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MISSING MIDDLE

BUILDING CORNWALL'S FLOATING OFFSHORE WIND INDUSTRY

CIOS LEP

A CORNWALL COUNCIL COMPANY

CONTENTS

1 EXECUTIVE SUMMARY

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1.1 CELTIC SEA FLOW OPPORTUNITY

The pipeline of floating offshore wind (FLOW) projects in the Celtic Sea is now one of the three largest in the world. The Crown Estate's (TCE) plan[1] is that over 4.5GW of floating offshore wind (FLOW) capacity be deployed in the Celtic Sea by 2035, and a further 12GW by 2045. The associated total investment, of over £100Bn, represents the single largest economic development opportunity in the Celtic Sea region for decades. The key to maximising the associated regional economic benefits will be to maximise regional work capture, routinely described as local content.

Britain's local content track record has been disappointing, with less than half of British offshore wind farm works captured by British-based businesses. **It seems clear, on the basis of the historical evidence, that the conventional British policy intervention paradigm of developing 'supply chain readiness' through support for small and medium enterprises (SME) has not worked. This poor performance may also be due in part to a lack of synchronised policy working by national and regional government entities**. Furthermore, with the Celtic Sea region at the start of its FLOW industrialisation journey, there is an inevitable gap between, on the one hand the industrial requirements of the future FLOW projects and, on the other hand, the Celtic Sea region's current industrial capacity, comprised of its ports, grid, companies and workforce.

This report seeks to address these issues. The title **Missing Middle** has been chosen for two reasons. First, it accurately describes the gap in industrial capacity. Second, it describes what we judge, on the basis of the study's evidence, to be the missing connection between, on the one hand national policy planning and, on the other hand regional industrial development: in particular, the lack of a comprehensive integrated package of policy interventions designed to match the future demand for components and services in Celtic Sea FLOW projects to the regional industry's capabilities, capacity, and competitiveness, and thus its ability to meet this demand.

Our analysis suggests there is a compelling case for coordinated policy planning & action to: fill these Missing Middle gaps; deliver a step change in the region's industrial capacity; provide the industry with the best opportunity to win significant FLOW contracts; maximise the regional economic development and job creation opportunities. With such changes, we judge the Celtic Sea region has the potential to become a world-leader in the global FLOW market.

The key to maximising the associated regional economic benefits will be to maximise regional work capture

1 https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2023-the-crown-estate-refines-plans-for-celtic-sea-floating-wind/

1.2 POLICY – CHANGES IN THE INTERNATIONAL POLICY LANDSCAPE

In recent months, we have seen a noticeable shift in the international legal norms relating to offshore wind and local content. For example, under the US's Biden-Harris Inflation Reduction Act (IRA) and under the EU's Green Deal, Net Zero Industry Act and new EU guidelines on State Aid, new interpretations of WTO obligations are emerging that use exemptions to preference domestic content. For the UK offshore wind sector, the associated risk is that the British government inadvertently diverges from this new international policy playbook, which is embracing a more flexible interpretation of trade and investment rules.

The consequent danger is that Britain falls behind other countries, both in framing similar degrees of legal room for manoeuvre for policy makers, and in the design by these policymakers of instruments and measures to drive investments into local supply chains and build skilled workforces. To avoid this trap, we recommend adopting a set of policy principles for the design of all national and regional policy interventions to support the growth of the Celtic Sea FLOW industry.

Foremost amongst these is the principle of 'policy parity', which draws on Pillar 3 of the EU Green Industrial Plan, and the intention therein to *"to match the aid received for similar projects by competitors located outside of the EU while ensuring the proportionality of such aid"*. This will ensure we avoid over-reacting to the recent success of EU's challenge on UK content in CfD AR4[2], which preceded the US IRA. Instead, we should follow the EU's lead in achieving 'parity' with US on the extent of subsidies and support for green industrial growth in offshore wind. **In short, the US Inflation Reduction Act has largely redefined, and widened, the legal room for manoeuvre around government support for green industrial growth in renewables. British policymakers and civil servants, and their lawyers, can and should adapt to this new international policy context**.

1.3 CORNWALL FLOW CAPACITY BUILDING: 'MISSING MIDDLE'

With the Celtic Sea FLOW market now well established and in the light of these changes in the policy landscape, Cornwall & Isles of Scilly Local Enterprise Partnership (CIOSLEP) has commissioned Celtic Sea Power to consider how to maximise FLOW's economic development opportunities. As the lead authors of this report, **Celtic Sea Power judges that Cornwall's economic development benefits will be maximised only if the Celtic Sea region's[3] economic development benefits are maximised; thus the Missing Middle analysis has been undertaken at two levels, for the Celtic Sea region and the Cornwall sub-region**.

A full description of the methodology is at Section 3.4 below but, in short, our analysis has been undertaken using economic and project task modelling together with policy analysis, review and selection.

A 'Business as Usual' scenario, drawn from earlier supply chain analyses, has been developed as a baseline, and three alternative scenarios of increasing ambition – termed 'Essential', 'Realistic' and 'Ambitious' – then used to assess the economic benefits of increasing local work capture. Conventional and innovative policy options have been reviewed to derive a suite of policy interventions, if you like a "policy toolkit". From this, "best bet" policy interventions have been selected for each scenario and grouped in 'Policy Packages'; and the economic benefits associated with each package modelled, calculated and summarised. Finally, an executive governance framework, based on a Cornwall FLOW Commission, is offered as an interim basis for devolved regional oversight and direction of coordinated policy programmes.

Note finally that the bulk of the analysis was undertaken prior to The Crown Estate's (TCE) recent announcement of a change in the forthcoming seabed leasing round, from 4 x 1.0GW projects totalling 4.0GW to 3 x 1.5GW projects totalling 4.5GW. The report's analysis thus uses the earlier 4.0GW target, which in turn means that its economic development, GVA and job creation forecast benefits are conservative.

2 Contracts for Difference Allocation Round 4

3 The Celtic Sea region is defined as the area encompassing the Great South West (Cornwall, Devon, Somerset and Dorset), South Wales (including the Swansea Bay and Cardiff Bay City Regions and the West of England Combined Authority)

1.4 ESSENTIAL CAPTURE – "NEED TO HAVE"

The Essential – "Need to Have" scenario is based on the minimum regional investment judged necessary to meet TCE's timelines of 4.0GW by 2035.

Principal targets (with associated policy interventions) are:

- **Development & Consenting Services** (Celtic Sea 52%, Cornwall 26%) – targeted using fair procurement including in Seabed leasing auctions (SLA) & Contracts for Difference (CFD).
- **Port & Logistics Activities** (Celtic Sea 80%, Cornwall – 40%) – targeted using updated and SLA/CfD and FLOWMIS[4], Government-backed finance, and devolved power Investment.
- **Foundation Manufacture & Assembly** (Celtic Sea 10%, Cornwall 0%) – targeted using SLA/CFD non-price factors adjustments.
- **Vessels & Subsea Construction** (Celtic Sea 88%, Cornwall – 44%) – targeted using SLA/CFD adjustments, fiscal incentives, and the Home Shipbuilding Credit Guarantee Scheme.
- **Electrical infrastructure** (Celtic Sea 36%, Cornwall – 0%) – targeted using SLA/CFD adjustments.
- **Operations & Maintenance expenditure @ 25 years** (Celtic Sea 37.8%, Cornwall 17.9%) – targeted using SLA/CFD non-price factors and promotion of British Business Bank products.

If the Essential capture targets are achieved, our models forecast that at least 24% of total lifetime expenditure will land in the Celtic Sea region and 10% in the Cornwall sub-region.

This would deliver an additional £661M GVA and additional jobs peak, in the early 2030s, of 3,600.

1.5 REALISTIC CAPTURE – "WANT TO HAVE"

The Realistic – "Want to Have" scenario is based on the minimum regional investment judged necessary to deliver targets considered realistic for the region to capture, in the light of its actual and potential industrial capability.

Principal targets (with associated policy interventions) are:

- **Development & Consenting Services** (Celtic Sea 75%, Cornwall 37.5%) – targeted using SLA incentives for regional domiciling of a large anchor project developer(s).
- **Foundation Manufacture & Assembly** (Celtic Sea 80%, Cornwall 8%) – targeted using further adjustments to FLOWMIS and SLA/CFD, UK Infrastructure Bank & TCE direct investments and HMG forward order underwriting.
- **Moorings Manufacture** (Celtic Sea 88%, Cornwall – 44%) – targeted using a FLOW Balance of Plant Manufacturing Investment Scheme (FLOW-BoPMIS).
- **Electrical Infrastructure** (Celtic Sea 36%, Cornwall – 18%) – targeted using SLA/CFD adjustments.
- **Operations & Maintenance @ 25 years** (Celtic Sea 37.8%, Cornwall 17.9%) – targeted using SLA/CFD non-price factors and regional promotion of British Business Bank products.

If the Realistic capture targets are achieved, our models forecast that at least 41% of total lifetime expenditure will land in the Celtic Sea region and 14% in the Cornwall sub-region.

This would deliver an additional £914M GVA and additional jobs peak, in the early 2030s, of 5,100.

4 Floating Offshore Wind Manufacturing & Investment Scheme.

1.6 AMBITIOUS CAPTURE – "LIKE TO HAVE"

The Ambitious – "Like to Have" scenario is based on the minimum regional investment judged necessary to deliver targets that, if achieved, would meet the OWSD Sector deal national target of 60%.

The principal targets (with associated policy interventions) are:

- **Foundation Manufacture & Assembly** (Celtic Sea 100%, Cornwall 40%) – targeted using incentives to regional locate: steel foundation fabricator, supported by a DBT/UK Export Finance High Value Proposition; international EPCm contractor(s), supported by an OWIC-led[5] model contracts initiative.
- **WTG Component Manufacture** (Celtic Sea 40%, Cornwall 0%) – targeted using an updated OWMIS scheme, in three regional tranches (Celtic Sea, NE England, Scotland).
- **Electrical Infrastructure** (Celtic Sea 87%, Cornwall 18%) – targeted using FLOW-BoPMIS and development of a DBT/Office of Investment High Value Proposition.
- **Operations & Maintenance @ 25 years** (Celtic Sea 38.2%, Cornwall 21.3%) – targeted through domiciliation of an international EPCm contractor(s) and regional support programmes.

If the Ambitious targets are achieved, our models forecasts that at least 60% of total lifetime expenditure will land in the Celtic Sea region and 22% in the Cornwall sub-region.

This would deliver an additional £1.39B GVA and additional jobs peak, in the early 2030s, of 7,900.

1.7 POLICY – PRINCIPLES FOR POLICY DESIGN AND COORDINATION

In the light the recent changes in the international policy landscape and the historical evidence from the last decade or so of British offshore wind development, we judge that **the best way to obtain the very significant potential benefits set out at Sections 1.4, 1.5 and 1.6 will be to formulate a policy intervention strategy, with an associated regional plan, based around 5 core policy principles:**

A COORDINATED POLICY PLANNING

To develop policy programmes that explicitly use policy levers from across national and regional government in an integrated and chronological way to achieve regional industrial development goals.

B POLICY PARITY

To judge British government interventions against the new international policy context, in particular the new US subsidy and leasing regimes and the EU's internal adjustments to state aid, even if these are not yet reflected in revisions to our trading agreements.

C POLICY ROOM FOR MANOEUVRE

To take advantage of the policy flexibility provided under international trade and investment rules to support economically disadvantaged areas – such as Cornwall, South Wales and West Devon, and mitigate supply bottlenecks that compromise Net Zero targets.

D BENEFITS OF DESIGN-TO-LOCAL

To facilitate developers and private financiers to design projects and financing plans to take advantage of the inherent advantages of regionally-located suppliers and infrastructure, including:

i. **Commercial Benefits** – for example, reductions in insurance costs and de-risking of project delivery.

ii. **Going-Local Benefits** – for example, minimising CO2 emissions across the project life cycle, including in logistics, low carbon materials & components, and low carbon O&M services.

5 Offshore Wind Industry Council

E REGIONALLY DEVOLVED POLICY DIRECTION AND EXECUTION

To devolve the direction of the coordinated policy programmes to empowered regional government entities, supported by the appropriate Whitehall departments.

Whilst we are clear that such an approach will not be sufficient to deliver the posited benefits, we do believe it is necessary if we are to achieve better economic benefits than heretofore; and indeed essential if we are to hit HMG's Celtic Sea FLOW deployment target timelines from now to 2035.

1.8 INTERIM GOVERNANCE – CORNWALL FLOW COMMISSION

The associated policy packages at Section 1.4, 1.5 and 1.6 above are designed as integrated wholes, rather than for cherry-picking. As is reflected in Principles A and E above, we believe that **the chances of success will be maximised if the design, agreement, authorisation, and execution of the different policy interventions is coordinated between the relevant policy owners, and direction is devolved to the Celtic Sea region**. There are a number of national and regional fora with interests in some of the policy areas but no single regional body that encompasses the whole or is adequately resourced to guide their execution.

There is, though, in prospect the Cornwall FLOW Commission, which could undertake this role on an interim basis:

- **Cornwall Devolution Deal** – the county's Level 2 Devolution Deal, announced in November 2023, will include a Cornwall FLOW Commission.
- **Cornwall Strategic Sectors** – Cornwall's Shared Prosperity Fund (SPF) includes allocations for the county's Strategic Sectors[6], within which a bid to create a funded Cornwall FLOW Commission has been approved.

In the event that Cornwall's Devolution Deal is authorised, then a Cornwall Council-led, DESNZ-supported and SPF-resourced Cornwall FLOW Commission would be able convene, and could be the interim entity able to take forward, coordinating policy planning & action.

We are, though, clear that – following Principle E above – it would be essential for the formal regional directing entity to be comprised of regional government bodies from across Celtic Sea, and perhaps take the ultimate form of a Celtic Sea FLOW Commission, rather than a Cornwall FLOW Commission.

However, pending such developments, If the coordinated policy planning approach is supported, then we can see no reason why the Cornwall FLOW Commission, working with the Celtic Sea Cluster partners, could not act as the secretariat and engine room for the execution of the Missing Middle approach across the Celtic Sea, pending creation of a more permanent devolved governance body.

5 FLOW, Critical Minerals, Space & Data, Food Systems.

1.9 CONCLUSIONS & RECOMMENDATIONS

CONCLUSIONS

As far as we are aware, the industrial development approach suggested above is new, at least in the offshore wind and offshore renewables industry, and is different in three respects:

- **Targeted Policy Planning** – it proposes the use of targeted, synchronised & integrated policy interventions to achieve industry-specific regional industry development targets.
- **Coordinated Policy Action** – it proposes the coordinated design and execution of these interventions, with the potential that the policy whole and the resulting intervention benefits are greater than the sum of the parts, as would be the financial value-for-money leverage.
- **Devolved Policy Execution** – it proposes that leadership for the execution of regional industrial development lies in the Celtic Sea region, within a regional governing entity.

As such, these proposals, with the prospect of coordinated policy planning & action, could represent a step change in how British offshore wind industrial development is undertaken.

RECOMMENDATIONS

To take the findings of this report forward, we make the following recommendations:

1 CORNWALL POLICY ACTION

That the advantages of the report's 5 policy principles (Section 1.7) be noted, integrated into the future work of the Cornwall FLOW Commission, and provide the foundation for Cornwall's future regional and national policy engagement.

2 CELTIC SEA CLUSTER POLICY INTEGRATION

That the report be shared and discussed with Celtic Sea Cluster colleagues, including:

a **Celtic Sea Cluster Regional Strategy** – representing Cornwall's contribution to the Celtic Sea FLOW Regional Strategy review, due in Q1-24.

b **Celtic Sea Missing Middle** – providing a basis for future discussion with Celtic Sea Cluster colleagues on potential follow-on works to take the Missing Middle approach to all Celtic Sea sub-regions.

3 NATIONAL POLICY ENGAGEMENT

That the report:

a **SofS DESNZ** – be formally submitted by CIOSLEP to SofS DESNZ and copied to relevant Whitehall departments and other national entities.

b **Future Policy Design** – provide the foundation for Cornwall's future policy engagement with Whitehall and the other national entities involved in the design, development, and deployment of policy interventions in support of the Celtic Sea FLOW industry.

2
CELTIC SEA FLOW OPPORTUNITY

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2.1 BACKGROUND

The Celtic Sea region comprises the four counties of the Great South West (Cornwall, Devon, Somerset, Dorset), South Wales (Pembrokeshire, Carmarthen, Glamorgan, Monmouthshire) and West of England Combined Authority (WECA) (Bristol, South Gloucestershire, and Bath and North East Somerset). All are either represented in, or have been invited to join, the Celtic Sea Cluster, whose activities are being guided by the Celtic Sea FLOW Regional Strategy[7], published in November 2022.

After 4 years of policy engagement and market creation activity, the Celtic Sea is now established as one of the world's largest FLOW pipelines. The key pipeline projects, in time order, are:

- **2025/26** – build-out of the 32MW Twin Hub Test & Demonstration project, at Hayle, which secured a CfD in 2022.
- **2026/28** – build-out of 396MW of Test & Demonstration projects[8], comprising Erebus, Llŷr 1 and Llyr 2, and White Cross, which will most likely be bidding for CfDs in 2024/25.
- **2029-2035** – build-out of over 4.0GW of Commercial Projects, with Agreements for Lease (AfL) being auctioned in 2024/25.
- **2036-2045** – signposts for a further 20.0GW of Commercial Projects, to be installed by 2045.

The region's focus has thus shifted to regional activities that either accelerate FLOW industrialisation or maximise FLOW's regional economic development benefits or both.

2.2 LOCAL CONTENT IN BRITISH OFFSHORE WIND FARMS

The British offshore wind sector's local content record has been less than stellar. An oft-quoted figure is that British companies have captured 42% of the works on British windfarms. This notwithstanding an agreed government-industry local content target in the Offshore Wind Sector Deal of 60%.

The reasons for this British shortfall are complex, and beyond the scope of this report, but an important culprit appears to be a lack of policy coherence across the numerous public sector institutions, national and regional, who are working in support of the offshore wind industry. The policy architecture that has built up to support offshore wind is the result of organic evolution over the last 15 or so years. There is no evidence of a policy system of systems, through which to maximise policy impact and maximise the policy leverage of different public sector support measures.

THE AGREED GOVERNMENT-INDUSTRY TARGET FOR LOCAL CONTENT

7 celticseacluster.com/resources/celtic-sea-regional-strategy-launched-november-2022
8 www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/floating-offshore-wind/test-and-demonstration-projects-for-floating-wind

2.3 HISTORICAL POLICY SUPPORT FOR CELTIC SEA FLOW

This lack of a policy system-of-systems approach appears to manifest itself in the early policy development years of Celtic Sea FLOW. CIOSLEP and Cornwall Council began policy engagement in 2018 to make sure a regional FLOW market was established. This in turn required: first, a growing pipeline of FLOW lease opportunities; second, a FLOW-focused Contracts for Difference mechanism. Both were in place by 2022, but only after a circuitous policy journey, the detail of which is instructive:

- **2018-19 – South West Marine Area Plan** – there was extensive engagement by Cornish FLOW professionals in the Marine Management Organisation's (MMO) South West Marine Area Planning process. Despite this, when the first draft plan was issued, the waters allocated were for areas of least constraint for **fixed** offshore wind, rather than floating technologies. Fortunately the region was able, with the support of the Offshore Renewable Energy Catapult (OREC), to correct this mistake.
- **2019-20 – Wave Hub Section 36 Consent** – to develop the region's first project for the FLOW pipeline, Section 36 consent was sought from the MMO for conversion of the Wave Hub project, off Hayle, from Wave Energy to FLOW. The only substantive government objection to this conversion came from MoD, who argued that the impact of 4 wind turbines located in a 2km by 4km area off the Cornish coast would have a substantive impact on MoD's Portreath radar performance, and thus on Britain's Air Defence. Celtic Sea Power's team included former naval aviators working to secure the consent, who could see minimal – if indeed any – strategic or operational logic in the objection, but it was nevertheless necessary to engage with MoD at Secretary of State (SofS) level to shift MoD's position.
- **2021 – CFD Round 4** – to help create the Celtic Sea project pipeline, Cornwall Council divested the Wave Hub site to Hexicon, a FLOW technology developer. But immediately after this divestment, the CFD Round 4 competition design worked counter to the region's interests. Whilst there was a welcome ring fence for FLOW projects, it was insufficient to meet the needs of only two British project developers eligible to apply: Hexicon, with the Wave Hub site; and EDF Renewables UK & Ireland with a FLOW extension to their Blyth conventional offshore wind site. The informal feedback was that BEIS wished to introduce some 'competitive tension', but the effect was to establish a competition between: on the one hand, Hexicon (a small technology developer) supported by Cornwall with an as-yet nascent offshore wind infrastructure; on the other hand, EDF Renewables UK & Ireland (a large multi-national developing a test & demonstration project) supported by the North East with sophisticated offshore wind infrastructure and industry. In the event, the region made representations, through a Ministerial Submission to SofS BEIS and Hexicon were successful, albeit by bidding a strike price that most of the follow-on Celtic Sea project developers think unrealistically low for follow-on CFD applications.
- **2022 – National Grid OTNR** – to help make Britain's approach to offshore wind projects' export cable landing more coherent, Celtic Sea Power's Pembrokeshire team were developing, under the auspices of the Pembrokeshire Demonstration Zone (PDZ) project and with the full support of both the Welsh Government and the Swansea Bay City region, pre-front end engineering (FEED)[9] designs for a Multi-connection Offshore Substation, with the potential to host all 4 of the Celtic Sea FLOW test and demonstration (T&D) projects. And, in the process, developing significant insight into the advantages of coordinated grid solutions. Despite this expertise and despite the work being undertaken by regional public sector entities using regional economic development public sector funding, the PDZ team were initially barred by National Grid ESO from their Holistic Network Design Follow Up Exercise (HNDFUE) and Offshore Transmission Network Review (OTNR) forum – which, as a result, were not provided technically competent regional government input. This situation has very recently been resolved, but largely because of personal engagement by the region with National Grid ESO at Board level.

9 Front End Engineering Design

- **2023 – CFD Non-Price Factors** – Call for Evidence – in early 2023, DESNZ issued a Call for Evidence to consider how Non-Price Factors might be used in future CFD rounds. In concert with Celtic Sea Cluster colleagues, and supported by local content specialist sub-contractors, Celtic Sea Power responded to this Call for Evidence in the usual way. However, what is distinctive about this consultative process is that there is no statutory requirement, nor is it customary practice for DESNZ, to consult with regional government. This notwithstanding that regional government is better placed than Whitehall to understand its own regional needs, and to thus help shape the CFD in a way that helps best meets these needs.
- **2023 – Offshore Wind Leasing Round 5** – in Jul 23, TCE issued a formal update to developers on the developing shape of the Offshore Wind Leasing Round 5 competition. In a similar way to the CFD Non-Price Factors Call for Evidence, regional government was not invited to this update and had not been involved in the design of this or any proceeding rounds. This despite the fact that developing the Celtic Sea region's industry was purportedly a central design factor for the competition, and that regional government is again likely better placed than TCE to understand its own regions' industry and its needs, and thus better placed to shape the competition in a way that best meets these needs.

Our intention, in recording these institutional obstacles and policy oddities, is not to criticise any of the cited departments or institutions, nor their staff, almost all of whom we judge to have been working with clear positive intent. Rather it is to demonstrate that:

- **Existing Policy Straitjacket** – all are operating in a very constrained policy and regulatory framework, which limits their capacity for integrated action.
- **No Policy Planning Capacity** – there is no evidence of an overarching national-regional policy planning capacity nor policy systems-of-systems. This in turn limits government's capacity for integrated cross departmental and regional working in pursuit of a common aim.
- **Limited Regional Government Involvement** – the customary involvement of regions is limited and there is no statutory requirement for regions be involved in policy design or even statutorily consulted on matters that critically impact their regions' economic development.

There are, in our opinion, a number of reasons why Britain has failed to improve on its offshore wind local content targets, and reap the associated economic development and jobs creation benefits. Unlike many of Britain's North Sea oil & gas companies, Benelux marine civil engineering contractors were quick to hit the price points that offshore wind required. Large British engineering companies showed little early interest in the manufacture of offshore wind turbines. And the City was, on occasion, risk averse on offshore wind. But we believe that the systemic lack of integrated policy planning and action has also played a central part in this failure.

It does not follow that better integrated policy will solve the problem. Nevertheless, we judge it essential if we are to: improve on the status quo; have any chance to meet the Offshore Wind Sector Deal target of 60% British content; maximise the economic development and job creation opportunities for the whole of the Celtic Sea region.

The Missing Middle work rests on this core judgement, and the report sets out the framework, developed in workshops with supporting research, to: first, guide a systems approach to coordinated policy planning and action; second, to provide a suite of substantive proposed policy interventions to help meet the report's scenario targets.

3

CORNWALL FLOW CAPACITY BUILDING: 'MISSING MIDDLE'

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3.1 OVERVIEW

The Celtic Sea region does not yet have in place the industrial ecosystem – ports, grid, regional companies, workforce, commercialized innovation – needed to build out over 4GW FLOW projects, starting in the late 2020s.

To understand how such an industrial ecosystem could be built in time to meet TCE's timelines, the Missing Middle project is: led by Celtic Sea Power (whose expertise is in all aspects of offshore renewables); supported by two sub-contractors, the Centre for Local Content Innovation (whose expertise is in the use of policy interventions to maximize local content) and Moor Economics (whose expertise is in the regional economic development analysis).

3.2 REGIONAL PRIORITIES

Cornwall's execution of the Celtic Sea FLOW Regional Strategy is being led by Celtic Sea Power (CSP), whose primary FLOW development activities for FY23/24 are:

1 ACCELERATING OFFSHORE DEVELOPMENT

Working to streamline the offshore development process, in particular to reduce the time it takes to develop, install, and operate Celtic Sea FLOW farms and thus accelerate the supply chain development and socio-economic benefits through so doing.

2 DEVELOPING INDUSTRY LONG-LEAD COMPONENTS

Growing the long-lead industry components needed to maximise local, regional, and national work content in the 4GW projects that will begin construction in the late 2020s. Long lead components include, but are not limited to:

a. **Ports – supporting the development of:** maritime ports with fabrication, assembly, integration, installation, or operations & maintenance (O&M) potential; shipyards with construction and assembly or construction and assembly potential; airports with installation support and O&M potential.

b. **Grid – supporting the electrical design and development work of the regional grid, through:** first, applied R&D on the offshore and onshore transmission network; second, engagement with the National Grid's Offshore Transmission Network Review and Holistic Network Design Follow Up Exercise (HNDFUE); third, engagement with Western Power Distribution's development of the Cornish distribution network.

c. **Companies** – supporting the growth of local companies with the capability, capacity and competitiveness needed to maximise local work capture.

d. **Workforce** – supporting the growth of the regional workforce, through: regional workforce demand modelling and analysis; regional workforce supply engagement and provision, in particular through engagement with HE/FE institutions and guidance to regional workforce supply initiatives.

3 LOCAL AREA ENERGY SUPPORT

Supporting Cornwall's broader onshore energy transition, net zero and energy security activities, through developing a better understand of how the county's energy demand needs can be matched with FLOW's energy supply potential.

The 'Missing Middle' project provides the opportunity to review national and regional policy interventions in support of these three priority areas. The term Missing Middle was chosen, and is used, as a shorthand for what the authors judge, on the basis of the study's evidence, to be a missing connection between, on the one hand national policy planning and, on the other hand regional industrial development: in particular, the lack of a comprehensive package of policy interventions deigned to join together the demand of planned FLOW projects for components and services, with the regional industrial capabilities, capacity and competitiveness to supply these inputs.

The study considers how extant and innovative policy interventions might be evolved to increase local works capture and, thus, maximise FLOW's regional and sub-regional benefits. Although Missing Middle is Cornwall funded and focused, the project's methods are widely applicable, throughout the Celtic Sea region, its sub-regions and counties, including for the Great South West, South Wales, and West of England Combined Authority.

3.3 PROJECT OBJECTIVES

The project's fundamental premiss is that, to maximise local work capture, the region needs to secure front-loaded investment to build the FLOW industrial capacity ecosystem ahead of time and thus have it ready in time for build-out of over 4.0GW of FLOW projects by 2035. The project's overarching aim is to understand how this might be done.

3.4 METHODOLOGY OVERVIEW

The project's analysis has 5 primary steps:

- **Economic Modelling, Metrics & Project Taxonomy** – earlier regional and national offshore wind studies are used to develop a project taxonomy. Two models, the first economic and the second workforce, are developed to calculate the regional and sub-regional benefits of increasing local work capture.
- **Works Targets & Scenarios Analysis** – for comparative purposes, a base case is established from a previous Celtic Sea supply chain study. Drawing on the study taxonomy, the potential FLOW work packages where the Celtic Sea region and/or Cornwall could successfully compete for works contracts, either because of existing/potential industrial or for reasons of geography, are reviewed. Using local industry knowledge and professional judgement, target sets are then developed and collected into 3 scenarios of increasing work capture ambition:

  Base Case – "Do Nothing" – assumes that sector development is left to extant policy mechanisms and global and regional market forces.

  Essential – "Need to Capture" – the scenario comprises targets judged essential for the region to meet TCE pipeline schedules of over 4.0GW installed by 2035.

  Realistic – "Want to Capture" – the scenario comprises targets judged realistic for the region to capture, in the light of its actual and potential industrial capability.

  Ambitious – "Like to Capture" – the scenario comprises targets that, if achieved, meet the OWSD Sector deal national target of 60%.

- **Regional Benefits** – the consequent economic development benefits that would result if these targets are achieved are calculated, with the results collected and aggregated in the 3 scenarios, using: primary spend; Gross Value Added (GVA); primary job numbers.
- **Policy Interventions** – conventional and innovative policy interventions are reviewed and summarised. Conventional market-regulatory interventions such as Seabed lease auctions and Contracts For Difference (CfD) are described, as are regional interventions, such as targeted regional grant funding. Innovative interventions, drawing amongst other things from international best-practice and including innovative commercial interventions, such as preferred collaborative and consortia contract models, are also reviewed. Taken together, the conventional and innovative interventions provide a suite of policy Interventions – if you like, a policy toolkit – upon which to draw in the follow-on analysis. For each scenario, "best bet" policy interventions are then selected to maximise the chances of achieving the individual targets within each of the scenarios, and then organised into Essential, Realistic and Ambitious scenario 'Policy Packages'.
- **Governance & Cornwall FLOW Commission** – finally, a preliminary governance framework is set out, centred initially on a Cornwall FLOW Commission, as a mechanism to deliver the coordinated policy planning & action, followed by associated Conclusions & Recommendations.

The report follows the structure of this project approach, but with two key exceptions:

- **Work Capture Targets & Policy Interventions** – in each scenario, the detail of each work capture target is presented with its associated policy intervention to allow the reader to see the linkage between policy interventions and the potential economic development benefits.
- **Regional & Sub-Regional Benefits** – although the economic benefits analysis was undertaken before the policy packages were developed, the overall scenario benefits are presented at the end of each scenarios, so that the reader can understand overall benefits, were each of the target scenarios to be met, including through executing the policy package[10].

The Missing Middle works will also inform the standing up, by Celtic Sea Power, of a Cornwall FLOW Commission, and related CSP-initiatives such as Zonal Planning, which is considering options for streamlining and improving offshore development processes for the Celtic Sea FLOW region.

3.5 PROJECT OUTPUTS:

The primary outputs of the Missing Middle project are:

- **Report** – including:
  Agreed Taxonomy.
  Improved Economic & Workforce Models.
- **Future Works Direction** – including for:
  Cornwall FLOW Commission.
  Celtic Sea Cluster Regional Strategy Review.
  Future Applied R&D.
- **Future Investment Direction** – including for:
  Cornwall Shared Prosperity Funding.
  Cornwall Good Growth support activities.
  Cornwall & Isles of Scilly Investment Fund.

We also consider that the approach recommended for Cornwall potentially has wider utility: first, within the other Celtic Sea FLOW sub-regions; second, in other British offshore wind regions.

10 Note that it does not follow that, if a policy package is executed, then the benefits will accrue. Rather, it is the authors' judgement that the associated policy measures provide the best chance of success in meeting the scenario targets.

4
ECONOMIC MODELS & SECTOR METRICS

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4.1 INTRODUCTION

Our analysis includes the use of economic and workforce models of the Celtic Sea and Cornwall FLOW industrial ecosystems to understand the potential economic benefits of different sets of policy interventions. Notwithstanding that the report's focus is on Cornwall, we have necessarily modelled the whole of Celtic Sea FLOW industrial ecosystem, to understand the overall scale and timing of the market, compare the capabilities of the different sub-regions, and then make realistic professional judgements about potential Celtic Sea local content targets, and Cornish targets as a target subset.

4.2 PROJECT TAXONOMY

The analysis requires a defined taxonomy of the different project work packages, the basis of which is set out at Table 1 below, with a more detailed breakdown and glossary at Annex A.

Table 1 - Project Taxonomy

Target Areas	Sub-Components/Work Packages
Development & Consenting	Project Development, certification, consultancy services (design, environmental, legal), surveys
Substructure	Steel sub-structure fabrication, concrete sub-structure manufacture & fabrication, secondary steel fabrication
Wind Turbine	Blades, tower, nacelle, transition piece
Anchors	Drag embedded, suction, drilled/driven
Mooring Lines	Chain fabrication, synthetic line manufacture
Array Cables	Inter array cables
Electrical Infrastructure	Manufacture of export & dynamic array cables, offshore sub-station (fabrication of jacket, topsides and installation), onshore sub-station & civil works
Ports & Logistics	Integration, installation, wet & dry temporary storage, vessels load out of foundations & integrated platforms
Vessels and Subsea Engineering	Anchors & mooring lines installation, turbine assembly (towing & hook up), array cable installation, offshore sub-station installation, offshore export cable installation
Other capex	
O&M Offshore	Services for minor offshore repairs; re-supply, maintenance, and repair of offshore service vessels (OSVs); helicopter services; services for inspection drones, autonomous surface vessels, personnel agencies providing technicians and other skilled labour
O&M Onshore	Operations control and site offices, contractor office, equipment and spare parts storage
O&M Other	Crown Estate seabed leasing charges, National Grid use of system charges

The original taxonomy was based on the approaches used in a BEIS-commissioned BVG 2015 Study[11] and a CIOSLEP & Welsh Government-commissioned Supply Chain Report (OREC, 2020[12]), then adapted by the study team to reflect current industry practice.

4.3 PROJECT PHASES

As is the case with all offshore wind installations, the projects are classically broken into primary project phases: consenting and development; procurement; construction; installation; operations & maintenance (O&M); decommissioning. The relationship between these phases and the work packages at Table 1 is show in Table 2 below.

Table 2 - FLOW Project Phases

Project Development & Engineering	Covers activities required to get the project to financial close/FID. This includes activities to secure planning and environmental consents, as well as FEED to define the design and engineering aspects.	Includes: development and consenting services, seabed leasing, marine licencing, environmental surveys, resource and met ocean assessment, geological and geotechnical surveys, engineering and consultancy.
Procurement:	Point of procurement is reached on granting of consents when firm orders can be placed throughout the supply chain. Procurement decisions fall out of FEED study in development phase, change may require the developer to request variations to the consent order obtained in development stage.	Includes: procurement decisions, purchase orders, delivery/logistics.
Construction:	Construction/assembly of procured components for all land and sea-based activity prior to installation example; sub-structures, WTG, on and offshore sub station platforms, array & export cables.	Includes: Construction ports, logistics, cranes & lifting assets, steel fabrication, concrete slip forming & post-tensioning, electrical engineering, integration.
Installation:	Includes all installation and commissioning of turbines, offshore balance of plant and onshore balance of plant. This starts with the shipping of major items to the construction port and ends when the fully commissioned assets are handed over to operational teams.	Includes: Integration/staging ports, wet storage, offshore installation vessels.
Operations:	Support the ongoing operation of the wind farm through scheduled/ unscheduled maintenance and servicing, in order to minimise downtime and maximise financial return. Commences from construction works completion date and continue throughout the working life of the wind farm.	Includes: Onshore control/SOV room providing 24/365 operational support, insurance, O&M ports, monitoring, inspection, repair, transport of crew and equipment to site (CTV/helicopter).
Decommissioning:	Removal or making safe of offshore infrastructure at end of life, including disposal or recycling of equipment.	Includes: Decommissioning ports & vessels, recycling or disposal facilities, environmental surveys.

11 https://bvgassociates.com/publications/
12 https://ore.catapult.org.uk/?orecatapultreports=benefits-of-floating-offshore-wind-to-wales-and-the-south-west-supply-chain-report

4.4 METRICS

The estimates of economic impact associated with each of the scenarios are assessed using three primary measurements:

- **Expenditure** – the expenditure that is associated with the development and deployment of Celtic Sea FLOW, and which is captured by firms located in the region providing goods and/or services to the development of FLOW projects in the Celtic Sea. This is based on estimated cost benchmarks (£kw installed) and assumptions around the typical duration of when these costs apply (see description below).
- **Gross Value Added** – in broad terms, gross value added (GVA) measures the value of outputs less the value of inputs used in the production process to produce the outputs. More specifically, it is the sum of:

  - compensation of employees (i.e. wages and salaries)

  - operating surplus (i.e. surplus/profits for businesses)

  - both adjusted for taxes less subsidies.

  From an alternative but complementary economic metrics perspective, GVA represents output minus intermediate consumption. Therefore, if an activity associated with Celtic Sea FLOW involves the import of a significant level of materials, this would be reflected in intermediate consumption but not in GVA. However, if the operating surplus associated with the activity flows out of the region – most obviously to a regionally-based but foreign-owned company – then the GVA estimate may overstate local economic benefits, which is important to bear in mind when interpreting our estimates.
- **Employment & Jobs** – we have calculated the local economy job numbers by assuming, first, the FLOW deployment profile set out above and, second, the assumptions developed below on market capture for each scenario. The approach is described in more detail below. Jobs are represented as: estimated jobs supported at any particular time; as well as cumulative 'job years'.

In choosing these metrics, we were informed by His Majesty's Treasury (HMT)'s Green Book[13], which states that 'macro variables (such as GVA) may well form part of the higher-level analytical research that informs identification of policy, and policy priorities'. We have thus been guided by this approach throughout our analysis.

4.5 SOCIO-ECONOMIC MODEL

4.5.1 INTRODUCTION

To forecast the potential economic impact of the different policy packages in each our 3 scenarios, we have developed a sophisticated economic model, which amongst other things, draws on:

- **Previous Regional Model Analysis** – of particular importance is the work undertaken by OREC in 2020, which forms the basis of the 'Do Nothing' baseline scenario.
- **Current Regional Capability** – we have used our local industrial knowledge and engaged with the local supply chain, including through both the Cornwall FLOW Accelerator and Pembrokeshire Demonstration Zone ERDF projects, to assess the existing and potential capability and capacity of the region's FLOW industrial ecosystem, and anticipate future capability and capacity.
- **Contestable FLOW Project Segments** – drawing on this regional capability analysis, we have examined the 'contestable' work packages within the project taxonomy – which we term segments – and mapped these onto current and potential future regional capacity.

This, together with the Missing Middle team's professional knowledge and regional industry input, has allowed us to develop, for each of the 3 scenarios, a realistic set of target work packages or segments, with realistic levels of increased work capture for each work package or segment, and then combine the total to forecast the associated GVA and job benefits.

13 https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

4.5.2 EXPENDITURE METRICS & DEPLOYMENT ASSUMPTIONS

Our economic model uses an expenditure-based approach, based on the following cost benchmarks and deployment assumptions:

- **CAPEX & Decom** - capital expenditure (CAPEX) & decommissioning expenditure are measured in £ per kw installed. The pre-capital and capital phase of the project is sub-divided into development & consenting, procurement, construction, and installation.
- **OPEX** – operations & maintenance (O&M) activites are considered as operational expenditure (OPEX) and measured in £/kw per year. The assumed timeframe for O&M activity is 25 years, taken broadly from the point of installation (with a slight time lag) and decommissioning occurring 25 years from that point.
- **Project Deployment** – as overviewed in Section 2.1, we have used TCE's two primary pipeline deployment targets of 4.0GW by 2035 and a further 20.0GW to 2045 to derive two associated installed capacity profiles, and deduce the associated CAPEX, OPEX and Decom expenditures.

The assessment of economic benefits is set out to 2060, thus capturing CAPEX, OPEX and the very early stages of Decommissioning activity.

An important question has been the profile of the build-up of installed capacity within each of the deployment scenarios. In the absence of a settled view in the industry, we have assumed:

- **4GW to 2035** – a linear installation profile of 666MW per annum between 2029 and 2035.
- **A further 20.0GW to 2045** – a linear installation profile of 2.0GW per annum between 2036 and 2045.

These assumptions are, though, tested with sensitivity analysis.

4.5.3 REGIONAL & SUBREGIONAL EXPENDITURE ANALYSIS

In terms of the relationship between projected total expenditure and the economic metrics as set out in 4.2, the approach is described below:

- **Estimated Total Expenditure** – we estimate total expenditure, based on installed capacity and the cost benchmarks for the various target areas within the FLOW supply chain.
- **Scenario Analysis** – for each of the 4 scenarios, we use regional capability analysis to derive target segment work capture assumptions, at both regional and sub-regional level. The baseline 'Do Nothing' scenario is drawn from OREC's 2020[14] analysis.
- **Regional Analysis** – we define the region as that comprising the Celtic Sea Cluster counties (Section 2.1), and the sub-regions as the individual counties, albeit our sub-regional analysis is limited solely to Cornwall because the study funding was provided by CIOSLEP.
- **Target Segment Mapping** – each of the target FLOW activities/supply chain segments is then mapped onto relevant industrial classifications – using Standard industrial Classification (SIC) codes. This follows the approach of similar mapping exercises in previous studies. However, in a few instances this mapping has been adjusted to reflect an improved understanding of which SIC code is most appropriate for each activity. Note that mapping between 'activity' and 'industry' is always an imperfect exercise, in that the needs of each economic activity will require market support from a range of range of industries and sectors.
- **GVA Calculation** – with the mapping established, the modelling then uses ONS published data relating to typical levels of GVA that could be supported by the estimated expenditure, in effect this represents an output [15] :GVA ratio[16]. We use an output/expenditure:GVA ratio for each industry mapped. This in turn allows us to calculate estimated GVA impact for each scenario, at the regional and subregional level.

Note that our market capture assumption is that the captured segment works lead to increased economic activity located within both the region (Celtic Sea) and the component sub-region (Cornwall), i.e. it is a locationally-based assumption.

14 Supply Chain Report - Benefits of Floating Offshore Wind to Wales and the South West' – ORE Catapult, 2020.

15 Output is used as a reasonable proxy for expenditure in the model.

16 This has been derived from the UK Supply Use Tables (2022 release and 2020 latest data) – consistent with UK National Accounts. The output: GVA ratio is derived by comparing total output at basic prices with Gross Value Added at basic prices.

4.5.4 JOB ESTIMATES ANALYSIS

4.5.4.1 INTRODUCTION

We use two forms of modelling to estimate job numbers. The first derives job numbers from our economic model; the second, described below at Section 4.4, uses FLOW project works & associated jobs analysis to derive job numbers.

4.5.4.2 GVA JOBS ANALYSIS

To estimate jobs using economic analysis, we start with the estimated GVA as discussed in Section 4.3.2 and 4.3.3 above, and then use Office for National Statistics (ONS) data on output per job at an industry level[17], to in turn estimate the number of jobs that could be supported. The employment profile and job estimates are thus determined by five factors:

- **FLOW Project Timelines** – the Celtic Sea FLOW project deployment timelines.
- **Cost Benchmarks** – industry cost benchmarks to derive total expenditure.
- **Economic Activity Mapping** – the mapping of economic activity to the particular industries.
- **GVA Expenditure Levels** – typical levels of GVA supported by output/expenditure in each of the mapped industries.
- **GVA per Job** – typical 'GVA per job' in each of the mapped industries.

The employment impact is expressed in terms of job years, rather than full time equivalent (FTE). As such, we anticipate that FTE employment will be somewhat lower, particularly given that some job opportunities will not be permanent, or they will flex according to need i.e. they may not be constantly in place.

Estimated job impacts (described later) are expressed in terms of the maximum scale of jobs that may be supported at the peak of deployment (largely mirroring the deployment profile), and 'job years' over the appraisal period. It is important that these estimates of 'job years' are not misinterpreted as jobs supported at any one point in time.

From a wider economic perspective and as with all modelling approaches, there are limitations to the approach. For example, job estimates should be regarded as gross jobs: that is, they do not consider factors such as substitution and displacement effects of labour.

4.5.4.3 FLOW PROJECT JOBS ANALYSIS

In contrast to the economically derived jobs analysis, the FLOW Project Jobs analysis takes FTE data derived from a jobs modelling study commissioned by OREC in 2022[18]. The OREC report analysed the number and specific types of jobs required over the development and operation of a 510MW FLOW project, divided into:

1. Pre-consenting
2. Consenting
3. Pre-construction
4. Manufacturing
5. Construction
6. Operations & Maintenance

For each work phase, there are a number of more granular tasks and for each individual tasks there is an associated number of individual jobs:

- Level | Available figures
- Phase | FTE and individual jobs
- Task | individual jobs

The model uses FTE figures at the task level, which are then aggregated using a simple scaling function:

$$FTE_{task} = \frac{\text{individual jobs}}{\text{individual jobs}_{phase}} \times FTE_{phase}$$

This in turn calculates the FTE task for a 510 MW farm, which can be scaled pro-rata for any MW development, with additional scaling factors applied as set out below.

To ensure this modelling aligns with the economic modelling approach (Section 4.4.2 above), each task is associated with component area within the Missing Middle taxonomy. This in turn allows a percentage of the overall capture could be assigned to each task, as associated FTE.

This has been repeated for each of the four scenarios, and the output is a series of percentage work captures for each work package/segment.

17 Output per job is calculated by the ONS for each given industry by dividing GVA by jobs.

18 https://opergy.co.uk/new-major-report-on-future-jobs-in-uk-floating-offshore-wind-sector-maps-out-critical-skills-for-deployment-of-large-scale-floating-offshore-wind/

SCENARIO DIFFERENCES

OREC's original report's input figures were based around steel foundations. Whereas the Baseline and Essential scenarios assume the use of steel substructures, Realistic and Ambitious scenarios assume a concrete substructure.

It has proved difficult to find robust data upon which to base an assumption for the difference in workforce needed for concrete substructure production rather than steel. It nevertheless seems generally acceptable to assume there will be FTE savings when using concrete. So, to provide an illustrative insights into the consequences for job numbers, an efficiency coefficient range was modelled for Realistic and Ambitious scenarios. As well as being less demanding of materials and labour, these two scenarios involve a significant increase in regional industrialisation. So an assumed range of coefficients for economy of scale was also applied to the FTE Project Jobs model. In what follows, the high/low values for these scenarios are the model outputs scaled with either higher or lower coefficient values for these two variables.

OUTPUTS

The Project Activity & Jobs model outputs an FTE value for each year from the start of the project to the defined end date. The individual year values are also summed to show a cumulative FTE years value, which shows the overall profile of regional workforce growth over time. These outputs can be interrogated to the granular level of FTE per task, and thus provide insights into the required skill sets, but are also useful as a general cumulative FTE years value.

The model generates line graphs for the cumulative FTE years, and an uncertainty range for the latter two scenarios. These are validated against the outputs from the GVA Economic Jobs model to compare both the output numbers and the profile of the workforce demand curve.

LIMITATIONS

The input manipulations for different materials are based on assumptions made by the lead modeller, after professional consultation. More in-depth research into concrete production requirements would improve the validity of this part of the modelling. Future work will also focus on the integration of specific occupations and job titles linked to the European Skills, Competences, and Occupations (ESCO) dataset and map competence requirements on a sub-task level, which will add granularity to the outputs and allow for cross-reference with supply data.

COMMENTARY

The sensitivity analysis for the change of substructure material from steel to concrete showed a minimal impact on the overall cumulative FTE years figure. Rather, the significant impact comes from the opportunity to root the concrete manufacturing supply chain in the region. Internalising the supply chain would also have a significant positive impact on the GVA from substructure manufacture.

Finally, using the profile of a single 4.0GW development may not give the most accurate profile, as the individual projects will be built independently, but the aggregate approach nevertheless made most sense for modelling the regional industry.

4.5.4.4 CONCLUSION

We believe the Project Activity & Jobs model, drawing as it does on detailed FLOW project works analysis, is likely to be the provide the more accurate of the Workforce forecasts, but the economic analysis nevertheless provides an important cross-check on the estimates. As we show later, the alignment is quite close, which increases our confidence in the forecasts – and also, through reverse economic logic, in our overall GVA forecasts.

4.5.5 GUIDING MODEL ASSUMPTIONS AND CONSTRAINTS

4.5.5.1 MODEL CONSTRAINTS

As with all economic analysis, there are necessarily modelling constraints:

- **No Supply Side Constraints** – there are no restrictions on inputs such as raw materials and labour. In the context of this report – which focuses on enhancing supply side capability to exploit the demand-side opportunities as they arise – this is a fundamental point, particularly at a smaller geographical scale where there will be supply side constraints.
- **Static v Dynamic** – the economic model is not dynamic, that is to say there are no embedded-feedback loops or price effects e.g. wage effects. The modelling also does not account for the counteracting or balancing effects of a change in one industry being offset by a change in another industry.
- **Constant Returns to Scale** – the same quantity of inputs is assumed per unit of output, regardless of the level of production. As such, the modelling

does not consider economies of scale that will probably occur over time, particularly as 20.0GW projects are built from the late 2030s. The model also assumes that the key assumptions and input-output relationships as defined above remain static over time i.e. cost per kw installed, output/GVA and GVA per job etc. Note too that the original OREC cost benchmarks (also adopted in this report) were based on a 500MW FLOW deployment, which seem likely to change for larger-scale deployment[19].

- **Fixed Input Structure** – it is assumed that changes in the economy will affect the level of inputs and outputs but not the mix. Again, it is realistic to expect that this will change over time, as resources (including labour) shift to respond to the significant demand that is expected to materialise.
- **Scenario Capacity Steps** – the model assumes an immediate 'step' in industrial capacity to secure the market segment capture in each scenario. It would be more realistic to assume industrial capacity would build over time, but there is significant uncertainty around the build profile of that industrial capacity that assumption. We have thus adopted a simplifying assumption that changes in market capture are reflected in the changes between scenarios, rather than adopting a 'build-up' rate for each scenario.

Although these assumptions and constraints are commonly and necessarily employed in economic forecasting, they inevitably affect the veracity of the study output, which must be judged with them in mind.

4.5.5.2 SENSITIVITY ANALYSIS

Given the general uncertainty implicit in any economic model of this nature and the specific uncertainty how the Celtic Sea FLOW opportunity will develop over time, we have also modelled a sensitivity scenario, using two flexed assumptions:

- **Deployment Speed** – we have modelled a slower deployment by assuming a slip of 5 years for both the 4.0GW and 24.0GW deployment profiles.
- **Deduced Benefits** – we have modelled a 30% lower assumption of estimated economic benefits, both GVA and jobs supported.

This approach also reflects Green Book guidance on approaches to address optimism bias, and the results are set out in detail at Annex B.

4.5.5.3 MODEL OUTPUTS

The model outputs follow Green Book guidance, albeit this in turn leads to some variances in, amongst other things, the % breakdown of associated benefits:

- **GVA Estimates** – are presented in Present Value terms. That is, estimates of future benefits are discounted to reflect social time preference. This acknowledges that, particularly for the 20.0GW deployment profile, the associated activity continues over a long period, with O&M running for 25 years (assumed WTG asset life) and decommissioning thereafter. In accordance with Green Book guidance, we have discounted future GVA benefits by 3.5%, which has a commensurate impact on job estimates.
- **Project % Cost Breakdown** – the implicit % breakdown between CAPEX, OPEX and Decom activity assumed in the cost benchmarks (as a % of total FLOW lifecycle spend), will differ from the implicit % breakdown in our economic model. Although the model extends out to 2060, the full lifecycle costs of OPEX and Decom are not all captured, particularly at the end of the deployment profile. For example, within the FLOW lifecycle:

  Decom – in total lifecycle expenditure, decommissioning costs are 21% of overall project costs, but in our model represents only 4% of modelled expenditure. This is because, for those turbines installed by 2031 whose decommissioning starting in 2055, only the 4 years up to 2060 of the decommissioning expenditures are captured.

  CAPEX – conversely, because all CAPEX is completed well before 2060, all CAPEX expenditures are captured and it is thus a higher proportion (c61.5%) of our model, when compared to overall FLOW project lifecycle (51%).

These proportional differences then play out in terms of how they interact with assumptions made around market capture in each scenario:

- **Direct v Indirect Benefits** – It is important to note that the estimates shown in this report relate only to the opportunities that may arise directly from the Celtic Sea development. Because of the many inter-relationship in the value chain, we have not estimated wider indirect impacts. We have not applied any multiplier ratio because of this uncertainty around relationships in the value chain, aiming to avoid double counting.

19 In more recent OREC, we understand that different cost benchmarks have been developed – although not publicly available – which are based on a 1.0GW deployment scenario.

- **Exports** – our estimates do not include any of the export potential/opportunities that may arise as a consequence of regional businesses developing expertise through Celtic Sea opportunities. This has been considered in other studies, but not included here because it is a further uncertainty and assumption. It is also not known at this stage how regional businesses may develop a competitive advantage due to their involvement in Celtic Sea development.

4.5.6 CONCLUSION

Given the preliminary and high-level nature of this analysis, together with the significant but inevitable uncertainty over key core assumptions, we prefer to exclude secondary multiplier effects and export opportunities benefits to help ensure that the outputs are conservative. However, it is important to note that some of the other assumptions noted previously i.e. not factoring in any economies of scale, can have a counter effect i.e. our cost-driven approach may lead to overestimates of work capture. We highlight these uncertain factors were relevant.

Finally, each of the 4 scenario estimates are presented in two ways:

- **Absolute Benefits** – in absolute terms, for both GVA and jobs.
- **Relative Improvements** – in relative terms, with 'Do Nothing' as baseline, and the 3 scenarios benefits as relative improvements, in both GVA and jobs.

This approach is consistent with Green Book guidance and also presents the forecast benefits in a way that is accessible to the lay reader.

4.6 LOCAL CONTENT

4.6.1 INTRODUCTION

In Section 4.3 above, we defined modelling metrics for direct spend, GVA and jobs, and explained how these align with the Green Book assessment methodologies. In this section, we explain how we interpret these data in the context of the government's Industrial Strategy Offshore Wind Sector Deal (OWSD) and the specific commitment of the sector to the target of 60% lifetime UK Content in domestic offshore wind projects by 2030[20].

4.6.2 LOCAL CONTENT ASSESSMENT METHODOLOGY

Our calculations for local content (regional and subregional) local content analyses are based on the % share of total project expenditure that is:

- **Competition** – won in competition or secured through single/sole sourcing by suppliers (in any tier) whose headquarters (or facilities relevant to the scope of work) are geographically located in the Celtic Sea region.
- **Timelines** – these % scenarios anticipate total regional capture of domestic FLOW project expenditure comprising:

  CAPEX – across the full development and construction phases.

  OPEX – for 25 years of operations and maintenance.

  Decom – for 4 years of Decom activity to 2060 although, as discussed above, this is back-ended within the assessment period.

For reporting simplicity, we present the total estimates associated with regional and sub-regional expenditure for each scenario. However, the model does allow us to calculate regional and sub-regional expenditure capture by project phase and by major project component.

The metric of expenditure capture by region is not a strict measure of UK regional content because it does not account for imported components or imported equipment that might have been used in services or supply.

20 BEIS (2020) Offshore Wind Sector Deal: https://www.gov.uk/government/publications/offshore-wind-sector-deal

The Offshore Wind Sector Deal (OWSD) (last updated in 2020) provides no formal methodology to calculate project lifetime local content. However, the Offshore Wind Industry Council (OWIC) has endorsed the BVG Associates (2015) methodology for measuring UK content in offshore wind projects[21]. Furthermore, DESNZ/BEIS has provided a user guide to understand the (somewhat complex) BVG (2015) methodology within the Contracts for Difference (CfD) Supply Chain Plan questionnaire[22]. This CfD guide adopts the following calculation variables:

- **capacity** – the % capacity of UK suppliers to meet demand.
- **probability** – the % probability of UK suppliers to capture orders, through competition or single/sole sourcing
- **goods & services** – the % UK Content within the goods or services supplied, as follows:

  goods – for suppliers of goods operating in UK, UK Content assessed using professional judgement based on 100% minus estimated imported value of intermediary goods used in manufacturing process (equivalent to CIF (IncoTerm 'Cost, Insurance, Freight')[23] ;

  services – for suppliers of services operating in UK, where services are assumed as service (less overheads), then UK Content is automatically 100%, given the definition of UK FTE as any employee or direct hire created or maintained by suppliers operating in UK.
- **overheads** – % UK Content in overheads, apportioned to contract value.
- **profit margins** – excludes profit margins from the calculation of UK Content.

Our methodology combines the OREC (2020) projections for Celtic Sea region's capture of floating wind project expenditure together with our own professional judgements on the future capacity and competitiveness of suppliers in Celtic Sea region and Cornwall sub-region. This approach aligns with the capacity and probability assessment criteria used in the CfD UK Content methodology.

4.6.3 METHODOLOGICAL CONSTRAINTS

In the contrast with the DESNZ CfD method our approach makes no deduction of profits, there is some debate within the industry around why profits that accrue to suppliers located in the UK should not legitimately form part of UK content. Indeed looking at international measurement practice, such domestic economic value is more often than not incorporated within suppliers' local content figures[24].

With regards to the provision of services that are based largely on labour costs, this difference in treatment of profit and imported components between the CfD method and our method makes only a nominal difference to the resulting % local content so calculated.

But in services that deploy imported equipment or use vessels charted from overseas, providers will carry a slightly higher regional content % under our approach compared to the CfD method, as will the supply of goods by UK suppliers where components in the manufacture or finishing of those goods in the UK have been imported.

Regarding profits, of note is that the method used by UK Export Finance (an HMT agency) to calculate local content within buyer credit guarantee schemes does apportion profits to be retained in the UK as part of UK local content.

21 BGV (2015) Methodology for measuring UK content for UK offshore wind farms: https://bvgassociates.com/publications/

22 DESNZ/BEIS (March 2023) Draft AR6 Supply Chain Plan scheme: https://www.gov.uk/government/consultations/contracts-for-difference-allocation-round-6-amendments-to-the-supply-chain-plan-questionnaires

23 Incoterms: https://www.trade.gov/know-your-incoterms

24 Professional judgement of Dr M Warner, Director, CLCI Ltd based on international career in local content

4.6.4 **CONCLUSION**

In conclusion, our forecasts of regional capture as % of expenditure broadly align with common international methods of calculating local content and with UK Export Finance methodology.

When compared to the CfD methodology on UK content, our % expenditure captures are: likely to be consistent in cases of labour-intensive services; but may be at variance for services that are equipment-intensive (if this equipment has been imported), and for goods in cases where components have been imported for manufacture, assembly or finishing in the UK. Because our method builds on scenarios built up by project component – foundations manufacture, foundations assembly, vessel charters etc – the above variances are largely avoided, since major components (e.g. turbines, foundations, moorings etc) are assessed discretely.

Finally, we judge that our aggregated % expenditure captures under the Essential, Realistic and Ambitious scenarios broadly align with the approach used to calculate the Offshore Wind Sector Deal 60% UK Content target, which is key to their utility in policy analysis and planning.

4.7 **CONCLUSION**

Whilst the funded purpose of our report is to assess, and then maximise, the economic development benefits for Cornwall of FLOW, we can see no theoretical reason why the same process should not be transferable, mutatis mutandis, to the other Celtic Sea sub-regions. Indeed, to assess the benefits for Cornwall as a sub-region, we have had to model the whole Celtic Sea FLOW industrial system, thus basic model foundations are already in place to make similar assessments for the other Celtic Sea sub-regions.

5
POLICY ROOM FOR MANOEUVRE

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5.1 INTRODUCTION

In recent months, we have seen a noticeable shift in the international legal norms relating to offshore wind and local content. A broader and more flexible legal 'room-for-manoeuvre' can be identified in the way in which a number of governments are starting to craft policy instruments that overtly deliver domestic economic benefits in the transition to renewable power. The origin of this shift lies in governments needing to demonstrate to their constituencies that the discomfort of transitioning to Net Zero, through projects that include wind, solar, hydro, biofuel, tidal, CCUS[25], hydrogen and so on, can also bring the benefit of local jobs and investment in local supply chains and wider domestic economy.

The political imperative for this domestic 'green growth' dividend has necessitated ministers, officials and their advisors to explore what additional legal flexibility might be afforded under WTO and regional trade and investment rules. For example, under the US's Biden-Harris Inflation Reduction Act and under the EU's Green Deal, Net Zero Industry Act and new EU guidelines on State Aid, new interpretations of WTO obligations are emerging that use exemptions to incentivise investments in domestic content, justified by the contributions that such measures make to tackling the climate emergency (see details in Section 5.2 below). For the UK offshore wind sector, there are risks of the UK government inadvertently diverging from this new international policy playbook, which is embracing a more flexible interpretation of trade and investment rules. The concern is that the British government falls behind other countries, both in framing similar degrees of legal room for manoeuvre for policy makers, and in the design by these policy-makers of instruments and measures that drive investments into local supply chains and build a skilled workforce.

Our experience is that legal advice to UK government officials is currently guided predominantly by strict adherence to WTO rules for national treatment under GATT/TRIMS Article III:8 – rules by which members countries may not apply policy measures that discriminate against foreign products through quotas, targets, tender criteria, or ownership. For Britain's relationship with our largest trading partner, the EU, these strict legal norms on trade and investment are reinforced by the UK-EU Trade and Cooperation Agreement (TCA), which prohibits the UK from applying local content requirements to public grants and competitions (notwithstanding certain state aid exemptions). Moreover, these non-discrimination rules are now embedded as Article 366 within the UK Subsidy Control Act (2022).

In relation to offshore wind in particular, a recent legal UK-EU test case has likely solidified such conservative legal framing within Whitehall, with legal advisors possibly fearful that the EU will challenge further attempts by the UK government to introduce local content incentives within 'green growth' policy instruments. The test case in question arose in March 2022 when the EU requested WTO consultations on the UK's CfD 4th Allocation Round scheme. The challenge was against the scoring of local content commitments in developers' CfD Supply Chain Plans, which the EU considered to favour UK over imported content, and thus be in breach of WTO non-discrimination rules. As a result of these consultations (which we assume indicate that the EU would likely win the case had it gone to a full WTO tribunal), the UK has now clarified that UK content will not be scored in the CfD process nor made a contractual commitment, specifically: "under the CfD scheme, any data requested from potential beneficiaries about the level of UK content in their projects is used for information purposes only".

The challenge for the UK government is that its historically-strict adherence to WTO anti-discrimination rules, combined with the doubling down on this position as a result of the successful challenge by the EU to the CfD local content provisions, means the UK risks falling out of step with the new creative policy direction of the US and EU, in particular the Biden Inflation Reduction Act and the EU Green Deal, respectively (see Section 5.2 below). Imperative, if the UK government is not to remain behind competitor nations in policy support for the localisation of offshore wind supply chain infrastructure, is to achieve parity with these new legal norms - if not to the same volume of direct subsidies (due to affordability), then at least in the application of impactful non-priced factors in seabed leasing, CfD auctions and competitions for offshore wind infrastructure subsidies.

For floating offshore wind in the Celtic Sea, adopting this 'principle of policy parity' achieves two ends. First, the expectation of higher levels of inward investment to support early development of Celtic Sea ports and other coastal infrastructure for wet/

25 Carbon Capture, Utilization and Storage.

dry storage, substructure assembly, component manufacturing, turbine integration and structural maintenance. Second, as a means of securing legal cover. Were the UK to, as stated in Pillar 3 of the EU Green Industrial Plan "match the aid received for similar projects by competitors located outside of the EU while ensuring the proportionality of such aid", it would then be problematic for the EU to raise a legal challenge against the UK at the WTO for such policy interventions, since the government's defence would be parity with the EU in interpretation of the legal "proportionality of such aid".

The UK-EU Trade and Cooperation Agreement has a built-in review in 2025. This would be an opportunity to consider adjusting the subsidy control provisions of the Agreement to align with the principle of policy parity discussed above, namely: enabling UK government to design policy instruments that support the localisation of floating offshore wind supply chain capacity in ways comparable to the legal room for manoeuvre afforded by the Green Deal Industrial Plan (2023) and EU Net Zero Industry Act (2023). In turn, these revisions may necessitate amendments to the UK Subsidy Control Act 2022 and the forthcoming Energy Bill/Act 2023, the latter being likely to pass into law this year. Section 5.2 below lays out the climate emergency justifications offered by the US and EU in their re-interpretation of WTO exemptions to support domestic content policy measures in the offshore wind sector. In addition to the climate emergency, there are at least four other areas of potential policy room-for-manoeuvre that could shape UK interventions to incentivise investments in floating offshore wind supply chain and skills in the Celtic Sea region: These are described in the following sections:

- (Section 5.3) state aid to economically deprived areas;
- (Section 5.4) export finance;
- (Section 5.5) public procurement; and
- (Section 5.6) inherent commercial advantages of local.

Taken together, there is the potential within these five areas of policy room for manoeuvre, (Sections 5.2 to 5.6) to develop packages of interventions, which, whilst remaining consistent with WTO rules, nevertheless provide Britain with the potential to re-establish a level playing field for the Celtic Sea FLOW market against international competition in the 'green growth' policy arena.

5.2 THE CLIMATE EMERGENCY JUSTIFICATION

As noted, a material consideration for UK government in the design of policy instruments to support the Celtic Sea's floating wind supply chain is that, in recent months, the US has moved the dial on how WTO rules are re-interpreted for national climate emergency policy responses.

Essentially, the US appears to be applying certain WTO exemptions that allow the waiver of prohibitions on policy measures that incentivise domestic content in offshore wind projects. Significantly, in 2022, at the leasing competition stage of project development, the US federal Board of Ocean Energy Management (BOEM) introduced within the Carolina Longbay offshore wind lease auction a 20% option fee credit, in exchange for developers' financial commitments to US domestic workforce training and supply chain development. The legal justification for including this incentive is described in Box 1 below. It appears that the following exemptions under GATT Article XX are being applied to allow discriminatory domestic content policy measures:

- "necessary to protect human, animal or plant life or health"
- "relating to the **conservation of exhaustible natural resources** if such measures are made effective in conjunction with restrictions on domestic production"
- "essential to the acquisition or distribution of products in …**local short supply**…Provided that [the measures] …be discontinued as soon as the conditions giving rise to them have ceased to exist".

It is also possible that BOEM are drawing on an interpretation of GATT Article XXI which exempts measures that concern the "protection of essential [national] **security interests"**.

'Local Short Supply' justification

"The U.S. offshore wind industry is currently highly dependent on international supply chains. Most components of wind facilities that are planned for offshore in the U.S. must be manufactured overseas and shipped to the U.S. This introduces uncertainty and risk in the construction and operation of U.S. offshore wind facilities. Foreign suppliers may be subject to impediments within their own countries, such as work stoppages, taxing or legal constraints, or effects of political disruptions, and must ship their products long distances to the U.S., potentially resulting in increased costs or delays. Further complicating matters, Europe has its own aggressive offshore wind targets (450 gigawatts by 2050), in addition to those of the U.S. (30 GW by 2030), which could potentially strain the international supply chain. Foreign suppliers may have trouble meeting the demand from both European and U.S. developers".

'National Energy Security' justification'

"Reliance on foreign providers of offshore wind project components creates vulnerability for the U.S. because the offshore wind industry is one element of the nation's diverse energy sector, which is critical to the national security interests of the United States, powering transportation, communications, finance, and government infrastructure…..offshore wind leasing must be carried out in a manner that provides for protection of the national security interests of the U.S. To help protect the national and energy security of the U.S., it is important to ensure that the offshore wind industry can access the materials it needs without having to rely on foreign suppliers…. Enhancing domestic production of offshore wind project components serves to protect the offshore wind industry from international supply chain risks, allowing it to provide the nation with critically needed energy which, in turn, protects U.S. national security"

Box 1 - US Offshore Wind Leasing - Justification of Bidder Credit for Domestic Content Investment[26]

Additionally, the US Inflation Reduction Act (2022) has introduced a range of government subsidies to drive the US domiciliation of offshore wind supply chains and workforce. This includes:

- **10% domestic content bonus tax credit** for investment in offshore wind, if > 20% of total cost of products manufactured in US (rising to 55% in 2028)
- **4 cents advanced manufacturing tax credit** for floating wind foundations per watt completed turbine ($600,000/15MW platform)

Largely in response to the US Inflation Reduction Act, the EU has in turn strengthened its Green Deal policy package and created the Temporary Crisis and Transition Fund (TCTF), targeted to incentivise EU content in member states' offshore wind projects and other renewable power projects. Justification for this more flexible interpretation of its own subsidy rules is contained in the Green Deal Industrial Plan (2023) and the EU Net Zero Industry Act (2023), as follows:

- enhanced investment in Net Zero technologies (renewable energy, including H2 and biofuels, and decarbonised industrial processes) "to match the aid received for similar projects by competitors located outside of the EU while ensuring the proportionality of such aid" (Pillar 3 of the EU Green Industrial Plan);
- "more targeted aid for Net Zero value chains" (Pillar 4 of the EU Green Industrial Plan)
- "net-zero technologies are at the centre of strong geostrategic interests…Our competitors [US, Japan, UK, Canada are already] deploying ambitious measures to secure parts of this new market…[contributing to a] lack of level playing field" (EU Net Zero Industry Act, 2023)
- These new EU green subsidy developments are also "driven by security of supply considerations [that can] slow down the sustainability transition of the EU…..In turn, a secure supply of energy will be essential for ensuring sustainable economic growth, and ultimately public order and security" (EU Net Zero Industry Act, 2023)

26 BOEM (2021) Decision Memorandum: New York Bight Final Sale Notice Dec 2021, Appendix 1

In addition, recently revised EU Guidelines on State Aid for Climate, Environmental Protection and Energy (CEEAG) (2023) and the aforementioned EU Net Zero Industry Act (2023) include:

- up to 30% weighting for state aid for contributions to "the main objectives", i.e. decarbonisation of EU 2030 energy Net Zero and energy security targets; and
- measures that allow for the decarbonisation measures to "outweigh negative impacts on EU internal market competition".

Lastly, of particularly relevance to supporting domestic production of steel and concrete, the EU Carbon Border Adjustment Mechanism, proposed under the EU Green Deal (2022), affords the EU scope to apply tariffs to ensure that imported high-carbon content materials are treated no more favourably than domestic products produced in EU ETS (Emission Trading Standard) installations, which includes steel and cement manufacturing plants. Such carbon tariffs are in effect a means to protect EU steel and concrete on the grounds that EU producers have either to pay an ETS carbon levy or invest to produce decarbonised products, and as such face financial constraints not required of producers of imported steel and concrete.

Within certain limits, governments may subsidise investments in domestic technology and industry if such schemes are directed at economically deprived areas.

5.3 STATE AID TO ECONOMICALLY DEPRIVED AREAS

Within certain limits, governments may subsidise investments in domestic technology and industry if such schemes are directed at economically deprived areas. Indeed, such state aid has been a central policy measure of the EU for decades, and the foundation of ERDF investment, including in both Cornwall and Wales. Post Brexit the UK government has embedded this same philosophy within a number of offshore wind-related policy and regulatory instruments, as follows:

- **PM's Ten Point Plan for a Green Industrial Revolution** – published in 2021, this plan includes the policy ambition to "bring new jobs and growth to our ports and coastal regions" in the context of offshore renewable power projects.
- **Offshore Wind Manufacturing Investment Scheme (OWMIS)** – grants offered under the OWMIS in 2021 subsidized offshore wind manufacturing in Hull, East England, based on the premise that such locations constituted "disadvantaged or deprived regions in the UK". At the time, eligible regions were defined as areas listed as 'assisted' on the UK assisted areas map, which included the coastal regions of South Wales and Cornwall.
- **CFD Non-Price Factors** – the recent DESNZ Call for Evidence paper considering reform to the CfD Supply Chain Plan scheme, and which proposes including the following non-priced factor in the award of CfD contracts: "Investments in assisted areas...near deployment zones.. based on £ value to assisted areas"[27]
- **Social Value Model** – the Social Value model for public procurement allows weighing to be applied to the criteria of jobs created or retained in economically deprived areas, and was cited by The Crown Estate in its recent Celtic Sea leasing round Press Release of 4 Jul.
- **'Levelling-up and Regeneration Bill'** – which, at time of writing, is making its way through parliament.
- **UK Infrastructure Bank** – which provides below-market rate (i.e. subsidized, government-backed) loans, and where the first Investment Principle

27 UK Government (2023) Introducing Non-Priced Factors into Contracts for Difference: Call for Evidence: https://www.gov.uk/government/consultations/introducing-non-price-factors-into-the-contracts-for-difference-scheme-call-for-evidence

of the Bank is that investments must "…support the Bank's objectives to drive regional and local economic growth or support tackling climate change". Although not explicit that it is 'deprived' regional and local economic areas that are the focus of this local economic growth lending, the Bank's 2022 Strategic Plan notes that "significant disparities in growth and productivity across the UK present an urgent and important challenge" and that "Infrastructure investment…. can help address these disparities and achieve sustainable local economic growth"[28].

Notable is that Cornwall and Wales are two of Britain and Northern Ireland's most economically deprived regions, as reflected in their historic classification as 'a' areas within the EU state aid framework (Figure 2).

Member States may designate 'a' areas where the GDP per capita of the designated region is below or equal to 75% of the EU27 average. Translating these parameters to the UK post-Brexit, UK average GDP per capita in 2018 (i.e. pre-Covid) was € 36,500 and for Cornwall and Isle of Scilly in same period € 24,500 (67%) and for West Wales and the Valleys € 23,000 (63%)[29].

In line with the new EU state aid guidance, regional aid schemes may be put in place in 'a' areas that support initial investments by not only SMEs (as per 'c' areas) but also for "large enterprises" and which could thus theoretically include support for large industrial facilities such as ports and fabrication yards. Eligibility for state aid under the new EU state aid guidelines is based on:

- **Job Creation** – the number, quality and durability of both direct regional jobs created in the entity that receives the subsidy and indirect 'spillover effect' jobs in the related supply chains.
- **Training** – the provision of training to improve regional skills.

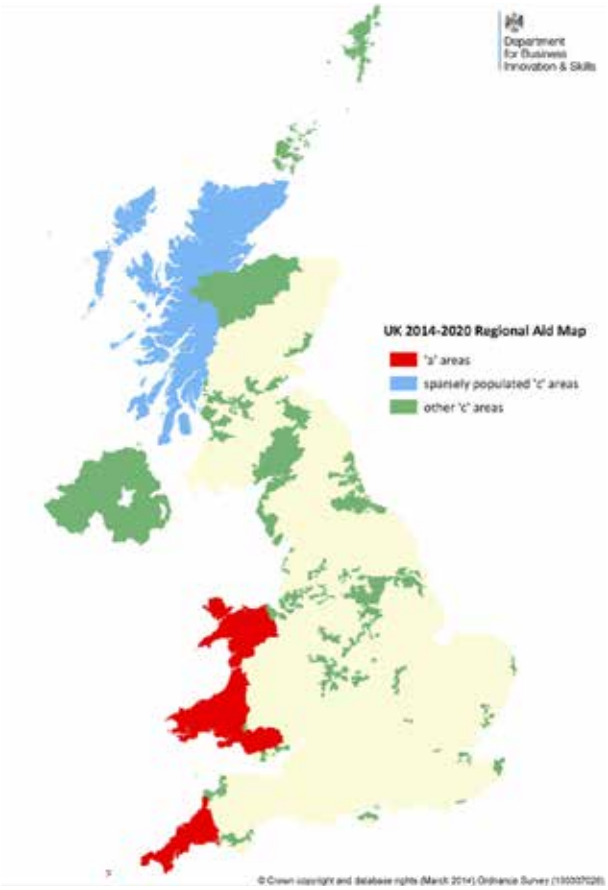


Figure 2 - Historic Classification of Cornwall & South Wales 'a' areas

- **Clustering** – any regional economic development that may arise as a result of proximity of firms, i.e. the 'clustering effect'.
- **Technology Innovation** – the creation of new technology through local innovation.

5.4 EXPORT FINANCE

The UK export finance programme is part of the existing toolkit of policy instruments available to drive investments into floating wind supply chain capability in the Celtic Sea region.

Probably the most helpful of government export finance products for offshore wind industry investment in the Celtic sea region is the Export Development Guarantee (EDG). Crucially, under the EDG, guarantees can be provided to commercial (i.e. bank) lenders who loan to supply chain companies for their expansion, without the need for these loans to be linked to specific export contracts. The nature and arrangements for the EDG are as follows[30]:

28 UK Infrastructure Bank (2022) Strategic Plan: www.ukib.org.uk/sites/default/files/2022-06/UKIB%20Strategic%20Plan%202022%20-%20Full_1.pdf

29 Eurostat website, accessed 22nd June 2023, 'GDP Per Capita in EU Regions' (March 2020), base don 2018 data:https://ec.europa.eu/eurostat/documents/2995521/10474907/1-05032020-AP-EN.pdf/81807e19-e4c8-2e53-c98a-933f5bf30f58

30 UK Government, gateway website accessed 22nd June 2023: https://www.gov.uk/guidance/export-development-guarantee

- **Partial Guarantees** – covering up to 80% of the risk to lenders
- **Guarantee Terms** – over a maximum repayment period of up to 5 years, or up to 10 years if the loan is to develop clean growth exports such as renewable energy.
- **Scale** – transactions from a minimum of £25 million upwards (average value of EDG transactions is expected to be between £100 million and £500 million).

For eligibility applicants must pass the Exporter Test, which requires that either:

- **Export Sales:**
  - UK export sales represent at least 20% of its UK annual sales turnover in any one of the last three financial years; or:
  - UK export sales represent at least 5% of its UK annual sales turnover in each of the last three financial years; and

Furthermore, an eligible exporter must,

- **Business Activity Location:**
  - be carrying on business in the UK, either by manufacturing goods in the UK, delivering services from the UK or providing intangibles from the UK; and
  - have both premises and employees in the UK.

A summary of the full range of UK export finance products is available on the Government Gateway website[31].

5.5 PUBLIC PROCUREMENT

In our assessment of regional capture of floating wind supply chain expenditure in Cornwall and the Celtic Sea region we identify key opportunities for regional supply of vessels used for installation of moorings, anchors, and cables; platform integration; towing and hook-up; and O&M. This potentially includes: Offshore Construction Vessels (OCVs); crew transfer vessels (CTVs); multi-purpose Service Operations Vessels (SOVs); daughter craft; tugs, pilots and other port ancillary vessels; rescue boats; and autonomous vessels.

Regional economic value capture of this part of the supply chain is anticipated from:

- vessel owners through charter contracts;
- naval architects, e.g. Mainstay Marine Solutions in Pembroke Dock, Solis Marine and Morek Engineering in Falmouth;
- material suppliers, e.g. Tata Steel in Port Talbot and Celsa Steel in Cardiff, and Anglesey Aluminium Metal Ltd;
- fabrication and shipbuilding yards, e.g. Exeter Fabrication and Hydrosurf in Exeter, C Toms and Sons in Fowey, Cockwells in Falmouth, Harland & Wolff at Appledore in Devon, Haven Marine in Milford Haven, AMC and Diverse Marine on the Isle of White, Mainstay Marine Solutions in Pembroke Dock, Pendennis shipyard in Falmouth
- suppliers of propulsion systems equipment, including engines, generators, motors, batteries, fuel cells, gearbox, shafts, propellers;
- low carbon propulsion systems, including dual fuel, biofuel, hybrid, full electric, hydrogen fuel cells;
- other onboard equipment; and
- suppliers of various port and vessel maintenance services, including Pembroke Docks, ABP Port Talbot, Bristol Port, ABP Plymouth, Swansea Docks, A&P Falmouth, Bristol Port, Appledore, Milford Haven.

Published in 2020, the government's National Shipbuilding Strategy (NSBS)[32] identifies opportunities to leverage the public procurement of MOD naval support vessel (tugs, passenger transfer vessels, barges, workboats, pilot craft, sealift vessels etc), along with procurement of regional ferries,

31 UK Government, Gateway website accessed 22nd June 2023: 'UK Export Finance Leading with Finance – All products: https://www.gov.uk/government/publications/uk-export-finance-leading-with-finance-product-brochure/uk-export-finance-leading-with-finance-all-products

32 UK Government (March 2022): National Shipbuilding Strategy Refresh: https://www.gov.uk/government/publications/refresh-to-the-national-shipbuilding-strategy

scientific, survey and research vessels, Border Force and Coast Guard vessels and lightships, as a means to drive up UK capacity and competitiveness to capture expenditure in the offshore vessel market for the above materials, equipment and shipbuilding and maintenance services.

In support of this public procurement 'leverage' strategy the government has three policy levers it can exercise:

- **WTO Exemption** – the UK is a signatory to the WTO Agreement on Government Procurement (GPA), which prohibits ring-fencing tenders for public procurement to UK suppliers. However, there is a GPA exemption for "procurement indispensable for national security". Following the same legal interpretation as the US Bureau of Ocean Energy Management (BOEM) offshore leasing agency and the principle of policy parity, this exemption could possibly include the construction and/or fit-out of vessels related to the protection of national energy security assets, including offshore wind farms.
- **Social Value Model** – PPN (Procurement Policy Note) 06/20 makes it mandatory for all procurements covered by Public Contracts Regulations 2015 (i.e. all Central Government Departments, their Executive Agencies and Non-Departmental Public Bodies) to apply a minimum weighting of 10% of total scores in a public procurement tender (including price factors) as a differentiating factor in bid evaluation, for example 30% on price, 60% on quality and 10% on social value. There is thus room for the design of these tenders to utilise social value factors geared towards the development of regional shipbuilding capability for the Celtic Sea offshore wind vessel market, in particular:
  - the application of greater than 10% weighting (which is allowed if justified) applied to social value criteria that benefit economically deprived regions, e.g. job creation in Cornwall and South Wales.
  - selection of social value criteria most likely to drive orders with suppliers (or lower tier sub-contracted suppliers) located in Cornwall and South Wales. This includes model assessment criteria (MAC) 2.2 on job creation in deprived areas, MAC 2.3 on training, MAC 3.1 on creating a diverse supply chain to increase supply chain resilience, and MAC 4.1 on reducing carbon emissions in performance of a contract.
- **Home Shipbuilding Credit Guarantee Scheme** – the NSBS proposed a Home Shipbuilding Credit Guarantee Scheme to level the playing field for domestic shipbuilding facilities. The aim of the scheme is to facilitate UK shipyards access to government finance (guarantees) that underwrite domestic contracts for constructing ships and boats in British shipyards. The aim of the scheme is to level the playing field with overseas competitor governments' export credit guarantees and ensure UK shipbuilders have a competitive chance of securing contracts. The focus of the scheme is on high-value, low carbon, complex vessels, and the scheme guarantees up to 80% of the purchase price of ships built in the UK. At the time of writing the scheme had yet to be launched. Regardless, the offshore wind industry is already intent on moving its newbuild toward low carbon vessels: Solis Marine of Falmouth have recently overseen the conversion of an SOV to ammonia; and Ørsted have announced procurement of two methanol powered SOVs for the North Sea. As such, the industry's newbuild vessels fall fair and square into the high-value, low carbon, complex vessel criteria and render the vessels potentially eligible for the scheme.

5.6 INHERENT COMMERCIAL ADVANTAGES OF LOCAL

The above sections have focused on the UK government applying the principle of policy parity, not least with the US and EU, to expand the legal scope for developing policy measures that support investment in FLOW regional supply chains. Outside of these new interpretations of trade and investment rule exemptions, there are also the inherent advantages that locating certain supply chain activities in the South West and Wales would bring to the commercial viability and efficient delivery of floating offshore wind projects in the Celtic Sea. Discussed in more detail in the policy sections of this report, the inherent commercial benefits of 'going local' include:

- The advantages for developers of the geographic proximity of South West and Wales ports and other coastal locations to the project offshore sites, offering shorter towage times from storage sites to staging ports, staging ports to project sites, and project sites back to on-shore maintenance facilities, as well as lower weather-window risks. In turn, such regional advantages then contribute to lower insurance and logistics costs.

- With regards to floating wind platform foundations, for developers who elect to manufacture concrete substructures, the local presence of aggregate (in Cornwall) and rebar from recycled steel (Port Talbot) offers the potential for regional manufacture, bringing commercial advantages with respect to lower insurance costs and weather risks when compared to transporting completed concrete substructures from the European continent.
- A significant construction feature of floating offshore wind technology compared to fixed bottom wind projects is the alongside integration of wind turbines with foundations, which renders regional ports in the South West and Wales at an advantage over more distant European integration sites.
- Taking a life-cycle approach to contribution of floating wind projects to the governments Net Zero target, parts of the South West and Wales supply chain offer, or will soon offer, lower levels of carbon emissions than competitors. A case in point is the recent £500m subsidy to support Tata Steel in Port Talbot to convert to Electric Arc Furnaces, which could then offer decarbonised steel for regional concrete foundation manufacture, for example in the manufacture of secondary steel. For developers, sourcing from this supplier, as an example, would contribute to reducing their own corporate carbon footprint, as well as offering a competitive advantage with respect to securing subsequent CfD, since the Supply Chain component of the CfD is likely to continue to reward low levels of carbon in project supply chains.

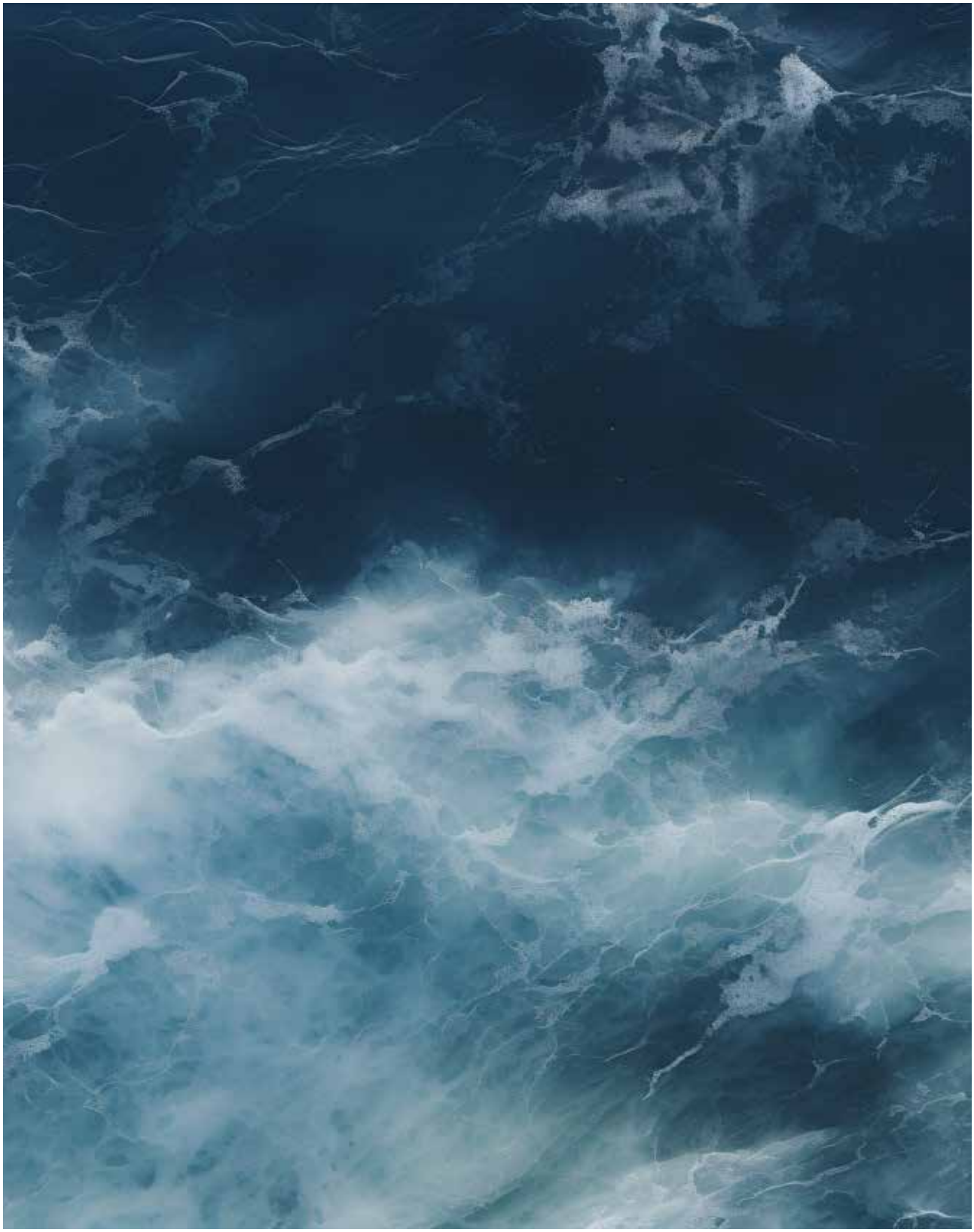
Converting these and other inherent commercial advantages for developers of utilising Celtic Sea suppliers into policy instruments, requires the careful framing of questionnaires and scoring criteria, for example in leasing and CfD auctions. Critically, the requirement here is not for developers to give preference to regional Celtic Sea suppliers (which is prohibited under the UK's trade and investment obligations and the Subsidy Control Act), but to require developers to explain how their proposals have taken consideration of the inherent commercial advantages of suppliers located in the Celtic Sea coastal regions with respect to lowering project delivery risk, costs and carbon emissions. In other words, to centre the design of the policy instruments around meeting commercial objectives not mandating or rewarding local content preferences per se.

5.7 CONCLUSION

Within the five areas above, and by adopting the principle of policy parity and exploiting the inherent advantage of local, there is significant potential to rewrite the UK's policy play book for supporting the British offshore wind sector, whilst at the same time remaining within the overall provisions of WTO and related trade and investment obligations.

Note though that the Whitehall policy ownership of each area is diverse. For example: CfDs, OWMIS and FLOWMIS are owned by DESNZ; NSBS by MOD; EGDs by HMT, through UK Export Finance. In one way, this presents a cross-Whitehall coordination challenge, but in another way, it presents a British opportunity.

If a range of policy options can be developed, drawing from each of the above areas in a way that ensures policy parity with our competitors and WTO compliance, and combined into integrated policy packages and executed in a coordinated way, then we believe there is a good chance that the whole may be greater than the sum of the parts. We term this approach coordinated policy planning & action and develop it further in Section 6.



6 INDUSTRIAL DEVELOPMENT TARGETS & POLICY PACKAGES

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6.1 INTRODUCTION

We seek in this section to shine a light on policy measures with the potential to drive the industrial development of Celtic Sea FLOW – a key part of so-called 'Green Growth' policy agenda – through investment in regional supply chains and workforce in the Celtic Sea's coastal sub-regions. In this section, we first establish our three regional scenarios – Essential (24% for Celtic Sea and 10% for Cornwall), Realistic (41% for Celtic Sea and 14% for Cornwall) and Ambitious (60% for Celtic Sea and 22% for Cornwall) – we then offer:

- modifications to conventional policy instruments including leasing, CfD and subsidies;
- innovative policy measures including forward contracts underwriting, model contracting strategies and regional anchor companies;
- all designed as integrated policy packages.

Table 3 lays out a suite of policy interventions considered in our study. Some of these can be considered conventional, where our proposals build largely on existing schemes and initiatives. Others are more innovative and offer government departments a broader scope of options than currently to hand, and amongst other things take account of the policy room-for-manoeuvre offered by recent shifts in international legal trade and investment norms emanating from US and EU green growth policy, as discussed in Section 5 above.

Table 3 - Inventory of Conventional (white) and Innovative (grey) policy interventions to develop FLOW supply chain capability in the Celtic Sea region

Seabed Leasing	Consenting	PPAs and market reform	Govt investments and subsidies	Procurement practices	Tax incentives	Anchor companies	Standards and model contracts
PPQ	Nationally Significant Infrastructure Projects (NSIPs) reform process	Review of Electricity Market Arrangements (REMA), esp intermittent vs firm power market split	FLOWMIS reform, eg expanded scope (cables, moorings, vessels, BoP); differentiated scopes (integration vs foundations vs components); ranking and re-design; 2nd + 3rd rounds	Public procurement of vessels builds commercial capability of UK yards, eg MOD, coast guard vessels	Flexing Tax incentives at Free Ports (Milford Haven/Port Talbot/ Plymouth/Anglesey)	Developers	Model pre-orders contracts, eg Take or Pay (TOP); hedged forward contacts (fixed/drawdown/window)
ITT1 - Info only	Zonal planning and Offshore Energy SEAs	CfD Supply Chain Plan /NPF revisions AR6+	Loans and loan guarantees (a) at market rates eg Green Investment Bank; HSCGS, (b) at discounted rates, eg British Business Bank, UKIB, Export Devt Guarantees	Other public procurement that builds regional FLOW capacity, eg public transport	Spread key free port tax incentives to other ports in Celtic sea region	EPC/EPCm/ EPCI	Model EPCI tenders - 'K' factor Supply Chain Plans
IIT1 - Pass/Fail or multi-factor auction	Inspectorate and DLUHC 'fast-track' consenting (amendments to Levelling-Up and Regeneration Bill)	Private Wire PPAs to address Grid connection bottlenecks and incentivise Wind > H_2 base load	FLOW-BoPMISscheme (Balance of Plant Manuf Investment scheme) Second round OWMIS (Offshore Wind Manuf Investment scheme)	Devolved powers public procurement, eg ferries	Capital allowances; Structures and Building allowances; NIC allowances; Business rates relief	OEMs	Quality standards, eg DNV-ST-0119 Floating wind turbine structures, Low carbon H_2 standard; low carbon concrete/ steel; dynamic cables
ITT2 - option fee discount	Role of MND in fast-tracking (Mitigated Negative Declaration) framed by quality standards, planning performance agreements (PPAs) and Environmental Outcomes Reports	Benefit Cost Analysis/Value for Money	Govt insurance underwriting, eg coverage gaps due to complex FOAK + turbine scaling + project scaling; unknown moorings and cable risk; liabilities 'domino'	Social Value Model criteria and weightings	TRL 1 to 5 - R&D tax relief	Manufacturing under OEM license	Methodology standards, eg LCOA; ERoEI; UK regional Content; HMT Green Book (VfM; Jobs; GVA wider economic benefits)
AfL - lease rent discount	HRA for leasing vs EIA for DCO (Development Consent Order)	Community PPAs/benefit agreements	State aid to Assisted/Deprived area, incl South Wales and Cornwall 'a' areas		TRL 6 to 9 - innovation commercialisation tax incentives (EIS, VCT, SEIS, SITR)	UK/Int JVs	Model Contracting Strategies and FLOW construction contracts (offshore vs onshore) that manage risk/local content
Enabling investments	Public consultation and community benefits, incl OSW jobs and training; and Local Authority Innovation and Capacity Funds		Direct investments by devolved power, eg port expansion, assembly yard JVs, new regional Development Corporation/Agency, underwrite hedging of forward orders, eg foundations		Tax incentives for private sector 'pooled' insurance funds for FLOW risks	Prime service contractors, eg Moorings as a service	Model insurance contracts: Contractor All Risk (CAR); Knock-for-Knock; 50:50; Back-to-Back; Nat Cat marine insurance methods

The inventory is not exhaustive but, unlike the piece-meal approach of most policy design work, we have reviewed and developed a coherent package of potential government interventions from which impactful and coordinated policy packages might be formulated.

Our approach throughout has been to move away from the conventional ad hoc approach of Whitehall departments working in semi-isolation – both internally within Whitehall and externally with the regions – to an approach akin to a 'policy-systems-approach'. In this, policy interventions to incentivise investments in UK supply chains are coordinated across the FLOW project time line from leasing, through consenting to CfD, project delivery and O&M. This in turn necessitates cooperation between central Whitehall departments and agencies, and devolved government – termed, as foreshadowed above, coordinated policy planning & action. But we also judge this will realise additional economic value and better value for money from Whitehall and regional resources deployed in support of individual policy interventions.

Our selection of policy levers has also been guided a clear commercially driven objective. This is to de-risk – for developers, infrastructure owners, and suppliers – the raising of finance to front-load investment in regional supply chain infrastructure and workforce skills, be that for the integration of WTGs at regional ports, establishment of wind component manufacturing sites, expansion of shipbuilding, mooring and fabrication yards, or new plant and equipment to produce decarbonised steel

We have adopted a 'soft' systems approach to policy selections[33], based on modelling the 'best bet' solutions that build on the core design principles of policy instruments that we know have largely worked well in the real world, for example:

- the way in which the CfD scheme de-risks project revenues and, importantly, ranks bidders rather than offering only a winner-takes-all or top-sliced competition.
- infrastructure subsidy schemes, including the Offshore Wind Manufacturing Scheme, which use in part the HMT 'Green Book' benefit-cost value for money calculation based on UK job creation as a basis for awarding subsidies, and as such rewards UK-based outcomes.
- government loan guarantees that unlock commercial bank lending, for investment opportunities that otherwise would fail tests for market-based levels of investment returns.

We do not examine the detailed merits and weaknesses of each policy instrument. Instead, for reasons of reporting efficiency and logic, we move straight to those policy measures (and their coordination) that we judge will best deliver the different regional expenditure capture scenarios, and the economic and jobs benefits predicted by our economic modelling.

These policy measures are selected, designed, and coordinated with the intent of de-risking private investments so as to deliver each of three scenarios for the capture of project expenditure in the deployment of floating offshore wind in the Celtic Sea, over and above the Baseline, i.e. the Do-Nothing scenarios.

- **Baseline Capture ('Do Nothing')** – 20% of lifetime project expenditure captured by the South West and Wales, with 8% captured by Cornwall and the Isles of Scilly.
- **Essential Capture ('Need to Have')** – 24% of lifetime project expenditure captured by Wales and the South West, with 10% captured by Cornwall and the Scilly Isles.
- **Realistic Capture ('Want To Have')** – 41% of lifetime project expenditure captured by Wales and the South West, with 14% captured by Cornwall and the Scilly Isles.
- **Ambitious Capture '(Like To Have')** – 60% of lifetime project expenditure captured by Wales and the South West, with 22% captured by Cornwall and the Scilly Isles.

Each scenario is an aggregate capture of project lifetime expenditure across development, construction, O&M, and early Decom, increasing in value with the ascending ambition in each of the three scenarios.

33 Checkland P. and J. Scholes(1999) Soft systems Methodology In Action: a 30-year Retrospective, Chichester, UK: Wiley

The percentage capture under each scenario is made against 4 GWs and 24GWs of floating wind projects deployed in the Celtic Sea region.

Note that the majority of proposed policy measures are intended to incentivise investment in supply chains in Wales and the South West, inclusive of bringing economic benefits to Cornwall and the Isles of Scilly. By way of example, in our proposed policy measures to drive investments in the regional manufacture of concrete foundations we anticipate that the aggregate inputs could be supplied from Cornwall, with manufacture taking place in South Wales.

Where, for maximum economic impact, it is important that different policy measures be coordinated across Whitehall departments or with devolved powers, this we have indicated, for example, through coordination in the metrics used to reward investments in port infrastructure between the stage of seabed rights leasing exercised by The Crown Estate and the award of CfD contracts at pre-FID stage exercised by DESNZ.

We use the terms policy 'intervention', policy 'lever' and policy 'measures' interchangeably. We mean these terms to imply a particular action taken by a Whitehall department and/or an agency within central or devolved government to deliver a change in the system of FLOW project development that would otherwise not take effect. This includes, for example, introducing a new FLOW Balance of Plant manufacturing investment scheme, as well as alterations to existing policy measures, for example to the Supply Chain Plan questionnaire completed by applicants to the CfD scheme.

Some of our proposals could be argued to be new policy positions in their own right, e.g. model contracts and contracting strategies, whilst others are measures designed to augment an existing government policy position, e.g. modification to CfD auction questionnaire. This is a further reason why we do not seek to differentiate between proposed 'policies' and proposed policy 'interventions, levels, or measures'.

Each of the three sections describing our scenarios are structured as follows:

- Basis of the Scenario Targets
- Overview of the Scenario Targets
- Summary of the Scenario Target Benefits
- Overview of the Scenario Policy Package

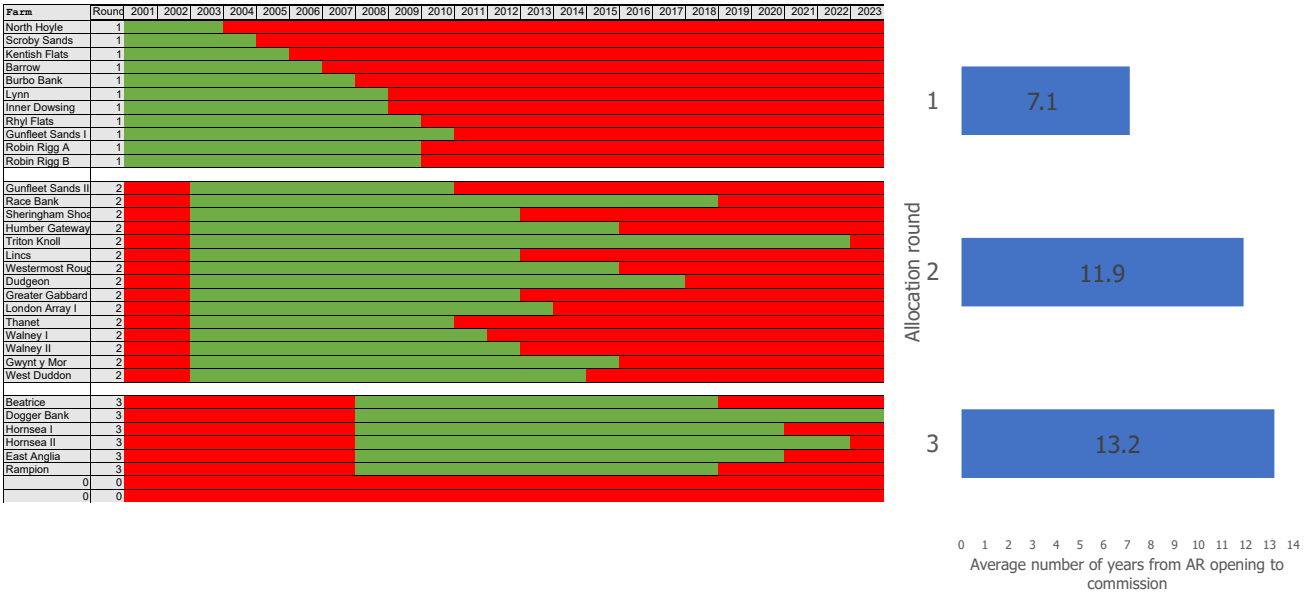
6.2 ESSENTIAL SCENARIO – "NEED TO HAVE" - PROJECT EXPENDITURE CAPTURE: 24% BY SUPPLIERS LOCATED IN CELTIC SEA REGION; 10% BY SUPPLIERS LOCATED IN CIOS SUB-REGION

6.2.1 BASIS FOR THE SCENARIO TARGETS

We define our lowest ambition target scenario of 24% expenditure won directly or indirectly by suppliers located in the Celtic Sea region as the Essential or 'Need to Have' level of work capture, and base this on three inter-related imperatives:

- **Pipeline Targets** – based on our industry and local infrastructure knowledge, we judge it highly unlikely that the Celtic Sea region will develop the capacity to deliver 4.0GW of FLOW by 2035 if matters are left to the market alone. Our analysis shows that, over the first 3 British leasing rounds, the average project development time has grown, rather than reduced, from 7.1 years in Sea Bed Auction – Lease round 1 (LR 1) through to 13.2 years to LR 3 (see Figure 3 below). As we have also noted earlier, local work capture, for which the anecdotal industry figure is 42% appears also to be going in the wrong direction, given that of the 9 major work contracts for Dogger Bank, only 2 have been won by British companies[34].

Figure 3 - British offshore wind farm development times



- **Foundational Capability** – as well as improving the chances of hitting current pipeline targets, we judge that the 'Need to Have' capabilities provide the essential foundation for achieving our higher target scenarios.
- **Political Expectation** – finally, as we set out below, the scenario assumes that the existing capabilities and competitiveness of regional suppliers, combined with selected minor policy interventions (i.e. 'nudges'), should allow the region to meet the 24% target. Because of the amount of planned public investment – in particular but not solely through the CFD – and the evolutionary nature of the associated policy package – we believe it reasonable, and that the general public and business community would expect, that at least 24% of total lifetime project expenditure on 4GW or 24GW licensed floating offshore wind in the Celtic Sea over 37 years lands in the region.

6.2.2 OVERVIEW OF THE SCENARIO TARGETS

In the Essential scenario, we anticipate regional suppliers capturing the components of project spend shown at Table 4 below and summarised here - for ease of digestion, the figures are based on the 4GW deployment profile, with Cornwall's sub-regional capture shown in brackets, and the 20GW follow-on pipeline impacts developed later in the analysis:

- **Development & Consenting Services expenditure capture: SW&W 52%, CIoS 26% (equivalent to 1.3% or 0.7% of total lifetime expenditure, respectively)** – comprising surveying services, engineering design and consenting services.
- **Port & Logistics Activities expenditure capture: SW&W 80%, CIoS 40% (equivalent to 0.3% or 0.2% of total lifetime expenditure, respectively)** – comprising platform integration, on shore storage and staging, and wet storage.
- **Foundation Manufacture & Assembly expenditure capture: SW&W 10%, CIoS 0% (equivalent to 1.8% or 0% of total lifetime expenditure, respectively)** – comprising fabrication of secondary steel sub-components, e.g. gangways and stairs.

Table 4 - Components, £ and % Lifetime Project Expenditure Captured in Essential Scenario[34]

Scenario 1 - Essential						
		Cost benchmarks (£kw)		% total spend	SW&W market capture	CIoS market capture
CAPEX	Development and Consenting	£	124	2.7%	52%	26%
	Substructure	£	879	19.2%	10%	0%
	Wind turbine	£	1,000	21.9%	0%	0%
	Anchors	£	26	0.6%	100%	80%
	Mooring lines	£	92	2.0%	10%	5%
	Array cables	£	19	0.4%	0%	0%
	Electrical infrastructure	£	364	8.0%	36%	0%
	Ports & logistics	£	21	0.5%	80%	40%
	Vessels and subsea engineering	£	198	4.3%	88%	44%
	Other capex	£	320	7.0%	28%	22%
		Cost benchmarks (£/kw/y)				
OPEX	O&M Offshore		23	11.1%	100%	50%
	O&M Onshore		3	1.4%	90%	23%
	Other Opex		42	20.2%	0%	0%
		Cost benchmarks (£kw)				
	Decomissioning	£	51	0.7%	24%	6%

- **Vessels & Subsea engineering construction expenditure capture: SW&W 88%, CIoS 44% (equivalent to 3.5% or 1.8% of total lifetime expenditure, respectively)** – comprising vessels for port side turbine assembly, towing and offshore hook-up, offshore moorings and anchor installation (incl. AHV charter), offshore array cable installation vessel charters, crew transfer vessels (CTVs), and vessel maintenance.
- **Electrical infrastructure expenditure capture: SW&W 36%, CIoS 0% (equivalent to 2.6% or 0% of total lifetime expenditure, respectively)** – comprising fabrication and related civil works for on-shore substation construction.
- **Operations and Maintenance over 25 years expenditure capture: SW&W 37.8%, CIoS 17.9% (equivalent to 13% or 6.1% of total lifetime expenditure, respectively)** – comprising minor offshore repairs, operations control and site office, airport services for segregated autonomous arial vehicles.

The component policy interventions are discussed in detail at Sections 6.2.4-6.2.10

34 It is important to note that total of the market capture columns in the table do not exactly tally with overall market capture figures for each scenario. This reflects that the total market capture by component has not been discounted (i.e. not reflected in Present Values). The total market capture under each scenario does reflect discounting over the appraisal period and is reflected in Present Values. For example, in the Essential Scenario for SW&W the sum of each component is c26% compared to the overall market capture estimate of 24% associated with that scenario. This is also the case in each of the same summary tables for each scenario.

6.2.3 OVERVIEW OF THE SCENARIO POLICY PACKAGE

To hit these targets, and deliver the resulting regional benefits, we have selected from our policy inventory a package of Essential – 'Need to Have' policy measures, adapting these to take account of the policy room-for-manoeuvre offered by recent shifts in US and EU green growth policy, and designing the overall package as a coordinated whole to maximise chances of success. The overall package is in Table 5 below.

Table 5 - Policy Package to incentivise investments to help deliver Essential scenario targets

Seabed Leasing	Consenting	PPAs and market reform	Govt investments and subsidies	Procurement practices	Tax incentives	Anchor companies	Standards and model contracts
PPQ	Nationally Significant Infrastructure Projects (NSIPs) reform process	Review of Electricity Market Arrangements (REMA), esp intermittent vs firm power market split	FLOWMIS reform, eg expanded scope (cables, moorings, vessels, BoP); differentiated scopes (integration vs foundations vs components); ranking and re-design; 2nd + 3rd rounds	Public procurement of vessels builds commercial capability of UK yards, eg MOD, coast guard vessels	Flexing Tax incentives at Free Ports (Milford Haven/Port Talbot/ Plymouth/Anglesey)	Developers	Model pre-orders contracts, eg Take or Pay (TOP); hedged forward contacts (fixed/drawdown/window)
ITT1 - Info only	Zonal planning and Offshore Energy SEAs	CfD Supply Chain Plan /NPF revisions AR6+	Loans and loan guarantees (a) at market rates eg Green Investment Bank; HSCGS, (b) at discounted rates, eg British Business Bank, UKIB, Export Devt Guarantees	Other public procurement that builds regional FLOW capacity, eg public transport	Spread key free port tax incentives to other ports in Celtic sea region	EPC/EPCm/ EPCI	Model EPCI tenders - 'K' factor Supply Chain Plans
IIT1 - Pass/Fail or multi-factor auction	Inspectorate and DLUHC 'fast-track' consenting (amendments to Levelling-Up and Regeneration Bill)	Private Wire PPAs to address Grid connection bottlenecks and incentivise Wind > H_2 base load	FLOW-BoPMIS scheme (Balance of Plant Manuf Investment scheme) Second round OWMIS (Offshore Wind Manuf Investment scheme)	Devolved powers public procurement, eg ferries	Capital allowances; Structures and Building allowances; NIC allowances; Business rates relief	OEMs	Quality standards, eg DNV-ST-0119 Floating wind turbine structures, Low carbon H_2 standard; low carbon concrete/ steel; dynamic cables
ITT2 - option fee discount	Role of MND in fast-tracking (Mitigated Negative Declaration) framed by quality standards, planning performance agreements (PPAs) and Environmental Outcomes Reports	Benefit Cost Analysis/Value for Money	Govt insurance underwriting, eg coverage gaps due to complex FOAK + turbine scaling + project scaling; unknown moorings and cable risk; liabilities 'domino'	Social Value Model criteria and weightings	TRL 1 to 5 - R&D tax relief	Manufacturing under OEM license	Methodology standards, eg LCOA; ERoEI; UK regional Content; HMT Green Book (VfM; Jobs; GVA wider economic benefits)
AfL - lease rent discount	HRA for leasing vs EIA for DCO (Development Consent Order)	Community PPAs/benefit agreements	State aid to Assisted/Deprived area, incl South Wales and Cornwall 'a' areas		TRL 6 to 9 - innovation commercialisation tax incentives (EIS, VCT, SEIS, SITR)	UK/Int JVs	Model Contracting Strategies and FLOW construction contracts (offshore vs onshore) that manage risk/local content
Enabling investments	Public consultation and community benefits, incl OSW jobs and training; and Local Authority Innovation and Capacity Funds		Direct investments by devolved power, eg port expansion, assembly yard JVs, new regional Development Corporation/Agency, underwrite hedging of forward orders, eg foundations		Tax incentives for private sector 'pooled' insurance funds for FLOW risks	Prime service contractors, eg Moorings as a service	Model insurance contracts: Contractor All Risk (CAR); Knock-for-Knock; 50:50; Back-to-Back; Nat Cat marine insurance methods

6.2.4 DEVELOPMENT & CONSENTING SERVICES (52% OF PROJECT COMPONENT, 2.5% OF TOTAL LIFETIME EXPENDITURE)

The Celtic Sea region has over twenty environmental consultancy firms or subsidiary offices, including in Cornwall, with consenting expertise, including in environmental impact assessment (EIA) services (OREC 2020). The region also has firms with expertise in: FLOW engineering and certification, geophysical and geotechnical surveying, and data analysis; naval architects with experience in the development of low carbon and survey vessels. The OREC report also notes that these types of services offer significant export potential.

To assure that the region captures the projected Essential scenario of 52% of project Development & Consenting costs we propose that The Crown Estate's (TCE) seabed leasing process is modified to require developers to adhere to industry good practice in local fair procurement. This modification should include the requirement for commitments:

- **Regional Supply Chain Registers** – to maintain up to date information on regional supplier capabilities and capacity;
- **Tender Alerts** – to provide tender alerts to regional suppliers, for example through an on-line supplier portal;
- **Supplier Workshops** – to provide timely supplier engagement workshops in multiple, accessible, locations within the region to introduce suppliers to buyers and navigate the developers' and 1st tier contractors' procurement processes from Expression of Interest, through pre-qualification to full tenders (RFPs or equivalent);
- **Project Contracting Strategies** – to formulate project contracting strategy guided by these same fair procurement principles and for these to flow down to the prime contractors as contractual requirements.

We also propose that evaluative criteria are introduced in the award of 1st tier contractors relevant to the development phase, weighted to reward contractors who make or facilitate investments in supply chain infrastructure, innovation, and skills in the Celtic Sea coastal regions.

At the time of writing it is unclear how the Crown Estate plans to introduce Social Value criteria into the Celtic Sea floating wind leasing round. But, since the above fair procurement practices are proposed as requirements and not part of a weighted qualitative scoring (other than the weighting of supply chain investments), we propose including these as declarations, signed up to as part of technical requirements to enter the lease auction, or as contractual commitments within the Agreement for Lease (AfL).

We further propose that these same fair procurement good industry practices are introduced to realise the 52% expenditure capture target during project development, also be a requirement of developers during project construction and operations.

As part of our coordinated policy package, fair procurement requirements put in place at leasing, will be more impactful if their effective actual delivery at development phase (and planned delivery at construction and operations phases) is then tested as a material factor in the CfD scheme.

This approach was already in place within the Green Growth section of the CfD Allocation Round 5 Supply Chain Plan, where a suite of fair procurement practices were asked of developers and scored. The scoring matrix included questions on the visibility of tender opportunities for suppliers and the extent to which project contracting strategies assured fair procurement. We propose that such questions be continued and, as importantly:

- **AfL-CfD Alignment** – be closely aligned with the language and intent of the fair procurement requirements scored at leasing;
- **CfD Non-Price Factors** – then maintained as weighted criteria in the CfD auction in a shift to non-priced factors in future CfD rounds (as indicated in the recent DESNZ Call for Evidence on non-priced factors in the CfD scheme)[35].

We also propose that a more pro-UK position be taken in these fair procurement requirements both at leasing and at CfD to assure that UK suppliers, in particular Celtic Sea regional suppliers, are the prime beneficiaries of these practices. There are three complementary options here:

35 DESNZ (April 2023) Introducing Non-Priced Factors into the Contracts for Difference (CfD) scheme: https://www.gov.uk/government/consultations/introducing-non-price-factors-into-the-contracts-for-difference-scheme-call-for-evidence

- **No disadvantage to local suppliers** – to frame the purpose of the fair procurement measures as to not disadvantage regional and/or UK suppliers, similar to how the Australian Industry Participation plan scheme for large projects operates (a policy measure which thus far has avoided WTO challenge).
- **Targeting economically deprived areas** – to justify targeting these fair procurement requirements at regional suppliers so as to rejuvenate the economically-deprived areas of South Wales and Cornwall.
- **Net Zero De-risking**– to adopt the new legal international trade norms discussed in Section 5, and advocated by the US and EU, to justify a focus on the role of domestic suppliers in de-risking supply chain bottlenecks to in turn assure project delivery and progress towards Net Zero.

6.2.5 PORT & LOGISTICS ACTIVITIES (80% OF PROJECT COMPONENT, 0.4% OF TOTAL LIFETIME EXPENDITURE)

Our Essential – 'Must Have' scenario targets regional capture of 80% of total expenditure on platform integration services and related on-shore storage (blades, towers, nacelles), short-term wet storage mooring (of foundations and integrated platforms) and load-out (of foundations, and of integrated platforms if subsequently transported to a different tow-out port).

The 80% target is primarily justified on the basis of the inherent advantages for developers of the closeness of regional ports and other coastal locations to the project offshore sites and associated towage times and project and weather risks. Weather risks arise either because the ports from which fully integrated platforms are towed to the offshore project sites are too distant, creating additional costs in insurance or introducing schedule delay risks (the preferred distance being 145Nm, 265km)[36]; or because the coastal locations for temporary storage of assembled foundations is too distant from the integration port (or the temporary storage of fully integrated platforms is too distant from the tow-out port), so introducing similar cost and schedule risks as above.

However, despite the geographic advantages for the ports of Bristol, Falmouth, Port of Milford Haven, Portland and Port Talbot for platform integration, and for other UK regional coastal locations to provide temporary storage, we are clear that it is not a given that the ports and coastal site owners or lease holders will be able to raise capital finance for infrastructure expansion at competitive market-rates.

The investments needed for industrial scale serial platform integration and to meet the required installation tow-out rates within available weather windows will be high. They will include, but not be limited to: development costs; cost for the repurposing or reclaiming of land; installation of cranes, rail systems and other heavy equipment; the widening and deepening of berths, harbours, and access channels; the installation of mooring systems for temporary wet storage at the integration port or other coastal location; and construction of load-out and tow-out facilities. As importantly, the required investments must be made years before the FLOW project works begin and the associated revenues start to flow.

To incentivise ports and other coastal sites to make these investments we focus our policy proposals on four areas: (a) the FLOWMIS grant scheme, (b) government backed loans, equity and guarantees, (c) investments by devolved powers, and (d) competition assessment criteria applied to TCE leasing and DESNZ CfD.

6.2.5.1 FLOWMIS

According to the competition literature, the government's Floating Offshore Wind Manufacturing Investment Scheme (FLOWMIS) will provide subsidies, in the form of grants, to attract and de-risk private investment to increase the capacity of UK ports to deploy and service floating offshore wind projects.

FLOWMIS aims to contribute to meeting HMG's policy target of 5.0GW of FLOW by 2030, to drive cost reduction and commercialisation of FLOW, longer term FLOW projects, and deliver industrial growth and associated regional economic and social benefits in the form of quality jobs and increased GVA[37].

As described in the FLOWMIS Guidance, to be eligible to access the scheme, projects must enable either (a) "turbine integration with floating wind foundation"; (b) "floating wind foundation assembly"; and/or (c) "floating wind foundation manufacture". The scheme has a £160m Scheme Cap of grant funding available for the following eligible expenditures: (a) "the construction, replacement or upgrade of port infrastructure"; (b) "the construction, replacement

36 Floating Offshore Wind Taskforce (2023) Floating Offshore Wind Taskforce: Industry Road Map 2040: https://energycentral.com/system/files/ece/nodes/598429/flow_tf_-_inegrated_report_f.pdf

37 Government gateway, website accessed 28th June 2023: Floating Offshore Wind Manufacturing Investment Scheme: https://www.gov.uk/government/publications/floating-offshore-wind-manufacturing-investment-scheme

or upgrade of access infrastructure"; and/or (c) "dredging". Notably, the scheme funding sought by the Applicant must only be in respect of 'ports', and eligible ports must be maritime (not inland) and based in the UK. This definition appears then to preclude coastal locations with quayside facilities that are not "ports" as so defined, yet might be suited to foundation assembly or temporary wet storage of completed integration platforms or assembled foundations.

There also appears to be no requirement for these ports to be located in economically deprived areas, or assessment criteria present that might reward investments in locations that are economically deprived, noting that Cornwall and South Wales are some of most economically deprived areas in the UK, with areas of North and South Devon only marginally less deprived according to EU classifications. Furthermore, stated ineligibility to access FLOWMIS is "investment in factory production". This is unfortunate, given that it could be interpreted as running counter to the scheme supporting the serial production of foundations or integrated platforms, which will be a critical to meeting current project pipeline targets and central to delivering regional economic benefit.

At the time of drafting this report, the subsidy intensity ratios of the scheme were as follows: 90% of eligible expenditure for projects not greater than £15m; 80% for greater than £15m and less than £40m, and 60% for £40m or more. Note also that applicants are to make port infrastructure developed with the grants available to interested users "on an equal and non-discriminatory basis and on market terms".

Our proposals to augment the FLOWMIS scheme draw heavily on our working interactions with the British ports, as represented by the British Ports Association and discussed in the Celtic Sea Cluster's Ports Working Group. This includes the recent government's announcement, in response to industry concerns, that the release of FLOWMIS grants will be staggered, with £70m available in 2024/25 and £90m in 2025/26. This staggering also aligns with the recent Floating Offshore Wind Taskforce 'Industry Road Map 2040' [38]. We note though, that as far as can be ascertained, the government has yet to increase the overall funding Scheme Cap beyond the original £160M. We thus make the following proposals.

Our proposals seek to increase the £160M Scheme Cap but also, and as importantly, to better apportion the FLOMWIS scheme budget so as to explicitly contribute to the South West/Wales (Celtic Sea) regional capture of expenditure on (a) platform integration, (b) foundation manufacture and assembly, and (c) temporary storage (wet and dry) of components , as follows:

1. **FLOWMIS Scheme Strands** – separate the FLOWMIS scheme budget into three discrete strands, each with three geographic sub-strands:

   Strand A – Platform Integration – WTG integration with floating wind foundation (sub-divided into discrete geographic zones: A1 – Scotland, A2 - North England, A3 – Celtic Sea).

   Strand B – Foundation Manufacture & Assembly – floating wind foundation manufacture and assembly (B1 – Scotland, B2 - North England, B3 – Celtic Sea). The scheme should define investments in the manufacture of concrete foundations (barge and semi-submersibles) to include investments in laydown areas, quayside, draught, installation vessels, logistics for supply of aggregates, rebar and cement, and investments in formwork (e.g. slip form rigs and post-tension operations) as well as associated workforce skills; and define investments in manufacture and assembly of steel foundations to include facilities and workforce skills for pre-fabrication, fabrication and final assembly, each of which could take place in a different location.

   Strand C – Temporary Storage of FLOW Components (B1 – Scotland, B2 - North England, B3 – Celtic Sea) – definitions for eligibility should include wet storage of fully integrated platforms, assembled foundations and foundation columns, and dry storage of WTG and foundation components, e.g. secondary steel, blades, towers, and nacelles.

The scope of the current FLOWMIS scheme budget applies to Strand A and Strand B together, and to all three regions collectively. Thus, a successful proposal to develop a foundation final assembly facility in a port in Scotland could consume the majority of the phase 1 cap of £70m, leaving insufficient funds to support platform integration, foundation fabrication or temporary wet storage, whether that be in Scotland, North England or the Celtic Sea.

38 Floating Offshore Wind Taskforce (2023) Floating Offshore Wind Taskforce: Industry Road Map 2040: https://energycentral.com/system/files/ece/nodes/598429/flow_tf_-_inegrated_report_f.pdf

In contrast, with our proposal, focusing a strand of FLOWMIS on platform integration, for example, and a sub-strand on the Celtic Sea region, would likely assure that Celtic Sea ports and coastal locations emerge as recipients of a FLOWMIS grant for integration. This in turn would help ensure that we hit our Essential – 'Need to Have' scenario target of 70% project expenditures from platform integration and storage activities.

1. **FLOWMIS Scheme Cap** – increase the available funds. Under the prior OWMIS scheme, just one winner – ABLE Marine Energy Park port development on the south Humber bank – was awarded £75m. This illustrates the clear risks of underfunding the FLOWMIS scheme, in that should only one or two winners emerge, many viable investment opportunities and/or FLOW regions would be left without support.
2. **Technical Assistance Grants** – we propose that the FLOWMIS scheme include small dedicated technical assistance grants for applicants who fail to win in a first round of FLOWMIS. The grant awards would enable applicants to review and resubmit their applications. In more detail: instead of announcing a single winner, or perhaps two, and all other applicants deemed to have failed, the FLOWMIS scheme would rank applicants by the quality (especially the 'bankability' of their bids). Then for the top 80% of bidders the FLOWMIS scheme would provide technical assistance grants of £250,000 to £1M to enable applicants to revise their studies and application[39]. Depending on the quality of their revised bids, applicants would then be included in the next round of FLOWMIS, and/or directed to other central government support measures (e.g. export finance, UK Infrastructure Bank, Crown Estate enabling investments) or to devolved authority finance, or towards commercial market-based financing, including potentially the Green Investment Group, formerly the UK Green Investment Bank.

6.2.5.2 GOVERNMENT-BACKED FINANCE

Given the current budget limitation of FLOWMIS, together with the obvious likelihood that viable investment opportunities will fail to secure FLOWMIS grants due to the wide scope of the scheme eligibility – covering not only platform integration but also foundation manufacture and assembly – potential suppliers of these services may need to look elsewhere for financing support. Government-backed options include:

- **Export Finance** – the proposed Home Shipbuilding Credit Guarantee scheme (see Section 5) is intended to complement the working capital and buyer credit financial products offered by UK Export Finance (UKEF). The scheme can support, for example, UK shipyards to export offshore wind service vessels and equipment. Given our specific Essential – 'Must Have' objective of incentivising investments in port infrastructure for platform integration and wet/dry storage, we judge the UKEF's Export Development Guarantee (EDG) as the most appropriate product. Eligibility for EDG requires an applicant to present a future business plan for earning at least 10% of its annual turnover from exports, and an ability to demonstrate at least 5% of past annual turnover from exports in each of the last three years (with one of these years at least 20%). For eligible applicants, EDG guarantees up to 80% of bank loans for use as working capital. We propose that UKEF clarify the extent to which EDG eligibility rules allow, or could be modified to allow, a guaranteed loan to be directed to capital investment in port infrastructure for platform integration and wet/dry storage, in the context of ports already often earning income from providing storage services to foreign vehicle exporters.
- **Loans, Equity & Guarantees** – the UK Infrastructure Bank (UKIB) is the UK's primary state-owned, government-backed, infrastructure financing facility for tackling climate change and supporting regional and local economic growth. Its stated mission is to "tackle climate change and support regional and local economic growth across the United Kingdom". The four core investment principles of UKIB that all applicants are required to meet are as follows:

39 Cornwall has already used regional funds in a similar way to support A&P Falmouth's port development, with Enterprise Zone support for feasibility work followed by Shared Prosperity Funds to support environmental impact assessment works, which has in turn positioned A&P Falmouth's FLOWMIS bid.

- the investment drives regional and local economic growth and/or supports tackling climate change;
- the investment is in infrastructure assets or networks, or new infrastructure technology, with priority to clean energy, transport, digital, water and waste;
- the investment delivers a positive financial return; and
- the investment crowds in significant private capital.

UKIB offers the full spectrum of financing products across loans, equity and guarantees. Important to the de-risking of investment in FLOW port infrastructure, UKIB offers Sovereign Infrastructure Guarantees (SIGs) – an agreement between the commercial bank offering a loan and HM Treasury. UKIB also offers financing to local and mayoral authorities across the UK (see Investments by Devolved Power below). These investment principles of the UKIB are in almost perfect alignment with the opportunity that Celtic FLOW represents to regional ports' potential to provide platform integration and storage services. Indeed, UKIB already has a track record with such investment, having in June 2023 invested £50M in the Port of Tyne for port infrastructure regeneration and expansion to service the needs of offshore wind suppliers. We thus propose that the Celtic Sea ports, supported by regional government, investigate the details of the Port of Tyne's UKIB submission to understand what makes a 'bankable' proposal. We also note that the Bank places a strong emphasis on the operating principle of 'additionality': the extent to which what happens as a result the investment in contributing to UK's climate goals and regional and local economic growth can be attributed to UKIB's investment and would not otherwise have occurred. We judge that there is a strong case that additionality can be attributed to SW/Wales ports offering platform integration and storage services, when compared to the alternatives of other UK ports or foreign (e.g. French and Spanish) ports for two reasons. First, because Celtic Sea ports are in areas of relatively high economic deprivation compared to many other UK port locations. Second, localising platform integration and storage close to the offshore FLOW sites de-risks project delivery, timelines and cost over-run risks by mitigating against 'local short supply'. Such investments can thus be argued to be material to UK meeting its 2035 target to decarbonise the UK electricity sector.

Further, investments by the Bank that mitigate the risk of 'local short supply' in sectors that tackle climate change are aligned with the new international policy playbook whereby governments apply the policy objective of tackling climate change to justify state aid for domestic industries. In the case of UKIB, we assume that the Bank's below-market rates of finance can be considered as state aid.

6.2.5.3 INVESTMENTS BY DEVOLVED POWERS

As noted above, the UKIB also offers financing to local and mayoral authorities. This opens up the possibility of Cornish and Welsh authorities applying to UKIB to finance a stake in regional port developments to support FLOW, possibly in joint applications with regional port owners. As with UKIB finance for private clients, eligible local authorities would need to invest in projects that align with the government's Net Zero objectives and/or support regional and local economic growth.

UKIB offers loans to authorities at the relevant Gilts rate +60 basis points – which is 20 basis points lower than the Public Works Loan Board – and for up to 50 years for fixed rates and 10 years for floating rates. We propose that relevant authorities, and local investment agencies such as Treveth in Cornwall, engage with UKIB to establish what types of company structures would be eligible for such loans, or for the Bank's equity or guarantee products. For example, were a local authority to take equity in a dedicated Special Purpose Vehicle (SPV) investment company to raise funds for port expansion for platform integration, would this satisfy the investment principles of UKIB?

Again, there is precedent for this approach. UKIB's latest annual report includes reference to lending of a £107 million loan to develop the South Bank Quay in Teesside Freeport as part of transforming the former Redcar Steelworks site. Teesworks (previously the South Tees Development Corporation) is a £200million initiative to redevelop the 4,500-acre area to the south of the River Tees, overseen by the Tees Valley Combined Authority. The redevelopment project is intended to create a 450-metre deepwater quay to service the offshore wind sector, providing opportunities for manufacturing facilities and storage. The investment is projected to support 800 jobs[40].

40 UK Investment Bank (2023) Annual Report and Accounts 2021 to2022: /www.ukib.org.uk/sites/default/files/2023-01/UKIB-Annual-Report-and-Accounts-202122.pdf

We note that since the UKIB loan announcement for the South Bank Quay expansion[41], the intended siting of a turbine blade manufacturing plant on the redeveloped quay by GE Renewable Energy has been cancelled. In its place is a planned investment of £450 million in a monopile manufacturing facility by UK subsidiary of Korean steel manufacturer SeAH[42]. Steel for what will be a production volume of 200 monopiles per year, is to be supplied by British Steel from its Teesside Beam Mill at Lackenby, near Redcar, with structural steel fabrication by Northallerton-based Severfield ahead of delivery to SeAH[43]. Subject to a Final Investment Decision for the Orsted Hornsea 3 Offshore Wind project, the SeAH facility has pre-orders for monopiles placed by the developer[44].

There is an important lesson emerging from the Teesworks case of relevance to devolved powers who may be considering investments in port infrastructure for offshore wind. These include the extent to which Heads of Agreements or equivalent agreements securing Original Equipment Manufacturers (OEMs) investments or developer forward orders, will be considered by Banks (UKIB or commercial banks) as sufficient evidence to satisfy their investment criteria. For OEMs, it may be that more legally binding agreements need to be negotiated; and for pre-orders by developers, some form of 'Take-or-Pay' contract be put in place, with the residual risk (i.e. the difference between the investment sum and pay sum) being hedged or in some other way insured against, for example taken on by the devolved powers, or by the pooling of risk by developers. This approach might also be adapted to support investments in onshore infrastructure, such as offices, workshops, logistics warehouses and training facilities.

6.2.5.4 COMPETITION ASSESSMENT CRITERIA IN LEASING & CFD

We consider here together and in a coordinated way (a) the Leasing process for seabed rights overseen by The Crown Estate and (b) the CfD auction for power offtake contracts managed by DESNZ. Unlike FLOWMIS and other policy instruments supporting the localisation of offshore wind supply chains that may impact projects differentially, these two critical stages of project development are currently[45] applicable across all projects.

Our central proposal is that the two competitions be aligned more closely: that the criteria for winning an award for seabed rights at leasing includes commitments to invest (or facilitate investments) in regional platform integration and storage infrastructure, and that sufficient progress in delivery of these investments constitutes a requirement to (i) activate a lease, (ii) secure a CfD contract and (iii) release first CfD payment. Indeed, recent government policy initiatives provide an immediate opportunity to align these two policy instruments in exactly this way.

First, in October 2022 TCE announced that creating economic and social value was an objective of their forthcoming Celtic Sea FLOW leasing round:

"The Celtic Sea programme is intended to provide 4GW of renewable energy capacity by 2035….The programme will not only boost the UK's net zero ambitions and deliver enhanced energy security, but will also create new jobs, skills and investment, including in Wales and the South West of England", and that as part of their participation in the tender for floating wind leases in mid-2023 developers 'will be expected to provide a plan of their early investment in support of an internationally competitive supply chain', and that these plans 'will determine whether participants qualify for proceeding to the final stage of the tender'[46].

The institution has yet to clarify what aspects of social value this supply chain plan will include, what the weightings might be, how exactly these criteria will be incorporated into the award of seabed leases, whether what is bid will become commitments, and what level of penalties will be applied for non-delivery.

41 UK Investment Bank (2022) https://www.ukib.org.uk/news/first-ukib-investment-goes-green

42 SeAH Wind Ltd'

43 Teesworks (2023) Web site accessed 18th September 2023: https://www.teesworks.co.uk/news/british-steel-to-supply-huge-seah-wind-plant-at-teesworks

44 Teesworks (2023) Web site accessed 4th July 2023: https://www.teesworks.co.uk/news/a-year-of-change-and-the-promise-of-much-more-whats-come-down-and-whats-going-up-at-teesworks

45 Reference to BP's consideration of CFD scheme opt-out.

46 The Crown Estate (2022) Press Release:The Crown Estate updates developers on latest steps in the leasing process for floating wind in the Celtic Sea: https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2022-the-crown-estate-updates-developers-on-latest-steps-in-the-leasing-process-for-floating-wind-in-the-celtic-sea/

Second, as noted in Section 2 of this report, DESNZ have completed a Call for Evidence[47] on the potential of applying non-priced factors to the CfD scheme. The call document includes proposed factors to reward investments in (i) infrastructure (e.g. ports, grid, etc), (ii) economically assisted areas (e.g. deprived areas near deployment zones), (iii) low carbon intensity supply chains, (iv) new technologies in the construction, operations & maintenance phases of a project; and (v) actions that contribute to reducing skill gaps and shortages.

To realise the early opportunity that aligning these two policy developments offers, we propose that the new social value criteria integral to lease tenders be chosen and weighted to reward developers who commit to invest or facilitate investments in platform integration, storage infrastructure and foundation fabrication/assembly in the Celtic Sea. Given (a) the leverage that developers have through market signalling and forward orders to facilitate early investments in regional ports and other coastal infrastructure, and (b) given the cost-escalation risks to developers of 'choosing' a specific port to invest in directly, we propose that any weighting by TCE to early FLOW supply chain infrastructure investments be applied equally whether the resulting investments were direct investments from developers or facilitated investments.

Bidders could be scored on a monetary scale of the investments or some other means to assess their scale of investment ambition. To maximise the likelihood of investments taking place in the Celtic Sea region, but without compromising the UK's obligations to international trade and investment rules, developers would be invited to (a) explain how their investments took consideration of the inherent commercial advantages of suppliers being located in the Celtic Sea coastal regions, (b) how the proposed investments would benefit regions that have relative economic deprivation, and (c) how formulation of project contracting strategies would be driven in part by considerations of the carbon content in the supply for materials and equipment. Specifically, this would entail tender assessment criteria and weightings that rewarded investments that:

- **Supply Chain Resilience** – increase the resilience of supply chains to reduce project delivery risks and disruptions, including weather risks, foreign supplier regulatory and tax risks, foreign political (nationalistic) prioritization, geopolitical threats to cross-border supply chains, and FOAK IP/licensing risks from foreign-owned FLOW innovations;
- **National Energy Security** – mitigate the national security risk of energy supply to the UK, for example regional suppliers could be at lower supply delivery risks of causing project delays which in turn risks delaying achievement of Net Zero targets and securing energy;
- **Minimise CO2 Emissions** – consider local solutions to reduce carbon emissions across lifetime of FLOW projects, for example by using low carbon local sources of concrete to manufacture foundations (aggregate, cement, rebar) and attract inward investment in low carbon steel production; and
- **Deprived Coastal Area Rejuvenation** – bring jobs and wider economic benefits to rejuvenate the Celtic Sea coastal regions.

TCE's communique of 4 July 2023 concerning forthcoming 4.0GW Celtic Sea seabed leasing rights provides an opportunity to define the above tender assessment criteria[48]. The communique states that:

"New aspects of the tender design will also require developers to set out more detail on how they plan to create lasting social and environmental value, with the introduction of questions linked to the UK Government's social value model (SVM) focused on education, inclusion, environment and communities."

This will require prospective developers to think innovatively and constructively about how their proposed developments can provide wider benefits across the UK's economic, social and environmental objectives; with the aim of creating a legacy of healthier, more resilient, more fair, vibrant and prosperous communities that will stretch beyond the lifetime of the leases.

A clear commitment to these aspects will be required in order for developers to progress to the later stages of the leasing process.

In the communique TCE indicates the intent to draw on the government's Social Value Model, therefore we see here a clear opportunity to embed certain Social Value questions and evaluative criteria into the Celtic Sea lease tender. Such criteria can support not only the regional capture of wind turbine integration with foundations but also potentially also steel foundation assembly and/or concrete foundation manufacture

47 DESNZ (April 2023) Introducing Non-Priced Factors into the Contracts for Difference (CfD) scheme: https://www.gov.uk/government/consultations/introducing-non-price-factors-into-the-contracts-for-difference-scheme-call-for-evidence

48 The Crown Estate, website accessed 13th July 2023:. The Crown Estate sets out next steps on floating offshore wind off Welsh and South West coast: https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2023-the-crown-estate-sets-out-next-steps-on-floating-offshore-wind-off-welsh-and-south-west-coast/

(see Section 6.4 on our Realistic scenario). We thus propose that the Crown Estate adopt the following Model Assessment Criteria (MACs) and model reporting metrics:

- **Social Value MAC 4.1** – Carbon emissions in foundation manufacture, fabrication, assembly & storage.
- **Social Value MAC 2.2** – Employment creation and training in economically deprived areas
- **Social Value MAC 3.1** – Supply chain resilience.
- **Social Value Theme 2** – Mandatory reporting as a condition of AfL against Social Value metrics 'FTE jobs and training by UK region'.

With these revisions in place, winning bidders would likely emerge from the Celtic Sea FLOW seabed leasing rights auction actively championing investments in regional platform integration (and potentially foundation assembly and manufacture). If so, it is critical to then align these commitments with follow-on policy mechanisms that continue this momentum.

Specifically, we propose that the following regulatory decision-gates be used to continue the policy momentum: (i) the activation of a lease option; (ii) the award of a CfD contract; and (iii) first CfD payment. Progressively, each of these follow-on stages of project development need to include assessment criteria that reward those developers who have delivered on the regional infrastructure investment commitments made at the leasing stage, e.g. in platform integration, wet/dry storage and/or foundation manufacture and assembly.

There is already preliminary precedence for this policy-coordinated approach, with the CfD scheme moving in this direction. For example, the proposed Supply Chain Plan questionnaire for CfD Allocation Round 6 for offshore floating wind projects of less than 300MW, scores responses to Question 2.1 that asks: "Are you (or your tier one suppliers) supporting investments in the infrastructure necessary for increasing the capacity and capability of your suppliers?" The highest marks are awarded to developers "if [their] investment triggers or will lead to major infrastructure upgrades (new or expanded infrastructure)", and lesser marks "if investment triggers or will lead to incremental infrastructure upgrades (e.g. improving existing infrastructure)", and lesser still "if providing other forms of support only (e.g. guaranteeing pipeline to enable investment)". 80 marks are awarded for this single question, which is nearly 25% of total marks of 329. Likewise, another 20 marks is awarded for "collaboration that aims to bring forward the development of infrastructure", bringing the total marks for floating wind supply chain infrastructure investment to 30%.

What is currently missing is alignment with dedicated tender criteria rewarding early investments in platform integration, storage and/or foundation manufacture/assembly at the Seabed Leasing Rights stage. Furthermore, there is need for parity in the weightings applied to investments made directly by developers and those that result from developers facilitating investments, e.g. through forward orders or accepting supply risks. Finally, although we support that 30% of total marks for Supply Chain Plans relate to commitments to infrastructure investments, we propose revisions to the way developers can avoid making impactful commitments by exploiting weaknesses in the scoring criteria. These weaknesses include: (a) the absence of rewarding the quantitative financial scale of direct or supported investments (the scheme assesses only the qualitative criteria of whether investments "will lead to major infrastructure upgrades"); (b) the application of criteria in isolation of other developers, instead of assessing investment commitments against the relative offers of other developers, and (c) the available 80 marks being spread across a required four "actions" to strengthen infrastructure, 20 per action. This means that a single substantive capital investment, for example in a critical port infrastructure, plus three weaker investment actions, is placed at a disadvantage compared to a developer who offers four moderate-scaled investment actions.

To summarise, we propose that for the Seabed Leasing Rights and CfD phases of Celtic Sea FLOW deployment:

- **TCE** – establishes criteria that rewards early investment in regional infrastructure for platform integration, wet/dry storage and foundation manufacture and assembly and at the lease activation decision gate;
- **DESNZ** – in the CfD auction process, strengthens the rewards for developers based on the scale and extent of delivery of these earlier investment commitments arising from the leasing auction.

Finally, there is more that both lease auctions and CfD competitions can do to frame supply chain investments around the inherent commercial advantages of localising floating wind supply chains in Wales and the South West through reference to the new room for legal manoeuvre offered by new

precedents set by the US and EU to justify investment in domestic supply chains where these de-risk supply bottlenecks, protect or enhance delivery of a country's national Net Zero targets and/or bring economic benefits to deprived regions.

6.2.6 FOUNDATION MANUFACTURE & ASSEMBLY (10% OF PROJECT COMPONENT, 17.8% OF TOTAL LIFETIME EXPENDITURE).

Our Essential – 'Need to Have' scenario assumes certain ports and other Celtic Sea coastal locations in the South West/Wales, whilst with potential to provide platform integration services, are unable to attract investment in quayside and laydown infrastructure sufficient to host floating wind foundation manufacture and assembly. However, with steel fabrication yards already located in the region and opportunities for investments in port or coastal locations to accommodate less-complex (e.g. lower structural stress loads and smaller scale) work than needed for assembly of floating wind steel foundation columns and platform, we anticipate opportunities for local fabrication of secondary steel. This could include, but is not limited to, gangways, stairs, ladders, platform boat landings, turbine service decks, crane struts and low-stress braces, as well as J-tubes to protect subsea cables.

The early challenge to capture secondary steel will be for regional fabricators to secure sufficient forward orders to support raising investment finance. Part of the solution is, as described in Section 6.2.5.4, to introduce competition assessment criteria at the government's seabed lease auctions and the CfD process that increase the likelihood of FLOW project prime contractors (hereinafter termed project primes) and/or foundation prime contractors (hereinafter termed foundation primes) to source their secondary steel from regional fabricators. Pour memoire, these proposed policy interventions include non-price factors that reward project developers who use suppliers who provide resilience to supply chain bottlenecks, offer low carbon products and help bring jobs and wider economic benefits and thus rejuvenate the deprived Celtic Sea regions.

Noticeably, in CfD AR5, the criteria applied to score developers' Supply Chain Plans contained no questions nor scoring to reward this form of contracting strategy to flow-down supply chain localisation for secondary steel and other component products. Instead, project contracting strategies were assessed only with regards to whether the developer (i) considers "non-financial value factors" to distinguish between bids, and (ii) assures "full and fair opportunity for all suppliers to access open tenders". There was no explicit reference to non-price factors for supply chain resilience, low carbon supply chains or economic rejuvenation, and no consideration of whether developers would flow down a requirement for prime contractors to include the same non-price factors in their sub-contracting, including tenders for secondary steel.

To incentivise project primes and/or foundation primes to flow-down supply chain localisation in the contracting of lower tier suppliers, either through requirements in the scope of work or through contract clauses, we propose to reward project developers who commit to such contracting strategies within the seabed leasing and CfD processes

6.2.7 VESSELS & SUBSEA ENGINEERING CONSTRUCTION (88% OF PROJECT COMPONENT, 4.0% OF TOTAL LIFETIME EXPENDITURE)

There is as yet no settled view on what large scale FLOW installation campaigns will look like, for example on the sequencing of anchors and moorings, production engineering for floating foundations, integration & wet storage of completed floating units and so on. Nor is there a settled view on what form follow-on operations & maintenance (O&M) approaches will take, including on the combination for O&M of CTV (crew transfer vessels) and/or larger SOV (service operation vessels) and/or helicopters, and/or unmanned air, surface, and subsea vehicles. We nevertheless anticipate that, even under our relatively conservative Essential – 'Need to Have' scenario, the Celtic Sea region will capture 88% of expenditure on vessels for offshore construction and subsea engineering operations, and follow-on O&M, and for three principal reasons.

- **Existing Capacity** – existing capacity suitable for FLOW in O&M already available in the conventional offshore wind fleet of workboats (tugs, multicat, AHVs/AHTSs etc), e.g. for harbour movements, resupply, portside turbine integration, wet storage control, platform towing, anchor and mooring handling, cable installation, etc.
- **New Build** – Britain has strong shipbuilding capacity in CTVs, OCVs and SOVs, through UK ownership, naval architects, ship building and repair yards, and the development and commercialisation of clean propulsion equipment

and systems. Research carried out by the Centre for Local Content Innovation (CLCI) in 2021, based on estimated demand for CTVs across projected offshore wind development to 2050 (floating and fixed), found that a particular UK competitive strength is in aluminium CTVs with hybrid diesel/electric or full electric (battery or hydrogen fuel cell) propulsion systems, as well as in engineering designs offering high levels of fuel efficiency.

- **Project Location** – during service operations, CTV bases will need to be 50km to 100km from the project site, i.e. within the range at which CTVs can feasibly operate. It is thus inevitable that CTV supply, maintenance and repair bases will be located in Cornwall and Pembrokeshire. A similar logic holds for OCVs and SOVs: although they have better range and can remain at sea for extended periods, it is still a significant advantage for chartered or owned SOV vessels to operate from shoreside locations as close as possible to the offshore projects.

Without policy interventions, the Centre of Local Content Innovation (CLCI) research estimated that the UK could capture design orders for 81 of the anticipated 300 hybrid CTVs The projected 81 wins is equivalent to 27.1% of total aggregated expenditure on hybrid CTVs by the offshore wind sector to 2050. For each CTV the UK content would average 95%, assuming 100% UK labour, UK retention of profits, and that the only imported components would be aluminium ingots and bars. The same study concluded that UK shipyards could win construction of 95 of the projected 300 hybrid CTV vessels, 31.7% of total expenditure in this class, and that UK content per vessel would average 88%. Note that, whilst ICE-powered CTVs fuelled by methanol or green Ammonia may also play a part in the decarbonisation of vessels used in floating wind projects, the CLCI research assumed these would be constructed more cheaply overseas based largely on off-the-shelf designs (excluding adaptations for alternative fuels).

To improve on these 'Do Nothing' figures and meet our Essential – 'Must Have' work capture targets, we propose a coordinated set of policy interventions in these areas:

- **SLA & CfD** – to date, the only reference to offshore wind vessels in [either the seabed leasing auctions or] CfD rounds has been in the CfD scheme as part of the definition for what constitutes qualifying actions to reduce the carbon footprint of offshore wind projects (see Section 2.2 of AR5 Supply Chain Plan questionnaire[49]). We thus propose that future Celtic Sea seabed leasing auctions and CfD allocation rounds include criteria that reward developers for chartering low carbon and/or zero carbon CTVs and SOVs, sourcing vessels from designers and shipbuilders with experience of UK coastal waters, and contracting vessel re-supply, maintenance and repair bases located in geographic proximity to project sites.
- **Fiscal Incentives for Training** – we also propose additional fiscal incentives for UK naval architect firms and UK shipyards, including to provide additional training in CTV and workboat design and fabrication, and in maritime decarbonisation, to increase overall capacity of skills in this area of UK and regional competitive advantage.
- **Home Shipbuilding Credit Guarantee Scheme** – EU shipbuilders already benefit from significant national government support. For example: Norwegian yards are supported with exceptionally competitive Norwegian government export credit schemes; German yards are supported by regional and national grants; Spanish yards benefit from attractive tax incentives. Aligned with the principle of policy parity, we thus propose that British shipbuilding companies and shipyards with the capability to build CTV and SOVs be considered in the scope of the proposed Home Shipbuilding Credit Guarantee scheme, so that they can expand existing yards, bring new yards onto line, and be in a position to compete on a more level playing field with EU shipbuilders.

With these policy interventions in place, the CLCI research anticipates that UK capture of hybrid CTV design orders would rise from 81 of 300 vessels (27.1% of total expenditure) to 111 (37.1%), and that UK shipyards could increase their orders from 95 vessels (31.7%) to 225 (75.0%). Table 6 lists UK naval architects and shipyards with potential to benefit from policy interventions to support the design and construction of CTVs for the offshore wind sector to 2050.

The CLCI study did not look at the capture of O&M vessel re-supply, maintenance, and repair but due to the need for geographic proximity for these services for hybrid CTVs, and assuming that skills development policy levers are in place and effective, we judge it not unreasonable to assume regional UK yards and ports capturing 100% of related expenditure.

49 UK Government (Supply Chain Plan Questionnaire, Contracts for Difference Allocation Round 5, All Project equal to or greater than 300MW: https://www.gov.uk/government/publications/contracts-for-difference-cfd-allocation-round-5-supply-chain-plan-questionnaire-and-guidance

Table 6 - UK Naval Architects and Shipyards with potential to benefit from Policy Interventions to support the design and construction of CTVs for the offshore wind sector to 2050

Naval Architects	Shipyards
AliCat Workboats- Yarmouth	AliCat Workboats- Yarmouth
AMC – Cowes	Ambrey Yard – Southampton
Artemis Technologies – Belfast	AMC – Cowes
BAR Technologies – Portsmouth	Blyth Catamarans – Canvey Island
Berthon Boat Company – Solent	Cammell Laid - Birkenhead
BMT – Southampton	Diverse Marine – Cowes
Chartwell Marine - Southampton	Ferguson Marine - Glasgow
Diverse Marine- Cowes	Harland & Wolff - Appledore
Goodchild Marine Services - Norwich	Harland & Wolff - Belfast
Harland & Wolff - Belfast	Mainstay Marine Solutions - Pembrokeshire
HolyHead Marine – Anglesey	Manor Marine – Weymouth
ICE Marine Design – Southampton	McDuff Shipyard - Aberdeen
Incat Crowther UK – Southampton	MMS Ships repair and drydock Co. – Hull
Macduff Design – Aberdeen	Parkol Marine - Whitby
Mainstay Marine Solutions - Pembrokeshire	Pendennis shipyard – Falmouth
Meercat Boats – Southampton	Swansea Dry Dock - Swansea
PDL Marine – Portsmouth	UK Docks - Teesside
Sea KIT - Essex	UK Docks – Tyneside
Vectis Marine Design – Portsmouth	UK Docks Gosport and Victoria Key – Portsmouth
Walker Marine Design – Southampton	UK Docks Mashford – Cornwall
Windcat Workboats – Lowestoft	Weight Shipyard – Cowes

6.2.8 ELECTRICAL INFRASTRUCTURE (36% OF PROJECT COMPONENT, 7.4% OF TOTAL LIFETIME EXPENDITURE).

We include within the term Electrical Infrastructure the manufacture and supply of export and dynamic array cables, offshore substation (fabrication of jacket and topsides, and installation) and onshore substation along with civil works. Electrical components for the substations include switchgears, converters, reactive power compensation and earthing systems.

Prysmian Group, a UK company with HQ in Bishopstoke and manufacturing plants in Aberdare (South Wales), Wrexham and Tyne and Wear, specializes in the design, manufacturing and installation of submarine cables and systems for power transmission and distribution. The Group currently has an order book of over £7 billion, including a recent £1.6 billion order from developer TenneT for first-of-a-kind 525 kV HVDC submarine cable grid connection projects to connect offshore wind farms in Dutch North Sea to mainland Netherlands[50].

Our Essential – 'Need to Have' scenario assumes Prysmian will win the order for similar grid connection as well as for dynamic cables and onshore cabling, having already won contracts with RTE and Cobra Group for dynamic cable systems for the Gruissan floating offshore wind farm in Southern France[51] and the Kincardine floating wind project offshore Scotland, respectively. The UK content impact of this activity is complex. For example, OREC[52] note that the cable system for the Kincardine project covers both dynamic and static cable sections, but with the cables manufactured in Prysmian plants in Spain and Norway. Further, the array cable cores produced for the Hornsea Two project were assembled in Wrexham, but using raw materials from across Europe, with the cores formed into cables in Norway.

For the onshore electrical infrastructure works relating to Celtic Sea floating wind projects, OREC note that "all onshore electrical infrastructure can be manufactured within the region". In addition, we anticipate that regionally-located civil engineering firms will likely be sub-contracted to undertake construction works to connect the offshore projects to onshore converters and substations, in a similar way to the contracting of J. Murphy & Sons' to manage the onshore civil works contracts for the Sofia and Dogger Bank C offshore wind projects[53].

To incentivise the realisation of these work capture targets (36% of component spend, 7.4% of overall expenditure), we propose the design of non-price factors in the award of seabed leasing rights and CfD contracts. Associated auction evaluation criteria should reward developers who source electrical infrastructure components and electrical infrastructure civil works contracts and sub-contracts from suppliers who can assure supply and avoid bottlenecks, and who bring employment opportunities to economically deprived areas. Emphasising both factors is legitimately commercial in nature whilst also increasing the likelihood that suppliers will be selected from the Celtic Sea region or the wider UK. In addition, we propose that government, in partnership with UK engineering institutes, develop model EPCI/EPCm tender documents that include 'K' factors (i.e. non-priced criteria) designed to flow-down the same incentives for the contracting of those sub-suppliers in the Celtic Sea region who can offer similar inherent commercial benefits.

50 Prysmian, website accessed 10th July 2023: https://www.prysmiangroup.com/en/media/press-releases/prysmian-secures-1-8-bn-offshore-wind-farm-connection-projects-from-tennet-in-the-netherlands

51 Prysmian, web-site accessed 10th July 2023: https://www.prysmiangroup.com/en/media/press-releases/prysmian-cable-project-for-a-new-floating-offshore-wind-farm-in-france

52 ORE Catapult (2020) Benefits of Floating Offshore Wind to Wales and the South West: https://ore.catapult.org.uk/?orecatapultreports=benefits-of-floating-offshore-wind-to-wales-and-the-south-west-supply-chain-report

53 J.Murphy and Sons, website accessed 19th July 2023: https://www.murphygroup.com/what-we-do/our-business-units/energy

6.2.9 OPERATIONS & MAINTENANCE OVER 25 YEARS (37.8% OF PROJECT COMPONENT AND 30.5% OF TOTAL LIFETIME EXPENDITURE)

Our Essential – 'Need to Have' scenario assumes that there is an overwhelming commercial advantage to developers locating O&M services geographically close to the Celtic Sea project lease areas. This includes: operations control and site offices; contractor offices and equipment and spare parts storage; services for minor offshore repairs to wind farm components; re-supply, maintenance, and repair of offshore service vessels; and helicopter services; services for inspection drones and autonomous surface vessels, and personnel agencies providing technicians and other skilled labour. Applicable regional ports include Falmouth (ship repair, towage fleet, main O&M operating base), Pembroke Dock (main O&M operating base), Harland & Wolff Appledore (ship repair, towage fleet), Devon (potential for re-supply and component minor repairs and potentially tow-in repairs, Newlyn Harbour (forward O&M operating base), Plymouth Harbour (autonomous vessels).

To incentivise project developers toward these local work capture targets, we recommend a similar approach to that for electrical infrastructure at Section 6.2.8 above. In particular, we propose the inclusion of non-price factors in the award of seabed leasing rights and CfD contracts, and for these criteria to give competitive advantage in these auctions to developers who plan to invest in O&M facilities and source related services from suppliers who can offer fast turn-around times for repairs and maintenance, mitigate risks of supply chain bottlenecks, and bring employment opportunities to economically deprived areas – factors for which Celtic Sea locations also offer clear commercial advantages.

We also propose regional promotion of the potential role of the British Business Bank and UK Infrastructure Bank. The former offering government-backed loans and other financial products to UK SMEs (The bank recently launched a South West Investment Fund with £200 million allocated to a range of financing options for firms in Cornwall, Devon, Dorset, Gloucestershire, Somerset, and Wiltshire, offering loans up to £2million and equity investment up to £5million[54]). As discussed earlier, the latter– UKIB - offers larger-scale financing aimed at high growth opportunities and includes below-market rate loans, equity stakes and loan guarantees.

6.2.10 SUMMARY OF THE SCENARIO TARGET BENEFITS

The policy packages described above is our 'best bet' for a coordinated set of policies designed to deliver the Essential scenario targets for capture of FLOW expenditure in the Celtic Sea region of the South West and Wales, and specifically in Cornwall. If fully funded and executed in a timely manner, we envisage that, taken together, the policy measures will bring the following economic and social benefits, for 4GW of installed capacity by 2035 and for a cumulative 24GW by 2045.

- **GVA** – deliver, over the assessment period an additional (over and above the 'do nothing' risk scenario):

  Celtic Sea Region – £180mn GVA (4GW) or c£815mn (24GW).

  Cornwall Sub-Region – c£93mn GVA (4GW) or c£425mn GVA (24GW).

- **Jobs** – deliver, at the peak of employment, an additional (over and above the do nothing scenario):

  Celtic Sea Region – c100jobs (4GW) or c100 jobs (24GW).

  Cornwall Sub-Region – of c100 jobs (4GW) or c100 jobs (24GW)

- **Jobs** – support cumulative job years of employment of:

  Celtic Sea Region – c1850 job years (4GW) or c9,150 job years (24GW)

  Cornwall Sub-Region – c900 job years (4GW) or c4,800 job years (24GW)

The difference in estimated economic benefits from Scenario 2 (Essential Scenario) are illustrated over for both CIoS and SW&W. This is expressed both in terms of cumulative job years (noting this does not represent number of jobs supported at any one time) and cumulative GVA.

The charts show estimated benefits for the 4GW deployment scenario (orange graphs, figures 4 to 7) and the 24GW deployment scenario (blue graphs, figures 8 to 11), in terms of both jobs and GVA – for both the Celtic Sea region and Cornwall, as a sub-region.

54 British Business Bank, website accessed 11th July 2023: https://www.british-business-bank.co.uk

6.2.11 ESSENTIAL SCENARIO – 4GW – ADDITIONAL JOBS

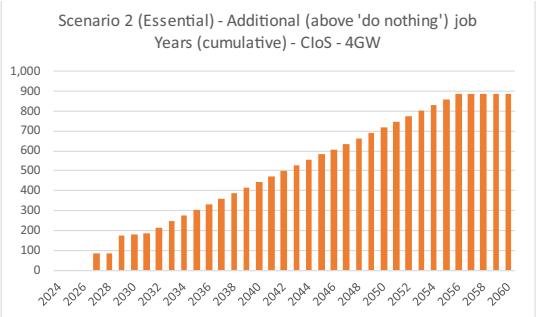


Figure 4 - Essential Scenario - 4GW – Additional Jobs – Cornwall and the Isles of Scilly

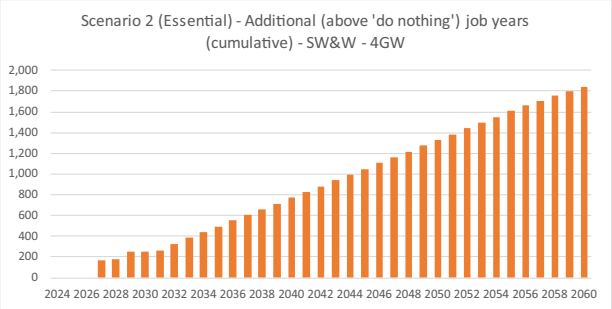


Figure 5 - Essential Scenario - 4 GW – Additional Jobs – SW&W

6.2.12 ESSENTIAL SCENARIO – 4GW – ADDITIONAL GVA

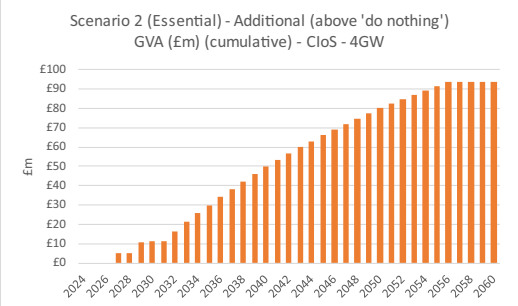


Figure 6 - Essential Scenario - 4GW – Additional GVA – Cornwall and the Isles of Scilly

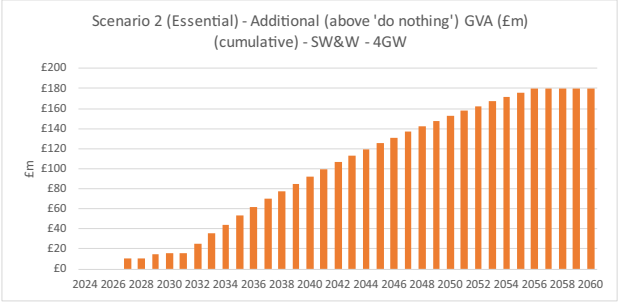


Figure 7 – Essential 4 GW – Additional GVA Benefits – SW&W

6.2.13 ESSENTIAL SCENARIO – 24GW – ADDITIONAL JOBS

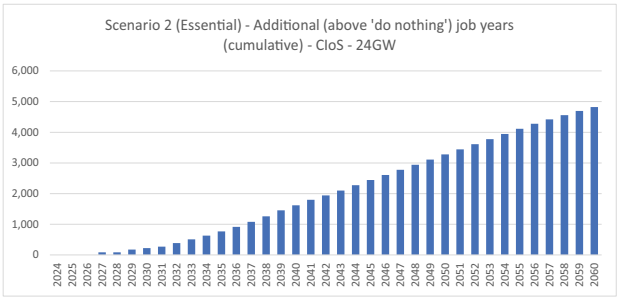


Figure 8 - Essential Scenario - 24 GW – Additional Jobs – Cornwall and the Isles of Scilly

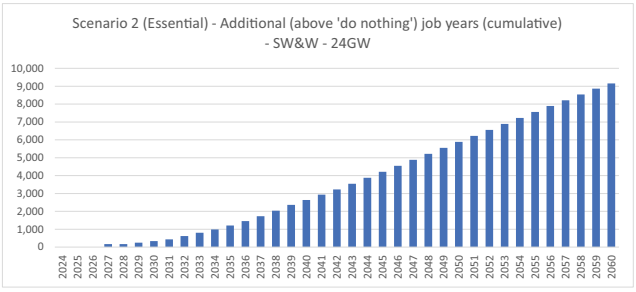


Figure 9 - Essential Scenario - 24 GW – Additional Jobs – SW&W

6.2.14 ESSENTIAL SCENARIO – 24GW – ADDITIONAL GVA

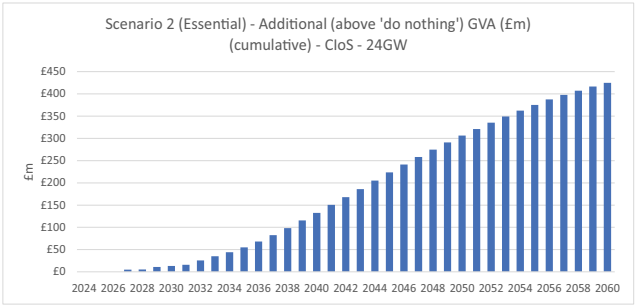


Figure 10 - Essential Scenario - 24GW – Additional GVA – Cornwall and the Isles of Scilly

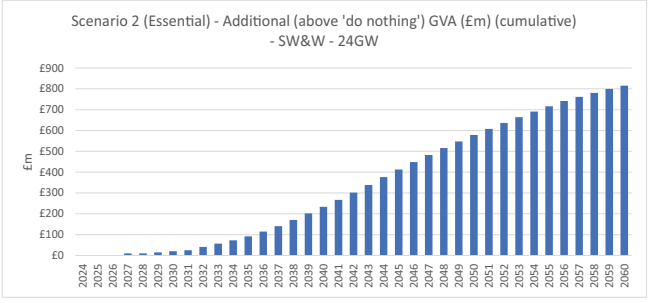


Figure 11 - Essential Scenario - 24GW – Additional GVA – SW&W

The associated policy package largely comprises more impactful design and closer coordination of extant policy interventions, as well as exercising the principle of policy parity with recent US and EU interpretations of the legal room for manoeuvre for the localisation of OSW supply chain, as well as a focus on the inherent commercial advantages of developers sourcing from Celtic region-based suppliers. If successful in delivering the 'Essential' scenario targets, these policy proposals would require a relatively modest level of additional public investment in relation to the targeted economic and social benefits.

6.3 REALISTIC CAPTURE SCENARIO – "WANT TO HAVE" – 41% OF PROJECT EXPENDITURE CAPTURED BY SUPPLIERS LOCATED IN CELTIC SEA

6.3.1 BASIS OF THE SCENARIO TARGETS

Our Realistic – 'Want to Have' scenario assumes the work captures anticipated in the Essential – 'Need to Have' scenario as its foundation, and includes additional work capture areas that we judge could realistically be achieved if there is early, substantial, and focused investment in supply chain companies, logistics infrastructure and workforce/skills, the result of which would be the capture of 41% of project expenditure, directly or indirectly by Celtic Sea suppliers.

6.3.2 OVERVIEW OF THE SCENARIO TARGETS

Table 7 below shows which additional components of project spend we anticipate being captured in the region for this 'Realistic' scenario over and above the 'Essential' case.

In the Realistic scenario, we anticipate the following additional project sub-components being captured by regional suppliers, for some elements over and above that captured in the Essential scenario:

- **Development & Consenting expenditure capture:** SW&W 75%, CIoS 37.5% (equivalent to 1.9% or 0.9% of total lifetime expenditure, respectively)– comprising at least one regionally-located project developer who brings a procurement office and sourcing decision-making to the region.
- **Foundation Manufacture & Assembly expenditure capture:** SW&W 80%, CIoS 8%) (equivalent to 14.2% or 1.4% of total lifetime expenditure, respectively) – comprising international/local joint ventures to manage the deliver assembly of steel and concrete foundations, 1 x local facility to manufacture and assemble concrete foundations (incl. inputs of local concrete, aggregate and rebar), and 1 x facility to assemble steel foundations (incl. columns, braces, heave plates, stiffeners) but with import to the region of pre-cut and formed plates, tubes, sections and columns (either from fabrication sites in UK, e.g. Offshore Solutions Group, Teesside, or from overseas).

Table 7 - Components, £ and % Lifetime Project Expenditure captured in Realistic Scenario[55]

Scenario 2 - Realistic					
		Cost benchmarks (£kw)	% total spend	SW&W market capture	CIoS market capture
CAPEX	Development and Consenting	£ 124	2.7%	75%	38%
	Substructure	£ 879	19.2%	80%	8%
	Wind turbine	£ 1,000	21.9%	0%	0%
	Anchors	£ 26	0.6%	100%	80%
	Mooring lines	£ 92	2.0%	50%	25%
	Array cables	£ 19	0.4%	50%	50%
	Electrical infrastructure	£ 364	8.0%	36%	18%
	Ports & logistics	£ 21	0.5%	80%	40%
	Vessels and subsea engineering	£ 198	4.3%	88%	44%
	Other capex	£ 320	7.0%	28%	22%
		Cost benchmarks (£/kw/y)			
OPEX	O&M Offshore	£ 23	11.1%	100%	50%
	O&M Onshore	£ 3	1.4%	100%	60%
	Other Opex	£ 42	20.2%	0%	0%
		Cost benchmarks (£kw)			
	Decomissioning	£ 51	0.7%	24%	6%

55 It is important to note that total of the market capture columns in the table do not exactly tally with overall market capture figures for each scenario. This reflects that the total market capture by component has not been discounted (i.e. not reflected in Present Values). The total market capture under each scenario does reflect discounting over the appraisal period and is reflected in Present Values. For example, in the Realistic Scenario for SW&W the sum of each component is 40.2% compared to the overall market capture estimate of 41% associated with that scenario. This is also the case in each of the same summary tables for each scenario.

Table 8 - Policy Package to incentivise investments to help deliver Realistic scenario targets

Seabed Leasing	Consenting	PPAs and market reform	Govt investments and subsidies	Procurement practices	Tax incentives	Anchor companies	Standards and model contracts
PPQ	Nationally Significant Infrastructure Projects (NSIPs) reform process	Review of Electricity Market Arrangements (REMA), esp intermittent vs firm power market split	FLOWMIS reform, eg expanded scope (cables, moorings, vessels, BoP); differentiated scopes (integration vs foundations vs components); ranking and re-design; 2nd + 3rd rounds	Public procurement of vessels builds commercial capability of UK yards, eg MOD, coast guard vessels	Flexing Tax incentives at Free Ports (Milford Haven/Port Talbot/ Plymouth/Anglesey)	Developers	Model pre-orders contracts, eg Take or Pay (TOP); hedged forward contacts (fixed/drawdown/window)
ITT1 - Info only	Zonal planning and Offshore Energy SEAs	CfD Supply Chain Plan /NPF revisions AR6+	Loans and loan guarantees (a) at market rates eg Green Investment Bank; HSCGS, (b) at discounted rates, eg British Business Bank, UKIB, Export Devt Guarantees	Other public procurement that builds regional FLOW capacity, eg public transport	Spread key free port tax incentives to other ports in Celtic sea region	EPC/EPCm/ EPCI	Model EPCI tenders - 'K' factor Supply Chain Plans
IIT1 - Pass/Fail or multi-factor auction	Inspectorate and DLUHC 'fast-track' consenting (amendments to Levelling-Up and Regeneration Bill)	Private Wire PPAs to address Grid connection bottlenecks and incentivise Wind > H_2 base load	FLOW-BoPMIS scheme (Balance of Plant Manuf Investment scheme) Second round OWMIS (Offshore Wind Manuf Investment scheme)	Devolved powers public procurement, eg ferries	Capital allowances; Structures and Building allowances; NIC allowances; Business rates relief	OEMs	Quality standards, eg DNV-ST-0119 Floating wind turbine structures, Low carbon H_2 standard; low carbon concrete/ steel; dynamic cables
ITT2 - option fee discount	Role of MND in fast-tracking (Mitigated Negative Declaration) framed by quality standards, planning performance agreements (PPAs) and Environmental Outcomes Reports	Benefit Cost Analysis/Value for Money	Govt insurance underwriting, eg coverage gaps due to complex FOAK + turbine scaling + project scaling; unknown moorings and cable risk; liabilities 'domino'	Social Value Model criteria and weightings	TRL 1 to 5 - R&D tax relief	Manufacturing under OEM license	Methodology standards, eg LCOA; EROEI; UK regional Content; HMT Green Book (VfM; Jobs; GVA wider economic benefits)
AfL - lease rent discount	HRA for leasing vs EIA for DCO (Development Consent Order)	Community PPAs/benefit agreements	State aid to Assisted/Deprived area, incl South Wales and Cornwall 'a' areas		TRL 6 to 9 - innovation commercialisation tax incentives (EIS, VCT, SEIS, SITR)	UK/Int JVs	Model Contracting Strategies and FLOW construction contracts (offshore vs onshore) that manage risk/local content
Enabling investments	Public consultation and community benefits, incl OSW jobs and training; and Local Authority Innovation and Capacity Funds		Direct investments by devolved power, eg port expansion, assembly yard JVs, new regional Development Corporation/Agency, underwrite hedging of forward orders, eg foundations		Tax incentives for private sector 'pooled' insurance funds for FLOW risks	Prime service contractors, eg Moorings as a service	Model insurance contracts: Contractor All Risk (CAR); Knock-for-Knock; 50:50; Back-to-Back; Nat Cat marine insurance methods

- **Moorings Manufacture expenditure capture:** SW&W 50%, CIoS 25% (equivalent to 0.9% or 0.5% of total lifetime expenditure) – through the establishment of a chain mooring line manufacturer in the region
- **Electrical Infrastructure expenditure capture:** SW&W 36%, CIoS 18%) (equivalent to 2.6% or 1.3% of total lifetime expenditure) – comprising respectively establishment of a regional dynamic array cable manufacturer.
- **Operations & Maintenance expenditure capture over 25 years:** SW&W 37.8%, CIoS to 18.1 (equivalent to 13.1% or 6.7% of total lifetime expenditure) – comprising respectively regional onshore yards capable of executing major repairs and structural maintenance following tow-to-port of WTGs.

6.3.3 OVERVIEW OF THE REALISTIC SCENARIO POLICY PACKAGE

Table 8 above summarises the package of policy covers that will maximise our chances of increasing regional expenditure capture from 24% to our Realistic - 'Want to Have' capture scenario of 41%. Again, we assume that: first, these policy measures are additional to, not instead of, the Essential – 'Need to Have' policy package; second, the measures are combined, and executed in a coordinated way.

In upgrading our Essential scenario policy package to deliver the higher Realistic scenario, we have drawn on international policy measures, for example the US leasing agency option fee discount. In addition, we have brought subject matter experts together to explore innovations in policy that might be applicable, for example model pre-order contracts and insurance contracts to handle the high levels of risk carried by first-of-a-kind FLOW technologies. We have also looked at opportunities to draw on alternative sources of investment finance and grant schemes, for example a role for devolved powers taking equity risk and further adaptations of the FLOWMIS subsidy scheme.

Each policy measure is then developed in detail in sections 6.3.4-6.3.7.

6.3.4 DEVELOPMENT & CONSENTING WITH REGIONAL ANCHOR DEVELOPERS (75% OF PROJECT COMPONENT AND 2.5% OF TOTAL LIFETIME EXPENDITURE)

To assure delivery of our Essential capture scenario, Section 6.2.4 outlined proposals for the Seabed Leasing and CfD stages of projects to promote good practice in fair procurement for UK and regional suppliers; so that the existing capacity the region had to support consenting, surveys and consulting services was given every opportunity to complete for orders. This included the requirement for developers to flow down fair practices to prime contractors and suppliers, through their Contracting Strategies and major contract tenders, and for these government agencies to explore again the legal room-for-manoeuvre, particularly in the light of the new US and EU positions, to take a more a pro-UK position in these fair procurement procedures.

To reach 75% of project development expenditure won by regionally based firms (2.5% of total lifetime expenditure), we propose incentivising at least one project developer to locate to the region, as an anchor company, bringing with them:

- **Procurement Office** – so that sourcing decisions are made with enhanced knowledge of regional supplier capacity.
- **R&D Expenditure** – to enable them, for example, to make investments in a local research centre, fund regional research organisations, and engage with local universities and innovative SMEs),
- **Workforce Engagement** – to interact with local technical training colleges, for example providing industrial placements, inputting to curriculum development, and providing guest lecturers.

We propose that the seabed leasing tender process asks a specific question on anchor companies, framed not to be specific to a named region, but to ask bidders: 'describe your consideration of the benefits for project development and overcoming technical and commercial challenges of locating parts of your business in regions close to the project site'.

Of note is a recent proposal for the profits of an anchor company to be placed in a regional wealth fund. To explain: following success in the recent ScotWind leasing round for a 496MW floating wind project, Magnora Offshore Wind (a joint venture between Hiraeth Energy and a Norwegian energy specialist) are intending to bid into the Celtic Sea leasing programme for its 1GW project 'Môr Glas' project. As an anchor company based in Pembrokeshire, South Wales, the consortium proposes to place a share of profits into a wealth fund to support innovation in the renewable energy sector, with an emphasis on supporting Welsh-owned technology firms. The lesson to take from this example is the need for the scoring criteria for a question on anchor companies in the Celtic Sea seabed leasing tender to reward not only the known ways in which an anchor developer company might bring additional regional benefits, but to also allow for competitive innovation.

6.3.5 FOUNDATION MANUFACTURE & ASSEMBLY (80% OF PROJECT COMPONENT AND 17.8% OF TOTAL LIFETIME EXPENDITURE)

The most significant increase in expenditure capture in the Realistic scenario, compared to Essential, is for regional foundation manufacture and assembly work - an eight-fold increase over the 10% capture of secondary steel fabrication alone. These gains are due to: first, an assumed regional facility for concrete platform foundation manufacture to supply the construction needs of 2GWs of floating offshore wind; and second a regional facility for the final assembly of steel substructures for a further 2GW of capacity. We anticipate joint venture or consortia arrangements for each facility, comprising the inclusion of international experience alongside regional partners. We assume the concrete foundation manufacturer will use local aggregates (most likely from Cornwall), along with rebar from Celsa Steel in Cardiff or from the Tata steel works at Port Talbot, and cement produced at Port Talbot (possibly by Hanson, since their current annual production capacity of 0.5 million tonnes per year is comparable to an average production rate of 1 x 15,000 tonne[56] concrete barge every two weeks and one a week at peak, quality considerations notwithstanding).

We assume that under the Realistic scenario fabrication of steel foundations takes place outside the Celtic Sea region, but that final assembly of prefabricated components is within the region, either at a port location or other coastal site. For both concrete manufacture and steel final assembly we assume that the vast majority of labour at these

56 ORE Catapult (2022) Manufacturing Concrete Floating Wind Foundations in Scotland: https://ore.catapult.org.uk/wp-content/uploads/2021/12/7557-Catapult-Report-Manufacturing-Concrete-Foundations-FINAL.pdf

plants and in the related supply chains is from the UK, with a significant portion being residents in the Celtic Sea region.

Achieving this scale of increase in regional expenditure capture, from 10% to 80%, will require substantial capital investment in the region's FLOW supply chain infrastructure. For concrete foundations this includes investment in an industrial-scale concrete batching plant and related fabrication and formwork facilities (fabrication hall, barge launch infrastructure etc.), as well as equipment (cranes, gantries etc.) and the training of a skilled workforce. For the assembly of prefabricated steel foundation (the welding together of columns, braces, heave plates and stiffeners) this includes similar structures, as well as a coating shed, welding equipment and a substantial high-quality welding workforce. For both concrete and steel foundations, the completed structures would need access to wet storage over a period of 1 to 6 months – necessary to build up a sufficient stock to meet offshore installation rates limited by offshore weather windows. Wet storage solutions could be part of a multiple port strategy, with, for example, local ports in Cornwall offering a wet storage and towing service, along with quayside storage of other WTG components, blades, towers, nacelles.

To achieve TCE's 4GW of Celtic Sea FLOW by 2035, and assuming construction work commences in 2029-30 (taking into consideration delays in planning consent and CfD contract awards), production rates for foundations would need to deliver 267 platforms (assuming 15MW turbines) over 260 weeks. Since production rates would build up towards their maximum output over time, and then factoring in down-times, other delays and noting that, for steel assembly, the facility may be involved in other work such as sub-stations, we anticipate over the 5 years to 2035 an average production of 1 platform every two weeks for each of the concrete manufacturing and steel assembly facilities, and a capacity to produce up to 1 platform per week to meet peak demand.

There are two key requirements to increasing regional capacity for foundation manufacture and assembly to meet this pipeline requirement and regional expenditure capture target:

- **Front Loaded Investment** - early up-front investments will be needed to construct the necessary infrastructure; and
- **Forward Orders** – securing forward orders for these 'long-lead' components such that banks have the confidence to loan the ports or other coastal companies the expansion risk capital they need.

The core challenge for both is that it is only after achieving the Final Investment Decision (FID), which in turn comes after a successful CfD contact award that these foundation production facilities will know that they have secure orders in place; and yet these facilities need to raise risk capital long before these commercial certainties are known.

Three policy interventions – further expansion of FLOWMIS, integrated seabed leasing and CfD auctions assessment criteria, and government-backed finance – are proposed to overcome this core challenge:

6.3.5.1 FURTHER EXPANSION OF FLOWMIS

We proposed above revisions to extant FLOWMIS to assure delivery of regional platform integration and wet storage under our Essential capture scenario, in particular assigning dedicated budgets and sub-budgets to these two components plus foundation assembly and manufacture, with ring-fenced sub-budgets under each for Scotland, North East England, and the Celtic Sea. To support delivery of our Realistic scenario, and the target of regional capture of 68% of expenditure on foundation manufacture and assembly, we propose further and important revisions to the FLOWMIS scheme eligibility criteria:

- **'Ports'** – Remove the criteria that appears to require an applicant be a "port" (defined as "principally for the reception of sea-going vessels") to be eligible to access FLOWMIS grants to support floating wind foundation assembly and manufacture. Potential applicants proposing concrete foundation manufacture and/or steel foundation assembly, and who offer quayside access but do not meet the FLOWMIS definition of a "port", appear to be ineligible for the FLOWMIS scheme. This anomaly also includes many of our established UK shipyards who, with their welding halls and skill sets, could conceivably participate in this work. Further, many British ports who do host "sea-going vessels" (as FLOWMIS currently defines a port) may be reluctant to diversify their operations by investing in plant and machinery to become manufactures or fabricators of foundations, and only a few regional ports (perhaps ABP's Port Talbot and the Port of Milford Haven's Pembroke Dock facility), would be willing

to invest in facilities for the assembly (i.e. high-quality welding) of prefabricated steel foundation components.

- **'Factory Production'** – Remove (or redefine) the eligibility criteria that prohibits "investment in factory production", since this criteria appears to preclude FLOWMIS grants supporting investments in serial (i.e. 'factory') production of foundation components (beams, pontoons, columns, secondary steel). It seems illogical to offer grants for the "construction of port infrastructure", which would presumably include the construction of large manufacturing halls (in effect 'production lines') for welding foundation components, and yet then prohibit "factory production".

6.3.5.2 ASSESSMENT CRITERIA IN SEABED LEASING AND CFD AUCTIONS

We propose, over and above the revisions for the Essential scenario set out above, further adjustment to the Seabed Leasing and CfD competition criteria. In particular, that TCE and DESNZ clarify the way in which FLOW foundation manufacture and assembly are treated in the forthcoming Celtic Sea Seabed leasing auction and in the next CfD Allocation Round. The aforementioned TCE communique on the 4GW Celtic Sea leasing programme states that:

"Bidders have therefore been informed that they will be required to set out a number of commitments as part of the tender process, including how they intend to reflect the important role of ports in the assembly and deployment of turbines. In particular, integration ports are expected to play a key role when it comes to the manufacture and storage of the numerous components required to deploy floating offshore wind, such as foundation assembly[57], cabling and placing the turbines on top of the floating foundations. There is broad consensus across the sector that these ports must be in relative proximity to project sites, so assembled turbines can be floated out to their final locations".

This statement appears ambiguous on whether the lease tender process will, or will not, require developers to set out their commitments to regional foundation manufacture and assembly, or whether the focus is exclusively on platform integration. We therefore propose a clarification that, in the TCE tender process, FLOW platform foundation manufacture and assembly is to be treated as comparable to platform integration in importance, and weighted appropriately. We also propose that the Celtic Sea seabed leasing process adopts the same definitions and disaggregation of assessment that we recommended for FLOWMIS above, namely with assessment criteria and/or weightings applied separately to (i) platform integration, (ii) storage and (iii) foundation manufacture and assembly. And we propose that the Social Value Model be applied as described above, plus with additional questions and weighting for the establishment of anchor companies.

6.3.5.3 GOVERNMENT-BACKED FINANCE

In Section 6.2, we made proposals to refocus government-backed finance to improve the attractiveness to private capital of developing infrastructure for FLOW platform integration in the Celtic Sea region. These included measures to improve access to UKIB, UK Export Finance, and finance from devolved powers. To achieve the 'Realistic' regional capture targets, especially the jump from 10% to 80% of expenditure on foundations manufacture and assembly, we proposed these additional policy interventions:

- **The Home Shipbuilding Credit Guarantee Scheme** – The HSCGS is part of the National Shipbuilding Strategy (NSS)[58] refresh, launched by the National Shipbuilding Office in March 2022. The scheme is intended to address gaps in access to finance for UK shipyard to finance "innovative and sustainable shipbuilding" with a particular focus on the construction of "high value, low carbon, complex vessels". The scheme is designed to guarantee up to 80% of the purchase price of UK built ships, thus securing affordable loans from commercial banks. The scheme is market-based, in that the fees and terms are to match the open market. Although the intent in the NSS was to launch the scheme in May 2022, at time of writing we could find no confirmation of the scheme in operation.

  Our proposal is that: first, the HSCGS be launched as soon as possible; and second, its scope be broadened beyond 'ships and boats' to include the fabrication and assembly of floating offshore wind foundations, given the commonality of much of the infrastructure, equipment, and skills. The presence of the HSBCGS would then provide potential ports and infrastructure investors who were unsuccessful in securing a FLOWMIS grant an alternative avenue of government support,

57 Emphasis added.

58 National Shipbuilding Office (2022) National Shipbuilding Strategy (March 2022) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061201/_CP_605____National_Shipbuilding_Strategy_Refresh.pdf

which in theory at least, would assist in de-risking investments in FLOW foundation manufacture and assembly, thus reducing the cost of private capital.

- **UK Infrastructure Bank** – we noted above that UKIB's investment principles to fund investments that contribute to Net Zero and support regional and local economic growth, are in almost exact alignment with the opportunities that FLOW presents for Celtic Sea regional ports to provide platform integration and storage services. The same argument pertains for investments in port or non-port coastal locations for the manufacture and assembly of FLOW foundations production. Thus we similarly propose that prospective land owners and investors in Celtic Sea locations suitable to develop capacity for foundations manufacture and assembly, investigate the details of the successful submission of the Port of Tyne to UKIB to learn what makes a 'bankable' proposal, and also approach UKIB directly to determine at an early stage if their planned investment meet the bank's criteria.
- **TCE Direct Investments** – TCE could be an alternative source of government-backed finance for investments in foundation manufacture and assembly facilities in the Celtic Sea region for at least five reasons.

  First, the prospects of more funding for, and restructuring of, FLOWMIS as we have proposed, may be limited given the near-term pressures on HMG finances. Investments by TCE could help to overcome this constraint.

  Second, given the zero bids by offshore wind developers into CfD Allocation Round 5, there is an urgent need for government to send a policy signal to the current and prospective floating wind market for the Celtic Sea (ie the planned 396MW projects and forthcoming industrial scale projects) that timely financial support remains forthcoming. An announcement by TCE to contribute £x millions of risk finance to leverage private investment in early development of supply chain capacity in the Celtic Sea region could help bridge the policy gap between the failed CfD AR5 and results emerging from CfD AR6 in September 2024.

  Third, as noted earlier, the TCE's 4th July 2023 communique is ambiguous about whether the forthcoming 4GW Seabed Leasing tender process will require bidders to give consideration only to 'integration ports' and not to investments in sites for foundation manufacture and assembly. An announcement by TCE of its intent to make investments in regional FLOW supply chains prior to the Celtic Sea leasing round, and then quantified announcement of investment commitments by TCE soon after the Celtic Sea leasing round, if clearly targeted at integration ports and foundation manufacture and assembly sites, would clarify the position of TCE as supporting the localisation of both of these high-value components of FLOW projects.

  Fourth, although future CfD allocation rounds may reward bidders for sourcing foundations from Celtic Sea coastal locations – based, for example, on meeting criteria for rejuvenating economically-deprived areas, supply chain resilience and/or low carbon footprint – the timing of the CfD auction process is too close to the developer's FID. The auctions are also too far removed from the necessary timing of investments in foundation manufacture and assembly to have much impact on decisions that need to be taken five to seven years before CfD contracts are awarded to prospective buyers of these foundations. Investment from TCE, matched to the timing of award of seabed rights for floating wind, offers a more timely policy intervention to support early investments in these capital-intensive supply chain development projects.

  Fifth, TCE already makes equity investments in fixed assets, and has a property portfolio of £15.6 billion[59]. This begs questions: (a) whether TCE (and the HMT) has the appetite to invest in high-risk assets at least five to seven years away from the confirming of orders; and (b) whether TCE has the experience to assess investment decisions in assets that are higher risk and in a very different asset class to its current portfolio.
- **Government underwriting of Forward Orders** – A key challenge for government is how to support investors in floating wind foundation manufacturers and fabricators when there is a lack of future revenue certainty, and when this uncertainty in turn drives prohibitively high costs of capital. An option is for government to provide loan guarantees for such investments. The HSCGS scheme above is one such option. Another is for government to award guarantees that target the gap in Take-or-Pay contracts.

  Take or Pay contracts (TOPs) secure long-lead forward orders for the seller by giving the buyer the option to not exercise the order but instead

59 The Crown Estate (2022) Annual Report 2021/2022: https://www.thecrownestate.co.uk/annual-report-2022/

pay a penalty, usually a minimum portion of the agreed order volume or payment amount. In the context of infrastructure for FLOW foundation manufacture or assembly, Take-or-Pay contracts would enable the manufacturer/fabricator to share risks with developers. The intent of these contracts is to incentivise the manufacturer (ie the seller) to invest capital up front with assurance of a minimum level of income. Concurrently, developers (ie the buyer) gains access to foundations at reduced cost for which they carry the risk of a fixed penalty if they elect not to honour the terms of the contract.

Given the high level of uncertainty for developers around FLOW as a relatively new technology (for example there is as yet no common design agreed between developers for foundations which could offer an effective spot market in this component), and with the systemic challenges of the planning and offshore consenting processes, the risk that a developer opts to pay the penalty under such a TOP arrangement appears particularly high. This said, variations in foundation design (notwithstanding the obvious between concrete and steel) are not endless, with most designs likely to fall within fairly tightly-defined parameters of steel type (and concrete quality), the range of pre-fabricated sub-components, and welding quality and finishing. Thus, it may be possible for manufacturing and fabrication facilities to be constructed and equipped in ways that accommodate this current level of design uncertainty). This could in turn reduce the risk that, should a buyer decide not to honour the contract, the manufacturer has fallback options to make up the shortfall between the penalty price revenue needed to cover the capital and operational costs of the order.

However, even if there was the flexibility for manufacturers to adapt to alternative orders with different design requirements, the power will likely remain in the hands of the new buyer, such that the level of penalty paid if not exercising a forward order would fall materially short of what the manufacturer needs to raise affordable finance and take the associated risks. In short, there would still be the risk that the manufacturer's revenue stream is insufficient to meet the capital local repayments, as well as overheads.

We therefore propose some form of specialised government-based loan guarantee might be developed. This government-backed financial product would effectively offer an insurance against the gap in a Take-or-Pay arrangement. Taking into consideration the likelihood of alternative buyers and the specific terms of capital loan repayments, what the government guarantee would do is pick up the risk (or perhaps 80% of the risk) that there is short fall between (a) the penalty payment made by a developer if failing to exercise its forward order commitment, and (b) the need of the manufacturer for working capital to meet its debt obligations We consider this proposal of merit because it does not ask government to take on the entire risk of forward orders, only the gap between the level of risk that the buyer is bearing (ie the TOP penalty), and the risk that the manufacturer is willing to accommodate (ie a portion of the capital loan obligation). In effect, we are proposing a form of underwriting: a partial loan guarantee in the context of a Take or Pay arrangement. To this end, we note the recent decision by the German government to provide $8.1BN of guarantees to support Siemens Energy in fulfilling turbine component orders[60].

6.3.6 ESTABLISHMENT OF REGIONAL CHAIN MOORING LINE MANUFACTURER (50% OF PROJECT COMPONENT AND 1.9% OF TOTAL LIFETIME EXPENDITURE)

There is currently no chain mooring line manufacturer in the Celtic Sea region, and yet expenditure on these components is 1.9% of total lifetime expenditure. And yet, as OREC estimate, "a 500MW site will require upwards of 45,000 tonnes of chain, which means any chain fabrication facility will need to be located in close proximity to the sea, most probably within existing or new port facilities"[61]. OREC also identify design capacity for mooring lines in the region (Exeter University and Longitude Engineering), and note that an international chain manufacturer has expressed interest in investment in a plant in South Wales, with capacity sufficient to supply a five-year pipeline of Celtic Sea FLOW and room for export.

To incentivise this investment, and promote similar investments in the regional supply of manufactured

60 German government supports Siemens Energy with $8 bln guarantees: https://www.reuters.com/business/energy/german-government-unveils-deal-siemens-energy-guarantees-2023-11-14/

61 ORE Catapult (2020) (2020) Benefits of Floating Offshore Wind to Wales and the South West (p18): https://ore.catapult.org.uk/?orecatapultreports=benefits-of-floating-offshore-wind-to-wales-and-the-south-west-supply-chain-report

components for Celtic Sea FLOW projects, we propose that the government design and stand up a FLOW Balance of Plant[62] Manufacturing Investment Scheme (FLOW-BoPMIS). The FLOW-BoPMIS scheme would work in tandem with the FLOWMIS scheme, which is restricted to platform integration and foundation manufacturing and assembly. Design of the FLOW-BoPMIS scheme would be informed by developers, OEMs requirements, primes and engineering companies, together with relevant public sector experts, including, but not limited to, the High Value Manufacturing Catapult, Energy Systems Catapult and ORE Catapult.

As with our proposals for FLOWMIS, for the FLOW-BoPMIS scheme to benefit the Celtic Sea region its budget would need to be divided into regional and component tranches, for example, the same three regions (Scotland, North East England and Wales/SW), and then also three categories of sub-budget per region: (i) heavy manufacturing (mooring lines, anchors, array and export cables), (ii) high-value manufacturing (design optimisation technologies, low-carbon vessel propulsion systems, ASV/AUV/drones); and (iii) high-risk manufactured components (the latter including components and spares that are at highest risk of supply chain bottlenecks due to global demand, and for which regional or UK manufacture would offer developers supply chain resilience and thus protect project delivery timelines, commercial returns and delivery of Net Zero targets).

6.3.7 OPERATIONS & MAINTENANCE OVER 25 YEARS (38.2% OF PROJECT COMPONENT AND 34.3% OF TOTAL LIFETIME EXPENDITURE).

In lifetime expenditure terms, O&M capture represents a relatively modest % and the capacity for significant additional capture beyond that which we identified under our Essential scenario is constrained by these factors:

- **Wind Turbine Generators (WTG)** – OEMs generally provide WTGs with 5-year warranties. Thereafter, without a large, domiciled OEM, Britain is unlikely to be able to compete for WTG O&M for the remainder of the project life. Although it would be in Britain's strategic interests to establish a domiciled OEM, for our Realistic scenario we assume that WTG O&M is conducted under an effective extended warranty, and thus not targetable.
- **Foundations** – although we predict that 'Return to Port' (R2P) will be the favoured approach to conduct major repairs and structural maintenance of the integrated platforms, in engineering terms the foundations themselves, be they concrete or steel, will have relatively low risk of failure and comparatively low cost to replace compared to the WTG and 'topsides'. We understand the foundations to be akin to the hull of a ship, rather than its equipment, which in any docking and essential defects (DED) or longer-term refit, represents a relatively low % of the overall DED or refit costs.
- **Other O&M** – the remaining components of O&M expenditure are in TCE lease charges, National Grid ESO charges, and insurance costs, all of which are outside the Celtic Sea region's work capture scope.

Together, these constraints limit to some extent our ability to increase work share in O&M. Nevertheless, there are some additional opportunities for the Celtic Sea region during project O&M phases over those of the Essential scenario. Specifically, our Realistic scenario assumes a shift, from regional ports and fabrication yards providing small scale repairs, such as secondary steel components that are then transported back out to the project site for installation, to onshore capacity and capabilities to conduct major repairs and structural maintenance following the tow-to-port of integrated platforms. Notwithstanding the constraints identified above, we estimate investments in these major maintenance and repair capacities, in particular for foundations, would lead to a modest increase in percentage capture, excluding Decom.

For repairs to foundations, only minor adjustments to previously proposed policy interventions would be needed to incentivise such investment, since the plant and equipment required would be similar, if not the same, as that required to manufacture foundations, be that the production of concrete barges or the assembly of steel foundations. In the first instance, we therefore refer the reader to Section 6.3.2 above where we describe a package of policy measures to increase from 10% to 68% regional capture of expenditure on foundation manufacture and assembly.

However, to strengthen the incentive for regional investment in foundation manufacture and assembly sufficient to support O&M, we propose

62 In this context, the term Balance of Plant is taken to cover all elements of the FLOW system, outside the WTG and foundation

important modifications to the scope of eligibility and/or the scoring criteria of each of the following policy measures described in Section 6.2 – FLOWMIS, Crown Estate leasing, CfD auction, government-backed finance, and underwriting. Essentially, these policy instruments would need to be strengthened to reward not only investments in the manufacture and assembly of foundations but also the capability of these assets to support major repair and structural maintenance. The design objective for policy makers here would be to assure that repair and maintenance is explicit and rewarded separately from manufacture and assembly, based on the response of applicants, for example, applying a higher weighting for developers' proposals that offer sufficient capacity for both serial manufacture/assembly and onshore structural repairs.

6.3.8 SUMMARY OF THE SCENARIO TARGET BENEFITS

Taken together, the forecast benefits for the Celtic Sea and Cornwall of achieving these are (over and above the Baseline scenario):

- **GVA** – deliver, over the assessment period:
  Celtic Sea Region – £1.1bn GVA (4GW) or c£5.0bn (24GW).
  Cornwall Sub-Region – £347mn GVA (4GW) or c£1.6bn (24GW).
- **Jobs** – deliver, at the peak of employment, an additional (over and above the do nothing scenario):
  Celtic Sea Region – c5,600 jobs (4GW) or c5,600 jobs (24GW).
  Cornwall Sub-Region – c1,500 jobs (4GW) or c1,700 jobs (24GW).
- **Jobs** – support cumulative job years of employment of:
  Celtic Sea Region – c17,500 job years (4GW) or c103,000 job years (24GW)
  Cornwall Sub-Region – c5,900 job years (4GW) or c34,100 job years (24GW)

The difference in estimated economic benefits from Scenario 3 (Realistic Scenario) are illustrated over for both CIoS and SW&W. This is expressed both in terms of cumulative job years (noting this does not represent number of jobs supported at any one time) and cumulative GVA. The charts show estimated benefits for the 4GW deployment scenario (orange graphs) and the 24GW deployment scenario (blue graphs). Note again that the benefits are for both the Celtic Sea region and Cornwall, as a sub-region.

6.3.9 **REALISTIC SCENARIO – 4GW – ADDITIONAL JOBS**

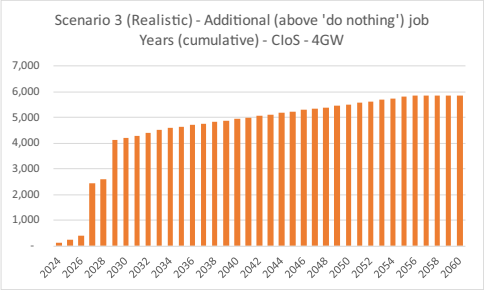


Figure 12 - Realistic Scenario - 4GW - Additional Jobs – Cornwall and the Isles of Scilly

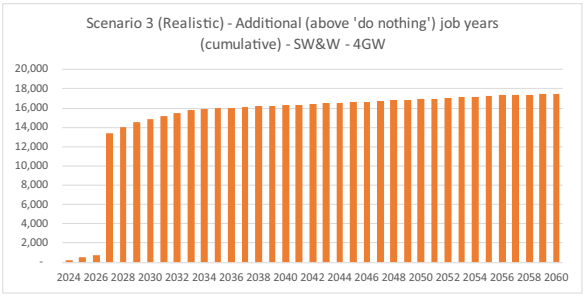


Figure 13 - Realistic Scenario - 4GW - Additional Jobs – SW&W

6.3.10 **REALISTIC SCENARIO – 4GW – ADDITIONAL GVA**

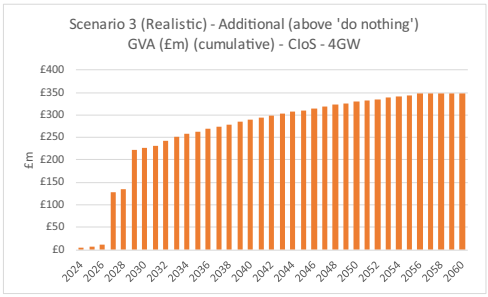


Figure 14 - Realistic Scenario - 4 GW - Additional GVA – Cornwall and the Isles of Scilly

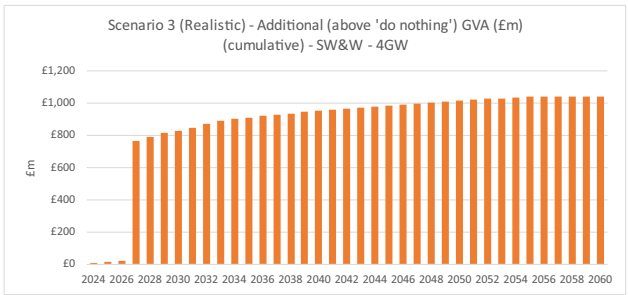


Figure 15 - Realistic Scenario - 4GW - Additional GVA – SW&W

6.3.11 **REALISTIC SCENARIO – 24GW – ADDITIONAL JOBS**

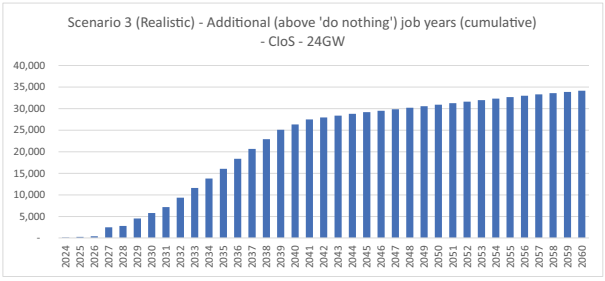


Figure 16 - Realistic Scenario - 24GW - Additional Jobs – Cornwall and the Isles of Scilly

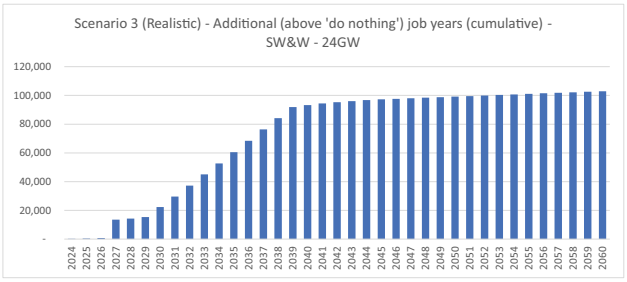


Figure 17 - Realistic Scenario - 24GW - Additional Jobs – SW&W

6.3.12 **REALISTIC SCENARIO – 24GW – ADDITIONAL GVA**

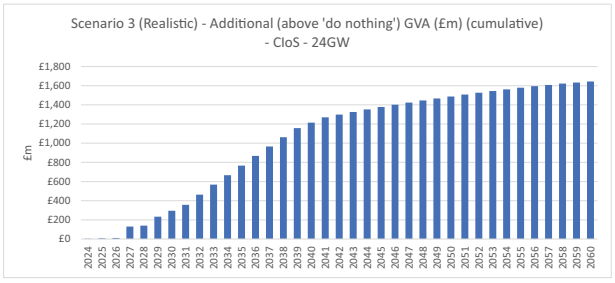


Figure 18 - Realistic Scenario - 24GW - Additional GVA – Cornwall and the Isles of Scilly

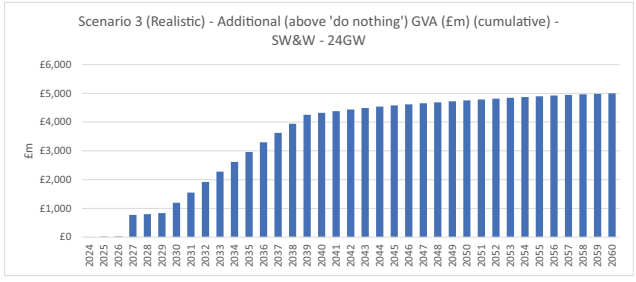


Figure 19 - Realistic Scenario - 24GW - Additional GVA – SW&W

6.4 AMBITIOUS CAPTURE SCENARIO – "LIKE TO HAVE" – 60% OF PROJECT EXPENDITURE CAPTURED BY CELTIC SEA REGIONAL SUPPLIERS

6.4.1 BASIS OF THE SCENARIO TARGETS

Our Ambitious 'high-end' scenario assumes that: first, the work capture targets of the Essential and Realistic scenario are achieved; second, the policy measures proposed in the Essential and Realistic scenarios are fully implemented.

We then introduce additional work capture targets, which whilst ambitious we nevertheless judge achievable provided action is taken to encourage early inward investment. If the combined targets are met, then 60% of total expenditure across the development, construction and operations phases of Celtic Sea FLOW would be won directly or indirectly by suppliers located in the Celtic Sea region. To maximise chances of achieving these targets, we have developed an additional package of policy interventions, as set out below.

6.4.2 OVERVIEW OF THE SCENARIO TARGETS

Table 9 below shows which additional components of project spend we anticipate being captured in the region of Wales and the South West under the 'Ambitious' scenario, over and above the Essential and Realistic cases.

In overview, under the Ambitious scenario, we anticipate the following additional project sub-components being captured by regional suppliers, over and above those captured in the Essential and Realistic scenarios:

- **Foundation Manufacture & Assembly expenditure capture:** SW&W 100%, CIoS 40%) (equivalent to 17.8% or 7.1% of lifetime expenditure, respectively) – comprising an international EPCm contractor locating in the region able to absorb the liability of liquidated damages for non-delivery of foundations, and a regional steel floating wind platform foundation manufacture and fabricator providing cut and formed plates, tubes, sections, columns for assembly either in situ or at another location in the region.
- **WTG Component Manufacture expenditure capture:** SW&W 40%, CIoS 0% (equivalent to 8.1% or 0% of total lifetime expenditure, respectively) – comprising manufacture of blades, towers and/or transition pieces, but excluding generators and nacelles, which we assume will continue to be imported. These manufacturing facilities would either arise from direct investments (e.g. FDI by

Table 9 - Components, £ and % Lifetime Project Expenditure Captured in Ambitious Scenario[63]

Scenario - Ambitious						
		Cost benchmarks (£kw) 3		% total spend	SW&W market capture	CIoS market capture
CAPEX	Development and Consenting	£	124	2.7%	75%	38%
	Substructure	£	879	19.2%	100%	40%
	Wind turbine	£	1,000	21.9%	40%	0%
	Anchors	£	26	0.6%	100%	80%
	Mooring lines	£	92	2.0%	50%	25%
	Array cables	£	19	0.4%	50%	50%
	Electrical infrastructure	£	364	8.0%	87%	18%
	Ports & logistics	£	21	0.5%	80%	40%
	Vessels and subsea engineering	£	198	4.3%	88%	44%
	Other capex	£	320	7.0%	28%	22%
		Cost benchmarks (£/kw/y)				
OPEX	O&M Offshore	£	23	11.1%	100%	50%
	O&M Onshore	£	3	1.4%	100%	100%
	Other Opex	£	42	20.2%	0%	0%
		Cost benchmarks (£kw)				
	Decomissioning	£	51	0.7%	24%	6%

63 It is important to note that total of the market capture columns in the table do not exactly tally with overall market capture figures for each scenario. This reflects that the total market capture by component has not been discounted (i.e. not reflected in Present Values). The total market capture under each scenario does reflect discounting over the appraisal period and is reflected in Present Values. For example, in the Ambitious Scenario for SW&W the sum of each component is 55.6% compared to the overall market capture estimate of 60% associated with that scenario. This is also the case in each of the same summary tables for each scenario.

OEMs) or through manufacture under licence.

- **Electrical Infrastructure expenditure capture:** SW&W 87%, CIoS 18% (equivalent to 6.4% or 1.3% of total lifetime expenditure) – comprising respectively establishment of the finishing and supply of array and export cables, either by an OEM or under license; a dynamic cable supply and maintenance 'cradle to grave' service provider in the region; and expansion (or establishment) of a regional yard with capability to fabricate topsides and jackets for offshore sub-stations, along with vessel and installation services for offshore hook-up and commissioning.
- **Operations & Maintenance expenditure capture over 25 years:** SW&W 38.2%, CIoS 21.3%) (equivalent to 13.1% or 7.3% of total lifetime expenditure) – comprising respectively regional steel manufacturer to support onshore yards execute major repairs and structural maintenance following tow-to-port of WTGs; a regional sub-contractor clusters providing a high concentration of FLOW related skills and specialized training; specialist facilities to support testing and certification of new technologies to meet emerging quality standards.

Detailed proposals for the overall policy package are set out in Sections 6.4.4 to 6.4.7.

6.4.3 OVERVIEW OF THE SCENARIO POLICY PACKAGE

Table 10 below summarises the package of policy measures that, in addition to those proposed to realise the Essential and Realistic capture scenarios, we judge will maximise the chances of increasing regional expenditure capture from 41% to our 'Ambitious' capture scenario of 60%.

Table 10 - Policy Package to incentivise investments to help deliver Realistic scenario targets

Seabed Leasing	Consenting	PPAs and market reform	Govt investments and subsidies	Procurement practices	Tax incentives	Anchor companies	Standards and model contracts
PPQ	Nationally Significant Infrastructure Projects (NSIPs) reform process	Review of Electricity Market Arrangements (REMA), esp intermittent vs firm power market split	FLOWMIS reform, eg expanded scope (cables, moorings, vessels, BoP); differentiated scopes (integration vs foundations vs components); ranking and re-design; 2nd + 3rd rounds	Public procurement of vessels builds commercial capability of UK yards, eg MOD, coast guard vessels	Flexing Tax incentives at Free Ports (Milford Haven/Port Talbot/ Plymouth/Anglesey)	Developers	Model pre-orders contracts, eg Take or Pay (TOP); hedged forward contacts (fixed/drawdown/window)
ITT1 - Info only	Zonal planning and Offshore Energy SEAs	CfD Supply Chain Plan /NPF revisions AR6+	Loans and loan guarantees (a) at market rates eg Green Investment Bank; HSCGS, (b) at discounted rates, eg British Business Bank, UKIB, Export Devt Guarantees	Other public procurement that builds regional FLOW capacity, eg public transport	Spread key free port tax incentives to other ports in Celtic sea region	EPC/EPCm/ EPCI	Model EPCI tenders - 'K' factor Supply Chain Plans
IIT1 - Pass/Fail or multi-factor auction	Inspectorate and DLUHC 'fast-track' consenting (amendments to Levelling-Up and Regeneration Bill)	Private Wire PPAs to address Grid connection bottlenecks and incentivise Wind > H_2 base load	FLOW-BoPMIS scheme (Balance of Plant Manuf Investment scheme) Second round OWMIS (Offshore Wind Manuf Investment scheme)	Devolved powers public procurement, eg ferries	Capital allowances; Structures and Building allowances; NIC allowances; Business rates relief	OEMs	Quality standards, eg DNV-ST-0119 Floating wind turbine structures, Low carbon H_2 standard; low carbon concrete/ steel; dynamic cables
ITT2 - option fee discount	Role of MND in fast-tracking (Mitigated Negative Declaration) framed by quality standards, planning performance agreements (PPAs) and Environmental Outcomes Reports	Benefit Cost Analysis/Value for Money	Govt insurance underwriting, eg coverage gaps due to complex FOAK + turbine scaling + project scaling; unknown moorings and cable risk; liabilities 'domino'	Social Value Model criteria and weightings	TRL 1 to 5 - R&D tax relief	Manufacturing under OEM license	Methodology standards, eg LCOA; ERoEI; UK regional Content; HMT Green Book (VfM; Jobs; GVA wider economic benefits)
AfL - lease rent discount	HRA for leasing vs EIA for DCO (Development Consent Order)	Community PPAs/benefit agreements	State aid to Assisted/Deprived area, incl South Wales and Cornwall 'a' areas		TRL 6 to 9 - innovation commercialisation tax incentives (EIS, VCT, SEIS, SITR)	UK/Int JVs	Model Contracting Strategies and FLOW construction contracts (offshore vs onshore) that manage risk/local content
Enabling investments	Public consultation and community benefits, incl OSW jobs and training; and Local Authority Innovation and Capacity Funds		Direct investments by devolved power, eg port expansion, assembly yard JVs, new regional Development Corporation/Agency, underwrite hedging of forward orders, eg foundations		Tax incentives for private sector 'pooled' insurance funds for FLOW risks	Prime service contractors, eg Moorings as a service	Model insurance contracts: Contractor All Risk (CAR); Knock-for-Knock; 50:50; Back-to-Back; Nat Cat marine insurance methods

6.4.4 FOUNDATION MANUFACTURE & ASSEMBLY CAPTURE (100% OF PROJECT COMPONENT AND 17.8% OF TOTAL LIFETIME EXPENDITURE).

Our Realistic scenario already assumes investment sufficient to support a single serial concrete foundation manufacturing facility in the region able to supply construction of 2GW of floating offshore wind at an average production rate of 1 platform every two weeks. The key difference in our proposal for the Ambitious scenario lies in the following two additional regional capabilities:

- **Regional Steel Foundation Fabricator** – domiciling a regional steel foundation fabricator to provide cut and formed prefabricated plates, tubes, sections, and columns for final assembly of the platform foundation at a different (or same) location.
- **Regional EPCm Contractor** – establishing an international EPCm (Engineering, Procurement and Construction-management) contractor in the region, with sufficient balance sheet capacity to absorb the liabilities for delayed delivery of foundations.

Regional Steel Foundation Fabricator

At the time of writing, the only known credible proposal for a UK-based steel platform manufacturer of prefabricated steel components is the Offshore Solutions Group consortium project termed 'UK FLOW Forward'. The facility is at the feasibility stage and is to be located in Teesside. The facility would be unique in the UK wind sector, with the necessary quality and volumes of steel pipe and plate required for floating wind foundation manufacture supplied from the planned £400m investment by South Korean steel producer SeAh Wind (with government financial backing), which is to produce monopiles on land next to the proposed UK FLOW Forward site.

To incentivise a similar FLOW serial production steel foundation fabrication facility in Celtic Sea region, we recommend that the Department for Business and Trade (DBT) and UK Export Finance work together to develop a High-Value Proposition to attract international investment, and that this proposition be marketed through the UK Office for Investment (OfI).

We identify Port Talbot, or land adjacent to the port, as the most attractive to potential owners and investors in such a fabrication facility. We propose that the OfI engage with Tata steel, and then, assuming that Tata can expand production to meet the required quality and volumes needed by a steel floating foundation fabricator, a Heads of Agreement or equivalent be negotiated that can form part of the high-value investment offer.

Should Port Talbot be the selected location, we note that it is likely that the prefabricated steel foundation components would undergo final assembly at the same site, with subsequent WTG integration at the port of Port Talbot (rather than Pembroke Dock). Such a geographically proximate interlinked supply chain solution for steel production + foundation component fabrication + foundation assembly + platform integration would offer developers exceptional supply chain resilience, and significantly de-risk potential bottlenecks in what is a critical area of supply for FLOW's timely deployment of floating offshore wind. In return, de-risking of project deployment for developers in this way would strengthen the attractiveness of the fabrication facility for investors.

Regional EPCm Contractor

Our additional proposal for government to incentivise the domiciliation of an international EPCm contractor to the region is predicated on the success of other countries' experiences in the oil and gas sector. A case in point is fabrication of offshore gas platforms in Trinidad and Tobago. In 2005 the Trinidadian government invested in the extension of water and power utilities to two fabrication facilities on the island. Concurrently, project developers (firstly BP, then subsequently BG Group) developed contracting strategies designed to (a) incentivise the local fabrication firms to establish Joint Ventures with experienced fabricators from the US Gulf Coast, and (b) provide a wrap-around EPCm contract, offering international engineering companies the opportunity to bid for a substantial contract with high level of control in return for taking on liabilities for liquidated damages against delivery of the gas platforms.

The EPCm tender winner for BP's series of unmanned platforms (950 tonnes) gas platforms and two years later BG Group's manned Poinsetta platform topsides (4,300 tonnes) was Fluor Daniel corporation. The local fabrication yard that carried out the platform fabrication, and was nominated as such by Fluor Daniel as part of their bids, was Trinidad Offshore Fabricators (TOFCO). TOFCO is located in the Labidco

Industrial Estate of the La Brea region of Trinidad, and was a joint venture between Chet Morrison Contractors from the US Gulf Coast and Weldfab, a local fabricator called Welfab. Details of how BP and BG's contracting strategies created the incentive for the domiciliation of significant fabrication work can be reviewed in a published case study[64]. Box 2 below provides a summary.

Learning from this and other cases, our policy proposal is that the Offshore Wind Industry Council (OWIC) – the government-industry forum responsible for driving the offshore wind Sector Deal, including the target of 60% UK content by 2030 – convene a task force to develop model contracting strategies and major contracts that incentivise cost-effective and risk-mitigated UK national and regional content solutions for the floating offshore wind industry.

In this regard, we note that FIDIC – the International Confederation of Consulting Engineers – have begun work on developing a new FIDIC contract for the offshore wind sector and reflecting the organisation's core principles of "fair and balanced risk allocation"[65].

However, we also note that the anticipated delivery date for the new offshore wind FIDIC contract is not until the end of 2025. Furthermore, as yet there appears to be no specific consideration by FIDIC in their planned work of either (a) the greater uncertainties of floating wind projects over fixed-bottom wind (i.e. the former requiring both onshore contracts for foundation assembly and integration, as well as offshore contracts able to manage greater risk and the efficient allocation of liabilities for offshore installation in what will be a hostile marine environment), or (b) the importance of such contracts in contributing to the localisation of regional economic and social value. The work of FIDIC also appears to be development of a model contract only, and not to consider model contracting strategies – which, as described earlier, play an equally important incentivising and risk-allocation role.

We therefore propose that OWIC take on the urgent role of developing early forms of FLOW contracts for onshore foundation work and, separately, for offshore installation, as well as developing model contracting strategies that manage the inherently higher levels of risks associated with FLOW projects and pro-actively incentivise regional localisation of jobs and supply chain industrialisation.

To this end, we propose that the terms of reference for such an OWIC model contract and contract strategy development initiative include the pooling of developers' experience, both from the offshore wind sector and the oil and gas sector. The aim would be to learn how different developers have already adapted FIDIC model contracts (designed originally for onshore work), as well as modifications to Leading Offshore Energy Industry Competitiveness (LOGIC) contracts (designed for hostile offshore marine environments) and NEC (New Engineering Contract) contracts (used in onshore construction work and focused on more proactive and collaborative management of risks than FIDIC). Further, we recommend that such a review to look at the international experience of upstream oil and gas project developers in meeting local content expectations through the design of contracting strategies, as illustrated in Box 2 regarding BP and BG Groups' experience in Trinidad and Tobago.

64 Warner, M. (20211) Local Content in Procurement, Chapter 4, Greenleaf Publishing

65 FIDIC website accessed 17th July 2023, 'Work starts on new FIDIC contract for offshore wind farm projects': https://www.fidic.org/node/41494

From 2005, BP Trinidad and Tobago executed a contracting strategy formulated in part to ensure that fabrication of its unmanned offshore platforms (deck and jacket) could be performed in Trinidad. Key elements of the contracting strategy were as follows:

- a wrap-around EPCm contract involving an experienced international engineering company (Fluor Daniel) in alliance with a local engineering design company (Summit Engineering) and a locally based local/international JV sub-contracted steel fabricator.
- a replicable, cookie-cutter, design for the platform jacket and deck, such that the local JV fabricator could move up the learning curve on progressive platforms, so reducing welding defects down to US Gulf Coast quality, which by the fourth platform in the series removed the need for any government subsidies.
- a price premium (i.e. subsidy) for the first few platforms, paid in part to cover the additional shipping costs of importing construction materials to enable fabrication in Trinidad, as well as insurance costs for welding defects and training costs for the fabricator's employees.
- a decision-gate within the timeline for the series of platform construction work, to assess adequacy of quality and performance by the fabricator before awarding subsequent platform work

The local JV fabricator – TOFCO Ltd – successfully completed the first BP 'Cannonball' platform in 2005. The same JV was subsequently awarded contracts to construct a sequence of 'cookie-cutter' platforms on a rolling basis.

In 2006, the operations of BG Group in Trinidad formulated a contracting strategy to localise the construction and installation of a manned platform on the Poinsettia offshore gas field. As with the BP approach, to align with the government's industrial domiciliation policy and to protect the commercial interests of BG Group, the contracting strategy called for the sub-contracting of platform assembly work to a local fabricator, with the efforts of this local company overseen by – and liabilities for non-delivery carried by – an international EPCm contractor. **To achieve these objectives, the contracting strategy included:**

- high levels of local content communicated as a key value driver.
- the Letter of Award to the winning EPCm contractor to incorporate a pre-nominated local fabricator.
- at preferred bidder stage: an open-book approach to agree a lump sum contract with the EPCm contractor, providing comfort to BG Group that the risks posed by the local fabricator were fully mitigated and priced-in; the EPCm contractor required to sign up to liquidated damages, leading to intense quality control of the local fabricator's performance by the EPCm contractor
- prior to contract execution, capital investment by the local fabricator in site development (quay side strength, berthing depth, navigation channel etc), equipment and marine vessel capabilities sufficient to assure contract delivery.

Through the design of these contracting strategies, both BP and then BG were able to undertake the construction work for their offshore platforms in Trinidad, and deliver these to budget, to quality, on time and with high levels of local content. For BG Group, at 4,200 tonnes, their manned platform deck was three times the tonnage of the previous BP unmanned decks. Fluor Daniel's (the EPCm contractor) sub-contract with the local fabricator TOFCO achieved 91% local content – measured as economic value retained in the Trinidadian economy – as well as significantly contributing to the capability and competitiveness of the local fabricator, as demonstrated by welding defect rates reduced to US Gulf Coast levels of quality, and an HSE performance that included zero Lost Time incidents and a Total Recordable Incident Frequency (TRIF) per million hours of 0.97 (BG Group's target at the time was 1.35).

Source: Warner, M. (2011) Local Content in Procurement, Chapter 4, Greenleaf Publishing

Box 2 - Summary of Contracting Incentives for Domiciliation of Steel Fabrication in Trinidad

6.4.5 REGIONAL WTG COMPONENT MANUFACTURING FACILITIES (CAPTURE UP TO 40% OF WTG EXPENDITURE)

The 2021 government grant scheme dedicated to WTG components – the Offshore Wind Manufacturing Investment Scheme (OWMIS) – awarded a £75m grant to Able Marine Energy Park (AMEP) on Humberside; which in turn leveraged in a total of £500m to upgrade port infrastructure and attract investments from offshore wind component manufacturers[66]. Notwithstanding this success, OWMIS has now closed and as noted earlier, the FLOWMIS scheme is restricted to platform integration and foundation manufacture and assembly. Thus, at the time of writing there is no dedicated government subsidy scheme to attract private investment into the Celtic Sea region (or any other UK region) for the manufacture of blades, towers, or transition pieces, be that for floating or fixed wind projects.

To achieve our Ambitious scenario of expenditure capture, we propose that one or more manufacturing facilities for blades, towers and/or transition pieces be established at a regional port or other coastal location – and, to attract the necessary private sector investment into the upgrading of port infrastructure or other coastal location, we propose that government run a second round of OWMIS.

As with our proposals for an expanded FLOWMIS and the new BoPMIS scheme, this second round OWMIS scheme would be split into regional tranches, with separate budgets for Scotland, North East England, and Wales/SW. Based on the prior experience of OWMIS, we would propose: first, a grant budget of £75M for each of the three UK geographic regions; second, as was the case with the original OMWIS scheme, there be no subdivision of these regional budgets by type of WTG component.

6.4.6 REGIONAL ELECTRICAL INFRASTRUCTURE MANUFACTURE (87% OF PROJECT COMPONENT AND 7.4% OF TOTAL LIFETIME EXPENDITURE).

To achieve a jump in the capture of regional economic value for electrical infrastructure from 36% to 87%, we propose policy interventions to: first, attract dynamic cable manufacturers to the Celtic Sea region; second to attract export cable suppliers to the region, possibly with facilities for cable finishing; and third, to secure the regional fabrication and assembly of offshore substations.

Regional Cable Manufacture, Supply, Maintenance and Replacement

To encourage this, we propose modifying the assessment criteria adopted to award grants under our proposed FLOW-BoPMIS scheme (see Section 6.3.6). Instead of asking for bidders to describe their investment plans to facilitate subsequent investments by cable manufacturers and suppliers (dynamic and export), the FLOW-BoPMIS scheme would award higher scores in the assessment process for bidders offering complete 'investment plus service' solutions. To illustrate: awarding the highest score to bidders who offer, in combination, delivery of (a) capital investments to develop regional sites for hosting of cable manufacturers and suppliers, (b) credible commitments by OEMs to invest in dynamic cable manufacturing plants and/or export cable fishing and supply facilities on these developed lands, (c) contractual arrangements (e.g. consortia of service companies) that offer developers 'cables-as-a-service', i.e. contracts to supply, maintain, repair and replace cables across the project life (or after expiry of warrantees).

66 Offshore Wind, website accessed 17th July 2023: Able UK gets Government funding for Offshore Wind Upgrade: https://www.offshorewind.biz/2021/03/04/able-uk-gets-government-funding-for-offshore-wind-upgrade/

Regional Substation Fabrication & Manufacture

Turning to electrical substations and given our Realistic Scenario policy proposal to revise the FLOWMIS scheme to attract to the Celtic Sea region the final assembly of pre-fabricated foundation components (see Section 6.3.5) and our Ambitious scenario proposal above that the Office of Investment promote a high-value proposition for investment in a regional steel foundation fabrication facility (see Section 6.4.4), we envisage that these same two facilities would realistically capture the fabrication and final assembly of the topsides and jackets for offshore sub-stations.

6.4.7 OPERATIONS & MAINTENANCE OVER 25 YEARS (50% OF PROJECT COMPONENT AND 34.3% OF TOTAL LIFETIME EXPENDITURE).

Under our Ambitious scenario, our proposals to target an increase from 35% of regional expenditure in operations and maintenance to 50% assumes that domiciliation of an international EPCm contractor in the region (as described above in Section 6.4.4), and importantly, that this has the effect of stimulating development of a regional cluster of sub-contractors providing a cost-competitiveness and a high concentration of floating wind related services to the prime contractor.

We further anticipate that the localised EPCm contractor will bring specialized skills training programmes to the region, creating additional or higher-paid employment opportunities. We also anticipate the potential for the same prime contractor to invest in a local facility to support testing and certification of new technologies to meet emerging quality standards.

Further, and finally, we assume that the proposed policy incentives to attract investments in regional steel foundation fabrication and final assembly (see Section 6.4.4) will enable the region to capture more of the economic value of major repairs and structural maintenance to platforms that need to be towed to port during their operational life.

6.4.8 SUMMARY OF THE SCENARIO TARGET BENEFITS

Taken together, the forecast benefits for the Celtic Sea and Cornwall of achieving these, over and above the Business as Usual 'Do Nothing' risk scenario) are:

- **GVA** – deliver, over the assessment period:
  Celtic Sea Region – £2.1bn GVA (4GW) or c£10.5bn (24GW).
  Cornwall Sub-Region – £822mn GVA (4GW) or c£3.9bn (24GW).
- **Jobs** – deliver, at the peak of employment, an additional (over and above the do nothing scenario):
  Celtic Sea Region – c16,200 jobs (4GW) or c16,200 jobs (24
  Cornwall Sub-Region – c4,300 jobs (4GW) or c4,300 jobs (24GW).
- **Jobs** – support cumulative job years of employment of:
  Celtic Sea Region – c39,900 job years (4GW) or 207,500 job years (24GW)
  Cornwall Sub-Region – c13,400 job years (4GW) or c78,500 job years (24GW)

The difference in estimated economic benefits from Scenario 3 (Ambitious Scenario) are illustrated over for both CIoS and SW&W. This is expressed both in terms of cumulative job years (noting this does not represent number of jobs supported at any one time) and cumulative GVA. The charts show estimated benefits for the 4GW deployment scenario (orange, figures 20 to 23) and the 24GW deployment scenario (blue, figures 24 to 27.

6.4.9 AMBITIOUS SCENARIO – 4GW – ADDITIONAL JOBS

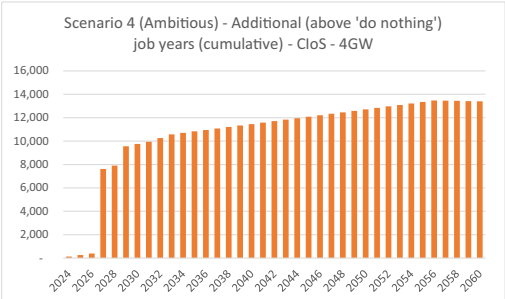


Figure 20 - Ambitious Scenario - 4GW - Additional Jobs – Cornwall and the Isles of Scilly

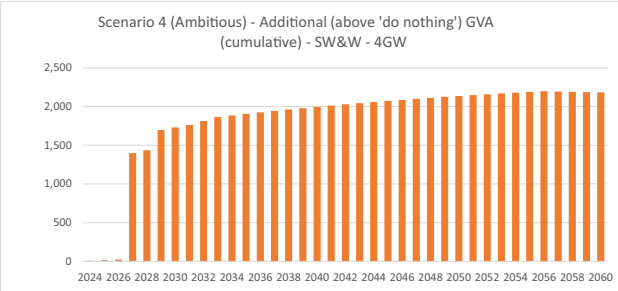


Figure 21 - Ambitious Scenario - 4GW - Additional Jobs – SW&W

6.4.10 AMBITIOUS SCENARIO – 4GW – ADDITIONAL GVA

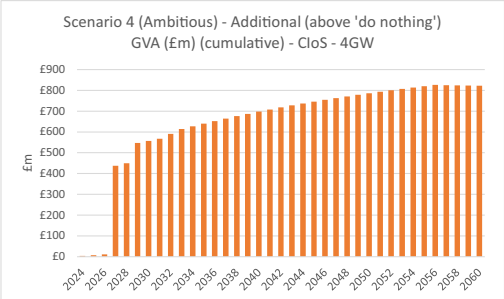


Figure 22 - Ambitious Scenario - 4GW - Additional GVA – Cornwall and the Isles of Scilly

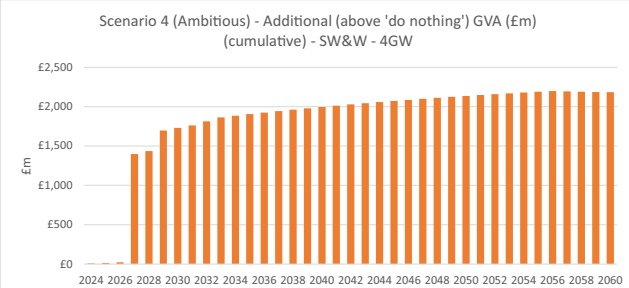


Figure 23 - Ambitious Scenario - Additional GVA – SW&W

6.4.11 AMBITIOUS SCENARIO – 24GW – ADDITIONAL JOBS

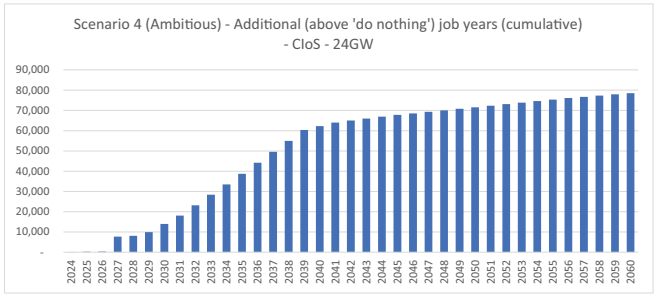


Figure 24 - Ambitious Scenario - 24GW - Additional Jobs – Cornwall and the Isles of Scilly

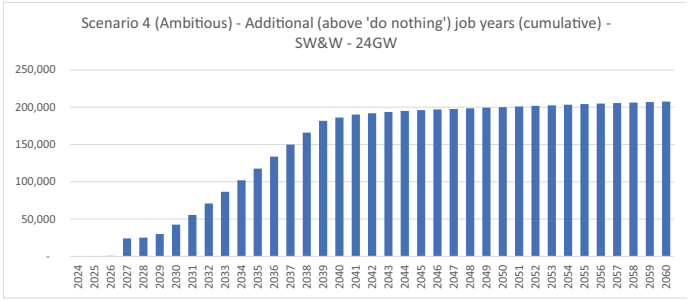


Figure 25 - Ambitious Scenario - 24GW - Additional Jobs – SW&W

6.4.12 AMBITIOUS SCENARIO – 24GW – ADDITIONAL GVA

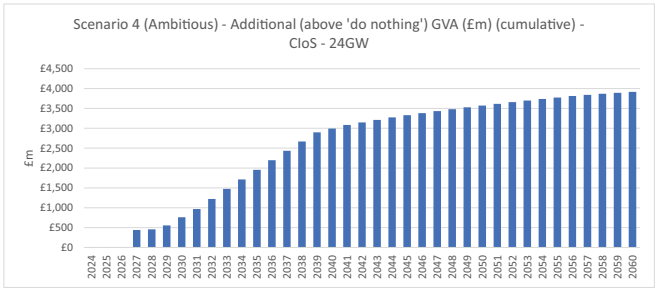


Figure 26 - Ambitious Scenario - 24GW - Additional GVA – Cornwall and the Isles of Scilly

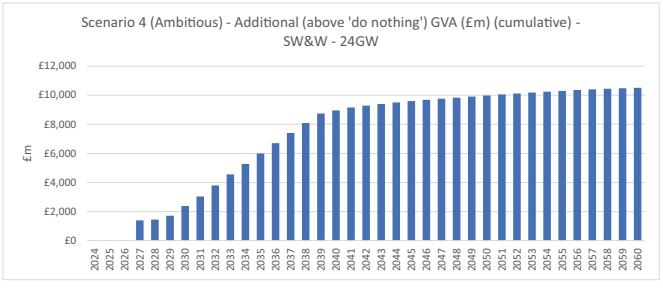


Figure 27 - Ambitious Scenario - 24GW - Additional GVA – SW&W

6.5 CONCLUSION

The economic development benefits listed in the Essential, Realistic and Ambitious Scenarios set out in Sections 6.2, 6.3 and 6.4 above, running into 1,000s of additional jobs and £100Ms of additional GVA are particularly significant.

It is important to re-emphasize that it does not follow that, by implementing the associated policy interventions, these benefits will automatically accrue. It is equally important to emphasize that, based on the historical evidence, in our professional and commercial judgement there is little chance that significant improvement can be made over the current objectively disappointing British local content performance if a business-as-usual policy intervention approach is continued.

Given this judgement and in the light of the changes in the international policy landscape, our analysis concludes that **the best way to obtain the very significant potential benefits set out at Sections 1.4, 1.5 and 1.6 will be to formulate a policy intervention strategy, with an associated regional plan, based around 5 core policy principles:**

F. **Coordinated Policy Planning** – to develop policy programmes that explicitly use policy levers from across national and regional government in an integrated and chronological way to achieve regional industrial development goals.
G. **Policy Parity** – to judge British government interventions against the new international policy context, in particular the new US subsidy and leasing regimes and the EU's internal adjustments to state aid, even if these are not yet reflected in revisions to our trading agreements.
H. **Policy Room for Manoeuvre** -– to take advantage of the policy flexibility provided under international trade and investment rules to support economically disadvantaged areas and mitigate supply bottlenecks that compromise Net Zero targets.
I. **Benefits of Design-to-Local** – to facilitate developers and private financiers to design projects and financing plans to take advantage of the inherent advantages of regionally-located suppliers and infrastructure, including:

iii. **Commercial Benefits** – for example, reductions in insurance costs and de-risking of project delivery.
iv. **Going-Local Benefits** – for example, minimising CO2 emissions across the project life cycle, including in logistics, low carbon materials & components, and low carbon O&M services.
J. **Regionally Devolved Policy Direction & Execution** – to devolve the direction of the coordinated policy programmes to empowered regional government entities, supported by the appropriate Whitehall departments.

Whilst we are clear that such an approach will not be sufficient to deliver the posited benefits, we do believe it is necessary if we are to achieve better economic benefits than heretofore; and indeed essential if we are to hit HMG's Celtic Sea FLOW deployment target timelines from now to 2035.

7 GOVERNANCE – CORNWALL FLOW COMMISSION

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7.1 INTRODUCTION

The policy packages set out above are each designed as an integrated whole, rather than measures to be dined on à la carte. The chances of success will be maximised if their agreement, authorisation, and execution is coordinated between the relevant policy owners. There are a number of national and regional fora with interests in some of the policy areas but there is no single body that encompasses the whole or is adequately resourced to guide their execution.

7.2 CORNWALL FLOW COMMISSION

There is, though, in prospect the Cornwall FLOW Commission, which could undertake this role,

- **Cornwall Devolution Deal** – it is anticipated that the county's Level 2 Devolution Deal will include a Cornwall FLOW Commission, jointly led by DESNZ and Cornwall Council.
- **Cornwall Strategic Sectors** – Shared Prosperity Funds (SPF) include monies for the county's Strategic Sectors[67] and a Cornwall FLOW Commission SPF bid has been successful.

It may not be the ultimate coordinating body, but a DESNZ-Cornwall Council led Cornwall FLOW Commission, will be adequately and imminently resourced, be able to convene, and appears to be the best and only entity with the potential to take coordinating policy planning and action. Inclusion of other Celtic Sea cluster sub-region observers would allow the Commission to work for the whole region, pending regional and national agreement on governance best-practice.

7.3 REGIONAL & NATIONAL GOVERNANCE

As the Cornwall FLOW Commission mobilises and begins its work, there will be a parallel need to review the current fora with primary or secondary interests in floating offshore wind in the Celtic Sea. These include, but are not limited to:

- **National:**

  UK FLOW Task Force.
  Celtic Sea All Party Parliamentary Group (APPG).
  OREC FLOW Centre of Excellence.
  Offshore Wind Industry Council (OWIC).
  Offshore Wind Growth Partnership (OWGP).
  Offshore Transmission Network Review (OTNR).

- **Regional**:

  Celtic Sea Cluster.
  Celtic Sea Developers Alliance.
  Marine Energy Wales.
  Great South West.
  CIOSLEP Strategic Sectors Board.
  Maritime UK South West .
  ORE SuperGen.

The sheer number of fora and interested entities tells its own story but, in any event, it will be important to review the different roles and responsibilities of these different groupings, from the perspective of their potential contribution to coordinated policy planning & action.

7.4 CONCLUSION

Build-out of the 4.0GW FLOW projects will not start until 2029, but time is nevertheless pressing. Given the extended lead times needed for key infrastructure, such as ports and grid, and industrial capacities in both regional companies and workforce: the investments needed in FLOW's industrial development in the Celtic Sea will be needed soon; and the policy packages to incentivise these investments will be needed sooner. Governance mechanisms thus needed to be established as soon as possible, and with the emphasis on practical functionality rather than perfection.

67 FLOW, Critical Minerals, Space & Data, Food Systems.

8 CONCLUSIONS & RECOMMENDATIONS

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8.1 CONCLUSIONS

As far as we are aware, the industrial development approach suggested above is new, at least in the offshore wind and offshore renewables industry, and in three respects:

- **Targeted Policy Planning** – it proposes the use of targeted, synchronised & integrated policy interventions to achieve industry-specific regional industry development targets.
- **Coordinated Policy Action** – it proposes the coordinated design and execution of these interventions, with the potential that the policy whole and the resulting intervention benefits are greater than the sum of the parts, as would be the financial value-for-money leverage.
- **Devolved Policy Execution** – it proposes that leadership for the execution of regional industrial development lie in the Celtic Sea region, within a regional governing entity.

As such, these proposals, with the prospect of coordinated policy planning & action, could represent a step change in how British offshore wind industrial development is undertaken.

8.2 RECOMMENDATIONS

To take the findings of this report forward, we make the following recommendations:

1. **Cornwall Policy Action** – that the advantages of the report's 5 policy principles (Section 1.7) be noted, integrated into the future work of the Cornwall FLOW Commission, and provide the foundation for Cornwall's future regional and national policy engagement.
2. **Celtic Sea Cluster Policy Integration** – that the report be shared and discussed with Celtic Sea Cluster colleagues, including:
    a. **Celtic Sea Cluster Regional Strategy** – representing Cornwall's contribution to the Celtic Sea FLOW Regional Strategy review, due in Q1-24.
    b. **Celtic Sea Missing Middle** – providing a basis for future discussion with Celtic Sea Cluster colleagues on potential follow-on works to take the Missing Middle approach to all Celtic Sea sub-regions.
3. **National Policy Engagement** – that the report:
    a. **SofS DESNZ** – be formally submitted by CIOSLEP to SofS DESNZ and copied to relevant Whitehall departments and other national entities.
    b. **Future Policy Design** – provide the foundation for Cornwall's future policy engagement with Whitehall and the other national entities involved in the design, development, and deployment of policy interventions in support of the Celtic Sea FLOW industry.

ANNEX A
TARGET BENEFITS OVERVIEW AND SENSITIVITY ANALYSIS

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Based on the assumptions for each scenario around potential market capture as set out in the previous sections, and the overall approach to estimating the economic benefits as set out in 4.3, the estimated economic benefits are set out below. It is important to note that for each scenario, the estimated economic benefits (in the form of GVA and jobs) are set out in two ways. First, the gross benefits of each scenario. Second, the benefits over and above what may be delivered through the 'do nothing' scenario i.e. the Risk Scenario. To reiterate, this represents a scenario where no coordinated policy intervention takes place. These benefits should be considered as additional, rather than gross benefits. The estimates are set out in tabular form for simplicity. The benefits represent an assessment period to 2060, and benefits have been discounted to be shown in Present Values. Finally, estimated economic benefits are shown for both the 4GW and 24GW deployment profiles. It is important to note – as discussed in Section 4.3 - the assumptions around market capture are consistent between the two deployment scenarios.

ESSENTIAL CAPTURE - "NEED TO DO" 4GW

CIoS - Gross Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 1,298,750,751	£ 661,397,621	3,627	7,806

CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 293,999,959	£ 93,555,789	90	887

SW&W - Gross Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 3,165,743,088	£ 1,491,251,193	9,790	20,879

SW&W- Additional (over and above 'do nothing') Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 578,897,578	£ 180,080,977	77	1,841

24GW

CIoS - Gross Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 6,043,016,152	£ 3,127,698,276	4,066	45,211

CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 1,330,036,579	£ 424,776,053	90	4,822

SW&W - Gross Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 14,715,606,245	£ 7,029,953,596	10,669	120,774

SW&W- Additional (over and above 'do nothing') Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 2 - Essential Capture	£ 2,615,948,139	£ 815,470,166	77	9,156

REALISTIC CAPTURE – "WANT TO DO"4GW

CIoS - Gross Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 1,927,520,516	£ 914,784,987	5,051	12,784

CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 922,769,724	£ 346,943,155	1,514	5,865

SW&W - Gross Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 5,461,107,180	£ 2,355,271,082	15,338	36,525

SW&W- Additional (over and above 'do nothing') Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 2,874,261,670	£ 1,044,100,866	5,625	17,487

24GW

CIoS - Gross Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 9,072,455,125	£ 4,346,841,938	5,685	74,531

CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 4,359,475,552	£ 1,643,919,714	1,708	34,143

SW&W - Gross Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 25,837,778,009	£ 11,215,974,476	16,126	214,503

SW&W- Additional (over and above 'do nothing') Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 3 - Realistic Capture	£ 13,738,119,903	£ 5,001,491,046	5,534	102,885

AMBITIOUS CAPTURE – "LIKE TO DO"4GW

CloS - Gross Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 2,915,594,591	£ 1,389,934,309	7,911	20,329

CloS - Additional (over and above 'do nothing') Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 1,910,843,799	£ 822,092,477	4,374	13,411

SW&W - Gross Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 7,936,502,325	£ 3,494,228,250	25,958	53,980

SW&W - Additional (over and above 'do nothing') Benefits (discounted) - 4GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 5,349,656,815	£ 2,183,058,034	16,245	34,942

24GW

CloS - Gross Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 13,842,436,676	£ 6,619,458,499	8,361	118,885

CloS - Additional (over and above 'do nothing') Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 9,129,457,104	£ 3,916,536,275	4,385	78,497

SW&W - Gross Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 37,837,644,146	£ 16,726,397,547	26,381	319,148

SW&W - Additional (over and above 'do nothing') Benefits (discounted) - 24GW				
	Direct Spend	Gross Value Added	Jobs (Maximum)	Job Years (cumulative)
Scenario 4 - Ambitious Capture	£ 25,737,986,040	£ 10,511,914,118	15,789	207,530

Sensitivity Analysis

Given the uncertainty in the overall pathway of the Celtic Sea development, and uncertainty around specific assumptions used in this analysis, it is appropriate to undertake some sensitivity analysis. Within this report we have combined two sets of sensitivity scenarios:

- A slippage in the overall timeframe by 5 years (for both 4GW and 24GW) in terms of activity (pre and post deployment)
- A 30% lower assumption around scale of economic benefits (in effect one cause of this would be lower market capture in some of the key project components).

These two sensitivity scenarios combined effectively reduce estimated economic benefits by >30%. An overview of findings is presented below. We have presented the results for two of our economic indicators – GVA and maximum jobs. The results show the importance of timeliness in development and deployment combined with regional and local capture in delivering economic benefits. A slower deployment and/or lower local market capture will obviously affect the scale of local economic benefits able to be captured.

ESSENTIAL CAPTURE – "NEED TO DO"

CIoS - Gross Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 2 - Essential Capture	£	382,414,953	2,539

CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 2 - Essential Capture	£	53,591,087	63

SW&W - Gross Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 2 - Essential Capture	£	858,318,960	6,853

SW&W- Additional (over and above 'do nothing') Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 2 - Essential Capture	£	103,063,789	54

REALISTIC CAPTURE – "WANT TO DO"

CIoS - Gross Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 3 - Realistic Capture	£	530,456,746	5,051

CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 3 - Realistic Capture	£	201,632,881	2,575

SW&W - Gross Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 3 - Realistic Capture	£	1,364,341,281	10,737

SW&W- Additional (over and above 'do nothing') Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 3 - Realistic Capture	£	609,086,109	3,937

AMBITIOUS CAPTURE – "LIKE TO DO"

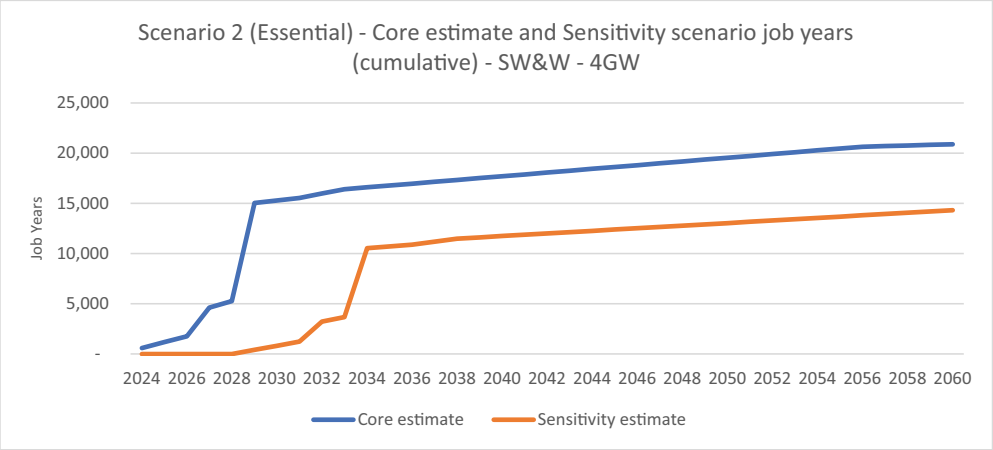
CIoS - Gross Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 4 - Ambitious Capture	£	749,929,780	7,911

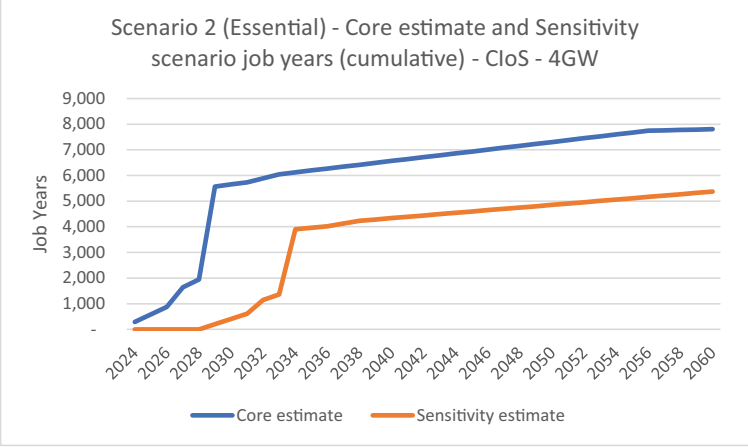
CIoS - Additional (over and above 'do nothing') Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 4 - Ambitious Capture	£	421,105,915	5,435

SW&W - Gross Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 4 - Ambitious Capture	£	1,919,350,491	25,958

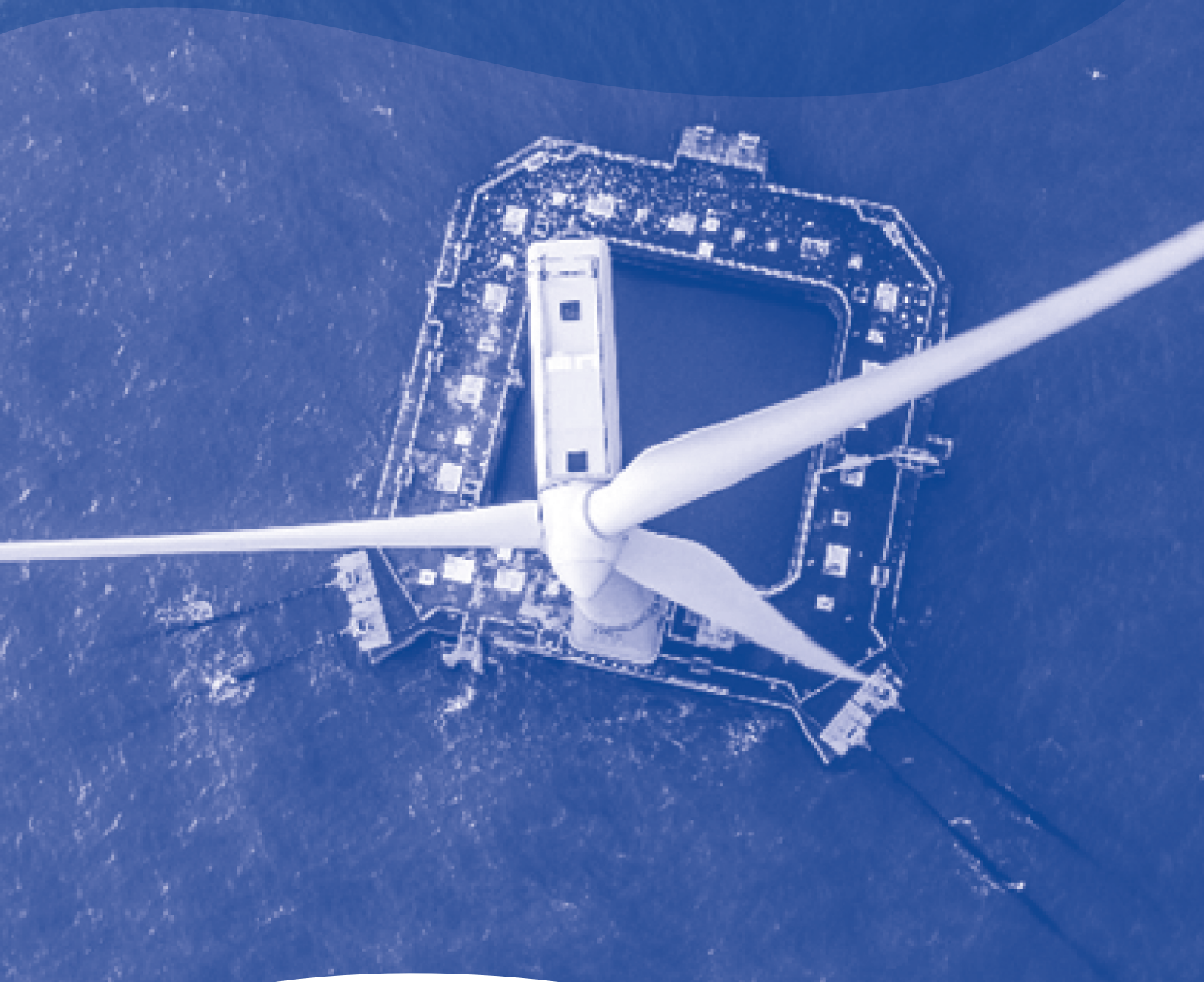
SW&W - Additional (over and above 'do nothing') Benefits (discounted) - 4GW			
	Gross Value Added		Jobs (Maximum)
Scenario 4 - Ambitious Capture	£	1,164,095,319	19,159

The impact of sensitivity scenario is illustrated below in terms of cumulative job (years) for the 4GW deployment profile and for both CIoS and SW&W (noting the difference in scale). The charts demonstrate the lost opportunity if deployment slips and/or the full extent of potential economic benefits are not captured i.e. through local market capture.





ANNEX B
BIOGRAPHIES



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MATT HODSON:

Matt Hodson is Chief Operations Officer at Celtic Sea Power, and has over 30 years' experience in the offshore renewables, ports and shipping industries. A master mariner and qualified dynamic positioning operator, his sea-going experience included dynamic positioning operations and support to offshore construction, and then ports management. In the offshore renewables sector he worked for Mojo Maritime Ltd in offshore wind, wave and tidal works, then led Cornwall's Marine-I ERDF project. Since joining Celtic Sea Power, he has directed the Cornwall FLOW Accelerator and Pembrokeshire Demonstration projects, and now leads on the Cornwall FLOW Commission.

STEVE JERMY:

Steve Jermy is Chief Executive Officer at Celtic Sea Power, and has over 35 years' in offshore and maritime operations, including diving, offshore aviation, maritime security, fishery protection and offshore renewables. His first career included appointments in the policy areas of the MoD, culminating in the Department of Policy Planning. Since 2010, he has worked in the offshore renewables sector, including with Mojo Maritime Limited, James Fisher Group and latterly Celtic Sea Power. He is also a Non-Executive Director on the Cornwall & Isles of Scilly Local Enterprise Partnership, where he advises on marine, energy and aerospace matters and chairs the Enterprise Zone Board.

PHIL JOHNSTON:

Phil Johnston is the Regional Business Development Manager at Celtic Sea Power. He originally graduated in environmental sciences before an early career in marine ecology research. He then spent several years at sea as an offshore environmental consultant, primarily on oil and gas exploration surveys but also on offshore wind developments and navy frigates. Phil then moved onshore to manage ocean monitoring programmes before switching to business development. His experience here involved commercialising one of the UK's first uncrewed surface vessels (USVs) from early testing through to market readiness. Phils role at CSP involves working on the development of sustainable industries and workforce for FLOW that is rooted in the region.

OLAF MARSHALL-WHITLEY:

Olaf Marshall-Whitley is an engineer and workforce Project Specialist at Celtic Sea Power. His independent workforce modelling has been used to support and validate the economic model findings in this report. He has broad knowledge of the technologies and processes required to deliver offshore wind projects, and a background in renewables engineering technology and principles.

LUKE SHARP:

Luke Sharp is a Project Officer at Celtic Sea Power; he works on both the Ports & Infrastructure and Sustainable Regional Business teams. He specialises in Ports and has carried out work exploring the role of concrete sub-structures in Celtic Sea FLOW. He has past experience in marine engineering and delivery of renewable energy projects.

SHANE VALLANCE:

Shane Vallance is a freelance consultant and a Director of Moor Economics. He is an experienced economist, with particular application within the field of economic development. He has 25+ years' experience of using his analytical skills for private, public and third sector clients. He has been responsible for making investment recommendations on a range of major economic development projects through the application of economic appraisal techniques, assessing value-for-money returns and ensuring that the approach meets Government guidance. He has provided support to several organisations in the development of business cases - with a focus on the economic case - and in recent years he has undertaken a range of post-investment project/programme evaluations.

MICHAEL WARNER:

Dr Michael Warner is Director of the Centre for Local Content Innovation. He brings to the report a career in Local Content strategy and policy, working internationally in the Oil & Gas sector, including the position of Local Content and Supply Chain Sustainability Manager for BG Group, and more recently working on policy development in renewables for Whitehall departments, including on the CfD Supply Chain Plan scheme, Offshore Wind Manufacturing Investment (OWMIS) scheme, Home Shipbuilding Credit Guarantee scheme, Social Value Model, Celtic Sea seabed rights leasing round for The Crown Estate and as a member of the Sector Working Group for the government-industry Hydrogen Advisory Council. www.clci.org.uk

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@sea_celtic

(0)1736 800290

enquiries@celticseapower.co.uk

celticseapower.co.uk

Chy Gallos, Hayle Marine Renewable Energy Park
North Quay, Hayle, Cornwall TR27 4DD