Cornwall FLOW Accelerator

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Risk Roundtable Notes

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Glossary

AHTS	Anchor Handling Tug Supply
CAPEX	Capital Expenditure
CC	Cornwall Council
CFA	Cornwall FLOW Accelerator
CfD	Contract for Difference
CLV	Cable Laying Vessel
CSP	Celtic Sea Power
CTV	Crew Transfer Vessel
DNV	Det Norske Veritas
EDG	Export Development Guarantee
EPC	Engineering, Procurement, Construction
EPCI	Engineering, Procurement, Construction, Installation
EPCM	Engineering, Procurement, Construction, Management
ERDF	European Regional Development Fund
EU	European Union
FIDIC	International Federation of Consulting Engineers
FLOW	Floating Offshore Wind
FOAK	First of a Kind
GW	Gigawatt
IMCA	International Marine Contractors Association
ITT	Invitation to tender
LCOE	Levelised Cost of Energy
LOGIC	Leading Oil and Gas Industry Competitiveness
MW	Megawatt
MWS	Marine Warranty Surveyor
NatCat	Natural Catastrophe
O&G	Oil and Gas
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
OPEX	Operating Expenditure
OSW	Offshore Wind
PPA	Power Purchase Agreement
SOV	Service Operations Vessel
T&I	Transport and Installation
TCE	The Crown Estate
TLP	Tension Leg Platform
WTG	Wind Turbine Generator

1 Introduction

As we stand on the cusp of a significant ramp-up to industrial scale build out of FLOW, project developers are having to deal with significant risks from the earliest stages of development. The need to secure project finance/ investment requires these projects to be “de-risked”. but does this lead to unintended consequences? Precedent from elsewhere suggests a major issue of risk not being fully dealt with - but instead being pushed down the supply chain. presenting a major challenge to growing a sustainable regional industry capable of delivering FLOW. So, can we look at this in a different way? Are there opportunities that can arise from a different approach?

To start building better understanding, and to identify opportunity areas for further work, the part-ERDF funded Cornwall FLOW Accelerator (led by Celtic Sea Power) delivered a Risk Roundtable, kindly hosted by Burgess Salmon LLP in Bristol on 19th April 2023.

This roundtable brought together experience from the insurance, finance, legal and de-risking industries. The clear agenda was to frankly assess and identify whether there are solutions which better deal with risk in what is a new industry which carries significant exposure, both commercially and technically.

Topics of conversation ranged from;

- What are the key risks facing the industrialisation of FLOW? Is it technology, infrastructure, schedule, consenting, supply chain or something else?
- Does the perception of “risk” trump “actual risk”?
- What will be the most effective contractual approach to risk?
- What is the insurance markets view on actual risk? Are these concerns being addressed by developers, or are the entities with the capability to properly control risk yet to come to the table?
- Is there a role for UK enabling investment in driving risk understanding? For a new industry, which needs new products, processes, systems and infrastructure, how we do raise finance without precluding the innovation, new market entrants and agility essential to be ready to deliver within current timeframes?

This document provides, in note form, the outcomes of those discussions and is designed to act as a resource for stakeholders with an interest in developing solutions underpinned by an understanding of need.

It is worth considering whether these solutions provide opportunities for UK first movers? Can we understand, quantify, control and mitigate risk in such a way as to ensure that we maximise the benefits Floating Offshore Wind to the Celtic Sea region and, by extension, the UK in general?

2 Acknowledgements

All discussions took take place under Chatham House rules; therefore, no individual has been quoted or the source of comments and/ or thoughts has not been explicitly identified.

However, Celtic Sea Power Ltd (on behalf of CFA) would like to extend our thanks to those who gave their time, expertise and enthusiasm to this exercise.

- Michael Bullock, Director, Renewable Risk Associates Ltd.

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- Daniel Stevens, Head of Renewable Energy Engineering, Axis Capital.
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- Dr. Michael Warner, Director, Centre for Local Content Innovation.
- Clément Weber, Founder, Green Giraffe Advisory.

3 Discussion Points

3.1 Top risks and concerns

What are the actual risks associated with FLOW? What are the top five risks currently being considered?

- There are points of concern from Fixed Offshore wind experience which are also of concern with FLOW,
- It is considered that the emphasis on Construction phases and Operational phase needs to be different with FLOW (as opposed to Fixed).
- Insurers' (including oil and gas specialists) risk engineers have a Joint Natural resources Committee, working closely with the World Forum Offshore Wind to describe the (currently wide) range of FLOW risk issues and therefore to prioritise them.

It was noted that the perspective of insurers and project financiers was subtly different, shifting the weight of concern from (a) how to reduce unacceptable/worrying levels of FLOW risks for insurers, to (b) unmitigated risks falling within the risk appetite of project financiers.

Key “pain points” currently under consideration include.

3.1.1 Cables.

- Concerns arising from the number, and scale, of claims related to inter-array cable claims in Fixed wind are impacting risk appetite towards Floating Offshore wind cables,
- A move to Dynamic Cables (for FLOW) may help reduce failure rate (as opposed to static cables operating in a dynamic environment), but there is, as yet, limited data, particularly with regard to long term rates of wear and tear.
- FLOW installation and O&M Standards and industry guidelines is much needed.
- Standards should be included in Project Certification (currently not a mandatory requirement for DNV).
- Cables are currently excluded from project certification, whereas in practice, cable losses are the most frequent cause of claims in offshore renewables.

3.1.2 Moorings (lines and anchor systems).

- Redundancy is key. Continued station keeping sufficient for continued generation/ operation in the event of failure is important. This will be even more critical in the context of floating sub-stations which will represent a key business interruption bottleneck.
- Concerns around sacrificing redundancy for LCOE. Losing the luxury of over-design.

- Increasing loads and the challenges of differing seabed conditions.
- Mooring designs for the operating/ generating condition, but not taking sufficient account of installation/ O&M/ failure. Eg capsize or collision after TLP mooring failure.
- Natural Catastrophe (Nat CAT) marine insurance methods and guidelines updated for FLOW.
- Serial issues – scaling up within cost constraints.
- Too many technology variants, we need standardisation. Can do 'fast', 'cheap' and 'well', but not all three at once. Certification and class society requirements.
- Technology continually evolving and WTG continually scaling up, with each considered by insurers to be, at first, a prototype. Celtic Sea FLOW exhibits multiple risk variables: experimentation/FOAK + increasing technology scale + increasing project size + more extreme adverse weather events + larger physical loads + multiple areas being developed at once.
- What will be the scope of work for the marine warranty surveyor? How many repetitions will need to be attended?
- Class requirement for operations and maintenance will be required. Frequent inspections of subsea components, moorings, cables etc. will be needed. And it is quite conceivable that through life class approval based on such inspections will be required in the event of a tow to port scenario.

3.1.3 Supply Chain constraints

- The lack of port infrastructure for laydown, floater assembly, integration, wet storage.
- Supply chain crunches and concerns around the availability of local capabilities.
- Vessel availability (AHTS's/CTVs/SOVs/ CLV's) for offshore installation, hook-up and commissioning. North Sea oil & gas development back in play and cash-rich, and priority for fixed-bottom wind over FLOW.
- Risk that local content requirements will lead developers to make sub-optimal choices.

3.1.4 Operations.

- Critical question: will maintenance be (a) In situ/offshore or (b) Tow to Port? Very different project cost and insurance risk curves. Clarity on approach is needed much earlier.
- Proper planning for the operational life of the wind farm is crucial. As is condition monitoring, inspection, and spares strategies. To inform strategy choices, risk assessments should be conducted, including on port facilities, vessel availability outside the construction phase, and weather risk in bad weather months.
- Lack of FLOW historic data sets and experience to calculate frequency and severity of insurance events (eg frequency of unscheduled repair events, length of downtime period), leading to higher premiums, less coverage, higher deductibles.
- Therefore, assumptions on risks must be made over the operating life of projects.
- Operational limitations are becoming "baked in" as structures are being designed for the operation condition without sufficient consideration of the installation and O&M requirements.
- What will the role of flag states?
- What will be required in terms of hull/ structural inspections, how will that be achieved (in-water or other). O&M decisions need to be made now.
- Some specialist construction vessels may be very expensive and slow to obtain for unscheduled repairs etc.

3.1.5 Contractual risks

- FLOW combines very different scopes that need tying together contractually, plus each scope is significant proportion of CAPEX (marine industry 20%; construction industry 20%, electrical industry 20% etc.)
- Complex chain of risk 'domino' liabilities for what is essentially a single FLOW system (eg hull failure > mooring line failure > cable failure).
- Current contracts not fit for (FLOW) purpose.
    - FIDIC, though familiar, is an onshore contract and would need to be modified eg for realistic weather windows.
    - LOGIC is designed for hostile offshore North Sea environment and works for different points of supply chain (product supply, heavy plant, offshore services) but carries over-emphasis on pollution liabilities unnecessary for FLOW.
- Lack of long-term contractual commitments for major supply chain components (ports, floaters, cables) sufficient to raise finance.
- Warrantees insufficient due to FLOW uncertainties, with insurance premiums picking up the risk gap.
- Lack of locally anchored EPCIs companies willing to take on contract interface risks and carry liquidated damages.
- Applicability of knock-for-knock insurance arrangements for FLOW technology failure risks.
- Lack of insurance coverage for FLOW in areas of high uncertainty/low predictability.

3.2 Potential areas of mitigation/ solutions discussed

- Leases (TCE ITT#2 technical and Supply Chain Investment Plan or equivalent), subsidy regimes (CfD technical, financial and Supply Chain Plan or equivalent) and other levers of power must include non-price, qualitative metrics as part of the award process, especially supply resilience and redundancy factors, developer pooling/coordination (for integration, floater assembly, early port infrastructure investment).
- There would be benefit in entities (project owners) coming together to drive a commercial club approach, with priority access to locally based vessels through the project life, and potentially also for holding common spares. e.g., floaters, OSW service vessels, redundancy arrangements.
- Examples of similar arrangements are found in the telecoms industry e.g., Atlantic Cables Mutual.
- Call off framework contracts for O&M (particularly mooring and cables).
- Following 1980's era Oil and Gas North Sea procurement strategy - 'Project Partnering', between developers and critical suppliers to protect reliability of supply.

3.3 From a wider investment/ finance perspective.

- There is always the key risk of losing money.
- The perception of risk for financiers is not necessarily the same as insurance industry. The key risk to project financing is that is a project doesn't develop as fast as it could. The availability of project finance is not a bottleneck to speed of project development, but that insurance, ports, grid and acceptable LCOE are.
- It was noted that projects with CfD/PPA, consents, insurance and EPC/ Prime contracts are not difficult to finance.
- However, capital for technology, supply chains and ports is not as easy to come by due to a lack of long term contracts. This is a potential blockage to industry development as it muzzles infrastructure/ supply chain development ahead of need.

- The role of UK export finance as a de-risking mechanism was discussed. This was on the basis that supporting investment ahead of need could support a drive towards “clean and green” businesses exporting (10% of turnover within 4 years) on the basis that involvement in early UK projects builds track record and capability.
- The proposed UK Home Shipbuilding Credit Guarantee scheme could also be an option for de-risking substructure manufacture.
- UK Export Finance products possibly relevant to FLOW, and increasingly more flexible, eg Export Development Guarantee (EDG) requires just 10% of investment in port infrastructure for export, but limited to 5 year term
- Inherent risk should be allocated to the pot of deployed capital where it can be best managed (Insurance, Finance, Equity, State). Currently, we are not “solving” risk but just pushing it around.
- For example; Insurance capital should not be subsiding R&D and/ or paying for Return on Investment. It is there to cover fortuitous losses only.
- The first wave of offshore wind insurance capital were traditional insurers who have been “burned”.
- The second wave of insurance capital are those insurers who have traditionally covered Oil and Gas who are following their O&G clients into the market.

3.4 In terms of current technology.

- FLOW has the particular challenge of the interface between the foundation and the turbine. It is the combined “system” which is considered “proven” after at least 8,000 hours of problem free commercial operation. Using larger turbines on evolved platforms “starts the clock” again.
- However, from a confidence perspective, if a “big” company says that they can make it work, then many in the finance / insurance markets would probably agree.
- Is the drive to bigger turbines necessarily a good thing. Are we not better off setting the standard based on current, proven combinations before ramping up to GW scale?
- From a finance perspective, it is considered a good thing. Increasing capacity from current providers/OEMs is preferred to new entrants.

3.5 Can existing technical, operational, contractual, financial methodologies fully mitigate risk to an acceptable level? Do we need to think differently for FLOW?

3.5.1 In terms of contracting models, how they might translate to FLOW.

- Offshore wind has used both FIDIC (liabilities) and LOGIC (knock-for-knock).
- Moving forward, it is felt that core tier 1 contractors will have more leverage with respect to risk allocation. This is a theme IMCA are currently bringing to prominence. At the same time, insurers are concerned that too much risk is often passed to them.
- The use of multi-contract approaches are tried and tested, although this does increase interface and dispute risk which is a concern to finance.
- This can be mitigated though some form of “wrap”, including EPC(I) contracts. This can be taken on by prime contractors, joint ventures, and possibly alliance structures however a single, responsible entity bearing all risk is the least “risky” option for finance. This has considerable merit. But this concept is not straightforward to get off the ground with the first projects and may require an element of public "facilitation”.
- There is a very limited availability of insurer reinsurance for EPCI wraps, but it is understood that this does not yet extend to FLOW given the lack of experience to

date. It was noted that the experience of EPCI in fixed wind was that gaps and interface issues were very apparent.

- This may not necessarily deal with the reduction of actual risk, which is best allocated to the entity best placed to manage it.
- For FLOW, there are a number of specific issues;
    - There is no holistic approach to O&M with turbine, foundation and balance of plant warranties sitting with different contractors,
    - Could a vertically integrated approach, with turbines and foundations considered a “whole” system work to overcome this problem?
    - Turbine OEM’s highly unlikely to take on foundation risk, foundation designers not placed to take on turbine warranties, design risk shall need to be pushed on to construction contractor (in opinion of some).
    - Could a full digital twin of the entire offshore wind farm be helpful?
    - The fairness of imposing long term defect risk was questioned.
- Could supplying components as a service be a solution? Selling hours/ uptime/ redundancy as opposed to assets, eg vessels + maintenance service contract?
    - Consider mutual service agreements to maximise asset deployment (support vessels, cable lay)
    - This could necessitate a move from project finance (infrastructure finance at 6%) to asset finance (corporate finance at 10%).
    - This would have a significant impact on LCOE.
- There was general agreement that once you are at GW scale deployments, utilising a spare, mobilised turbine to change in/ out for planned/ unplanned maintenance would reduce loss of yield associated with O&M.
- The use of “club” or “mutualised” approach to the O&M of moorings and cable elements (subsea), has merit.
- Such a concept could be the driver for long term vessel charter or purchase to reduce weather and spot price volatility.
- Following 1980’s era Oil and Gas North Sea procurement strategy - 'Project Partnering', between developers and critical suppliers to protect reliability of supply. Importance of Contracting Strategy value drivers being specific to managing FLOW risks, eg optimal contact interfaces, EPCI wrapper, EPCm (management of local sub-contracts/ports).

3.5.2 Supply Chain Crunches

- It would be useful to develop a model mapping key port, steel, concrete, vessel requirements against global pipeline.
- This could be used to “red flag” areas where there are key gaps.
- It could also be used to examine the impact of designing to local.
- Treat WTG/floater/moorings/anchors/cables as a single FLOW ‘system’ to be insured.
- Digital twins (4D models of FLOW project from design, through construction and operations) increasing predictability and mitigation of risks.
- Design-for-local, eg wet-storage temporary anchoring of floaters designed to fit port capacity, eg Falmouth, Port Talbot, Milford Haven.