

The Polish Baltic Sea Offshore Wind Potential: When Will the Dedicated Support Scheme Mechanism for Offshore Wind in Poland Be Presented?

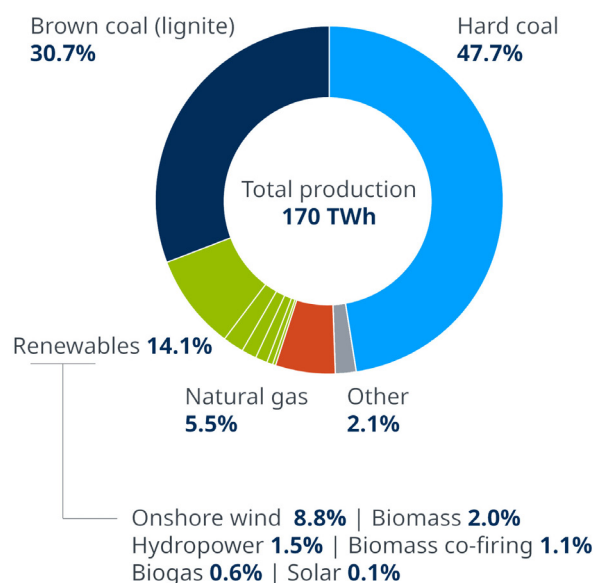
by Henry Davey, Robert Ryszard Broom and Igor Hanas

Poland has huge potential in the Baltic Sea with 10GW of offshore wind envisaged to be built by 2040 to help reduce carbon emissions and fill a potential capacity gap created by no new coal generation being built to accommodate growing demand. A comprehensive offshore wind act with direct support for the first wave of projects is eagerly anticipated by the Polish offshore wind industry to kick-start the first wave of prospective projects. During an Economic Congress held in mid-May, in Katowice, Poland, officials from Poland's Ministry of Energy presented on ways to develop Poland's renewable energy sources sector that match EU requirements and are reflective of the Polish energy sector needs and structure. Offshore wind was highlighted as a key component of Poland's future generation mix as part of its transition towards renewable energy diversification. We take a look at the prospects for offshore wind in Poland and the latest developments for this technology in the Polish energy sector.

Energy Policy of Poland Until 2040

According to the Polish government's Draft Energy Policy of Poland until 2040 (which contains the main strategic objectives for the country's energy sector) (the Energy Policy),¹ apart from nuclear power plants and photovoltaics, offshore wind energy is to be a key component in the Polish energy transformation. This signals a slight shift away from lignite and hard coal-fired generation (which today accounts for almost 80% of all electricity generated in Poland – see Figure 1) towards a more diverse, low-carbon fuel mix. The increasing role of renewable energy sources results from the need to diversify Poland's energy mix, in particular, the need to contribute to the EU-wide renewable energy sources (RES) target in final energy consumption: the EU first set binding targets for sustainable power in its member states with its Renewable Energy Directive (RED) of 2009. The new Renewable Energy Directive (RED II) of 2018 specifies that at least 32% of the EU's energy consumption would come from renewable energy by 2030.

Figure 1: Poland's energy mix in 2017 (by source in public supply of electricity).



According to the Energy Policy:

- The share of coal in electricity production is anticipated to drop to 60% in 2030 (national deposits of coal will remain the key element of Poland's energy security and the foundation of its energy mix, but its share will decline to this level on account of an increase in energy consumption).
- Poland's first nuclear power plant (NPP) is planned to start generating in 2033 with a capacity of 1-1.5GW. Six nuclear units are to be built by 2043 with a total capacity of 6-9GW.
- The share of RES in final electricity consumption will reach 21% in 2030. Full exploitation of the potential of offshore wind in the Baltic Sea, along with photovoltaics, can provide up to 30GW (in total) by 2040.
- Rapid diversification and growth of installed capacity and energy production generation will lead to a reduction by 30% of CO2 emissions (compared to 1990 levels) in Poland's energy sector by 2030.

¹ [Draft Energy Policy of Poland](#), accessed 27 April 2019.

In the Near Term, Coal Still Dominant (But Less so Than Before)

The implementation of the Energy Policy signifies that significant renewables growth, in particular offshore wind, will be registered over the next 10-year period, primarily motivated by reductions in carbon emissions under EU law: an emission limit of 550g CO₂ of fossil-fuel origin per kWh of electricity for new power plants taking part in capacity mechanisms was informally agreed by the EU last December. These limits are currently prescribed in the EU's proposal for a directive on wholesale electricity market design likely to enter into force around mid to late 2019. However, the political and economic significance of coal-fired power in Poland (given the sector's continued importance to Polish utilities and its socio-political importance as a source of employment: approximately 100,000 workers still work in the industry – that workforce being mainly concentrated in the hard-coal regions of Silesia²) will deter shutdowns and ensure Poland's dependence on coal for most of its electricity supply: over the coming decade, coal-fired power will make up 77% of total power generation by 2028.³

New-build coal-fired plants are unlikely. In March 2019, Energy Minister Krzysztof Tchorzewski confirmed that the Ostrołęka C coal-fired power project in northeastern Poland, a joint venture between Energa and Enea, two state-controlled energy groups, will be the country's last investment in a coal-fired power plant.⁴ Ostrołęka C was awarded a 15-year contract in last December's capacity market auction for 2023 delivery and will receive state subsidies through to the end of 2037 despite exceeding the 550g CO₂/kWh emission limit.⁵ However, to date, the financing of this project is not completed, as most of the European banks refuse to finance the fossil fuel generation.

NPP Baseload Required to Accommodate Offshore Wind Development

The combination of sufficient baseload capacity in the form of nuclear power to accommodate the development of offshore wind has also been highlighted by Minister Tchorzewski, who was quoted as saying: "Nuclear energy does not depend on the weather ... availability of offshore wind farms is greater than those on land [45-55% against 25-35%], but Poland still needs to provide a reserve for half of the energy needed. We will not deliver it from [thermal] power plants in the south of the country, if the system runs out of 2-3GW from Baltic farms because of windless weather."⁶

² Anna Mikulska, EnergyPostEU, "Poland, Europe and the coal conundrum", 19 September 2018, accessed 28 April 2019.

³ BMI Research, Europe Power & Renewables Insight, "Poland Offshore Wind Progress To Have Limited Impact On Coal", 21 March 2019.

⁴ The First News, "Gov't wants to invest wisely in renewable energy sources – minister", 30 March 2019, accessed 28 April 2019.

⁵ Existing power plants emitting both more than 550g CO₂/kWh and 350kg CO₂ on average per year per installed kW will only be able to receive capacity payments until 1 July 2025.

⁶ Andreas Franke, Adam Easton. Platts Power in Europe, "Tchorzewski: "nuclear first, then offshore". 21 May 2018.

The 1.5GW NPP, if online by 2033, will be the first of several NPPs Poland expects to build as it prepares to increase its installed power portfolio to 73GW as compared to 40GW today (it is expected that nuclear power will provide about 10% of that total).⁷ According to the Energy Policy, the deployment of renewable energies is expected to accelerate after 2025, when individual technologies are seen to achieve technological and economic maturity. Based on the Energy Policy, the mix of generation by technology in 2040 would be as set out in Figure 2.

Figure 2: Electricity generation by technology until 2040.

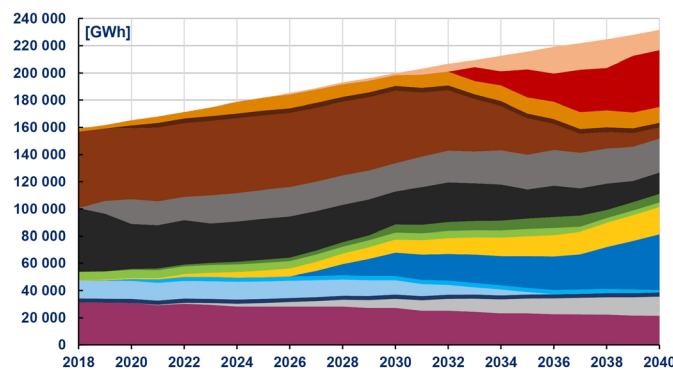
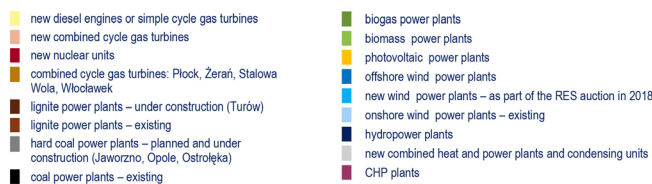


Figure 2. Electricity generation by technology until 2040



Source: Draft Energy Policy of Poland, available at: https://www.gov.pl/documents/33372/436746/EN_Extract_EPP2040.pdf/ca2760d6-f9ab-9a87-c3a9-61063abe3681, accessed 27 April 2019.

Transmission Capacity to Accommodate Offshore Wind Capacity

The development of offshore wind will depend also on the completion of work on strengthening the transmission network in the northern part of Poland; the Polish transmission network operator (Polskie Sieci Elektroenergetyczne, or "PSE" for short) is currently capable of connecting 4GW of offshore wind power capacity to its power grid by 2026/2027 and aims to bring this up to 8GW in the longer term.⁸ The challenge for PSE is to adapt the grid to the new configuration of generation sources. Networks in the northern part of the country are too weak to receive energy from offshore wind farms with a capacity of 8-10GW. Moreover, it is necessary to increase the capacity of connections on the North-South route.

This is important due to the asymmetric distribution of the Polish Power System (KSE)⁹ loads (the southern part of the country receives comparatively more energy than the northern part).¹⁰

⁷ Steve Hanley, Clean Technica, "UK Turns Away From Nuclear As Poland Prepares To Embrace It", 4 February 2019.

⁸ Veselina Petrova, Renewables Now, "Poland's PSE says grid can take 4 GW of offshore wind by 2027", 12 April 2018, accessed 28 April 2019.

⁹ Krajowy System Elektroenergetyczny.

¹⁰ Jan Raczka, Forum-Energii.eu Report, "Offshore Energy; Downwind or upwind", November 2018, accessed 28 April 2019.

Grid connection is undoubtedly an issue in Poland. As in other countries such as Germany, the issue is not so much whether power from offshore wind can be connected to the grid, but that the onshore grid needs to be reinforced to take the electricity injected into the system to be transmitted to the energy-hungry industry in the south of the country. The PSE is working on a plan to provide another 5GW of grid capacity.¹¹

In addition, Baltic Sea regional partners are exploring the potential of meshed offshore grids for the Baltic Sea region. The project, called the "Baltic InteGrid Project", is aimed at contributing to a sustainable electricity generation, furthering integration of regional electricity markets, and enhancing the security of supply around the Baltic Sea.¹² Furthermore, in order to integrate the Polish power systems with that of other Baltic states into the continental European grid, a new offshore Poland-Lithuania interconnector, located by their respective offshore wind farms, is expected to be commissioned in 2025 and to carry 700MW of electricity.¹³

Other Factors That Contribute to the Argument for Wind Development in Poland

The Increase in the Price of Carbon Can Push More Coal Off-grid in Poland

[Rising carbon prices](#) in the EU are acting as a further deterrent for coal power, by making it increasingly expensive and unattractive; in August 2018, the EU carbon price broke €20 per tonne for the first time since 2008 and prices are predicted to rise higher still, hitting €35-€40 per tonne from 2020. This marks a significant increase considering that, in May 2017, a tonne of carbon was priced at just €4.40.¹⁴ Wind energy growth in Poland, therefore, has a major role to play to address a potential capacity gap from the future declining amount of coal on the Polish grid, as well as lowering CO₂ emissions.

Wind Presents a Possible Future Remedy to Currently High Electricity Prices

Wholesale power prices in Poland surged in 2018, mostly driven by rising coal prices and carbon emission costs, as Poland generates most of its electricity in polluting coal-fuelled power plants, which, for Polish households, meant potential electricity bill hikes from January 2019; Polish state-run utilities proposed raising household bills by more than 30% to claw back revenue hit by a 65% jump in wholesale electricity prices and a 400% leap in carbon prices.¹⁵

The Polish government, in a bid to stabilise power prices for end electricity users, passed legislation on 28 December 2018 that capped 2019 power prices at the level reached at the end of June last year and froze distribution and transmission fees at the level reached in late December 2018.¹⁶ Apart from excise tax cuts, power companies will be offered a total of PLN4 billion (€0.03 billion) in government compensation. The Polish government's intervention illustrates the extent of how exposed its coal sector is to coal prices and carbon emissions costs, including how this issue is likely to grow in future years. Energy prices from coal cannot be sustained by the government at levels below the cost of its production.

The decreasing costs of wind power (the investment cost of offshore wind in Europe has fallen 44.5%, from €4.41 million/MW in 2013 to €2.45 million/MW in 2018, due to the rise of competitive tendering, larger turbines and more capacity¹⁷) creates a further compelling argument for introducing wind in an energy mix for end consumers to benefit from a decreasing levelised cost of energy (LCOE). The gap between the cost of electricity production in a conventional power plant and a wind farm has been stressed by Janusz Gajowiecki, President of the PWEA: "New wind farm investors already declare the readiness to produce 1MWh below PLN200, which is less than on the wholesale market. In subsequent years the price will decrease to approximately PLN160. At the same time electricity from conventional sources costs 350 PLN/MWh." Gajowiecki argues that "The gap will increase to the advantage of renewable sources – first onshore wind, PV, and eventually, in 5-10 years, also offshore wind."¹⁸

So Just How Much Offshore Wind Could Be Housed in the Baltic Sea?

According to the Bloomberg Energy Finance Report, the Baltic Sea may become the next offshore wind market after the North Sea. The Baltic Sea offers good conditions for offshore wind development: waters are relatively shallow, have low salinity, lack of icing, wave height is lower, tides are less pronounced, and the distances to the shore are shorter than in the North Sea, resulting in lower project installation, operation and maintenance, and grid infrastructure costs.¹⁹ All these factors, taken together, indicate that the Baltic Sea has enormous wind energy potential and stands out as a possible high-yield region for wind power generation. The Foundation for Sustainable Energy (FNEZ) published an analysis that found Poland's installed offshore wind power capacity in the Baltic Sea could be 4GW by end-2030 and reach 8GW by 2035.²⁰ This is consistent with the Gdynia Maritime Office Offshore Area Development Plan, which earmarks approximately 2,340 square kilometres for offshore wind farms, which would allow construction of 8-10GW wind farms by 2035.²¹

¹¹ David Foxwell, owjonline, "[Morawiecki administration putting legislation in place to kick-start offshore wind](#)", 14 May 2019, accessed 19 May 2019.

¹² Baltic InteGrid Project Website, "[About Baltic InteGrid](#)", accessed 28 April 2019.

¹³ Reve (Wind Energy and Electric Vehicle Review), "[Cross-border energy markets are a reality](#)", 16 May 2019, accessed 19 May 2019.

¹⁴ Madalene Cuff, Business Green, "[EU carbon price clears €20 for first time since 2008](#)", 23 August 2018, accessed 5 May 2019.

¹⁵ Euractiv, "[EU to scrutinise Warsaw over law curbing energy price rises](#)", 3 January 2019, accessed 5 May 2019.

¹⁶ Yannik Rack, S&P Global, "[EU plans to probe Polish power price freeze](#)", accessed 5 May 2019.

¹⁷ David Weston, Windpoweroffshore, "[Europe's offshore wind costs falling steeply](#)", 11 February 2019, accessed 5 May 2019.

¹⁸ PWEA Website release, "[Special Offshore Act will be in place in Autumn 2019](#)", accessed 5 May 2019.

¹⁹ Offshore Wind Industry, "[Offshore Wind Energy as an opportunity for the Polish Economy](#)", 14 February 2017, accessed 28 April 2019.

²⁰ Ibid 9.

²¹ [Gdynia Maritime Office website](#).

Offshore Wind Under Poland's Renewable Energy Act

Under Poland's Renewable Energy Act, offshore wind projects compete for subsidies by auction in a technological basket with hydro, biofuels and geothermal projects above 1MW in capacity. No offshore wind projects competed in the 2018 auction in November because neither the Polenergia nor PGE's projects are far enough advanced yet. Aside from this, developers are also awaiting the dedicated offshore wind support mechanism to be provided by government in a dedicated offshore wind act.

Poland's Draft Law on the Development of Offshore Wind Energy (the "Offshore Wind Act")

Work on an Offshore Wind Bill by the parliamentary offshore wind energy group is being developed, with the group's chairman confirming that works on the bill should be announced and adopted in the coming months, in order not to interfere with the autumn parliamentary elections. This timeline was also highlighted by officials from the Ministry of Energy and Polish Parliament during the mid-May European Economic Congress held in Katowice, Poland. Considering the timing of such parliamentary elections, theoretically, a bill is likely to be presented either in June or otherwise after the elections – being the end of 2019. The bill will address three key issues:

- The first is deciding what kind of support scheme should be put in place for the first round of Polish offshore wind projects
- The second is how electricity produced by offshore wind will be connected to the Polish grid and how the Polish onshore grid can be reinforced
- The third is how the full potential of the supply chain in Poland can best be exploited²²

Permitting Process

The first stage of the investment process is obtaining and paying for the location decision. Currently, the decision issuing process has been halted until the new offshore area development plan has been approved (expected in September 2019). The next stage is obtaining a permit to lay undersea cabling within the exclusive Polish economic zone. Once these decisions have been obtained, the environmental impact study commences, which concludes with issuing the environmental decision. Irrespective of the process of obtaining such decision, the investor must enter into a grid access agreement with the transmission grid operator (usually prior to obtaining the environmental decision). The last stage of obtaining a complete set of permits is seeking an offshore wind farm building permit.

Latest Offshore Wind Projects

Poland's largest utility, Polska Grupa Energetyczna (PGE), and privately owned utility Polenergia, in cooperation with Equinor and PKN Orlen (Poland's largest refiner), are developing investments to build the country's first offshore wind capacity in the next decade.

These projects can be classified into three broad categories:

- The first category are the leading precursor projects, with location decisions – permission to build and use artificial islands (PSZW), connection conditions, legally valid or finalised environmental decisions.
- The second category are projects that only have a location decision of the artificial islands that gives a legal title to dispose of the area. Some of them are in the process of preliminary environmental studies or the procedure of environmental impact assessment initiated.
- The third category are "greenfield" projects, which are based on complex, but suspended applications for the PSZW – the first milestone in the whole permitting procedure.²³

We set out some of the reported details of these projects below:

PGE

PGE generates approximately 90% of its electricity from lignite and hard coal, but rising carbon costs and the fact that PGE's lignite resources will start exhausting from 2030 has caused it to develop offshore projects.²⁴ In December 2018, PGE invited more than 10 companies for talks to build two offshore wind farms with a combined capacity of 2,545MW (which would be Poland's largest wind farm in the Baltic Sea) and received 13 initial proposals from foreign partners.²⁵

In addition, PGE also announced plans to close the sale of a 50% stake in two special purpose vehicles created to build PGE's Baltica-2 (1,500MW) and Baltica-3 (1,045MW) offshore wind projects (located 35km off Poland's northern Baltic Sea coast) to an experienced foreign partner in Q3 of this year.²⁶ PGE has reportedly signed a contract with Irish engineering consultancy Gavin & Doherty Geosolutions to conduct geotechnical surveys on the Baltica-2 and EW Baltica-3 offshore wind power projects. Latest estimates put total combined project costs for both projects at about US\$7.8 billion.²⁷ A financial investment decision (FID) is expected in Q3 of 2023 and commercial operations of the first 1GW in Q2 of 2026. PGE also mentioned that, post 2030, an additional 1-2GW in the Baltica-1 project could be developed.

²³ Biznes Alert, "[Polish Briefing: Offshore needs a scale](#)", 5 February 2019, accessed 28 April 2019.

²⁴ Adam Easton, Platts Power in Europe, "PGE seeks offshore wind partners", 17 December 2018

²⁵ CE Noticias Financieras, "EDP Renováveis interested in mega-wind project in Poland", 30 January 2019.

²⁶ Adam Easton, Platts Power in Europe, "PGE outlines transition plan", 25 March 2019.

²⁷ BMI Research, Business Monitor Online, "Poland Power Key View", 26 January 2019.

²² Ibid 11.

Polenergia

Polish privately owned utility Polenergia concluded a deal, in May 2018, to sell 50% of its stake in two offshore wind farm projects in the Baltic Sea to Norway's Equinor; Baltic-II and Baltic-III (with a total capacity of 1,200MW). Both projects (located 27km and 40km from the port of Leba, respectively – the water depths at the site range between 20m and 40m)²⁸ already have positive environmental decisions from the Regional Directorate for Environmental Protection for the construction of offshore transmission infrastructure connecting the wind farms with the Polish National Grid. The total capacity that can be derived using the infrastructure detailed in the environmental decision is up to 1,440MW.²⁹ Polenergia estimates average wind speed of 9-10 metres/second for both projects.³⁰

In December 2018, Equinor exercised an option to acquire a 50% interest in Baltyk I. The site (located approximately 81km from the port of Leba, with water depths at the site ranging between 25m and 35m) allows for the development of a wind farm with a capacity of up to 1,560MW (of which Equinor will hold 50%).

PKN Orlen

Poland's biggest oil refiner, state-run PKN Orlen, plans to start investment in offshore wind farms in 2024.³¹ In January 2019, PKN Orlen confirmed that an Orlen group company, Baltic Power, was about to commence surveys to assess the environmental impact of building windfarms and gather data about wind conditions at its offshore wind licence area. To that end, an agreement has been signed with a consortium comprising MEWO SA and the Maritime Institute of Gdansk with a view to obtaining an environmental permit for the project and determining the production potential of the windfarm. PKN Orlen first assembled a team to plan an offshore wind project with a potential of up to 1.2GW in 2018.³²

Poland's Supply Chain for Offshore Wind

In addition to being able to piggyback off cost reductions, technological improvements and best practices developed in the North Sea, Poland has already developed a sizeable supply chain for offshore wind. Poland's strong and extensive port system is also seen as offering significant growth opportunities for operation and maintenance of offshore wind farms.³³ A compelling factor that supports offshore wind technology and its further development is that it has direct links to the maritime industry.

Manufacturing of offshore wind farm components and construction vessels, servicing farms in shipyards and ports – these are some of the major stimuli driving the process of modernisation and growth of the European, and Polish, maritime industry.

Some Polish companies have already benefited from this opportunity:

- The CRIST S.A. shipyard in Gdynia was built leading edge jack-up vessels that are used to install offshore wind farms (OWF).
- A new ST³ Offshore facility was built in Szczecin specifically designed for the production of transition pieces, jacket foundations and offshore wind foundation components for OWFs. Housing Europe's highest gantry crane and unique welding technologies, ST³ Offshore is the most innovative offshore wind foundations supplier.³⁴
- Other companies have started specialising in steel structures and components of substations used for wind farms built in the North Sea. Tele-fonika Kable, a Polish cable manufacturer and global industry leader, has acquired JDR Cable Systems (Holdings) Ltd., thus becoming a major supplier of submarine bus and power cables for OWFs.³⁵

Concluding Thoughts

With so many compelling arguments, the wider Baltic Sea region will continue to attract investment for offshore wind, including amongst international financial institutions. For example, the European Bank for Reconstruction and Development plans to increase its funding for Poland's renewable energy this year.³⁶ New investors are applying for a permit to build power plants in the Polish Baltic Sea zone. To date, seven projects have been taken into account by PSE – two of them have connection agreements and at the beginning of this year, five of them received technical connection conditions (WTP). PGE, Polenergia, PKN Orlen, Baltic Trade and Invest have location permits.³⁷ We have further set out in Figure 3 the locations and MW of these and other projects. Work on a development plan of offshore areas is currently ongoing. The total area made available so far is approximately 2,000km² and includes the Oder Bank area (380km²), Słupsk Bank (1,210km²), and Middle Bank (390km²). According to Forum Energii, this area would be sufficient for 8-10GW overall, with development in stages, which would allow for the gradual acquisition of experience by domestic companies, facilitate integration into the Polish network and help to reduce the LCOE.³⁸

²⁸ Tom Russell, 4Coffshore, "[Environmental nod for Polish projects](#)", 15 March 2019, accessed 27 April 2019.

²⁹ Ibid 28.

³⁰ Henry Edwardes-Evans and Adam Easton, European Power Daily, "Polenergia offshore wind project progresses", 30 January 2019.

³¹ Reuters, "Polish refiner PKN Orlen to invest in offshore wind power in 2024", 24 April 2019.

³² David Foxwell, Offshore Wind Journal, "[Polish energy outfit reiterates offshore wind plan](#)", 26 April 2019, accessed 5 May 2019.

³³ Heather O'Brian, Wind Power Monthly, "[Poland outlines offshore ambitions](#)", 28 May 2018, accessed 28 April 2019.

³⁴ [ST³ Offshore website](#), accessed 28 April 2019.

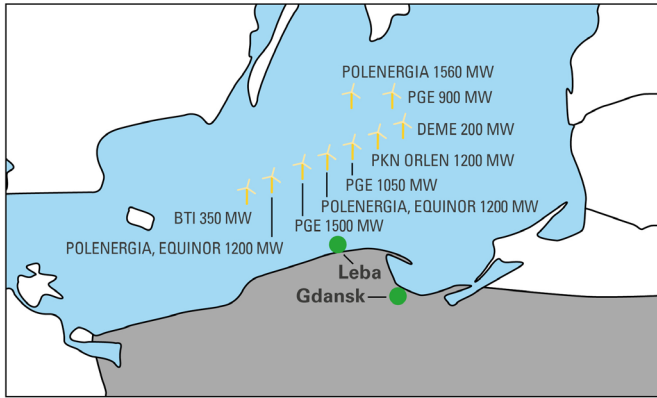
³⁵ FNEZ, "[Programme for the development of offshore energy and maritime industry in Poland](#)", 2018, accessed 28 April 2019.

³⁶ Reuters, "[EBRD to spend more on Polish green-energy projects this year](#)", 23 April 2019, accessed 5 May 2019.

³⁷ Stowarzyszenie Energii Odnawialnej, "[Investments in Polish offshore wind farms](#)", 29 April 2019, accessed 5 May 2019.

³⁸ Ibid 11.

Figure 3: Location of offshore wind farm projects in the Baltic.



Whilst the Baltic Sea has huge offshore wind potential, this must be matched with the correct legal framework – the much awaited Offshore Wind Act and clarity on subsidy/support arrangements (for example, whether under a Contracts-for-Difference for individual projects, bilaterally negotiated between a government entity and investors) will be key milestones in realising the full potential for offshore wind in the Baltic Sea. In addition, a clear regulatory framework and a stable long-term outlook will bring down prices and give comfort for offshore wind project investors to make significant long-term investments. The experience of other markets with developed wind capacity should be taken into account to drive the Polish offshore wind development in a “smart way” and build local expertise and capacity with a long-term view. It should be borne in mind that offshore wind is a capital intensive industry and the cost of capital drives LCOE more than anything else (this is true for both balance sheet projects (investor equity) and project financed projects (weighted cost equity + debt)),³⁹ and as the LCOE for offshore wind has been on a steady decline – this can only add further impetus to fulfilling the Baltic Sea’s offshore wind potential.

³⁹ Udo Schneider, “Offshore Wind – Energising an Industry”, 13 February 2019, accessed 11 May 2019.

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