Global & Regional Outlooks

Pinpointing Opportunities: Tenders & Project Pipelines

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All figures and statistics included in this report were disclosed during Offshore and Floating Wind Europe 2019 (11-12 November)

Section 1: Global & Regional Outlooks

1.1 Capacity Recap & Forecasts

- Bloomberg New Energy Finance (BNEF) forecast a 19% CAGR in cumulative offshore wind (OSW) installations between 2018 and 2030, rising from 22GW globally to 177GW.
- BNEF forecast the number of global markets annually installing OSW assets is set to proliferate exponentially during the 2020s, rising from five markets in 2020 to 12 markets in 2030.
- BNEF forecast annual installation to peak in 2026 with 19GW of capacity installed, with new capacity never falling beyond the 15GW mark from 2025.





- BNEF's regional forecasts indicate that while the EMEA's annual installed capacity remains sizeable into the next decade, its position as global leader will be usurped by new capacity gains in APAC from 2020, before regaining its global foothold post-2025.
- The Americas will embark upon its commercial-scale OSW journey from 2021 when annual installations commence and continue every year until the close of the decade, according to BNEF.
- Offshore Wind Consultants' analysis indicates that by close-2018 the UK, Taiwan and China hosted the largest construction (or pre-construction) pipelines globally.



Global cumulative offshore wind capacity will increase more than fivefold towards 2028 Global new-built offshore wind capacity: annually and cumulative, 2009-2028e (GW) (GW) 25 175 150 20 15% 125 CAGR 16% 14% 15 100 +226% 209 75 10 50 49% 5 25 639 0 0 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 Europe China Asia Pacific (excl. China) AMER Cumulative

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- Wood Mackenzie expect that cumulative grid-connected OSW capacity will experience rapid growth between 2019-2028, increasing at a CAGR of 14% and a total increase of 226% across the period.
- The cumulative installed capacity share is set to undergo profound changes from the early 2020s according to Wood Mackenzie when the Asia Pacific (excluding China) and American markets begin to connect OSW capacity to their grids.
- By 2022, OSW energy will be in operation across four regions, with Europe retaining market share lead by the close of next decade with 49% of connected capacity. The three remaining markets will experience a much more equally distributed market share at this point, Wood Mackenzie's forecasting shows.
- Wood Mackenzie's data shows that global demand is set to change as we expand from c.7 OSW markets today to c.20 active OSW markets by 2028.



1.2 European Markets Outlook



NB/ The above does not include countries that have below 100MW of installed OSW capacity – Finland, France, Ireland, Norway and Spain.

- WindEurope data shows that European installed capacity currently sits at c.20GW, accounting for c.2% of European power demand.
- The UK leads the European market with 9GW of installed capacity, representing 8% of the country's power demand, according to WindEurope.
- WindEurope's outlook forecast scenarios show massive uncertainty in the volumes of capacity to be installed in the near-term to 2023.
- Europe could install 90 GW of new wind energy (onshore and offshore) capacity over the next five years if governments adopt clear and ambitious National Energy & Climate Plans, resolve their current issues around wind farm permitting and continue investing in grid infrastructure, according to WindEurope's central scenario.
- If the NECPs are unambitious and permitting issues remain unresolved, then Europe will install much less new wind power: only 67 GW (26% less than central).

Uncertain future



- If permitting improves significantly and the National & Climate Plans are super ambitious, then Europe could install 112 GW over the next five years (24% more than central)
- WindEurope's near-term outlook shows that the UK will account for 35% of the growth in offshore wind over the next five years, followed by the Netherlands and Germany.
- The planned tenders and the results of previous auctions and tenders in Germany, France and the Netherlands provide good visibility on post-2020 market development.
- Under the Central Scenario, 2019 will be a strong year: 16.8 GW of gross installations, with record installations in offshore wind.
- After 2020 (17.7 GW), WindEurope expect 2021 and 2022 to be at 17 and 17.9 GW respectively, while 2023 is expected to be the best year (20.8 GW) over the next 5-year period due to a strong contribution of offshore wind (6.3 GW).



Outlook to 2023

- Under WindEurope's central scenario, between 2019 and 2023 offshore installations would represent 18.2 GW.
 With an average of 3.6 GW/year, offshore wind will represent about 20% of the total market of the 5-year period (compared to a 17% share in the last 5-year period).
- Installations will concentrate mainly in the UK, with 6.4 GW or 35% of all the new grid-connected capacity.
 Another 5 countries will see large offshore installations: the Netherlands (4 GW), Germany (2.9 GW), Denmark (1.7 GW), France (1.3 GW) and Belgium (1.1 GW).
- Norway and Ireland are expected to enter the offshore market with large commercial projects but still below the 1 GW mark in the 2019-2023 timeframe. Italy, Portugal, Spain and Sweden will have small projects.
- 2019 will be a record year for offshore wind (3.4 GW) due to strong installations in the UK (Beatrice 2, Hornsea 1 and East Anglia 1) and Germany (Merkur Offshore, EnBW Hohe See, EnBW Albatros and Deutsche Bucht). After that, there will be no installations in German waters until 2022 but the Dutch offshore wind projects (Borssele Sites I, II, III and IV) will prevent a significant decrease in new offshore installations.
- In 2023, WindEuope expects another record year of 6.3 GW due to strong installations in almost all North Sea countries (the UK, the Netherlands, Germany, France and Denmark).



Strong 2023 for offshore installations

1.3 APAC Markets Outlook Asia Pacific (APAC):

- Asia Wind Energy Association forecasts that OSW annual installations will grow at a significantly faster rate out to the period 2026 than European growth rates, with China leading the way, followed by South Korea, Japan and Taiwan.
- APAC growth is expected to be quick and sizeable, with an average of 5GW installed annually post-2020 and almost half of the proposed OSW projects in the region to be realized within the next ten years.
- Asia Wind Energy Association project installed APAC capacity to hit 45GW by 2027, a significant upward revision on its 2017 estimate which peaked at 11.2GW.
- China is expected to install >30GW of OSW by 2027.
- New APAC markets expected to begin their OSW development journey within the next 5 years include Australia, India, Thailand and Vietnam.



Global Outlook

Asia outlook



| Despite a slow start, large-scale growth post-2020 will average 5 GW of new annual added capacity.



1.4 US Markets Outlook

- BNEF forecasts' place the US as the fourth largest OSW market globally by 2030, with 15GW of commissioned OSW.
- The first US commissioned OSW capacity is scheduled from 2021, with activity peaking in 2025.

Gigawatts States 2.5 OH 2.20 2.15 15.39 2.00 2.00 CT 2.0 1.77 0.43 1.60 RI 1.35 1.5 4 33 ■ VA 1.20 0.02 6.39 NY 1.0 0.66 1.10 0.43 NJ 0.43 1.59 0.5 0 30 MD 0.03 3.20 0.03 ME 2016 21 23 28 17 18 19 20 22 24 25 26 27 29 30 Cum Cum Cum 2020 2025 2030 Commissioning Year MA

The fourth largest market in 2030

 BNEF estimate that up to a third of U.S. new wind capacity additions will be from the offshore wind sector across the coming decade.



The newcomer to grab up to a 1/3 of future US build

Is the global OSW pipeline enough?

"As an industry, we are not nearly ambitious enough to deal with global warming. If we are going to decarbonize in Europe, for instance, we need to build 900,000MW offshore. Based upon the current forecasts, it would take c.100 years to build enough OSW to decarbonize Europe. We don't have 100 years."

Eddie O'Connor, Executive Chairman, Mainstream Renewable Power

Section 2: Pinpointing Opportunities: Tenders & Project Pipelines

2.1 US

NY/NJ targets 9 GW by 2035/3.5 GW by 2020 resp. We await NY Bight lease sale

- Next lease in the New York Bight
 - Final areas were supposed to be announced in early 2019, final sale notice in late 2019 and Lease sale in early 2020
- Planning issues affecting Vineyard Wind are delaying this solicitation as depending on Vineyard's outcome the cumulative impacts analysis for the New York Bight sites could have to be repeated
- New York
- 9GW target by 2035
- Last July awarded 816MW to Equinor's Empire Wind and 880 to Orsted's and Eversource's Sunrise Wind
- No solicitations ongoing
- New Jersey

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- 3.5GW target by 2030
- First solicitation won last July by Orsted's 1.1 GW Ocean Wind
- No solicitations ongoing



- The New York Bight lease sale is the next scheduled development milestone to take place in the US market.
- Offshore Wind Consultants have indicated that the permitting complexities currently delaying progress for Vineyard Wind in the Massachusetts Wind Energy Area could have repercussions on this scheduled lease sale due to take place in early 2020. The Bight sites could potentially have to repeat and extend their cumulative impact analysis in-line with the Bureau of Ocean Management's (BOEM) additional requirements for Vineyard Wind.

Massachusetts targets 3.2 GW by 2035, one ongoing, then 2022, 2024 & 2026

- 1.6GW target by 2027 and 3.2GW by 2035
- Second tender ongoing to procure 400 800MW
- **Two 800MW** solicitations should be held in **2022 and 2024**, following the one already planned for later this year. Another could follow in **2026**
- Vineyard Wind won the first commercial scale US tender in 2018
- Vineyard is having planning issues (accumulative impact) hindering the commissioning of the project in 2022
- Complex bid evaluation criteria could lead to hybrid projects to maximise power system benefits
- Winning bids have to be below 1st solicitation (\$65/MWh, 2017 prices)



- Massachusetts currently has an open second tender to procure between 400-800MW, following Vineyard Wind's success at the first commercial-scale US tender in 2018.
- Offshore Wind Consultants forecast two 800MW solicitations to be held in 2022 and 2024, with potentially a fourth following in 2026.
- Successful bids will be required to come in below the first solicitation round level of \$65/MWh.



- All OSW capacity in Virginia will be purchased from Dominion Energy's lease area, opening up the potential for developers to partner with the utility to construct and develop additional projects, according to Offshore Wind Consultants.
- The West Coast will see growth from the mid-2020s, with the water depths in this region lending itself to the installation of floating OSW technology.

2.2 APAC

- Development uncertainties and delays are expected to plague India's first OSW tender. In January, the draft lease rules for the Gujarat tender were released but lacked granular details, according to Offshore Wind Consultants.
- The tender of between 0.5-1GW of projects along Gujarat's coast is expected to open in December 2019, but BNEF expect that to be delayed.

India initialtes and stalls



India targets 30GW by 2030, many uncertainties remain e: MNRE. as 31/05/19 India Electricity Capacity Breakdown by Source (%) • National targets set in June 2018: - 5 GW of offshore wind by 2022 - 30 GW of offshore wind by 2030 • Draft of the lease rules for the 1st offshore wind tendering Gujarat released on the 29th of January 2019 and was open for comments from relevant interested parties until the 25th of February 2019, but lots of parameters have not been specified and many risks and uncertainties remain · Offshore wind identified as key technology with regards to decarbonisation and industrial strategy and envisages a potential for 35 GW in the States of Gujarat and 30 GW in Tamil Nadu • We will release a joint White Paper with TATA Consulting Engineers on India's offshore wind risks, policies & challenges soon SHORE 25 C Offshore Wind Consultants Limited 2019

Japan

Japan is set to see its first OSW auction open in H1 2020 following on from the enactment of the "Law on Promotion of Use of Marine Areas for Development of Marine Renewable Energy Generation Facilities" in April 2019.

	") was approved which provides	s an outline of projec	Renewable Energy t development.
Brief Outline and Expected Scheo	dule of Project Development (First	Round)	
Announcement Design of the Guidelines Promo	nation of 2-Step Selection Proces of Business Operator	s FIT Approval by METI ^{*1}	Permission of Exclusive Use
 June 2019 July In June of 2019, Guidelines for Public Auction and the Exclusive Use (the "Guidelines") was announced. Evaluation methods for selecting business operator was disclosed. Details to be further explained in Page 5. METI'¹¹/MLI designate t "Promoted prepare the Subscriptio relation to 1 designated Area. On July 20 METI/MLIT Promoted Details to b introduced 	2019 15 ^{il} Stage: Conformance review of bidders' plan to evaluate satisfaction of the minimum standards. 9 "Public on Policy" in the IPromoted 2 nd Stage: Assessment of bidders' plan to evaluate the qualitative and relative implementation of the project by a third party committee. Winning bidder will be selected by METI/MLIT.	 3Q 2020 The selected business operator applied for METI approval of the business plan for feed- in-tariff according to the approved Plan of Exclusive Use. 	 The business operator applies for exclusive use based on the approved Plan of Exclusive Use. Exclusive use of the Promoted Area will be granted up to 30 years.
Note : 1. Ministry of Economy, Trade an 2. Ministry of Land, Infrastructure	d Industry , Transport and Tourism		

- Two key developmental mechanisms have emerged from this enactment, the Development Bank of Japan (DBJ) explained. 1) In June 2019, Guidelines for the Public Auction and the Exclusive Use was announced outlining the project development process in the Japanese market; in July 2019, 4 out of 11 promising areas for OSW were elevated to 'promoted areas' where the government will now conduct wind measurement and geological surveys.
- DBJ expect the next activity to take place just after the Tokyo Olympics in summer 2020, when evaluation of bidders' plans will occur, and the winning bidder will be selected.
- DBJ expect this process to run every year, which could mean the remaining 7 areas not promoted in this first auction round could be promoted in future rounds.



- JDB forecast the first wave of projects to start operations in 2025. The bidding process will be completed by autumn 2020, construction will take between 3-4 years, taking us to around 2025.
- JDB foresee a different buildout trajectory from the European experience where OSW projects started of very small and grew in scale as the industry matured. In Japan, the power buy-in and project sizes will start at large capacities. Area 1 could see 500MW built, 7 could see 700-1GW, and Area 8 around 500MW.
- Supporting infrastructure readiness will be a barrier to buildout at that scale, warns JDB, such as harbour and port capabilities to house the components and vessels required for such scale.
- Forming partnerships will be central to foreign players entering the market given the impetus placed upon elements beyond strike price in the tender evaluation process.
- Successful bids will not be based on bidding price alone, instead a scoring system will be used whereby different weightings will be given to project schedule, risk level, experience, supply-chain partnerships, technologies proposed and engagement (BNEF).
- Establishing Japanese partnerships will require 3 key considerations from international players, JDB highlighted.
 - When to establish partnership? The process is very difficult because all the projects are coming from the bidding system, until after the bidding system you cannot find who will be the developer, so you need to think seriously about whether you find a partnership before the bidding process or after.
 - How to establish partnership? You can establish exclusive partnerships or ad-hoc basis partnerships. Again, the bidding process means you do not know who is going to be the winner, so an exclusive partnership is a bit risky
 - Who to partner with? In Japan there are two types of developers those who have experience developing
 onshore projects who want to move into offshore and those who have do not have onshore experience.
 Those who do not have onshore experience will be easier to form partnerships with because they need the
 experience partners can bring from Europe and established offshore markets. It will be difficult to partner with
 onshore players because they want to do offshore their own way.

Partnerships: Entry route to Japan



China

- China is currently moving from a fixed tariff system to competitive auctions, with the objective to achieve subsidy free projects by 2022.
- BNEF analysis shows that there is 38.2 GW of capacity which has not been secured under the FiT system which will be eligible to compete under the auction system.
- A race to permitting is underway as projects seek to secure the necessary mechanisms to participate in the upcoming auctions.
- Foreign players will need to establish local partnerships in order to share in this colossal market, as Equinor, GE and EDF have recently established.
- China are targeting >30GW of OSW by 2030.

China's bumper pipeline



Partnerships: Entry route to China



South Korea



Taiwan



Vietnam

Vietnam targets 6.2GW by 2030, competitive tenders post-2021

- Rising energy demand and decarbonisation, Gov targets 6.2GW of wind by 2030 from 190MW today (100MW the nearshore Bac Lieu OWF)
- Mainly nearshore projects led by Vietnamese companies
- 2018 FiT of \$98/MWh with competitive tenders expected to start after 2021
- Concerns over PPA bankability and availability of grid connection remain
- Most active foreign developers are Enterprize Energy (Ke Ga 3.4GW) and Mainstream Renewable Power (Phu Cuong 800MW)



2.3 Europe UK: Crown Estate's Round 4

The Crown Estate Objectives:

- Round 4 is designed to satisfy policy and market demand, in combination with 2017 Extensions, through to 2030 and beyond;
- It will help maintain a robust portfolio minimising deployment risk by leveraging market and shareholder expertise & knowledge, alongside our own;
- We are seeking to enable longer term growth by promoting a range of initiatives & commitments in relation to data, innovation, and strategic enabling actions.





- The UK has a strong portfolio with 35GW under agreement as of today. Nearly 10GW is expected to be agreed over the next couple of years, with 7GW of capacity expected from Round 4.
- Total pipeline capacity is up to 44.4GW making the UK very well-placed to deliver the targeted 30GW of OSW by 2030 and possibly exceed this target.
- Round 4 signals the first major UK leasing round for a decade.
- The most significant change since Round 3 concluded in 2009 has been the external market context and policy environment. The theme of Round 4 according to the Crown Estate has been balancing the technological advances made in OSW since Round 3 larger turbines, changing siting characteristics with growing interest in OSW development from stakeholders and users of the seabed.
- A 7GW delivery target has been the balancing level agreed on after considering the often-competing drivers of the OSW sector and seabed users and environmental stakeholders.
- Round 4 is more modest than Round 3 which had a 32GW capacity, but it is still a sizeable amount of capacity and currently the largest active leasing round in the world.
- Round 4 has been designed at a scale that can be repeated quickly. A ten-year gap is not expected before Round 5, with a more regular and predictable cycle of leasing anticipated.
- Leasing in smaller chunks of capacity enables the Crown Estate to adapt to changes in the market and policy environments that large-scale leasing in bulk wouldn't allow for.
- One of the key diffractors of Round 4 is the potential for developers to identify their development sites within four bidding areas.
- The Crown Estate expect to approve new capacity across at least 3 of those sites to ensure geographical diversity.

Bidding Areas

The four available Seabed Bidding Areas are:

- Bidding Area 1 Dogger Bank (comprising the Dogger Bank region)
- **Bidding Area 2** Eastern regions (comprising the Southern North Sea region, The Wash region (refined) and the East Anglia region (refined))
- **Bidding Area 3** South East (comprising the South East region (refined))
- **Bidding Area 4** Northern Wales & Irish Sea (comprising the North Wales region, Irish Sea region, and the Anglesey region (refined))

Round 4 leasing process Pre-qualification questionnaire (PQQ) **Invitation to Tender** Agreement for Lease (AfL) Invitation to Tender Plan-level HRA Stage 1 (ITT Stage 1) Stage 2 (ITT Stage 2) Autumn 2020 – Summer 2021 Oct 2019 – Jan 2020 (14 weeks) Feb - Jun 2020 Autumn 2021 Sept 2020 (18 weeks) (1 - 4 weeks) Assesses potential Bidders' financial capability, technical experience and legal compliance, with successful Bidders pre-qualifying for the ITT Stage 1 process (becoming a Pre-qualified Bidder). Assesses the financial and technical robustness of projects submitted by Pre-qualified Bidders. Projects that pass will then be eligible to take We will enter into a Wind Farm AfL with successful Bidders. A multi-cycle bidding process, using option role as a Competent Authority under the Habitats Regulations, we fees bid by Eligible Bidders to determine award. One project will be awarded per daily will undertake a Plan-Level Habitats Regulations Assessment (HRA) to assess the possible impact of the awarded projects on relevant nature consonction citors of Bidding Cycle, with Bidding Cycles continuing until the 7 GW has been awarded or process (becoming Eligible Bidders with eded (up to 8.5 GW). On being conservation sites of European importance successful in a daily bidding cycle, a Bidder will need to enter into a Preferred Bidder Letter and pay an Option Fee Deposit. one set out in this docu Anticipated dates PQQ Activity Indicative Timetable IM issued (Round 4 launch) Bidder Information Day 9 October 2019 PQQ issued 14 October 2019 All future dates are indicative and PQQ Response Deadline 29 November 2019 subject to change Appointment of Prequalified Bidders w/c 27 January 2020 Feedback to unsuccessful Bidders w/c 27 January 2020 Dates for each stage will be confirmed at the start of each stage ITT Stage 1 Activity Indicative Timetable ITT issued to Prequalified Bidders February 2020 Deadline for Bidders to submit ITT Clarification Questions March 2020 ITT Response Deadline April 2020 Appointment of Eligible Bidders in respect of Eligible Projects June 2020 Feedback to unsuccessful Bidders June 2020 ITT Stage 2 Indicative Timetable Activity September 2020 **Bidding Cycles**

The Crown Estate plan to repeat bidding cycles until they have leased 7GW of capacity across at least 3 bidding areas. No more than 3.5GW will be allowed in anyone bidding area and no more than 3 projects will be allowed per bidder to ensure customer and geographical diversity in order to deliver a robust portfolio.

Germany



Netherlands



Denmark



Belgium

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Belgium targeting 4 GW for 2030, next tender expected in 2022

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- There is a target of around 4GW by 2030 from 2.3GW auctioned today
- Belgium has decided to shift to a "Dutch" model, the next tender will probably be in 2022
- There have not been competitive auctions for subsidy allocation to date, the government has directly negotiated with project developers
- Market mainly dominated by local players: Otary, Parkwind, Electrabel (Engie)
- Belgium is the country with the least ambitious offshore wind targets, this can be explained because of the limited size of its territorial waters. Netherlands EEZ is 15.5 times larger than Belgium's
- New offshore wind zones identified will allow the development of 2GW post 2020
- Belgium has decided to phase-out nuclear power (6GW around 50% of electricity produced) by 2025, hence large scale offshore wind development will be critical



Ireland:

Ireland targeting 3.37 GW for 2030, 1st auction expected 2020

- RESS 1 auction expected in Q3 2020, technology neutral, pay as bid and capacity limit 3TWh (750MW offshore wind maximum). Due to project delivery dates offshore wind projects more likely to take part in RESS 3 expected in 2021
- Ireland will miss their 2020 renewable energy targets (16% of energy from RE but will reach 14%) and need to speed-up renewable energy deployment to comply with their 2030 target for electricity from RES (70%)
- New Renewable Electricity Support Scheme (RESS) is being introduced to launch competitive tenders for renewable energy, but no timeline of auctions and no specific category for offshore wind
- General Scheme of the Marine Planning and Development Management Bill (MPDM) published last July. A Government decision in Q2 2020 on the offshore grid framework (developer led or TSO) is expected
- Active M&A market in early phase projects in 2018 with acquisition of stakes in projects by Innogy, Parkwind and ESB



OFFSHORE

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Norway:

No formal targets, but Norwegian Govt keen to promote expertise/business Norway's Ministry of Petroleum and Energy plans to open the area of Utsira Åpning av havvindområder Nord, off the coast of Rogaland, for applications on floating offshore wind Utsira N • Utsira Nord could support 0.5-1.5GW and North Sea II 1-2GW 500 – 1500 MW Utnyttelse: 6 – 19 pro • The ministry will need to propose a regulation detailing rules about the Sørlige Nordsjø II 1000 – 2000 MW license process, at this stage the route to market is unclear 2000 MW lse: 6 – 10 prosen · Massive hydropower capacity and low-cost onshore wind present challenges for offshore wind to compete · However, offshore wind prospects to decarbonise the oil and gas are promising Proposed developments to decarbonise oil and gas exploration and production as 23% of emissions come from GTs used by the oil industry • Havsul 1 (nearshore) 350MW by Gassco and Enbridge to boost power supply at one of the largest gas plants • Hywind Tampen 88MW floating array by Equinor to provide 35% of Snorre and Gullfalks oil fields' electricity but 50% of the costs covered by the Norwegian Government NKr2.3bn (~\$257m) and NKr556m (~\$60m) from the NOx fund OFFSHORE WIND 13

Poland:



10GW projected by the draft power strategy by 2040

- In early November, the Polish government released its draft 2040 Polish Power Strategy where offshore wind alongside PV are to form the pillars of Poland's future energy mix.
- OSW is projected to reach 8-10GW by 2040.
- OSW has been accepted by the Polish geo-political scene, with the country currently in the midst of an interministerial consultations on a new draft OSW Act which would regulate CfD auctions specifically for OSW.
- The anticipations is that this will be enacted into law early next year to give clarity for the developers to make decisions and move forward.
- Polish developers are bringing in international developers with technical know-how and operational experience to help them build out this capacity. Poland already have a solid base of local and international developers including Baltic Trade and Invest – Offshore Wind, two state companies – PGE who are in exclusive partnership negotiations with Orsted, and PKN Orlen who are in a process of inviting a partner into their 1.2GW farm scheduled to launch in 2026. EDP Renewables who are already present in 2 Polish OSW projects. RWE Innogy acquired 4 large scale Polish OSW projects in October.



- Poland is different to other global new markets like Taiwan because established industrial base and active OSW supply-chain which will stay in large in Poland.
- Poland and Baltic states looking to OSW as a GDP enabler and driver.

Domestic developer perspective on early-Polish OSW market: F.E.W. Baltic II offshore wind project

"We started to think about OSW projects in Poland in 2004, in has been a long story to get here. All the regulatory frameworks will follow.

In 2013 we received our seabed permit. In 2016 we started environmental surveys.

Every action we did carte blanche, it was a learning curve for everyone in our team. We developed knowledge and developed momentum but still needed to know more, so we made a joint development agreement with our partners for the financial and BOP knowledge – Green Giraffe and Van Oord.

In October we successfully gave the project to RWE Innogy.

This was one of four large-scale Polish OSW projects RWE acquired with an associated development pipeline, totalling more than 1.5GW in the Polish Baltic Sea.

At the earliest we are likely to see the first offshore installations enter Polish waters in 2023."

Joanna Rzepecka, Director of the Board, Baltic Trade & Invest - Offshore Wind Development

International developer experience of early-Polish OSW market:

"We have been in Poland in 2007 which is basically the establishment of EDPR – when other companies pulled out during the slow, long years, we stayed there because of its fundamental potential.

In 2010 we submitted applications for OSW in Poland and in 2013 we got site permits, but because of reasons outside of OSW in Poland we didn't take them. Very quickly we realized our error and resubmitted the applications, securing 2x200MW projects where two companies were pulling out.

It is part of our DNA to team up with local players. But I also want to highlight an issue with the new market plan – which is connected to existing sites and the plan is very much rigid. But we need the flexibility to look at further areas of potential outside of these sites.

What we need as a developer is clear frameworks to strike the lowest LCOE possible."

Spyros Martinis, Chief Operating Officer Offshore & Chief Development Officer, EDPR Lithuania:

- Lithuania is already on a good track in terms of renewable energy development achieving its 2020 targets in 2016.
- In 2016 it became the first European country to export and sell excess renewables generation, exporting power to Luxembourg
- Last year it approved its National Energy Independence Strategy into Parliament providing a clear vision for energy development out to 2050. For electricity, Lithuania are aiming for 100% renewable generation by 2050 and 45% in 2030.
- OSW is instrumental to achieving its 2030 renewable targets There is 3.35GW of OSW potential on Lithuania's Baltic coast, in an area 30-40km from shore and in depths 25-40m.
- Lithuania already have OSW specified within their Law on Renewable Energy enacted in 2012 and amended in 2017.



- Lithuania's approach is a centralized model for development following the Dutch model.
- The state is responsible for carrying out grid and environmental assessments
- In 2020 Q4 a decision from the Cabinet regarding auction rollout is expected which will outlines sites, developer requirements and capacities we are realistically looking at 2023 for the auctions.
- Capacity for the auction will be based upon 700MW in one auction in 2023 or 2x350MW auctions based upon gird integration capabilities. Either way, 700MW of OSW will connect to the Lithuanian grid from 2028-2031

Lithuanian stakeholders seeking buy-in on established European OSW projects to export know-how to domestic market

"We are a state-owned Lithuanian utility operating across eastern European markets. We announced an EOI process at beginning of 2019 to partner on an existing project and we have received a number of proposals for partnerships which we are currently shortlisting. The objective is to partner in a project which is in a more advanced state of development then the upcoming project in Lithuania and then to take place in the auctions in Lithuania leveraging that experience. We see Europe as still the market where we want to learn and more synergies for applying back into the Lithuania context."

Dominykas Tuckus, Member of teh Board, Infrastructure & Development, Ignitis Group

How to enter Baltic markets as an established European-market developer

"What does Northland look for in Poland and Lithuania and how can transpose experience into these markets? We are not going to propose we enter the Polish market from standing start, we will be looking to partner up with local developers, the same applies to Lithuania. We will look for partners to team up with.

This is a European sector, so Poland is an easier move than most because it has an active and competitive supplychain we already tap into. It's not a brand-new market in the sense that APAC markets are."

Nigel Slater, Managing Director, Development - Europe, Northland Power

Assessing new market opportunities and forging entry strategies

"We haven't yet been successful in new markets in APAC and the US, but we are very active in these markets. We look for a coastline obviously in the first instance to accommodate OSW, we look for government commitment, we look for factors such as renewable energy and carbon reduction targets and fulfilment of those to gauge government commitment to carbon reduction and ideally with an appetite for offshore wind, or where we believe OSW will be key to the market meeting its energy targets.

Then, when regimes are put in place, we try to work to influence the regime. We are looking for mechanisms that will prove stable revenue for the project and a regime that makes sense and encourages credible projects to move forward, so we don't want to see projects priced so low that they're never going to be delivered. Ideally, we are looking for a market that has consistency, longer term targets and objectives, project pipeline transparency to build up manufacturing and skills. We like to do this with a partner local developer who has supply chain, government and stakeholder contacts. We cannot do it alone."

Richard Sandford, Director of Offshore Investment & Asset Management, Innogy Renewables

"When as a Canadian biomass IPP we moved it to European OSW we teamed up with a local partner on Gemini. Second time around we teamed up with Innogy and took a larger portion of the project - 85% on Nordsee 1 from 60% on Gemini. Then we felt confident enough to take 100% ownership of Deutsche Bucht, our third OSW project.

When we moved into Taiwan and other parts of the APAC region – in Taiwan we stepped into a partnership with a semi local developer, a British developer who had teamed up with local people and taken the first steps in Taiwan, and we bought 60% of that project as we find that it is important to have local people on the ground who understand the regulatory environment, the permitting environment, and understand the dos and don'ts in order to move around because I think one thing we have to appreciate is that Europe is still more cohesive as a market whereas moving between countries in APAC there are lots of cultural and political differences.

We are looking to replicate this model to market entry in Japan and Korea. This will be especially important in Japan getting that local know-how because of the number of fishing associations that will need to be consulted within the environmental studies and permitting phase.

First and foremost, we are looking for partners we believe we can work with then we have our lawyers draft up the agreements. It is about sharing values and working ethics, predominantly with our looking for partnership expertise around the permitting and consenting with us bringing the experience in OSW related know-how and of course our project financing experience. Having respect for the local ways of doing things and bringing in know-how from the European OSW industry."

Morten Melin, Executive Vice President Construction, Northand Power