Building our Potential

Ireland's Offshore Wind Skills and Talent Needs

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Commissioned by

Green Tech Skillnet

In partnership with

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Glossary of key terms

Term	Meaning
Business as usual scenario	A scenario for job demand based on the assumption that current capability will grow organically with little major government intervention to address skills shortages and increase local content. This scenario assumes Government capacity targets will be met. It is not the guaranteed number of jobs, rather the minimum likely demand if the ambitious targets are to be met on time.
Decommissioning	Project lifecycle phase. Covers the removal or making safe of the infrastructure of an offshore wind farm at the end of its useful life, plus disposal of equipment.
Development and project management	Project lifecycle phase. Covers the activities up to the point of final investment decision (FID) and managing the construction of the project through to commercial operations date. This includes activities required to secure planning consents, design and engineering, and all aspects of project management.
FTE year	"Full time equivalent" (FTE) is a unit to measure the number of employed persons. One FTE year is the equivalent of one person working full time for one year, or two people working for six months. For seasonal roles therefore, filling one FTE year will require multiple employees.
Gross value added	Measure of the value of goods and services produced in an area, industry or sector of an economy.
Installation	Project lifecycle phase. Includes all installation and commissioning of turbines, offshore balance of plant and onshore balance of plant.
Intervention scenario	A scenario for job demand based on the assumption that Government actively addresses skills shortages and attempts to increase local content in Ireland. This scenario assumes Government capacity targets will be met. It is not the guaranteed number of jobs, rather the possible demand if the ambitious targets are to be met on time and appropriate Government action is taken to increase local content.
Local content	The value added by the supply chain within a country. It can be quoted as a monetary value or as a percentage of total spend. It is not simply the value of contracts placed in Ireland, as this may include value added outside the country.
Manufacturing	Project lifecycle phase. Covers the manufacture of all wind turbine and balance of plant components.
Operations, maintenance and service	Project lifecycle phase. The combined functions which, during the lifetime of the wind farm, support the ongoing operation of the wind turbines, balance of plant and associated transmission assets.

Executive Summary

Introduction

Ireland's offshore wind industry is set to undergo a major transformation, with ambitious targets to install 5 GW of offshore wind energy capacity by 2030, and 37 GW by 2050. This goal forms a key part of the national objective to generate 80% of electricity from renewable sources by 2030. Current installed capacity stands at approximately 30 MW, but with a large area of suitable seabed there is potential for significant growth. The capacity target of 37 GW by 2050 has the potential to add at least €38 billion to the Irish economy over the lifetime of all installed wind farms.[i] While showcasing Ireland's commitment to sustainable energy, achieving these targets presents a unique set of challenges and opportunities, especially given the absence of a large oil and gas industry for skill and resource transition.

Methodology

We establish an annual offshore wind deployment projection in Ireland up to 2050. This forecast, based on Government targets, differentiates between fixed and floating technologies, acknowledging their distinct supply chain and skills implications. Our methodology also includes an in-depth supply chain analysis of the offshore wind activities likely to be conducted in Ireland. We assess key metrics such as Irish track record in offshore wind, Irish capabilities in similar sectors, benefits of local supply, current skills availability, investment risks, and the size of opportunity.

This supply chain analysis informs our assessment of the local content potential in Irish projects under both business-as-usual (BAU) and intervention scenarios, where we assume:

- BAU: current capability will grow organically with little major government intervention to address skills shortages and increase local content.
- Intervention: Government actively addresses skills shortages and attempts to increase local content in Ireland.

Skills opportunity for Ireland

The analysis shows that while there is limited direct experience in offshore wind in Ireland, there is some relevant capability in most parts of the supply chain. The main opportunities lie where:

- There is a track record or capability in parallel sectors
- There is logic in supplying Irish projects from Ireland, and
- The investment risk is low.

Using these metrics, we estimated the local content percentage for a typical offshore wind project in the BAU and intervention scenarios. This shows opportunity is greatest in categories such as project development and project management, tower manufacture, onshore infrastructure, and in the OMS phase. Some categories, such as development and consenting services, are conducted locally in the vast majority of cases, so we forecast a high local content percentage.

Combining our estimated local content percentages and the proportion of project spend for each supply chain category with the capacity projection, we derived the estimated number of jobs in Ireland per category for the BAU and intervention scenarios.

We project a total demand of at least 19,500 FTE years up to 2030 in the BAU scenario if Ireland realises its capacity targets. This equates to around 2,800 FTE in an average year to 2030. In the intervention scenario, we project a cumulative demand of 30,000 FTE years up to 2030, or around 4,200 FTE in an average year to 2030.

Up to 2040 meanwhile, we project a total demand of around 86,000 FTE years in the BAU scenario. This equates to around 5,000 FTE in an average year to 2040. If Ireland increases its capabilities as per the intervention scenario, it will see demand for 60,000 additional FTE years by 2040. This equates to around 8,600 FTE in an average year to 2040. Many of these additional jobs will likely come in the manufacturing phase, such as tower and substructure foundation manufacture, as this is where Ireland has the greatest potential to increase its local content.

[i] Gross value add using 2021 Euros. Costs based on 1 GW fixed and floating projects installed in 2030, so does not account for potential cost reductions over time.

A summary of projected job demand in the two scenarios is shown in Figure A. A breakdown of projected job demand in the two scenarios for each lifecycle phase for 2030 and 2040 is shown in Table A.

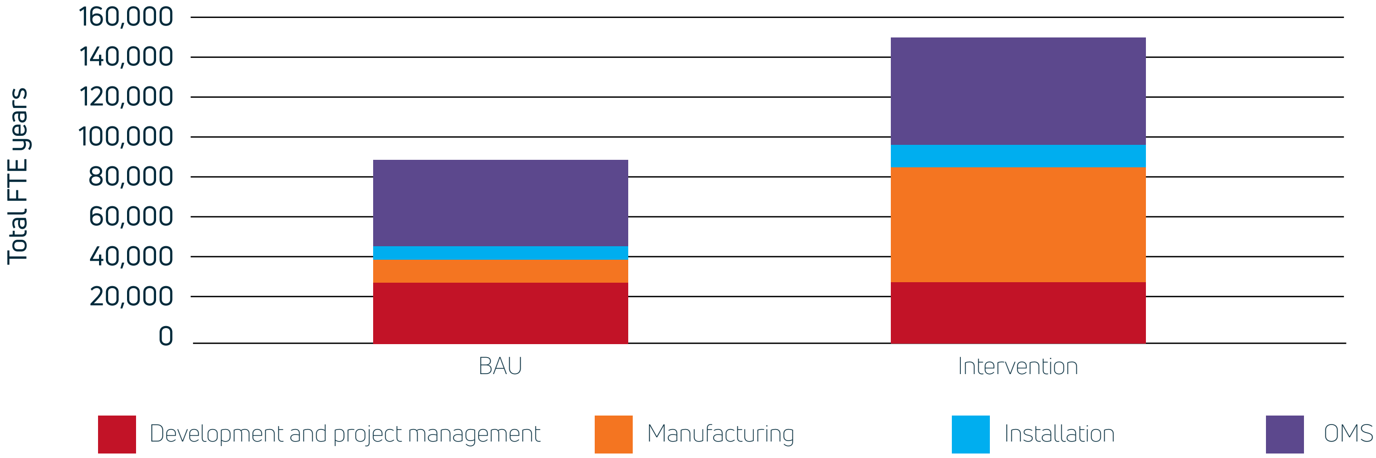


Figure A: Cumulative projected full time equivalent jobs in Ireland to 2040, split by lifecycle phase.

Cumulative number of FTEs						
Scenario	Year	Development and project management	Manufacturing	Installation	OMS	Total
BAU	2030	11,000	4,800	1,400	2,300	19,500
	2040	25,900	11,000	6,900	42,500	86,300
Intervention	2030	12,000	12,000	3,700	2,700	30,400
	2040	28,000	56,700	12,200	49,800	146,700

Table A: Cumulative projected full time equivalent jobs in Ireland, split by year and lifecycle phase.

Skills challenges for Ireland

Ireland has numerous parallel industries which have a workforce with skills applicable to offshore wind. Onshore wind is the most obvious sector from which people and suppliers can transfer training, experience, and skills. The country's engineering and maritime sectors, as well as project management and other managerial and professional sectors, also have skills transferable to offshore wind. Nonetheless, Ireland faces a significant challenge to both develop the skills unique to offshore wind and facilitate skills transfer.

We evaluate potential future skills shortages facing the offshore wind industry in Ireland by engaging with key players in the Irish offshore wind industry, including major multinational developers and suppliers. Their views inform our analyses on the skills shortages Ireland faces.

A selection of skills shortages we identify include:

Development and project management phase

- **Management skills and senior roles:** The industry has also indicated there is a difficulty in hiring EIA and other environmental management type roles. This is primarily due to a lack of offshore expertise and experience, and the transferability to offshore from onshore is more challenging than initially expected by many developers.

- **Electrical skills:** Knowledge of the electrical engineering required for large-scale energy systems, particularly within the offshore environment, is in short supply and will face further constraints as the number of projects in development increases.

- **Engineering skills:** Marine, civil, structural, geotechnical, and mechanical engineering have all been highlighted as bottlenecks in Ireland, despite Irish capability in the engineering sector.

Manufacturing phase

- **Skilled trade workers:** There is currently a severe global shortage of skilled trade workers including such as welders, fabricators, and electrical technicians.

- **Offshore qualifications:** In addition to a shortage of skilled workers, there is an even greater shortage of those with the qualifications required to work offshore.

- **Construction management skills:** Developers are struggling to hire for construction management roles, and this shortage is likely to intensify as the pipeline increases.

Operations, maintenance and service phase

- **Maritime training:** Ireland's maritime industry, while small, is well-trained and experienced. Despite this, the expected growth in offshore wind capacity underscores a potential shortfall. Compounding this skills shortage is the lack of experience and skills of existing maritime workers in offshore wind.

- **Health and safety expertise:** The offshore wind industry has indicated there is a shortage of health and safety expertise, particularly offshore health and safety. Ireland's health and safety training schemes are currently aimed at onshore activities due to the country's significant installed onshore wind capacity.

- **Electrical skills:** A lack of electrical expertise and skills, particularly in high voltage and direct current (DC) systems, will present a major bottleneck to Ireland.

Recommendations

We recommend any intervention from Government in skills development is led by, or uses the participation of, the offshore wind industry. Government funding can help de-risk skills investment on the part of industry and encourage companies to invest in the local workforce. Taking an industry-led approach would help ensure that people are being trained in the right skills at the right time, and help ensure better employment outcomes at the end.

Many in the industry do not see much value in generalised training and prefer to bring through staff using their own in-house methods. Furthermore, while training for skills in advance of demand may be of some benefit, there is likely to be little take-up for training if job opportunities do not yet exist. There is also an additional risk of people with the required skills relocating to other markets where demand is higher.

We split the recommendations into short, medium and long term.

Short term

Establish a skills development fund: The Irish Government could establish a skills fund which allows companies (or further education institutions in collaboration with companies) to bid in for match funding for appropriate training initiatives. Matching funding will help encourage investment in training programs as companies will share the financial burden. This maximises the impact of the fund as well as ensuring its resources are aligned with industry needs. The fund could replace or sit alongside existing, general-purpose skills initiatives such as National Training Fund and the National Training Advisory Group.

Attract workers from abroad to help plug short-term skills shortages: Ireland could attract workers from abroad, as it is highly unlikely that the local workforce has the capacity to meet short term demand. Workers involved in the development stages of offshore wind will be in particularly high demand in the coming 3-5 years as multiple projects enter the develop phase simultaneously. Government could award relocation grants to employers or individuals which relocate to Ireland to work in offshore wind. Such interventions could be tailored specifically to target Irish nationals working in offshore wind abroad.

Medium term

Build industry and market confidence: Ireland will need to secure investor confidence if it wants to attract suppliers to conduct business locally. This is especially the case for manufacturing; Ireland will only create a significant number of manufacturing jobs if suppliers invest in local manufacturing facilities and move production to Ireland. It is vital that the Irish Government shows long-term commitment to offshore wind by developing clear frameworks and a steady auction pipeline, and follows through on any commitments made in upcoming offshore wind strategy publications. This will help inspire confidence in the industry and reduce perceived risk.

Ensure offshore specialisms are covered in public education and private training providers: While Ireland has a strong onshore wind industry, professional sector and a significant engineering and management skills base, upskilling for offshore work needs to be accelerated and managed effectively. Government could therefore engage with higher education institutions and private training providers to ensure degree and training programmes have offshore related modules. It is also vital to ensure workers with relevant skills have the capacity to work offshore, by enabling and accelerating the ability to obtain suitable, internationally recognised qualifications, such as offshore safety courses approved by the GWO. Micro credentials relevant to offshore wind should also be enabled.

Assess parallels with other expanding industries: There is potential for duplication of skills training effort. By assessing parallel industries expected to expand alongside offshore wind, Ireland can ensure training and educational resources are distributed effectively and minimise potential duplication of training initiatives. The skills and training initiatives within parallel industries, including aviation, construction and marine, could be monitored for potential parallels.

Long term

Advertise offshore wind as an attractive industry: Ireland has a tight labour market. People will therefore require an incentive to potentially change jobs and enter the offshore wind industry. They will need to view it as an attractive employment prospect. The Government could increase public awareness around the benefits of working offshore wind and its role in Ireland's decarbonisation effort. Industry should also play its part. This could be through awareness raising activities to increase understanding of the benefits of offshore wind and promote public acceptance.

Monitor local content levels over time to help enable an adaptive skills response: As the offshore wind industry in Ireland expands and matures, skills requirements may shift. Government could monitor the levels of local content, industry activity and planned investments in Irish offshore wind projects and supply chain infrastructure. Certain key milestones and decision points will influence skills requirements, for example the announcement of a new assembly port for floating turbines. Investments like this will determine the skills requirements over the coming years.

Ensure health and safety legislation is relevant to offshore: Health and safety legislation in Ireland is currently targeted towards its onshore wind industry. Government could ensure relevant legislation is applicable to the full range of vessels and health and safety practices used in the offshore wind industry, by engaging with industry to establish best practice. This will help developers and training providers refine their offerings to appropriately upskill the workforce.

Build an HV and HVDC knowledge base: Offshore wind faces a severe skills shortage in electrical systems, particularly HVDC systems. Government could engage with industry to develop apprenticeships focused on electrical systems, particularly HV and HVDC systems. It could also engage with higher education institutions and electrical apprenticeship and training providers to ensure introduce HV and HVDC specialisms are introduced as standalone courses or integrated in existing programmes. Research projects could also be established between academia, industry, and government agencies. These projects could focus on solving specific HVDC challenges and advancing the technology. This will help increase local HVDC skills in the process.

1. Introduction

Ireland has an ambitious target to deliver 5 GW of grid connected offshore wind energy, plus an additional 2 GW in development for non-grid solutions, by 2030. This forms part of the Government's target to provide 80% of Ireland's electricity from renewable sources by 2030. It also has a long-term target to install 37 GW of offshore wind by 2050. The Irish offshore wind industry reached an important milestone in its development with the award of the first Maritime Area Consents under the new Maritime Area Planning Act at the end of 2022, and held its first offshore renewable electricity auction (ORESS 1) in April 2023.[ii] The country currently has an installed capacity offshore of approximately 30 MW, but with an EEZ seven times its landmass, Ireland has the potential to create a significant domestic offshore wind industry.

The size of the potential presents an attractive opportunity in terms of gross value added (GVA) and full-time equivalent jobs (FTEs) to the Irish economy.

To achieve its capacity target and realise the economic potential offshore wind presents, Ireland will require the appropriate skills base. There are several challenges this requirement presents:

- It is essential that a successful Irish offshore wind industry is seen to deliver tangible benefits to Irish society and coastal communities in particular. This includes supporting a prosperous supply chain with both local and international ambitions.

- The size of the long-term potential offshore wind installed capacity is an order of magnitude greater than the likely national demand for electricity. The challenge for Ireland is to find ways to develop the industry beyond the scale of its home market and harness the export opportunities that a significant offshore wind industry could bring.

- A particular challenge for Ireland is it does not have a parallel supply chain which can be used to easily transition skills and jobs, such as the oil and gas industry in the UK. There is a significant need therefore to educate and support the Irish supply chain to enable it to seize the economic opportunities Irish offshore wind deployment will present.

This report therefore aims to outline the skills required in Ireland by taking a targeted approach. We establish which offshore wind activities are likely to be conducted in Ireland and focus on the skills in those areas, to give focussed and bespoke recommendations on how to address the skills shortages we identify.

These recommendations aim to increase the level of local content delivered in Irish offshore wind projects through addressing potential skills shortages, so the required supply chain activity can be sourced domestically, where possible. An increased local skills base will help Ireland maximise its potential local content and increase the economic benefits the offshore wind industry will bring to the country through additional GVA and job creation.

[ii] Irish Statute Book, Maritime Area Planning Act 2021, https://www.irishstatutebook.ie/eli/2021/act/50/enacted/en/html, last accessed Nov 2023.

2. Methodology

Step 1: Establish an offshore wind capacity projection

Our first step was to establish our projection of annual offshore wind deployment in Ireland up to 2050. This projection is based on a mixture of publicly available data and BVGA expert insight. We split the capacity into fixed and floating technologies, as this has implications for the supply chain and therefore jobs and skills opportunities.

Step 2: Initial supply chain category screening

We provided a high-level assessment of the likelihood that each supply chain category of a wind farm lifecycle would be conducted using Irish content. The 33 supply chain categories used can be found in **Table 1**.

This screening was based on the capacity of the Irish domestic industry to participate in these activities, the benefit of local supply and the amount of inward investment required to allow the activity to be conducted locally. This includes evaluating the number of companies capable of delivering the Irish pipeline, including local firms and non-Irish owned multinational companies with a presence in Ireland.

Each supply chain category was given a red, amber or green (RAG) rating depending on how likely significant Irish content will be used.

Table 1 Supply chain categories in offshore wind farm lifecycle

	Supply chain category
1	Development and Project Management
1.1	Development and consenting services
1.2	Environmental surveys
1.3	Resource and metocean assessment
1.4	Geological and hydrographical surveys
1.5	Engineering and consultancy
1.6	Project management
2	Manufacturing
2.1	Turbine nacelle and hub
2.2	Turbine blade
2.3	Turbine tower
2.4	Turbine electrical system
2.5	Array cables
2.6	Export cables
2.7a	Monopile foundation (fixed)*
2.7b	Semi-submersible foundation (floating)*
2.8	Mooring system (floating)
2.9	Offshore substation
2.10	Onshore substation
3	Installation
3.1	Offshore substation
3.2	Offshore cables
3.3	Onshore export cables
3.4	Mooring system (floating)
3.5	Turbine and foundation installation
3.6	Inbound transport
3.7a	Construction port (fixed)
3.7b	Marshalling and integration port (floating)
3.8	Offshore logistics
3.9	Onshore substation
4	Operations, maintenance and service
4.1	Operations
4.2	Maintenance
4.3	Major repair
4.4	Offshore vessels and logistics
4.5	OMS port
5	Decommissioning
5.1	Decommissioning services

*Most likely technology to be used in Irish market.

Step 3: In-depth triage

For each supply chain category given an amber or green rating, meaning it is likely or possible that that activity will be conducted in Ireland, we conducted an in-depth triage. We rated each sector from 1-4 on a six different metrics:

- Track record and capacity in offshore wind
- Irish capability in parallel sectors
- Benefit of local supply
- Current skills availability
- Investment risk, and
- Size of opportunity

This detailed assessment of each sector was then used to assess likely levels of local content in Irish projects. Our assessment of local content potential for each supply chain sector in Ireland was based on two scenarios – business as usual (BAU), based on the assumption that current capability will grow organically, and an intervention scenario in which action is taken by Government and industry to maximise Irish content by addressing skills shortages and investing in infrastructure and support of new facilities.

Step 4: Skills shortages and opportunity analysis for Ireland

Within each supply chain category in which we expect Ireland to play a role, we identified the critical skills needed to deliver the relevant product or service. We also derived a list of 42 key job roles which will be likely required in Ireland, in collaboration with Wind Energy Ireland.

We engaged with key players in the Irish offshore wind industry, including major multinational developers and suppliers, to gather views on the potential future skills shortages facing the offshore wind industry in Ireland, as well the shortages facing the 42 key job roles specifically. We also asked what actions they would like the Irish Government to take to help address these skills shortages. For further information on our industry engagement process, see Appendix B.

We then assessed the overall opportunity for Ireland, breaking down our FTE-year projections by each of the supply chain categories, while reflecting the specific demand for the 42 key job roles within those projections up to 2040. This was achieved by using our internal jobs model.

We forecast FTE-years up to 2040. We assumed that by this time, Ireland has built up a sufficient skills base to meet its 2050 capacity target.

BVGA jobs model

We used our internal economic impacts model to assess the economic impacts of Ireland's offshore wind industry. The method is based on an offshore wind local content methodology that seeks to understand the supply chain in the lower tiers and produces a figure that is equivalent to direct and indirect GVA. Calculating a national and local content figure, and having an understanding of profit margins, costs of employment and salaries enables direct and indirect FTEs to be calculated.

The remaining expenditure is analogous to the direct and indirect GVA created. GVA is the aggregate of labour costs and operational profits. We can therefore model full-time equivalent (FTE) employment from GVA, provided we understand some key variables. In our economic impact methodology, employment impacts are calculated using the following equation:

$$FTE_a = \frac{(GVA - M)}{Y_a + W_a}$$

Where:

- FTE_a = Annual FTE employment
- GVA = Gross-value added (€)
- M = Total operating margin (€)
- Y_a = Average annual wage (€), and
- W_a = Non-wage average annual cost of employment (€).

To make robust assessments, therefore, we considered each major component in the offshore wind supply chain. We took our estimated costs for each supply chain category for a typical 1 GW project in Ireland in 2030. We estimated typical salary levels, costs of employment and profit margins, bringing together BVGA's specific sector knowledge and research into typical labour costs for the work undertaken in each part of the supply chain.

Step 5: Recommendations

Finally, we made recommendations on the necessary interventions over the short, medium and long term which can help Ireland realise the full economic opportunity presented by its rollout of offshore wind.

3. Overview of Ireland's offshore wind development process

To provide some context for offshore wind development in Ireland, we outline the development process for a typical offshore wind farm, including key milestones, timeframes and key stakeholders involved. The order of these milestones may change depending on the auction round.

This is particularly relevant as many of Ireland's job opportunities are in the development phase of an offshore wind farm, as detailed later in this report.

3.1. Marine spatial planning

The Irish Government's Department for Housing, Local Government and Heritage oversees marine spatial planning in the Irish maritime area which extends to the limits of Ireland's exclusive economic zone (EEZ). The EEZ has extensive coastal waters reaching 200 nautical miles into the Atlantic Ocean on the west coast and varies in water depths, which are suitable for both fixed and floating offshore wind projects.

Offshore wind developments in the maritime area will be deployed within designated areas identified by the Department of Environment, Climate and Communications (DECC) as suitable. Designated maritime area plans (DMAP) to identify areas suitable for offshore wind developments will be carried out in compliance with the Marine Area Planning Act, 2021, and the Maritime Spatial Planning Directive.[iii]

The expected timeframe to complete the maritime spatial planning process each DMAP is 1-2 years.

Key stakeholders involved in designating DMAPs for offshore wind development include:

- The Department of Housing, Local Government and Heritage,
- The Department of Environment, Climate and Communications, and
- The Maritime Area Regulatory Authority.

3.2. Maritime Area Consents

The new Maritime Area Regulatory Authority (MARA) will award maritime area consents (MAC). A MAC gives the holder the right to exclusive or non-exclusive use (determined by MARA having regard to the nature of the use) and occupation of a specific maritime area for a specified term.

MACs can be awarded on a competitive or non-competitive basis, with applications being scored against criteria such as suitability of the applicant, preparatory work done, level of stakeholder engagement, and the National Marine Planning Framework.

For offshore wind development the Government has prescribed a plan led approach for the award of future MACs for ORE developments, with areas suitable for ORE development identified and designated in statutory Designated Maritime Areas Plans (DMAPs). The first such DMAP is proposed off the South Coast where applications for MACs will be assessed in tandem with the proposed ORESS 2.1 auction, with MACs ultimately awarded to the successful bidders under the ORESS 2.1 auction.

Key stakeholders involved include:

- Local coastal planning authorities, and
- The Maritime Area Regulatory Authority.

iii European Union, Directive 2014/89/EU of the European Parliament and of the Council, https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=uriserv:OJ.L_.2014.257.01.0135.01.ENG%20, last accessed Nov 2023.

3.3. Permitting

Once a developer has a MAC it will submit a planning application to Ireland's independent planning body An Bord Pleanála to receive development consent.

As part of the planning application the developer will prepare an Environmental Impact Assessment Report by undertaking environmental surveys and site investigations. This is then submitted to An Bord Pleanála for review.

The expected timeframe for permitting is 18-24 months to get development consent, but this time could be extended should the consent be legally challenged under the Judicial Review process. The Irish Government is aiming to streamline the permitting progress and will likely issue updated requirements in 2024.[iv]

In addition to the above, developers must obtain authorisation to construct a generating station and a licence to generate from the Commission for the Regulation of Utilities (CRU), in accordance with the requirements of the Electricity Regulation Act, 1999.[v] These permits are required for all electricity generation activities taking place on or offshore in Ireland.

Key stakeholders involved include:

- An Bord Pleanála
- Commission for the Regulation of Utilities
- The National Parks and Wildlife Service, and
- The Maritime Area Regulatory Authority.

3.4. Grid Connection

Ireland's state-owned transmission system operator (EirGrid) is responsible for facilitating grid connections for offshore projects. Grid connection policies were published for the first Offshore Renewable Electricity Support Stream (ORESS) in 2022 by the Commission for Regulation of Utilities.

For projects in the first ORESS auction, all transmission assets will be built by the developer and then transferred to EirGrid at an agreed stage. For the second ORESS auction EirGrid will be responsible for developing the transmission assets. This approach may be subject to change for future auctions and offshore renewable energy development.

The expected timeframe for grid connection is within two years of a successful auction bid.

Key stakeholders involved include:

- EirGrid and
- The Commission for Regulation of Utilities.

3.5. Offtake

Ireland supports offshore renewable energy projects through the Offshore Renewable Electricity Support Scheme (ORESS) auctions.[vi] The scheme has a contract for difference (CfD) structure which gives the developer security by earning a flat rate on the energy they produce. This process is a competitive auction designed to be in line with CfD auctions in other European markets.

Ireland's first offshore wind CfD auction was held in April 2023. Projects awarded MACs under the first MAC process (known as 'Phase 1 Projects') were eligible to participate in the auction. The average price of the winning bids was both lower than expected and significantly lower than the maximum bid price. Under the terms of the MACs awarded to the Phase 1 Projects unsuccessful applicants were afforded an opportunity to secure corporate power purchase agreements as an alternative means of revenue.

The expected timeframe to plan for and conduct an offtake auction, including the consultation process on the draft terms and conditions, is 1-2 years.

Key stakeholders involved include:

- Department of the Environment, Climate and Communications, and
- EirGrid.

[iv] Department of Housing, Local Government and Heritage, Guide to the Planning and Development Bill 2023, https://www.gov.ie/en/publication/8bdf0-guide-to-the-planning-and-development-bill-2023/, last accessed Nov 2023.
[v] Irish Statute Book, Electricity Regulation Act, 1999, https://www.irishstatutebook.ie/eli/1999/act/23/enacted/en/html, last accessed Dec 2023.
[vi] DECC, Offshore Renewable Electricity Support Scheme (ORESS), https://www.gov.ie/en/publication/5099a-offshorerenewable-electricity-support-scheme-oress/, last accessed Nov 2023.

4. Offshore wind capacity projection

We have used an offshore wind operating capacity projection based on the Irish Government targets of:

- 5 GW of fixed wind installed by 2030 (with an additional 2 GW of floating wind in development),
- 20 GW installed by 2040 (both fixed and floating), and
- 37 GW installed by 2050.

While ambitious, using this projection will best inform of the skills requirements to reach these targets. We have also split the capacity projection into fixed and floating, as this will have an impact on the skills required. This split is based on our understanding of the two market segments.

The annual capacity projection is shown in **Figure 1**, and cumulative installed capacity is shown in **Figure 2.**

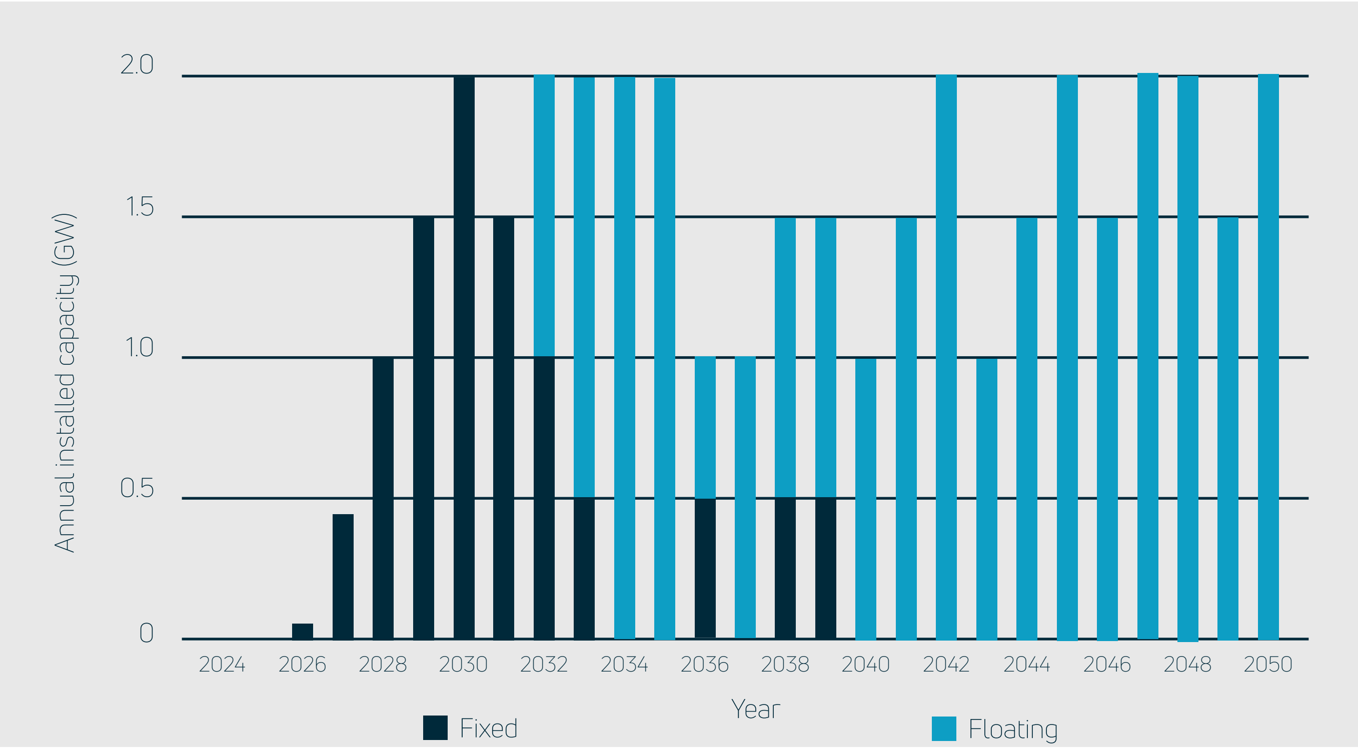


Figure 1 Ireland offshore wind annual installation projection, 2024-2050.

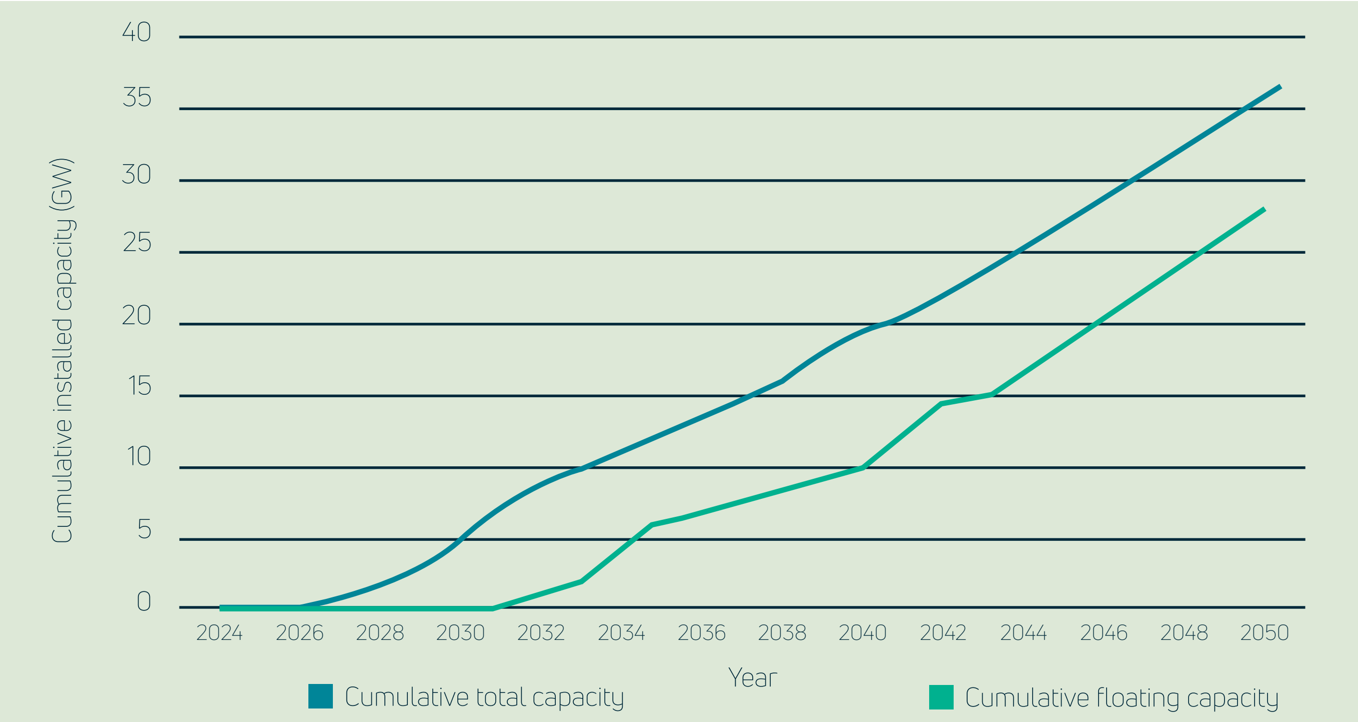


Figure 2 Ireland offshore wind cumulative installation projection, 2024-2050.

To reach its target of 5 GW installed by 2030, Ireland will need to ramp up to a significant yearly installation rate, peaking at approximately 2 GW in 2030.

Installed capacity is expected to be initially dominated by fixed offshore wind. This is because the supply chain for this technology is mature and much more cost competitive than floating.

Floating offshore wind will play a vital role in Ireland's offshore wind ambitions. The earliest year we anticipate floating wind capacity to come online is 2032, as we expect the supply chain for commercial scale floating projects to not mature until the early 2030s. Deep waters off the west coast of the country, where development activities are underway, will require floating foundations. This area of seabed is large and so offers potential for significant deployment.

4.1. Current projects in Ireland

Ireland has a pipeline of projects currently installed or in development with exclusive development rights via a MAC. These are listed in Table 2.

Table 2: Offshore wind projects in Ireland awarded a MAC, as of mid-2023.

Project Name	Capacity (GW)	Current Status	Fixed or floating	Developer(s)	(Estimated) COD
Arklow Bank - phase 1	0.025	Fully commissioned	Fixed	GE Energy	2004
Arklow Bank - phase 2	0.80	Concept/early development	Fixed	SSE Renewables	2028
Codling Wind Park*	1.3	Concept/early development	Fixed	Fred. Olsen Renewables, EDF	2028
Dublin Array*	0.82	Concept/early development	Fixed	RWE	2028
North Irish Sea Array (NISA)*	0.5	Concept/early development	Fixed	Statkraft	2028
Oriel Wind Farm)	0.38	Concept/early development	Fixed	ESB, Parkwind	2028
Sceirde Rocks*	0.45	Concept/early development	Fixed	Corio	2030

*Projects successful in ORESS 1 auction, announced in June 2023.

4.2. Irish market challenges to meet capacity targets

This report focuses on the skills requirements in Ireland. It assumes that various other market challenges are addressed, and that timely action in growing a skills base is the only potential constraint on the growth of the industry. These market challenges are outlined below.

Grid and energy systems

As more projects are developed around the coast of Ireland, holistic network design (HND) offers the potential to facilitate industry growth by offering a coordinated approach to grid connections.

The challenges with such a coordinated approach include the complexity of coordination and the significant early financial commitment and risk borne by early movers. Not all projects would benefit equally from a coordinated approach and may need government legislation to enable anticipatory investment. HND will disproportionally increase demand for expertise in high voltage direct current (HVDC) systems. There is currently too much uncertainty to quantify the demand, but this uncertainty has an impact on our conclusions in sections that cover balance of plant supply chain categories and HVDC skills.

The role of hydrogen will also have an impact on the Irish offshore wind market. While the extent of hydrogen production is uncertain and has not been accounted for in this report, it may affect demand for certain engineering and electrical skills as developers seek to integrate hydrogen production and storage into wind farm designs.

Consenting

The Irish Government may wish to shorten the time required for consenting, which will help accelerate development times and address some of these concerns. Ireland aims to impose maximum time periods for various stages of the planning process. However, shortening timelines will not be possible without having the necessary and appropriately skilled resources.

Human impacts and local objections may present a challenge, particularly on the west coast. Projects with an impact on the fishing and leisure industries may also be delayed due to objections raised in the development process.

Demand in other markets

As Ireland plans to drastically increase its offshore wind capacity, many countries in Europe and worldwide are aiming to do the same. As worldwide demand increases further, this increases pressure on the supply chain and skills base, and so whether it can deliver for the Irish market. This is especially the case for Ireland as a member of the European Union. The demand for skills in other European countries may encourage local workforces to stay in their domestic markets, constraining key bottlenecks further.

5. Current supply chain capability in Ireland

5.1. Supply chain categories – initial screening

To determine the current supply chain and skills capability in Ireland, we must first conduct an initial screen of the supply chain categories in the offshore wind market to determine which are the most suitable and likely to be conducted using Irish content. The criteria used to conduct this initial screening is seen in Table 3.

This screening considers various factors, such as:

- Current company and skills availability in Ireland
- Whether any inward investment is required, and
- Logic for local supply.

Based on these factors, initial screening results show early-stage development activities are likely to include significant Irish content. Meanwhile manufacturing, installation and decommissioning are not likely, with some notable exceptions. Operations, maintenance and service (OMS) activities are expected to contain some Irish content, depending on the activity. The results are in Table 4, along with an explanation and justification for each category.

Note that a red rating does not mean there will be no jobs in Ireland, but the number will be low. There is therefore a low need for local skills and any meaningful action to increase local skills for the supply chain category.

Table 3: Supply chain screening rating criteria.

Rating	Meaning
(Red)	**Local participation unlikely (in a reference project)**
(Amber)	**Local participation possible (in a reference project)**
(Green)	**Local participation probable (in a reference project)**

Table 4: Initial supply chain category screening.

#	Category	Rating	Explanation
1	Development and Project Management		
1.1	Development and consenting services		Development services are led by the developer, which manages the development process and subcontracts work to a range of specialist consultancies. Major multinational developers have offices in Ireland alongside Irish developers, which means it should be able to develop capability to deliver such services domestically, using mostly domestic labour and skills. Each country has its own approach to offshore wind deployment, supported by a unique legislative and policy framework. For this reason, project development and consenting services are almost always delivered locally.
1.2	Environmental surveys		Environmental surveys of the offshore wind farm location and its surroundings determine the environmental impacts. These surveys establish the baseline for the assessment and allow impact modelling to be undertaken. A number of companies are active in Ireland which are capable of undertaking environmental survey work. However, offshore environmental surveys require very specific expertise, and as Ireland's industry grows there may be a need for investment in skills and training to address a potential shortage. Environmental surveys are typically undertaken by companies from the home market, partly because there is sufficient local resource and partly because some of the wildlife impacts are site specific and require detailed local knowledge and expertise.
1.3	Resource and metocean assessment		Resource and metocean assessments provide atmospheric and oceanographic data to inform the engineering design of an offshore wind farm, the potential future energy production, and to fully describe the likely installation and operating conditions at the proposed offshore wind farm location. There are Irish companies with capability in this space, as well as multinational companies with Irish presence active in this area. However, as Ireland's offshore industry grows, more companies are likely to enter the market and there is likely to be a need for training in the specialist skills associated with resource and metocean assessment to maximise local economic opportunity. Barriers to entry are not significant, so moderate inward investment is required. There is no reason this work could not be undertaken by foreign contractors should Irish capacity be lacking, however. Availability of appropriate local skills will likely be the driving factor.
1.4	Geological and hydrographical surveys		Seabed surveys analyse the seabed of the proposed offshore wind farm site and export cable route to assess its geological characteristics. Ireland has some domestic companies with capability. A few international companies also have an Irish presence and capability in this field. However, as Ireland's offshore rollout ramps up, further companies are likely to enter the market and there is likely to be a need for training in the specialist skills associated with geological and hydrographical surveys to maximise local economic opportunity. There is some logic for hiring local contractors to undertake geological and hydrographical surveys, and barriers to entry are not significant. Availability of appropriate local skills will likely be the driving factor.
1.5	Engineering and consultancy		Front-end engineering and design (FEED) studies establish offshore wind farm system design and develop the concept of the offshore wind farm in advance of procurement, contracting and construction. Ireland has some companies with capability in this space, and multinational also have an Irish presence. Investment in skills will likely be needed to maximise local share of this activity, particularly in marine and naval engineering. There is some logic for hiring local contractors to undertake engineering and consultancy, as proximity to project site is beneficial, though not essential. Availability of appropriate local skills will likely be the driving factor.
1.6	Project management		Project management includes managing the collection and interpretation of surveys, submission of planning consents and any design work, and managing the construction of the project through to operations. Project management is predominantly undertaken in-house by wind farm developers. Multinational companies have offices in Ireland, alongside homegrown developers, which means it should have ample capability to deliver such services domestically. Project management is best done locally. Staff are highly mobile and experienced offshore wind project managers will often be recruited from Europe, but most will be based in Ireland.
2	Manufacturing		
2.1	Turbine nacelle and hub		Nacelles use components sourced from a range of external suppliers. Nacelle assembly has a complex supply chain. Ireland does not have any current capability in this area. Given the size of Ireland's project pipeline relative to other European countries, lack of existing relevant industrial base and skills, and absence of a strong logic for local supply, this activity is extremely unlikely to be conducted locally.

#	Category	Rating	Explanation
2.2	Turbine blade		Wind turbine blades are usually designed and supplied by the wind turbine supplier. Blade manufacturing is a highly technical and capital-intensive activity with high barriers to investment, so inward investment is required. Ireland does not have any current capability in this area. Given the size of Ireland's project pipeline relative to other European countries and absence of a strong logic for local supply, this activity is extremely unlikely to be conducted locally.
2.3	Turbine tower		The tower is a tubular steel structure that supports the nacelle. Fabricators manufacture towers to designs provided by wind turbine suppliers. Ireland does not have any current capability in this area. It is a highly specialised area and competitive supply in Ireland is only likely to come through significant inward investment. However, barriers to investment and skills requirements for tower manufacturing are less severe than for blade and nacelle manufacturing. Ireland could participate if it can attract the necessary inward investment from an established manufacturer. There is some logic to local supply to minimise transport costs, however skills availability and labour costs tend to play a bigger role in investment decisions.
2.4	Turbine electrical system		Electrical components and cables are generally supplied by the turbine supplier to the tower manufacturer for fit-out. Ireland does not have any current capability in this area. Electrical system manufacture is a highly technical activity with high barriers to entry and significant skill requirements. Given the size of Ireland's project pipeline relative to other European countries, lack of existing relevant industrial base and skills, and absence of a strong logic for local supply, this activity is extremely unlikely to be conducted locally.
2.5	Array cables		The network of array cables transfers power from the wind turbines to the offshore substation. They are supplied by specialised manufacturers. There are no companies with this capability in Ireland and relevant skills are likely to be scarce in the labour market. Cables are easily transportable, therefore there is little logic for local supply.
2.6	Export cables		The export cable connects the offshore and onshore substations to transmit power from the wind farm to shore. Cable manufacturing is associated with a high investment requirement and barriers to entry. They are supplied by specialised manufacturers. There are no companies with this capability in Ireland and relevant skills are likely to be scarce in the labour market. Cables are easily transportable, therefore there is little logic for local supply.
2.7a	Monopile foundation		The foundation supports the turbine in the water. For fixed, this is typically a steel monopile. or may be floating in deeper waters. Ireland has little significant capability in this area. A competitive international market already exists for monopiles and significant inward investment would be required in both manufacturing and port facilities. The logic for local supply is only moderate, as they are relatively straightforward to ship.
2.7b	Semi-submersible floating foundation		A greater variety of foundation designs exist for floating, but typically they are constructed either from steel or concrete in dockside locations. Ireland has little significant capability in either area. There is potential opportunity to manufacture concrete floating foundations and assemble steel floating foundations, where the market is not yet developed and the logic for local supply is stronger, due to the relative expense of transporting finished floating foundations.
2.8	Mooring system		Mooring systems keep floating offshore wind turbines tethered in place. Ireland has some capability in this area. A large-scale supply chain for floating wind mooring systems is not yet established, and barriers to entry are lower relative to major turbine components. However, the logic for local supply is not strong, as mooring systems are relatively easy to transport. Ireland is therefore likely to face competition to capture, especially from countries with an active oil and gas sector which are likely to have more capabilities and transferrable skills in this sector.
2.9	Offshore substation		The offshore substation connects the array cable system to the export cables and refers here to the fabrication of the topside. EirGrid is required to develop two offshore substations as part of initial stages of ORESS Phase 2. It will likely conduct the electrical engineering activities in-house but will almost certainly outsource the manufacture and fabrication of the substation(s). Offshore substations are often delivered as one element of a contract to connect the wind farm generating assets to the onshore transmission grid. Ireland lacks current capability in this area. Offshore substation fabrication requires experience in oil and gas topside production or shipbuilding. The cost is sensitive to labour costs and, as a result, the work is often carried out in lower wage locations, typically in Asia.

#	Category	Rating	Explanation
2.10	Onshore substation		The onshore substation transforms power to grid voltage. They are generally contracted to the same main contractor as the offshore substation. However, they typically contain more local content as the construction methodology is different. Onshore substation construction requires a standard construction skillset. Ireland is well served by construction and power transmission sectors, and there is a strong logic for employing local teams to undertake this work. We therefore expect the majority of this activity to be undertaken locally.
3	Installation		
3.1	Offshore substation		Offshore substation installation is a heavy lift operation (minimum of 2,000 t) requiring vessels with sufficient crane capacity. There are no companies which have this offshore wind experience based in Ireland. It is conducted by specialist, experienced marine contractors with appropriate skills and training, which are lacking in Ireland currently. It requires inward investment from companies to acquire the appropriate cranes and other equipment. Experienced foreign contractors could conduct this installation work in Ireland, so there is little logic in attempting to boost Irish content in this area.
3.2	Offshore cables		Offshore cable installation is conducted using dedicated installation vessels by specialist, experienced marine contractors, or in some cases cable manufacturers themselves. There are no companies which have this experience based in Ireland. It therefore requires inward investment from domestic companies to procure the appropriate vessels and other equipment. Experienced foreign contractors could conduct this installation work in Ireland, so there is little logic in attempting to boost Irish content in this area.
3.3	Onshore export cables		Onshore cable installation is routine construction work. Before construction, site investigation and environmental work is undertaken to plan the installation and minimise impact on the surroundings. There are also range of local services used before and during the cable installation. Ireland has many large construction firms capable of these activities. It is therefore unlikely that inward investment is required. This work can be completed by local construction companies, providing they have the required capability and offer a cost-effective service, and so there is logic in local supply.
3.4	Mooring system		Anchor and mooring installation is conducted by specialist, experienced marine contractors. There are no companies which have this experience based in Ireland. It therefore requires inward investment from domestic companies to procure the appropriate vessels and other equipment. Experienced foreign contractors could conduct this installation work in Ireland, so there is little logic in attempting to boost Irish content in this area.
3.5	Turbine and foundation installation		Turbine and foundation installation is conducted using dedicated vessels by specialist, experienced marine contractors. There are no companies which have this experience based in Ireland. It therefore requires inward investment from domestic companies to procure the appropriate vessels and other equipment. Experienced foreign contractors could conduct this installation work in Ireland, so there is little logic in attempting to boost Irish content in this area.
3.6	Inbound transport		This involves shipping of major items from their manufacturing ports (likely to be in mainland Europe or the UK) to the construction ports, including nacelles, blades, towers, and foundations. This will likely be conducted by the installation contractor for each component. Experienced foreign contractors could conduct this work, so there is little logic in attempting to boost Irish content in this area.
3.7a	Construction port – fixed		The construction port is where major components, such as turbines and foundations, are marshalled. Infrastructure investment will be required as there are no ports currently suitable in Ireland. There is large benefit in having the construction port based locally as it allows for cheaper and quicker installation. It is therefore likely that Irish construction ports will be used but only if the necessary infrastructure investments are made.
3.7b	Marshalling and integration – floating		Major floating wind components, such as turbines and foundations, are marshalled at a floating wind marshalling and integration port. This requires a different port specification to a fixed construction port. Infrastructure investment will be required as there are no ports currently suitable in Ireland. There is benefit in having the construction port based locally as it allows for cheaper and quicker installation. It is therefore likely that Irish marshalling and integration port will be used but only if the necessary infrastructure investments are made. If it is not made however, use of other Northern European ports will be required to meet demand.

#	Category	Rating	Explanation
3.8	Offshore logistics		This involves coordination and support of offshore installation and final commissioning activities and covers the work needed to ensure that construction proceeds smoothly, safely and on time. Some inward investment may be required depending on the infrastructure and skills available and the activities conducted locally. Whether activities will be conducted locally depends how these services are contracted. The high-level logistical coordination is typically undertaken by the developer, so if the developer is Irish then local skills will be used. Meanwhile, services like support vessels, construction management, health and safety, and metocean forecasting may be contracted separately or under a single contract. Irish content is therefore possible but not certain.
3.9	Onshore substation		Like onshore cable installation, onshore substation installation is routine construction work and so can be completed by local construction companies, providing they have the required capability and offer a cost-effective service. Ireland has many large construction firms capable of these activities. It is therefore unlikely that inward investment is required. This work can be completed by local construction companies, providing they have the required capability and offer a cost-effective service, and so there is logic in local supply.
4	Operations, maintenance and service		
4.1	Operations		There are a wide range of operation activities conducted on wind farms. Depending on the operations activities conducted, some inward investment may be required. Some of these benefit from or require local knowledge and presence, such as operation of vessels and quayside infrastructure, and management of spares and equipment. It is therefore likely Irish content will be used.
4.2	Maintenance		Wind farm maintenance covers a range of activities on a variety of assets, both above and below water. Maintenance activities are provided by a combination of the owner's in-house resources, wind turbine suppliers and third-party service providers. Ireland has an existing skills base through its onshore wind industry, though some additional investment may be required. There is logic for local supply of some maintenance activities, such as minor repairs and port maintenance.
4.3	Major repair		Major repairs are conducted when there is a severe, large-scale failure of a key component or asset in a wind farm. They are most often conducted by the major equipment installers or original equipment manufacturers (OEMs) themselves. There are no companies which have this experience based in Ireland, and experienced foreign contractors could conduct this installation work in Ireland, so there is little logic in attempting to boost Irish content in this area.
4.4	Offshore vessels and logistics		Offshore vessels are used to access offshore infrastructure, and offshore logistics involves management and coordination of all marine-based activities and operations. Whether this is conducted locally depends on how these activities are contracted by the owner. Some inward investment may also be required. Local knowledge of local maritime rules and ports is somewhat beneficial, particularly when conducting marine coordination, but not required. Irish content is therefore possible but not certain.
4.5	OMS port		OMS ports provide facilities from which long-term OMS activities are carried out – such as jetties or quaysides for crew transfer vessels (CTVs) and service operation vessels (SOVs), warehouses, workshops and offices – and which support major repairs. Inward investment will be needed to develop Irish OMS ports to make them suitable for offshore wind. There is a significant cost saving in basing the OMS port near the wind farm. There is therefore strong logic in local supply.
5	Decommissioning		
5.1	Decommissioning services		Decommissioning services are typically conducted by the major equipment installers. There are no companies which have this experience based in Ireland. It therefore requires inward investment from companies to procure the appropriate vessels and other equipment. Experienced foreign contractors could conduct this work in Ireland, so there is little logic in attempting to boost Irish content in this area.

5.2. Supply chain capability triage

For supply chain categories that have been deemed likely (green) or possible (yellow) in our initial screening, we have triaged each to assess the current and future capability of the supply chain in Ireland. The scoring relates to the general capability of the supply chain at a country level and is not based on a detailed analysis of individual companies. The scoring is based on an appreciation of global offshore wind supply chain capability and an understanding of the factors that are key to successfully localising offshore wind supply chains. These criteria were scored using six different categories, as shown in **Table 5**. A summary of results is found in **Table 6**.

Explanations for each triage score are provided in Appendix C. This also contains an indication of key job roles and expected local content in each supply chain category. Job roles we have analysed in further detail in subsequent sections are highlighted in **bold**.

Table 5: Triage criteria.

Criterion	Score	Description
Track record and capacity in offshore wind	1	No experience
	2	Experience in supplying wind farm ≤ 300MW
	3	One company with experience of supplying wind farm > 300MW
	4	Two or more companies with experience of supplying wind farm > 300MW
Capability in parallel sectors	1	No relevant parallel sectors in Ireland
	2	Relevant sectors with relevant workforce only
	3	Companies in parallel sectors in Ireland that can enter market with high barriers to investment
	4	Companies in parallel sectors in Ireland that can enter market with low barriers to investment
Benefit of local supply	1	No benefits in supplying projects in Ireland from Ireland
	2	Some benefits in supplying projects in Ireland from Ireland but significant impact on cost or risk
	3	Work for projects in Ireland can be undertaken from outside Ireland but with increased cost and risk
	4	Work for projects in Ireland must be undertaken locally
Current skills availability	1	Relevant skills are severely limited in the Irish workforce
	2	Relevant skills are present but limited
	3	Relevant skills are present but potential for bottlenecks unless action taken
	4	Relevant skills are abundant in the Irish workforce
Investment Risk	1	Investment that needs market certainty from offshore wind for five or more years
	2	Investment that needs market certainty from offshore wind for two to five years
	3	Low investment ≤€50 million that can also meet demand from other small sectors
	4	Low investment ≤€50 million that can also meet demand from other major sectors with market confidence
Size of Opportunity	1	<2% of wind farm lifetime expenditure
	2	2%≤3.5% of wind farm lifetime expenditure
	3	3.5–5% of wind farm lifetime expenditure
	4	>5% of wind farm lifetime expenditure

Table 6: Triage results.

#	Category	Track record and capacity	Capability in parallel sectors	Benefit of local supply	Current skills availability	Investment Risk	Size of Opportunity
1	Development and Project Management						
1.1	Development and consenting services	4	4	4	4	4	1
1.2	Environmental surveys	4	4	3	4	3	1
1.3	Resource and metocean assessment	4	4	3	3	3	1
1.4	Geological and hydrographical surveys	4	2	3	3	2	1
1.5	Engineering and consultancy	4	4	2	4	4	1
1.6	Project management	4	4	3	4	4	1
2	Manufacturing						
2.3	Turbine tower	4	1	2	1	2	3
2.7	Foundations (fixed and floating)	1	1	3	1	1	4
2.8	Mooring system	1	3	2	1	1	2
2.10	Onshore substation	1	4	4	4	4	1
3	Installation						
3.3	Onshore export cables	1	4	4	4	4	1
3.7	Construction (fixed) and marshalling and integration port (floating)	2	3	4	2	2	1
3.8	Offshore logistics	2	3	3	2	2	1
3.9	Onshore substation	3	4	4	4	4	1
4	Operations, maintenance and service						
4.1	Operations	3	4	4	2	4	4
4.2	Maintenance	3	4	3	2	3	4
4.4	Offshore vessels and logistics	2	3	4	2	2	1
4.5	OMS port	3	4	4	4	4	1

5.2.1 Triage results

The analysis shows that while there is limited direct experience, there is some relevant capability in most parts of the supply chain. The main opportunities lie where:

- There is a track record or capability in parallel sectors
- There is logic in supplying Irish projects from Ireland, and
- The investment risk is low.

Using these metrics, opportunity is greatest in categories such as project development and project management, tower manufacture, onshore infrastructure, and in the OMS phase. Some categories, such as development and consenting services, are conducted locally in the vast majority of cases, so we forecast a high, local content percentage. For a full breakdown of these results, see Appendix C.

There is also an early-mover advantage that would be realised if Ireland captured some of the floating market. This market dynamic is not fully captured by the quantitative triage analysis. This advantage is primarily seen in the floating substructure manufacture, which due to its high proportion of project spend, and current lack of commercial-scale manufacturing capabilities, represents a significant opportunity for Ireland.

The offshore wind industry is highly and increasingly cost-sensitive. Competition takes place on a global basis for many categories of supply. This means that local suppliers will need to work hard to learn and compete, with international collaboration a likely key to success.

6. Skills opportunity for Ireland

6.1. Local content analysis

Table 7 shows our assessment of local content achieved for each supply chain category in Ireland in two scenarios. The first is a business as usual (BAU) scenario, based on the assumption that current capability will grow organically. The second is an intervention scenario in which action is taken to maximise Irish content by addressing skills shortages and investing in infrastructure and support of new facilities. The proportions of total project spend for all supply chain categories can be found in Appendix D.

We also provide the estimated proportion that each supply chain category contributes to total project spend. This is based on our internal cost estimates for a typical 1 GW fixed or floating project commissioned in Ireland in 2030. While total costs are likely to decrease in time as economies of scale and project learning take hold, the proportions are likely to remain similar.

The supply chain categories we have used exclude a range of costs incurred by developers, including:

- Insurance
- Legal fees
- Miscellaneous construction costs, and
- Grid infrastructure upgrades.

An overall local content figure can therefore not be derived from the data.

For supply chain categories not listed, local content is assumed to be 5% or less in both scenarios, and so has little impact on job demand. These categories scored red in the initial supply chain screening in Table 4.

Table 7: Proportion of total spend and local content for offshore wind projects in Ireland per supply chain category.

Lifecycle phase	Supply chain category	Proportion of total project spend		Local content in BAU scenario	Local content in potential scenario
		Fixed	Floating		
Development and project management	1.1 Development and consenting services	1.3%	1.3%	80%	80%
	1.2 Environmental surveys	0.2%	0.2%	60%	70%
	1.3 Resource and metocean assessment	0.1%	0.1%	60%	70%
	1.4 Geological and hydrographical surveys	0.2%	0.2%	60%	70%
	1.5 Engineering and consultancy	0.2%	0.2%	50%	60%
	1.6 Project management	0.9%	0.8%	50%	60%
Manufacturing	2.3 Turbine tower	2.9%	2.8%	0%	40%
	2.7b Floating substructure	N/A	14.9%	0%	20%
	2.8 Mooring system	N/A	3.4%	0%	20%
	2.10 Onshore substation	2.9%	1.5%	30%	30%
Installation	3.3 Onshore export cables	0.1%	0.1%	80%	80%
	3.7a Construction port (fixed)	0.6%	N/A	20%	60%
	3.7b Marshalling and integration port (floating)	N/A	0.6%	20%	60%
	3.8 Offshore logistics	0.05%	0.05%	50%	60%
	3.9 Onshore substation	0.1%	0.1%	80%	80%
Operations, maintenance, and service	4.1 Operations	11.7%	11.2%	60%	70%
	4.2 Maintenance	16.4%	15.7%	60%	70%
	4.4 Offshore vessels and logistics	1.3%	1.2%	50%	60%
	4.5 OMS port	0.2%	0.2%	80%	80%

6.1.1 Local content in Ireland - business as usual scenario

Supply chain categories that have the highest proportion of local content are those which are required to have or benefit heavily from local supply. For products and services that can be supplied remotely, Irish suppliers face intense competition from suppliers from across Europe. Our assessment of the benefit of local supply all supply chain categories can be found in Appendix C.

6.1.2 Local content in Ireland - intervention scenario

The most notable increases are in the manufacturing phase, in which we assume Irish content goes from 0% to 40% for tower manufacture and 20% for the floating substructure and mooring system manufacture. We assume local content in these areas as:

- Ireland can capitalise on the early-mover advantage that floating offshore wind presents
- Manufacturing is labour-intensive and so presents large potential economic opportunities in job creation and GVA for Ireland, and
- Tower manufacture, of all the manufacturing categories, is the simplest to set up from nothing, and has some economic benefit of local supply due to reduced transportation costs.

The construction port (fixed) and marshalling and integration port (floating) also see a notable increase in local content. We assume that the turbine and substructures are assembled in Ireland for the intervention scenario, rather than being assembled elsewhere and transported to the Irish port for deployment. This is a labour-intensive process, and so the increase in local content is significant.

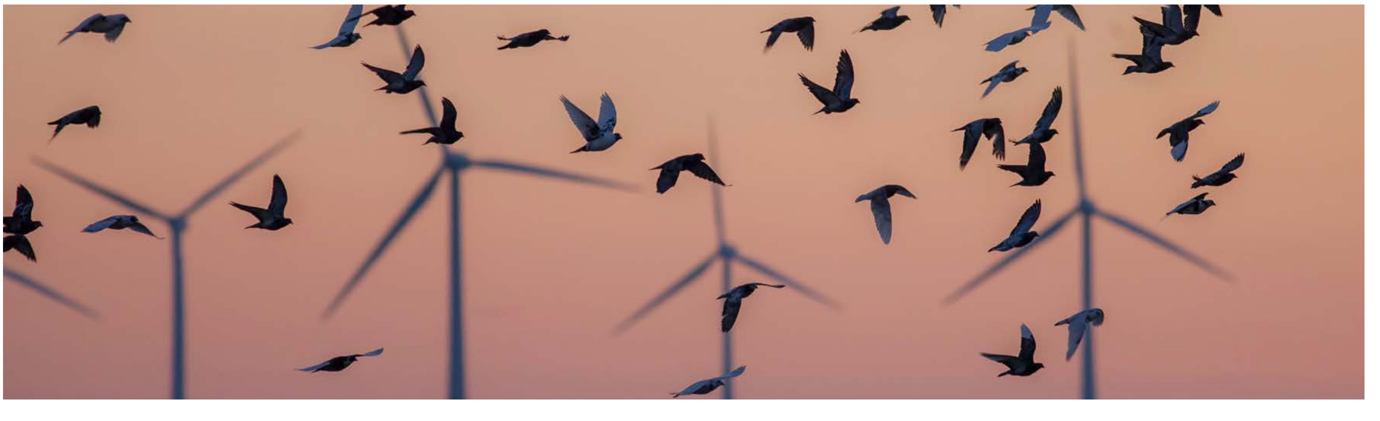
We assume most other categories see a marginal increase in local content of about 10%, as Ireland addresses skills shortages and takes actions to encourage the use of the local workforce.

We assume the following supply chain categories do not see an increase in local content in the intervention scenario compared to the BAU:

- Development and consenting services
- Onshore substation manufacture
- Onshore export cables installation
- Onshore substation installation, and
- OMS port.

Almost all these supply chain categories will have high local content (around 80%) regardless, as it is required to conduct these activities locally.

For substation construction meanwhile, while the assembly and enabling civil engineering works are highly likely to be conducted locally, while raw materials, fabrication and electrical components are produced abroad.



6.2. Jobs opportunities - whole wind farm lifecycle

Combining our estimated local content percentages and the proportion of project spend (as outlined in Table 7) for each supply chain category with the capacity projection in Figure 1, we derived the estimated number of FTEs in Ireland per category for the BAU and intervention scenarios. A summary of results can be seen in Figure 3, with the projection over time for both scenarios shown in Figure 4. For further information on how the model works and how we derive FTE estimates, see Section 2.

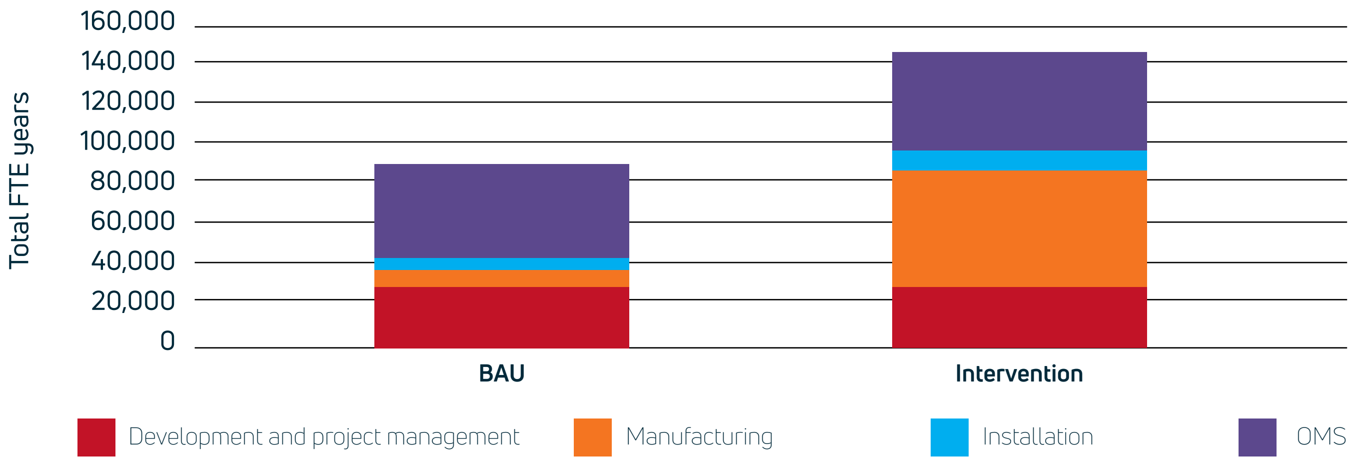


Figure 3: Cumulative projected FTE years in Ireland to 2040, split by lifecycle phase.

The difference in total FTE years created up to 2040 between the BAU and intervention scenario is approximately 60,200 – an increase of 70%. This is primarily driven by increases in the number of jobs created in the manufacturing phase, which is highly labour-intensive and makes up a high proportion of project spend.

Development and project management, manufacturing and installation jobs peak around 2029-2033 (depending on the lifecycle phase), before decreasing slightly. This is due to a large projected build out rate up to 2035 if Ireland was to meet its capacity targets, as shown in Figure 1, before a slight decrease in the rate from 2035-2040. This pattern in shown in Figure 4. Meanwhile, OMS jobs peak in 2040 due to the cumulative nature of these roles. The more capacity Ireland has installed, the more OMS-related roles are required.

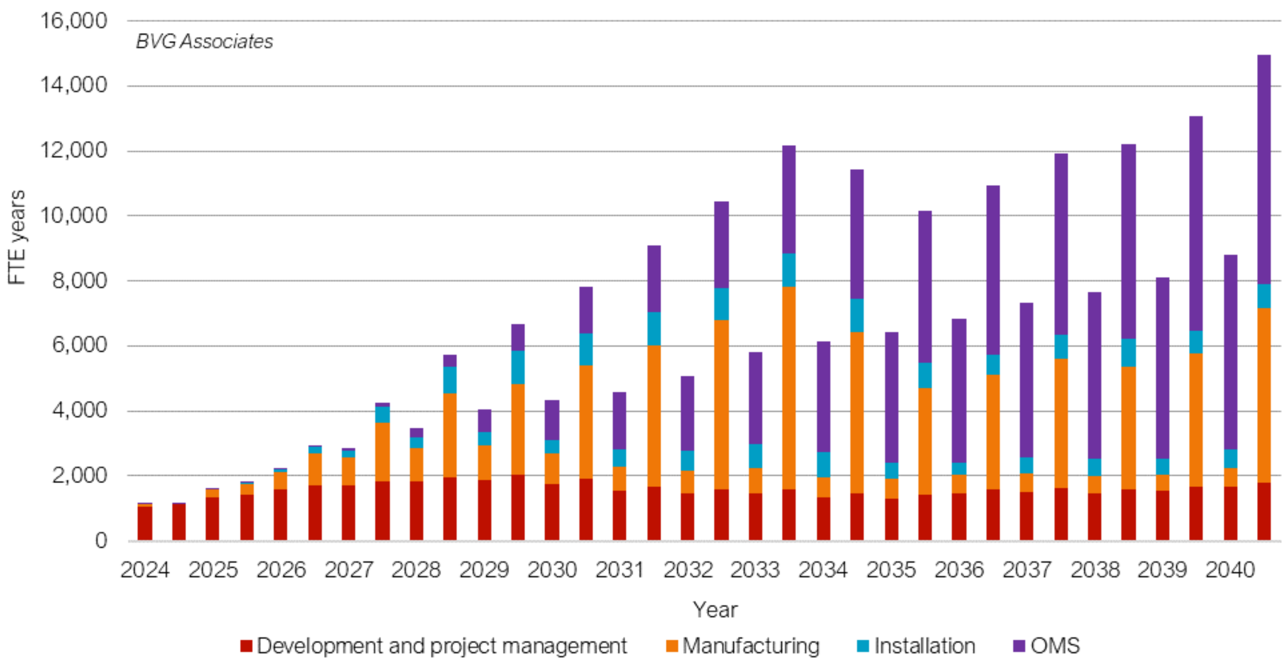


Figure 4: Comparison of FTE year growth in Ireland in BAU (left bars) and intervention (right bars) scenarios from 2024-2040, split by lifecycle phase.

6.2.1 Development and project management

We forecast the cumulative demand up to 2040 in the development and project management phase will be:

- 25,900 FTE years (BAU scenario), and
- 28,000 FTE years (intervention scenario).

In the short term, we forecast average annual demand up to 2030 as:

- 1,590 FTE years (BAU scenario), and
- 1,710 FTE years (intervention scenario).

We do not anticipate significant differences between the BAU and intervention scenarios due to the strong logic for local supply in this lifecycle phase. Parallel capabilities are present in Ireland's onshore wind and engineering industries, and so the Irish Government could help facilitate skills transfer to offshore wind to help leverage Ireland's current domestic skills base.

6.2.2 Manufacturing

We forecast the cumulative demand up to 2040 in the manufacturing phase will be:

- 11,000 FTE years (BAU scenario), and
- 56,700 FTE years (intervention scenario).

In the short term, we forecast average annual demand up to 2030 as:

- 690 FTE years (BAU scenario), and
- 1,710 FTE years (intervention scenario).

The difference between the two scenarios is more apparent after 2030, as many will projects will enter the manufacturing phase from this date.

Manufacturing is the lifecycle phase with the largest increase in job demand between the two scenarios. This is primarily driven by the manufacture of the floating substructure, in which we assume the local content increases from 0% in the BAU case to 20% in the intervention. This 20% assumes the substructure is assembled in Ireland, and sourcing raw materials and fabrication is conducted elsewhere.

Mooring system manufacture also contributes to the forecast increases in job demand between the two scenarios. We assume the local content increases from 0% in the BAU case to 20% in the intervention. This 20% assumes the synthetic mooring line is manufactured, and the mooring system is assembled, in Ireland. We assumed sourcing of other raw materials and fabrication is conducted elsewhere. The industry is yet to consolidate around a specific mooring system design; if concrete mooring systems become widely used, Ireland could fabricate this locally and boost local content further.

Tower manufacture also plays a role in job demand for the intervention scenario. We assume the local content increases from 0% in the BAU case to 40% in the intervention. This 40% assumes the steel tower is rolled and assembled in Ireland, with raw materials sourced and shipped from elsewhere. The growth of floating wind, which typically requires stronger and heavier towers due to the impact of wave motion on floating turbines, will put further pressure on the existing supply chain due to increased factory obsolescence, giving Ireland an opportunity if suppliers see it as a place with the right conditions to invest.

As manufacturing comprises a large proportion of total Irish project spend and involves labour-intensive activities, an increase in local content will have an outsized impact on job creation. To meet the projected floating capacity of 10.5 GW by 2040 as shown in Figure 2, Ireland will require 700 substructures and mooring systems.[vii] Domestic assembly of this number of systems , as per the intervention scenario, will require a significant workforce.

While in time developers will seek to use technologies and other innovations to make manufacturing processes less labour-intensive, the floating substructure, tower and mooring system nonetheless represent a significant opportunity for Ireland for job creation. High labour and land costs Ireland, as well as the risks attached to obtaining planning permission for manufacturing facilities, will likely dampen investor appetite, however. Another obstacle may be the limited number of ports available close to floating wind sites, which may mean that capacity for turbine integration will need to be prioritised.

vii Assuming an average turbine rating of 15 MW.

6.2.3 Installation

We forecast the cumulative demand up to 2040 in the installation phase will be:

- 6,900 FTE years (BAU scenario), and
- 12,200 FTE years (intervention scenario).

In the short term, we forecast average annual demand up to 2030 as:

- 190 FTE years (BAU scenario), and
- 530 FTE years (intervention scenario).

The difference in job demand between the two scenarios is primarily driven by the construction port (for fixed) and marshalling and integration port (for floating), in which we assume the local content increases from 20% in the BAU case to 60% in the intervention.

We anticipate the majority of this additional local content could be achieved through the assembly of the turbine for fixed projects and turbine-substructure unit for floating projects. This activity is a labour-intensive task and so requires a significant number of additional port workers.

We also assume additional project spend in Ireland for aspects like port upgrades, security and storage of installation components.

6.2.4 Operations, maintenance and service

We forecast the cumulative demand up to 2040 in the operations, maintenance and service (OMS) phase will be:

- 42,500 FTE years (BAU scenario), and
- 49,800 FTE years (intervention scenario).

In the short term, we forecast average annual demand up to 2030 as:

- 330 FTE years (BAU scenario), and
- 390 FTE years (intervention scenario).

Due to the cumulative nature of demand for OMS roles, demand up to 2030 comprises a small proportion of the total demand to 2040. Between 2031-2040, annual demand is a factor of 12 higher than that up to 2030, in both scenarios.

The difference in job demand between the two scenarios is driven by the assumed local content increases. We assume increases from 60% to 70% for both operations and maintenance activities, and from 50% to 60% for offshore vessels and logistics. While the benefit of local supply is high for most OMS supply chain categories (and so the BAU local content is already high), we assume more Irish companies and labour is used in the intervention scenario as skills shortages are addressed and local companies are established which can conduct OMS activities in-house. This is particularly the case for operations and maintenance activities that require maritime expertise.

6.3. Key job roles in the Irish supply chain

Based on our assessment of Irish supply chain capability and opportunities, as well as the expected skills shortages, we have derived a list of 42 private sector jobs which will be key in helping to develop the emerging Irish offshore wind industry. These roles are listed in Table 8 and cover a range of supply chain categories which will probably, or possibly with some intervention, use Irish content. They are weighted towards roles in the development and project management and OMS phases as this will likely have a high proportion of local content.

Appendix A contains an individual job profile for each of these job roles.

For each role, we outline:

- A skills availability assessment. This data is sourced from major offshore wind developers active in Ireland. The skills availability is assessed using a red, amber or green (RAG) rating, defined below.
    - Red - we foresee a critical skills shortage for this role. It will be difficult to hire for Irish offshore wind projects without external action.
    - Amber - there may be a skills shortage in this role. It will be somewhat difficult to hire for this role, but internal developer actions such as higher wages or internal training could help mitigate.
    - Green - We do not foresee a skills shortage and there will be no major difficulties in hiring this role for Irish offshore wind projects.
- The demand for a typical 1 GW project for each role. This data is sourced from BVGA internal data, corroborated by major offshore wind developers active in Ireland.
- The cumulative demand in Ireland to 2040 for each role in both scenarios. This has been calculated using the FTE years per GW, expected local content for the relevant supply chain categories, and combined with thecapacity projection outlined in Figure 1.
- Any challenges facing each role which may present a bottleneck to meeting the demand. This information is sourced from developers we engaged with as part of this report.

A full breakdown FTE demand per year for all job roles in both scenarios can be found in an accompanying spreadsheet.

Table 8: Key job roles in Irish supply chain

#	Job role	Primary supply chain category	Lifecycle phases	Skills availability (RAG)	Demand for typical 1 GW project (FTE years)	Cumulative demand to 2040– BAU (FTE years)	Cumulative demand to 2040– intervention (FTE years)	Challenge that may present bottleneck to meeting demand
1	Offshore consents manager	1.1	D		12	240	240	Detailed understanding required of the intricacies and complexities of offshore wind consenting and policy frameworks and is difficult to train and hire for.
2	Grid package manager	1.1	D, M		9	180	180	While onshore grid experience is transferable, there is still a limited number of people who understand grid commercial operations. HVDC knowledge and skills currently severely lacking.
3	GIS technician	1.1	D		30	600	600	Offshore-specific skills and knowledge may face shortfall with rapidly increasing demand. Rampup period will be required before self-sufficiency is reached.
4	Bid manager	1.1	D		3	60	60	Detailed understanding of the intricacies and complexities of the offshore wind industry is required. This is difficult to train and hire for.
5	Community liaison officer	1.1	D		12	240	240	No major challenges expected.
6	Offshore EIA manager	1.2	D		6	90	110	Transferability from other large scale infrastructure projects impacted by requirement to understand environmental issues unique to offshore wind.
7	Marine ecologist	1.2	D		12	180	210	Limited number of people with marine ecology experience and specialist knowledge of local migration patterns of marine life.
8	Ornithologist	1.2	D		12	180	210	Limited number of people with marine ecology experience and specialist knowledge of local migration patterns of marine life.
9	Resource analyst	1.3	D		12	180	210	While general data analysts are likely to be abundant, offshore-wind specific knowledge faces a shortfall. Ramp-up period will be required before self-sufficiency is reached.
10	Geophysicist	1.4	D		18	270	320	Geophysics knowledge may face shortfall with rapidly increasing demand, for both private and state conducted surveys.
11	Hydrographer	1.4	D		24	360	420	No major challenges expected.
12	Electrical engineer	1.5	D, M, I, O		33	415	500	Offshore wind-specific skills and knowledge currently lacking. HVDC knowledge and skills severely lacking.
13	Civil engineer	1.5	D, M, I, O		220	2770	3320	Knowledge of interface between offshore and onshore elements for offshore wind currently lacking. Floating designs will also present new skills challenges.

#	Job role	Primary supply chain category	Lifecycle phases	Skills availability (RAG)	Demand for typical 1 GW project (FTE years)	Cumulative demand to 2040– BAU (FTE years)	Cumulative demand to 2040– intervention (FTE years)	Challenge that may present bottleneck to meeting demand
14	Mechanical engineer	1.5	D, M, I, O		88	1110	1330	Offshore wind-specific skills and knowledge currently lacking. Floating designs will also present new skills challenges.
15	Geotechnical engineer	1.5	D		16	200	240	Offshore wind-specific skills and knowledge is currently lacking.
16	Structural engineer	1.5	D, M, I, O		35	440	530	Offshore wind-specific skills and knowledge currently lacking. Floating designs will also present new skills challenges.
17	Naval architect	1.5	D, M, I,		30	380	450	Skills and knowledge around floating designs will present new skills challenges.
18	Marine engineer	1.5	D, M, I, O		15	190	230	European region currently has shortage of marine engineers trained for offshore wind specifically.
19	Project manager	1.6	D, M, I, O		115	1450	1740	Likely a shortfall of skills required for large-scale infrastructure projects, particularly offshore.
20	Procurement manager	1.6	D		9	110	140	No major challenges expected.
21	Commercial analyst	1.6	D		18	230	270	The combination of industry knowledge with local supply chain knowledge and connections are currently lacking.
22	Supply chain manager	1.6	D		6	80	90	The combination of industry knowledge with local supply chain knowledge and connections are currently lacking.
23	Construction project manager	2	M, I		20	20	90	May be shortfall of skills required for large-scale infrastructure projects, particularly offshore.
24	Cable jointer	2.10	M, I		50	60	440	Electrical systems knowledge is currently lacking, especially for high voltage systems. HVDC knowledge severely lacking.
25	Electrical technician	2.10	M, I,O		175	200	390	Electrical systems skills and knowledge is currently lacking, especially for high voltage systems. HVDC knowledge severely lacking.
26	Welder	2.7b	M, I		300	0	1330	Technical skills required for large-scale welding projects facing global shortfall.

#	Job role	Primary supply chain category	Lifecycle phases	Skills availability (RAG)	Demand for typical 1 GW project (FTE years)	Cumulative demand to 2040– BAU (FTE years)	Cumulative demand to 2040– intervention (FTE years)	Challenge that may present bottleneck to meeting demand
27	Crane operator	3.7	I		96	400	1220	No major challenges expected.
28	Port operative	3.7	M, I, O		960	4030	12,240	No major challenges expected.
29	Offshore quality manager	4.1	I, O		35	100	110	Offshore wind-specific experience - skills are transferrable from marine industries but rampup period will be required before self-sufficiency is reached.
30	Instrument control engineer	4.1	M, I, O		70	190	230	No major challenges expected.
31	Communications network technician	4.1	O		90	250	290	No major challenges expected.
32	Site manager (onshore and offshore)	4.1	M, I, O		105	230	340	No major challenges expected.
33	Data analyst	4.1	O		120	330	390	No major challenges expected.
34	SCADA engineer	4.1	O		30	80	100	Offshore wind-specific experience required - skills are transferrable from other industries but ramp-up period will be required before selfsufficiency is reached.
35	Health and safety coordinator	4.1	M, I, O		110	310	360	Health and safety training, both globally and in Ireland, is largely targeted onshore. Training and further regulation will be required for offshore works.
36	Wind turbine technician	4.2	I, O		750	2080	2430	Knowledge of turbine operations, particularly newer models, will be lacking. Electrical systems knowledge in general will also be lacking.
37	Mechanical technician	4.2	I, O		160	440	520	Technical skills required for large-scale offshore wind projects facing global shortfall, particularly for general roles like this.
38	Boat maintenance technician	4.2	I, O		96	270	310	Offshore wind-specific vessel experience required - skills are transferrable from marine industries but ramp-up period will be required before self-sufficiency is reached.
39	Able seafarer	4.4	I, O		384	890	1070	Offshore wind-specific experience - skills are transferrable from marine industries but rampup period will be required before self-sufficiency is reached.
40	Offshore logistics manager	4.4	I, O		32	70	90	Offshore wind-specific experience requiredskills are transferrable from marine industries but ramp-up period will be required before selfsufficiency is reached.
41	Master mariner	4.4	I, O		32	70	90	Offshore wind-specific experience required - skills are transferrable from marine industries but ramp-up period will be required before selfsufficiency is reached. People with experience of more senior seafaring roles also lacking.
42	Harbour pilot	4.4	I, O		58	130	160	Skills are transferrable from marine industries but a current shortfall in junior harbour pilots may present skills challenges in the future. There is a general lack of more senior seafaring skills, which are required for harbour pilots

6.4. Skills assessment by lifecycle phase

6.4.1 Development and project management

For the specific key roles assigned to this project phase listed in Table 27, we forecast the cumulative demand up to 2040 will be:

- 9,960 FTE years (BAU scenario), and
- 11,600 FTE years (intervention scenario).

In the short term, the forecast average annual demand up to 2030 is:

- 610 FTE years (BAU scenario), and
- 710 FTE years (intervention scenario).

Demand over time for these roles is shown in Figure 5 and Figure 6. The remaining jobs will primarily comprise of:

- Further management-related roles such as package managers and EPC directors
- Financial and legal roles, such as finance directors
- Other internal supporting roles within developers and contractors, and
- Indirect supporting roles, such as HR and accounting.

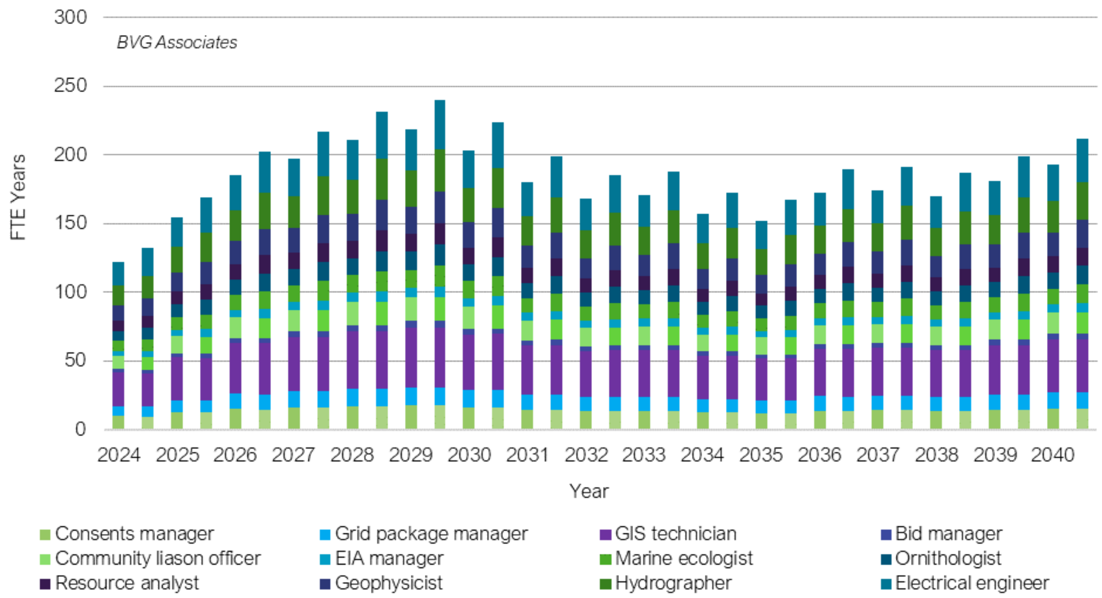


Figure 5: Comparison of demand in BAU (left bars) and intervention (right bars) scenarios for key job roles (first half) in the developm ent and project management phase.

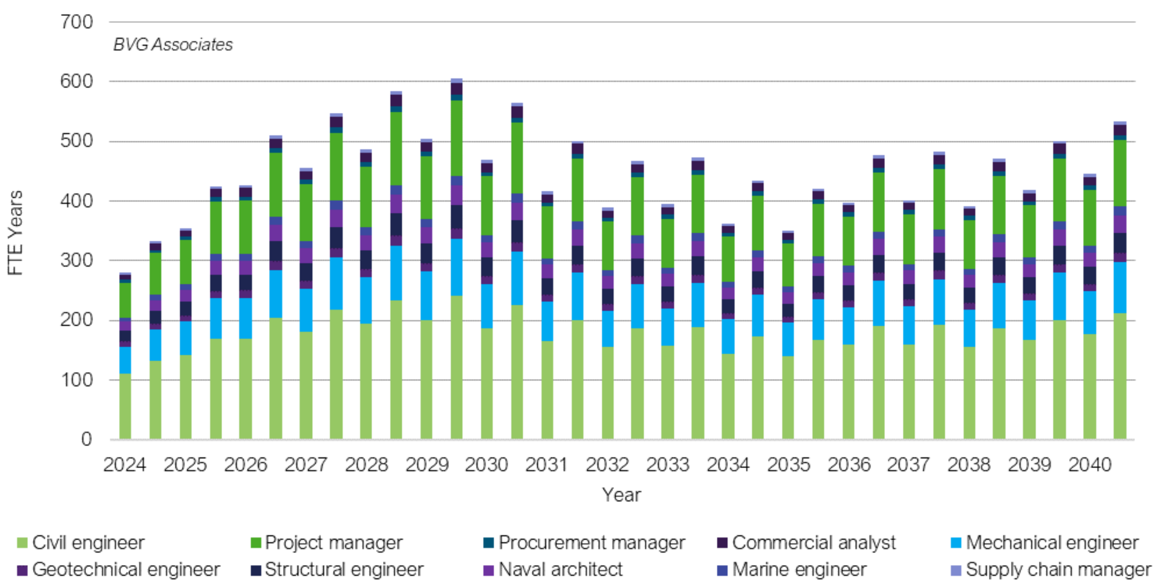


Figure 6: Comparison of demand in BAU (left bars) and intervention (right bars) scenarios for key job roles (second half) in the development and project management phase.

Key shortages

Management skills and senior roles

The offshore wind industry has highlighted a likely shortfall in offshore consenting expertise, and in particular knowledge of the Irish consenting process. This will impact the ability to recruit competent offshore consents managers and other management roles for the development phase.

The industry has also indicated there is a difficulty in hiring EIA and other environmental-management type roles. This is primarily due to a lack of offshore expertise and experience, and the transferability to offshore from onshore is more challenging than initially expected by many developers.

Competent offshore procurement expertise, particularly for EPCI and multi-supplier contracts, for major infrastructure projects is also lacking.

Project management skills for large scale offshore projects are difficult to internally train for, and global demand is high. Phase one projects in Ireland are expected to develop at a similar time frame, which could lead to a temporary skills shortage.

Electrical skills

Knowledge of the electrical engineering required for large-scale energy systems, particularly when based offshore and the challenge this presents, is in short supply and will face further constraints as the number of projects in development increases.

The skills and knowledge required for grid engineers and grid commercial leads are currently scarce. This is especially the case for HVDC knowledge. Due to the current lack of HVDC projects globally, few have the relevant skills on a global scale.

Engineering skills

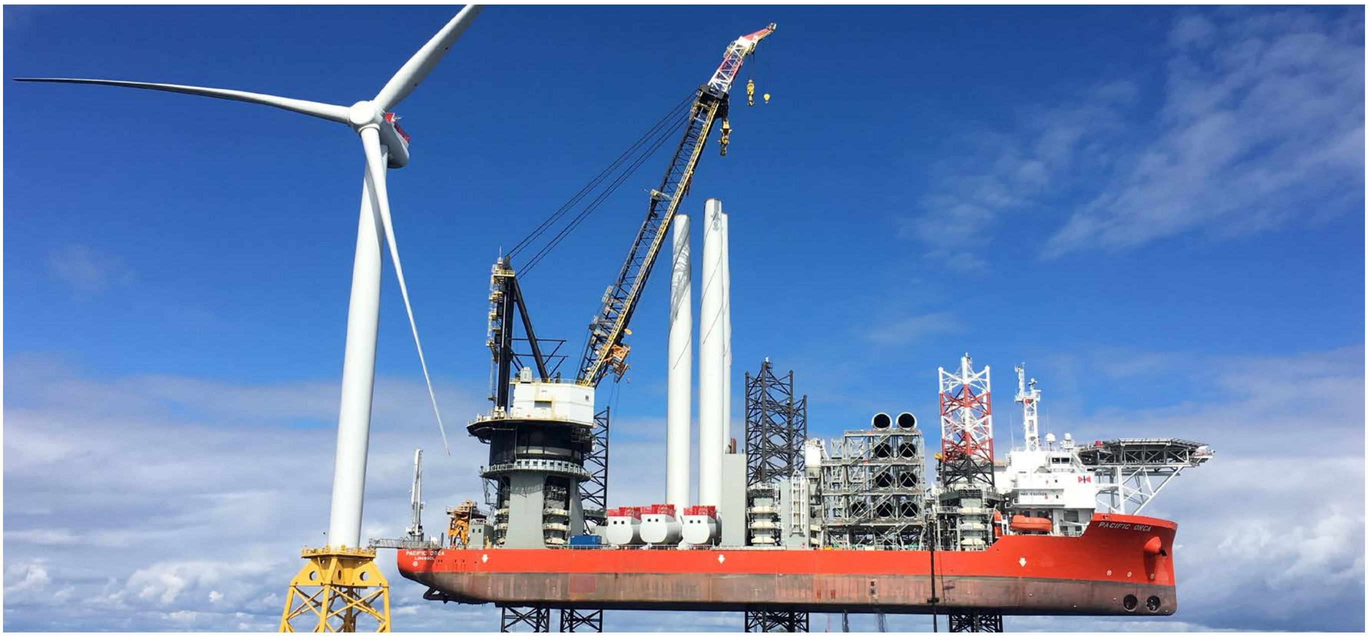
Engineering skills, including marine, civil, structural, geotechnical, and mechanical engineering, have been highlighted as a bottleneck in Ireland, despite Irish capability in the engineering sector. Designing for an offshore environment is significantly more onerous than onshore. Additionally, niche expertise in areas such as coupled analysis and designing offshore components suitable for serial production are lacking.

Naval architecture skills have been specifically highlighted as difficult to source in Ireland due to a lack of training opportunities.

Surveying and subsequent analysis

The industry foresees shortage of local geophysical and geotechnical expertise in Ireland if the project pipeline dramatically increases as expected.

Ornithologists and other related specialist roles may also face a shortfall if the pipeline dramatically increases, due to the niche nature of the expertise.



Conclusions

To help move from the BAU scenario to the intervention scenario and boost local content, Ireland will need to address local skills shortages and therefore reduce the need for foreign supply of skills and expertise.

A key theme across the anticipated skills shortages for the development and project management phase is the transferability of existing skills for offshore purposes. While Ireland has a strong onshore wind sector, professional sector and a significant engineering and management skills base, upskilling for offshore work needs to be accelerated and managed effectively.

Actions that Irish state bodies could take to help address skills shortages and maximise local content in the development and project management phase include:

- Award relocation grants to employers or individuals which relocate to Ireland to work in offshore wind. Expertise is more widely available in northern European markets which have an established offshore wind industry, so the Irish government could financially incentivise skills available elsewhere to relocate to Ireland. There may be significant numbers of Irish nationals working abroad with relevant skills, and any intervention could seek to target these potential returnees specifically.
- Engage with private training providers to help ensure offshore-specific skills transfer and training is available, particularly in parallel industries like onshore wind and engineering. Green Tech Skillnet is an example of industry-Government partnership which has proven effective in engaging industry to identify upskilling and skills transfer needs. It works with higher education, private training companies and industry experts to develop solutions with Government grant funding.
- Engage with higher education institutions to help ensure that:
    - Related degree programmes, especially in engineering disciplines, have offshore related modules, and
    - Masters courses are established with offshore renewable energy specialisms.
- Apprenticeship and graduate schemes for electrical engineers in Ireland are available but lack a focus in HV and HVDC systems. Ireland could introduce HV and HVDC specialisms within its education system, either as standalone courses or integrated in related courses.
- The Government could also offer financial support for chartership in areas such as all engineering types as an option for successful graduates or apprentices.

For further discussion on recommendations, see Section 6.4.5.

6.4.2 Manufacturing

For the specific key roles assigned to this project phase listed in Table 8, we forecast the cumulative demand up to 2040 will be:

- **280 FTE years (BAU scenario), and**
- **2,260 FTE years (intervention scenario).**

In the short term, the forecast average annual demand up to 2030 is:

- **10 FTE years (BAU scenario), and**
- **105 FTE years (intervention scenario).**

Due to the addition of floating substructure manufacture in the intervention scenario, welders go from being not required in the BAU scenario to the most in-demand role in the intervention scenario. Demand over time for these roles is shown in Figure 7. The remaining jobs will primarily comprise of:

- Roles involved in the floating substructure manufacture, including: engineers, site managers, technical directors, site supervisors, metal workers, machine operatives, quality inspectors, and health and safety roles.
- Roles involved in the mooring system manufacture, similar to the substructure roles above
- Roles involved in the onshore substation manufacture, similar to the substructure roles above, and
- Indirect supporting roles, such as HR and accounting.

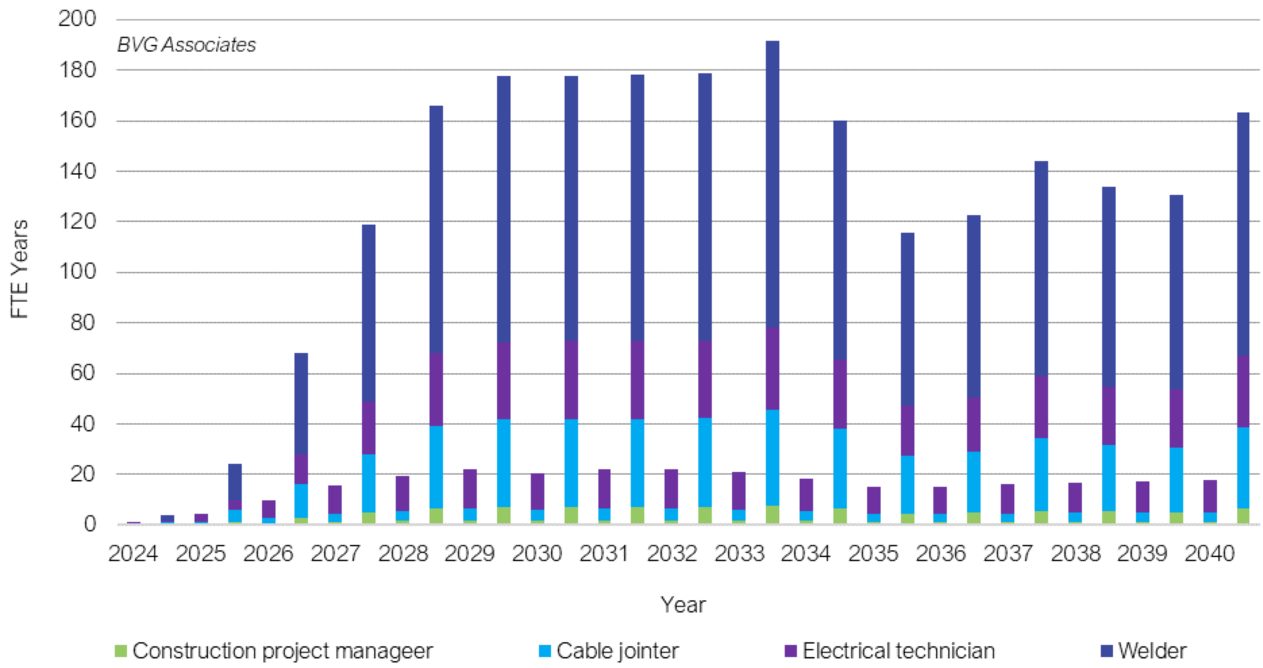


Figure 7: Comparison of demand in BAU (left bars) and intervention (right bars) scenarios for key job roles in the manufacturing phase.

Key shortages

Skilled trade workers

There is currently a severe global shortage of skilled trade workers including in the key roles we highlight such as welders, electrical technicians, and cable joiners. This will create a bottleneck for all offshore wind manufacturing.

Offshore qualifications

In addition to a shortage of skilled workers, those with the qualifications required to work offshore face an even greater shortage.

Construction management skills

Developers are struggling to hire for construction management roles, and this shortage is likely to intensify as the pipeline increases.

As with senior management roles in the development and project management phase, offshore experience for these roles is also lacking.

Electrical expertise

As with related development and project management roles, the skills required for working with high voltage electrical systems face a significant shortage.

Conclusions

While Ireland has a well-developed mechanical and process engineering sector with manufacturing transferability to offshore wind, the scale of offshore wind ambition will require significant skills increases.

The key theme across the anticipated skills shortages for the manufacturing phase is the shortages are primarily due to a global, rather than Irish-specific, shortages. Skills constraints for workers with experience suitable for offshore wind, such as welders, will present a key bottleneck worldwide in the coming years.

Ireland could mitigate this shortage by encouraging relevant skills training in-house, attracting skilled workers, and retaining these skills. It could do this through:

- Support and incentives to help supply chain companies invest in skills development and training through supply chain strengthening schemes. Examples like the Offshore Wind Manufacturing Investment Support (OWMIS) scheme have proven to be successful in the UK, which incentivises investment in the manufacturing supply chain through:
    - Grant funding for major investments in new build or expansion of existing manufacturing facilities for offshore wind farm components, port and access infrastructure and dredging. The investments must support or enable offshore wind development.
    - Incentivising employment by including a condition in the grant for applicants to create or safeguard jobs, and
    - Ensuring each offshore wind project has evidence of long-term supply chain agreements, is market competitive, and offers value for money in terms of wage benefits. This has the effect of encouraging job applicants as the project (and hence the job role) appears secure and well compensated.
- Ensure workers with the relevant manufacturing skills have the capacity to work offshore by enabling and accelerating the ability to obtain internationally recognised qualifications, such as the Basic Safety Training Standard, approved by the Global Wind Organisation (GWO).
- Ensure Micro Credentials relevant to offshore wind are available for people to gain qualifications and transfer skills to the industry.
- Award relocation grants to individuals who relocate to Ireland to work in offshore wind. Expertise is more widely available (though still heavily constrained) in European and Asian markets which have established offshore wind or parallel industries, so the Irish government could financially incentivise skills available elsewhere to relocate to Ireland.
- Ensure salaries in the manufacturing phase are competitive and workers are appropriately compensated, as low salaries are a key cause of low staff retain in these fields.
- Apprenticeship and graduate schemes for electrical engineers in Ireland are available but lack a focus in HV and HVDC systems. Ireland could introduce HV and HVDC specialisms within its education system, either as standalone courses or integrated in related courses.

Ultimately, Ireland will only create a significant number of manufacturing jobs if suppliers are willing to invest in local manufacturing facilities and move production to Ireland. While there is some logic to local supply for the tower, substructure and mooring system, these can be manufactured elsewhere if necessary. Therefore, Ireland will need to attract investment alongside developing its skills base.

6.4.3 Installation

For the specific key roles assigned to this project phase listed in Table 8, we forecast the cumulative demand up to 2040 will be:

- **4,430 FTE years** (BAU scenario), and
- **13,500 FTE years** (intervention scenario).

In the short term, the forecast average annual demand up to 2030 is:

- **180 FTE years** (BAU scenario), and
- **570 FTE years** (intervention scenario).

We highlight only two key installation-specific roles for this report, crane operator and port operative, as shown in Figure 8. This is primarily because installation activities will likely comprise a small proportion of total FTE numbers in Ireland.[viii] Developers do not anticipate a shortfall in the types of roles associated with installation and port operations.

It is common for developers and turbine manufacturers to send in-house staff to work on and inspect the turbine assembly. These roles will likely be non-Irish and so are not included in these numbers.

The remaining jobs will primarily comprise of:

- Roles related to turbine assembly but have been assigned to the manufacturing phase as their primary category, such as engineers, technicians, welders, and cable jointers
- Other roles involved in the construction and marshalling of turbine components such as project managers and construction managers, and
- Roles such as health and safety coordinators and offshore logistics managers.

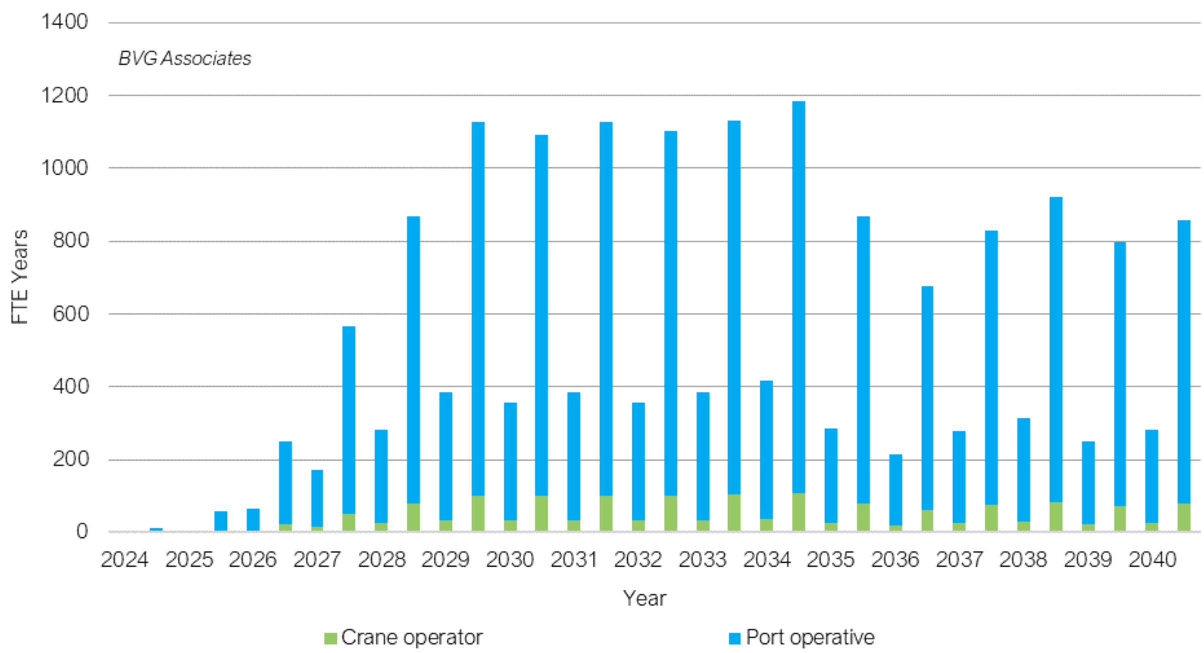


Figure 8: Comparison of demand in BAU (left bars) and intervention (right bars) scenarios for key job roles in the installation phase.

Key shortages

Developers have indicated there is no anticipated shortfall in the key installation related roles we highlight in this report. Nonetheless, bottlenecks may arise as the number of projects simultaneously in the installation phase increases.

[viii] While project installation required some seafaring roles (which face a global shortage), we do not anticipate Ireland conducting major offshore installation activities, such and turbine and cable installation, locally. There is little logic for local supply and experienced foreign installation firms with the appropriate vessels and workforce will likely conduct these installation activities. Seafaring roles which will be required locally are covered in Section 6.4.4.

Conclusions

To ensure Ireland captures the full potential economic value of its offshore wind rollout, and maximises local content in the installation phase, it will be important to:

- Monitor the timetable of offshore wind projects and availability of port workers. The key job roles we highlight are not exclusive to offshore wind, and so will face competition from other industries that utilise ports.
- Ensure sufficient expertise is coming through training and apprenticeship programmes and have room to increase them as offshore wind capacity in Ireland increases.
- Ensure supply chain partners collaborate with maritime training providers (such as the National Maritime College of Ireland (NMCI) and professional associations to ensure existing expertise within the maritime economy is utilised.
- Encourage developers to use Irish labour for project installation. Use of foreign crews on vessels and in ports for installing offshore wind projects is common practice, but developers can encourage the use of appropriately skilled local labour through the terms of tenders when they go to market for installation services.

6.4.4 Operations, maintenance and service

For the specific key roles assigned to this project phase listed in Table 8, we forecast the cumulative demand up to 2040 will be::

- **5,500 FTE years** (BAU scenario), and
- **6,470 FTE years** (intervention scenario).

In the short term, the forecast average annual demand up to 2030 is:

- **40 FTE years** (BAU scenario), and
- **50 FTE years** (intervention scenario).

Note, due to the cumulative nature of demand for OMS roles, demand up to 2030 comprises a small proportion of the total demand to 2040.

Demand over time for these roles is shown in Figure 9 and Figure 10. The remaining jobs will primarily comprise of:

- Technical roles including port operatives, technicians, engineers, and asset managers
- Managerial roles such as supervisors, project managers, supply chain managers and commercial managers, and
- Indirect roles such as HR and accounting.

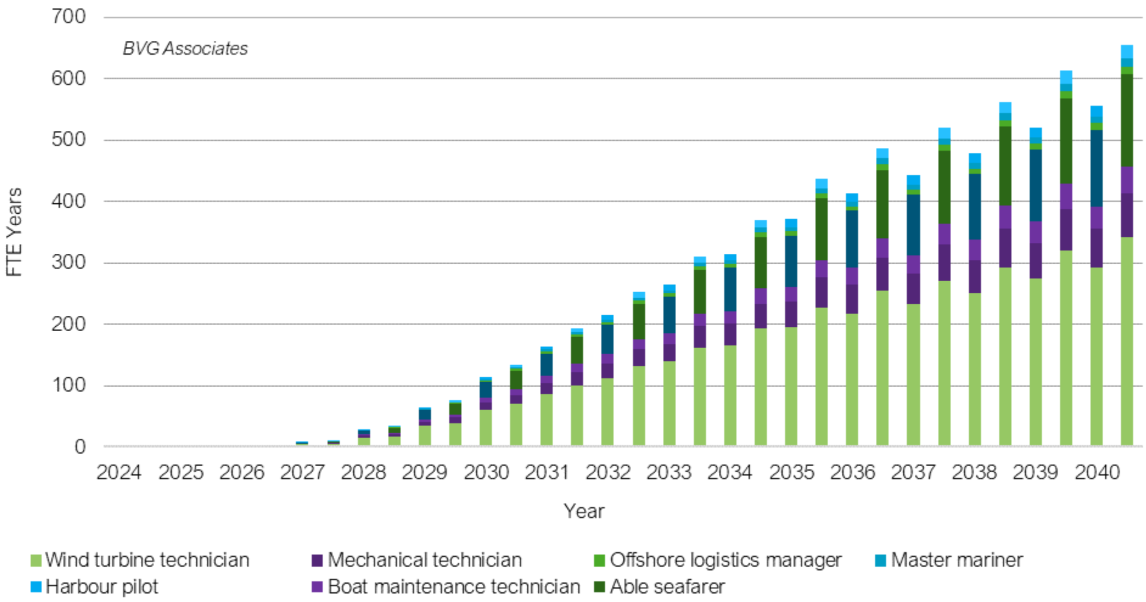


Figure 9: Comparison of demand in BAU (left bars) and intervention (right bars) scenarios for key job roles (first half) in the operations, maintenance and services phase.

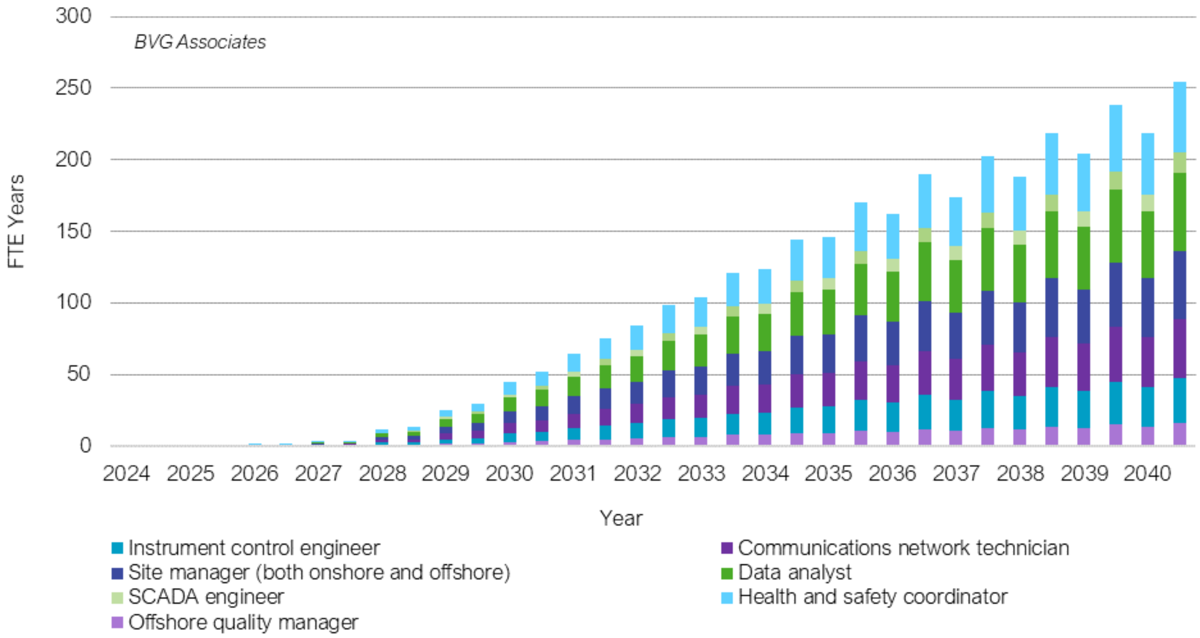


Figure 10: Comparison of demand in BAU (left bars) and intervention (right bars) scenarios for key job roles (second half) in the operations, maintenance and services phase.

Key shortages

Maritime training

Ireland's maritime industry, while small, is well-trained and experienced. Despite this, the expected growth in offshore wind capacity underscores a potential shortfall in key roles we highlight, such as boat maintenance technicians, able seafarers, master mariners, and harbour pilots. The maritime industry requires antisocial working hours and leave periods, for relatively low wages. As a result, the maritime industry forecasts a shortage of naval officers, seafarers, and other vessel crew. This emphasises Ireland's need to increase training and recruitment initiatives, ensuring the nation's offshore wind industry's requirements are met and avoiding a workforce deficit.

Compounding this maritime skills shortage is the lack of experience and skills of existing maritime workers in offshore wind. While no specific offshore wind-related skills are required for vessel crews, experience with offshore wind vessels, and of the industry in general, is preferred by OMS contractors. Ireland's workforce will likely gain this experience over time as its industry expands, but in the short-term suppliers may hire foreign crews with offshore wind experience.

Health and safety expertise

The offshore wind industry has indicated there is a shortage of health and safety expertise, particularly offshore health and safety. Ireland's health and safety training schemes are currently aimed at onshore activities due to the country's significant installed onshore wind capacity, and so lack a focus on offshore risks such as extreme weather conditions, falling objects and moving platforms. This shortage of in-house training capability will present a bottleneck to Ireland's OMS activities as turbine, foundation and cable maintenance all require offshore health and safety certifications.

Skilled trade workers

There is currently a severe global shortage of skilled trade workers including in the key roles we highlight such as communications network technicians, mechanical technicians, and wind turbine technicians. This may present a bottleneck for offshore wind maintenance activities being conducted locally.

Electrical skills

As with the development and project management and manufacturing phases, a lack of electrical expertise and skills, particularly in high voltage systems, will present a major bottleneck to Ireland. Both onshore and offshore substation maintenance, as well as subsea cables and turbine maintenance, require this knowledge. This subject area is facing a global skills shortage, especially for HVDC systems, and so any action that Ireland can take to help alleviate this shortage will help the local (and international) offshore wind industry.

Management skills and senior roles

Industry has indicated there is a shortage in skills required for managerial roles such as offshore quality manager and project manager. This shortage is especially acute for skills required for offshore operations.

This will impact Irish content in the OMS phase as developers and OMS suppliers will use foreign labour for these roles if necessary.

Conclusions

As with the development and project management phase, there is a lack of offshore-specific skills. While Ireland has experience in OMS services through its onshore wind industry, training provisions need to be adapted and expanded to ensure sufficient numbers of new workers are appropriately trained, and existing onshore workers can transfer their skills for offshore activities.

Maritime skills and training also present a bottleneck for Ireland. Seafaring roles will be vital for OMS activities, and so ensuring training opportunities are available will help elevate a global shortage in this area, as well as incentivise OMS suppliers to hire Irish workers.

To ensure Ireland captures the full potential economic value of its offshore wind rollout, and maximises local content in the OMS phase, it will be important to:

- Engage with higher and further education institutions to help ensure that:
  - Relevant degree programmes have offshore related modules
  - Masters courses are established with offshore renewable energy specialisms
- Engage with private training providers to help ensure that:
  - Health and safety training programmes cover the necessary skills required, including offshore training, and
  - Specialised training facilities are created that provide accreditation, workshops and mentoring programmes for workers, which will help ensure the availability of a local workforce.
  - Micro Credentials relevant to offshore wind are available for people to gain qualifications and transfer skills to the industry.
- Ensure legislation is applicable to the full range of vessels and health and safety practices used in the offshore wind industry. This will help developers and training providers refine their offerings to appropriately upskill the workforce.
- Help ensure maritime training and skills are readily available in Ireland, through:
  - Working with the NMCI to help recruit seafarers and ensure the training provided is appropriate for offshore wind. NMCI currently provides training from the GWO, and other providers should do the same to ensure qualifications are applicable internationally.
  - Incentivising offshore wind supply chain companies to sponsor cadets to attend the NMCI (and other maritime institutions) to help increase the number of people in training.
  - Ensuring seafarers and other maritime workers are compensated fairly and have sustainable working conditions to help improve staff retention and attract further workers.

6.4.5 Public sector

Suitable resourcing of relevant public sector bodies will be important to achieving deployment projections as they are critical enablers for deployment. Public sector jobs are not included in our assessment of Irish local content as all public sector work is carried out domestically in any scenario, and additional public sector employment does not offer a domestic GVA benefit.

We outline a selection of key public sector roles in Ireland in Table 9. This is a sample of required roles, not all public sector demand, which will be considerably larger and will include indirect supporting roles as well, such as HR and accounting.

We group them into three categories:

- Consenting
- Grid connection, and
- Development and EIA.

In addition to those roles highlighted, the offshore wind industry will likely place increased demands on other state agencies and bodies such as, for example, the Environmental Protection Agency, as the competent authority for the award at permits for dumping materials at sea.

Table 9 Selection of key public sector roles

#	Role	Area of development	Government body
1	Administrative staff to assess MACapplications and to process Maritime Usage Licence Applications	Consenting	Maritime Area Regulatory Authority
2	Technical and ecological staff to assess Maritime Usage Licence Applications	Consenting	Maritime Area Regulatory Authority
3	Planning inspectors	Development and EIA	An Bord Pleanála
4	Marine ecologists (marine mammals, benthic)	Development and EIA	National Parks and Wildlife Service
5	Ornithologists	Development and EIA	National Parks and Wildlife Service
6	Legal advisors	Development and EIA	An Bord Pleanála
7	Policy and admin staff to designate DMAPs	Development and EIA	Department of Environment, Climate and Communications, Department of Housing, Local Government and Heritage
8	Grid connection assessors	Grid connection	EirGrid / Commissioner for Regulation of Utilities

It will be critical to ensure that these types of roles are sufficiently resourced to accelerate offshore wind deployment and minimise potential bottlenecks in the public sector.

The number of people required to fill these public sector roles is small compared to the private sector. The key risk in the public sector however is the skills to fill these roles face strong competition in private as well as the public sector, as knowledge of Irish offshore wind policy, consenting and grid connection are in high demand. The Irish Government will therefore need to make these job roles attractive to ensure expertise is built up within government and external workers with the appropriate expertise are attracted to work in Ireland. In the short term, the Government could begin a secondments programme from industry into the public sector to help frontload resources at early stages of offshore wind development.

7. Recommendations

We recommend taking an industry-led approach to skills interventions. We would not recommend that Government pre-emptively involves itself directly in funding new courses or places on existing courses unless there is a clear demand from industry (as listed in subsequent sections).

We recommend government interventions in skills development harness the participation of industry. Government funding can help de-risk skills investment on the part of industry and encourage companies to invest in the local workforce. Taking an industry-led approach would help ensure that people are being trained in the right skills at the right time and help ensure better employment outcomes at the end.

Many in the industry do not see much value in generalised training and prefer to bring through staff using their own in-house methods. Furthermore, while training for skills in advance of demand may be of some benefit, there is likely to be little take-up for training if job opportunities do not yet exist. There is an additional risk of people with the required skills relocating to other markets where demand is higher.

7.1.1 Short term recommendations

Establish a skills development fund

Issue: Lack of targeted funding towards required skills development

Solution: The Irish Government could establish a skills fund which allows companies (or further education institutions in collaboration with companies) to bid in for match funding for appropriate training initiatives such as the Skillnet Ireland industry-led funding model. Matching funding will help encourage investment in training programs as companies will share the financial burden. This maximises the impact of the fund as well as ensuring its resources are aligned with industry needs. The fund could replace or sit alongside existing, general-purpose skills initiatives such as National Training Fund and the National Training Advisory Group. Public private partnerships like the Green Tech Skillnet could be used to help facilitate and distribute funding allocations.

This fund could be managed directly by DFHERIS, or a joint government-industry board could be established to oversee it. Collaboration between the public and private sectors is crucial, and so a joint government-industry board could provide a balanced perspective, ensuring that the fund's resources are allocated effectively and transparently.

Developing a system to measure the impact of the training initiatives will help ensure the fund remains useful. This may involve:

- Tracking the placement rates of trained individuals in relevant jobs
- Monitoring the growth of participating companies, and
- Assessing the overall economic benefits.

The Government could also explore whether to link skills funding with participation in the Irish labour market. For example, grants to support an apprenticeship position could be made conditional on that apprentice continuing to work in Ireland for two years following completion of their training, else the grant would need to be repaid.

The skills fund could be accessible to companies of all sizes. Resourcing of the skills fund could be flexible. For example, regular assessments and adjustments could be made to keep funding allocations aligned with industry trends and technological advancements. The following trends are examples of what could be monitored, as this will have an impact on skills required and therefore the training required:

- Types of floating foundations used
- Proportion of projects that use HVDC systems
- Green hydrogen integration in offshore wind farms, and
- Technological trends in turbine and foundation maintenance practices.

Body(s) responsible: DETE, DFHERIS

Attract workers from abroad to help plug short-term skills shortages
Issue: Many projects will be moving through the development stages in parallel, placing acute pressure on the domestic skills base.
Solution: Ireland could attract workers from abroad workers, as it is highly unlikely that the local workforce has the capacity to meet short term demand. It should target foreign workers involved in the development stages of offshore wind especially. The key development roles with acute skills shortages highlighted by developers include:

- Grid commercial leads
- Consents managers
- Environmental managers
- Ornithologists and other offshore wildlife specialists, and
- Engineers, including civil, electrical, mechanical, geotechnical and structural engineers.

For further information on key role shortages, see Section 6.3.

Government could award relocation grants to employers or individuals which relocate to Ireland to work in offshore wind. Expertise in offshore wind development is more widely available in northern European markets which have an established offshore wind industry, so the Irish government could financially incentivise skills available elsewhere to relocate. Such interventions could be tailored specifically to target Irish nationals working in offshore wind abroad.

Body(s) responsible: DETE, DFHERIS, DFA.

7.1.2 Medium term recommendations

Build industry and market confidence
Issue: Potential lack of market and investor confidence due to regulatory uncertainties in Ireland.
Solution: Ireland will need to secure investor confidence if it wants to attract suppliers to conduct business locally. This is especially the case for manufacturing; Ireland will only create a significant number of manufacturing jobs if suppliers are willing to invest in local manufacturing facilities and move production to Ireland. While there is some economic benefit for local supply for the tower, substructure and mooring system, these can be manufactured elsewhere if necessary. In order to maximise domestic economic benefit Ireland will need to attract investment in these areas alongside developing its skills base, through actions like:

- Ensuring a steady, visible, long-term and realistic project pipeline and thus demonstrating a commitment to offshore wind
- Ensuring the grid connection process is clear and timely
- Ensuring the offshore wind offtake process is clear and bankable, to provide revenue certainty for developers, and
- Support schemes to attract relevant investment to Ireland.

Ireland is due to publish its offshore wind industrial strategy in Q1 2024. It is expected to include details on, amongst others:

- Enabling innovation including grant funding and research and development centres
- Use of free ports and enterprise zones, and
- Grants and other financing, including grant funding for major investments in new build (or expansion of existing) manufacturing facilities.

DETE is due to publish a National Clustering Framework for offshore wind, which will outline the approach to regional or national supply chain clusters including developers, ports, suppliers, and educational institutions. It is also due to publish its Future Framework offshore wind policy in 2024, outlining how policy can be aligned for offshore renewables, including marine spatial planning, industrial strategy, interconnection, and renewable hydrogen development.

It is vital that the Irish Government follows through on any commitments made in these publications. This will show Government commitment to offshore wind and help inspire confidence in the industry. Conversely, if market confidence is reduced and offshore wind projects are cancelled, or developers do not bid for development areas, then people with relevant skills may seek jobs elsewhere in marine, construction, and other parallel sectors.

Body(s) responsible: Department of Housing, Local Government and Heritage, DECC, DETE, MARA, IDA Ireland.

Ensure offshore specialisms are covered in public education and private training providers

Issue: The transferability of existing skills for offshore purposes is a key skills gap.

Solution: While Ireland has a strong onshore wind industry, professional sector and a significant engineering and management skills base, upskilling for offshore work needs to be accelerated and managed effectively.

Government could therefore engage with higher education (HE) institutions and private training providers to ensure degree and training programmes have offshore related modules. This is especially the case in:

- Engineering disciplines (HE)
- Construction and project management (HE and private providers)
- Electrical joining and other electrical apprenticeships and training schemes (private providers), and
- Health and safety courses (private providers).

We recommend engagement with HE institutions and private training providers is conducted either together or in parallel, to ensure all relevant areas are covered and both parties understand which shortages they are addressing.

It is also vital to ensure workers with relevant skills have the capacity to work offshore, by enabling and accelerating the ability to obtain suitable, internationally recognised qualifications, such as offshore safety courses approved by the GWO.

Government could also encourage higher education institutions to establish Masters and postgraduate courses with offshore renewable energy specialisms.

Micro credentials relevant in offshore wind, such as in offshore construction, should also be encouraged and enabled. This will allow a more agile style of learning, meaning qualifications can be achieved while still in employment, rather than the commitment entails in a higher education degree.

Building a domestic knowledge base with offshore-specialist knowledge will help prepare the future workforce for the offshore wind industry.

Body(s) responsible: DFHERIS, education institutions, Skillnet Ireland.

Assess parallels with other expanding industries
Issue: Potential duplication of skills training effort.
Solution: By assessing parallel industries expected to expand alongside offshore wind, Ireland can ensure skills resources are distributed effectively and minimise potential duplication of training initiatives. The skills and training initiatives within the following industries could be monitored for potential parallels:

- Aerospace
- Construction
- Defence
- Marine and port logistics
- Superconductors and related technologies
- Technology, and
- Transmission, including international interconnectors.

Body(s) responsible: DETE, DFHERIS

7.1.3 Long term recommendations

Advertise offshore wind as an attractive industry
Issue: Ireland has a tight labour market. People will therefore require an incentive to potentially change jobs and enter the offshore wind industry. They will need to view it as an attractive employment prospect.
Solution: The Government could increase public awareness around the benefits of working offshore wind and its role in Ireland's decarbonisation effort through:

- Conducting public awareness campaigns to educate about the benefits of offshore wind energy, including its contribution to reducing carbon emissions and creating stable, long-term jobs.
- Emphasising the economic benefits of offshore wind, such as job creation, local supply chain development, and increased tax revenue. Governments can collaborate with industry associations and business groups to showcase success stories and economic growth statistics.
- Maintaining transparency in the industry by regularly updating the public on the progress of offshore wind projects, including construction milestones, energy production, and economic impacts.
- Emphasising Ireland's ambitious offshore wind targets, which will attract international interest and investment, and boost Ireland's standing on the world stage.

Parallel sectors such as aerospace will also compete with offshore wind, and potentially offer higher wages. This increases the need to make working in offshore wind an enticing prospect.

Industry should also play its part. This could be through awareness raising activities to increase understanding of the benefits of offshore wind and promote public acceptance. This could include, for example, engaging with the education system at secondary level to encourage the uptake of relevant third level courses, and engaging in other promotional activities such as sponsoring the inclusion of an offshore wind module in the Green Schools Programme.

Body(s) responsible: DETE, DECC, DFHERIS, Wind Energy Ireland, DoE.

Monitor local content levels over time to help enable an adaptive skills response
Issue: As the offshore wind industry in Ireland expands and matures, skills requirements may shift.
Solution: Government should monitor the levels of local content and industry activity in Irish offshore wind projects over time, to determine where skills needs lie. Requirements will change over time and with industry investment decisions. Certain key milestones and decision points will influence skills requirements, such as:

- If major suppliers indicate a willingness to move tower, floating substructure, mooring system or any other component manufacture to Ireland, this will result in demand for skilled labour such as welders and fabricators.

- If industry indicates a desire to assemble turbines in Irish ports, this will greatly increase local content in the installation phase (as per the intervention scenario) and indicate upcoming demand for port workers.

If a major investment is triggered, or being considered, government should engage closely with the investor or potential investor to understand their skills requirements. A skills fund as recommended above could be an appropriate vehicle for addressing these needs.

Government could monitor levels of local content through requiring developers to submit regular reports detailing their planned and realised local content levels. It could also track memoranda of understanding (MOUs) to monitor which supply chain areas are looking to increase Irish content.

Body(s) responsible: DECC, DETE

Ensure health and safety legislation is relevant to offshore
Issue: Health and safety legislation in Ireland is currently targeted towards its onshore wind industry.
Solution: Government could ensure relevant legislation is applicable to the full range of vessels and health and safety practices used in the offshore wind industry, by engaging with industry to establish best practice. This will help developers and training providers refine their offerings to appropriately upskill the workforce.

Body(s) responsible: Government of Ireland.

Build an HV and HVDC knowledge base
Issue: Offshore wind faces a severe skills shortage in electrical systems, particularly HVDC systems. As DC projects are currently rare, little knowledge base has been built up worldwide, but the use of DC systems is expected to increase dramatically as projects move further from shore.
Solutions: Apprenticeship and graduate schemes for electrical engineers are available in Ireland but lack a focus in HV and HVDC systems. Government could engage with industry to develop apprenticeships focused on electrical systems, particularly HV and HVDC systems. Government could also engage with higher education institutions and electrical apprenticeship and training providers to ensure HV and HVDC specialisms are introduced as standalone courses or integrated in existing programmes.

Government could also encourage collaborative HVDC research projects between academia, industry, and government agencies. These projects could focus on solving specific HVDC challenges and advancing the technology and will help increase local HVDC skills in the process.

Body(s) responsible: DFHERIS.

7.2 Limitations and areas of focus for future studies

There are several limitations to our approach of forecasting the demand for skills in Ireland. Further work could be done to build on our analysis, and provide further detail of the offshore wind jobs landscape in Ireland. Our approach does not consider:

Irish nationals working on projects abroad

Our approach only considers domestic capacity and associated skills requirements. We do not account for skills demand for offshore projects in other countries. This means the actual number of offshore wind jobs in Ireland may be higher, if Irish nationals are employed servicing projects outside of Ireland.

Individual employee numbers

We use FTE years as the unit to measure skills demand. This unit is beneficial as it provides a standardised measure for demand for (and comparison of) job roles regardless of their individual working patterns.

The average number of full-time employees per year for any given role to 2040 can be derived by dividing the cumulative FTE year demand to 2040 in Table 8 by the number of years remaining until 2040.

The resulting figure is likely an underestimate of actual employee numbers however, as it does not account for the impact of employees working less than full time, or for less than a full year. To calculate specific number of jobs associated with our FTE year demand projections, a multiplier needs to be applied which accounts for the impacts of seasonality, part time working patterns, and the extent to which a particular worker may spend time working on non-offshore wind matters. Demand for roles also fluctuates over time depending on project lifecycle and our capacity projection. All these considerations could increase the number of individual employees required, and the number can vary significantly depending on individual employers and employees' needs and preferences.

For the purposes of this study, we have not derived an estimate of employee numbers for each role, so figures are expressed throughout in terms of FTE years rather than employee numbers.

Consideration of more job roles in offshore wind

Our analysis profiles 42 specific key jobs in offshore wind, selected on the likelihood of these roles being based in Ireland. Further work could be undertaken to profile more offshore wind roles, including demand, details on working patterns, and any skills bottlenecks associated with each.

Detailed analysis of training providers in Ireland

Our analysis does not include an in-depth review of the training provision landscape in Ireland. Further work could be conducted to establish the current capabilities of training providers, and potential gaps which would present a bottleneck to meeting the skills shortages we identify.

8. Conclusions

Ireland has ambitious targets for offshore wind development, with a target of 5 GW installed by 2030 (with an additional 2 GW of floating wind in development), 20 GW by 2040 and 37 GW by 2050. This presents a significant challenge as a large, skilled workforce will be required to meet these ambitions. The challenge is even more substantial if it wishes to maximise the amount of Irish content in its wind projects, thereby requiring more than the minimal, necessary skills needed to develop multiple large-scale offshore wind projects.

We project a total demand of at least 19,500 FTE years up to 2030 in the BAU scenario if Ireland realises its capacity targets. This equates to around 2,800 FTE in an average year to 2030. In the intervention scenario, we project a cumulative demand of 30,000 FTE years up to 2030, or around 4,200 FTE in an average year to 2030.

Up to 2040 meanwhile, we project a total demand of around 86,000 FTE years in the BAU scenario. This equates to around 5,000 FTE an average year to 2040. If Ireland increases its capabilities as per the intervention scenario, it will see demand for 60,000 additional FTE years by 2040. This equates to around 8,600 FTE in an average year to 2040. The majority of these additional jobs will likely come in the manufacturing phase of an offshore wind farm, as this is where Ireland has the greatest potential to increase its local content. Ireland is expected to heavily utilise floating offshore wind in its capacity build out. The floating industry is still in its infancy, and so presents an early-mover opportunity for Ireland to develop domestic floating wind manufacturing capabilities.

Ireland has numerous parallel industries which have a workforce with skills applicable to offshore wind. Onshore wind is the most obvious sector from which people and suppliers can transfer training, experience, and skills. The country's engineering and maritime sectors, as well as project management and other managerial, professional sectors, also have skills transferable to offshore wind. Nonetheless, Ireland faces a significant challenge to both develop the skills unique to offshore wind and facilitate skills transfer.

We have identified numerous skills shortages across the supply chain in Ireland which will present a bottleneck to meeting government capacity targets and, if unaddressed, could reduce local content in Irish wind farms. These skills shortages are highlighted in 42 key job roles we anticipate being essential to the Irish offshore wind market. Skills shortages range from a lack of offshore-specific familiarity in various engineering disciplines, shortages in welders and cable joiners, HVDC specialists, and environmental management skills. Skills shortages are present across the lifecycle of the wind farm, and so present an issue for all areas of the offshore wind supply chain in Ireland.

Skills shortages are particularly critical in the development and project management phase. As Ireland begins its rapid capacity build up, multiple projects will enter this phase in parallel and relevant skills demand will rise steeply. It is likely that in the short term, Ireland will need to attract foreign workers with relevant skills to help meet demand, as well as build up its domestic skills capability.

We present a range of recommendations to help tackle these skills shortages and grow Ireland's necessary skills base. These are split into short, medium, and long-term recommendations, to enable the Irish Government to take the appropriate steps at the right time. Overall, we recommend taking an industry-led approach to skills interventions, and any government interventions in skills development harness the participation of industry.

Government funding can help de-risk skills investment on the part of industry and encourage companies invest in the local workforce. Taking an industry-led approach would help ensure that people are being trained in the right skills at the right time, and ultimately help ensure better employment outcomes. Existing industry-Government partnership organisations, such as Green Tech Skillnet, have demonstrated that this approach is agile and can effectively respond to industry skills needs.

The scale of Ireland's offshore wind ambitions will require development of a significant local skills base. Target offshore wind capacity is an order of magnitude greater than the national demand for electricity. If achieved, and the country develops a local skills base able to meet this demand, Ireland will have the opportunity to export its expertise worldwide.

Appendix A: Offshore wind job profiles

This Appendix contains profiles of 42 offshore wind jobs. They cover the full lifecycle of an offshore wind farm and vary in the type of role, employer and education and training required.

These job profiles will also be found in the online tool currently in development, due to be released in Q1 2024.

OFFSHORE CONSENTS MANAGER

Description
An offshore consents manager will support the development and management of early phase activities such as site selection, project consenting and overseeing the Environmental Impact Assessment (EIA). They are responsible for securing the licenses that may be required through-out each phase of development of the offshore wind farm. They may also have a role in procuring the contractors to carry out the EIA.

Lifecycle Stages
Development and project management.

Typical employer
Developer and specialist consultancies.

Place of Work
Onshore in an office although there may be some travel required to subcontractors' sites.

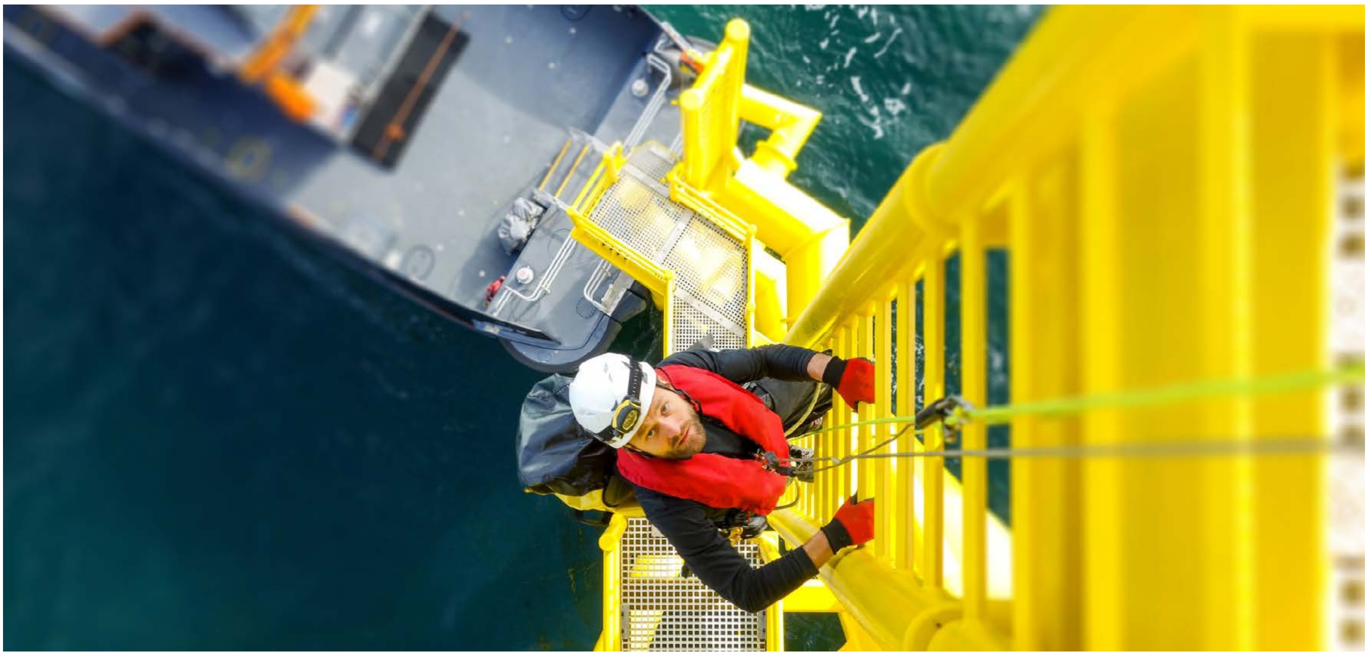
Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in a relevant environmental or planning discipline.
Extensive experience in offshore project management or consenting of complex infrastructure projects.

Typical entry position & transferable sectors
Entry roles can include junior roles within the development company, elsewhere in the offshore wind industry, or within the civil or public service in Ireland.

Career possibilities
Offshore consents managers can progress to other senior roles in the offshore wind industry, including project manager and project director.

Full time salary estimate
€52,000-€80,000 (Consents Manager) to €120,000 (Project Director), depending on experience.



GRID PACKAGE MANAGER

Description
A grid package manager is responsible for overseeing the grid connection of the offshore wind farm. They work with the appropriate private and governmental organisations (such as EirGrid) to ensure compliance with grid regulations, co-ordinate the relevant desktop studies and surveys for the grid routing (onshore and offshore) and input to other key elements of the development including substation and landfall .

Lifecycle Stages
Development and project management and manufacturing.

Typical employer
Developer.

Place of Work
Office.

Typical working pattern
Full time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in electrical engineering or similar. Experience in one or more of the following is required: renewable energy development including markets and technologies, electrical engineering, contract negotiations and management.
A detailed understanding of grid connection processes, regulations, and standards within Ireland.

Typical entry position & transferable sectors
Entry roles can include junior roles within the development company or the transmission system operator.

Career possibilities
Grid package managers can progress to other senior commercial roles in the offshore wind industry, including project manager and project director.

Full time salary estimate
€60,000-€90,000 per year (Grid package manager) to €120,000 (Project Director), depending on experience.

GIS TECHNICIAN

Description
A GIS technician is responsible for using Geographic Information Systems (GIS) to store, analyse and manage data. For offshore wind development this could include using data gathered from field surveys at the offshore site to create maps and other graphics of this data to advise the developer of the project.

Lifecycle Stages
Development and project management.

Typical employer
Developer or specialist consultancies.

Place of Work
Office.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in relevant fields such as geography, computer science, geophysics, engineering or statistics. Experience with GIS software including ArcGIS, python and AutoCAD.

Typical entry position & transferable sectors
Entry roles can include similar level positions in relevant industries such as the oil and gas industry or public authorities such as the geological survey service.

Career possibilities
GIS technicians can progress to become GIS analysts and GIS specialists.

Full time salary estimate
€30,000-€45,000 per year, depending on experience. This is an entry level position and therefore this salary range is for this specific role.

BID MANAGER

Description
A bid manager is responsible for: project managing the bidding process, ensuring that deadlines are met, overseeing quality assurance, producing high quality bid documents and accurate bid pricing to meet bid requirements. They will be analysing bid documentation to inform strategy and optimise success.

Lifecycle Stages
Development and project management.

Typical employer
Specialist consultancies or specialist contractor.

Place of Work
Office.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in a subject related to the offshore wind industry for example engineering or in business or marketing. Experience within the wind energy industry and in bidding or sales roles.

Membership of the Association of Proposal Management Professionals (APMP) and qualifications from this provider are highly desirable.

Typical entry position & transferable sectors
Entry roles can include junior bid management roles.

Career possibilities
Bid managers can progress to other senior management roles in the offshore wind industry, Sales Director or Business Development Director.

Full time salary estimate
€50,000-€100,000 per year, depending on experience. This salary range is for this specific role.

COMMUNITY LIAISON OFFICER

Description
A community liaison officer is responsible for establishing and maintaining relationships with local communities and other groups of interest who may be affected by the development of the offshore wind farm. They will be the main point of contact for the local community, raising awareness and advocating for the benefit of the project for the local community.

Lifecycle Stages
Development and project management.

Typical employer
Developer.

Place of Work
Onshore in an office but will travel to visit relevant communities near the wind farm site and attend public information events held by the developer.

Typical working pattern
Full-time. May be required to work flexible hours outside of a typical 9-5 position.

Education, training and qualifications
Minimum NFQ level 7 minimum in business, marketing, public relations or other relevant fields. Strong customer service, interpersonal and negotiation experience is essential to this role.

Knowledge of the offshore wind industry as well as knowledge of issues within the local community is highly desirable.

Typical entry position & transferable sectors
Entry roles can include community relation assistants and customer service positions.
Highly transferable from any industry.

Career possibilities
Community liaison officers can progress on as senior community liaison officers and similar stakeholder engagement positions.

Full time salary estimate
€30,000-€50,000 per year, depending on experience. This salary range is for this specific role.

OFFSHORE EIA MANAGER

Description
An EIA manager is responsible for managing the EIA process for an offshore wind farm. This includes leading teams to complete the Environmental Impact Assessment Report (EIAR), taking responsibility for the deliverables produced and managing the survey schedule.

Lifecycle Stages
Development and project management.

Typical employer
Developer.

Place of Work
Office.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in a relevant environmental discipline such as environmental sciences, environmental engineering or ecological sciences. NFQ level 9 is highly desirable. Relevant technical experience (5 years) in either marine science, or offshore wind energy completing EIAs.

Typical entry position & transferable sectors
Entry roles can include trainee EIA Assessor or as a specialist such as a geophysicist, hydrographer or marine ecologist. Highly transferable from similar industries such as onshore energy or oil and gas.

Career possibilities
Offshore EIA managers can progress to a principial EIA manager or consents manager.

Full time salary estimate
€30,000 (Graduate level) - €80,000 (Consents Manager) per year, depending on experience.

MARINE ECOLOGIST

Description
A marine ecologist is responsible for providing expertise to contribute to environmental impact assessments undertaken in the development phase of an offshore wind farm. They provide information about the impact an offshore wind farm will have on sea floor marine life, fish and shellfish and marine mammals. A marine ecologist will work both onshore and offshore. When working offshore they are typically collecting survey data on vessels at the development site.

Lifecycle Stages
Development and project management.

Typical employer
Specialist consultancies.

Place of Work
Onshore in an office. Offshore on vessels at the development site.

Typical working pattern
Full-time. At offshore projects, marine ecologists usually live offshore on vessels and typically work two-weekson/ two-weeks-off.

Education, training and qualifications
Minimum NFQ level 7 in ecology, zoology or related subjects. Experience in planning, assisting, and delivering baseline or species and habitat specific surveys is desirable. NFQ level 9 in marine ecology or other marine environmental disciplines are required for more senior positions. Membership of the Chartered Institute of Ecology and Environmental Management (CIEEM) is highly desirable.

Typical entry position & transferable sectors
Entry roles can include a graduate or junior ecologist. Transferable from similar industries such as oil and gas.

Career possibilities
Marine ecologists can progress on as senior or principal marine ecologists, ecological consultants and EIA managers.

Full time salary estimate
€30,000 (Graduate level) -€70,000 (EIA Manager) per year, depending on experience.

ORNITHOLOGIST

Description
An ornithologist studies the behaviour of birds, their habitat and their migration patterns using this information to help protect their habitat both during construction and the lifetime of the offshore wind farm. They are responsible for orchestrating ornithological surveys and impact assessments and using the results of these surveys to provide expert advice to mitigate the ornithological impacts of offshore wind farms.

Lifecycle Stages
Development and project management.

Typical employer
Specialist contractor.

Place of Work
Onshore in an office. Offshore on a vessel.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in ecology, zoology or a relevant field.
Work experience or voluntary work, on field surveys or in a research lab, is desirable.

Typical entry position & transferable sectors
Entry roles can include ornithological consultancy roles or research roles.
Highly transferable from similar industries such as oil and gas.

Career possibilities
Ornithologists can progress on as senior or principal ornithologists or as a specialist consultancy.

Full time salary estimate
€28,000-€70,000 per year, depending on experience. This salary range is for this specific role.

RESOURCE ANALYST

Description
A resource analysist is responsible for planning, procuring and evaluating wind, metocean and other site data in order to support the development of the project by producing wind farm capacity estimates. They also assist with the layout of the turbines to optimise the resources available and calculate the long-term estimation of resources and energy production.

Lifecycle Stages
Development and project management.

Typical employer
Developer, specialist consultancy.

Place of Work
Office.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in a relevant discipline such as meteorology, atmospheric science, or a related field.
Experience in energy analysis of wind development projects, preferably offshore.
NFQ level 9 in these fields is highly desirable.

Typical entry position & transferable sectors
Entry roles can include a graduate, or experienced data analyst roles from other related industries.

Career possibilities
Resource analysts can progress on as senior data analysts or similar.

Full time salary estimate
€35,000-€80,000 per year, depending on experience. This salary range is for this specific role.

GEOPHYSICIST

Description
A geophysicist is responsible for the acquisition, quality control, interpretation and analysis of geophysical surveys mapping the different types and depths of rocks that make up the seabed. They are likely to find themselves regularly offshore on the development site. They will usually start out their careers by working as a part of a team offshore executing geophysical surveys then with more experience move to supervising and analysing the survey onshore.

Lifecycle Stages
Development and project management.

Typical employer
Developer, specialist subcontractor, or specialist consultancy.

Place of Work
Onshore in an office. Offshore on a vessel at the development site.

Typical working pattern
Full-time. Fixed term contract (typically up to 140 days). When offshore geophysicists will typically work two-weekson/ two-weeks-off. Flexible working arrangements may be available when working from an office.

Education, Training and Qualifications
Minimum NFQ level 7 in geophysics, geology or other environmental-science related disciplines.
Practical offshore experience gained through fieldwork or research trips and experience using analysis software such as GIS is desirable.

Typical entry position & transferable sectors
Entry roles can include research assistants. Highly transferable from similar offshore industries such as oil and gas.

Career possibilities
Geophysicists can progress on as senior or principal geophysicists.

Full time salary estimate
€35,000-€80,000 per year, depending on experience. Additional offshore day rate for work done offshore on vessels. This salary range is for this specific role.

HYDROGRAPHER

Description
A hydrographer is responsible for conducting surveys to measure the depth, shape and physical features of a seabed. They are responsible for maintaining and calibrating specialist equipment such as sonars to ensure reliable data is produced. Hydrographers regularly work offshore on the proposed wind farm site.

Lifecycle Stages
Development and project management.

Typical employer
Developer or specialist contractor.

Place of Work
Onshore in an office. Offshore on a vessel at the development site.

Typical working pattern
Full-time. Fixed term (typically up to 140 days) contract. At far-shore projects, hydrographers usually live offshore on vessels and typically work two-weeks-on/two-weeks-off.

Education, Training and Qualifications
Minimum NFQ level 7 in hydrography, ocean science or related subject.
Relevant certifications are desirable such as an IHO (International Hydrographic Organisation) CAT A or B, STCW or GIS software experience.

Typical entry position & transferable sectors
Entry roles can include graduate hydrographic surveyors. Transferable from maritime sectors or from a career as a land surveyor and then pursuing an NFQ level 9 in hydrography to transition to this role.

Career possibilities
Hydrographers can progress on as a senior hydrographer. There are also opportunities for self-employment or freelance work, known as contract surveys, after 5 of more years of experience.

Full time salary estimate
€29,000-€55,000 per year, depending on experience. Additional offshore day rate for work done offshore on vessels.
This salary range is for this specific role.

ELECTRICAL ENGINEER

Description
An electrical engineer's responsibility is to design and maintain electrical systems on offshore platforms and vessels. They will produce circuit diagrams of the site during the development and project management phases of an offshore wind farm. They will also lead installation of the system ensuring it meets safety regulations.

Lifecycle Stages
Development and project management, manufacturing and installation.

Typical employer
EPCI, specialist contractor or specialist consultancy.

Place of Work
Office.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in electrical or electronic engineering. Qualified electricians (NFQ level 6) can complete a two-year apprenticeship in industrial electrical engineering and attain NFQ level 7 qualifications. NFQ level 9 in electrical engineering is required to achieve the status of chartered engineer for senior roles.

Typical entry position & transferable sectors
Entry roles can include a graduate or junior electrical engineer.

Career possibilities
Electrical engineers can progress on as a senior or principal electrical engineer.

Full time salary estimate
€35,000-€80,000 per year, depending on experience. This salary range is for this specific role.

CIVIL ENGINEER

Description
A civil engineer undertakes research and design, direct construction and management of the operation and maintenance of the onshore infrastructure associated with an offshore wind farm. They aid with the design studies and prepare technical specifications for onshore structures such as foundations, access roads and substations.

Lifecycle Stages
Development and project management, manufacturing and installation.

Typical employer
Developer specialist contractor, or specialist consultant.

Place of Work
Office or onsite.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in civil engineering or related fields. Proficient in civil software packages such as AutoCAD and other industry specific software. NFQ level 9 in civil engineering alongside membership of a chartered engineering is required to achieve the status of chartered engineer for senior roles.

Typical entry position & transferable sectors
Entry roles can include a graduate or junior engineer.

Career possibilities
Civil engineers can progress on to senior engineering roles, which vary widely depending on the engineer's experience.

Full time salary estimate
€35,000-€60,000 per year, depending on experience. This salary range is for this specific role.

MECHANICAL ENGINEER

Description
A mechanical engineer is responsible for designing and optimising the mechanical systems of an offshore wind farm. They ensure the performance of the wind turbine and foundations are optimised and comply with relevant trade standards.

Lifecycle Stages
Development and project management, manufacturing and installation.

Typical employer
EPCI, specialist contractor or specialist consultancy.

Place of Work
Onshore in an office, port, construction or assembly site.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in mechanical engineering or related field. Experience with CAD software and numerical simulation tools and methods. A background working in marine, or wind energy sector is desirable. NFQ level 9 in mechanical engineering alongside membership of a chartered engineering institution is required for senior roles.

Typical entry position & transferable sectors
Entry roles can include a graduate mechanical engineer or junior mechanical engineer.

Career possibilities
Mechanical engineers can progress on as lead or senior mechanical engineers There are also opportunities to progress towards becoming a project engineer and specialising within project management within a developer or specialist offshore consultancy.

Full time salary estimate
€35,000 (Graduate entry roles) to €100,000 (Offshore project management), depending on experience.

GEOTECHNICAL ENGINEER

Description
A geotechnical engineer undertakes foundation design work for offshore wind farms. These designs are based on soil samples obtained from offshore geotechnical investigations into seabed conditions which provide insight to the foundation design and installation

Lifecycle Stages
Development and project management.

Typical employer
Developer or specialist consultancy.

Place of Work
Office, performing desk-based research and design.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 8 in a related engineering discipline such as civil engineering or geology followed by an NFQ level 9 in a geotechnical engineering field. Chartered engineer with a recognised industry body.

Typical entry position & transferable sectors
Entry roles can include a graduate geotechnical or civil engineer role.
Transferable from similar industries such as oil and gas.

Career possibilities
Geotechnical engineers can progress on as senior or principal geotechnical engineers.

Full time salary estimate
€35,000 (Graduate level) -€90,000 (Principal) per year, depending on experience

STRUCTURAL ENGINEER

Description
A structural engineer is responsible for designing and analysing the structural components of an offshore wind farm such as the support structures that sit above the seabed. They will also act in an advisory capacity during manufacturing and installation to ensure that the components and processes meet specifications and design codes.

Lifecycle Stages
Development and project management, manufacturing and installation.

Typical employer
Specialist contractor or specialist consultancy.

Place of Work
Office.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum of NFQ level 7 in civil engineering or related fields. Demonstrable understanding of engineering processes and experience working in a similar role, at project development or execution stage, ideally in offshore wind or oil and gas. Chartered engineer status is desirable for senior roles.

Typical entry position & transferable sectors
Entry roles can include graduate civil engineer and structural design assistant. Highly transferable from similar industries such as military engineering, oil and gas, and a variety of work in both public and private sectors.

Career possibilities
Structural engineers can progress on as senior or principal structural engineers and specialist roles such as a project engineer or project manager.

Full time salary estimate
€35,000 (graduate level) -€90,000 (principal) per year, depending on experience. This salary range is for this specific role.

NAVAL ARCHITECT

Description
A naval architect is responsible for analysing engineering systems and designing solutions such as performing hull and deck strength assessments and designing structural reinforcements. They also assist with the design and installation of equipment on vessels by performing structural assessments.

Lifecycle Stages
Development and project management and manufacturing.

Typical employer
Specialist contractor.

Place of Work
Onshore in an office and at a construction site.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in naval architecture, mechanical engineering, or other relevant fields. Knowledge of section modulus, hand calculations related to load, and ship stability is desired. Chartered engineer or incorporated engineer status and membership of a relevant engineering institution is desirable.

Typical entry position & transferable sectors
Entry roles can include a graduate naval architect
Highly transferable from a variety of industries such as oil and gas, naval and defence.

Career possibilities
Naval architects can progress on as senior naval architects or senior project engineers.

Full time salary estimate
€52,000-€75,000 per year, depending on experience. This salary range is for this specific role.

MARINE ENGINEER

Description
A marine engineer is responsible for the maintenance, inspection and repair of vessels and equipment focusing on the mechanical systems. They typically work onshore at a construction site scheduling inspection and repairs or offshore on a vessel.

Lifecycle Stages
Development and project management, manufacturing and installation.

Typical employer
Specialist contractor.

Place of Work
Onshore at the port and offshore on a vessel.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in marine engineering or other related engineering subjects. Apprenticeships and other routes such as cadetships are available. Further certification may be required to work on specific types of vessels.

Typical entry position & transferable sectors
Entry roles can include a marine technician or junior engineering roles.
Highly transferable from similar industries such as the maritime and oil and gas industries.

Career possibilities
Marine engineers can progress on as maritime engineering managers, mechanical engineers, mid-level marine engineers and then onto senior marine engineers.

Full time salary estimate
€35,000-€50,000 per year, depending on experience. Additional offshore day rate for work done offshore on vessels. This salary range is for this specific role.

PROJECT MANAGER

Description
A project manager is responsible for the day-to-day operations, including project planning, staff management, project development, financial reporting, and client engagement.

Lifecycle Stages
Development and project management, manufacturing, installation, operations, and maintenance.

Typical employer
Developer, EPCI contractor or specialist consultancy.

Place of Work
Office, possibly visiting sites and clients outside of the office.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in a relevant field such as Engineering or Sciences. Training in principals of project management is desirable combined with at least 5 years of postgraduate experience in renewable energy or project development in similar industries. Graduate schemes are available with NFQ level 8. Demonstrable track record of successfully managing the development of multiple projects, as well as thorough understanding of the commercial, environmental and regulatory challenges facing all stages of wind project development and the renewable energy industry. A strong basic understanding of financial aspects of power generation projects, with experience and understanding of financial models. A full clean driving licence is often required, depending on the location of the wind farm.

Typical entry position & transferable sectors
Entry roles include a supply chain manager, construction manager and site manager, junior project manager or assistant project manager.Highly transferrable from related managerial sectors such as environmental sciences, economics or engineering, construction, and professional services.

Career possibilities
Project managers can progress to become project directors.

Full time salary estimate
€50,000 - €100,000 per year, depending on experience. This salary range is for this specific role.

PROCUREMENT MANAGER

Description
A procurement manager is responsible for managing the supply chain process. They identify suppliers, building relationships with vendor companies and negotiate the contracts and purchases of external components of the development process.

Lifecycle Stages
Development and project management.

Typical employer
Developer.

Place of Work
Office.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in business, engineering, planning or other relevant filed. Extensive experience managing and procuring contracts. Chartered Institute of Procurement and Supply MCIPS qualification is desirable.

Typical entry position & transferable sectors
Entry roles can include a purchasing or procurement assistant.
Transferable from similar industries such as construction, renewable energies and oil and gas.

Career possibilities
Procurement managers can progress to become senior or lead procurement managers.

Full time salary estimate
€30,000 (procurement assistant) -€75,000 (lead procurement manager) per year, depending on experience.

COMMERCIAL ANALYST

Description
A commercial analyst is responsible for monitoring market trends, competitors and opportunities, recommending steps the business should take given the results of the analysis. They are responsible for producing reports, forecasts, and analysis to help the developer make commercial decisions with regards to spending. They also monitor business proceedings and recommend improvements to maximise savings and minimise spending.

Lifecycle Stages
Development and project management, manufacturing, installation, operations and maintenance.

Typical employer
Developer.

Place of Work
Office.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in a mathematical related field such as accountancy, finance or business.
Experience with modelling and programming software such as PowerBI, python, VBA.
Experience within the energy industry is desirable.

Typical entry position & transferable sectors
Entry roles can include a commercial analyst trainee or research associate.
Transferable from similar industries such as onshore wind and oil and gas, however most jobs require experience within the energy industry or extensive knowledge of the offshore wind industry.

Career possibilities
Commercial analysts can progress to become lead commercial or business analysts.

Full time salary estimate
€35,000 (research associate) -€70,000 (business analyst) per year, depending on experience.

SUPPLY CHAIN MANAGER

Description
A supply chain manager is responsible for developing and implementing a supply chain strategy for the development of the offshore wind farm. They usually work with procurement managers and oversee the sourcing, logistics, and inventory management of materials and components required for offshore wind projects. Supply chain managers work with contracted suppliers and local authority bodies to secure supply chain packages.

Lifecycle Stages
Development and project management.

Typical employer
Developer or EPCI contractor.

Place of Work
Onshore in an office but will regularly go off site and meet with supply chain companies.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in a relevant field such as logistics, business administration or engineering. Experience in supply chain management and contract negotiation in a similar field such as oil and gas and the fabrication sector.
Highly desirable qualifications include ones from Chartered Institute of Procurement & Supply (CIPS).

Typical entry position & transferable sectors
Entry roles can include tender managers, procurement managers, and business development managers.
Highly transferable from relevant industries such as construction, fabrication and procurement.

Career possibilities
Supply chain managers can progress to become senior supply chain managers and project managers.

Full time salary estimate
€50,000 (procurement manager) -€100,000 (project manager) per year, depending on experience.

CONSTRUCTION PROJECT MANAGER

Description
A construction manager is responsible for all onshore or offshore construction activities. This includes budgeting, fabrication management, logistics, stakeholder engagement, supervising various activities and commissioning of offshore wind farm components.

Lifecycle Stages
Manufacturing and installation.

Typical employer
Manufacturer or EPCI contractor.

Place of Work
Onshore in an office but will regularly visit the port and construction sites.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7 in construction management, engineering or project management or other relevant fields. Experience (5 years) in project management in relevant sectors such as construction, oil and gas, and transportation. A technical background in mechanical or fabrication engineering is desirable. Extensive experience in a construction site manager role in a related heavy industry. Professional certifications in project management (such as PMP) and industry-specific certifications (such as GWO certification for working offshore) are desirable.

Typical entry position & transferable sectors
Entry roles can include site managers and logistic managers.
Transferable from similar industries as a construction site manager in mining, power and oil and gas.

Career possibilities
Construction project managers can progress to become technical directors, project managers and project directors.

Full time salary estimate
€50,000 (Construction project manager) -€120,000 (Project Director) per year, depending on experience.

CABLE JOINTER

Description
A cable jointer is responsible for the installation, termination, splicing, testing and maintenance of electrical cables and connections associated with offshore wind farms.

Lifecycle Stages
Manufacturing, installation, operations and maintenance.

Typical employer
Manufacturer, EPCI contractor, or specialist subcontractor.

Place of Work
Onshore in a manufacturing facility, port and assembly site. Offshore on a vessel at the wind farm site and offshore export cable area.

Typical working pattern
Full-time or fixed term contract. At far-shore projects, cable jointers usually live offshore on vessels and typically work two-weeks-on/two-weeks-off. Flexible working arrangements may be available for onshore based jobs. May be required to work on short notice for emergency situations.

Education, training and qualifications
Experience (1-2 years) as a cable jointer in a relevant industry such as oil and gas. This includes firm jointing, including inline splices, termination of cables. Graduate and apprenticeship schemes are available with NFQ level 7 and NFQ level 4, respectively. Vocational training (NFQ level 6), such as a City & Guilds qualification in Electrical Testing and Verification of Electrical Installations or similar, is an advantage. Training is usually provided by the employer. For offshore work, the following is required (and may be provided by the employer):

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW)
- Global Wind Organisation (GWO) certified training and,
- Climbing and rescue at heights training.

Typical entry position & transferable sectors
Entry roles include a cable technician, assistant cable jointer and electrical technician. Highly transferable from similar industries such as oil and gas, construction, rail and transport.

Career possibilities
Cable jointers can progress to become senior cable engineers, jointing supervisors, or Senior Authorised Persons (SAPs).

Full time salary estimate
€40,000-€75,000 per year, depending on experience. This salary range is for this specific role.

ELECTRICAL TECHNICIAN

Description
An electrical technician forms an integral part of the construction and operation phases and is typically responsible for front-end electrical engineering design (FEED) works, installation, maintenance, repair, and operation of electrical systems, equipment, and machinery on offshore wind farms.

Lifecycle Stages
Manufacturing, installation, operations and maintenance.

Typical employer
Developer, manufacturer, EPCI contractor, or subcontractor.

Place of Work
Onshore in a manufacturing facility, port and assembly site. Offshore in a vessel at the wind farm site.

Typical working pattern
Full-time or fixed term contract. At far-shore projects, electrical technicians usually live offshore on vessels and typically work two-weeks-on and two-weeks-off. Flexible working arrangements may be available for onshore based jobs. May be required to work on short notice for emergency situations.

Education, training and qualifications
Experience (1-2 years) as an electrical technician in a relevant field and a minimum NFQ level 6 qualification such as a City & Guilds qualification in Electrical Testing and Verification of Electrical Installations.
Working towards a Chartered Engineer and a member of the Engineering Council is desirable.
Graduate and apprenticeship schemes are available with NFQ level 7 and NFQ level 4, respectively.
Training is usually provided by the employer.
For offshore work, the following is required and may be provided by the employer:

- Seafarers Offshore Medical
- Global Wind Organisation Basic Safety Training and,
- Climbing and rescue at heights training.

Typical entry position & transferable sectors
Entry roles include a junior electrical technician and maintenance technician.
Highly transferable from similar industries such as automotive, power, oil and gas or aviation.

Career possibilities
Electrical technicians can progress to become senior technicians, supervisors, and senior authorised persons.

Full time salary estimate
€35,000 (junior electrical technician) -€75,000 (senior authorised persons) per year, depending on experience.
Additional offshore day rate for work done offshore on vessels.

WELDER

Description
A welder is a vital role responsible for fabricating offshore wind structures through cutting, shaping and joining sections of metal plate and pipes. This includes reading, interpreting, and implementing engineering documents and drawings, as well as fabricating and welding material that corresponds to the engineering design requirements. Welders in Ireland may work on structures that include the turbine tower, the foundation and the onshore substation.

Lifecycle Stages
Manufacturing and installation.

Typical employer
Manufacturer, EPCI contractor or subcontractor.

Place of Work
Onshore in a manufacturing facility, port and assembly site. May occasionally work offshore at the wind farm site.

Typical working pattern
Full-time or fixed term contract. Flexible working arrangements may be available.

Education, training and qualifications
Experience (1-2 years) as a welder in a relevant industry, including welding practices used in heavy machinery such as MIG/MAG. A Construction Skills Certification Scheme (CSCS) technical certificate is required. NFQ level 6 in mechanical or the welding discipline is desirable. Graduate and apprenticeship schemes are available with NFQ level 7 and NFQ level 4, respectively.

Typical entry position & transferable sectors
Entry roles include a junior welder and welding assistant.
Highly transferable from similar industries such as automotive, rail and transport, construction, oil and gas or aviation.

Career possibilities
Welders can progress to become as a weld specialists and site welding inspectors.

Full time salary estimate
€40,000-€60,000 per year, depending on experience. Additional offshore day rate for work done offshore on vessels. This salary range is for this specific role.

CRANE OPERATOR

Description
A crane operator is responsible for operating the machinery to carry out lifting of heavy structures, components, and equipment while adhering to strict safety and environmental regulations.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
EPCI contractor and subcontractor.

Place of Work
Onshore at the port, construction and assembly site. Offshore on a vessel at the wind farm site.

Typical working pattern
Full-time or fixed term contract. At far-shore projects, crane operators usually live offshore on vessels and typically work two-weeks-on/two-weeks-off. Flexible working arrangements may be available for jobs onshore based.

Education, training and qualifications
Experience (1-2 years) as a crane operator in a relevant industry, such as construction. This includes experience with heavy lift machinery. Construction Skills Certification Scheme (CSCS) training is required. Apprenticeship schemes may be available. It is desirable to have NFQ level 3 to join these. For offshore work, the following is required (may be provided by the employer):

- Stage 3 crane operator certification
- Seafarers Offshore Medical
- Global Wind Organisation Basic Safety Training and,
- Climbing and rescue at heights training.

Typical entry position & transferable sectors
Entry roles can include crane riggers, crane operator assistants and equipment operators. Highly transferable from similar industries such as automotive, rail and transport, construction, oil and gas or aviation.

Career possibilities
Crane operators can progress to become advanced crane operators, crane supervisors and crane engineers.

Full time salary estimate
€40,000-€70,000 per year, depending on experience. Additional offshore day rate for work done offshore on vessels.
This salary range is for this specific role.

PORT OPERATIVE

Description
A port operative is responsible for managing day-to-day operations, supporting the transportation of personnel, equipment, and material. This includes alarm surveillance, response, communication. As well as coordination with sites, traders, grid authorities, and other operations colleagues. Workplace transport operations and Infrastructure operations are typical duties for a port operative.

Lifecycle Stages
Manufacturing, installation, maintenance and operations.

Typical employer
Manufacturer, developer or EPCI contractor.

Place of Work
Onshore at the manufacturing facility, port, construction, and assembly site.

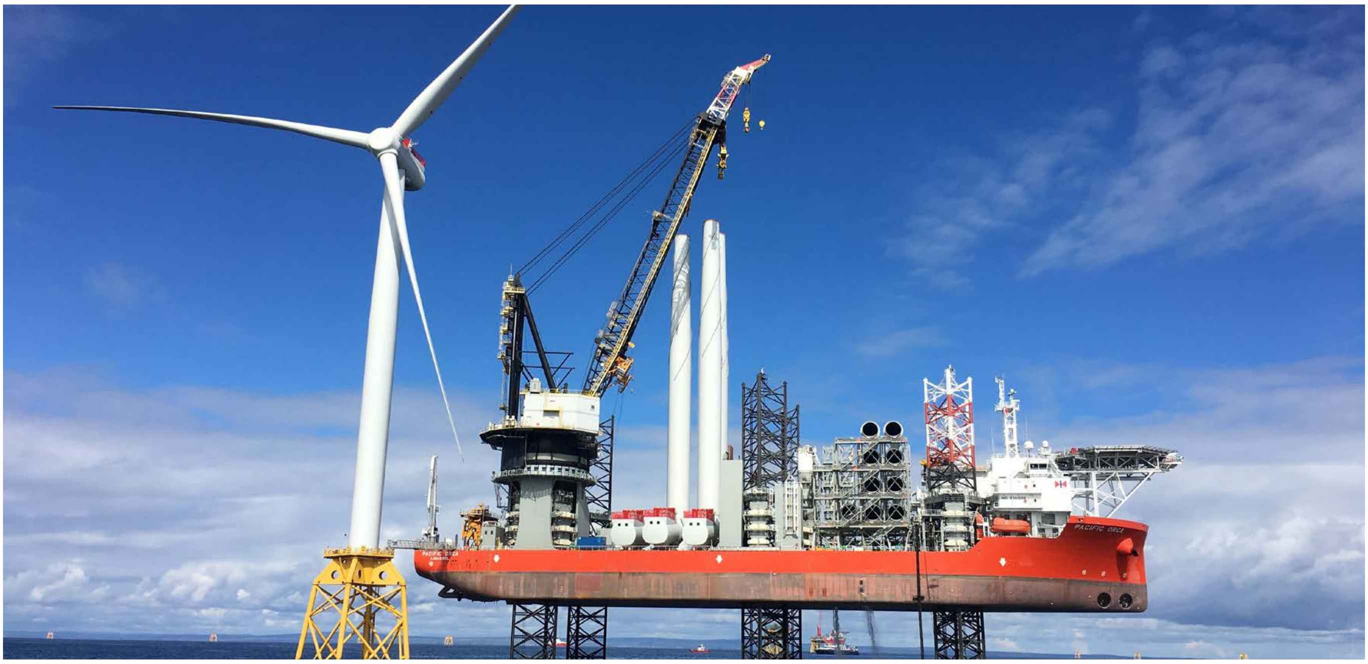
Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Experience (1-2 years) as a port operative in a relevant industry. This includes experience with power generation or transmission, technical system engineering, troubleshooting in a control room setting. International graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 3, respectively.

Typical entry position & transferable sectors
Entry roles can include port workers, dock workers, stevedore trainees and port operation clerks.
Highly transferable from similar industries such as construction, oil and gas, rail and transport, aviation, naval and defence.

Career possibilities
Port operatives can progress to become site managers, port supervisors and operations managers.

Full time salary estimate
€30,000 (port operatives)-€60,000 (operations managers) per year, depending on experience.



OFFSHORE QUALITY MANAGER

Description
An offshore quality manager is responsible for overseeing quality control, assurance processes, development, implementation, and maintenance of processes. This includes the identification of risks and proposing alternative technical options or mitigation measures. They provide technical advice and support in planning, implementing, and maintaining the Project Quality Management System (PQMS) and other quality-related systems. They ensure that all project activities, including design, construction, and maintenance, comply with relevant industry standards and regulatory requirements.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
Developer or EPCI contractor.

Place of Work
Onshore in an office, port and construction site. Could also be placed offshore on a vessel at the wind farm site.

Typical working pattern
Full-time. At far-shore projects, offshore quality managers usually live on vessels and typically work two-weeks-on and two-weeks-off. Flexible working arrangements may be available for onshore based jobs.

Education, training and qualifications
Minimum NFQ level 7, in a relevant field such as quality management, engineering, and/or relevant certifications such as the Certified Quality Management certificate is required.
Experience (at least 5 years) in quality management in a relevant industry, such as maritime or construction.
Including experience in quality management systems and knowledge of industry standards and regulatory requirements.
Graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 4, respectively.
For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical
- Global Wind Organisation Basic Safety Training and,
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW)

Typical entry position & transferable sectors
Entry roles can include quality inspectors, engineers, supervisors or technicians.
Highly transferable from similar industries such as oil and gas, energy systems, rail and transport and construction.

Career possibilities
Offshore quality managers can progress to become senior quality managers, project managers and quality directors.

Full time salary estimate
€60,000-€100,000 per year, depending on experience. This salary range is for this specific role.

INSTRUMENT CONTROL ENGINEER

Description
An instrument control engineer is responsible for a wide range of tasks related to instrumentation, control systems (including software) and data management. They provide technical and maintenance support including the installation and fault diagnosis of instrumentation and control equipment.

Lifecycle Stages
Manufacturing, installation, operations and maintenance.

Typical employer
Manufacturer, developer, EPCI contractor or specialist consultancies.

Place of Work
Office. May occasionally visit the offshore site to troubleshoot issues.

Typical working pattern
Full-time fixed term contract. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7, in a relevant field such as electrical, electronic, instrumentation, or systems controls and experience as an instrument control engineer in a related industry. TUV (or equivalent) Functional Safety Engineer qualifications are desirable.
Graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 4. For graduates, competencies in related engineering software such as ETAP & AutoCAD is desirable.

Typical entry position & transferable sectors
Entry roles can include junior instrument control engineers.
Highly transferable from similar industries such as other energy generation systems, maritime, aviation and oil and gas.

Career possibilities
Instrument control engineers can progress to become senior instrument control engineers, control systems managers and engineering managers.

Full time salary estimate
€30,000 (Graduate role) - €80,000 (engineering manager) per year, depending on experience.

COMMUNICATIONS NETWORK TECHNICIAN

Description
A communications network technician is responsible for managing and maintaining communication systems and networks. This includes ensuring reliable data transfer, monitoring network performance, ensuring data security, maintaining equipment inventory, and troubleshooting of the network.

Lifecycle Stages
Operations and maintenance.

Typical employer
EPCI contractor or subcontractor.

Place of Work
Onshore in an office. Travel for inspection may be required.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7, in a relevant field such as network infrastructure, systems engineering, computer science is required. Experience (1-2 years) as a communications network technician, including technical expertise and knowledge of communication systems. Good knowledge of communication cables and cabling techniques, and familiarity with international standards is required. International graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 3.

Typical entry position & transferable sectors
Entry roles can include IT or telecommunications roles, especially in marine or offshore environments. Highly transferable from similar industries such as aviation, naval and defence, and transportation.

Career possibilities
Communications network technicians can progress on as a senior network communications technician and various IT management roles.

Full time salary estimate
€40,000 (entry level communications network technician) -€90,000 (IT Manager) per year, depending on experience.

SITE MANAGER (ONSHORE AND OFFSHORE)

Description
A site manager is responsible for overseeing site coordination, safety, operational efficiency (resource management) and logistics. They collaborate with external stakeholders and the internal project group to manage day-to-day operations of the project and develop detailed project plans, schedules, and budgets. As part of project planning and coordination, site managers ensure that certain milestones, such as the construction and installation of components, and objectives are met within established timelines and budgets.

Lifecycle Stages
Manufacturing, installation, operations and maintenance.

Typical employer
Developer or EPCI contractor.

Place of Work
Office, with frequent construction and wind farm site visits.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7, in engineering, construction management, or a related field and relevant certification such as the CSCS, SMSTS, IOSH Site Manager accreditation is required. Experience (5 years) in project management in a relevant industry. For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical
- Global Wind Organisation Basic Safety Training, and
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW)

Typical entry position & transferable sectors
Entry roles can include assistant site managers and site supervisors. Highly transferable from similar industries such as oil and gas, construction, rail and transport, renewable energy and aviation.

Career possibilities
Site managers can progress to become senior site managers and project managers.

Full time salary estimate
€55,000 (site manager) -€100,000 (project manager) per year, depending on experience.

DATA ANALYST

Description
A data analyst is responsible for analysing, collecting, processing, and presenting data related to the performance and maintenance of the wind farm. They use various analytical tools and software to derive insights, improve efficiency, and make data-driven recommendations to enhance offshore wind farm operations.

Lifecycle Stages
Operations and maintenance.

Typical employer
Specialist consultancy or EPCI contractor.

Place of Work
Office.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7, in data science, computer science, statistics or a relevant field such as engineering, science, mathematics. economics and finance are required. Further degrees (NFQ level 8 and above) are highly desirable. Experience (1-2 years) as a data analyst in a quantitative field, including depth analysis on complex data sets is required and experience in developing financial models is desirable.
Graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 4.

Typical entry position & transferable sectors
Entry roles can include business analysts, data administrators and other relevant quantitative fields.
Highly transferable from any industry, such as other renewable energy sectors and cybersecurity.

Career possibilities
Data analysts can progress to become senior data analysts, consultant and data scientists.

Full time salary estimate
€40,000 (data administrator) -€80,000 (data scientist) per year, depending on experience.

SCADA ENGINEER

Description
A Supervisory Control and Data Acquisition (SCADA) Engineer is responsible for the design, deployment, test, and management of SCADA systems used to monitor and control the various components of offshore wind farms, leveraging real-time data and control capabilities.

Lifecycle Stages
Operations and maintenance.

Typical employer
Developer, EPCI contractor or specialist consultancies.

Place of Work
Office. May be required to travel to onshore maintenance sites.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7, in automation and controls engineering, power electronics engineering, computer programming engineering or equivalent, applicable experience and knowledge may be substituted for the degree requirement. Experience (1-2 years) as a SCADA engineer in a relevant field. Knowledge and an understanding of design and engineering, project economics, interfaces, risks and commercial aspects of offshore wind farm development and additional certifications such as Certified SCADA Security Architect (CSSA) is highly desirable. Graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 4.

Typical entry position & transferable sectors
Entry roles can include automation technicians, control system technicians and human machine interface developers. Highly transferable from similar industries such as rail infrastructure, automotive, construction, aviation, maritime and oil and gas.

Career possibilities
SCADA engineers can progress to become senior SCADA engineers and technical specialists in areas such as cybersecurity, advanced data analytics or system optimisation.

Full time salary estimate
€45,000 (control system technician) -€90,000 (technical specialist) per year, depending on experience.

HEALTH AND SAFETY COORDINATOR

Description
A health and safety coordinator is responsible for maintaining and coordinating all health and safety aspects of offshore wind farm projects. They ensure that safety protocols are followed, conduct risk assessments, and identify, plan and execute methodologies and safe working practises to prevent accidents and incidents.

Lifecycle Stages
Manufacturing, installation, operations and maintenance.

Typical employer
Manufacturer, developer, EPCI contractor or specialist consultancies.

Place of Work
Onshore in an office, visiting the manufacturing facility, port, construction, and assembly site. May occasionally work offshore on a vessel at the wind farm site.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Extensive experience as a health and safety coordinator, including fire marshal training, first aid certification, and a strong understanding of health and safety regulations and practises in construction projects. Advanced degrees or certifications such as NEBOSH, CSP are highly desirable. Graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 4. For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW)
- Global Wind Organisation Basic Safety Training and,
- Climbing and rescue at heights training.

Typical entry position & transferable sectors
Entry roles can include health and safety assistants and safety technicians. Highly transferable from similar industries such as oil and gas, aviation, rail and transport, and construction.

Career possibilities
Health and safety coordinators can progress to become senior health and safety coordinators, health and safety managers or move into areas of specialism such as environmental health and safety or risk management.

Full time salary estimate
€30,000 (Safety technician) -€70,000 (Specialist H&S) per year, depending on experience.

WIND TURBINE TECHNICIAN

Description
A wind turbine technician is responsible for on-site maintenance, repairs and replacement on the turbine. This includes the use of diagnostic and troubleshooting tools, both electrical and mechanical. They are likely to find themselves regularly offshore out in the operational wind farm, checking on performance of turbines, looking for issues and conducting repairs and preventative maintenance. Physical capabilities to work at heights, lift heavy objects and comply with health and safety standards is required.

Lifecycle Stages
Operations and Maintenance.

Typical employer
Manufacturer, developers and specialist subcontractors.

Place of Work
Offshore at the turbine site, travel is via vessels and helicopters.

Typical working pattern
Full-time or fixed term contract. At nearshore projects, technicians usually return home at the end of the day. At far-shore projects, technicians usually live offshore on vessels and typically work two-weeks-on/two-weeks-off.
Flexible working arrangements may be available.

Education, training and qualifications
Experience (1-2 years) as a wind turbine technician or relevant experience in a similar field with NFQ level 6 qualifications in mechanical, electrical, or marine engineering background is required. The Global Wind Organisation (GWO) training standards are now widely adopted in the offshore wind industry and technicians are typically required to train to those standards. Apprenticeship schemes are available at NFQ level 4. Offshore wind-specific training is provided by the employer. For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW), and
- Global Wind Organisation Basic Safety Training and sea survival.

Other training, such as tools and advanced recue training, may be required.
Travel requirements:

- Full Irish B driving license.
- Ability to travel domestically.

Typical entry position & transferable sectors
Entry roles can include assistant wind turbine technicians and wind technician trainees.
Highly transferable from offshore oil and gas maintenance. Transition is also seen from other similar industries such as electrical, engineering, mechanical or hydraulics technicians, building trades and the military.

Career possibilities
Wind turbine technicians can progress on as senior technicians. Those exiting the role often find employment in operation and maintenance management and offshore logistics.

Full time salary estimate
€35,000-€65,000 per year, depending on experience. This salary range is for this specific role.

MECHANICAL TECHNICIAN

Description
A mechanical technician is responsible for the maintenance, operation, servicing, testing and repair of offshore wind turbines and associated infrastructure. This includes troubleshooting of electrical, mechanical and hydraulic systems.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
Developer, EPCI contractor and specialist consultancies.

Place of Work
Onshore at the port, construction, and assembly site. Offshore in a vessel at the wind farm site.

Typical working pattern
Full-time or fixed term contract. At far-shore projects, mechanical technicians usually live offshore on vessels and typically work two-weeks-on/two-weeks-off. Flexible working arrangements may be available for onshore based jobs.

Education, training and qualifications
Technical training or certification, minimum NFQ level 7, in electrical, mechanical, marine engineering, maintenance or similar is required Experience (3 years) with electrical or mechanical systems in related fields. Graduate and apprenticeship schemes are available at NFQ level 7 and NFQ level 3. For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW), and
- Global Wind Organisation Basic Safety Training .

Typical entry position & transferable sectors
Entry roles can include wind turbine technician, assistant mechanical technician and safety technician.
Highly transferable from similar industries such as construction, aviation maritime.

Career possibilities
Mechanical technicians can progress to become senior mechanical technicians, quality control managers, mechanical engineers or in a specialism such as a hydraulic engineer.

Full time salary estimate
€35,000 (turbine technician) -€70,000 (hydraulic engineer) per year, depending on experience.

BOAT MAINTENANCE TECHNICIAN

Description
A boat maintenance technician is responsible for the maintenance, repair, and upkeep of boats to keep them seaworthy and in compliance with safety regulations. This includes boat and electrical assessments, ensuring compliance with the manufacturers' maintenance schedules and guidelines.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
EPCI contractor or specialist consultancies.

Place of Work
Port, and an offshore vessel.

Typical working pattern
Full-time or fixed term contract. At far-shore projects, boat maintenance technicians usually live offshore on vessels and typically work two-weeks-on/two-weeks-off.

Education, training and qualifications
Relevant technical training or certification in marine mechanics, boat maintenance or similar is required, Experience in marine maintenance, such as servicing small marine engines, hull repairs, cleaning, and general boat maintenance. Graduate and apprenticeship schemes are available with NFQ level 7 and NFQ level 4, respectively. Training is usually provided by the employer. For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW), and
- Global Wind Organisation Basic Safety Training.

Typical entry position & transferable sectors
Entry roles can include deckhands and seafarers. Highly transferable from maritime industries such as oil and gas, shipping and transport and, defence and naval operations.

Career possibilities
Boat maintenance technicians can progress to become senior boat maintenance technicians, marine engineers, shipyard supervisors and maritime surveyors.

Full time salary estimate
€30,000-€50,000 per year, depending on experience. This salary range is for this specific role.

ABLE SEAFARER

Description
An able seafarer is responsible for the operations and maintenance of vessels, including navigation, mooring, anchoring and cargo handling. They provide support to crew members and will be involved in various tasks relating to the offshore wind industry such as painting, asset inspections, and monitoring weather conditions.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
EPCI contractor or subcontractor.

Place of Work
Onshore at the port. Offshore on a vessel.

Typical working pattern
Full-time. Fixed term contract. At far-shore projects, able seafarers usually live offshore on vessels and typically work two-weeks-on/two-weeks-off.

Education, training and qualifications
Relevant experience is desirable but not essential. Technical training or certification, such as the Seafarer Certificate of Competency (CoC), and Proficiency in Survival Craft & Rescue Boat (PSCRB) or similar is required. Apprenticeship schemes are available, at NFQ level 3. Offshore wind-specific training is provided by the employer. For offshore work, the following is required (may be provided by the employer):

- Seafarers Offshore Medical,
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW)
- Global Wind Organisation Basic Safety Training.

Typical entry position & transferable sectors
Entry roles can include ordinary seamen. Highly transferable from similar industries such as oil and gas, shipping and transport and, defence and naval operations.

Career possibilities
Able seafarers can progress on as a qualified third officer, navigation officer, master mariner and related maritime roles.

Full time salary estimate
€30,000-€60,000 per year, depending on experience. This salary range is for this specific role.

OFFSHORE LOGISTICS MANAGER

Description
An offshore logistics manager is responsible for overseeing and managing the logistics and supply chain operations for offshore wind farms. This includes coordination and collaboration with the supply chain, transport and logistics of personnel, equipment and materials, and inventory management.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
Developer, EPCI contractor or subcontracted to specialist consultancies.

Place of Work
Office.

Typical working pattern
Full-time. Flexible working arrangements may be available.

Education, training and qualifications
Minimum NFQ level 7, in logistics, supply chain management, marine logistics or related is required. Experience (at least 5 years) in supply chain and/or logistics management in a relevant field such as despatch, shipping, warehouse, or export. Experience with offshore wind projects and package management is essential.

Typical entry position & transferable sectors
Entry roles can include assistant logistics managers, logistics supervisors and port operation managers.
Highly transferable from similar industries such as shipping, transportation, and maritime.

Career possibilities
Offshore logistic managers can progress to become senior logistics managers and supply chain managers.

Full time salary estimate
€45,000 (assistant logistics managers) -€90,000 (supply chain manager) per year, depending on experience.

MASTER MARINER

Description
A master mariner or captain is the highest-ranking officer on a vessel, responsible for the overall operation of the vessel. This includes navigation, safety procedures, watchkeeping, communications, crew management and cargo operations.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
EPCI contractor and subcontractor.

Place of Work
On a vessel. This will range from the port to the wind farm site.

Typical working pattern
Full-time.

Education, training and qualifications
Minimum NFQ level 7 in relevant fields such as marine transportation and maritime studies is required. Technical training or certification such as the Master Unlimited Certificate of Competency (CoC) or similar. Experience (5 years) in ship management as a captain or similar. They are expected to have completed relevant officer licence training at various levels, such as second officer, first mate and chief officer and undergo periodic training for certification renewals. For offshore work, the following is required:

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW), and
- Global Wind Organisation Basic Safety Training .

Typical entry position & transferable sectors
Entry roles can include ship officers and ship executives. Highly transferable from related maritime industries, such as oil and gas, naval and defence or shipping and transport.

Career possibilities
A master mariner is the highest position to hold as a captain. Other career possibilities could be specialisms in the maritime industries such as ship operations, management, and maritime training.

Full time salary estimate
€45,000 (ships officers) -€150,000 (master mariner) per year, depending on experience.

HARBOUR PILOT

Description
A harbour pilot is responsible for the safe and efficient navigation of vessels within the port and offshore wind farm. This includes piloting vessels in and out of ports, assessing navigational risks, monitoring vessel traffic and weather conditions.

Lifecycle Stages
Installation, operations and maintenance.

Typical employer
Port company or local authority (if it owns the port).

Place of Work
Onshore in an office at the port.

Typical working pattern
Full-time.

Education, training and qualifications
Relevant technical training or certification, such as the Class 2/II Chief Officer Certificate of Competency (CoC) or similar is required. Experience (3 years) in maritime operations and safety and/or sailing in the position of a first mate.
Graduate schemes in transferable sectors such as naval defence are available, at NFQ level 7.
For offshore work, the following is required:

- Seafarers Offshore Medical
- Standards of Training, Certification and Watchkeeping for Seafarers (STCW), and
- Global Wind Organisation Basic Safety Training .

Typical entry position & transferable sectors
Entry roles can include first mates, maritime operations and safety. Transferable from similar industries such as shipping, transportation, defence, and naval operations.

Career possibilities
Harbour pilots can progress to become harbour masters, chief pilots and safety managers.

Full time salary estimate
€40,000-€80,000 per year, depending on experience. This salary range is for this specific role.

Appendix B: Industry engagement process

We sought input from the offshore wind industry in Ireland to help identify skills shortages, provide FTE estimates for the key job roles, and provide its views on the most effective of actions the Irish Government could take to help address the skills shortages. We engaged with the industry through WEI, who distributed questionnaires and data sets for input via its members.

A summary of the two pieces of input we received from the industry are outlined below.

Key job roles dataset

We distributed a dataset for the 42 key job roles analysed in this report to offshore wind developers that are WEI members. We sought three pieces of data from developers:

- A RAG rating for the skills availability for that role, using the following definitions:
  - Red - we foresee a critical skills shortage for this role. It will be difficult to hire for Irish offshore wind projects without external action
  - Amber - there may be a skills shortage in this role. It will be somewhat difficult to hire for this role, but internal developer actions such as higher wages or internal training could help mitigate, and
  - Green - We do not foresee a skills shortage and there will be no major difficulties in hiring this role for Irish offshore wind projects.
- The number of FTE years required for that role for a typical 1 GW project.
- Any particular skills shortages that present a barrier in hiring for that role. This was a free-text box.

BVGA pre-populated the dataset with suggested values for the RAG rating and FTE years per GW, using in-house data. We then asked the developers to change these values if they thought they were incorrect. The free text box for the skills shortages was left blank.

We collated the responses from the developers and average them to produce a picture of the skills availability and required numbers of key jobs roles in Ireland.

Questionnaire

We distributed a questionnaire to the wider industry, contacting all organisations operating in the offshore wind industry that are WEI members. We sought the following information from WEI members:

- Whether they hire for any of the identified 42 key job roles
- Whether they are being impacted by skills shortages in the offshore wind industry in Ireland
- Whether they expect any future skills shortages, and if so which skills
- How they are likely to mitigate and address these skills shortages, including whether they would hire from outside of Ireland, and
- Any actions they would they like to see be enacted to help address skills shortages.

We collated these responses to help inform the skills shortages we identify in Ireland, and the recommendations made.

Appendix C: Supply chain category in-depth triage

Table 10: Supply chain assessment – development and consenting services

1.1 Development and consenting services	
Track record and capacity in offshore wind	There are a range of small and large developers in Ireland with experience of developing offshore wind farms and navigating the development and consenting process. It is a competitive market. In addition, Ireland has both indigenous and international consultants with an Irish presence with significant experience in providing development and consenting services in offshore wind internationally.
Irish capability in parallel sectors	Ireland has a significant onshore wind market which has many parallels with offshore wind. There will be some cross over with required permits and consenting services, particularly for onshore infrastructure. Ireland also has a strong engineering sector.
Benefit of local supply	The logic for local supply is strong as local knowledge of the legislative and regulatory environment in Ireland is beneficial. Stakeholder and community engagement must be undertaken locally Geographical proximity is also of moderate benefit for facilitating engagement with suppliers and subcontractors, but not a necessity. For developers, experience of the Irish planning system is a compulsory requirement under the Maritime Area Consent Process.
Current skills availability	Key skills requirements are project management, planning and consenting, and legal skills, all of which are abundant in Ireland.
Investment risk	Work is primarily office-based, which requires limited investment and has extensive crossover with parallel sectors.
Size of opportunity	Development and consenting services represent a small portion of overall project spend at around 1.3% over the lifetime of the wind farm.
Key jobs	Bid Manager, Commercial Analyst, Community Liaison Officer, Grid Commercial Lead, Project Manager, Offshore Consents Manager.
Expected local content	On the basis of this assessment, we expect Ireland to capture 80% of development and consenting service spend per GW by 2040.

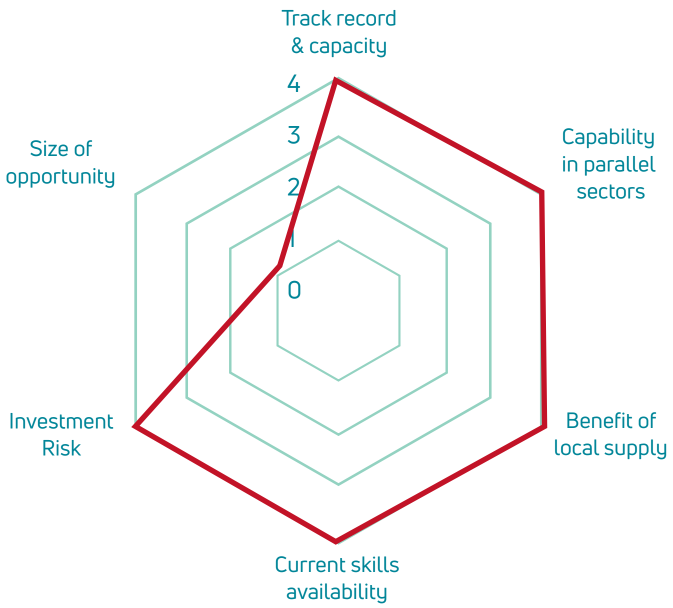


Table 11: Supply chain assessment – environmental surveys

1.2 Environmental surveys	
Track record and capacity in offshore wind	Several companies are based in Ireland capable of conducting environmental survey work and have experience in supporting offshore wind developments. It is a competitive market.
Irish capability in parallel sectors	There are some parallels between onshore cabling works for both onshore wind and the electricity transmission network. There are also parallels between coastal and marine development such as ports and coastal protection works.
Benefit of local supply	The logic for local supply is strong due to sufficient local resource as well as the requirement for local knowledge of wildlife and site impacts.
Current skills availability	Offshore environmental surveys require specific expertise, and as Ireland's industry grows there may be a need for investment in skills and training to address a potential shortage.
Investment risk	Moderate investment is required, particularly as key companies already have a base in Ireland. Investment will include small survey vessels, survey planes and relevant equipment.
Size of opportunity	Environmental surveys represent a small portion of overall project spend at around 0.2% over the lifetime of the wind farm.
Key jobs	Acoustician/Noise Specialist, Data Analyst, GIS Technician, Marine Ecologist, Offshore EIA Manager, Ornithologist.
Expected local content	On the basis of this assessment we expect Ireland to capture between 60% and 70% of environmental survey spend per GW by 2040.

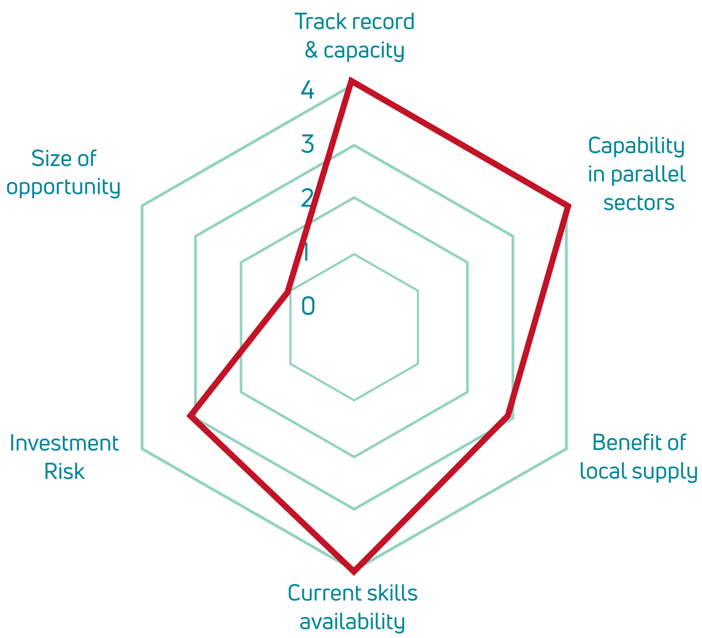


Table 12: Supply chain assessment – resource and metocean assessment

1.3 Resource and metocean assessment	
Track record and capacity in offshore wind	Several companies are based in Ireland capable of conducting resource and metocean survey and assessment work. It is a competitive market.
Irish capability in parallel sectors	Ireland has few offshore industries like oil and gas, and therefore its capacity in parallel sectors with regards to resource and metocean assessment is limited, though some companies could enter with investment and there is an active academic community in this area.
Benefit of local supply	The logic for local supply is moderate as geographical proximity provides an economic advantage. It is not a necessity however, and the work could be undertaken by foreign contractors if local supply is insufficient.
Current skills availability	While Ireland has some current capability, there is likely to be a need for training in the specialist skills associated with resource and metocean assessment to maximise local economic opportunity.
Investment risk	Barriers to entry are not significant, so moderate inward investment is required for companies to enter the market. Companies will need to show a track record delivering for offshore wind, which can take 12-24 months to achieve.
Size of opportunity	Resource and metocean assessment represents a small portion of overall project spend at around 0.1% over the lifetime of the wind farm.
Key jobs	Able Seafarer, GIS Technician, Hydrographer, Offshore EIA Manager, Resources Analyst.
Expected local content	On the basis of this assessment we expect Ireland to capture between 60% and 70% of resource and metocean service spend per GW by 2040.

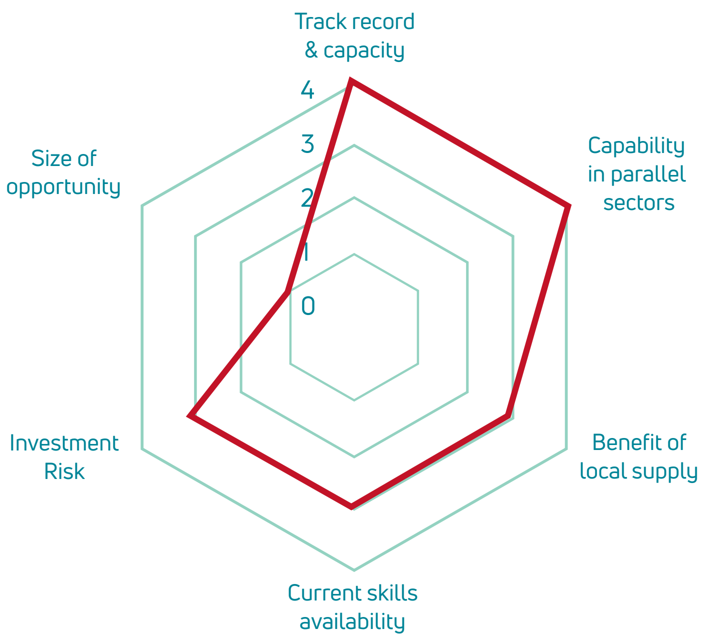


Table 13: Supply chain assessment – geological and hydrographical surveys

1.4 Geological and hydrographical surveys	
Track record and capacity in offshore wind	Several companies are based in Ireland capable of conducting geological and hydrographical survey work including design and management of surveys and analysis of survey output. It is a competitive market.
Irish capability in parallel sectors	Ireland has few offshore industries like oil and gas, and therefore its capacity in parallel sectors with regards to geological and hydrographical surveys is limited, though some companies could enter with investment.
Benefit of local supply	The logic for local supply is moderate as geographical proximity provides an economic advantage. It is not a necessity however, and the work could be undertaken by foreign contractors if local supply is insufficient.
Current skills availability	While Ireland has some current capability, there is likely to be a need for training in the specialist skills associated with geological and hydrographical surveys to maximise local economic opportunity.
Investment risk	Barriers to entry with respect to consultancy services (e.g. survey design and management) are not significant, however significant investment is required to establish a survey company so inward investment is required for companies to enter the market.
Size of opportunity	Geological and hydrographical surveys represents a small portion of overall project spend at around 0.2% over the lifetime of the wind farm.
Key jobs	Able Seafarer, Acoustician/Noise Specialist, Geophysicist, Geotechnical Engineer, GIS Technician, Hydrographer Offshore EIA Manager, Wind Resource Modeller.
Expected local content	On the basis of this assessment we expect Ireland to capture between 60% and 70% of geological and hydrographical surveys service spend per GW by 2040.

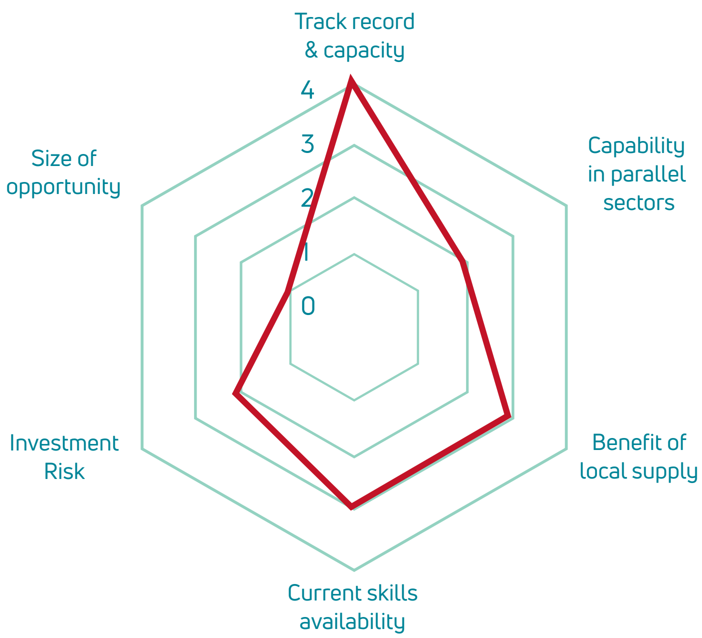


Table 14: Supply chain assessment – engineering and consultancy

1.5 Engineering and consultancy	
Track record and capacity in offshore wind	Several companies are based in Ireland capable of conducting engineering and consultancy work. It is a competitive market.
Irish capability in parallel sectors	Ireland has a significant engineering and construction sector which provides designs and technical programmes for civil engineering works including coastal developments such as ports. Its onshore wind sector is also large. There is significant cross over with offshore wind engineering services in both of these sectors.
Benefit of local supply	The logic for local supply is relatively small as there is little benefit gained from geographical proximity. The work could be undertaken by foreign contractors if local supply is insufficient, so local skill availability is essential.
Current skills availability	Ireland has a high level of skill availability in engineering and consultancy.
Investment risk	Barriers to entry are not significant as it is primarily office-based, so little inward investment is required for companies to enter the market.
Size of opportunity	Engineering and consultancy services represent a small portion of overall project spend at around 0.2% over the lifetime of the wind farm.
Key jobs	Civil Engineer, Structural Engineer, Electrical Engineer, Geotechnical Engineer, Mechanical Engineer, Marine Engineer, Naval Architect.
Expected local content	On the basis of this assessment we expect Ireland to capture between 50% and 60% of engineering and consultancy service spend per GW by 2040.

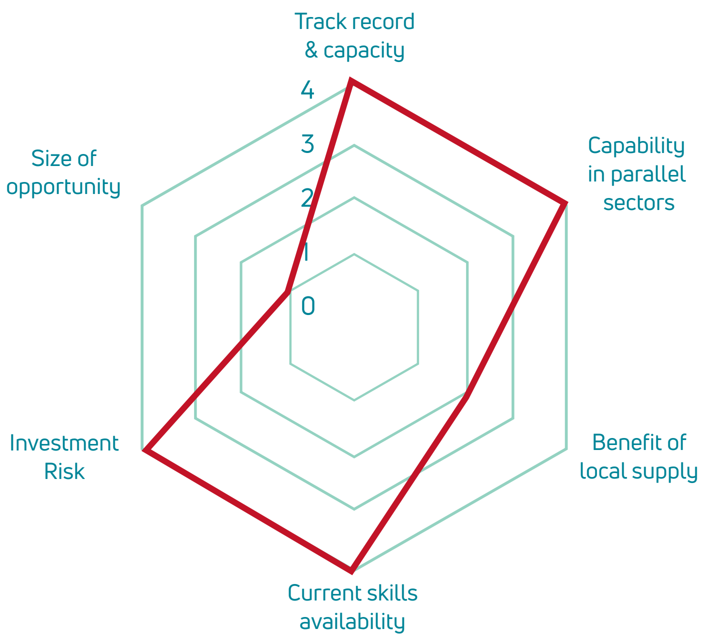


Table 15: Supply chain assessment – project management

1.6 Project management	
Track record and capacity in offshore wind	Several companies based in Ireland are capable of delivering project management services. It is a competitive market.
Irish capability in parallel sectors	Ireland has a significant engineering and construction sector which provides similar project management services to offshore wind. Its onshore wind sector is also large.
Benefit of local supply	The logic for local supply is relatively small as there is little benefit gained from geographical proximity. The work could be undertaken by foreign contractors if local supply is insufficient, so local skill availability is essential.
Current skills availability	Ireland has a high level of skills availability in project management.
Investment risk	Barriers to entry are not significant as it is primarily office-based, so little inward investment is required for companies to enter the market.
Size of opportunity	Project management services represent a small portion of overall project spend at around 0.8% over the lifetime of the wind farm.
Key jobs	Bid Manager, Commercial Analyst, Community Liaison Officer, Construction Project Manager, Offshore Consents Manager, Procurement Manager, Project Manager, Supply Chain Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture between 50% and 60% of project management service spend per GW by 2040.

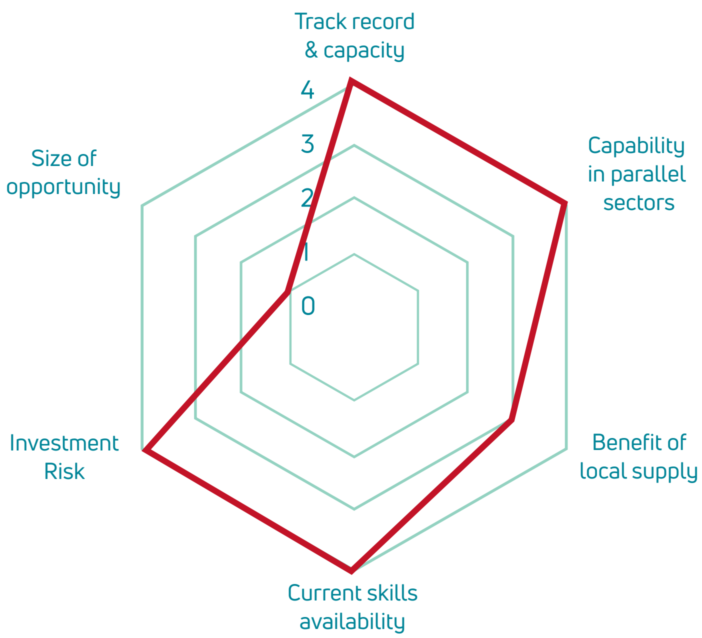


Table 16: Supply chain assessment – turbine tower manufacture

2.3 Turbine tower manufacture	
Track record and capacity in offshore wind	There are a number of turbine manufacturers with an Irish presence due to the mature onshore wind sector which shares turbine manufacturing with offshore wind. However, the turbines are manufactured and fabricated elsewhere, so Ireland has some knowledge-base but no manufacturing capacity.
Irish capability in parallel sectors	Ireland has few parallel sectors with tower manufacture and fabrication. It requires large and bespoke steel rolling and fabrication facilities. Civil construction has some overlap in skills requirements.
Benefit of local supply	The logic for local supply is moderate. There is some logic to local supply to minimise transport costs, particularly if the towers were manufactured quayside. Investment in new tower facilities could be viable as a means of securing local skills content.
Current skills availability	Tower manufacture is highly specialised and Ireland has no commercial-scale skills availability in this area. Skills requirements for tower manufacturing are less severe than for blade and nacelle manufacturing, however.
Investment risk	Barriers to entry are significant. It requires large and bespoke steel rolling and fabrication facilities, so suppliers would need to invest in new Irish facilities and be certain of a consistent project pipeline.
Size of opportunity	The turbine tower represents a large portion of overall project spend at around 2.8% over the lifetime of the wind farm.
Key jobs	Construction Project Manager, Electrical Technician, Mechanical Technician, Site Manager, Structural Engineer, Welder.
Expected local content	On the basis of this assessment we expect Ireland to capture between 0% and 40% of tower manufacture spend per GW by 2040.

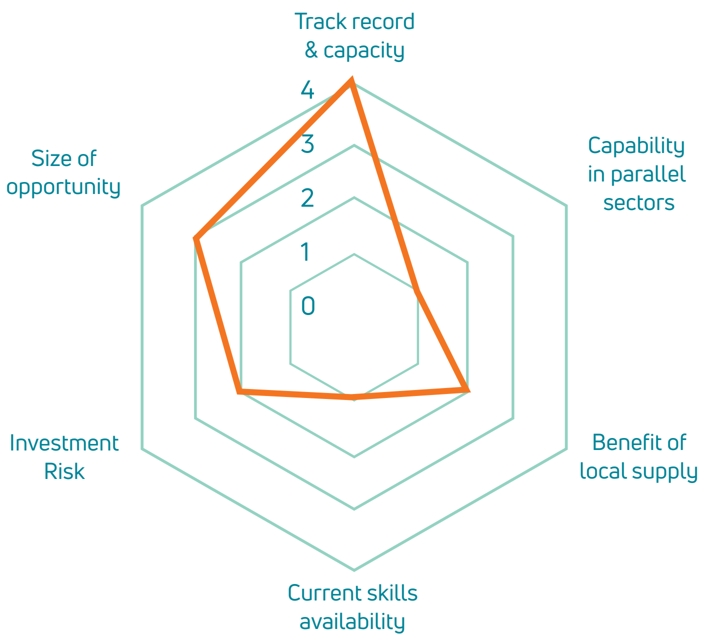


Table 17: Supply chain assessment – onshore substation manufacture

2.7b Floating substructure manufacture	
Track record and capacity in offshore wind	There are no companies operational in Ireland that have experience in offshore wind floating substructure manufacture.
Irish capability in parallel sectors	Ireland has few parallel sectors with floating foundation manufacture. It requires large bespoke fabrication facilities. Civil construction has some but limited overlap in skills requirements.
Benefit of local supply	The logic for local supply is moderate. There is logic to local supply to minimise transport costs, particularly for floating foundations which are more expensive to transport than fixed.
Current skills availability	Floating foundation manufacture is specialised, and Ireland has no commercial-scale skill availability in this area.
Investment risk	Barriers to entry are significant. Large inward investment would be required in both manufacturing and port facilities, and so suppliers would need be certain of a consistent project pipeline. There would be an early mover advantage for Ireland if investment was made in floating foundation manufacturing.
Size of opportunity	The floating substructure represents a large portion of overall project spend at around 15% over the lifetime of the wind farm.
Key jobs	Construction Project Manager, Mechanical Technician, Site Manager, Structural Engineer, Welder.
Expected local content	On the basis of this assessment we expect Ireland to capture between 0% and 20% of floating substructure manufacture service spend per GW by 2040.

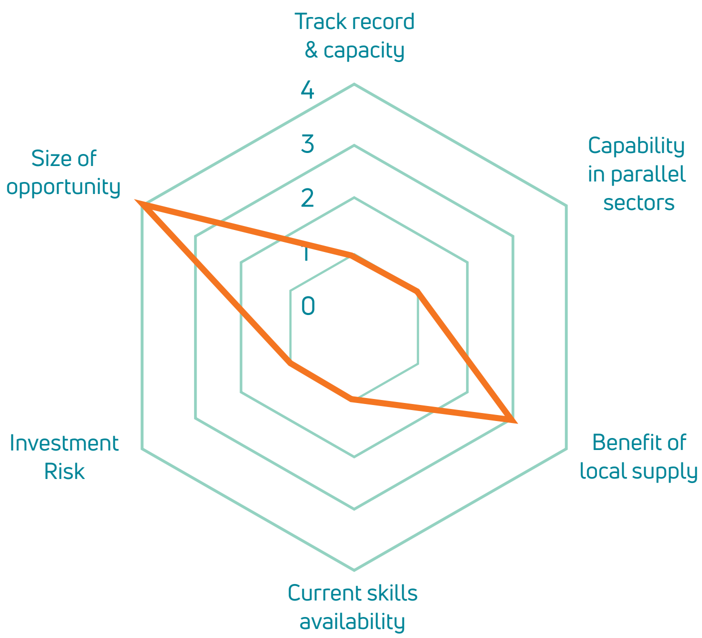


Table 18: Supply chain assessment – mooring system manufacture

2.8 Mooring system manufacture	
Track record and capacity in offshore wind	Ireland has a limited number of companies with experience in some elements of mooring systems, however this is restricted to small, specialised elements of the mooring system.
Irish capability in parallel sectors	Ireland has few parallel sectors with mooring system manufacture. It requires bespoke fabrication facilities. Marine engineering such as used in fin fish aquaculture and construction have some overlap.
Benefit of local supply	The logic for local supply is weak as mooring systems are relatively easy to transport compared to other components.
Current skills availability	Ireland has some but no commercial-scale skill availability in this area.
Investment risk	Barriers to entry are moderate. Inward investment would be required in manufacturing facilities, and so suppliers would need be certain of a consistent project pipeline. Investment required is not as high as other types of manufacturing however, and there would be an early mover advantage for Ireland if investment was made.
Size of opportunity	The mooring system represents a moderate portion of overall project spend at around 3.4% over the lifetime of the wind farm.
Key jobs	Construction Project Manager, Mechanical Technician, Site Manager, Structural Engineer, Welder.
Expected local content	On the basis of this assessment we expect Ireland to capture between 0% and 20% of mooring system manufacture service spend per GW by 2040.

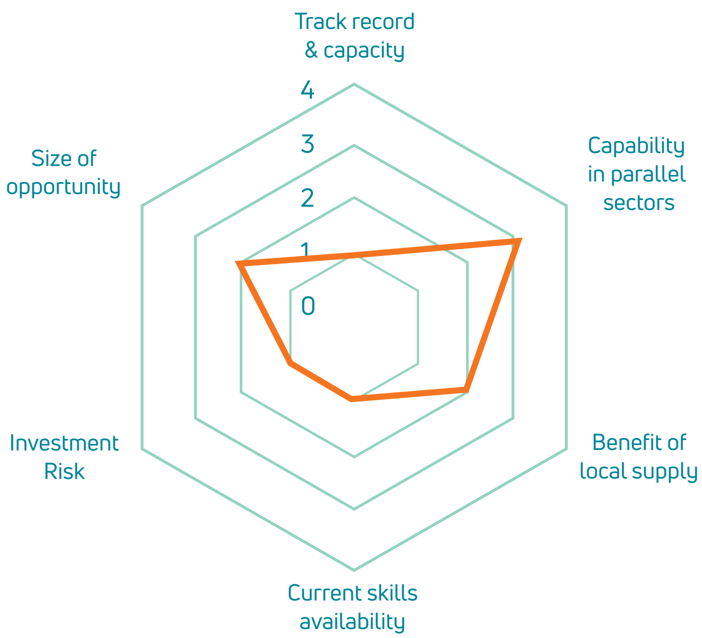


Table 19: Supply chain assessment – mooring system manufacture

2.10 Onshore substation manufacture	
Track record and capacity in offshore wind	Ireland has a small number of companies engaged in onshore substation manufacture and supply. While the experience isn't specifically offshore wind based, this is irrelevant with respect to the onshore substation.
Irish capability in parallel sectors	Ireland has a sizeable engineering and construction sectors, both of which are highly transferable to onshore substation manufacture as it is mostly standard construction work.
Benefit of local supply	Onshore substations are generally contracted to the same main contractor as the offshore substation. It is likely to be subcontracted to local suppliers if the capability is there however, as it is an effective way to boost local content.
Current skills availability	Ireland has sufficient skills availability in the construction sector.
Investment risk	Barriers to entry are small and demand can be met from parallel sectors if given sufficient notice.
Size of opportunity	The onshore substation represents a small portion of overall project spend at around 1.5% over the lifetime of the wind farm.
Key jobs	Cable Jointer, Civil Engineer, Construction Project Manager, Electrical Engineer, Electrical Technician, Mechanical Technician, Site Manager, Structural Engineer, Welder.
Expected local content	On the basis of this assessment we expect Ireland to capture 30% of onshore substation manufacture spend per GW by 2040.

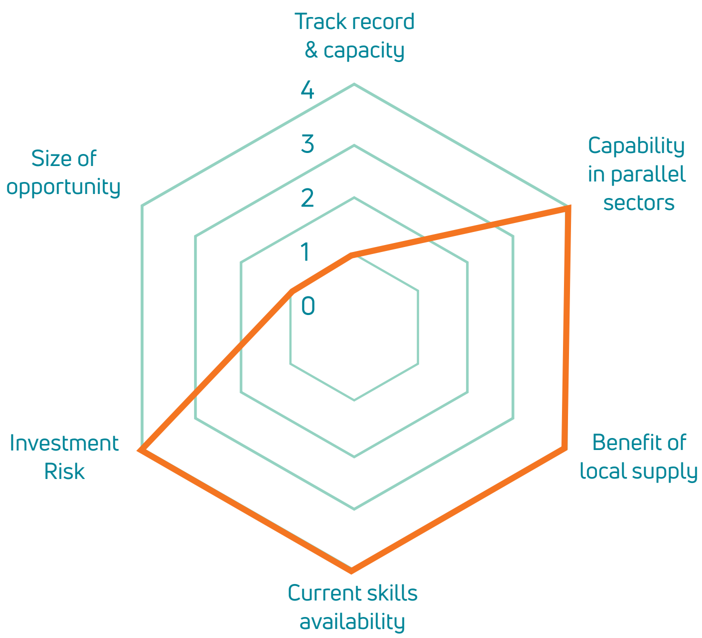


Table 20: Supply chain assessment – onshore export cable installation

3.3 Onshore export cable installation	
Track record and capacity in offshore wind	Ireland has a small number of companies engaged in onshore cable installation. While the experience isn't specifically offshore wind based, this is irrelevant with respect to the onshore cable installation.
Irish capability in parallel sectors	Ireland has a sizeable engineering, site investigation and construction sectors, all of which are highly transferable to onshore export cable installation as it is standard construction work.
Benefit of local supply	Onshore export cable installation is routine construction work and so is general contracted to local firms. There is strong logic in local supply.
Current skills availability	Ireland has sufficient skills availability in the construction sector.
Investment risk	Barriers to entry are small and demand can be met from parallel sectors if given sufficient notice.
Size of opportunity	Onshore export cable installation represents a small portion of overall project spend at around 0.06% over the lifetime of the wind farm.
Key jobs	Cable Jointer, Civil Engineer, Construction Project Manager, Electrical Engineer, Electrical Technician, Health and safety coordinator, Instrument Control Engineer, SCADA Engineer, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture 80% of onshore export cable installation spend per GW by 2040.

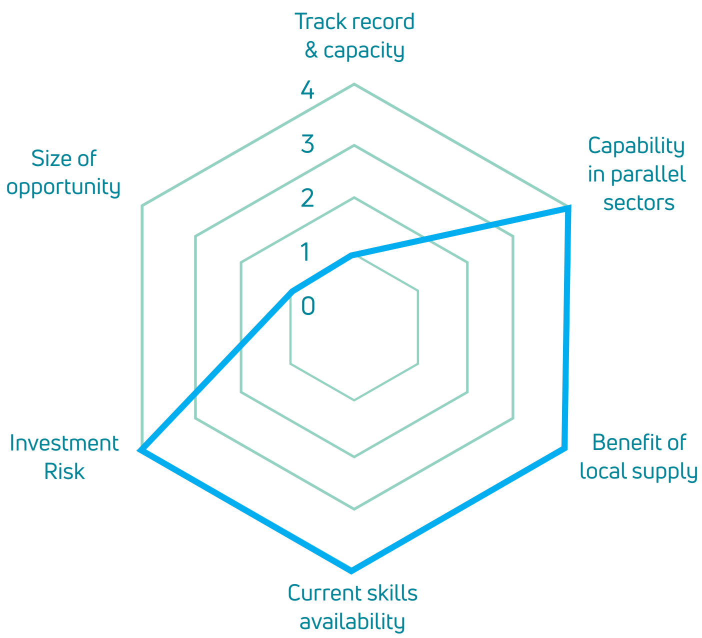


Table 21: Supply chain assessment – integration/marshalling and construction port

3.7 Integration/marshalling and construction port	
Track record and capacity in offshore wind	Ireland has installed one offshore wind farm to date – the 25 MW Arklow Bank Phase 1. While no port in Ireland has the capability of supporting construction of offshore windfarms at present (due to the scale of modern windfarms), a number of ports have supported the installation of onshore windfarms through the importing of towers and blades through their facilities. In addition, the existing seven turbines at the Arklow Bank Wind Farm were assembled out of Rosslare Europort.
Irish capability in parallel sectors	Ireland has moderate capability in parallel sectors. Marine and civil engineering, as well as the construction sector, have transferable capabilities.
Benefit of local supply	There is large benefit in having the construction port based locally as it allows for cheaper and quicker installation. It is highly likely that the construction port for a typical project will be in Ireland.
Current skills availability	Ireland has some skills capabilities in parallel sectors but few commercial-scale skills for turbine and foundation assembly at port. Some skill requirements at the construction port are standard construction and engineering skills, of which Ireland has supply.
Investment risk	Barriers to entry are significant as Ireland currently has no suitable ports for large scale projects. Investment is therefore needed, which requires market certainty and a strong project pipeline.
Size of opportunity	The construction/marshalling and integration port represents a small portion of overall project spend at around 0.6% over the lifetime of the wind farm.
Key jobs	Civil Engineer, Construction Project Manager, Crane Operator, Electrical Technician, Health and Safety Coordinator, Mechanical Technician, Offshore Logistics Manager, Port Operative, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture between 20% and 60% of integration/marshalling and construction port spend per GW by 2040.

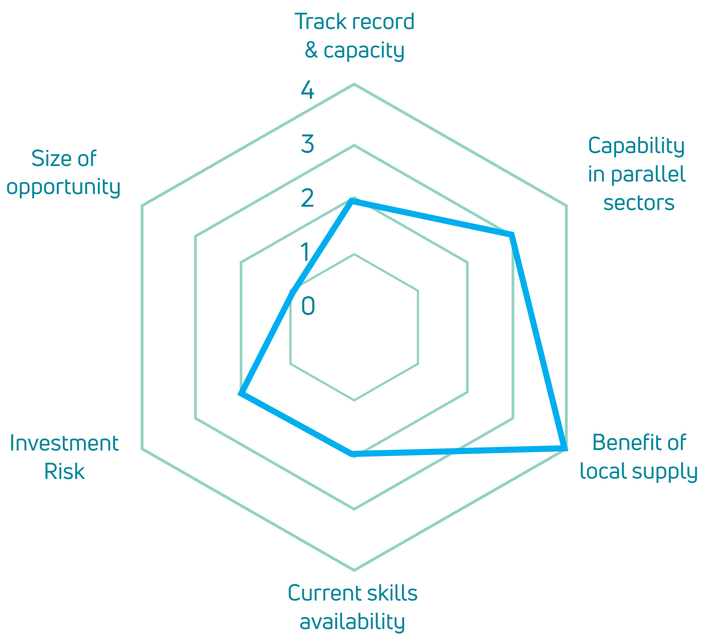


Table 22: Supply chain assessment – offshore logistics for installation

3.8 Offshore logistics for installation	
Track record and capacity in offshore wind	Ireland does not have any companies with experience in offshore wind in this area.
Irish capability in parallel sectors	Ireland has moderate capability in parallel sectors, particularly for the construction management and health and safety aspects of offshore logistics.
Benefit of local supply	There is some benefit in conducting offshore logistics locally, but it is not essential. Cost savings are minimal. Some local knowledge is beneficial, particularly in metocean forecasting and port logistics.
Current skills availability	Ireland has some capabilities in this area as locally based companies expand their offering to offshore wind developers in this area. There are also some capabilities in parallel sectors, but they are not directly transferable. Skill requirements include construction management and marine logistics skills, of which Ireland has some supply.
Investment risk	Some inward investment may be required depending on the infrastructure and skills available and the activities conducted locally.
Size of opportunity	Offshore logistics represents a small portion of overall project spend at around 0.05% over the lifetime of the wind farm.
Key jobs	Able Seafarer, Boat Maintenance Technician, Communications Network Technician, Harbour Pilot, Instrument Control Engineer, Master Mariner, Offshore Logistics Manager, Offshore Quality Manager, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture between 50% and 60% of offshore logistics for installation spend per GW by 2040.

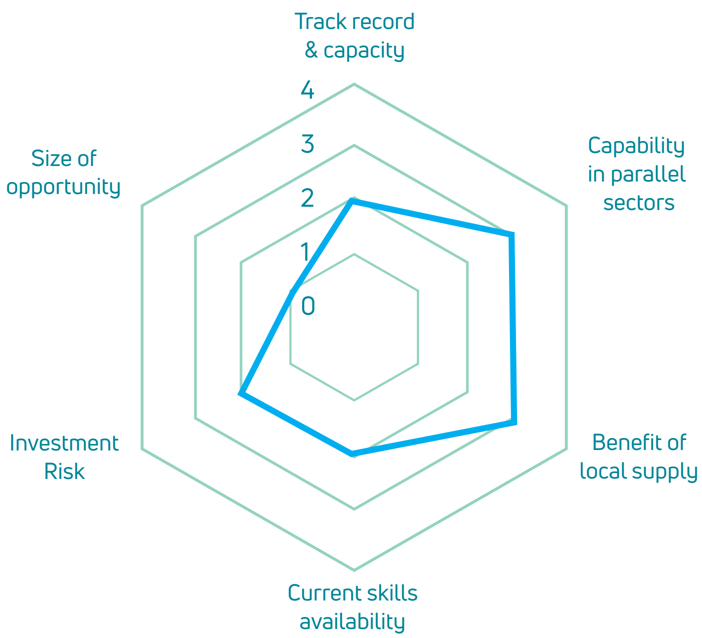


Table 23: Supply chain assessment – onshore substation installation

3.9 Onshore substation installation	
Track record and capacity in offshore wind	Ireland has a number of companies engaged in onshore substation installation. While the experience isn't specifically offshore wind based, this is irrelevant with respect to the onshore substation.
Irish capability in parallel sectors	Ireland has a sizeable engineering, site investigation and construction sectors, all of which are highly transferable to onshore substations as it is standard construction work.
Benefit of local supply	Onshore substation installation is routine construction work and so is general contracted to local firms. There is strong logic in local supply.
Current skills availability	Ireland has sufficient skills availability in the construction sector.
Investment risk	Barriers to entry are small and demand can be met from parallel sectors if given sufficient notice.
Size of opportunity	Onshore substation installation represents a small portion of overall project spend at around 0.06% over the lifetime of the wind farm.
Key jobs	Cable Jointer, Civil Engineer, Construction Project Manager, Electrical Engineer, Electrical Technician, Health and Safety Coordinator, SCADA Engineer, Site Manager, Welder.
Expected local content	On the basis of this assessment we expect Ireland to capture 80% of onshore substation installation spend per GW by 2040.

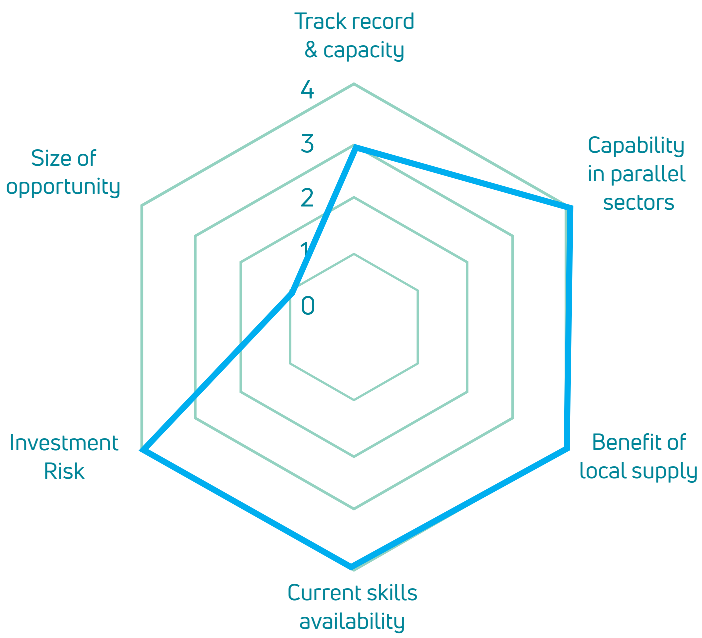


Table 24: Supply chain assessment – operations

4.1 Operations	
Track record and capacity in offshore wind	Ireland has a number of offshore wind developers and turbine suppliers with a local presence that have experience in this area.
Irish capability in parallel sectors	Ireland has a large onshore wind sector which has transferable, complimentary capabilities to offshore operations. Operations also requires vessel and port capabilities, of which Ireland has some limited experience in other sectors.
Benefit of local supply	There is a cost saving in conducting operations locally. Some of activities also benefit from or require local knowledge and presence, such as operation of vessels and quayside infrastructure, and management of spares and equipment.
Current skills availability	Ireland has some existing skills in operations from onshore wind. It also has some relevant skills available in port operations, such as storage, but these will need upgrading.
Investment risk	Barriers to entry vary on the operations conducted. Investment will be required in port upgrades.
Size of opportunity	Operations represents a large portion of overall project spend at around 11% over the lifetime of the wind farm.
Key jobs	Able Seafarer, Boat Maintenance Technician, Communications Network Technician, Data Analyst, Harbour Pilot, Health and Safety Coordinator, Instrument Control Engineer, Master Mariner, Offshore Logistics Manager, Offshore Quality Manager, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture between 60% and 70% of operations service spend per GW by 2040.

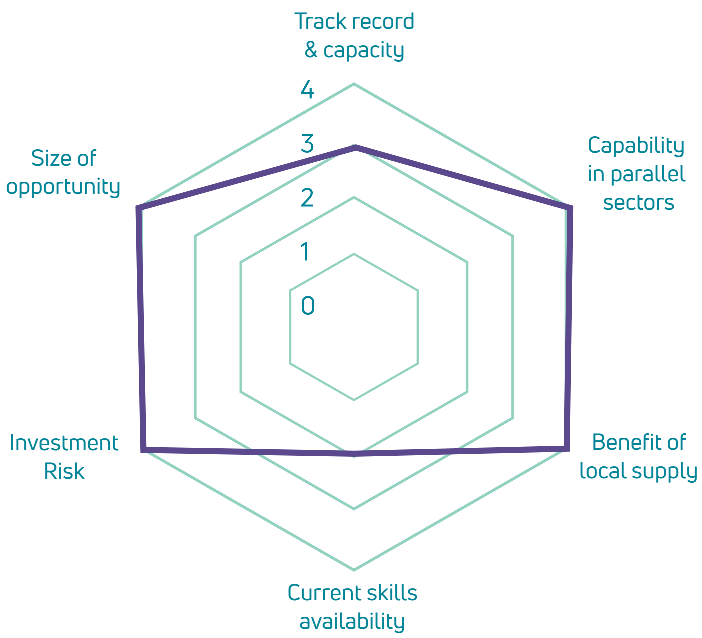


Table 25: Supply chain assessment – maintenance

4.2 Maintenance	
Track record and capacity in offshore wind	Ireland has a small number of companies with a local presence that have experience of supporting offshore wind farm maintenance activities internationally.
Irish capability in parallel sectors	Ireland has a large onshore wind sector which has transferable, complimentary capabilities to offshore maintenance. There are little parallel sectors for subsea maintenance in Ireland.
Benefit of local supply	There is a cost saving in conducting some maintenance activities locally, such as for minor repairs and port maintenance.
Current skills availability	Ireland has some existing skills in maintenance from onshore wind. It also has some relevant capabilities in port operations, but these will need expanding.
Investment risk	Barriers to entry vary on the maintenance conducted. Some inward investment will be required in vessels and equipment.
Size of opportunity	Operations represents a large portion of overall project spend at around 15.7% over the lifetime of the wind farm.
Key jobs	Able Seafarer, Boat Maintenance Technician, Data Analyst, Electrical Technician, Electrical Technician, Harbour Pilot, Health and Safety Coordinator, Instrument Control Engineer, Master Mariner, Mechanical Technician, Offshore Logistics Manager, Offshore Quality Manager, SCADA Engineer, Site Manager, Wind Turbine Technician. Quality Manager, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture between 60% and 70% of maintenance service spend per GW by 2040.

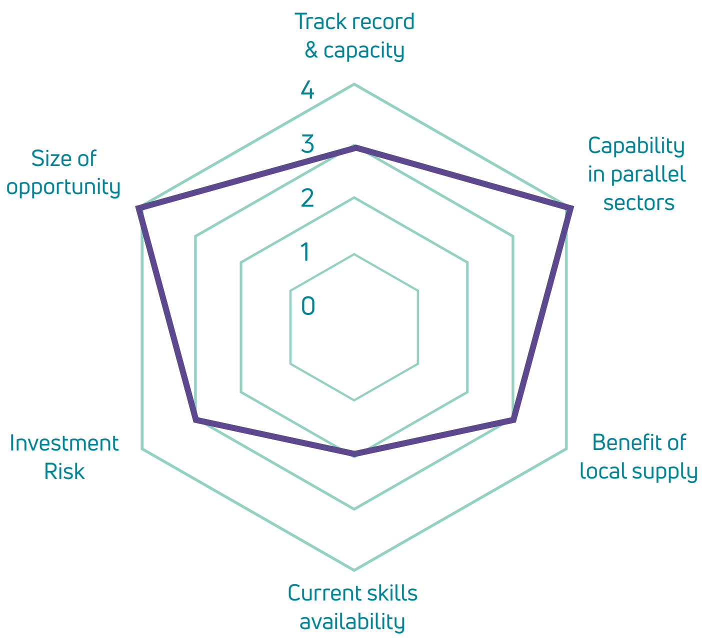


Table 26: Supply chain assessment – offshore vessels and logistics

4.4 Offshore vessels and logistics	
Track record and capacity in offshore wind	Ireland has one offshore windfarm (Arklow Bank Phase One) which has been serviced out of Arklow Harbour since installation.
Irish capability in parallel sectors	Ireland has moderate capability in parallel sectors, particularly for the construction management and health and safety aspects of offshore vessels and logistics.
Benefit of local supply	Whether this is conducted locally depends on how activities are contracted by the owner. There is some benefit in conducting offshore vessels and logistics locally, but not essential. Cost savings are minimal. Some local knowledge is beneficial, particularly in marine coordination and port logistics.
Current skills availability	Ireland has some capabilities in parallel sectors, but they are not directly transferable. Skills requirements include construction management and marine logistics skills, in which Ireland has some experience.
Investment risk	Some inward investment may be required depending on the infrastructure and skills available and the activities conducted locally.
Size of opportunity	Offshore vessels and logistics represent a smallportion of overall project spend at around 1.2% over the lifetime of the wind farm.
Key jobs	Able Seafarer, Boat Maintenance Technician, Communications Network Technician, Harbour Pilot, Health and Safety Coordinator, Marine Engineer, Master Mariner, Naval Architect, Offshore Logistics Manager, Offshore Quality Manager, Port Operative, Site Manager. Quality Manager, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture between 50% and 60% of OMS offshore vessels and logistics spend per GW by 2040.

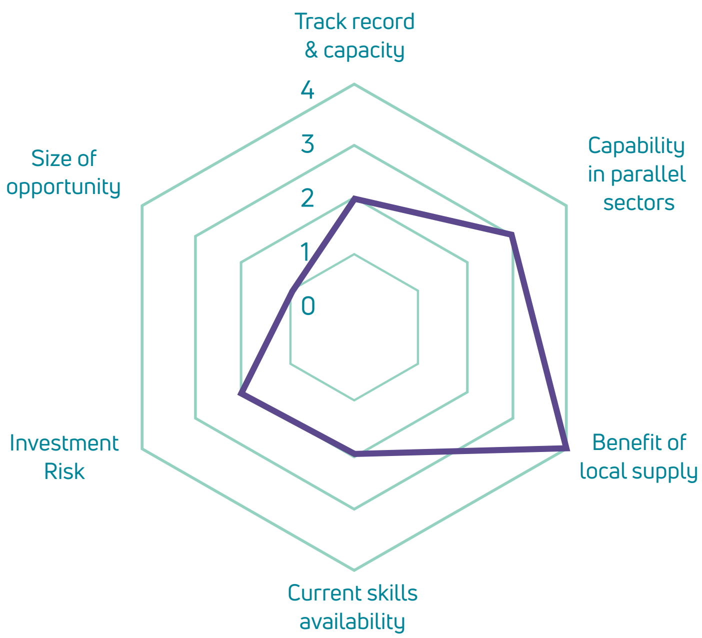
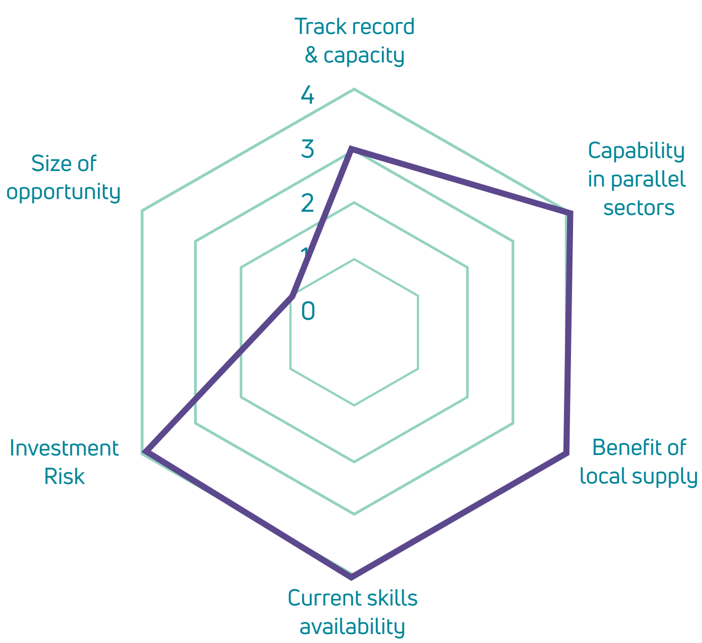


Table 27: Supply chain assessment – OMS port

4.5 OMS port	
Track record and capacity in offshore wind	Ireland has one offshore windfarm (Arklow Bank Phase One) which has been serviced out of Arklow Harbour since installation.
Irish capability in parallel sectors	As an island nation Ireland has some capability in parallel sectors with an active marine and port sector (90% of all imports arrive by sea). A number of geographically diverse ports and larger harbours are capable of supporting operations and maintenance facilities with varying degrees of upgrade.
Benefit of local supply	There is a significant time efficiency and economic benefit in basing the OMS port near the wind farm. There is therefore strong logic in local supply.
Current skills availability	Ireland has skills capabilities in construction and port operations, which are transferable to operating an OMS port.
Investment risk	Inward investment will be needed to develop the OMS port to make it suitable for offshore wind, such as adapting or adding jetties or quaysides for CTVs and SOVs, warehouses, workshops, and offices.
Size of opportunity	The OMS port represents a small portion of overall project spend at around 0.2% over the lifetime of the wind farm.
Key jobs	Boat Maintenance Technician, Crane Operator, Mechanical Technician, Offshore Logistics Manager, Offshore Quality Manager, Port Operative, Site Manager.
Expected local content	On the basis of this assessment we expect Ireland to capture 80% of OMS port spend per GW by 2035.



Appendix D: Project spend proportions for fixed and floating wind farms

Table 28: Project spend proportions for fixed and floating wind farms

Lifecycle phase	Supply chain category	Proportion of total project spend	
		Fixed	Floating
Development and project management	1.1 Development and consenting services	1.3%	1.3%
	1.2 Environmental surveys	0.2%	0.2%
	1.3 Resource and metocean assessment	0.1%	0.1%
	1.4 Geological and hydrographical surveys	0.2%	0.2%
	1.5 Engineering and consultancy	0.2%	0.2%
	1.6 Project management	0.9%	0.8%
Manufacturing	2.1 Turbine nacelle and hub	15.1%	14.2%
	2.2 Turbine blades	7.4%	6.9%
	2.3 Turbine tower	2.9%	2.8%
	2.4 Turbine electrical system	1.4%	1.3%
	2.5 Array cables	1.4%	1.3%
	2.6 Export cables	4.0%	3.7%
	2.7a Monopile foundation (fixed)	9.4%	N/A
	2.7b Semi-submersible substructure	N/A	14.9%
	2.8 Mooring system (floating)	N/A	3.4%
	2.9 Offshore substation	3.6%	2.8%
	2.10 Onshore substation	2.9%	1.5%
Installation	3.1 Offshore substation	0.5%	0.4%
	3.2 Offshore cables	2.8%	2.6%
	3.3 Onshore export cables	0.1%	0.1%
	3.4 Mooring system (floating)	N/A	1.3%
	3.5 Turbine and foundation installation	2.4%	2.3%
	3.6 Inbound transport	0.2%	0.2%
	3.7a Construction port (fixed)	0.6%	N/A
	3.7b Marshalling and integration port (floating)	N/A	0.6%
	3.8 Offshore logistics	0.05%	0.05%
	3.9 Onshore substation	0.1%	0.1%
Operations, maintenance, and service	4.1 Operations	11.7%	11.2%
	4.2 Maintenance	16.4%	15.7%
	4.3 Major repair	6.0%	5.6%
	4.4 Offshore vessels and logistics	1.3%	1.2%
	4.5 OMS port	0.2%	0.2%
Decommissioning	5.1 Decommissioning services	6.6%	2.8%

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