Forewind Ltd

Dogger Bank Offshore Wind Farm Economic Benefits Study

Headline Report

March 2014

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Offshore Wind Farm
Economic Benefits Study

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GENECON is a specialist management consultancy supporting the delivery of local economic growth by making sense of place economics - navigating the complexity of places, communities and economies to promote efficient and effective investment choices.

Parsons Brinckerhoff is a global consulting firm assisting public and private clients to plan, develop, design, construct, operate and maintain critical infrastructure.

1 Introduction

GENECON and Parsons Brinckerhoff were commissioned by Forewind Ltd to undertake an Economic Benefits Study of potential impacts on the UK and two of its constituent regions, North East and Yorkshire and Humber (NE&YH) of realising up to six offshore wind farm projects positioned within the Round 3 Dogger Bank zone.

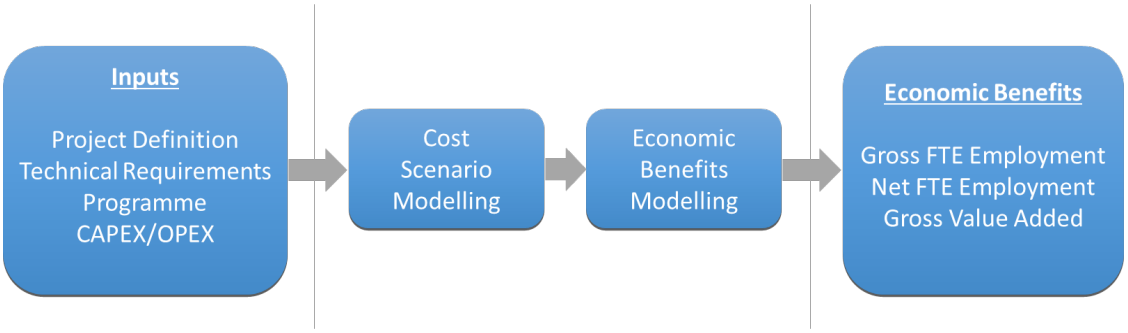
This study does not outline the additional economic benefits to the UK arising from energy generation. Instead it concentrates on benefits accrued through investment in realising and maintaining the development - in the following delivery phases; Project Management, Development, Manufacturing, Installation and Operation and Maintenance.

This report is supported by a technical paper[1], which outlines the methods, justifications, assumptions and results of the research.

2 Approach

The Economic Benefits Study adopted a bottom-up approach to quantifying the economic benefits to the UK and NE&YH regions for the pre-construction, construction and operation & maintenance stages of the Dogger Bank. Through scenario modelling, the study sought to understand employment and Gross Value Added (GVA[2]) gains from realising a range of potential development scenarios.

An assumed investment programme for delivering up to six 1.2GW wind farm projects within the Dogger Bank has been based on cost assumptions for the wind farm requirements (major assemblies and activities). A high-level supply chain review identified the potential for supply chain activity at a regional and national level and this has been used to develop model-based scenarios for different build-out options. The scenarios reflect assumptions regarding the level of supply chain activity captured at these geographic levels, informed by forecast projections for offshore wind generation delivery from Forewind, the Department for Energy and Climate Change (DECC) and The Crown Estate.



Using a series of metrics and weightings from national accounts and industry sources, the likely economic benefits that investment could support have been derived. Two approaches have been used to determine the range of economic benefits and actual benefits could fall anywhere in this range. A detailed methodology is provided in a supporting technical report.

[1] GENECON and Parsons Brinckerhoff, Dogger Bank Offshore Wind Farm Economic Benefits Study - Technical Paper, January 2014.
[2] GVA measures the contribution to the economy of each individual producer, industry or sector. It is the primary measure of productivity in the UK.

3 Scenarios

The scenarios developed represent an achievable but optimistic view of supply chain activity in the UK and NE&YH regions. Three build out scenarios for the wind farm have been considered, based on the delivery of 2, 4 and 6 1.2 GW wind farm projects. Each scenario has then been considered in terms of low or high supply chain content. The range in supply chain content is largely driven by the ability of the UK to secure a share of the total Original Equipment Manufacturing (OEM) capacity within the UK.

OEM in this study is defined as facilities for the main components required for a Wind Turbine Supply Agreement – i.e. nacelles, bladesets and towers. Other OEMs that could develop in this definition include the potential for additional cable manufacturing (onshore and offshore).

The high regional / UK supply content scenarios therefore includes OEMs becoming established in the UK or NE&YH, which this study anticipates could generate an uplift of between 23 and 26 percentage points in supply chain content. Additional supply chain activity is also included in the high scenarios, to include activities that could occur with or without OEM's becoming established.

The overall difference between the low and high scenarios is therefore 36 percentage points in UK scenarios and 26 percentage points in NE&YH scenarios, arising from both OEMs becoming established and additional supply activities forming. The specific difference between the low and high scenarios is contained in Annex 1.

The following 6 scenarios are therefore considered:

Scenario 1 (2 Projects)

- 2.4 GW capacity developed by 2025 with low regional / UK supply chain input
- 2.4 GW capacity developed by 2025 with high regional / UK supply chain input

Scenario 2 (4 Projects)

- 4.8 GW capacity developed by 2029 with low regional / UK supply chain input
- 4.8 GW capacity developed by 2029 with high regional / UK supply chain input

Scenario 3 (6 Projects)

- 7.2 GW capacity developed by 2030 with low regional / UK supply chain input
- 7.2 GW capacity developed by 2030 with high regional / UK supply chain input

Through the supply chain review, an optimistic but achievable proportion of UK content in all scenarios is that the UK could secure up to 40% of the wind farm supply chain in the absence of OEM activities. This proportion of content increases up to 76% if OEMs become established in the UK.

All Scenarios	Possible UK Content	Possible NE&YH Content
Without OEMs (Low content)	40%	38%
With OEMs (High content)	76%	64%

At the regional level, the supply chain review has highlighted the existing strengths of the combined NE&YH regions in large scale production and offshore industry support. These regions have a competitive advantage over remaining parts of the UK in securing a high proportion of activity due to the following:

- Proximity to the Dogger Bank offshore wind farm, proposed cable corridors and construction ports.
- Logistically, the transport of wind farm components is a significant operation; cost efficiencies can be made by locating closer to assembly ports.
- Existing skilled workforce in large scale manufacturing, offshore oil and gas, engineering and logistics – higher than the UK average – a fifth of all national

manufacturing and a seventh of all national energy production jobs are located in NE&YH.

- Identified port-side employment land around the Humber, Tees, Sunderland, Tyne and Blyth
- Significant historic and continued ports and renewables sector led promotion activities within the Humber, Tees Valley, Sunderland, Tyne and Blyth areas.

With this in mind and due to an expected agglomeration effect of industry clustering, this study assumes that up to 38% of total content could feasibly be delivered within the combined NE&YH regions in the absence of OEMs, and that this could increase up to 64% of content if OEMs locate in NE&YH.

4 Results

4.1 Total Wind Farm Investment

A bottom up approach to estimating total expenditure has been based on the technical requirements for delivering the range of projects. It would be unrealistic to assume that the UK supply chain could capture 100% of the supply chain content and accrue all economic benefits from the investment. To highlight the potential economic benefits that the UK has the chance to secure, UK weightings have been applied to total spend profiles. Such weightings give the following results:

Investment and Economic Benefit Potential			
	Investment[3]	Net FTE[4] jobs range	GVA[5] range
2.4GW	£9.3bn	5,900 - 6,250	£1.6bn - £2.3bn
4.8GW	£18.5bn	11,750 - 12,500	£3.0bn - £4.2bn
7.2GW	£27.8bn	17,650 - 18,750	£4.5bn - £6.3bn

- In realising 6 projects developed up to 2030, it is estimated that an investment of £27.8bn would be required. If the investment was entirely within the UK, then this could support up to 18,750 net additional FTE jobs, generating up to £6.3bn in GVA for the UK economy.
- For 4 projects delivered by 2029, estimated investment would be £18.5bn. If the economic benefits from this investment were entirely captured in the UK, then this would support up to 12,500 net additional FTEs, generating up to £4.2bn in GVA to the UK economy.
- For 2 projects delivered by 2025, it is estimated that an investment of £9.3bn would be required. If the investment was entirely within the UK, then this would support up to 6,250 net additional FTE jobs, generating up to £2.3bn in GVA for the UK economy.

The scale of the investment is clear and there is a substantial opportunity for the UK and its regions to capture proportions of the investment. The proportions are considered within the scenarios.

[3] Investment in Pre-planning, Development, Construction, Installation and Operations and Maintenance activities. It does not include costs for any Repowering or Decommissioning activities.
[4] Full Time Equivalent (FTE) employment is equivalent to 10 annual job years (filled by either one employee or multiple employees).
[5] GVA estimates include an annual discount factor of 3.5%. In line with HM Treasury guidelines, this is the present value to society of the investment - as a whole, society prefers to receive goods and services sooner rather than later.

4.2 Economic Benefits to the UK

UK Scenario Economic Benefits				
		Investment	Net FTE jobs range	GVA range
Scenario 1: 2.4GW by 2025	Without OEM	£3.5bn	2,250 – 2,400	£650m - £900m
	With OEM	£6.7bn	4,250 – 4,750	£1.2bn - £1.7bn
Scenario 2: 4.8GW by 2029	Without OEM	£7.0bn	4,450 – 4,750	£1.1bn - £1.6bn
	With OEM	£13.4bn	8,500 – 9,050	£2.7bn - £3.4bn
Scenario 3: 7.2GW by 2030	Without OEM	£10.6bn	6,700 – 7,150	£1.7bn - £2.4bn
	With OEM	£20.0bn	12,750 – 13,550	£3.3bn - £4.5bn

In all scenarios, the UK has the potential to secure up to 40% of total content in the absence of OEMs establishing in the UK. This share of content rises up to 76% if OEMs do establish themselves in the UK. Although optimistic, based on a review of current and potential supply chains, this is an achievable share of total content that could be delivered in the UK. This study anticipates that:

- If 6 projects were developed by 2030 with OEMs established in the UK, this could potentially support up to 13,550 direct and induced net additional FTE jobs in the UK, generating up to £4.5bn GVA for the UK economy. Even without OEMs becoming established in the UK, in realising 6 projects could still support up to 7,150 net additional direct and induced FTE jobs, generating up to £2.4bn for the UK economy.
    - OEMs establishing in the UK therefore provide an additional economic benefit by enabling up to 6,400 net additional FTE jobs on top of those employed in the absence of OEMs. Securing OEMs therefore has the potential to generate an additional £2.1bn to UK economy in Scenario 3.
- If 4 projects were developed by 2029 with OEMs established in the UK, this could potentially support up to 9,050 net additional direct and induced FTEs, generating up to £3.4bn to UK economy. Without OEMs establishing themselves in the UK, the deployment of 4 projects could still support up to 4,750 net additional direct and induced FTE jobs, generating £1.6bn to the UK economy under Scenario 2.
    - Establishing OEMs in the UK could therefore bring forward an additional economic benefit of up to 4,300 net additional FTE jobs, generating up to £1.8bn in GVA from 4 projects within the Dogger Bank zone.
- If 2 projects were developed by 2025 with OEMs established in the UK, this could potentially support up to 4,500 net additional FTE jobs in the UK, generating up to £1.6bn for the UK economy. Even without OEMs becoming established in the UK, the delivery of 2 projects in Scenario 2 could still support up to 2,400 net additional FTE jobs in the UK, generating up to £900m for the UK economy.
    - Should OEMs become established in the UK, this could bring an additional economic benefit of up to 2,100 net additional FTE jobs in the UK, generating up to £700m in GVA in Scenario 2.

4.3 Economic Benefits to NE&YH regions

NE&YH Regional Scenario Economic Benefits				
		Investment	Net FTE jobs range	GVA range
Scenario 1: 2.4GW by 2025	Without OEM	£2.8bn	2,050 – 2,200	£550m - £750m
	With OEM	£4.7bn	3,450 – 3,750	£900m - £1.2bn
Scenario 2: 4.8GW by 2029	Without OEM	£5.5bn	4,100 – 4,350	£1.0bn - £1.3bn
	With OEM	£9.3bn	6,900 – 7,350	£1.7bn - £2.2bn
Scenario 3: 7.2GW by 2030	Without OEM	£8.3bn	6,150 – 6,550	£1.5bn - £2.0bn
	With OEM	£14.0bn	10,350 – 11,000	£2.5bn - £3.3bn

The combined NE&YH region is well placed to secure a significant share of content. In all scenarios, the supply chain review has found the NE&YH region has the potential to secure up to 38% of total content in the absence of OEMs establishing in the region. This share of content rises to 64% if OEMs do establish themselves within the NE&YH region. Although optimistic, this is an achievable share of total content that could be delivered in the combined regions. This findings of this study therefore suggest that:

- If 6 projects were delivered by 2030 with OEMs establishing themselves within the region, then the investment has the potential to secure up to 11,000 net additional FTE jobs within the region, which in turn could generate up to 3.3bn in GVA for the regional economy. Without OEMs establishing themselves in the combined regions, then the delivery of 6 projects could still support up to 6,550 net additional FTE jobs within NE&YH, potentially generating up to £2.0bn for the regional economy under Scenario 3.
    - OEMs becoming established within the regions could therefore provide an additional economic benefit, by enabling up to 4,450 net additional FTE jobs on top of those employed in the absence of OEMs. Such employment growth has the potential to generate an additional £1.3bn to UK economy in Scenario 3.
- If 4 projects were delivered by 2029 with OEMs establishing themselves within the region, then the investment has the potential to generate up to 7,350 net additional FTE jobs within the region. Such employment growth could generate up to 2.2bn in GVA for the regional economy. Without OEMs establishing themselves in NE&YH, then the delivery of 4 projects could still support up to 4,350 net additional FTE jobs in the combined regions. This could generate up to £1.3bn for the regional economy from 4 projects within the Dogger Bank zone.
    - Establishing OEMs within NE&YH could therefore bring forward an additional economic benefit of up to 3,000 net additional FTE jobs, generating up to £900m in GVA in Scenario 2.
- If 2 projects were developed by 2025 with OEMs established in the NE&YH regions, this could support up to 3,750 net additional FTE jobs across the combined regions, generating up to £1.2bn for the NE&YH economy. Without OEMs establishing themselves in NE&YH, then the delivery of 2 projects could still support up to 2,200 net additional FTE jobs in the combined regions. This could generate up to £0.8bn for the regional economy from 2 projects within the Dogger Bank zone.
    - Should OEMs become established in the NE&YH Region, this could bring an additional economic benefit of up to 1,550 net additional FTE jobs in the Region, generating up to £450m in GVA in Scenario 2.

5 Conclusions

Deployment of offshore wind on the Dogger Bank presents a real opportunity to help support and bolster the UK and regional economies and help drive forward Government's economic growth agendas.

The location of the Dogger Bank and the technical requirements for delivery presents a substantial opportunity for the NE&YH regions to capture a significant proportion of the supply chain. Locational advantages arise from a concentration of projects within the Dogger Bank and from potential business efficiency gains in locating closer to the development. These combine with historic strengths and existing skills within the regions in large scale production activities and a marine support legacy. It is likely that the supply chain will cluster in port-side locations spanning the coastline of the two regions.

Those sectors which include activities that are of most relevance[6] to the offshore wind industry, and which will encompass the vast majority of activities in the supply chain, currently have a higher contribution of GVA to the UK economy - accounting for 27% of all jobs in the UK, but generating 30% of the UK's GVA. The contribution of these sectors is higher in NE&YH, highlighting the continued importance of such activities within the combined regions.

The majority of employment gains will be in the Manufacturing, Construction and Installation phases of the Dogger Bank, with lower levels of employment expected in both the Development and O&M phases. However, GVA per worker contributions in the Development and O&M phases are significantly higher than in the remaining phases, meaning that those jobs would individually generate a higher return for the UK economy. O&M jobs also have a longer lifecycle, providing long term sustainable employment gains.

A key driver for maximising economic benefits will be in establishing OEMs in the UK – the scenarios clearly demonstrate the role of OEMs in focussing cluster locations and fostering supply chain agglomerations in both the UK and regional scenarios. Maximising economic benefits at all levels will require coordinated efforts from public agencies and the private sector to enhance capacity in the supply chain.

UK in Context		
	Jobs	**GVA**
National Total	30.7m	1.3tn
Relevant OWF Sectors	8.4m	401bn
Share of National Total	27%	30%

NE&YH in Context		
	Jobs	**GVA**
Regional Total	3.7m	£134bn
Relevant OWF Sectors	1.0m	£45bn
Share of Regional Total	29%	33%

[6] Relevant Offshore Wind sectors include in Professional, scientific & technical, Manufacturing, Construction, Transport & storage and Electricity, steam, gas & air conditioning supply (ONS, 1-Digit SIC sectors)