Triton Knoll Offshore Wind Farm Project

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EV143: European Offshore Wind Industry Joint declaration on cost reduction

03 June 2016

Offshore wind can reduce costs to below €80/MWh by 2025

Dear Sir,

Ahead of the Energy Council on 6 June, we write to underline the crucial role that offshore wind can play in the European energy system and the commitment the wind energy industry is making to reduce costs.

With the right build out and regulatory framework the industry is confident that it can achieve cost levels below €80/MWh for projects reaching final investment decision in 2025, including the costs of connecting to the grid. This means offshore wind will be fully competitive with new conventional power generation within a decade. The offshore wind industry is on track to achieve its cost reduction ambitions and will be an essential technology in Europe's energy security and decarbonisation objectives.

As an industry, the joint and individual actions taken across the value chain will deliver lasting and tangible advancements that will establish offshore wind as an indispensable source of power generation. We recognise our responsibility to deliver industry and consumers with sustainable, secure and affordable energy. We look to policymakers to match this level of ambition.

This commitment is only possible with a stable, long-term market for renewables in Europe. If the offshore industry is to realise its cost reduction goals, a strong pipeline of projects is needed to scale up offshore deployment and identify efficiencies in the supply chain. Following a record year for installations in 2015, a serious question mark remains over the post-2020 environment for offshore wind. Policymakers at European and national level must set out clear visions for the industry after 2020 with robust laws that give investors peace of mind and visibility well into the future.

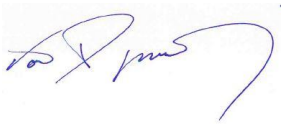
In addition to stable regulation, regional cooperation on offshore wind between European countries is of vital importance, particularly in the northern seas. Closer regional cooperation, e.g. on planning, financial and regulatory issues, would help to reduce costs and remove barriers to investment.

We understand that 10 countries in the northern seas are preparing to sign a Memorandum of Understanding and Work Programme on regional cooperation on 6 June at the Energy Council in Luxembourg. We congratulate this political will and commitment to action from the Energy Ministers concerned and Netherlands for the leadership they have shown on this under their Presidency of the EU Council.

Renewables such as offshore wind are steadily displacing conventional forms of power generation. As costs come down rapidly, the wind industry continues to meet its commitments. We now urge Europe's governments to work together to ensure offshore wind can be central to the continent's energy mix in the years to come.

Signed by

Luis Alvarez Rubio
General Manager
Adwen



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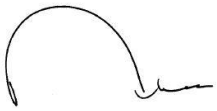

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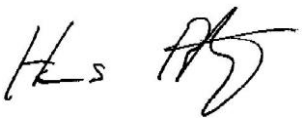

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Statement from DONG Energy:

“On 26 May 2016, DONG Energy published an offering circular in connection with the initial public offering and potential listing of its shares on Nasdaq Copenhagen A/S. As of the date hereof, the offering is not completed. Due to applicable rules and regulations, DONG Energy is restricted from making certain public statements until after completion of the offering and, therefore, DONG Energy is not a co-signatory of this statement. DONG Energy remains fully committed to continue to reduce the cost of electricity in line with the rest of the industry.”

ANNEX

European Offshore Wind Industry

Joint declaration on cost reduction

Introduction

Offshore wind energy is an indispensable part of the EU's energy future landscape. A sustainable, secure and affordable energy system can only be possible by exploiting the immense energy potential that European seas hold through this technology. As Europe progresses towards a low carbon economy, offshore wind energy will play an increasingly important role for businesses and consumers.

Already today, offshore wind energy helps meeting Europe's energy and economic recovery challenges. With over 11 GW of installed capacity across 82 sites in Europe, the offshore wind industry employs 144,000 workers and is the renewable energy technology with the highest deployment rate in the last five years at a 22.7% compound annual growth rate (CAGR). The industry expects its capacity to double by 2020 reaching 24 GW and further tripling in the following decade to 2030 to 66.5 GW cumulative capacity.[1]

The success of offshore wind in Europe over the last years has attracted significant investments from worldwide investors. In the period 2010-2015 investments amounted over €46.5 bn. In 2015, €13.3 bn worth of investments were committed to offshore wind energy, or half of the total investments in wind energy in Europe. The sector expects that by 2030, investments in offshore wind will be in excess of €130 bn.[2]

Offshore wind energy represents the most important technology for Europe to remain as global leader in renewables. 90% of offshore wind turbines are installed in EU waters and companies based in Europe are the world leaders in designing, manufacturing, constructing and operating utility-scale offshore wind farms.

The industry believes that with at least 4GW of projects each year, the industry will be able continue its early success and continue to drive down its cost of energy to below €80/MWh for projects reaching final investment decision (FID) in 2025, including the cost of grid connection.

Cost of offshore wind

As a nascent technology, with large scale development only a decade old, offshore wind energy has progressed steadily in technology development and project execution. Nonetheless, the technology is still today more expensive than other generating technologies under commonly used metrics. If it is to remain as a viable option in the long-term, its energy production costs must be reduced.

[1] WindEurope (2015), Wind Energy Scenarios for 2030
[2] WindEurope (2015), Wind Energy Scenarios for 2030

2020 cost reduction pathway

Since 2012, there have been multiple studies examining where cost reductions could be made in offshore wind to 2020[3]. The studies conclude that cost reductions are possible in a range of 32-46% in levelised cost of energy (LCoE).

The common drivers of cost reduction identified in these studies include: increasing energy yield, reducing the cost of finance and general technological and supply chain optimisation.

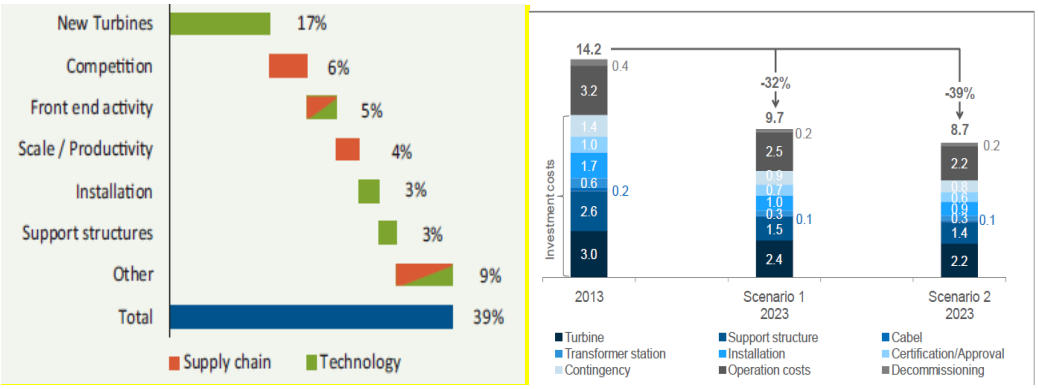

FIGURE 1 - COST REDUCTION PATHWAYS STUDIES - SOURCES: CROWN STATE (2012) LEFT, PROGNOS FICHTNER (2013) RIGHT

In parallel to these studies, industry players set an objective of achieving €100/MWh LCoE for projects reaching FID in 2020[4].

In turn, industry and government in the UK set up a framework for achieving these cost reductions. The Offshore Wind Program Board (OWPB) was established based on successful models used in other sectors to implement recommendations to drive cost reductions and support UK's offshore wind sector by assessing and tackling risks, barriers and implementing solutions in partnership. Similar schemes were then replicated in other major offshore wind markets across Europe.

Cost reductions have been already achieved. Thanks to collaborative partnerships between policy makers and industry but most importantly thanks to the initial economies of scale from the volume of projects committed by European countries to 2020.

Moreover, the industry is now on track to exceed its 2020 cost reduction target across Europe, in addition to the UK government's own target equivalent to €123/MWh by FID2020, which are inclusive of grid costs. UK Projects completed at the beginning of this decade had an average costs equivalent

[3] The Crown Estate (2012) – Offshore wind cost reduction pathways study, Prognos Fichtner (2013) – Cost reduction potentials of offshore wind power in Germany, TKI Wind op Zee (2015) – Cost reduction options for offshore wind in the Netherlands FID 2010-2020.
[4] DONG Energy (2013), Vattenfall (2014), Siemens (2013)

to €168/MWh[5]. These costs were maintained for the next four to five years until the next round of projects reaching FID showed a significant decrease in costs reaching around €149/MWh. These figures were well ahead of the trajectory laid out by the Crown Estate's costs reduction pathway, which forecast reductions to take place only as from 2017. Already by 2015 however, projects reaching FID were awarded strike prices equivalent to €141/MWh, which would put project costs at below the price obtained.

Looking forwards, UK strike prices for FIDs in 2017 will have a tender price ceiling of £105/MWh, equivalent to €129/MWh (Figure 2, blue line), and a ceiling equivalent to €105/MWh by FID 2023. The Dutch government has also put forward tender price trajectory ending at €100/MWh for FID 2020 (Figure 2, red line), that means project costs would therefore exceed industry's own targets.

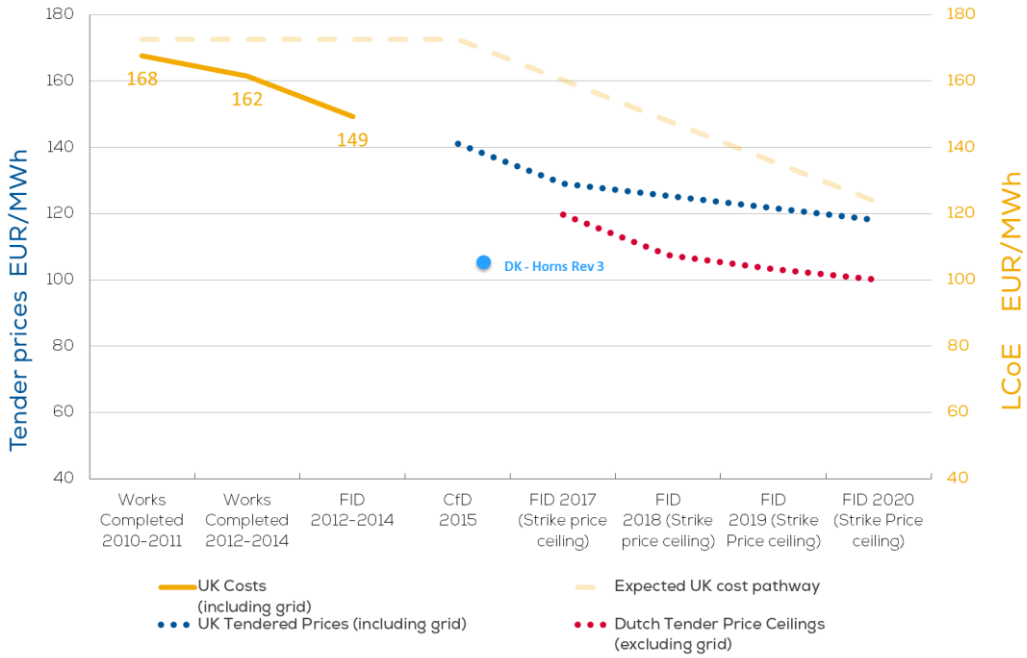

FIGURE 2 – UK AND DUTCH TENDER PRICES AGAINST UK LEVELISED COST PATHWAY. ALL LEVELISED COSTS ARE REPRESENTED IN YELLOW, AND TENDERED PRICES IN BLUE AND RED - SOURCES: ORE CATAPULT/WINDEUROPE

Observed cost reductions are not limited to UK projects; The 400 MW Horns Rev 3 offshore wind farm (DK) tendered at a price equivalent of €103/MWh in 2015 (Figure 2, light blue dot), adding further to indications on where costs will lie in the future.

Based on these trends, there is a strong indication that European projects reaching FID in 2020 would tender at below both GBP and €100/MWh.

[5] ORE Catapult (2015), Cost reduction monitoring framework – Summary report to the Offshore Wind Program Board.

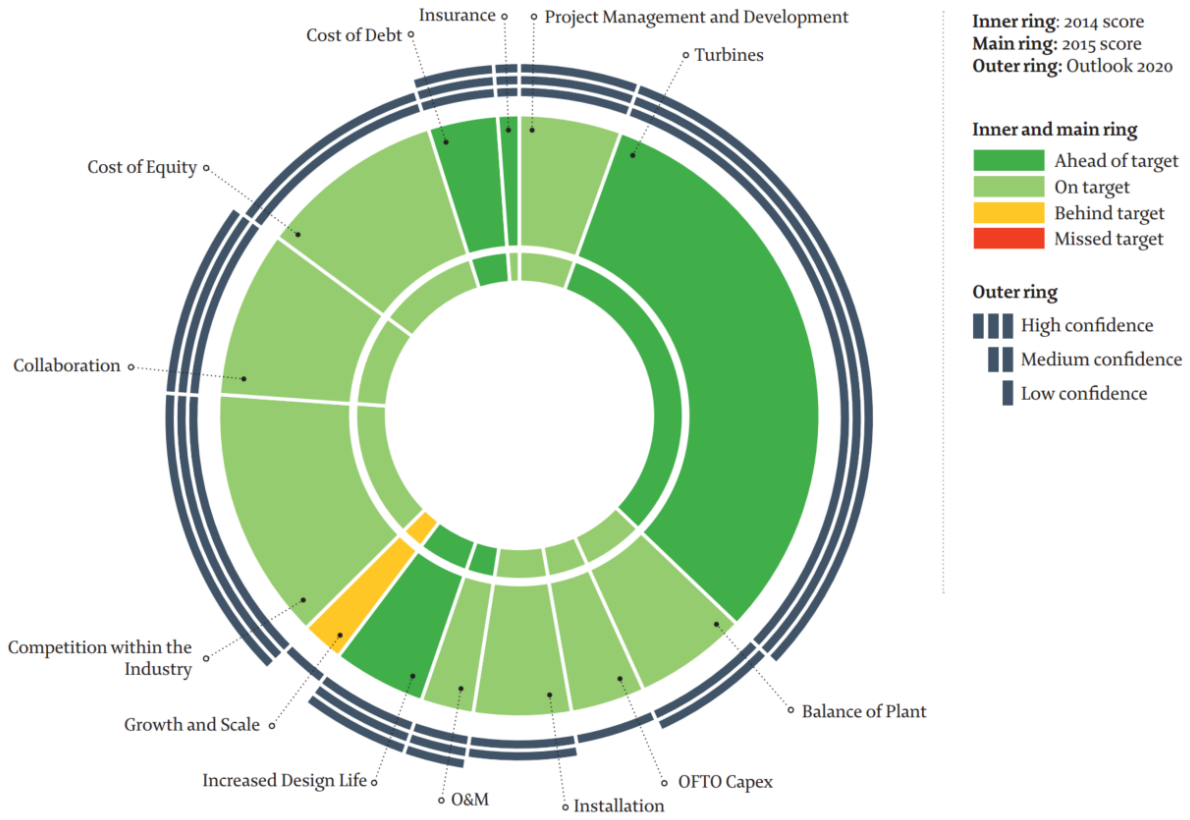

FIGURE 3 - UK CRMF 2015 RESULTS - SOURCE: ORE CATAPULT

In addition to tendered price observations, there is strong evidence that the 2020 cost reduction target can be overtaken based on the latest results of the cost reduction monitoring framework (CRMF), published in 2015. The industry is on target or ahead of the target in almost all areas identified for cost reduction. Only one exception remains behind the target, which is growth and scale of the market. (Yellow slice in pie chart of Figure 3)

Post-2020 cost reduction objectives

The offshore wind energy industry is committed to continue with the pace of cost reduction in the post-2020 period. The level of readiness and scalability exists. With the right volume of projects the industry is confident it can deliver a cost of energy below €80/MWh by 2025, including grid connection costs. This would mean that the industry is on track to achieve cost competitiveness against new conventional power plants by the year 2025.

Based on the observed trends to 2020, the future trajectory, using UK tendered unadjusted prices[6], suggests that projects reaching FID by 2023 will display a 52% reduction in prices compared to 2011. Additional observations reveal a learning rate in offshore wind of 20% in the years 2011-2015[7].

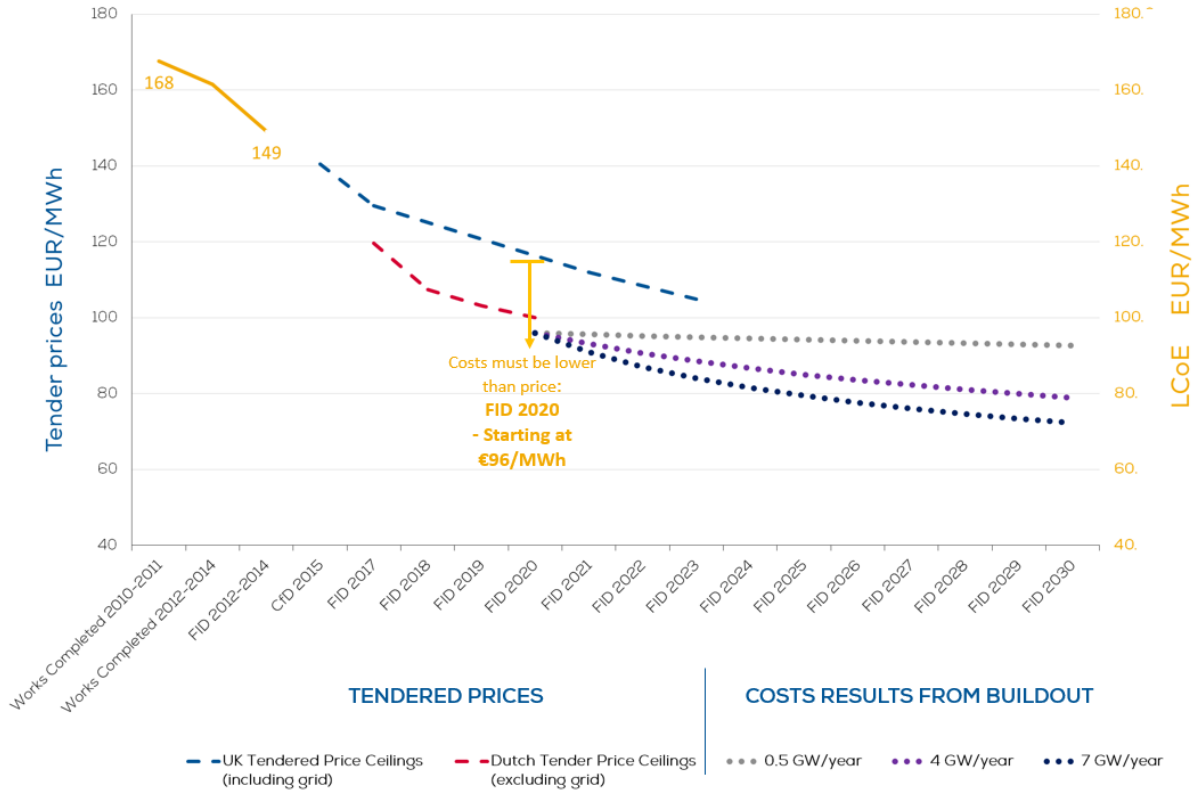

FIGURE 4 - EU OFFSHORE WIND ENERGY TENDER PRICE PROJECTION - SOURCE: WINDEUROPE

With this learning rate, and with expectations on projects coming in at below €100/MWh in FID 2020, a projection can be provided. Figure 4 shows this projection alongside the current tender price trajectories with three possible buildout scenarios from 0.5GW/yr to 7GW/yr. Learning effects do not materialise with low volumes as a lack of investment subsequently occurs that would allow for innovations to be brought to market, as well as only marginal savings gained through learning by doing.

Effect of volumes deployment on costs

Applying a 20% learning rate to costs across Europe allows to estimate the relation between costs and volume for projects expected post-2020 (Figure 5). The following section presents this projection, where projects in FID 2020 have a cost of €96/MWh as a starting point.

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[6] All prices are expressed as 2012 Euros, i.e. no inflation or currency exchange differentials adjusted.

[7] A Learning Rate of X% would suggest that for each doubling of capacity, prices would reduce by Y%. Learning rate is given by the formula: $Price f = Price_p * (InstalledCapacity_f / InstalledCapacity_p)^{\wedge} ln(1-LR) ln^2$

Where f = future, p = present, LR = Learning Rate

Under this scenario, it is estimated that projects reaching FID by 2025, could reach €85/MWh in a 4 GW/year volume scenario from 2020 onwards (solid green line in Figure 5). This would yield a cumulative capacity of 66.5 GW of offshore wind power by 2030. In a 7 GW/year scenario, enough to build 98 GW of cumulative capacity, the LCoE of projects reaching FID by 2025 could be just below €80/MWh (€79/MWh).

A cost estimation for projects reaching FID by 2030 is also shown in Figure 5 (solid blue line).

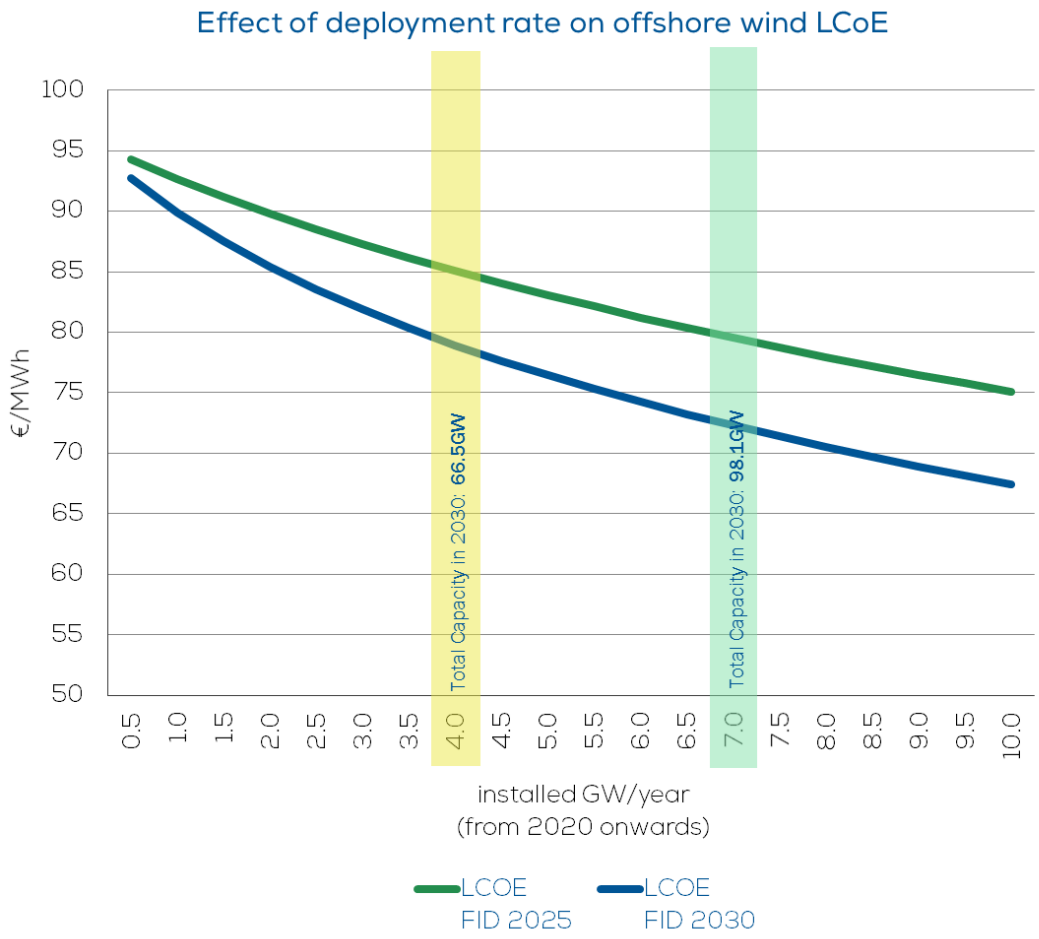

FIGURE 5 - EFFECT OF DEPLOYMENT RATE ON COSTS IN OFFSHORE WIND - SOURCE: WINDEUROPE

Crucially, cost reductions are only possible with a stable, long-term market for renewables in Europe. If the offshore industry is to realise its cost reduction ambitions, a strong pipeline of projects is needed to scale up offshore deployment and identify efficiencies in the supply chain. Following a record year for installations in 2015, a serious question mark remains over the post-2020 environment for offshore wind.

WindEurope 2030 scenarios set out 66-98 GW of installed offshore wind capacity by 2030.

Building 66 GW by 2030 would mean a rate of deployment of 4 GW/year in the period 2020-2030, while 98 GW would signify 7 GW/year. Currently visibility on projects that can be constructed beyond 2020 are limited, and clarity will need to be provided, particularly in the first half of the decade given the lead times required to bring projects to fruition.

Grid costs

Grid infrastructure development is treated differently in Member States. The cost reduction estimations above include grid connection costs. These are based on the most stringent case, where project developers face full costs for developing the grid connection to shore. It should be noted though, that whilst grid costs are factored into the levelised costs as capital expenditure, these costs are quickly recovered under a UK system where transmission assets are sold to be operated and maintained by the Offshore Transmission Owner (OFTO) upon commissioning of the site.

Distance from shore

The general trend across Europe is that offshore wind energy projects are being built farther from shore in order to take advantage of more constant wind resources. This trend is assumed to continue in the coming decade with areas consented at 100+ km from shore. As distances increase, so do costs for constructing and maintaining power plant operations. The cost reduction estimations to 2025 and 2030 are in the context of 2015 project distances from shore of around 40-50 km. However, there is a general view that costs increases of building father from shore are offset by the additional generation that these assets deliver.

Support /revenue stabilisation mechanisms

Offshore wind energy is a fast growing industry but is still in development. In the near future, offshore wind power will require guaranteed stable sources of revenue via national support schemes or revenue stabilisation mechanisms such as subsidy free CfDs. The assumptions made for estimating the cost reduction objectives post-2020 factor in projects receiving support for 15 years (over typically 25 years project life). This support is generally secured ahead of FID.