. Bloomberg New Energy Finance last year expected it to reach 115GW globally by 2030; and the International Renewable Energy Agency predicted there would be 400GW by 2045.

If the industry is to achieve growth at this rate then investors will need to expand into countries that do not currently have an offshore wind industry. At present, this means that opportunities are opening up in nations including Taiwan and the United States. This has attracted major players, especially European utilities and investors, that are looking to expand out of leading offshore markets like the UK and Germany.

Many are now looking at opportunities to get into new markets early and secure big profits. One major trade-off for that is plans often rely on the whims of politicians.

Dismayed in Taiwan

Political risk is not the only challenge for investors in emerging markets. Firms take on risks such as the lack of a supply chain to build offshore wind farms; permitting, regulatory and consenting complexities; and geographical challenges. But investors also require strong commitments from governments to grow an offshore wind market. If that isn't there then it can make investors vulnerable to political instability.

Take Taiwan. Political changes in local elections in November led to the country's ministry of economic affairs proposing a cut to offshore wind feed-in-tariffs by 12.7% this year, from TWD5,849/MWh (€168/MWh) to TWD5,106/MWh (€147/MWh); and a suggested production cap of 3,600 annual full-load hours.

It has since sought compromise and settled on a 5.7% cut on 30th January, but this will

still force developers to look hard at the economics of their projects.

The uncertainty since November has thrown into doubt investment plans of firms that last year won the right to build offshore wind farms of 5.5GW. Businesses including Ørsted, Northland Power, Copenhagen Infrastructure Partners and Wpd have been critical of the government's sharp U-turn. Ørsted also suspended activity on its planned 900MW Changhua 1 and 2 developments in January but, following the compromise deal, said it is now looking at how it can make its projects investable.

Henrik Poulsen, Ørsted's CEO & president, said in its 2018 results call on 31st January that companies in Taiwan are "facing extraordinarily high costs" to create a local supply chain, improve the onshore grid, and build, operate and maintain wind farms in

"This has happened a lot quicker than expected."

"challenging site and weather conditions". Ørsted now needs to work with its supply chain to make up the difference and see if it can take projects to financial close.

Others were surprised by the sudden shift: "We were expecting the government to lower the tariffs at some point, but this has happened a lot quicker than expected," says Charles Yates, managing director of CmY Consultants, who is working on projects in the region. Doreen Abeysondra, founder of independent financial advisory Fresco Advisory, says the move was "a reality check for what it's acceptable for remuneration".

This is set to have the biggest impact on developers. Achim Berge Olsen, executive director at Wpd, said at a forum in Taiwan that developers are set to pay the biggest price of these policy changes because they tend to take out large bank loans to fund their projects. This means they may still need to pay banks even if they suffer losses.

Ben Backwell, chief executive at the Global Wind Energy Council, says he welcomed the fact that the Taiwanese government had listened to arguments from those in the wind

industry, and was "cautiously optimistic" that the industry could push ahead. We will find out soon if firms are confident enough to make big investments in Taiwan.

There is a crucial lesson here for politicians in new offshore wind markets.

World of Uncertainty

After Taiwan, the world's next most promising emerging market for offshore wind is the US, where there is now a pipeline of potential projects in excess of 25GW due to supportive state policies. For example, New York's Governor Andrew Cuomo set out plans last month to support up to 9GW of offshore wind in the state's waters by 2035.

There are challenges for investors in the market, which is grappling how to 'go large' with future projects following the 30MW Block Island scheme that completed in 2016. These include building a supply chain with vessels compliant with the Jones Act.

But even the US market is facing political uncertainty, as the government shutdown has delayed permitting meetings on the 800MW Vineyard Wind project by Avangrid Renewables and Copenhagen Infrastructure. We don't expect this to harm Vineyard in the long-term, but such delays can have knock-on effects later in development.

Lack of action from central governments has also caused problems in France, where feed-in tariffs were reduced last year on projects that won support between 2012 and 2014; and in Japan, where the government has spoken about its support for offshore wind for seven years but only last year approved the Offshore Wind General Waters Act, which is set to finally kick start the development of offshore wind projects.

Establishing an offshore wind market is a long-term process that relies on a degree of political stability, but this is not always easy with short-term political cycles. We will no doubt see similar issues in many of the countries outlined in the next three pages.

The benefit of the global expansion of offshore wind for investors is that there should be plenty of opportunities to diversify their risks between established markets in or near the North Sea, and emerging markets in Europe, Asia and the Americas. This will be an exciting journey, but investors need deep pockets and strong hearts. ■

18 KEY EMERGING MARKETS FOR OFFSHORE WIND

Countries around the world are embracing offshore wind, but where should investors focus? Ilaria Valtimora reports on deals and developments in 18 of the most active.

AMERICAS

BRAZIL

South America's largest wind market looks to add offshore.

While the United States currently dominates discussion on offshore wind in the Americas, firms in South America's largest wind market are eyeing the industry too.

Norwegian oil giant Equinor last year signed a deal with Brazilian oil company Petrobras to jointly develop offshore wind farms off the Brazilian coast; and Petrobras is also looking to build a 5MW pilot project off Rio Grande do Norte by 2022.

CANADA

Progress overshadowed as southerly neighbour takes off.

The expansion of the US offshore market threatens to overshadow growth in neighbouring Canada. For example, Ørsted exited the planned 396MW Haida Energy Field development off British Columbia in October to focus on more developed markets, leaving Naikun as the sole developer.

But there are still schemes being planned. Copenhagen Infrastructure Partners and Beothuk Energy are co-developing the 180MW St George's Bay; and Canada's government has been planning to award support for more schemes in its Emerging Renewable Power Programme.

In addition, Canadian developer Boralex is looking to expand in offshore wind in France, where it is active onshore.

UNITED STATES

Industry gains momentum as states bring forward bold plans.

The US government shutdown may have delayed early permitting meetings at the 800MW Vineyard Wind project that Copenhagen Infrastructure Partners and Avangrid are developing off the coast of Massachusetts. But the appetite from US states for offshore wind means there is now more political certainty than ever.

The 30MW Block Island wind farm that was developed by Deepwater Wind, now part of Ørsted, in 2016 off the coast of Rhode Island is the only offshore wind farm working in US waters, but it may soon look less lonely. The US Department of Energy reported in June 2018 that there are now 25GW of wind schemes planned in US waters, including 4GW under development and lease areas with the potential to accommodate an additional 21GW.

Of these, Vineyard Wind and the 700MW Revolution Wind by Ørsted are the most advanced large schemes, having won support in Connecticut, Massachusetts and Rhode Island tenders last year. Other major schemes planned in the northeast US include the 1GW Empire Wind by Equinor; Ørsted and Eversource's up-to-800MW Bay State Wind; and a 2.5GW EDF-Shell scheme near New Jersey.

Supportive states include Connecticut, Massachusetts, Maryland, New Jersey and New York, with the latter's Governor

Cuomo announcing in January that there would be 9GW of wind farms in New York waters by 2035. And on top of that, while President Trump is famously hostile to wind farms, his administration has indicated its willingness to streamline permitting and identify new areas for future auctions.

John MacAskill, director at Offshore Wind Consultants, says he welcomed the competition between players in the recent auction in Massachusetts, as attracting new players to the market is vital; and said he hoped to see more regular lease auctions too.

Ross Tyler, co-founder and executive vice president of the US Business Network for Offshore Wind, says the biggest challenge for the market is to build a supply chain that is capable of supporting utility-scale schemes, as the delivery model will be very different to Block Island. He also says there will need to be the development of vessels compliant with the Jones Act: "Market forces will come into play here and there will be investments made," he says.

These fixed-bottom developments are primarily on the east coast, and particularly around the northeast. The market is also developing off the west coast, where schemes are being planned including the up-to-1GW Morro Bay scheme by EnBW and Trident Winds in waters near California, but this will take longer due to the need for floating foundations.

ALSO LOOK OUT FOR...

Argentina

Source: GovernmentZA via Flickr

ASIA-PACIFIC

AUSTRALIA

Offshore is on the radar as renewables investment picks up.

Wind investment in Australia picked up last year and we've seen a potentially huge project emerge offshore. Local developer Offshore Energy and Copenhagen Infrastructure Partners teamed up in late 2017 to develop the up-to-2GW Star of the South scheme off the coast of Victoria. The project could be operational by 2022 if it wins permits and planning approval.

INDIA

Major players line up as government gears up for first tender.

There are two regions in India where the offshore wind resource is as good as it is in Europe: Gujarat and Tamil Nadu. The government is now set to take advantage, and is due to hold a tender for the 1GW First Offshore Wind Project of India in Gujarati waters in February 2019. This is part of a plan to add 5GW of offshore capacity by 2022, and 30GW by 2030.

There is no shortage of interest. The government received 35 expressions of interest for the area in June, from players including E.On, Equinor, Macquarie, Northland Power and Ørsted.

But it won't all be smooth. Low prices for wind power onshore could make offshore projects look very expensive, and the health of offshore wind would also be affected by how well the pro-wind Prime Minister Narendra Modi does in India's general election this April and May.

JAPAN

Projects start to emerge as parliament gives policy clarity.

The Japanese parliament last November approved the Offshore Wind General Waters Act, which provides a framework for the introduction of auctions and the allocation of offshore development zones. The Japan Wind Power Association has forecast that at least 10GW of offshore capacity is due to be installed by 2030, with 6GW fixed-bottom and 4GW floating.

This certainty is opening the way for new projects. For example, Tokyo Electric Power



India auction: Prime Minister Narendra Modi faces re-election in April and May

signed a deal with Ørsted in January to co-develop the up-to-1GW Choshi scheme, which is part of Tepco's plan to build up to 7GW of offshore wind capacity in Japan and overseas.

Key challenges for the market include long environmental assessments; serious grid capacity constraints; and fragmented permitting processes. However, the development of the supply chain in Taiwan would open the way for regional cooperation.

SOUTH KOREA

South Korea pins early offshore hopes on floating technology.

Relations between Japan and South Korea may often be strained, but the pair have a great deal in common – not least the role of floating technology in their offshore plans.

In January 2019, a consortium made up of Copenhagen Infrastructure Partners, Macquarie's Green Investment Group, Principle Power and Shell joined up with local firms to work on a 1GW floating project. This flagship project is due to complete by 2022. South Korea plans to generate 20% of electricity from renewables by 2030.

TAIWAN

Unexpected tariff shift brings high-profile uncertainty.

Taiwan secured its place as the world's most attractive emerging market for offshore wind in 2018. The government awarded the right for developers to build projects of 5.5GW, and take advantage of favourable wind speeds of 12m/s in the Taiwan Strait. Winning bidders included Copenhagen In-

frastructure Partners, Northland Power, Ørsted and Wpd.

However, the government threw many of the investment plans into disarray in November, as it set out a plan to reduce feed-in tariffs equivalent to €168/MWh for 2019 by 12.7% to €147/MWh; and introduce a cap on production from offshore wind farms. This brought a strong reaction from developers, including Ørsted putting 900MW of projects on hold.

The government has since confirmed that it will cut the 2019 FIT rate by just 5.7%, as well as compromising on the production cap. That is an improvement for developers, who will now be looking at their projects' economics to see if they are viable. The uncertainty continues.

VIETNAM

Stability in Asia's dark horse attracts overseas investors.

The strong economy and political stability have helped to make Vietnam an attractive nation for overseas investors in infrastructure, and offshore wind is no exception.

In December, Singapore's Enterprize Energy unveiled a plan to build a 3.4GW wind farm in Vietnamese waters. The project, called Ke Ga, is set to be built in up-to-600MW phases and require total investment of \$12bn. This follows Thai solar firm Superblock's announcement in 2018 of its goal to build 700MW of nearshore wind.

ALSO LOOK OUT FOR...

Bangladesh, Philippines, Sri Lanka

EUROPE

ESTONIA

Baltic state looks to PPA deals to fund 3GW offshore pipeline.

There are more than 3GW of offshore wind projects at a very early stage of development in Estonian waters, but progress has been slow as schemes have faltered. For example, in 2017 utility Nelja Energia put on hold a plan for a 700MW scheme near the island of Hiumaa as it said offshore wind was not competitive in the country. Estonia's government is now looking at how it can help these projects secure finance, including with corporate power deals.

FRANCE

Subsidy renegotiations keep France as Europe's favourite also-ran.

France currently has only 2MW of operational offshore wind – which, given that it has had 3GW waiting to be built for more than five years, must go down as a failure. Administrative hurdles such as long permitting processes and public opposition have led the market to stall over the past five years, and in June cut tariffs for projects that have already won support.

It still talks a good game. In January, the government published a ten-year energy plan that commits to 2.2GW more offshore wind by 2028, on top of the 3GW already tendered, and is running a tender for a 500MW project off the coast of Dunkirk. It must now walk the talk.

LITHUANIA

Lithuania takes early steps to unlock 7.2GW offshore potential.

Lithuania's government is planning to assess the areas suitable for offshore wind ahead of a tender process. This follows an energy plan announced in 2018. It is looking to carry out that assessment by 2021, to unlock an estimated 7.2GW of offshore wind potential in its waters.

NORWAY

Scandinavian nation looks to oil and gas giants to power market.

There is only one offshore wind turbine working in Norwegian waters – the 2.3MW Hywind floating wind prototype – despite promising wind resources of 10m/s. How-



ever, Norwegian utility Equinor is looking to take its offshore wind expertise in other countries to see if it can use the planned 88MW Hywind Tampen floating scheme to power work at two oil fields. In addition, Enbridge plans to develop the 350MW Havsul 1 to power a gas processing plant.

POLAND

Equinor warms to Europe's most exciting offshore wind market.

Poland damaged investor confidence three years ago with retroactive changes to onshore wind rules. Despite this, it is now one of Europe's leading new offshore markets.

Norway's Equinor has committed to develop three offshore wind farms totalling 2.8GW with Polenergia in the Polish Baltic Sea; Polish utility PGE is looking for a partner for 2.5GW of projects; and other Polish utilities plan to enter the fray. Poland announced in November that it plans to add up to 10GW of offshore wind by 2040.

PORTUGAL

Iberian nation takes early lead in floating wind industry.

Portugal is at the vanguard of Europe's floating wind revolution – along with France – as a consortium of EDP Renewables, Repsol and Principle Power plans to invest €125m to build the 25MW Wind-Float project in the country's waters. In addition, its government unveiled plans in January to attract €1.1bn of private investment by 2030 to grow offshore wind.

Source: MHI Vestas

REPUBLIC OF IRELAND

Major European firms grow pipeline to at least 2.2GW.

The 25MW Arklow Bank wind farm was commissioned in Irish waters in 2004, and remains the only operational Irish wind farm – but that could be about to change. Its owner SSE last year unveiled a plan to invest €2bn growing the scheme to 520MW. Utilities and developers including ESB, Innogy, Parkwind and Statkraft are also interested in the market, where there are over 2.2GW of schemes in development. This could be backed by government tenders.

SPAIN

Onshore objectors stifle Spanish offshore potential.

One 5MW turbine is the sum total of offshore wind capacity in Spanish waters, and there are major barriers to that growing. The country has a target to install 750MW by 2020, but this is being stifled by factors such as unfavourable coastal conditions.

TURKEY

Market on hold as 1.2GW Turkey tender fails to fly.

The Turkish government planned to hold the country's first offshore wind tender for 1.2GW of capacity in 2018, but has now indefinitely postponed it due to low demand.

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WHAT CAN INVESTORS LEARN FROM TURKEY'S FAILURES?



By Alice Jones and Richard Heap

Turkey's government announced the country's first offshore wind tender in March 2018, where it committed to give support for projects totalling 1.2GW. This was set to close on 23rd October – but didn't. With no official explanation, the government postponed the tender.

The only explanation that investors could glean at the time of the cancellation came from the Turkish media, which reported that the government had not received the expected level of interest from companies willing to bid in the tender. This sounds plausible. We haven't heard of a rush of offshore players entering the Turkish market – utilities, manufacturers or financiers.

Any such rush is now highly unlikely.

Turkey has made no announcement on a date for the tender since then, which is a necessity if the government wanted to kick-start the market. The country also officially slipped into recession in December, which is likely to further reduce energy demand and interest from renewables investors.

As analyst Fitch Solutions put it in January: "The capital intensity of offshore wind projects coupled with Turkey's limited offshore wind equipment manufacturing supply chain leads us to expect the offshore wind sector to be on the backburner for now."

This failure to attract interest is in contrast with Turkey's appetite for onshore wind, where it remains a promising emerging market. The Turkish government announced a tender for 1GW of new

onshore wind capacity in October, to build on its already-solid onshore base: the nation had 6.9GW of installed onshore wind capacity at the end of 2017. Despite the economic turmoil, its government has been keen to support offshore wind to meet its 2023 wind power target of 20GW.

Offshore hurdles

The wind resource is there to develop an offshore wind market in Turkey. A 2015 study by Totaro & Associates estimated its capacity for offshore wind to be in the region of 32GW. But our feeling is that the government undermined its own auction process with policies that made prospective investors feel reticent about committing.

There are lessons here for other nations looking to kickstart offshore wind projects. One issue was Turkey's high local content requirements. Onshore wind and solar projects awarded under Turkey's 'Yeka' wind tenders require around 60% of local content, and officials said that the Turkish ministry of energy and natural resources would ensure the local manufacturing of offshore turbine parts too.

But here's the problem. The early success of pioneering offshore wind regions, such as countries around the North Sea, was aided by skills and infrastructure borrowed from domestic oil and gas operations. Turkey has no such advantage, although initial exploration of oil and gas resources is currently underway. Taking offshore wind to Turkey would mean importing expertise – but government policy discourages this.

You could argue that experts in offshore wind – Siemens Gamesa, MHI Vestas et al – should set up facilities in Turkey, as they

have in other countries such as the UK, to fulfil local content requirements. But we don't believe they would want to invest on that scale as the Turkish government never showed that it had a long-term pipeline of offshore wind projects, and there's little activity in the Mediterranean either.

Other factors have put off investors too.

For example, the government stipulated that offshore turbines must be of at least 6MW each. If they're not going to be built locally, then they'll need to be imported via sea from established hubs in northern Europe. Such a rule can only push up costs.

Finally, Turkey's cancelled offshore tender had a ceiling price of \$80/MWh. Given the challenges that Turkey faces, this is stretching the bounds of feasibility. It is possible – the first large-scale wind farm in the US, Vineyard Wind, will cost \$74/MWh for the first phase of 400MW – but that doesn't mean it's easy, especially in a new market. Politicians in emerging markets simply cannot expect the first offshore wind farms in their waters, with the risk that involves, to be built at emerging-market prices.

The lack of interest from investors in Turkey's first offshore wind tender has sent a message to that government that its offer was not attractive enough. And it should send a message to others too. While politicians want to ensure that offshore wind delivers benefits to local people, they must find ways to do that while making the market compelling for international developers, investors and manufacturers.

Turkey got that wrong. Others must learn from its mistakes. ■



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