OFFSHORE WIND INSIGHT 2025

Opportunities and challenges in the UK's offshore wind market

Contents

List of Abbreviations

Abbreviations	Definitions
AR	Allocation Round
CCC	Climate Change Committee
CCUS	Carbon Capture Use and Storage
CFD	Contract for Difference
CIB	Clean Industry Bonus
CP30	Clean Power 2030
DESNZ	Department for Energy Security & Net Zero
FID	Final investment decision
FLOW	Floating Offshore Wind
INTOG	Innovation & Targeted Oil & Gas
NESO	National Energy System Operator
MRF	Marine Recovery Fund
OFGEM	The Office of Gas and Electricity Markets
O&M	Operation & Maintenance
PPAs	Power Purchase Agreements
REMA	Review of Electricity Market Arrangements
SSEP	Strategic Spatial Energy Plan
TNUoS	Transmission Network Use of System

1.1 Executive summary

The global offshore wind market is growing rapidly, installing another 25% capacity in just a year. It is however increasingly facing multiple challenges including policy reversal, price inflation and increased cost of capital. These have caused investors to write off assets, freeze projects and to merge. In a changing world, offshore wind's licence to operate is not a given and the industry needs to continue demonstrate that it can scale up while bringing benefits to local supply chain and consumers.

The UK market looks better than many, but it is still facing similar challenges. By the end of this year, the UK will have 17 GW of offshore wind capacity installed and be second only to China in terms of scale for the foreseeable future. Investment in offshore wind is expected to overtake oil and gas by 2030, by which time half of the annual average UK's power supply will come from offshore wind.

The government's Clean Power 2030 (CP30) target will need between 43 and 51 GW of installed offshore wind capacity by 2030. This will require at least £15bn private investment spent on offshore wind each and every year between now and 2030. But unless the pace quickens, the UK will achieve only 35 GW. So, in response the UK government is transforming the market so that by Allocation Round (AR) 7 there will be major changes including:

(i) Grid connections: the most advanced projects will have priority
(ii) A Clean Industry Bonus to support the supply chain
(iii) A cap and floor price for the Transmission Network Use of System (TNUoS)
(iv) The Review of Electricity Market Arrangements will introduce further changes and may introduces a zonal market

AR7 needs to clear a record 8.4 GW of offshore wind capacity to maintain the course toward CP30. This will only be possible if the government strikes the right balance between increased obligations and incentives.

In all CP30 scenarios, gas remains the balancing power source so it makes sense for the UK to make the most of its own offshore gas resources, a process which will lower the carbon footprint and benefit the wider economy. The UK should also seize the opportunities offered by carbon capture and storage (CCS) to decarbonise gas fired power generation. CCUS-enabled (blue) and electrolytic (green) hydrogen is expected to scale-up and support industrial and power-sector decarbonisation.

Interconnectors should not be ignored either. In 2024, UK imported a tenth of its electricity, with France and Norway being the main suppliers. The interconnectors help the grid to balance and beyond 2030 they will become an export route for the UK's expected power surplus.

There is a visible gap in UK supply chain capabilities to meet the demand of the wind sector. Rather than simply import the means to deliver CP30, government should focus on helping the existing UK supply chain to scale up to deliver the large amounts of projects needed. Creating a competitive homegrown supply chain will ultimately drive costs down, leading to lower energy costs over the long term.

Floating wind will become a critical tool for delivering CP30 and beyond with the INTOG rounds offering the earliest developments which will be able to supply offshore oil and gas facilities and the national grid. This was championed by the North Sea Transition Deal (NSTD) and its ambitious decarbonisation targets for 2030. Floating wind, which can access windier areas in deeper waters, will be the growth engine beyond 2030 with floating wind investment expected to overtake fixed-bottom by 2033. The existing UK supply chain is better equipped to capture a sizeable stake of the floating wind market. However, a considerable portion of the spend remains beyond the reach of the current UK entities, highlighting the need for strategic investment in innovation, skills and infrastructure.

The UK needs to move at pace in the floating wind segment to reduce both the capital and operating costs of floating wind and make sure the UK supply chain capture a sizeable market share. This will position the UK well to serve the domestic market and pursue international opportunities in the exports market.

1.2 Recommendations

(i) Development plans should be front-loaded to meet CP 2030.

a. Meeting CP 2030 target would be a stretch, and we are currently not on track to do so. Based on current progress AR7 needs to be the most ambitious auction round yet. The round will need to secure 8.4 GW of new offshore wind capacity if the UK is to stay on course for CP30.

b. In a period of such intense activity, there will be a greater potential for risks and delays in funding, financing and project execution. Risk mitigation measures need to be carefully implemented across all phases of the project and investment life cycle. Where appropriate, wind developers should seek to learn lesson from the wider offshore energy sector in contracting practices, offshore deployment and project finance.

c. Market reform are needed to deliver CP30, however they should be incremental, large changes such as introduction of zonal market will damage investor confidence and lead to delays in delivering CP30.

(ii) Timely delivery of transmission infrastructure will be essential.

a. Rebuilding the transmission grid will be a massive task. A grid investment program of £58bn will be required to support 50 GW offshore wind by 2030.

(iii) Investment in UK energy should be to the long-term benefit of the UK economy

a. £65bn will be invested in UK offshore wind over the next five years – this has the potential to transform the growth outlook for the UK. The forthcoming UK industrial strategy should focus on developing a competitive homegrown energy supply chain equipped to make the most of these opportunities as one of its key objectives.

(iv) Market consolidation will continue.

a. In a highly competitive market, where margins are poor and external competition is high, we will continue to see consolidation in the marketplace – both for developers and across the supply chain. Regulatory and commercial processes will need to adapt accordingly. Consolidation and cost efficiencies may ultimately will need to give way to price increases to reflect the prevailing cost base.

(v) Energy security is no less important in a predominantly renewables-based power system.

a. There should be a focus on homegrown energy in all its aspects, making the most of our own resources.

b. There will be a continued role for gas-fired power generation to balance the grid. This should see the progressive deployment of gas with CCS and in due time hydrogen fuelled power generation.

c. Interconnectivity will help, a North Sea integrated grid can save £37bn/yr and cut wholesale prices by a fifth by avoiding redundancies.

1.3 Part 1: Markets

1.3.1 Introduction

The fortunes of the UK energy sector are intimately linked to global economics. This section examines how evolving dynamics in major markets – particularly US and Europe – affect the UK. It will also examine what and what it means for UK project development, the domestic supply chain and how the broader financial landscape influences investment and delivery.

1.3.2 Global market outlook

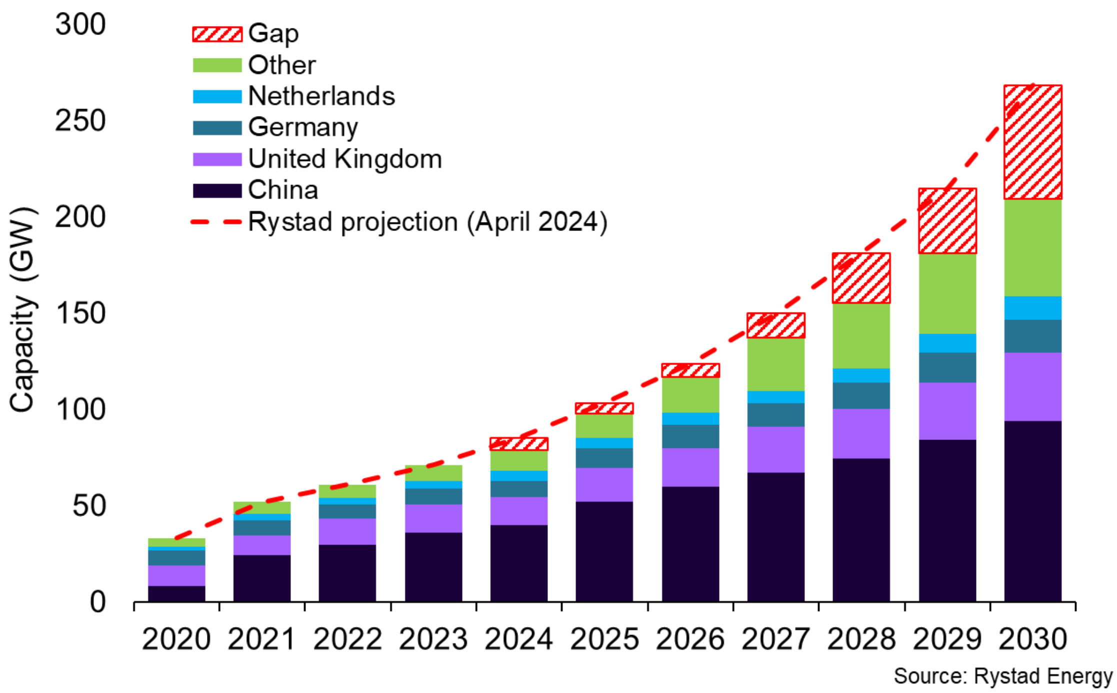


Figure 1: Global offshore wind market

Global offshore wind projections continue to be dominated by China, with the UK holding the second-largest project pipeline by 2030. Rystad Energy forecasts capacity at 208 GW by 2030 – representing an 18% compound annual growth rate (CAGR) from the 79 GW in 2024. While this is a high rate of growth, this year predicted capacity is lower than previous Rystad's estimation (*figure 1*), demonstrating the pressures on the global wind market. The downward revision reflects several setbacks (*figure 1*), including: Denmark's failed auction in 2024, China's new power pricing policy, US policy reversals under the Trump administration and a strategic shift by some oil majors toward hydrocarbons. Over the past five years, several companies have paused or scaled back their offshore wind activity, citing high project costs, supply chain constraints, changing policy landscapes and more attractive returns in oil and gas. That said, certain companies such as TotalEnergies and Equinor are still highly active in the wind sector.

Rystad Energy now expects international oil companies to invest under £28bn (real terms 2024) between 2025 and 2030. Of that, around £18bn could be spent in Europe – particularly in Germany and the UK.

1.3.3 US market

The US offshore wind sector is experiencing significant regulatory and market challenges. In January 2025, President Donald Trump issued a memorandum temporarily halting all new offshore wind leasing on the Outer Continental Shelf and mandating a comprehensive review of federal leasing and permitting practices. This uncertainty has had a chilling effect on project development and investment decisions.

One of the worst affected projects is the Atlantic Shores offshore wind development in New Jersey (1.5 GW), which was nearing a final investment decision (FID). The memorandum cost the developer almost $1bn. Following its exit, the New Jersey Board of Public Utilities cancelled the state's fourth offshore wind tender, citing federal policy uncertainty. Further complicating the project's progress, the US Environmental Protection Agency (EPA) revoked its air quality permit after an appeal by Save Long Beach Island, reflecting increased regulatory scrutiny. Despite these setbacks, EDF Renewables has reaffirmed its commitment to the project.

Beyond Atlantic Shores, several offshore wind developments with full regulatory approvals continue to face challenges in reaching FID, primarily owing to delays in finalising power purchase agreements (PPAs). Given the requirement for projects to reach FID soon to meet their 2030 commissioning deadline, only the most advanced initiatives are expected to proceed. The potential for US offshore wind capacity is vague as large-scale projects are still under construction. Notably, Equinor's Empire Wind 1 (810 MW) and Ørsted's Sunrise Wind (924 MW) have reached FID but they are still being challenged. Including Empire Wind 1 the total committed capacity is just over 6 GW - just a fifth of the official 30 GW by 2030 target that the previous administration set.

1.3.4 European market

1.3.4.1 French CfD system

The French market has adopted a subtly different approach to the UK for an apparent lower cost. In May 2024, France published the results of the AO5 competitive tender to build the 250-MW Pennavel floating offshore wind farm. The winning bid was awarded at £74.83/MWh (in 2025 prices), less than half the final strike price in UK at £198/MWh (in 2025 prices) in AR6, raising concerns around the project's economic viability.

In France, as in the UK, both fixed-bottom and floating offshore wind tenders are allocated through long-term Contracts for Difference (CfD). The tender includes a tariff indexed to industry related inflation with relevant adjustments. The actual price paid when the wind farm is built will exceed €86/MWh. The tariff was developed and structured by the consortium's experienced teams alongside expert advisors and a vast offshore wind network. Additionally, the awarded project would have a secured grid connection with the French Transmission System Operator (RTE) including substation and export cables – something developers in the UK can only hope for.

Many French firms still lack offshore wind experience, while UK companies have experience of the full lifecycle: from development and design to construction, operation and maintenance and port services. With the world's largest pipeline of floating wind projects, the UK is well-positioned to lead. But it can also learn from France's early progress: it has benefited from strong policy support, an industrial strategy, the use of industry-specific deflators to reflect true costs and a keen understanding of dynamic market conditions at the time of CfD contract awards, and with onshore delivery mechanisms in place.

Case Study: Unlocking the power of UK-EU offshore wind coordination

The North Sea is one of the world's most promising regions for offshore wind: it provides the opportunity for the United Kingdom and the European Union to meet shared energy and climate challenges through collaboration. Realising the full potential of this opportunity, to facilitate meeting ambitious decarbonisation targets, requires addressing significant barriers that currently hinder effective cooperation.

Barriers to the efficient deployment of offshore wind in the North Sea

Baringa's research identified four broad inefficiencies and barriers to offshore wind deployment that have emerged following GB's exit from the EU:

- Suboptimal trading arrangements;
- Stalled progress under the Trade and Cooperation Agreement (TCA);
- The erosion of coordination between network operators, and;
- Divergent processes in planning and supply chain procurement.

The consequences of these barriers are leading to missed opportunities for material project cost savings, delays in project delivery, and fragmented efforts to capitalise on the region's vast offshore wind potential. The result is higher costs for consumers, and lower economic growth and productivity.

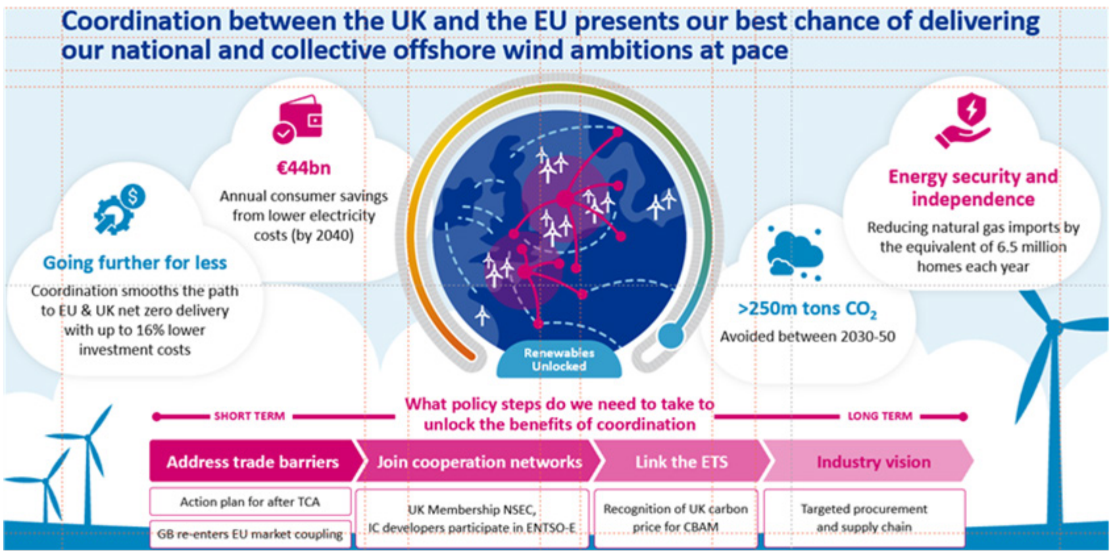
Action to address these barriers is needed

Baringa's report sets out the necessary actions in detail and they can be summarised as:

- Governance: improvements include re-instating the UK's membership in the North Sea Energy Cooperation, and revising regulation to facilitate risk transfer and financing to support offshore infrastructure growth.
- Coordination: of planning and consenting to accelerate development timelines and coordinating supply chain procurement to create a supply chain vision for the North Sea.
- Market and trading: linking the UK and EU ETS; recognising the UK carbon price as an equivalent to EU ETS, and; implementing price coupling. These measures will remove trade frictions and distortions.

Benefits include cost savings, market economic benefits and decarbonisation benefits:

Consumers savings of €44bn a year by 2040 in the form of lower electricity prices. Security and independence through 65 GW more capacity by 2040. Faster decarbonisation with emissions 24% lower in 2040.



1.4 Market consolidation

Although the IOCs are investing less, they continue to take part in joint ventures with various wind operators. Equinor, TotalEnergies and BP lead with a combined offshore wind portfolio of 43 GW. Equinor, despite announcing a reduction in its 2025-2027 offshore wind capital expenditure to $5bn (post-project financing), has remained active in the space. In December 2024, Equinor acquired a 9.8% stake in Ørsted – later increased to 10% – in a deal worth over $2.3bn, adding nearly 600 MW of advanced offshore wind capacity to its portfolio. The company is also building the world's largest offshore wind project: Dogger Bank in the UK, where it holds 1.5 GW of equity capacity.

TotalEnergies' project pipeline is heavily weighted towards a 2031-35 completion date, with a focus on fixed-bottom wind. The company is reassessing its floating wind ambitions, placing projects like Gray Whale in South Korea under major engineering review and shifting its medium-term focus to fixed-bottom technologies.

BP announced a "fundamental reset" of its energy transition strategy in February, cutting investment in low-carbon sectors to under $2bn/yr – a fifth of what it had planned. Notably, BP is merging its offshore wind business with Japanese utility JERA to form a new standalone entity, Jera Nex BP. With 13 GW of operational and in-development capacity and a $5.8bn committed, the London-based company will target offshore wind markets in northwest Europe, Australia and Japan. Subject to regulatory approvals, it is expected to launch in Q3 2025. The merger brings together BP's 9.7-GW pipeline (launched in 2019) and JERA's established projects in Belgium, Germany and Japan.

Shell, meanwhile, has pulled back from offshore wind, exiting the Atlantic Shores project in the US after a key air quality permit was revoked. Like BP, Shell is shifting focus back to oil and gas, halting spending on new offshore wind projects and scaling down its 2030 renewables target. However, it maintains a commitment to operate its most mature offshore wind assets.

Not all oil majors are retreating. China's CNOOC announced plans in January 2025 to scale up its offshore wind portfolio, including the 1.5-GW Hainan CZ7 project – its first utility-scale development – slated for commissioning before 2030. Italy's Eni, through its subsidiary Plenitude, reaffirmed its 2030 renewables target of 15 GW. Eni has the second-largest offshore wind portfolio under construction, thanks in part to its 13% stake in Dogger Bank via the Vårgrønn joint venture.

Beyond oil and gas, wind developers are also undergoing major structural shifts. RWE Renewables plans to sell a 50% stake in its 4.2 GW Norfolk offshore wind zone - comprising Vanguard East, Vanguard West, and Boreas (1.4 GW each) - all of which are consented and eligible for the AR7 CfD auction. The sale, anticipated in 2025, is part of RWE's broader strategy to reduce capital exposure. This follows its recent 49% farm-down of the Nordseecluster and Thor projects, with a similar plan for the 1.4-GW Sofia project in 2026. Most recently Orsted has cancelled development of its 2.4GW Hornsea 4 offshore wind.

While M&A in offshore wind can bring financial strength and risk-sharing benefits, these deals often result in internal restructuring and strategic realignments, which delay projects. Consolidation can also stifle competition, hinder innovation, and increase costs. That large, established operators see the need to turn to M&A or selling stakes shows that offshore wind is becoming a high-risk, lower-return sector – especially in today's economic conditions. This perception could discourage new investment and deter market entrants. Furthermore, consolidation may strain supply chain relationships, creating uncertainty for local contractors and manufacturers.

1.5 Current market opportunities

1.5.1 Project pipeline

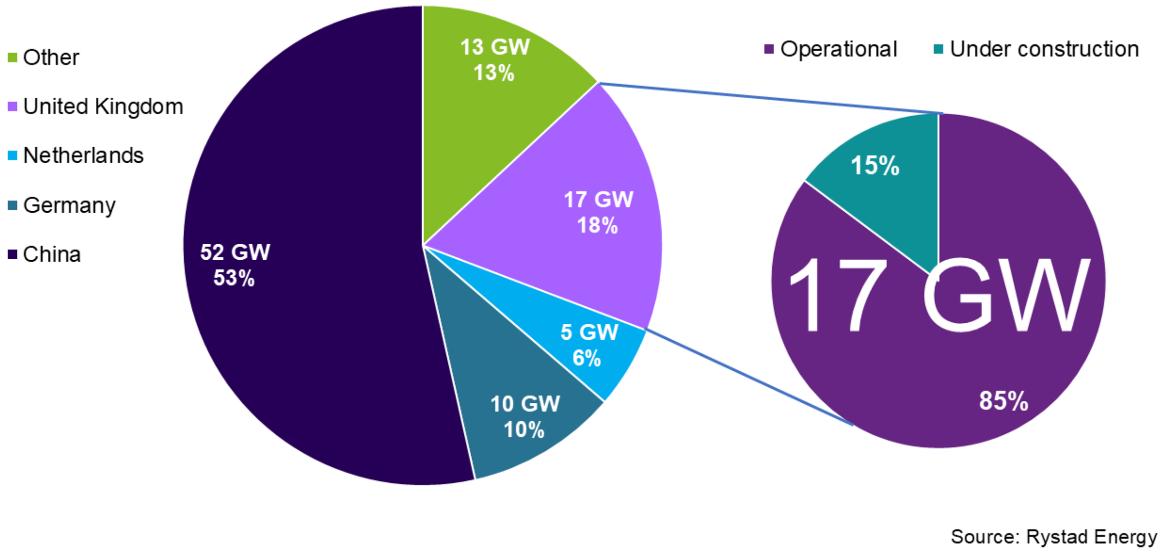


Figure 2: UK and global offshore wind capacity by end-2025

In 2025, offshore wind development in the UK continental shelf (UKCS) continues, with the UK projected to maintain its position as the world's second-largest market by capacity. The country's installed offshore wind capacity is expected to reach 17 GW this year, with 15% now being built (*figure 2*).

1.5.2 Electricity generation

Renewable electricity will play a crucial role in the energy transition and the path to a net zero future. Last year (2024) was the strongest year for renewables, accounting for 50.8% of the UK's total electricity generation.

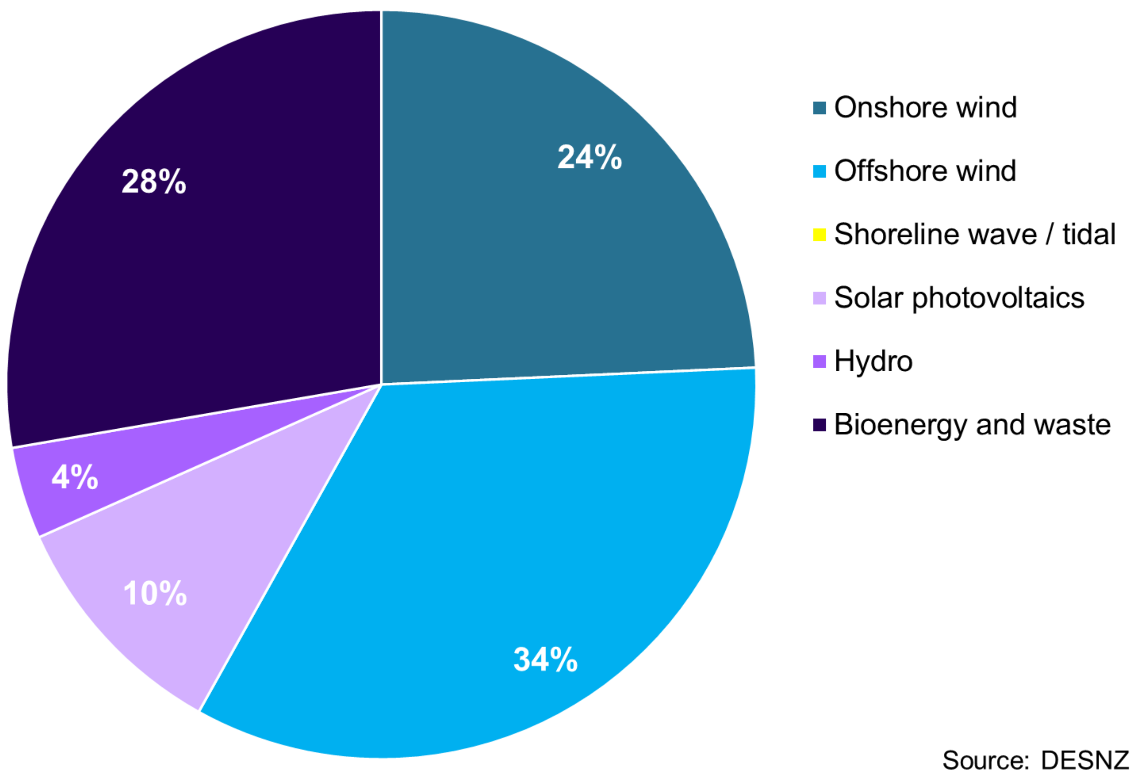


Figure 3: UK renewable energy generation breakdown in 2024

Wind power remains a key component of the UK's energy system, its share for total amounting to 29.5%. And of that, offshore wind contributed 17.2% of total electricity generation. Its ability to outperform onshore wind generation relative to installed capacity is down to newer, larger turbines installed off the coast (*figure 3*) where wind speeds are often stronger for longer and so the efficiency is also higher. This makes offshore wind one of the most attractive of the renewable energy technologies.

1.5.3 Supply chain transformation

As the energy transition advances, investment in the oil and gas sector is increasingly being redirected into renewables, particularly offshore wind in the UK. Fixed-bottom wind has been the backbone of offshore wind growth, with an estimated £50bn invested in UK projects over the past decade. From 2028 onwards, investment in offshore wind is expected to surpass oil and gas (£75bn between 2025 and 2030 - £100bn between 2030 and 2035).

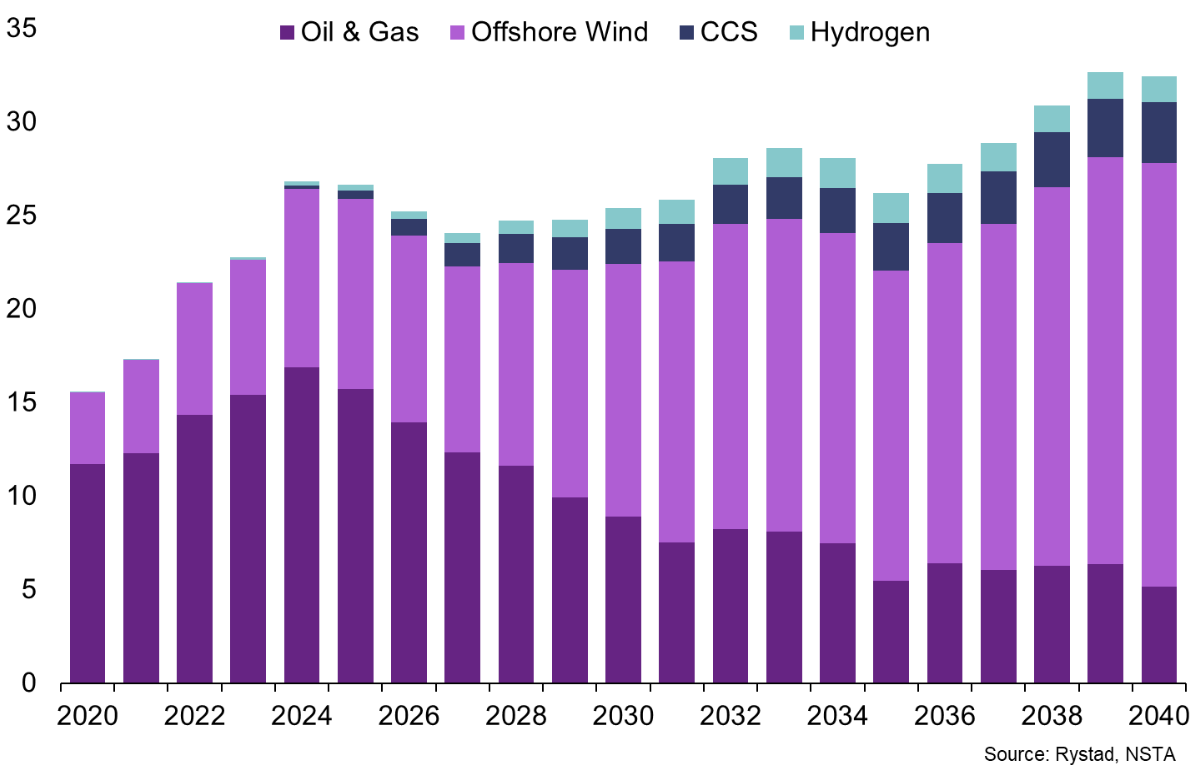


Figure 4: UKCS investment by energy segment

The offshore wind supply chain holds significant potential, with the sector expected to invest £8-10bn in the UK in 2025, primarily in engineering, procurement and construction (EPC). While the growth rate of the fixed-bottom offshore wind sector is expected to stabilise, annual expenditure will remain high through to the end of the next decade (*figure 4*).

Case Study: Remedial subsea cable burial campaign

OEG's subsea team was contracted to deliver a turnkey remedial cable burial campaign for Nexans, a leader in the design and manufacture of cable systems and services. The work scope was executed using OEG's innovative all-electric controlled flow excavation (E-CFE®) technology, SEAJET, to execute the campaign, which included trenching and burial of shallow water export cables at an offshore wind farm site in the UK.

Challenge

The project offered challenges with regards to the operational conditions, presenting tight weather windows to conduct work within and fluctuating tidal ranges.

The OEG subsea team successfully demonstrated that the SEAJET system delivers up to 100% more power than legacy hydraulic CFE systems currently on the market, even when presented with some of the most challenging conditions considered for this type of seabed intervention works.

The project team reported zero downtime, working in aggressively short high-water tidal conditions and ultrashallow water depths.

Solution

OEG mobilised the SEAJET E-CFE® system onto a 27m multicat vessel for the completion of the work scope.

The equipment spread included the SEAJET tool, electric umbilical winch, power cabin and control cabin. The compact deck space onboard the vessel allowed OEG to demonstrate the adaptability of the equipment spread, which was easily accommodated onto the vessel deck which had limited available space.

The advanced control system built into the SEAJET tool allows performance to be monitored and optimised in real-time, ensuring reliability and maximising project uptime. Other benefits include reduced CO2 emissions, eliminating the risk of high-pressure, high-volume oil spills into the marine environment and reduced noise pollution.

By harnessing an all-electric powertrain, E-CFE® commands the same power supply and vessel deck footprint as older hydraulic technology but delivers up to 100% more usable power at the seabed, even in the shallowest of water depths.

OEG successfully delivered the cable burial campaign utilising the SEAJET system, achieving trenching depths that were on average 2.5m deeper than existing hydraulic technology, in a single pass of the tool. In some areas, a single pass of the SEAJET tool was able to lower the pipeline up to 4m deeper than other CFE technologies.

Testimonial

Geir Korstad, Project Manager at Nexans commented:

"There is no doubt that the SEAJET is a very powerful tool, and we are extremely impressed with the burial results from this campaign. The environmental benefits of the SEAJET were greatly appreciated and the OEG team were highly skilled and professional in successfully delivering the project for us."

1.5.3.1 UK supply chain opportunities

The UK has been at the forefront of fixed-bottom wind developments, driven by substantial government funding and ambitious capacity targets. It was an early mover in this sector and it had the largest installed capacity base until 2023, followed by mainland China and the Netherlands. Despite these advantages, a significant portion of the workload is still beyond the reach of the UK supply chain. The segments it cannot compete in include turbine structure, towers and monopiles, which are typically carried out by foreign supply chain companies dedicated to fixed-bottom wind. The UK has relied heavily on international companies for critical components such as nacelles and export cables, and this has held back the birth of a robust, domestic manufacturing base. While the existing supply chain possesses transferable skills and resources, particularly in engineering, logistics and vessels and operations and maintenance (O&M), these capabilities only cover a limited segment of the overall market. Notably, the O&M sector is expected to experience the highest growth rate as existing wind farms mature. Analysis by Rystad Energy indicates that only a fifth (about 21%) of total fixed-bottom wind expenditure is likely to be awarded to the UK oil and gas supply chain between 2024 and 2040. The UK has only 11 operational plants making foundations, three operational high-voltage cable manufacturing plants, two operational blade plants and one operational tower factory. As the project pipeline lengthens, demand for these components is expected to rise to the point where it exceeds supply. This presents a significant opportunity for the domestic supply chain.

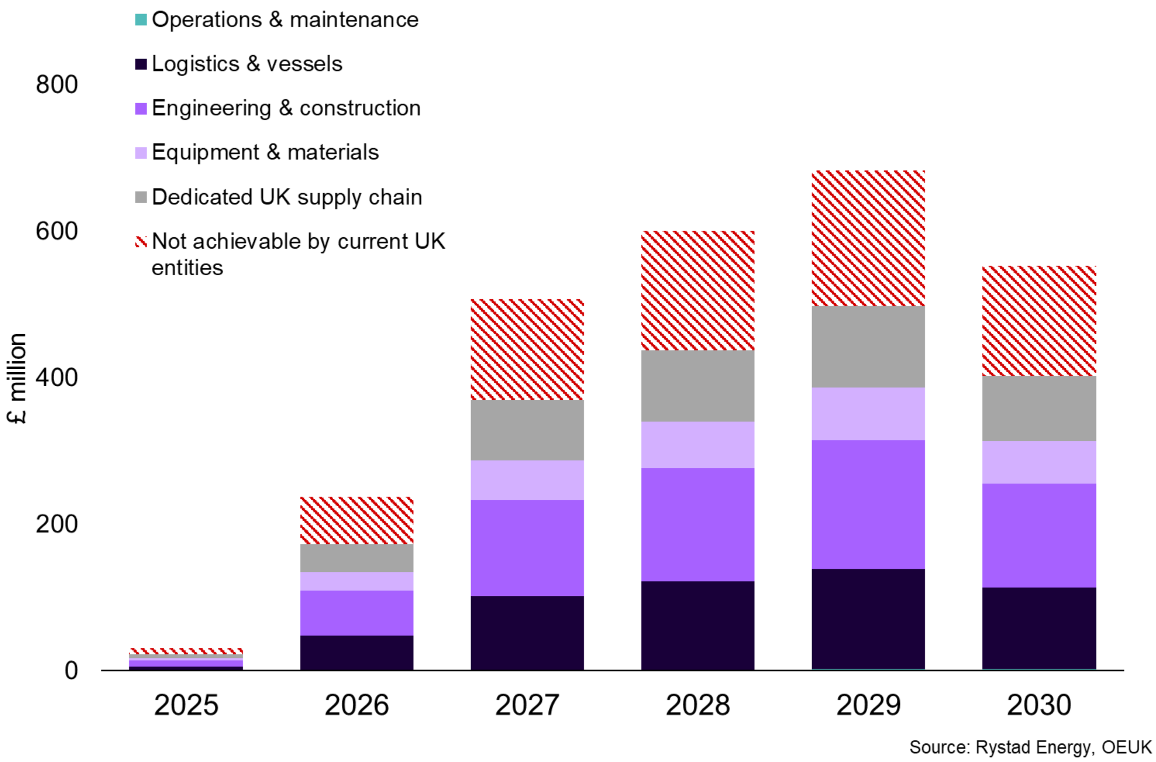


Figure 5: Achievable UK supply chain spends with CfD (floating wind)

The UK's offshore wind market is undergoing a dynamic shift, with fixed-bottom offshore wind investment slowing and floating wind poised for substantial growth. Pioneering projects such as Flotation Energy's and Vårgrønn's Green Volt represent a major step forward for floating wind. Green Volt addresses the twin problems of grid supply and decarbonising the oil and gas sector and it could be the first major commercial floating wind project in the world (see also page 18).

The oil and gas supply chain could feasibly bid for about 57% of the total floating offshore wind (FLOW) spend. The likeliest specialist skills are in segments like logistics and vessels, dynamic array cable installation and foundation fabrication (*figure 5*). The UK has proven experience in dynamic cables and mooring solutions, enabling it potentially to become a global leader in these technologies. The UK's domestic market is projected to capture 36% of global FLOW spending and 45% of European spending from now to 2030, signifying a strong first mover advantage. However, a considerable portion of the spend remains out of reach of the supply chain. This highlights the need for strategic investment. Many supply chain studies have highlighted the UK's capabilities in the offshore wind sector but few have borne fruit.

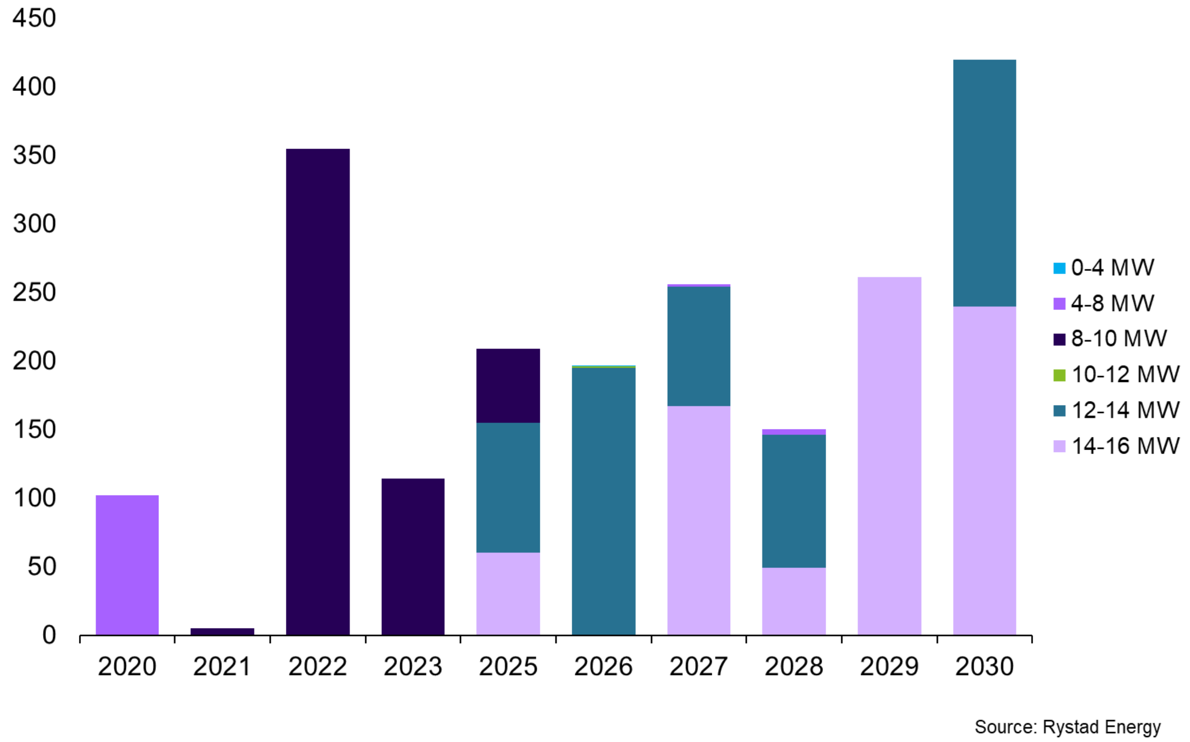


Figure 6: Additional turbine capacity/year

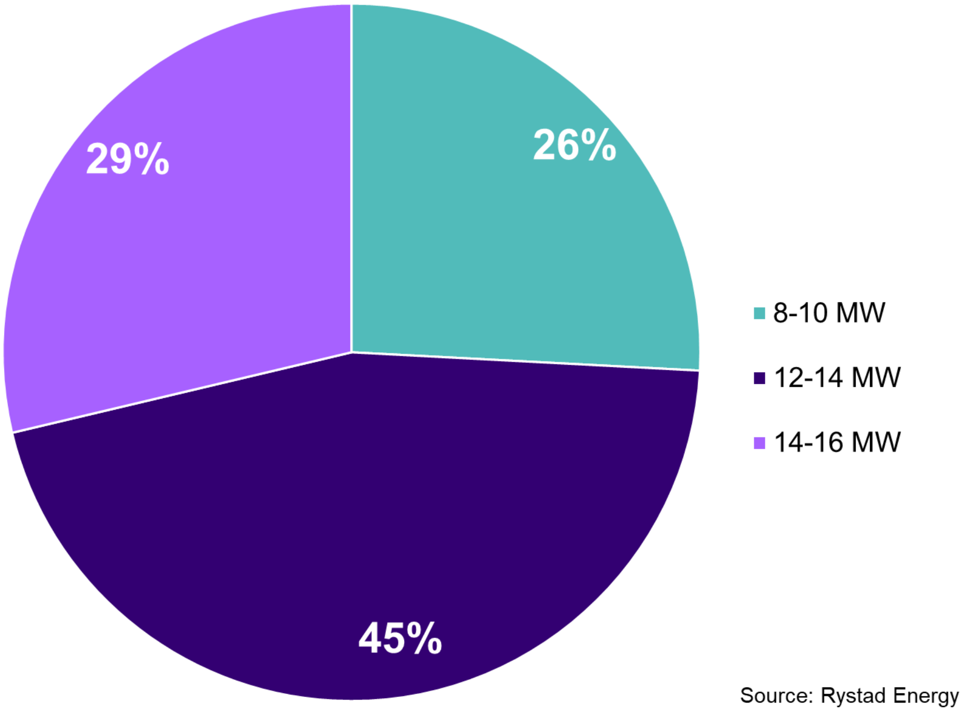


Figure 7: Capacity of UK offshore turbine additions in 2025

With 2.5 GW planned to be built this year in the UK, the turbine market is undergoing significant changes (*figure 6*). In previous years, most installed turbines were below 10 MW, reflecting a market trend toward smaller designs. However, this year marks a shift, with over 70% of new turbines expected to be 12-16 MW (*figure 7*).

Bigger turbines place more pressure on the supply chain, particularly regarding ports (for assembly) and vessels (for transportation). It highlights the need for rapid adaptation across the supply chain.

It costs about $20-25,000/MW/yr to maintain a wind turbine in Europe, of which 65-75% is for gearbox-related operational expenditures. Compared with other forms of electricity generation, the running costs of offshore wind are low and make it a competitive source of energy in the long run.

1.5.4 UK market conditions

1.5.4.1 Contract for Difference

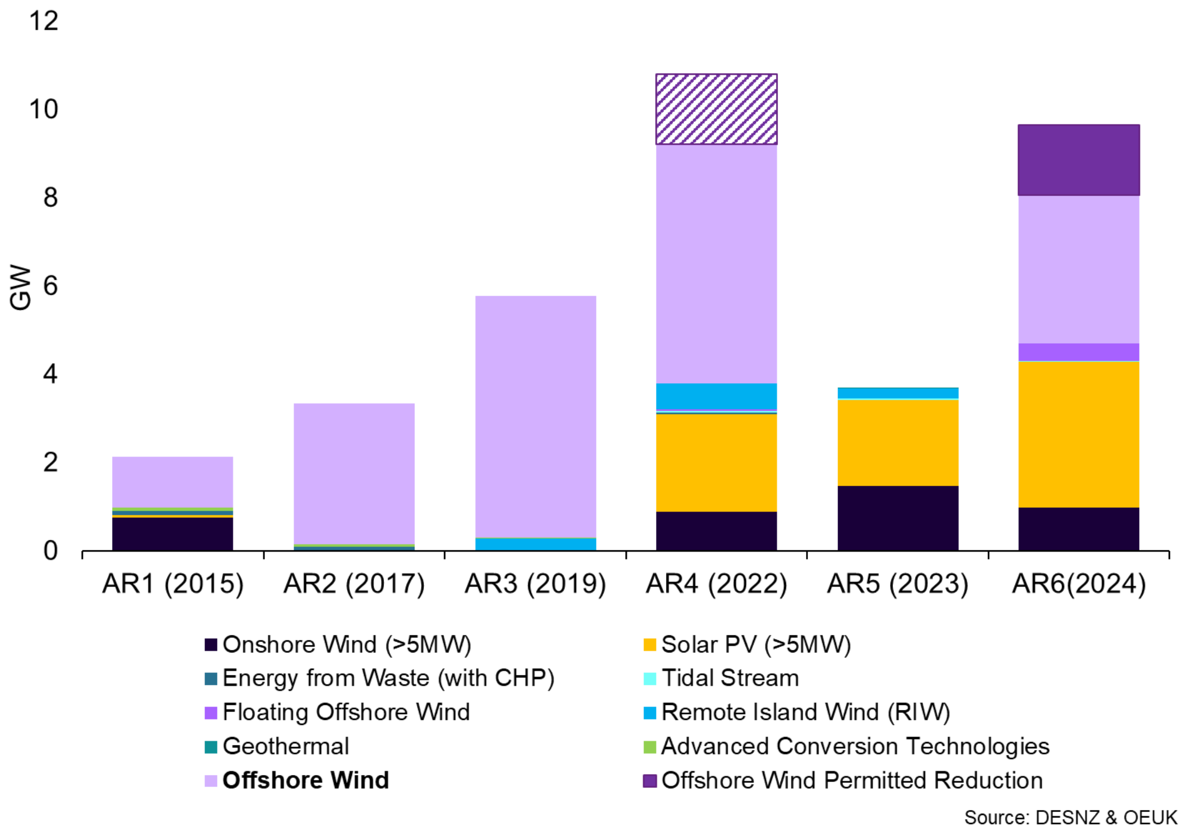


Figure 8: CfD awarded per round

The UK awarded 9.6 GW of renewable energy capacity in the latest AR6 CfD auction, nearly 1.6 times AR5 (*figure 8*). Fixed-bottom offshore wind had a total budget of £1.1bn in Pot 3 (specific allocation for fixed-bottom wind), while floating wind, along with other emerging technologies, received £285mn in Pot 2. After the AR5 auction failed to secure any offshore wind, AR6 marked a significant recovery, allocating 5 GW offshore wind capacity at an average strike price of £54.23/MWh (2012 prices). Offshore wind projects that secured CfDs in previous allocation rounds were allowed to re-apply in AR6 and obtained higher strike price through the 'Permitted Reduction' route and £58.8/MWh (2012 prices).

Meanwhile, around 1 GW of onshore wind capacity was awarded in AR6 of which all but 2% was to be developed in Scotland. Only one project was awarded in England, reflecting the impact of the country's onshore wind "virtual ban" over the past nine years. However, in July, the new UK government lifted the ban in England and established an industry task force for onshore wind with the government's ambition to double onshore capacity by 2030.

The only floating offshore wind project was awarded to Flotation Energy - Vårgrønn's consortium, which will develop the 560-MW Green Volt project (160 MW dedicated to decarbonisation and 400 MW CfD supported) at the highest strike price of £139.9/MWh (2012 prices). Although there are about 20 GW of fixed-bottom offshore wind projects under the whole suite of awarded CfD, even more must be awarded in the next allocation rounds if the grid is to be net zero by 2030. According to the recently published AFRY study commissioned by OEUK, capacity awarded under CfDs will need to more than double. Around 5.9 GW needs to clear in each of AR6-AR9. Based on the AFRY blueprint for net zero power, the AR6 auction is 4 GW short of the 2030 target meaning 8.4 GW are needed if AR7 is to reach a net zero grid. AR7 should also ensure that a sizeable budget is assigned to floating wind to make sure the UK take the lead in this emerging technology.

1.5.4.2 UK market inflection under inflation pressure

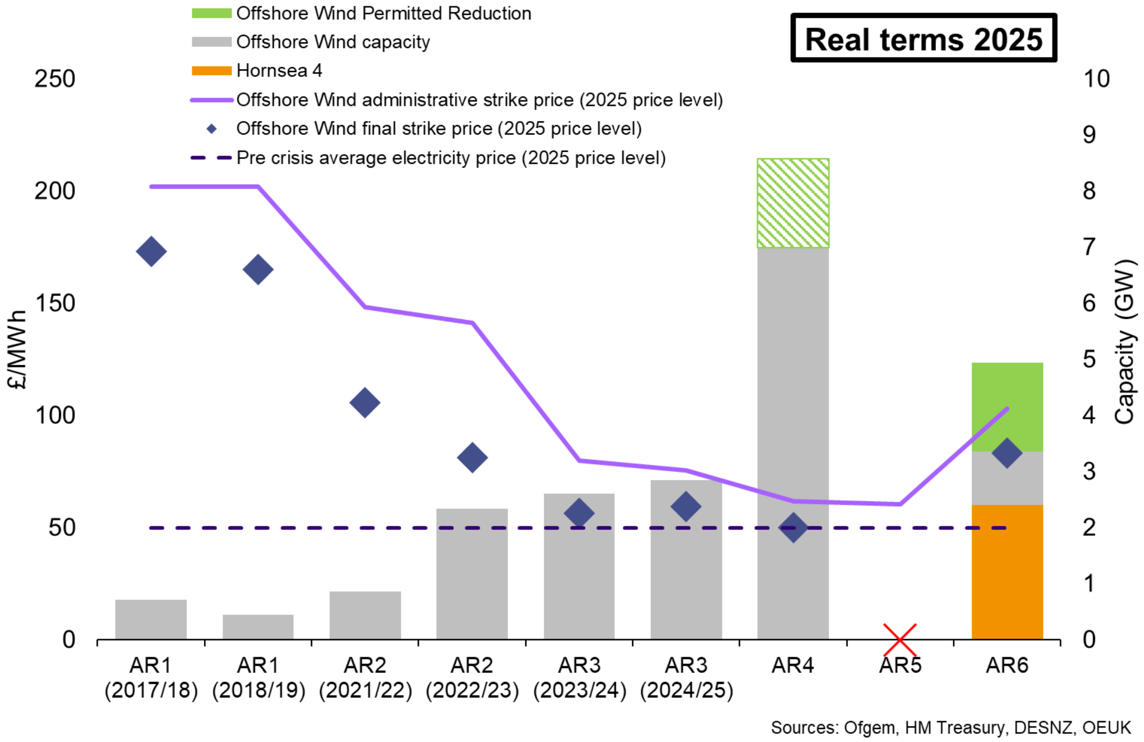


Figure 9: Fixed-bottom offshore wind strike price variations

At the time of writing, Ørsted has announced a "stop" to Hornsea 4. The 2.4 GW project makes up a significant portion of AR6, as shown in Figure 9, and the full implications of this decision will be assessed over time.

Market conditions have changed since the Covid pandemic (*figure 9*).

Before that, low inflation and low interest rates helped industry to scale up and reduce development costs. Post Covid, industry has to face the double threat of specific inflation and higher costs of capital owing to higher interest rate. The geopolitical climate has created further uncertainties, keeping up the cost of materials.

Together with its members, OEUK has developed a world-first wind decommissioning guideline bringing extensive experience of cost-effective decommissioning in the North Sea to the wind sector. Two guidelines were launched at OEUK's 2024 decommissioning conference and they can be downloaded below:

Offshore Wind Decommissioning Work Breakdown Structure Guidelines

Designing for Decommissioning of Offshore Wind Guidelines

Contact: Ricky Thomson rthomson@oeuk.org.uk and Caitlin Smith csmith@OEUK.org.uk

1.6 Part 2: Clean Power 2030: scenarios

The newly formed National Energy System Operator (NESO) published the CP30 report last November. It outlines two scenarios ("Further Flex and Renewables" and "New Dispatch") for achieving the net zero grid.

1.6.1 What needs to be done?

Installed Capacity in 2030 (GW)	CCC CB7 'Balanced Pathway'	AFRY 'Net Zero Pathway'	FES 2024 'Holistic Transition'	NESO 'Further Flex and Renewables'	NESO 'New Dispatch'	DESNZ 'Clean Power Capacity Range'
Intermittent Renewables Capacity	109.4	122.4	122	125.3	117.8	115 - 126
Onshore Wind Capacity	25.9	27.8	27	27.3	27.3	27 - 29
Offshore Wind Capacity	45.7	50.9	54	50.6	43.1	43 - 50
Solar PV Capacity	37.8	43.7	40	47.4	47.4	45 - 47
Nuclear Capacity	2.8	4.5	4.6	3.5	4.1	3 - 4
CCUS Capacity	0	10.7	0.6	0.5	2.3	TBD
Hydrogen-fuelled Generation Capacity	TBD	4.9	0.3	0.3	1.3	TBD
Total Storage Capacity	21.1	15.5	33	TBD	TBD	TBD
Total Interconnector Capacity	17.8	21	12	12.5	12.5	12 - 14

'Further flex and renewables' emphasises more strongly the speed at which renewables are deployed (51 GW offshore wind, 27 GW onshore wind and 47 GW solar PV), but envisages no new dispatchable power by 2030, instead relying on a five-fold increase in today's battery storage capacity, taking it to 27 GW. This pathway also sees the highest levels of societal engagement with expected consumer and industrial demand flexibility rising four or five times higher than it was in 2023.

'New Dispatch' on the other hand sees growth in renewables but at a marginally lower rate (43 GW offshore wind, 27 GW onshore wind and 47 GW solar PV), compared with further flex and renewables. This pathway envisages some new dispatchable power (including 1.4 GW power with CCS and 1.3 GW hydrogen to power) alongside 4.1 GW of nuclear and 0.9 GW of bioenergy with CCS (BECCS). This cuts the overall reliance on battery storage to 23 GW.

The UK government accepted the independent advice of NESO and it published the CP30 Action Plan last December. It has developed the Department for Energy Security and Net Zero (DESNZ) 'Clean Power Capacity Range', which is a range of possible installed capacities for each technology in 2030.

'Clean Power Capacity Range' sees offshore wind capacity grow from 43 GW to 50 GW, aligning with the two NESO pathways. However, it envisions higher growth in offshore wind and lower growth in solar PV, with 27 to 29 GW for onshore wind, and 45 to 47 GW for solar PV.

The plan shows the difficulty of deploying renewable technologies and the importance of reforming the CfD mechanism so that it can support the required volume of new capacity by removing market uncertainties.

The Climate Change Committee (CCC)'s 'Balanced Pathway' from the seventh Carbon Budget (CB7) sees offshore and onshore wind capacity grow alike but the scenario envisages less solar PV capacity and more interconnector capacity in 2030.

OEUK has collaborated with AFRY to develop the 'Net Zero Pathway' that sees more CCUS, hydrogen and total interconnector capacity and lower battery storage capacity. Unlike other plans the 'Net Zero Pathway' relies less on uncertain demand flexibility.

1.6.2 Is UK on track?

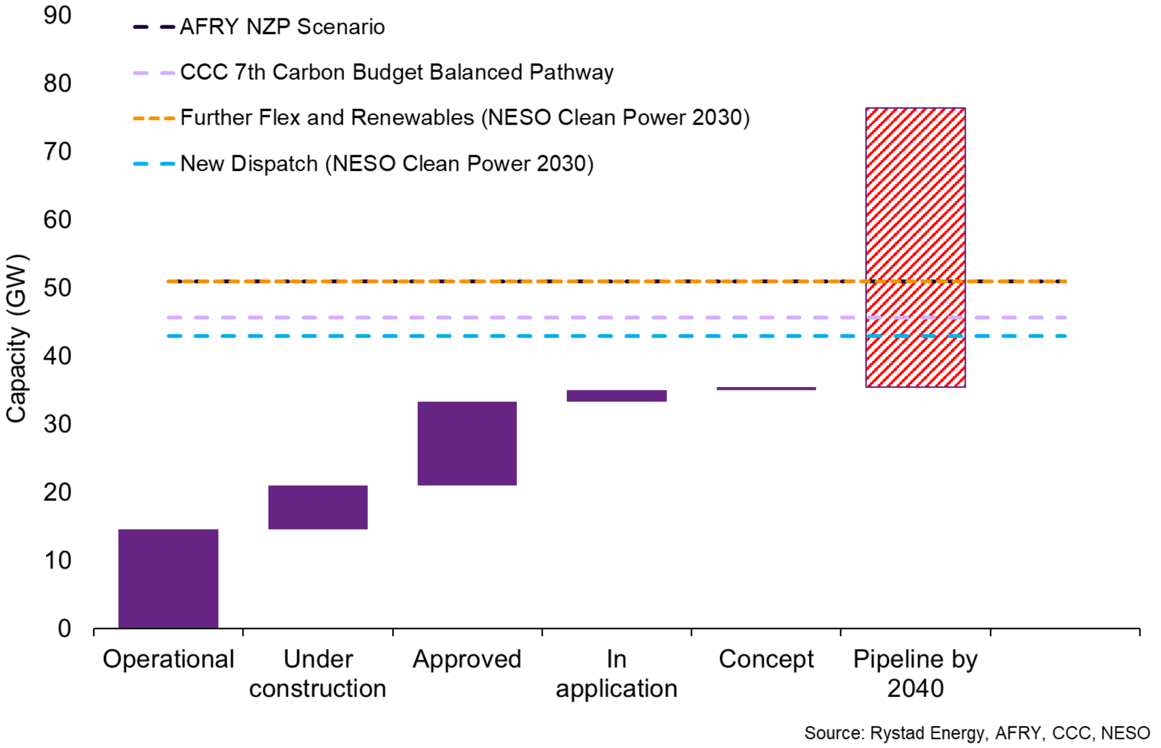


Figure 10 Wind pipeline vs. targets

As of Q1 2025, the operational offshore wind capacity is 14.8 GW. According to Rystad's analysis, the UK is on track to have 35.7 GW of installed capacity by 2030. However, this remains significantly below DESNZ's 'Clean Power Capacity Range' and falls short of key benchmarks (*figure 10*) — by at least 7 GW compared with NESO's pathway, 10 GW against the CCC's Balanced Pathway, and as much as 15 GW under AFRY's Net Zero Power (NZP) scenario. The UK is not on track to achieve CP30, and urgent action is needed to consolidate the existing pipeline, accelerate construction timelines and strengthen the surrounding supply chain. Both developers and the supply chain need clear and consistent signals to deliver CP30.

1.6.3 What would a CP30 future look like?

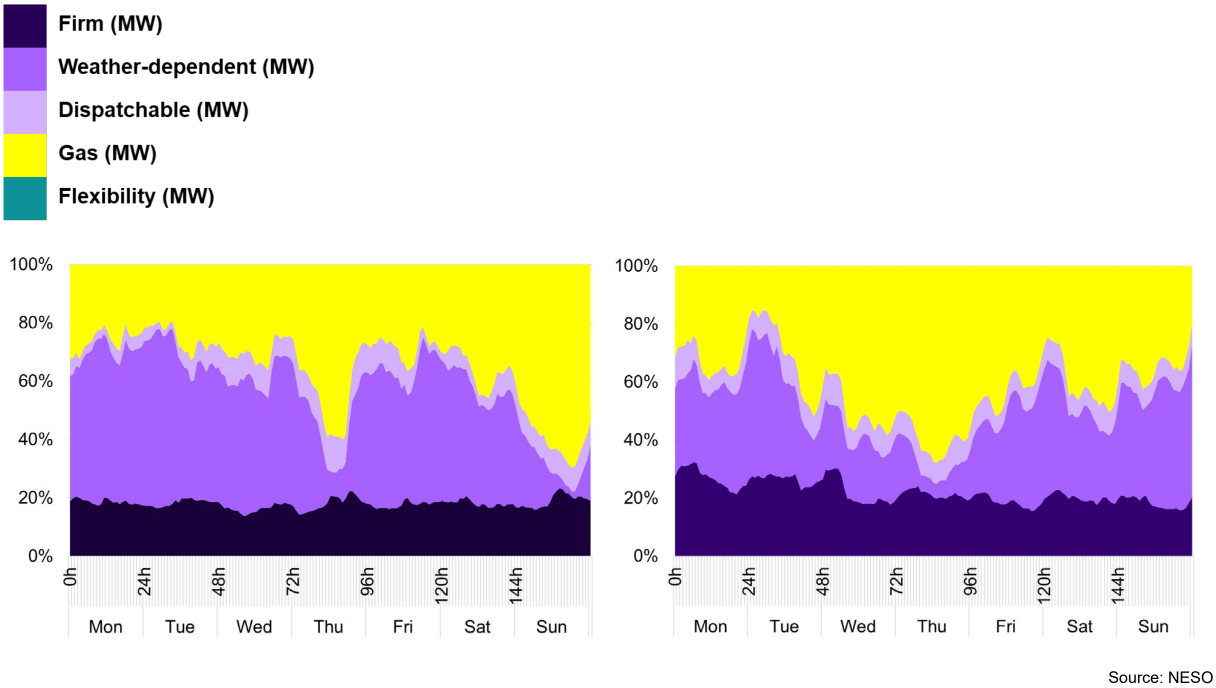


Figure 11: Current summer (left-hand chart) vs winter generation (right-hand chart)

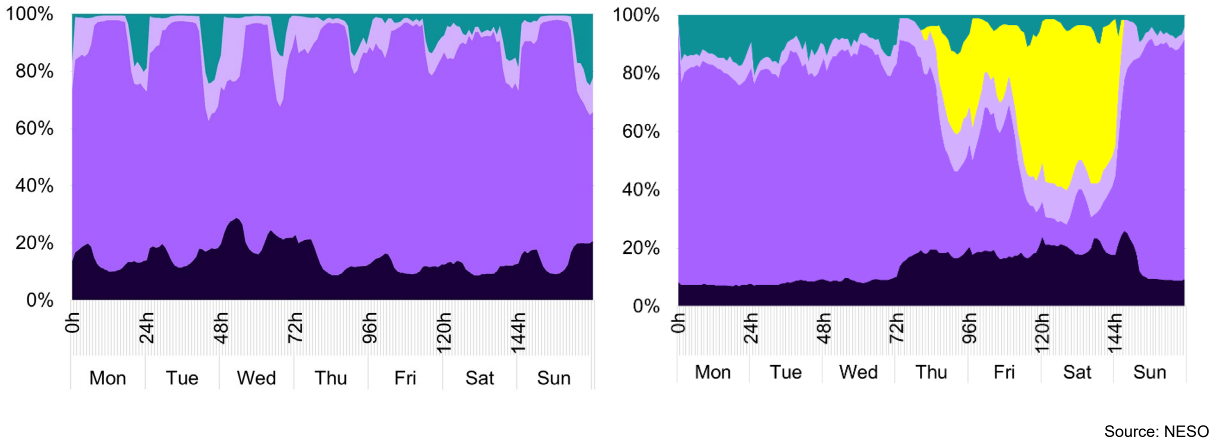
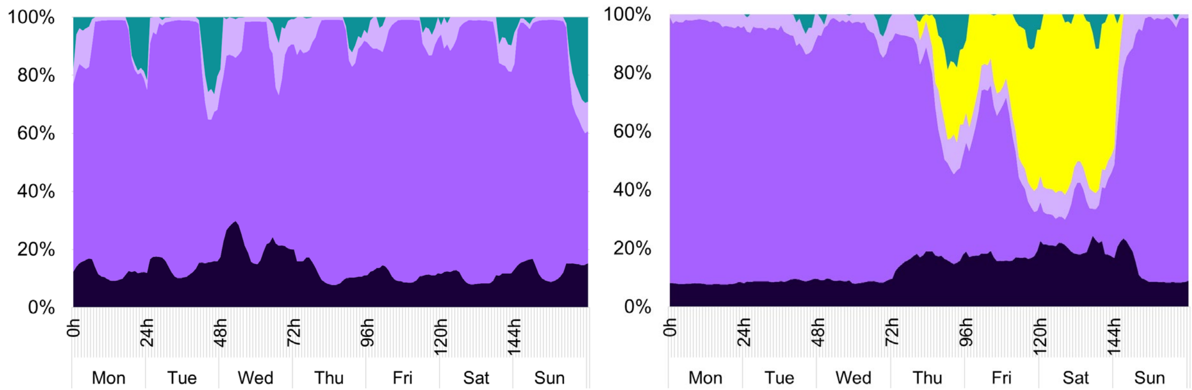


Figure 12 Clean power 2030: New Dispatch summer (left-hand chart) vs winter (right-hand chart)



Source: NESO

Figure 13 Clean power 2030: Further flex and renewables summer (left-hand chart) vs winter (right-hand chart)

In the CP30 scenarios, electricity demand in summer 2030 will be largely met by weather-dependent technologies – namely onshore wind, offshore wind and solar – highlighting their critical role in the energy mix. These technologies will need to scale up a lot if they are to meet up to 90% of peak electricity demand. Offshore wind presents a major opportunity but only if it is built in time (*figures 11,12 & 13*).

However, the importance of gas as a flexible supply source in the CP30 scenario is paramount. Projections from NESO indicate that during a typical winter, a significant share of electricity demand will have to be met by gas.

OEUK has joined forces with BGVA to produce an exhaustive guide that describes all the development steps required from lease to offtake:

UK Offshore Wind Farm Development Processes Guidelines | Offshore Energies UK (OEUK)

Contact: tcheret@oeuk.org.uk

1.6.4 Market transformation

Market reform dramatically changed the wind market between AR6 and AR7. NESO is implementing major change to the grid access queue system for developers, moving from “first come, first served” to “first ready, first needed, first served.”

Another change was the introduction of the Clean Industry Bonus (CIB) to support the supply chain. The first round closed April 14. Developers must obtain a CIB certificate to be eligible for AR7 by demonstrating investment in the supply chain.

A third change is a cap and floor to the transmission charge mechanism: Transmission Network Use of System (TNUoS) Charges. The change will be implemented from April 1 next year.

The CIB offers additional revenue support for offshore and floating wind projects that commit to meaningful supply chain investments. Projects must now meet minimum investment thresholds – £100mn/GW for fixed-bottom wind and £50mn/GW for floating wind – focusing on shorter supply chains in deprived UK areas or sourcing from suppliers in accordance with the science-based targets initiative (SBTs). A total indicative budget of £27mn/GW is set for 2025, with a ring-fenced sub-budget for Floating Offshore Wind. Applicants obtain a CIB Statement to qualify for AR7 (*figure 14*), and projects are scored by DESNZ based on investment levels and sustainability. Funding is allocated based on scores, with remaining funds distributed in a secondary round.

The Review of Electricity Market Arrangements (REMA) consultation is coming to its conclusion and one possible outcome, zonal pricing, could shake up Great Britain's market. Furthermore, government is looking to potentially make further changes to AR7 CfD by allowing unconsented projects to apply. This would give the Secretary of State more access to anonymized bidders' data, expand the CfD period beyond 15 years. Those reforms aim to make AR7 more competitive to support the level of capacity needed to meet CP30 at a lower strike price, thus protecting taxpayers more from market volatility. Finally, government is introducing a marine recovery fund (MRF) to offset the environmental impact of wind farm construction and ease permitting.

1.6.4.1 Connection reform (TMO4+)

The GB electricity grid faces major pressure, with over 700 GW of projects in the connection queue. This is much more than what is needed for 2050 net zero goals. In response, NESO will pause new applications from January 2025 and has introduced the Gate 2 Criteria Methodology to streamline grid access. Gate 2 aims to allocate confirmed connection dates, points, and queue positions to projects that are both viable and strategically aligned with national energy objectives. To qualify, users must meet two requirements: Gate 2 Readiness Criteria, proving their project is progressing; and Gate 2 Strategic Alignment Criteria, showing alignment with key initiatives like decarbonisation or energy system flexibility. Only projects fulfilling both will receive a Gate 2 Offer. This approach ensures resources are focused on delivering Clean Power by 2030 and a net zero power system by 2050. NESO is reviewing this. For the latest updates and developments, please refer to the following website:

https://www.neso.energy/industry-information/connections/connections-reform

1.6.4.2 AR7 with Clean Industry Bonus

The CIB offers additional revenue support for offshore and floating wind projects that commit to meaningful supply chain investments, focusing on shorter supply chains in deprived UK areas or sourcing from suppliers with Science-Based Targets (SBTs). A total indicative budget of £27mn/GW is set for 2025, with a ring-fenced sub-budget for floating wind. Applicants need to obtain a CIB Statement to qualify for AR7 (*figure 14*). DESN| scores projects based on how much is being invested and how sustainable it is. Funding is allocated based on scores, with remaining funds distributed in a secondary round.

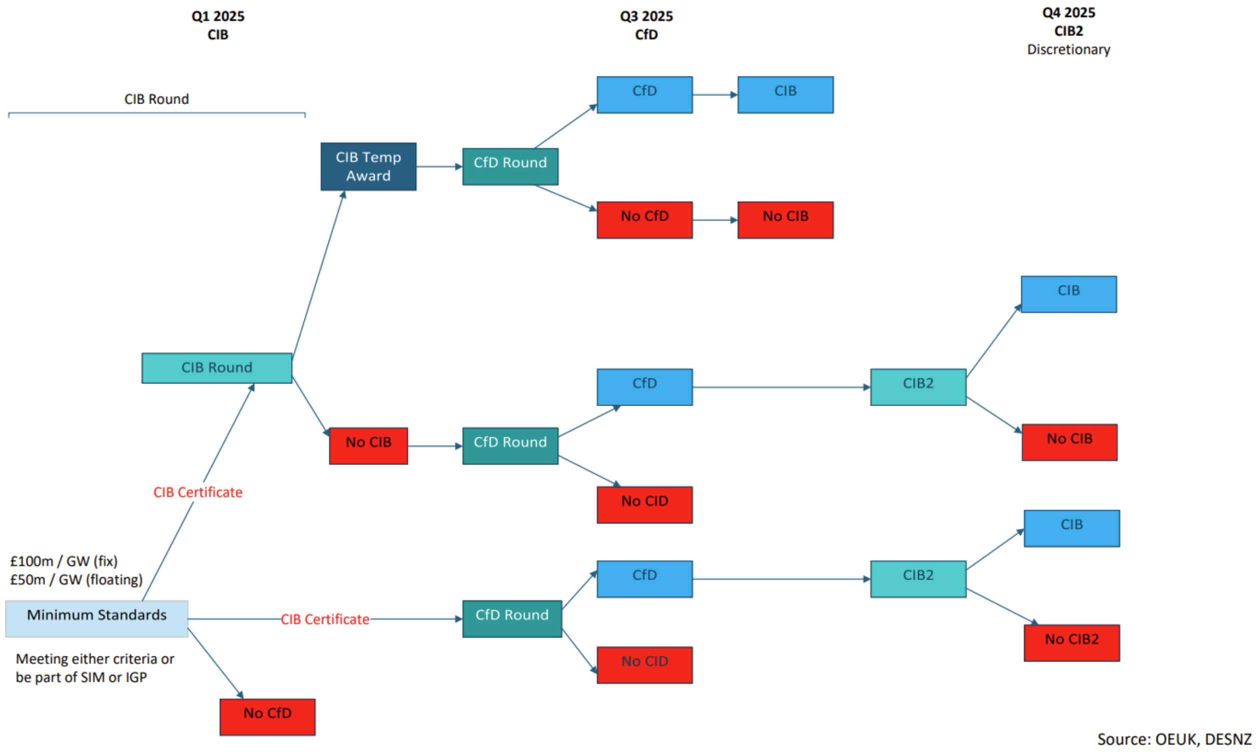


Figure 14 Combined CIB and CfD process

1.6.4.3 Transmission Network Use of System (TNUoS) Charges cap and floor

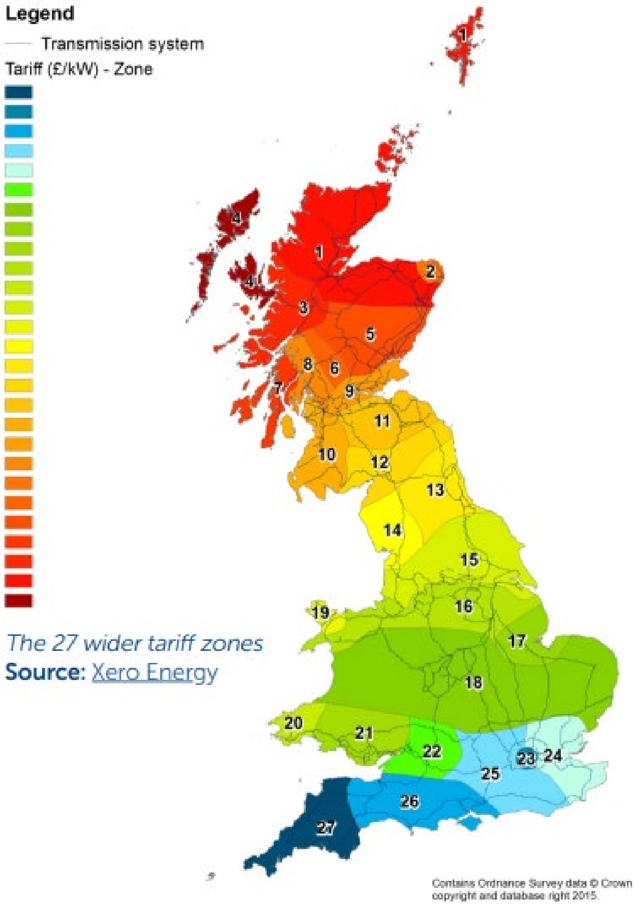


Figure 15: TNUoS zones

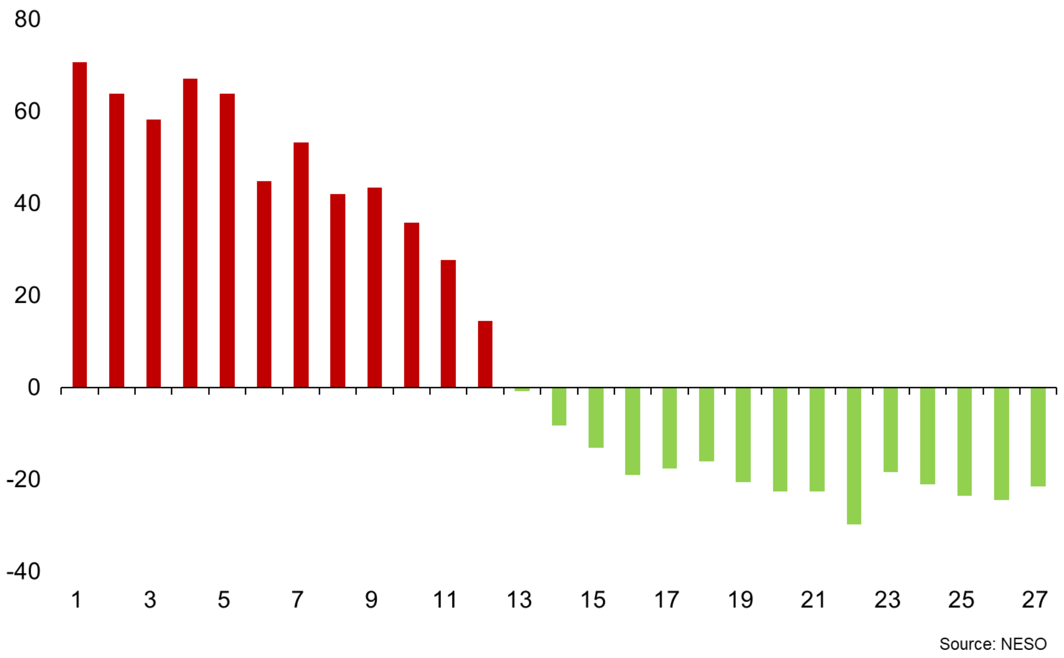


Figure 16 TNUoS tariff baseline impact

Transmission Network Use of System (TNUoS) charges cover the costs of operating and maintaining the UK high-voltage electricity transmission network (*Figure 18*). Both generators and consumers pay these charges that reflect the cost of delivering power to or from specific locations (*figures 15 & 16*). To improve investment certainty ahead of AR7 and ahead of potential reforms under REMA, a NESO working group – under Ofgem's instruction – has proposed a modification introducing a temporary cap and floor on wider TNUoS generation charges. This aims to stabilise costs and generate clearer investment signals. The cap and floor mechanism would reduce regional disparities in charges, helping to attract generation projects across different zones and ensuring more equitable access to the transmission system.

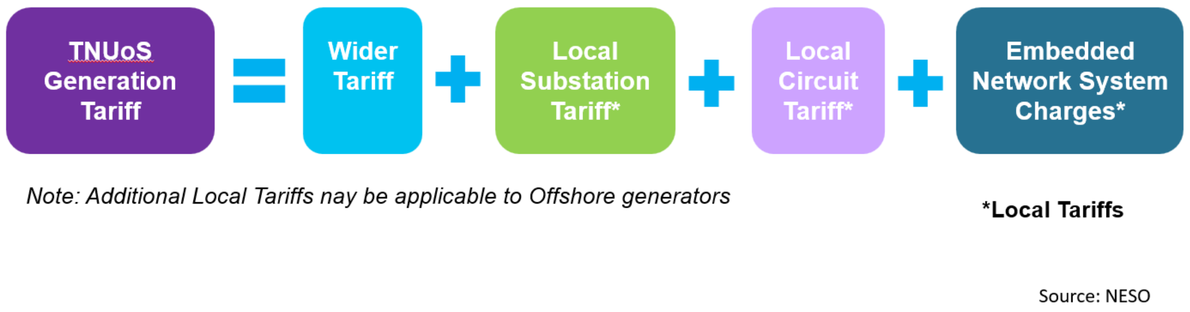


Figure 17: TNUoS charge formula

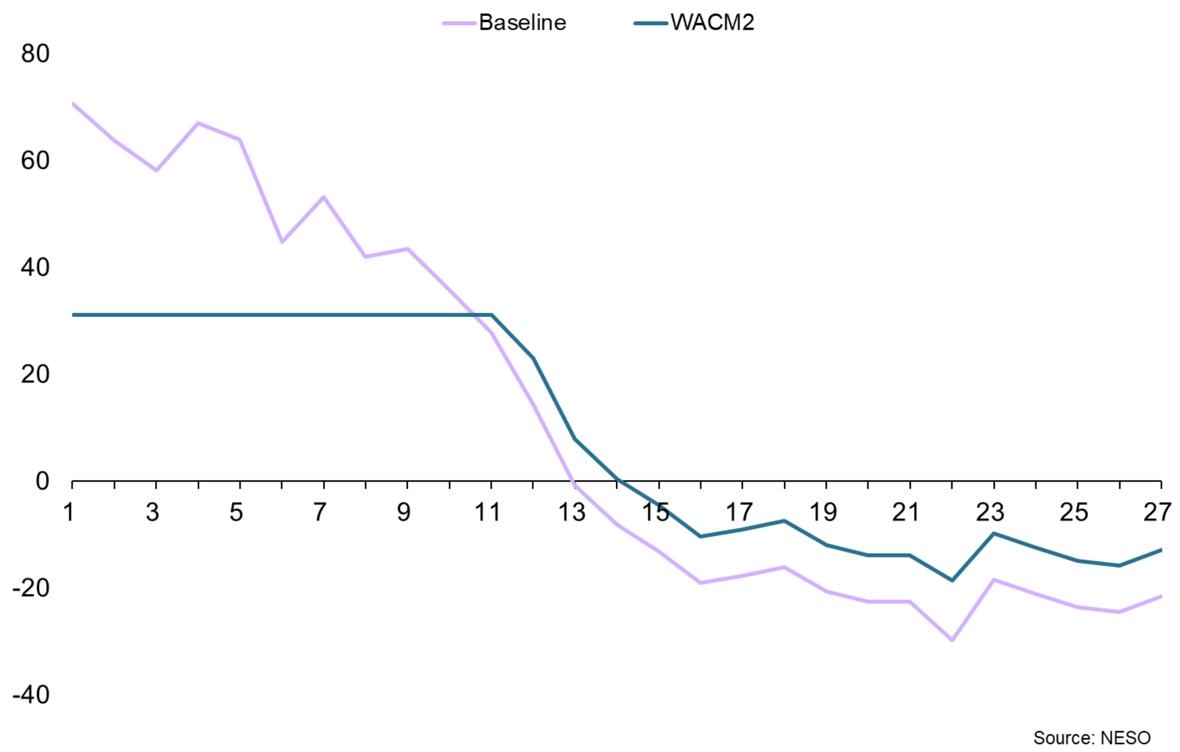


Figure 18 Example of cap and floor (WACM: workgroup Alternative proposal)

1.6.4.4 REMA

REMA considers changes to the power market in order to support the rapid shift toward decentralised, intermittent renewables like wind and solar, and growing electricity demand from electrification. Current market structures, built for centralised generation are increasingly outdated as industrial power demand falls. NESO estimates it will cost £58bn by 2030 for grid upgrades needed to integrate planned renewable capacity. Flexible, low-carbon back-up sources such as hydrogen, CCUS and interconnectors are essential to balance intermittency. OEUK is supportive of an enhanced national electricity market rather than a radical change like the introduction of zonal. Zonal market assumes large flexibility of both demand and supply. It assumes energy intensive industry would move to lower cost but those industries have other reasons to be located where they are and would most likely close if face with non-mitigable energy cost. It is challenging for generators to get permitting close to large urban areas where the demand is higher. Moving to zonal will generate investment uncertainty, risks to existing projects, raise overall system cost and potential delays to deployment impacting the delivery of Clean Power 2030. Alternatives such as hybrid systems (electricity + hydrogen), interconnectors, and improved CfD structures may better manage congestion while preserving investor confidence.

Latest publications showing both side of the argument on zonal pricing:

Enhanced National electricity market designs for Great Britain | AFRY

Zonal pricing to slash more than £55bn off energy bills, major new report finds | Octopus Energy

1.6.4.5 AR7 supplementary consultation

The AR7 supplementary consultation outlines three key proposals:

- allowing unconsented projects to participate in CfD rounds.
- extending CfD contract lengths beyond 15 years; and
- increasing the Secretary of State's access to bid details.

Project readiness – particularly grid connections and consents – is crucial. OEUK supports looser eligibility and consenting criteria to accelerate project delivery, while also stressing the need for properly resourced regulatory bodies.

INTOG and Test & Demonstration projects play a vital role in innovation and emissions reduction and should have tailored routes to market owing to their scale and risk profile. Although the extension of CfD terms improves the certainty, it should reflect the maturity of the technology involved. However, commercial sensitivity and the risk of project names could be guessed mean that the secretary of state should not have access to details allocation round information.

OEUK are supporting the MCA and industry in the delivery of the triennial live emergency response exercise code named Blyth. The purpose of the exercise is to test industry and the emergency service's emergency arrangements and procedures in response to a significant offshore renewables emergency. It will be a multi-agency exercise involving regulators, emergency services, search and rescue resources, industry and government. The scenario will include a range of topics including evacuating personnel dealing with fatalities and any negative environmental impact.

The exercise will involve Ocean Winds, Vestas, Esvgat, Bristows, RNLI, MCA and SoS Rep and will be witnessed by DfT, DESNZ, MAIB, HSE, Police Scotland and OEUK.

The exercise will run June 17-18 at the Moray East windfarm with Fraserburgh the onshore reception centre location.

Contact: Graham Skinner gskinner@oeuk.org.uk

1.6.4.6 MRF

The MRF will deliver industry-funded strategic measures to compensate for adverse effects of offshore wind developments on marine protected areas. This will support the Clean Power Mission.

The MRF is a core component of the Offshore Wind Environmental Improvement Package (OWEIP). Once operational, it will be a voluntary mechanism that organisations undertaking relevant offshore wind activities – such as developers or plan promoters – can pay into in order to secure appropriate and strategic compensatory measures (SCMs) if their projects damage protected sites.

The MRF aims to speed up decision making within the planning and consenting process for relevant offshore wind activities, contributing to CP30; and deliver more effective and strategic measures to compensate for any environmental damage to protected sites.

OEUK is joining forces with the Crown Estate to develop guidelines for coexistence between the different offshore activities of the wind, petroleum and CCS industries.

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1.6.5 Financing the transition

Offshore wind projects are capital intensive but financing conditions have deteriorated. The UK government is developing investment tools to support the industry and de-risk early development phases.

Great British Energy

GB Energy was created in 2024 by the incoming Labour government and is set to receive a total of £8.3bn from the National Wealth Fund over the next five years. GB Energy has agreed to partner with the Crown Estate to invest in UK offshore wind that could leverage £60bn. The government has assigned £300mn for the offshore wind supply chain that will be delivered via GB Energy.

The Crown Estate

The Crown Estate Act 2025 granted the entity new powers to borrow, as well as greater flexibility in how and where it invests. Until now it has had to sell assets to generate capital for reinvestment. Getting certainty to borrow through the new Act will free up its cash reserves to further invest, for example in accelerating the development of offshore wind; science and innovation. It has signposted an additional £400mn over the short to medium term for investment in supply chain infrastructure, manufacturing, research and testing facilities. This includes £15mn this year through the Supply Chain Accelerator Fund to de-risk the early-stage development of UK supply chain projects servicing the offshore wind sector. It will also be able to invest in digital technologies to support nature recovery.

National Wealth Fund

In October 2024, the UK Infrastructure Bank became the National Wealth Fund. The mandate of the fund was expanded beyond infrastructure to include a wider industrial strategy.

OEUK Investment Insight

Building on the April 24 Rystad Energy report *UK O&G supply chain opportunities in the energy transition*', OEUK's *Supply Chain Investment Insights* will illuminate strategic investment opportunities, providing an industry view on areas where local content could be higher. Working with the OEUK Supply Chain Investment Task Force and Business Growth and Transformation Forum, OEUK has identified the following areas of initial focus:

- Fabrication and construction – onshore structures: modularised solutions for offshore wind, carbon capture and hydrogen plants; fabrication of niche modular structures like small modules and pre-assembled units.
- Engineering: front-end engineering and design must be done in the UK.
- SPS and Subsea umbilicals, risers and flowlines (Surf); floating wind - dynamic array cables; mooring solutions.
- Major equipment: CCS subsea injection infrastructure systems with related subsea trees, manifolds, Surf and monitoring systems.

OEUK engages with public financial institutions such as the National Wealth Fund (and its Supply Chain investment team in particular) and the Scottish National Investment Bank, to highlight the best opportunities to invest in the energy supply chain and collaborate on these Insights.

Comprehensive Spending Review

The Comprehensive Spending Review 2025, expected to conclude in autumn, will be a strategic, multi-year review that sets budgets for the remainder of the parliament, aligning with the government's priorities and potentially providing longer-term certainty for capital budgets in priority areas.

Achieving the latest CP30 targets will require a total of 43-50 GW of offshore wind installed and operational by 2030, compared with 15 GW installed in 2024. The 2030 target includes 5 GW of floating wind (it is now 0.05 GW offshore Aberdeen). DESNZ's Floating Offshore Wind Innovation Fund must be sufficiently capitalised in 2025-2027 to support this promising technology, well suited to UK supply chain. Taken together, these are highly ambitious targets and will rely on close co-operation between government, regulators and industry. Reliable funding provided through the next three auction rounds will be essential to secure industry investment in the windfarms and underpin the UK's ambitions for offshore wind. This will require deployment of £5.1-7.5bn (real terms 2024) to underpin the CfD's, which are the basis of Auction Rounds 7, 8 & 9.

In May 2024, OEUK established an industry working group to develop a set of standard contracts for the offshore wind sector that can increase contracting efficiencies, remove unnecessary costs, and add value to boost competitiveness for the benefit of UK offshore wind developers and supply chain.

OEUK and its subsidiary LOGIC have developed and maintained a suite of standard contracts which have supported the oil and gas industry for many years. By using this expertise to draft standard contracts for offshore wind, industry can simplify contracting by ensuring consistency and reducing negotiating time. The full group meets every six weeks, with subgroup meetings in between. The group is working towards delivering a standard agreement by Q4 2025.

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Supply chain funding opportunities

Offshore wind Industrial Growth Plan

[Home - Offshore Wind Growth Partnership]

[SIM | Offshore Wind Scotland]

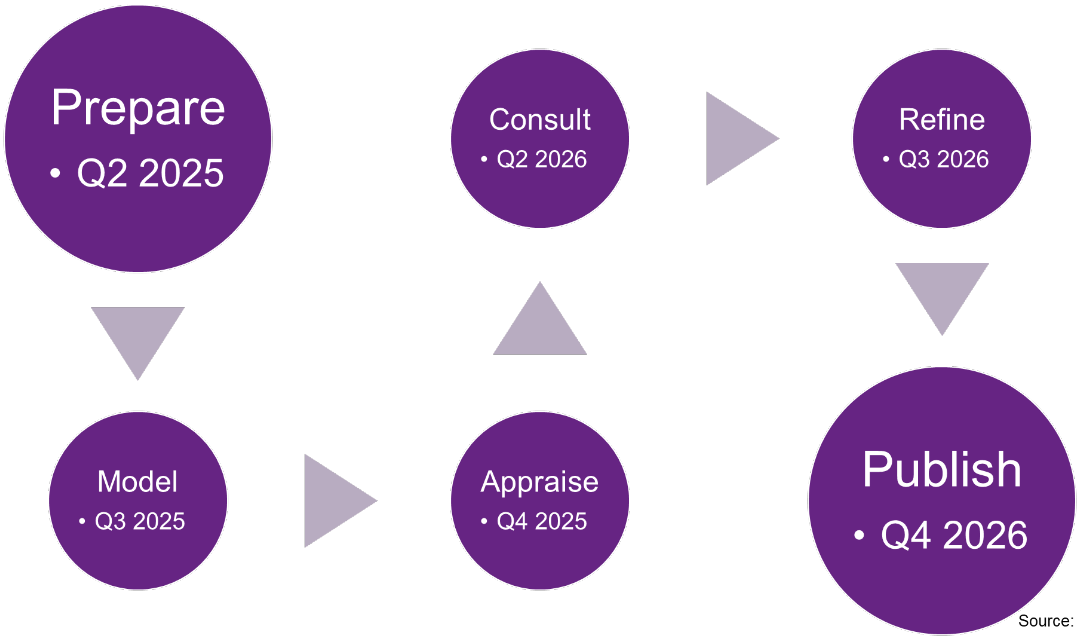
[Funded Support Programmes | Business Improvement | ORE Catapult]

[Associated British Ports | Energy Ventures Accelerator]

[Supply Chain Accelerator Fund | The Crown Estate]

1.6.6 Beyond 2030

The Strategic Spatial Energy Plan (SSEP) is a national model designed to map potential zonal locations, capacities, and types of electricity and hydrogen generation and storage. Its primary objective is to accelerate and optimise the UK's energy transition while ensuring economic sustainability. Jointly commissioned by the UK, Scottish, and Welsh governments, the plan aims to develop between four and six potential pathways for the future energy system. DESNZ will determine which pathway should proceed to public consultation.



Source: NESO

The SSEP will be delivered through a two-year phased process, incorporating economic, environmental, societal, and technical inputs across various sectors and stakeholder groups. The economic modelling will assess 17 zones, considering thousands of generators from diverse sources. It will also evaluate the transmission network, including interconnectors and storage infrastructure, under different weather conditions. As an evidence-based study, the plan will utilise geospatial analysis to identify potential developable areas, iteratively refining its assessments.

The plan's outputs will provide an optimised offshore wind capacity for each zone and the necessary transmission capacity between zones. However, it will not determine the specific locations of wind farms, individual projects, or the types of connections used. Additionally, the study will examine offshore hybrid assets, assessing their sensitivities and potential impacts within each region.

OEUK has teamed up with Xodus for 'Offshore Nesting Bird Census' initiative, where offshore workers can take part in evaluating the offshore bird population.

Contact: Caroline Brown cbrown@oeuk.org.uk

Case Study: The development of floating offshore wind (FLOW) in the Celtic Sea

Executive Summary

The development of floating offshore wind (FLOW) in the Celtic Sea represents a significant economic opportunity for Cornwall. However, For the UK private sector to take a significant role in the delivery of FLOW, both domestically and internationally, it is essential to scale-up existing capability in advance of the market. Celtic Sea Power are supporting ambitious local companies to build capacity as they develop solutions ahead of the challenges faced by FLOW. The aims of CSP's Piranha+ programme are to: maximise delivery from within the host region and develop export potential.

Challenge

FLOW remains a speculative market and a number of barriers to access and growth exist for smaller UK companies. The theme underlying them can be effectively expressed as; risk. Early development is the first to take on risk before passing it down the supply chain as delivery initiates. Existing global Tier 1 corporations have the financial credibility to take on such risk - effectively stymying the sustained growth of a UK supply chain in the offshore wind industry. This poses a significant check at an early stage on locally-led ambition in the Celtic Sea region. Innovation grants are of some use to company growth but it is commercial interventions - such as under-writing of risk, forward contracts and co-investment – which have significant potential to drive growth of the Celtic Sea supply chain.

Solution

To nurture early-stage ambition and develop investment propositions CSP's Piranha+ programme involves:

1. Encouraging "no regret activity" by local entrepreneurs. Given the risks, standing by as an uncertain new industry emerges is understandable – but the market pull of FLOW can be set in the context of export potential and adjacent industries
2. Prompting business-led collaboration, through Piranha Hub. This is CSP's business-to-business platform for developing solutions in advance of major market challenges – and establishing an early partnership approach between solution providers and potential future clients.
3. Commissioning Industry Delivery Plans (IDPs) - IDPs directly engage who has the ambition to scale-up by asking how? In the form of a forward contract companies develop short reports on how they would scale up to take on key industry challenges, such as anchors, mooring, operations and maintenance for FLOW.
4. Provision of tailored support for investment readiness and business growth

Results

To date, CSP's Piranha+ programme has prompted the formation of eight locally-led consortia. Four of which successfully went on to win support for development expenditure from the Crown Estate's Supply Chain Accelerator fund. In the process, over thirty UK companies have been significantly engaged in commercially-led solutions for FLOW and links have been forged between ports, yards, infrastructure owners and local stakeholders. These are significant steps forward that highlights the increasing investment readiness of an underdeveloped region – and its ambition to taking a leading role in the deliver of FLOW in the Celtic Sea.

For more information see:

- https://piranha-hub.com/
- Local business consortia set out ambitious plans to deliver floating wind in the Celtic Sea - Celtic Sea Power

1.7 Part 3: Horizon 2035 – floating wind

In 2033, floating wind investment in UKCS will overtake fixed-bottom (*figure 19*).

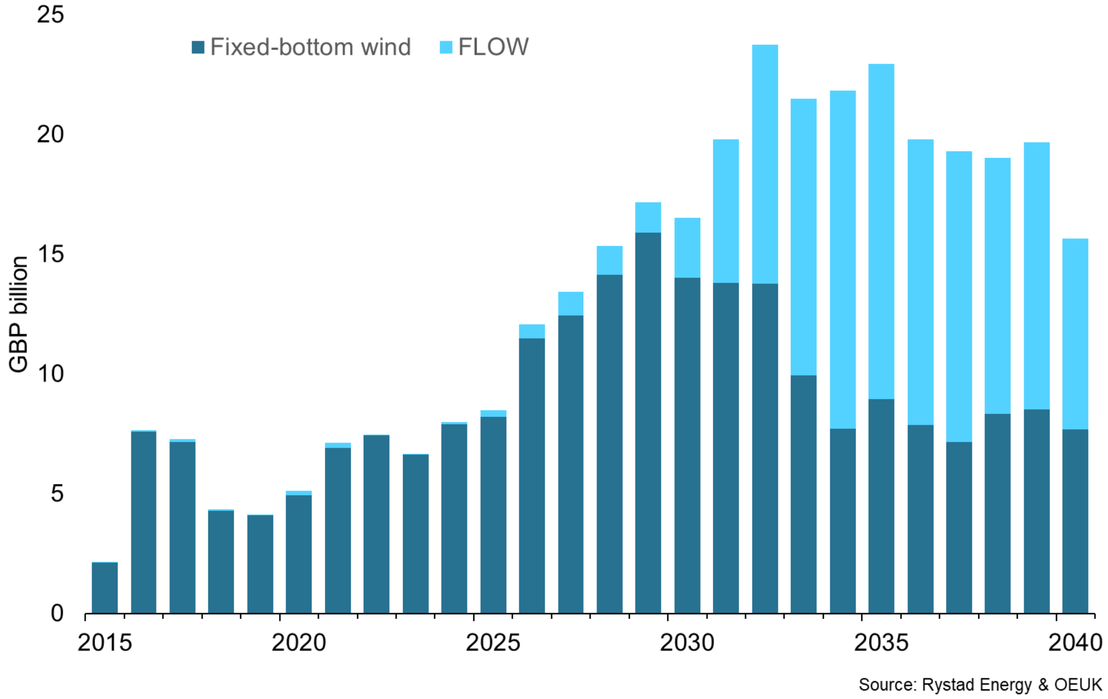


Figure 19 Offshore wind expenditure fixed-bottom and floating

Last year's Wind Insight predictions indicated that investment in fixed-bottom offshore wind would plateau after 2030. However, following the Labour government's announcement of a 2030 net zero grid target, much of that investment has now been brought forward, creating a backlog for floating wind development. While total offshore wind investment through 2040 is expected to remain broadly consistent, the spending is now split across two distinct phases. From 2033 onward, investment in floating wind is projected to surpass that in fixed-bottom projects, maintaining its lead through to 2040.

The opportunity in floating wind is too good to miss, especially as the UK is developing the world's first commercial-scale floating wind farm, Green Volt. If fully realised, this could unlock exceptional economic and supply chain benefits for the UK.

Figure 20 Floating Wind CfD strike price

As floating wind remains in its infancy, CfD strike prices are still high (*figure 20*). As shown by the French auction, concerted efforts and the continued race for turbine size can lead to price reduction despite advert market conditions. By streamlining the wind development process, with the right support mechanism (CIB or other) and investment and de-risking from GB Energy and The Crown Estate, the government can make the UK supply chain competitive in the floating wind market with export opportunities as the technology mature.

OEUK, in collaboration with the Energy Institute and G+, will launch a UK Wind Medical in Q2 2025. This medical assessment utilises the established network of occupational health doctors established for the existing offshore medicals, including OEUK quality control and certification processes to ensure that there is a robust assessment of wind workers fitness for work. Following the launch OEUK will set up a steering committee of wind company medical advisors to keep the guidance up to date and allow it to reflect latest practices in the sector and changes to occupational health practice.

The current OEUK medical examination process ensures that workers health is assessed as suitable for their work environment and certified them safe for offshore travel allowing workers to travel between multiple installations and companies with a single medical certificate, it also addresses procedures for those on prescription medication, or with health issues ensuring that their risk, and the risk they could pose to others, is considered whilst also supporting them to continue to work in their role where possible.

Case Study: Challenges in Gigawatt-Scale Floating Wind Installations

Apollo, in collaboration with DOF for ORE Catapult, conducted a comprehensive study addressing the challenges and solutions for installing a Gigawatt-scale floating offshore wind farm. The study focused on cost, schedule, and innovative methodologies to overcome critical installation bottlenecks. This case study delves into the specific challenges of scaling from current demonstrator projects to Gigawatt-scale installations, providing detailed insights and recommendations to improve efficiency and reduce costs.

Challenge

Installing a single state-of-the-art floating offshore wind turbine (FOWT) with its mooring lines and infield cables is a significant offshore marine operation. Scaling this up to develop a Gigawatt-scale floating wind farm, requiring sixty FOWTs, presents a major challenge of scale. This scale-up from 10MW to 100MW demonstrator projects involves substantial logistics, cost, and scheduling complexities, with critical bottlenecks identified in the availability of capable vessels and weather-related delays.

Solution

Apollo and DOF developed a detailed study to address these challenges. Focusing on a representative 100m water depth, 900 MW ScotWind site, the study explored methodologies, schedule, and cost implications.

The solution involved:

1. Developing a 'base case' installation method by scaling up current practices.
2. Exploring 'future case' installation scenarios for their potential impact.
3. Identifying approaches to accelerate the schedule and protect against emergent delays, such as using taut nylon moorings and smarter risk-based anchor tensioning requirements.
4. Proposing a novel installation method modelled on O&G umbilical installation to halve cable pull-in time and reduce costs.
5. Recommending quick connect systems to reduce cable pull-in costs further and optimise installation and maintenance.

Results

The study provided critical insights into the gigawatt-scale installation process, enabling developers to make better decisions. Key results included:

- Identification of major bottlenecks, such as the availability of AHTS vessels capable of handling 175mm chain.
- Recommendations for innovative mooring and cable system designs to reduce costs and installation time.
- Detailed methodologies for accelerating the installation schedule and mitigating delays.

The findings will inform project front-end engineering design (FEED) and technology development activities, aiding in the efficient and cost-effective deployment of gigawatt-scale floating offshore wind projects.

Additionally, the study estimated significant cost savings through optimised installation methods. The novel installation method and quick connect systems could reduce installation costs by millions of pounds, though exact figures require further detailed financial analysis.

For more information and to access the full report, visit: https://fowcoe.co.uk/industry-insights/reports/gigawatt-scale-cable-and-mooring-installation/

Case Study:
Mooring and anchoring

Using our extensive experience of mooring systems and the marine environment, we optimise our clients' floating foundation options, deployment method and the vessel selection, based on the mooring components and their operating strategy. We provide offshore wind projects with the knowledge and data to create savings in time and costs.

Introduction

Founded by two of the floating wind industry's leading experts, Flotation Energy submitted a joint marine license application for the proposed Green Volt floating offshore wind farm in February 2023.

Located around 80km from shore, Green Volt is at the forefront of global offshore wind developments and touted to become the world's largest offshore floating wind farm by 2027.

As the North Sea's leading provider of mooring and survey services to the offshore energy sector, we were contacted by Flotation Energy in 2022, at pre-application stage, with the request that our Glasgow-based Floating Offshore Wind engineering team address the challenge of understanding the relative mooring requirements for the technology options under consideration, to ultimately guide selection.

Situation

Integrating with a grid connected offshore wind farm offers the potential to provide 100% of oil and gas platforms power needs. Green Volt will also provide power to the UK grid - eliminating a total of at least 500,000 tonnes of carbon dioxide emissions annually.

With a proposed location over the former Ettrick and Blackbird oil and gas fields in the Central North Sea, this pioneering project will use floating offshore wind to address a major source of UK carbon dioxide emissions - those produced from the production and processing of offshore oil and gas.

Particular consideration was made towards the structural loading in light of the expected North Sea environmental conditions to understand location-specific responses.

What we did

Our study conducted a quantitative analysis comparing various types of floating structures (semi-submersible, barge and tension-leg-platform structures) loading in the Green Volt location.

Based on previous work and metocean data previously derived for the location, we utilised our calibrated models and existing site data to achieve a running start and provide results from day 1.

Influencing factors we considered included:

- The reliability and up-time provided by field-proven systems, bearing in mind the requirement for Green Volt windfarm to power operating oil and gas assets.
- The potential layout constraints based on existing oil and gas infrastructure on the seabed and large mooring radii associated with traditional catenary solutions.
- The risk of dragging anchors.

Results

Our study delivered an overview of mooring/anchoring technology, ancillary systems and operations and assisted Floating Energy in:

- Determining the anchor radii required for each substructure type - how the various mooring systems for semi-submersibles, barges and tension-leg platform structures behave at the location;
- Identifying anchor solutions;
- Failure analysis if line was to part/anchor was to drag;
- Understanding the impacts of redundancy;
- Identifying costs of higher line numbers;
- The approach of substructure suppliers in M&A scope.

Case Study: Floating Offshore Wind: Overcoming Technical and Logistical Challenges in the Mediterranean

The EolMed floating offshore wind project has placed Ponticelli at the forefront of offshore renewables, applying its engineering and construction expertise to one of the most demanding environments: floating wind foundations. Located 18 km off the Mediterranean coast near Gruissan, EolMed is one of France's three pilot floating wind farms. Ponticelli, in joint venture with a structural steel specialist, is responsible for fabricating floating foundations and integrating three wind turbines.

This pioneering project, supported by a fully European supply chain, will generate 110 million kWh annually—enough to power 50,000 residents. The foundations are delivered via the redeveloped Port-La-Nouvelle, adapted as a hub for floating offshore wind (FOW) infrastructure.

Figure 1: Three floating foundation at Port-La-Nouvelle

FOW introduces several unique technical and logistical complexities, especially at the pilot project stage. For Ponticelli, the primary challenge was the assembly and integration of large, complex structures—each floater measures 45 meters per side, 17 meters in height, and weighs over 3,500 metric tonnes. Each foundation is made up of 100 modular steel blocks prefabricated each ranging from 5 to 50 tonnes.

This project hasn't been without challenges. The complexity of assembling these modules at the newly constructed marine energy facility at Port-La-Nouvelle presented significant logistical hurdles. Beyond scale, the project demanded intricate coordination of supply chains, transportation, and workforce planning. Further challenges included welding in confined spaces and applying marine-grade coatings under strict quality controls.

In true pilot-project fashion, the EolMed development brought a variety of unforeseen challenges. Nevertheless, the firm has persevered and adapted its original plan to ensure milestones were met, while also limiting the risk of escalating costs and maintaining continuity within the European supply chain. Throughout, Ponticelli has continued to advocate for a risk-sharing approach—one it believes will be essential for the broader success of renewable projects moving forward.

Ponticelli and its JV partner applied a modular construction approach to streamline the assembly process. By prefabricating modular blocks offsite, fabrication and assembly activities could be run in parallel, reducing project duration and improving workflow.

Over 250 skilled personnel were deployed at Port-La-Nouvelle to manage the handling, transport, and integration of components. Specialised heavy-lifting equipment and bespoke tools were used to ensure each block was positioned with millimetre accuracy. Given the scale and load demands, ensuring the mechanical integrity of each connection was critical—particularly in welded joints. Ponticelli leveraged its expertise in advanced welding and inspection techniques to meet stringent standards for safety and performance.

A significant engineering challenge was ensuring that all components fit together as planned while meeting the required standards. Ponticelli leveraged its expertise in high-performance welding techniques to ensure the integrity of critical load-bearing joints, which was especially important given the complex nature of the assembly. In addition to the welding, the coordination required to fit all the components together—considering the scale and weight of the floaters—presented significant challenges. This process was further complicated by the harsh marine environment, where factors such as corrosion and mechanical stress could affect the long-term performance of the structures.

Ponticelli also paid close attention to the painting and coating systems for the floating platforms. The coatings had to address the challenges of marine corrosion protection, with multiple layers of anti-corrosive paints applied to withstand exposure to saltwater and ultraviolet radiation.

The challenge of maintaining the project schedule was met through efficient project management and real-time adaptation. Ponticelli's project teams worked closely with stakeholders to ensure supply chain continuity, overcoming procurement delays and localised shortages of key materials. Flexibility in design and construction methods allowed the project to maintain progress, even in the face of unexpected obstacles.

Ponticelli's experience with the EolMed project has reinforced the importance of adaptability in large-scale renewable energy projects. Key takeaways include:

- Modular construction facilitates better control over timelines and costs, particularly in challenging environments.
- Early and sustained collaboration with supply chain partners is essential for mitigating supply and logistical issues, especially in new and complex projects.
- The use of advanced welding and coating technologies is crucial to meet both structural and environmental demands.
- Flexibility in design, construction, and scheduling ensures resilience in the face of unexpected disruptions.

The experience gained from the EolMed project will provide invaluable insights as Ponticelli continues to support the scaling-up of floating offshore wind farms in the Mediterranean, North Sea and beyond.

Founded in 1921, Ponticelli is an engineering, construction, and maintenance services provider that specialises in energy and industrial projects. With over 6,000 employees and a track record spanning oil and gas, nuclear, and renewables sectors, Ponticelli is committed to advancing sustainable energy solutions, bringing technical expertise to complex and large-scale projects.

Ponticelli UK, based in Aberdeen, is a leading player in the UK energy sector and leads the PBS consortium. PBS provides integrated industrial services to the oil and gas, energy, and renewable industries - combining innovation, safety, and operational excellence to support large-scale energy infrastructure.

Working together, we are a driving force of the UK's energy security and net zero ambitions. Our innovative companies, people and communities add value to the UK economy.

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