The Strategic Value of Test and Demonstration Projects as Cost Reduction Drivers in Floating Offshore Wind

Our Vision for the Future of Floating Offshore Wind

As a driving force in the sector, we believe that a phased approach to development using strategic T&D projects offers the most effective and sustainable path forward for the UK.

Drawing on our own expertise, research, and in-depth analyses we can clearly demonstrate that pilot projects like the Llŷr Floating Wind Farms will play a crucial role in building supply chain and investor confidence, de-risking technology and enabling cost certainties in future commercial scale offtake auction rounds.

While FOW currently carries higher costs than traditional offshore installations, taking a measured, stepping stone approach, will maximise long-term value, enhance future large-scale initiatives and strengthens the UK's position as a global leader in offshore wind development.

Our analysis reveals that a fully phased, structured approach, incorporating pilot projects like Llŷr Floating Wind Farms, unlocks cost reductions in future deployment of approximately 28% compared to moving to direct GW-scale deployment. This delivers multiple benefits including:

- Optimising infrastructure development based on operational learning
- Steady supply chain scale-up with clear investment signals
- Technology and deployment risk reduction through full scale experience
- Higher investor confidence through demonstrated success
- Maintenance of continuous workforce development and skill retention

The Global Context of Floating Offshore Wind

Since the first mega-watt scale Floating Offshore Wind (FOW) turbine—the 2.3MW Hywind Demo—began operation in Norway in 2009, FOW has been recognised as the next frontier in offshore wind energy, unlocking 80% of the world's offshore resource in waters deeper than 50 meters. Current global operational FOW capacity stands at approximately 200MW (0.3% of total installed offshore wind capacity), and whilst the sector is poised for exponential growth, it is unlikely that the 10GW targeted worldwide for installation by 2030 will be reached.

FOW remains more expensive than bottom-fixed offshore wind, with the latest CfD being awarded in AR6 for the 400MW Greenvolt project at a price of £197/MWh (Dec 2024 prices).

UK Offshore Wind: From Fixed to Floating

The UK was an early mover in bottom-fixed offshore wind, with its first installation operational in 2000. Over the past 25 years, the UK has been at the forefront of driving significant cost reductions in the offshore wind sector. This can be attributed to several factors, including:

- Scaling up of the market in the North Sea, enabling supply chain investment
- Declining oil & gas activity
- Increase in turbine size (factor of 10)
- De-risking of investment in the early years through smaller projects and
- Government support schemes such as ROC's, FIDER and CfD

The Impact of UK Government Support

The UK government has provided support to the offshore wind industry through several revenue schemes.

Renewable Obligation Certificates (ROCs) - introduced in 2002 for large-scale renewable energy generators as part of a Feed-In Tariff scheme, the certificates provided fixed payments per megawatt-hour (MWh) of green electricity and were guaranteed for developers who secured seabed leases, development consents and grid connections for the duration of the scheme.

The **Final Investment Decision Enabling for Renewables (FIDER)** was a bridging scheme which offered fixed term fixed price contracts to developers of low carbon electricity projects, allowing them to finalise investment decisions after ROC's and before the Contract for Difference scheme was established.

Contracts for Difference (CfD) was rolled out in 2014 to provide a 15-year stable indexed price, offering protection for developers against fluctuating wholesale prices and helping to shield consumers against increased electricity costs. Since the introduction of the CfD scheme, there has been a significant reduction in fixed offshore wind strike prices - from £160 per megawatt-hour (MWh) in Allocation Round 1 (AR1) to as low as £44 per MWh in AR4 (2012 prices). AR6 marked significant progress for offshore wind, with nearly 5GW of fixed offshore wind capacity awarded. This included the Green Volt FOW project, with a capacity of 400 MW which is expected to begin power generation by 2028/29.

The Department for Energy Security and Net Zero (DESNZ) have recently launched a consultation on potential changes for AR7, which recognises the importance of T&D projects in helping to facilitate early investment in the development of infrastructure and manufacturing capacity required to support the scale up of FLOW. They state their intention to support multiple T&D projects in the upcoming allocation rounds and that they will set the budget to facilitate this. At this stage the Government does not see a case for reducing the strike prices for FLOW compared to AR6 (£176/MWh 2012 prices, equivalently £249/MWh Dec 2024 prices).

This will be subject to a further consideration by government over the coming weeks where a decision will also be made on the potential to extend contract length. A **Clean Industry Bonus Scheme** has also been introduced, allowing developers to bid for direct government support for investments in the UK supply chain.

Cost Reduction Drivers for Floating Offshore Wind

Cost reduction in floating offshore wind (FOW) was expected to be able to build on existing industry scale and established supply chain which in place for fixed offshore wind. Whilst many market commentators forecast that the FOW cost reduction would be faster than in bottom-fixed wind, this theory ignored the early stage of FOW technology development and the very different supply chain and infrastructure requirements which are required. Advancements in turbine technology and O&M will help going forward, although some novel components still require tailored development. Our analysis identifies clear pathways to cost reduction through multiple factors:

Learning Rates: Small-scale insights drive significant cost and schedule savings in larger commercial projects. Learning rates encompass technological innovation, supply chain competition, and economies of scale achieved through portfolio management. While some learning benefits are global—such as overall technology maturation and risk reduction—others require local demonstration, from workforce development to process and infrastructure optimisation.

Project Scale: As project scale increases, facilities and infrastructure can be used more efficiently. However, investment in the necessary facilities and infrastructure to enable large scale projects relies on a proven track record of success. Therefore, initial small-scale FOW projects are essential to demonstrate supply chain capabilities and unlock private investment.

Cost of Capital: The FOW market is currently adjusting to a higher baseline, with debt financing costs increasing by approximately 4% and equity rates rising by 2 - 3%. As a new technology, FOW carries a higher risk premium than established technology. However, this risk premium will decrease as operational assets accumulate a proven history, particularly compared to first-of-kind projects.

The Strategic Value of Test and Demonstration Projects

Test and Demonstration (T&D) projects, such as the Llŷr Floating Wind Farms, serve as crucial stepping stones for industry development. Our internal assessment replicates the methodology applied by the Floating Offshore Wind Centre of Excellence in their 2021 report ***Floating Offshore Wind: Cost Reduction Pathway to Subsidy Free***, our own analysis of deployment scenarios demonstrates the compelling case for a phased approach.

Cierco has assessed FOW cost reduction by modelling three deployment scenarios:

1. **No pilot sites:** The first projects in the water in the UK are GW+
2. **First pilot site:** Single demonstration site (Llŷr 1) prior to GW+ projects
3. **Full project phasing:** Llŷr is joined by other pilot sites - phased construction for the first commercial scale sites and steady supply chain scale up.

Cost Reduction Impact

Cierco modelling shows that T&D projects, combined with other stepping stone initiatives, could generate maximum net savings in CfD payments of £210m per GW annually (2032-2054), with a net NPV saving of between £8bn - £25bn based on between 9.5GW and 18.5GW of installed capacity being positively impacted (15 year CfD).

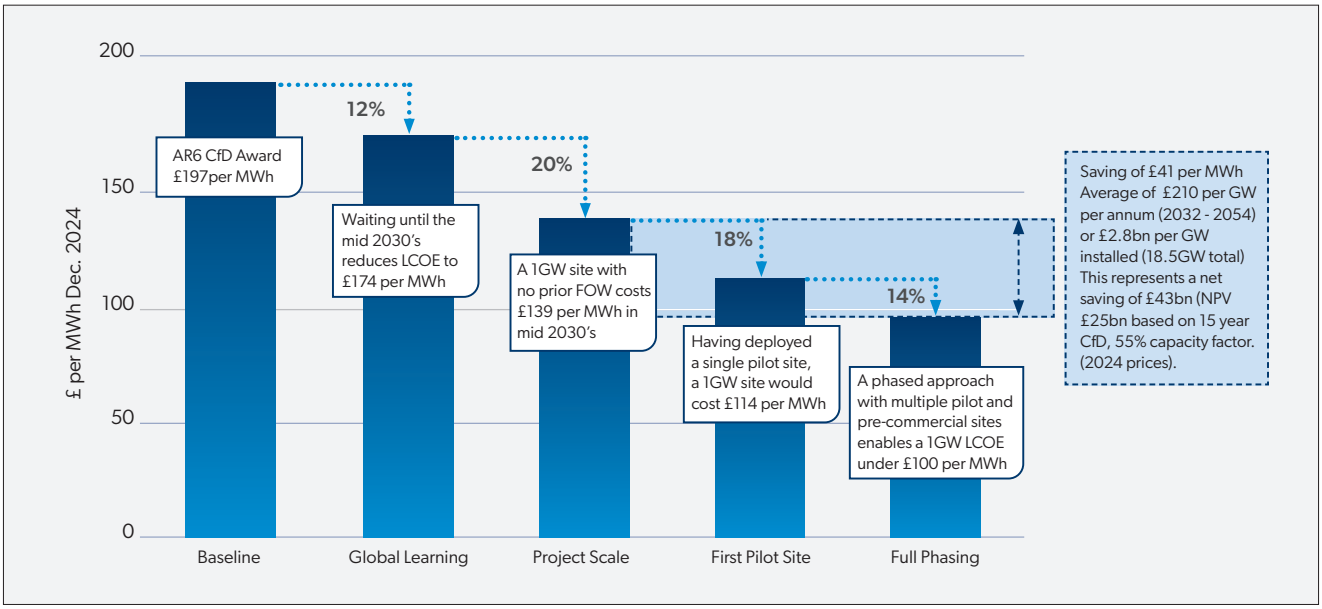

Figure 1: FOW Cost reduction enabled by pilot sites (Internal Cierco analysis).

Strategic Insights

Global Learning: The UK could wait for other FOW markets to progress technology thus avoiding the burden of development costs. For example, a development project constructed in the mid-2030s could benefit from a cost reduction of 10-15% due to global learning.

Project Scale: Instead of small-scale projects, the UK could progress directly to GW scale projects which could achieve LCOEs around £145/MWh in the 2030s. However, this requires significant investment in port facilities, grid infrastructure, and manufacturing, which may be challenging for private investors due to high initial costs and perceived risk.

First Pilot Site: A pilot project such as Llŷr could reduce costs by 15-20%, utilising existing small-scale port and existing grid infrastructure with limited upgrade requirements. However, a pilot project's benefits are limited without a clear, attainable project pipeline to maintain skills and momentum.

Fully Phased Industry: This approach fosters skills retention, domestic supply chain growth, reduces perceived risk and instils confidence in developers and investors, creating a cycle of sustained industry growth. This stepping stone strategy ensures the supply chain maintains sight of multiple opportunities, avoiding the risks of boom-and-bust cycles.

This commentary provides a perspective on the global floating offshore wind industry alongside the cost reduction potential and development challenges associated with floating offshore wind technology compared to bottom-fixed offshore wind. The paper was prepared by the management team at Cierco Energy and reflects their own opinions.