Partners in UK offshore wind

MORGAN GENERATION ASSETS PROJECT

Preliminary Environmental Information Report

Volume 4, annex 18.1: Technical Impact Report – Socio-economics

Image of an offshore wind farm

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Contents

Tables

1 SOCIO-ECONOMICS TECHNICAL IMPACT REPORT

1.1 Introduction

1.1.1.1 This Socio-economics Technical Impact Report provides supplementary documentation which informs the assessment of socio-economic impacts within volume 2, chapter 18: Socio-economics of the PEIR.

1.1.1.2 This report considers the potential socio-economic impacts of the Morgan Offshore Wind Project: Generation Assets (hereafter Morgan Generation Assets). Within the following categories:

- Economic impacts: covering the employment and GVA impacts associated with the Morgan Generation Assets
- Social impacts: covering the impacts of the workforce associated with the Morgan Generation Assets on housing, accommodation, and population.

1.1.2 Project overview

1.1.2.1 Morgan Offshore Wind Limited (the Applicant), a joint venture of bp Alternative Energy Investments Ltd. (hereafter referred to as bp) and Energie Baden-Württemberg AG (hereafter referred to as EnBW) is developing the Morgan Offshore Wind Project: Generation Assets (hereafter Morgan Generation Assets).

1.1.2.2 The Morgan Offshore Wind Project and the Morecambe Offshore Windfarm (developed by Cobra Instalaciones Servicios, S.A. and Flotation Energy plc) were scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review to assess options to improve the coordination of offshore wind generation connections and transmission networks. The output of this process concluded that the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm should work collaboratively on a coordinated grid connection at Penwortham in Lancashire.

1.1.2.3 The Morgan Offshore Wind Project and Morecambe Offshore Wind Ltd are seeking consent for transmission assets comprising shared offshore export cable corridors to landfall and shared onshore export cable corridors to onshore substation(s), and onward connection to the National Grid electricity transmission network at Penwortham, Lancashire. This will be delivered as part of a separate application for consent and therefore this chapter of the PEIR provides an outline description of the Morgan Offshore Wind Project Generation Assets (hereafter referred to as the Morgan Generation Assets).

1.1.2.4 With respect to the Morgan Generation Assets, as with other similar projects, there is a complexity with the socio-economic impacts associated with generation activities manifesting both onshore and offshore. This topic's approach is focused on the 'source' of the impact, rather than the ultimate location of the physical infrastructure. This is consistent with the broader approach to separating potential onshore and offshore effects:

- Generation: if physical infrastructure and civil works are associated with the Morgan Generation Assets, any resulting potential impacts are assessed within this topic. This is regardless of whether the impact manifests offshore or onshore.
- Transmission: if physical infrastructure and civil works are associated with the Morgan and Morecambe Offshore Wind Farms Transmission Assets, any resulting potential impacts are excluded from assessment of the project in isolation and are considered as part of the cumulative effects assessment instead. The potential impacts associated with the Morgan and Morecambe Offshore Wind Farms Transmission Assets will be assessed as part of a separate Development Consent Order (DCO) application.

1.2 Methodology

1.2.1 Socio-economics study area(s)

Socio-economics national study area(s)

1.2.1.1 National socio-economics study areas are defined to reflect the wider reach of Gross Value Added (GVA) and employment impacts that may materialise through the supply chain and demand for labour. As such, two socio-economics national study areas have been selected:

- United Kingdom (UK): understanding the UK content of potential economic impacts associated with offshore wind farm developments is an important aspect of considering a project's potential benefits. It is recognised, therefore, that assessing the potential impacts of the Morgan Generation Assets at the UK level will assist the Planning Inspectorate in its examination of the project application.
- Wales: assessing the potential impacts of the Morgan Generation Assets at the Wales level will assist the Planning Inspectorate in understanding the Morgan Generation Assets' potential economic benefits on a devolved nation with potential ports listed in Table 1.1. Wales can be defined as both a nation and a region of the UK. For the purposes of this assessment, Wales is defined as a nation.

Socio-economics regional study area(s)

1.2.1.2 The following approach has been followed to define potential regional study areas:

Step 1:

- Identification of port facilities that are potential options for construction and/or operations and maintenance bases.

Step 2:

- Assess socio-economics study area(s) associated with potential port facilities

Step 1 – Identify port facilities that are viable options for construction and/or operations and maintenance bases

1.2.1.3 Assumptions adopted as part of this analysis are to inform the assessment alone and have been determined based on a consideration of ports well placed to service offshore developments within the Irish Sea. The final selection of ports, potential manufacturing and fabrication facilities, and delivery models required for the Morgan Generation Assets project has not yet been determined. The Applicant will explore ports, supporting infrastructure and labour markets to understand the potential capabilities, capacities and availability that exists. Subject to these findings, more than one port could be used to support elements of the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets project as part of a wider supply chain. Final selection of ports, potential manufacturing and fabrication facilities, and delivery models will be subject to ongoing engineering and procurement considerations – the use of assumptions for the purposes of this assessment does not indicate any preference or imply any decision.

1.2.1.4 To ensure the assessment is proportionate, it concentrates on ports within the relevant planning jurisdiction of England and Wales in proximity to the Irish Sea. Therefore, ports in north Wales and northwest England are considered as part of this assessment.

1.2.1.5 The number of ports involved in the project lifetime of an offshore wind farm can vary depending on the size and location of the project. Typically, an offshore wind farm project will require multiple ports throughout its lifetime, broadly covering the following:

- Fabrication port (construction phase): as technology develops and the size of offshore wind farm components continues to increase, the need to manufacture components in close proximity to the waterside also grows due to the challenges of transporting large components by road or railway. Components such as blades, towers, foundations, cables, and offshore substations will therefore typically require fabrication at a port within reasonable proximity of the waterside. Components are typically built at the fabrication port and subsequently transferred to a marshalling port (assuming these are not the same port). The fabrication port delivering any component can be based anywhere in the world.
- Marshalling port (construction phase): serves as a hub for the coordination of components, equipment, and workforce during the construction phase, including storage and distribution. The marshalling port(s) will also serve as the staging area for installation and support vessels. The marshalling port(s) will typically be located within reasonable proximity of the offshore site.
- Operations and maintenance port: when an offshore wind farm has been commissioned, a port is selected as the primary hub for ongoing maintenance of components, along with other operational requirements.

1.2.1.6 There are a number of considerations when identifying ports that have the potential to support fabrication and/or marshalling activities during the construction phase. It is possible that some ports will be better suited to the fabrication and marshalling requirements of certain components, whilst being unsuitable for other components. Considerations regarding port suitability include:

- Water depth: as the size of offshore wind farm components increases, so does the size of the associated transportation and installation vessels. A port should have adequate water depth to accommodate vessels and equipment.
- Infrastructure: a port should have the necessary infrastructure and facilities, including cranes capable of lifting and moving equipment and components, storage areas (indoor and outdoor), workshops, and offices.
- Transport links: a port should have suitable road and rail connectivity to allow for the efficient transfer of smaller components/subcomponents, equipment, and workforce.
- Labour market: consideration can also be given to the availability of skilled labour within the labour market catchment of the port.

1.2.1.7 Given the many variables associated with port selection during the construction phase, typical delivery models incorporate multiple ports which will each deliver the fabrication and/or marshalling needs of specific components, depending on requirements (e.g. foundations, offshore substations, inter array or export cables etc).

1.2.1.8 The Applicant has conducted an initial exploratory facilities appraisal to identify a potential list of ports in England and Wales that could support elements of each phase of the Morgan Generation Assets. This list is currently high level and does not contain granular detail regarding port suitability by component. This longlist is set out in Table 1.1.

1.2.1.9 Identified potential port facilities deemed to be suitable bases for elements of the construction phase are also assumed to be suitable for the decommissioning phase, given the similarities between activities associated with both phases.

Table 1.1: Long list of potential construction, operations and maintenance, and decommissioning port facilities in England and Wales.

Construction/decommissioning	Operations and maintenance
Holyhead	Holyhead
Mostyn	Mostyn
Liverpool[1]	Liverpool
Heysham	Heysham
Barrow-in-Furness	Barrow-in-Furness

[1] Note: 60 minute drive time catchment for Liverpool is based on the Port of Birkenhead.

Step 2 – Assess socio-economics regional study area(s) associated with identified facilities

1.2.1.10 Labour catchment areas[2] associated with each longlisted port facility have been defined using a 60 minute drive time catchment as a proxy[3].

1.2.1.11 Adopting a methodology which defines regional socio-economics study area(s) associated with offshore wind farm projects on the basis of local authority areas is necessary given that government data sources are structured to reflect conditions at local authority level. Below this level of governance, data becomes increasingly scarce and can be less reliable when dealing with survey based data, for example. It is also necessary to take account of wider policy and administrative designations in determining appropriate areas for consideration.

1.2.1.12 Therefore, 60 minute drive time catchments for each facility have been converted to the following best fit socio-economics regional study areas:

- North Wales: together, the Holyhead and Mostyn ports' 60 minute drive time catchments cover (at least partially) the six local authorities which de facto constitute 'north Wales'. As per the Welsh Government's National Development Framework (Welsh Government, 2021), these local authorities constitute the 'North' strategic planning region. North Wales is therefore an appropriate definition for a socio-economics regional study area. Since this assessment defines Wales as a nation, it is appropriate to define North Wales as a 'region' of Wales (although it should be noted the North Wales socio-economics regional study area does not meet the definition of a UK region).
- Northwest England: together, the Barrow-in-Furness, Heysham, and Liverpool ports' 60 minute drive time catchments cover (at least partially) 37 of 39 local authorities in the northwest region – the two exclusions being Allerdale and the City of Carlisle in northern Cumbria. Levelling Up the United Kingdom (Department for Levelling Up, Housing and Communities (DLUHC), 2022) – the UK government's social and economic programme for government – utilises regional definitions for the purposes of identifying the next steps the Government will take to deliver its programme. Northwest England is therefore an appropriate definition for a socio-economics regional study area. Note: the Northwest England socio-economics regional study area does meet the definition of a UK region.

Summary

1.2.1.13 In summary, the following socio-economics study areas have been defined for the purposes of assessment:

- North Wales socio-economics regional[4] study area
- Northwest England socio-economics regional[5] study area
- Wales socio-economics national study area (hereafter referred to as "Wales")
- UK socio-economics national study area (hereafter referred to as "UK").

1.3 Assessing economic impacts

1.3.1 Standard approaches

1.3.1.1 There is not a standard approach to assessing the economic impacts of an offshore wind farm, but commonly used principles involve assessing the direct, indirect, and induced economic impacts of the wind farm, based on the key stages of:

- Design and development
- Construction
- Operation
- Decommissioning.

1.3.1.2 These stages can be further disaggregated by supply chain category.

1.3.1.3 This process can be achieved via either 'top-down' or 'bottom-up' approaches. A top-down approach typically begins at the macro level, often using publicly available data and generalised principles, in order to model a narrow set of micro variables. This approach is not project-specific, and inputs can be replicated across different developments. A bottom-up approach is the opposite; typically beginning with project-specific data in order to model a narrow set of micro variables. This approach is highly project-specific, with inputs needing to be established for every individual scheme this approach is applied to.

1.3.1.4 The current most commonly used guidance (non-binding) in the area of assessing the socio-economic impacts of an offshore wind farm is Glasson et al (2020). This sets out three potential approaches: Simple, Complex, and Hybrid. Each approach is discussed in more detail below.

Simple

1.3.1.5 Glasson et al (2020) sets out the 'Simple' approach as: "…extrapolative and comparative measures drawing on trends in relevant data, informed by examples of actual impacts from similar offshore wind projects, or some basic use may be made of a range of economic impact models, such as multipliers and input–output (I-O) models."

1.3.1.6 This top-down approach typically involves the input of a high-level assumption around expenditure or whole-project impact estimates, which is then developed into a useable economic impact assessment for EIA purposes by applying a series of assumptions and generalised principles underpinned by publicly available evidence, data, and guidance.

1.3.1.7 Therefore, with minimal project-specific inputs, it is possible to develop a useful economic impact assessment that can be used for EIA purposes.

[2] Labour catchment areas are commonly defined based on the locations from which people are typically drawn to an employment location such as a business, an employment centre (such as a port), or an entire town or city.

[3] As per non-statutory guidance in Glasson, J. et al. (2020).

[4] Does not meet the definition of a UK region

[5] Meets the definition of a UK region

1.3.1.8 Being 'top down', this approach is not project specific in its detail.

Complex

1.3.1.9 Glasson et al (2020) sets out the 'Complex' approach as: "the development of an Input-Output (I-O) approach… An I-O table is a balancing matrix of financial transactions between industries and sectors, which can be used to provide a detailed and disaggregated guide to the wider economic impacts resulting from changes in one industry or sector."

1.3.1.10 This top-down method can allow for the development of an accurate economic impact assessment at local and regional levels that delivers useful outputs for assessing significant effects for localised/regionalised impact areas.

1.3.1.11 Being 'top down', this approach is not project specific in its detail.

1.3.1.12 The key to the effectiveness of this approach is the level of granularity underpinning any I-O tables utilised, which presents difficulties for two main reasons:

- To be truly effective, I-O tables must be up to date, and bespoke to the impact areas under consideration. Such I-O tables are not publicly available. The alternative is to adapt publicly available national I-O tables for application at local/regional levels, however this begins to introduce a degree of generalisation
- I-O tables are typically categorised using Standard Industry Classification (SIC) codes. It is well established that the offshore wind sector is not easily defined according to SIC codes. As such, there may not be adequate and appropriate coding according to available I-O tables. The use of high-level data and assumptions can once again introduce a degree of generalisation.

Hybrid

1.3.1.13 A number of more 'Hybrid' approaches have been developed during recent years. These approaches tend to be bottom-up, making them highly project specific (although an application of top-down generalised principles typically remains to some extent, hence the 'Hybrid' label).

1.3.1.14 This approach utilises cost and supply chain data provided by the developer to develop a highly project-specific economic impact assessment. This will typically require the use of scenarios to deal with the levels of uncertainty at the pre consenting stage, particularly in terms of location of spend.

1.3.1.15 The main drawback of this method is ensuring that no commercially sensitive information on cost and supply chain enters the public domain during the consenting process, as discussions surrounding potential contracting matters are typically at a very early stage. Due to the current primitive position of commercial contracting and negotiations, detailed information on costs and supply chain is not available to inform the assessment in this technical report.

1.3.2 Approach at PEIR stage of application

1.3.2.1 For this assessment an approach most similar to the top-down 'Simple' approach described above is adopted at the PEIR stage of the planning application process. This is based on the best and most up-to-date information available at the time of this analysis, which includes:

- The PEIR Project Design Envelope (PDE) for the Morgan Generation Assets
- Oxford Economics (2021) The Impact on the UK Economy of The Applicant's Proposed Windfarm – provides an estimate of the employment and GVA created by a 3 GW capacity offshore wind farm in the UK economy. This is based on early project primary expenditure data provided to Oxford Economics by The Applicant in 2021
- BVG Associates (2019) Guide to an Offshore Windfarm prepared for the Crown Estate – which sets out indicative costs by component of a typical windfarm – see A.1 Appendix 1 for further details
- Glasson et al (2020) Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs).

1.3.2.2 Using the above sources of information, this analysis:

- Estimates the UK level impacts attributable to the Morgan Offshore Wind Project, and subsequently the UK level impacts attributable to the Morgan Generation Assets – drawing on Oxford Economics (2021)[6]
- Estimates the impacts attributable to the construction and operations and maintenance phases of the Morgan Generation Assets project below the UK level – drawing on rules of thumb established via Glasson et al (2020).

1.3.3 Estimating UK impacts associated with Morgan Generation Assets

1.3.3.1 The PDE for the Morgan Offshore Wind Project shows that the project has an anticipated capacity of 1.5GW of up to 107 Wind Turbines. Based on anticipated capacity, it has been assumed the scale of impact in the UK associated with the Morgan Offshore Wind Project is likely to be half of the total impacts assessed by Oxford Economics (which assesses a 3 GW wind farm).

1.3.3.2 UK impacts associated with the Morgan Offshore Wind Project have therefore been estimated by dividing the impacts presented in the Oxford Economics work in half, based on estimated capacity.

1.3.3.3 As this assessment considers the impacts of only the Morgan Generation Assets only, it is necessary to determine which impacts are attributable to this scope. Work undertaken by BVGA (2019) for the Crown Estate gives indicative costs for each element of the windfarm development process. This breaks down expenditure to:

- Wind turbines
- Balance of plant

[6] UK/national rules of thumb not available in Glasson et al (2020)

- Installation and commissioning

1.3.3.4 Each of these categories is then broken down to more detailed supply chain components, which are considered in turn. This breakdown can be found in A.1 Appendix 1.

1.3.3.5 Using professional judgement, the analysis allocates supply chain categories relevant only to the generation assets as appropriate and calculates the associated impacts of construction and operations and maintenance. This provides a percentage of the total spend derived from the Oxford Economics report attributable to of the generation assets. Further details are set out in Table A.1 Appendix 1.

1.3.3.6 This percentage is then applied to the estimate of the total employment and GVA impact of each project, as shown in Table 1.2.

Table 1.2: Distribution of economic impacts associated with Morgan Generation Assets category.

Asset category	Share of potential impacts
Construction	
Generation	81%
Operation and Maintenance	
Generation	84%
Decommissioning	
Generation	Unknown at this stage (see section 1.3.3.8)

1.3.3.7 Potential impacts at the UK level associated with operations and maintenance activities are estimated to be negligible and are not anticipated to be of material consideration. To ensure the assessment remains proportional, UK level operations and maintenance impacts have been omitted.

1.3.3.8 The scale and duration of decommissioning activity is uncertain. The exact approach to decommissioning is not yet confirmed as best practice at the time is not currently known. The workforce for the decommissioning of the offshore parts of the Morgan Generation Assets is likely to be supported in a similar way to installation, with the process taking place in reverse (i.e. construction phase activities minus fabrication). This assumption will form the basis of a qualitative assessment of potential decommissioning phase effects, therefore quantitative decommissioning impacts are omitted.

1.3.4 Estimate of construction and operation and maintenance impacts below UK level

Scenario descriptions – Morgan Generation Assets PEIR assessment

1.3.4.1 A ‘central’ impact scenario is based on a set of assumptions derived from evidence of impacts associated with existing conditions in the offshore wind sector.

1.3.4.2 With regards to the construction phase, the central impact scenario assumes that no single port can support all activities associated with the installation of the Morgan Generation Assets project. Port capacity and capabilities determine the facilities at which the installation of individual components could take place.

1.3.4.3 With regards to the operations and maintenance phases, the central impact scenario assumes that a single port within the North Wales socio-economics regional study area or the Northwest England socio-economics regional study area would be selected as the primary facility for this phase of the Morgan Generation Assets project.

1.3.4.4 A ‘low’ impact scenario would cover a situation where a primary port outside England and Wales is selected (applies to both construction and operations and maintenance phases), which would result in much lower impacts in the North Wales socio-economics regional study area, Northwest England socio-economics regional study area, and Wales. In a ‘low’ impact scenario, UK impacts would be expected to be retained at the levels assessed i.e. it is not anticipated the activities associated with the assessed impacts would be located outside the UK.

1.3.4.5 A ‘high’ impact scenario would cover a situation where an increased level of construction phase impacts would be located within the North Wales socio-economics regional study area, Northwest England socio-economics regional study area, Wales, and the UK. This would be the result of an increase in both port and supply chain capacity and capabilities, allowing for increased delivery of fabrication and installation at regional, and national levels. There is insufficient information available at this stage to define the parameters of a ‘high’ scenario.

1.3.4.6 For the purposes of this assessment, the central impact scenario has been assessed.

1.3.4.7 The impacts reported are not predicted to occur in both socio-economics regional study areas simultaneously – the potential impacts presented should be considered as ‘one or the other’. Further, UK impacts are inclusive of any stated regional and Wales impacts i.e. regional and Wales impacts are a subset of UK impacts. Similarly, North Wales regional impacts are a subset of Wales impacts.

Employment impacts

1.3.4.8 Glasson et al (2020) provides a series of ‘rules of thumb’ for estimating the employment impacts of an offshore wind farm development, which are based on a review of UK offshore wind farm project Environmental Statements.

1.3.4.9 These rules of thumb apply at both a ‘local’ and ‘regional’ levels. A description of these terms is set out as follows:

Table 1.3: Description of geographies from Glasson et al (2020).

Geography	Description
‘Local’	Typically based on a combination of local authority groupings and 60 minute drive time catchments (representing commuting distances).
‘Regional’	Typically based on the standard definition of a UK region.

1.3.4.10 Applying professional judgement to these geographical descriptions:

- ‘Local’ rules of thumb have been applied to the North Wales socio-economics regional study area as it does not meet the definition of a UK region

- ‘Regional’ rules of thumb have been applied to the Northwest England regional socio-economics study area as it does meet the definition of a UK region
- ‘Regional’ rules of thumb have been applied to Wales as it does meet the definition of a UK region.

1.3.4.11 The rules of thumb in Glasson et al (2020) are also based on ‘low’ and ‘medium’ scenarios which are described in Table 1.4 below.

Table 1.4: Description of scenarios from Glasson et al (2020).

Scenario	Description	Comments
Construction		
‘Low’	Typically assumes no port within the study area under consideration is utilised during construction phase, leading to low content.	This scenario is similar to the low impact scenario set out at paragraph 1.3.4.4.
‘Medium’	Typically assumes a port within the study area under consideration is utilised during the construction phase to fully deliver all installation activities.	This scenario is high compared to the central impact scenario assumptions set out at paragraph 1.3.4.2, which assumes no single port can support all activities associated with the installation of the Morgan Generation Assets project. The delivery model described under the central impact scenario is typical of offshore wind farm developments. Full delivery of all installation activities from a single port is less common and is becoming increasingly uncommon given the increasing size of components and the associated space requirements for staging.
Operations and maintenance		
‘Low’	Not defined	N/A
‘Medium’	Typically assumes a single port within the study area under consideration is utilised during the operations and maintenance phase to deliver the majority of associated activities.	This scenario is equivalent to the central impact scenario described in paragraph 1.3.4.3.

1.3.4.12 Applying professional judgement to these scenario descriptions leads to the following approach:

- Construction phase: in order to assess impacts under a central impact scenario as described in paragraph 1.3.4.4, it is necessary to develop a scenario which sits in between the ‘low’ and ‘medium’ scenarios described in Glasson et al (2020). Therefore, the mid-point between the ‘low’ and ‘medium’ scenarios has been adopted as the basis for a central impact scenario.
- Operations and maintenance phase: the ‘medium’ scenario described in Glasson et al (2020) is suitable for this assessment as it matches the description of the central impact scenario set out at paragraph 1.3.4.3.

1.3.4.13 Table 1.5 sets out the rules of thumb adopted for this assessment.

Table 1.5: Summary of ‘rules of thumb’ adopted for assessment of employment impacts below UK level – central impact scenario.

Study area	Rule of thumb
Construction	
North Wales	0.35 FTE jobs per MW, total
Northwest England Wales	1.05 FTE jobs per MW, total
Operations and maintenance	
North Wales	0.07 FTE jobs per MW, per annum
Northwest England Wales	0.2 FTE jobs per MW, per annum

GVA impacts

1.3.4.14 To estimate GVA impacts below the UK level, the content of employment impacts at lower geographies as a share of UK employment impacts is applied to UK level GVA impacts (drawing on Oxford Economics, 2021). This is based on the principle that employment content and GVA content are typically the same.

Additionality

1.3.4.15 The rules of thumb adopted here include direct, indirect, and induced employment as follows:

- Direct: these economic impacts are directly attributable to a development. For example, with respect to Morgan Generation Assets, the direct employment impacts are the jobs supported by activities associated with delivering each phase of the project.
- Indirect: these economic impacts are secondary impacts that occur as a result of the interactions between a development and other parts of the economy. For example, with respect to Morgan Generation Assets, the project will require fabrication of components and subcomponents, and supply of equipment and transportation, all of which increases sector demand leading to economic impacts throughout the supply chain.
- Induced: these economic impacts result from changes in household spending patterns as a consequence of direct and indirect economic impacts. For example, with respect to Morgan Generation Assets, the employment opportunities supported by the project (including those throughout the supply chain) result in workers having income to spend, leading to further economic impacts in other parts of the economy.

1.4 Social impacts

1.4.1.1 There will be a range of installation and commissioning roles filled by mobile workers, as is typical of offshore wind projects. This could support temporary, medium, or long-term labour migration into local areas associated with primary and secondary port facilities. This could also impact permanent residents of these locations.

1.4.2 Construction phase

1.4.2.1 Potential primary construction port facilities could support the following activities:

- Wind turbine staging and installation
- Foundation staging and installation
- Offshore substation staging and installation
- Inter-array cable staging and installation
- Export cable staging and installation

1.4.2.2 During the construction phase the roles associated with these activities are anticipated to be based largely offshore, with workers accommodated within vessels. However, these workers have the potential to give rise to demand for temporary accommodation at the start and end of typical shift periods at sea within the catchments of the relevant transfer port(s) before or after spending time at their home location. Some roles e.g. assembly or management, will be based onshore, and have the potential to give rise to further demand for temporary accommodation, and possibly short-term rented accommodation.

1.4.2.3 No permanent (i.e. long term), relocation of workers is anticipated during the construction phase based on the mobile nature of large parts of this workforce.

1.4.2.4 Workforce impacts associated with each project have been estimated based on assumptions relating to the following variables:

- maximum activities within a single area (e.g. co-location of wind turbine and inter-array cable staging and installation).
- maximum vessel numbers – based on information provided in project design envelope
- vessel crew size
- shift arrangements
- shifts per annum – based on construction programme
- nights of accommodation required per shift
- it is assumed that a minimum of one third of workers would not require local overnight accommodation, on the basis that workers may be based permanently in locations that are accessible without the need for overnight accommodation – based on professional judgement.

1.4.2.5 Under a central impact scenario it is assumed that wind turbine and inter-array staging take place at ports within the same regional area – this is to test the maximum potential impacts on a single locality. Further workforce impacts will be created in other areas of the UK depending on selection of support ports for other construction activities (e.g. offshore substation staging), however these are anticipated to be no greater than those estimated under the central impact scenario.

1.4.3 Operations and maintenance phase

1.4.3.1 Potential operations and maintenance port facilities are expected to support the following activities:

- Wind turbine operations and maintenance
- Foundation operations and maintenance
- Offshore substation operations and maintenance
- Inter-array cable staging and installation
- Export cable staging and installation.

1.4.3.2 During the operations and maintenance phase, the workforce could live anywhere and travel to the wind farm for shifts. However, given the long-term continuity of operations and maintenance work there is a likelihood that a proportion of the workforce will live locally.

1.4.3.3 Workforce impacts associated with each project have been estimated based on the following assumptions:

- maximum vessel numbers – based on project PDEs
- vessel crew size
- shift arrangements
- workers transitioning from the Oil and Gas or other relevant sectors
- new entrants to the sector resulting from existing and planned training activities – with a lead time of at least five years before commencement of operations there is time to train a local workforce
- relocations of skilled workers to the selected locality (assumed half of workforce in-migrate). Relocations are assumed to be long term or permanent. It is assumed that any migrating workers would also relocate their families.

1.4.3.4 Other periodic operations and maintenance tasks may require temporary overnight accommodation for crew immediately before and after commencing works. This is estimated as being negligible and does not to warrant further consideration for purposes of EIA.

1.4.3.5 Under a central impact scenario it is assumed that the majority of operations and maintenance activities take place at a single port.

1.4.3.6 It is assumed that a small operational base will be located at the selected operations and maintenance port, whilst operational headquarters will be located elsewhere in the UK, as this activity is not geographically dependant on port selection.

1.5 Economic Impacts

1.5.1 Construction phase

1.5.1.1 This technical report is based on a 4 year (48 month) construction phase (see volume 1, chapter 3: Project description of the PEIR).

1.5.1.2 The potential impacts of the Morgan Generation Assets on locally based employment and GVA in fabrication and installation activities under the central impact scenario are set out in Table 1.6.

Table 1.6: Potential impacts of the Morgan Generation Assets on employment and GVA in fabrication and installation activities, central impact scenario.

Source: based on analysis of Oxford Economics (2021)

Study area	Employment – per annum (FTE years)	Employment – total (FTE years)	GVA – per annum	GVA – total
Regional				
North Wales	110	420	£9 million	£35 million
Northwest England	320	1,270	£26 million	£110 million
National				
Wales	320	1,270	£26 million	£110 million
UK	640	2,560	£53 million	£210 million

1.5.1.3 These impacts will create opportunities to both safeguard existing economic activities and facilitate new economic growth.

1.5.2 Operation and maintenance phase

1.5.2.1 A 35-year operations and maintenance period is assumed throughout.

1.5.2.2 The potential impacts of the Morgan Generation Assets on locally based employment and GVA in operations and maintenance activities under the central impact scenario are set out in Table 1.7.

Table 1.7: Potential impacts of the Morgan Generation Assets on employment and GVA in operations and maintenance activities, central impact scenario.

Source: based on analysis of Oxford Economics (2021)

Study area	Employment – per annum (FTE years)	Employment – total (FTE years)	GVA – per annum	GVA – total
Regional				
North Wales	80	2,900	£10 million	£340 million
Northwest England	250	8,800	£29 million	£1,000 million
National				
Wales	250	8,800	£29 million	£1,000 million

1.5.2.3 These impacts will create opportunities to both safeguard existing economic activities and facilitate new economic growth.

1.6 Social Impacts

1.6.1 Construction phase

1.6.1.1 The potential social impacts during the construction phase of the Morgan Generation Assets project under the central impact scenario are set out in Table 1.8.

Table 1.8: Potential fabrication and installation mobile workforce impacts, central impact scenario.

Study area	Maximum temporary overnight stays (nights per annum)	Maximum medium term relocations (persons)	Maximum permanent relocations (workers)	Maximum permanent population increase (persons)
Regional				
North Wales	30,000	N/A	N/A	N/A
Northwest England	30,000	N/A	N/A	N/A

1.6.2 Operation and maintenance phase

1.6.2.1 The potential social impacts during the operations and maintenance phase of the Morgan Generation Assets project under the central impact scenario are set out in Table 1.9.

Table 1.9: Potential operations and maintenance mobile workforce impacts, central impact scenario.

Study area	Jobs per annum (FTE years)	Estimated permanent population increase	Estimated permanent dwelling requirement
Regional			
North Wales	705	850	350
Northwest England	705	850	350

1.7 Conclusion

1.7.1.1 This technical impact report has summarised the potential socio-economic impacts of the Morgan Generation Assets project within the following categories:

- Economic impacts: covering the employment and GVA impacts associated with Ethe Morgan Generation Assets
- Social impacts: covering the impacts of the workforce associated with the Morgan Generation Assets on housing, accommodation, and population.

1.7.1.2 The impacts assessed within this technical impact report are the basis for an assessment of significant socio-economic effects of the Morgan Generation Assets, which can be found in volume 2, chapter 18: socio-economics of the PEIR.

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A.1 Appendix 1: Offshore wind farm supply chain costs and categorisation

Table A1.1: Offshore wind farm supply chain total costs and categorisations.

Source: adapted from BVG Associates (2019)

Level 1 Supply Chain Category	Unit capacity	Cost estimate – per unit	Level 2 Supply Chain Category	Cost estimate	Level 3 Supply Chain Category	Cost estimate – total	Applicable to Generation Assets
Offshore Wind turbine	10 MW wind turbine	£10,000,000 per turbine	Nacelle	£4,000,000		£428,000,000	Y
			Rotor	£1,700,000		£181,900,000	Y
			Tower	£700,000		£74,900,000	Y
			Other turbine CAPEX	£3,600,000		£385,200,000	Y
Balance of plant	1 GW wind farm	£600,000,000	Cables	£170,000,000	Export cable	£130,000,000	N
					Array cable	£35,000,000	Y
					Other cable CAPEX	£5,000,000	N
			Turbine foundation			£280,000,000	Y
			Offshore substation			£120,000,000	Y
			Onshore substation			£30,000,000	N
Installation and commissioning	1 GW wind farm	£650,000,000	Foundation installation			£100,000,000	Y
			Offshore substation installation			£35,000,000	Y
			Onshore substation installation			£25,000,000	N
			Onshore export cable installation			£5,000,000	N
			Offshore cable installation			£220,000,000	N
			Turbine installation			£50,000,000	Y
			Construction port				
			Offshore logistics			£3,500,000	Y
			Other installation and commissioning CAPEX			£211,500,000	N

A.2 Appendix 2: Impact industries definitions

Table A2.1 Employment impact industry definitions

SIC07 Class/ Subclass	Description	Construction	Operation and Maintenance	Decommissioning
03.11	Marine fishing			
06.10	Extraction of crude petroleum			
06.20	Extraction of natural gas			
09.10	Support activities for petroleum and natural gas extraction			
23.61	Manufacture of concrete products for construction purposes			
24.10	Manufacture of basic iron and steel and of ferro-alloys			
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel			
24.31	Cold drawing of bars			
24.32	Cold rolling of narrow strip			
24.33	Cold forming or folding			
24.34	Cold drawing of wire			
24.42	Aluminium production			
24.43	Lead, zinc and tin production			
24.44	Copper production			
24.45	Other non-ferrous metal production			
24.52	Casting of steel			
24.53	Casting of light metals			
24.54	Casting of other non-ferrous metals			
25.11	Manufacture of metal structures and parts of structures			
25.50	Forging, pressing, stamping and roll-forming of metal; powder metallurgy			
25.61	Treatment and coating of metals			
25.93	Manufacture of wire products, chain and springs			
25.94	Manufacture of fasteners and screw machine products			
25.99	Manufacture of other fabricated metal products n.e.c.			
27.11	Manufacture of electric motors, generators and transformers			
27.12	Manufacture of electricity distribution and control apparatus			

SIC07 Class/ Subclass	Description	Construction	Operation and Maintenance	Decommissioning
27.20	Manufacture of batteries and accumulators			
27.31	Manufacture of fibre optic cables			
27.32	Manufacture of other electronic and electric wires and cables			
28.11	Manufacture of engines and wind turbines, ex. aircraft, vehicle and cycle engines			
28.15	Manufacture of bearings, gears, gearing and driving elements			
28.22	Manufacture of lifting and handling equipment			
28.29	Manufacture of other general-purpose machinery n.e.c.			
28.41	Manufacture of metal forming machinery			
28.91	Manufacture of machinery for metallurgy			
28.99	Manufacture of other special-purpose machinery n.e.c.			
30.11	Building of ships and floating structures			
33.11	Repair of fabricated metal products			
33.13	Repair of electronic and optical equipment			
33.14	Repair of electrical equipment			
33.15	Repair and maintenance of ships and boats			
33.20	Installation of industrial machinery and equipment			
35.11	Production of electricity			
35.12	Transmission of electricity			
35.21	Manufacture of gas			
38.31	Dismantling of wrecks			
38.32	Recovery of sorted materials			
39.00	Remediation activities and other waste management services			
39.00	Remediation activities and other waste management services			
42.22	Construction of utility projects for electricity and telecommunications			
42.91	Construction of water projects			
43.13	Test drilling and boring			
50.10	Sea and coastal passenger water transport			
50.20	Sea and coastal freight water transport			
52.10/1	Operation of warehousing and storage facilities for water transport activities			

SIC07 Class/ Subclass	Description	Construction	Operation and Maintenance	Decommissioning
52.22	Service activities incidental to water transportation			
52.24/1	Cargo handling for water transport activities of division 50			
77.32	Renting/leasing of construction and civil engineering machinery and equipment			
77.34	Renting and leasing of water transport equipment			
77.39	Renting and leasing of other machinery, equipment and tangible goods n.e.c.			