Job Roles in Offshore Wind
Green Port Hull

The Green Port Hull vision is to establish Hull and the East Riding of Yorkshire as a world-class centre for renewable energy, creating wealth and employment for the region. With its prime location close to the offshore wind opportunities in the North Sea, established infrastructure, knowledge, expertise and the capability to handle a diverse energy mix, the region is capitalising on its strengths. These attributes are the reason that Siemens chose Hull as the location to build its offshore wind turbine blade manufacturing, assembly and servicing facilities that will form the centrepiece of Green Port Hull. The Siemens investment is just the catalyst for the Green Port Hull vision. As well as offshore wind, there are major opportunities in biofuels, carbon capture and storage, waste to energy, solar, tidal and wave power generation. The renewable energy sector will be the single biggest influence on the local economy for generations, creating thousands of new jobs along with a wealth of opportunity for local people and business. To ensure this once-in-a-lifetime opportunity becomes a reality, Hull City Council and East Riding of Yorkshire Council, along with partner organisations, devised the Green Port Growth Programme. For further information see page 41.

The Green Port Growth Programme is administered by East Riding of Yorkshire Council.

Telephone: 01482 391639
Email: greenportgrowth@eastriding.gov.uk
Website: www.greenporthull.co.uk

Co-ordination of the guide
Dawn Hall  Business Support Project manager, Green Port Growth

BVG Associates

BVG Associates is a technical, business and economics consultancy with expertise in wind and marine energy technologies. We are dedicated to helping our clients establish renewable energy generation as a major, responsible and cost-effective part of a sustainable global energy mix. BVG Associates has an average of over 10 years experience in renewable energy, many of these being ‘hands on’ with wind turbine manufacturers, leading R&D, purchasing and production departments. BVG Associates has consistently delivered to clients in many areas of the wind energy sector, including:

• Market leaders and new entrants in wind turbine supply and UK and EU wind farm development
• Market leaders and new entrants in wind farm component design and supply
• New and established players of all sizes within the wind industry, in the UK and on most continents, and
• UK Government, RenewableUK, The Crown Estate, the Energy Technologies Institute, the Carbon Trust, Scottish Enterprise, ADEME, NYSERDA and other similar enabling bodies.

Telephone: 01793 752308
Email: info@bvgassociates.com
Website: www.bvgassociates.com

Authors
Clare Davies  Associate, BVG Associates
Andy Logan  Junior associate, BVG Associates
Alun Roberts  Associate director, BVG Associates

This report and its content is copyright of BVG Associates Limited - © BVG Associates 2017. All rights are reserved. The document may be distributed in full or be reproduced in part by The East Riding of Yorkshire Council provided that BVG Associates is acknowledged as the source of the material.
Renewable energy is a relatively new and rapidly changing sector, generating considerable ongoing investment and development, and the current labour market is starting to reflect this.

Through funding from Regional Growth Fund round 2, the Green Port Growth Programme was set up in 2012 to encourage supply chain development and diversification within the region, supporting local businesses and residents to maximise on the opportunities that the renewable energy sector presents in the coming years.

As the supply chain develops and businesses win more work, the variety of career opportunities also widens.

To support the widening market it is useful to consider the roles that are related not just to wind turbine operation and maintenance, but also those in development, turbine tower and balance of plant supply, installation and commissioning, and a full range of support services such as health and safety, port and harbour services, training services and logistics and warehousing.

We are therefore pleased to be working with BVG Associates to provide an insight into the potential future landscape of our local jobs market within offshore wind. We hope that whether you are seeking employment yourself or advising others on career opportunities, this publication provides you with a perspective into the requirements of this emerging industry for our area.

Tim Rix
Chair of the Green Port Growth Programme Board.

The wave of opportunity from renewable energy is the single biggest influence on the local economy for generations… be part of this ripple effect.

Contents

Introduction 6
What does the market look like? 8
What job roles are there? 15
Development surveys and studies 16
Turbine tower supply 18
Foundation supply 20
Cable supply 22
Substation supply 24
Turbine and foundation installation 26
Cable installation 28
Installation support 30
Wind farm operations 32
Turbine maintenance 34
Structural inspection and maintenance 36
Maintenance and service logistics 38
What steps do I need to take to start my career in offshore wind and how can the Green Port Growth Programme support me? 40
Practical steps to a career in renewables 40
Greentown Growth 41
Offshore wind packages and their inclusion in the guide 42
Acknowledgements 43
Introduction

The UK leads the global market in offshore wind installed capacity. Hull and East Riding of Yorkshire will be a hub for east coast offshore wind projects. This will create opportunities to work in the sectors of developing, manufacturing, installing and operating offshore wind farms. Green Port Growth and BVG Associates developed this guide to support you in understanding the specialist job roles in the offshore wind supply chain.

The guide will answer three key questions:

What does the market look like?
The first section will help you to understand:
• What the UK market looks like now and what is expected in the future
• What activity could take place in Hull and East Riding of Yorkshire
• What activities and costs are involved in the different sectors of the supply chain, and
• Where offshore wind projects are located and when they will be built.

What job roles are there?
The second section will help you to understand:
• The main functions within each supply chain package
• How products or services are typically contracted within supply chain packages, and
• The job roles associated with each main function that could employ someone located in Hull and East Riding of Yorkshire.

What steps do I need to take to start my career in offshore wind and how can the Green Port Growth Programme support me?
The third section will guide you with practical steps to support your career, including:
• Researching your job role
• Reviewing your CV
• Getting the necessary qualifications and skills, and
• How the Green Port Growth Programme can support you or your company.

Definition of terms

Sectors
The main areas of the offshore wind supply chain, including development and project management, turbine, balance of plant, installation, and operations, maintenance and service. Decommissioning has been excluded from this guide because there will be few job opportunities before 2030.

Packages
The main contracts awarded by offshore wind farm developers.

Functions
The main activities within each package. Some functions are needed across multiple packages. In this guide they have been termed ‘cross cutting’.

Job roles
The work opportunities within each function. The job roles considered in this guide are those needing specialist offshore wind skills. Some job roles are relevant across more than one function. For example, welders and platers may be required for turbine tower, foundation, cable and offshore substation supply.

The authors considered each package and function and concluded whether the work could be undertaken by someone located in Hull and East Riding of Yorkshire. A list of all packages and the reasons for inclusion and exclusion is provided on page 42.
What does the market look like?

At the end of 2016, the UK had over 5.8GW of operating offshore wind capacity, about 60% of the global total. 1GW is the volume of energy supplied from 1GW of operating capacity at full load for one hour. 1GWh provides the electricity needs for 1,000 average UK homes for around three months.

The UK’s first operational offshore wind farm was commissioned in 2003 with a capacity of 60MW (1GW is 1,000MW) using 2MW turbines. Since then, the market has experienced rapid growth and technology change. By 2013, the world’s largest offshore wind farm was commissioned at 630MW and in 2016, the world’s first 8MW turbine was installed.

This growth will continue, and the Humber region will play an important role. At the end of 2016, wind farms close to the Humber accounted for about 30% of the UK’s total offshore wind operating capacity. This is likely to increase to around 40% by 2025. Much of the new operating capacity will come from the Dogger Bank and Hornsea zones after 2020.

An offshore wind farm lifecycle can exceed 30 years and the main supply chain elements are:

- Development and project management
- Turbine
- Balance of plant
- Installation and commissioning,
- Operations, maintenance and service (OMS).

Development and project management

Wind farm development includes wind farm design and surveys, stakeholder engagement, consent application, procurement and project management up to wind farm commissioning.

Packages within this area of the supply chain considered in this guide include:
- Development surveys and studies.

Turbine

Turbine includes the supply of the rotor (including blades), nacelle and tower. Packages within this area of the supply chain considered in this guide include:
- Turbine tower supply.

Balance of plant

Balance of plant includes the supply of foundations, cables, and offshore and onshore substations.

A foundation is the structure between the seabed and the turbine tower. Array cables connect the turbines to each other and the offshore substation. Export cables connect the onshore and offshore substations.

The offshore substation transforms and transfers the energy collected by the wind turbines. Some wind farms may have more than one offshore substation. The onshore substation provides the interface between the wind farm and the onshore transmission grid.

Packages within this area of the supply chain considered in this guide include:
- Foundation supply
- Cable supply, and
- Substation supply.

Installation and commissioning

Installation activities are based at the construction port and the wind farm site. There are many different types of vessel involved in installation.

Packages within this area of the supply chain considered in this guide include:
- Turbine and foundation installation
- Cable installation, and
- Installation support.

Operations, maintenance and service

OMS includes:
- Day-to-day operations of the wind farm1
- Scheduled maintenance including inspection, checking of bolted joints, replacement of worn parts, and
- Unscheduled interventions in response to events or failures.

Service operations include both on-site repair and replacement of large and small components.

Packages within this area of the supply chain considered in this guide include:
- Wind farm operations
- Turbine maintenance
- Structural inspection and repair, and
- Maintenance and service logistics.

Breakdown of spend during wind farm lifecycle.2

1Day-to-day operations of the wind farm include costs associated with grid connection.

2Based on a large, Continental, close to shore wind farm.
1. Barrow
2. Beatrice
3. Blyth Offshore Demonstrator
4. Burbo Bank
5. Burbo Bank Extension
6. Dogger Bank Creyle Beck
7. Dogger Bank Teesside
8. Dudgeon
9. East Anglia ONE
10. East Anglia ONE NORTH
11. East Anglia TWO
12. East Anglia THREE
13. East Anglia Norfolk Vanguard
14. East Anglia Norfolk Boreas
15. European Offshore Wind Deployment Centre
16. Firth of Forth Phase 1
17. Firth of Forth Phase 2
18. Firth of Forth Phase 3
19. Galloper
20. Greater Gabbard
21. Gunfleet Sands
22. Gwynt y Môr
23. Hornsea 1
24. Hornsea 2
25. Hornsea 3
26. Hornsea 4
27. Humber Gateway
28. Hywind Scotland Pilot Park
29. Inch Cape
30. Kentish Flats
31. Kentish Flats 2
32. Kincardine
33. Lincs
34. London Array
35. Lynn and Inner Dowsing
36. Moray Firth Eastern Development Area
37. Moray Firth Western Development Area
38. Neart na Gaothie
39. North Hoyle
40. Ormonde
41. Race Bank
42. Rampion
43. RhiWeFlats
44. Robin Rigg East and West
45. Scroby Sands
46. Sheerwater Shoal
47. Teesside
48. Thanet
49. Thanet Extension
50. Triton Knoll
51. Walney 1
52. Walney 2
53. Walney extension
54. West of Duddon Sands
55. Westernmost Rough

*Project capacity (MW):*  
- Less than 100 MW
- 100 MW to 500 MW
- Over 500 MW

*Year of commissioning:*  
- Commissioned before the end of 2016
- Anticipated commissioning between 2017-2020
- Anticipated commissioning after 2020
Development & project management
1. Development surveys & studies
2. Turbine supply
3. Turbine tower supply
4. Balance of plant supply
5. Foundation supply
6. Cable supply
7. Substation supply
Installation & commissioning
8. Turbine & foundation installation
9. Cable installation
10. Installation support
Operations, maintenance & service
11. Wind farm operations
12. Turbine maintenance
13. Structural inspect & repair
14. Maintenance & service logistics
Cross-cutting
15. Cross-cutting
What job roles are there?
Geophysical surveys include bathymetric, cable route and unexploded ordnance (UXO) surveys. Geophysical investigation is generally the most costly part of survey work, making it a significant at-risk investment for developers. The worker location is not significant because much of this work is completed offshore. Someone living in the Hull and East Riding of Yorkshire could work for a non-local company offering geophysical and geotechnical studies.

Current suppliers include Fugro, Gardline, GPMC, Mainprize Offshore and Latitude Surveys. The client is normally the developer of the offshore wind farm.

Hydrographer: The hydrographer maps the marine environment by looking at the shape of the seabed and depth of the ocean. Two hydrographers are typically required to deliver a contract. The hydrographer works offshore. The salary ranges between £20,000 for a junior position and £40,000 for a senior position, with an additional offshore allowance of about £120 per day.

Onshore processor: The onshore processor analyses data once information is taken back to shore. Two or three onshore processors are typically required to deliver a contract. Degree level qualifications are required in environmental sciences and a master’s degree in geophysics is desirable. The geophysicist works offshore. The salary ranges between £20,000 for a junior position and £40,000 for a senior position, with an additional offshore allowance of about £120 per day.

Wildlife studies
Wildlife surveys include seabed organism, fish and marine life surveys. Marine life surveys are undertaken mainly from survey vessels, with some bird surveys using aircraft.

Current suppliers include Benthic, Pelagic Solutions, Fugro, Gardline, Hi Def and Precision Marine Surveys. The client is normally the developer of the offshore wind farm.

Marine mammal observer: The marine mammal observer monitors and records observational data. Three to six observers are typically required to deliver a contract. The role requires a marine mammal observer qualification (one-day course). A degree or higher national diploma in marine biology or environmental monitoring is desirable. The marine mammal observer works offshore. The salary ranges from £20,000 for a new graduate and £40,000 for a senior.

Marine ecologist: The marine ecologist collects survey data and analyses the results. Five or six positions are typically required to deliver a contract. Relevant degree level qualifications are required. The marine ecologist works both onshore and offshore. The salary ranges between £20,000 for a new graduate and £40,000 for a senior.
Current suppliers include Industrial Paint Supplies, International Paint and Witham Paint & Oil. Key appliers include Barrier Group, Offshore Painting Services, and Universal Coatings & Services.

Specialist coating technician (applier): A coating technician selects, mixes and applies coatings to component surfaces. Equipment such as spray guns and automated painting machinery is used to apply the coating. No formal qualifications are required, although an Industrial Coating Applicator Training Scheme (ICATS) qualification is desirable. Forklift operating and rigging qualifications may be required. The specialist coating technician works offshore. The salary ranges between £16,000 and £25,000.

Cross cutting: Coatings

Coatings, such as metal sprays and paints, are required on several components including turbine blades, towers, foundations, gearboxes, bearings and hydraulic components. Coatings help to prevent damage and corrosion from the marine environment. Coatings are applied after initial installation but may be re-applied during operations, maintenance and service if required. Current suppliers include Industrial Paint Supplies, International Paint and Witham Paint & Oil. Key appliers include Barrier Group, Offshore Painting Services, and Universal Coatings and Services.

Cross cutting: Health and safety equipment

Health and safety equipment for offshore wind personnel includes overalls, safety footwear, safety vests, full body harness and lanyards, safety glasses, helmets, personal lighting (such as a head torch) and fall-ariest systems. Many equipment manufacturers will equip through (third) parties. For a manufacturer, workers are normally located onshore. The vendor, the client is the turbine tower manufacturer. Because of the volumes needed for an offshore wind farm, suppliers tend to be specialist. Workers are typically employed locally to a ladder manufacturer. The client is the turbine tower manufacturer. There are currently no UK suppliers of turbine tower ladders.

Towers are welded conical structures made from steel. Towers are manufactured by cutting and rolling steel plate and then welding to make ‘cans’. These cans are then welded into three sections, which are bolted together as part of the installation process. Towers are painted before fit-out, into each component, and are then prepared for transport and storage. Towers are always fittted with internal ladders, and in the case of offshore turbines also a lift. Offshore turbines are equipped with offshore survival equipment in case weather conditions stop the crew leaving the turbine as planned. The towers also need lighting for safe personnel access.

Key-supplies of turbine towers are Amba, Titan Wind Energy, Valmont SM and Windmills. CS Wind will develop a manufacturing facility in Scotland in 2017. Turbine towers are contracted by the turbine supplier because they are an integral part of the turbine design and contain turbine electrical components.

Ladders

Ladders inside the tower provide access from the base of the tower to the turbine nacelle. Ladders are fabricated off-site from the location of turbine tower manufacturing. Because of the volumes needed for an offshore wind farm, suppliers tend to be specialist. Workers are typically employed locally to a ladder manufacturer. The client is the turbine tower manufacturer. There are currently no UK suppliers of turbine tower ladders.

NDT Inspector: The non-destructive testing (NDT) inspector investigates structural materials to find cracks, flaws and other imperfections using a range of inspection methods. Typically, there are no dedicated in-house NDT inspectors across all projects, but workers in the profession may be through an apprenticeship or technical qualification such as a Certification Scheme for Personnel (CSWIP) certificate. The NDT inspector works offshore. The salary ranges between £23,000 and £35,000.

Welders: Welders fabricate structures through cutting, shaping and joining sections of metal plate and pipes. Major contracts involve many skilled welders. A career in welding may start with an apprenticeship that will include obtaining qualifications such as a CSWIP or Construction Site Specific Certification (CSSC) technical certificate. The welder works offshore. The salary ranges between £17,000 and £30,000 for an experienced welder.

Plater: The plater sets up, operates and tends plating machines used to coat metal components. Large projects can involve many platers. Platers may also have skills to carry out other fabrication roles such as welding. No formal qualification is required and entry to plating may be through an apprenticeship or a background in fabrication. The plater works offshore. The salary ranges between £17,000 and £30,000 for an experienced plater.

Quality controller: The quality controller checks and reports on fabrication quality and processes to meet recognised standards. One quality controller is required to deliver a contract. No formal qualifications are required but previous experience in a technical role may be necessary. The quality controller works offshore. The salary ranges between £18,000 and £25,000.

Account manager (distributor): The account manager negotiates contracts with clients and engages with distributors to improve and develop new products. No formal qualifications are required, but a good commercial skills are necessary. A degree in business studies or a related field may be required. No formal qualifications are required, but experience in sales is desirable. The technical sales specialist works offshore. The salary ranges between £30,000 and £40,000.

Garment technician (manufacturer): A garment technician works as part of a team design to develop product specifications and ensure the quality and performance of the finished product. Travelling to factories to supervise production is required. The technician also identifies and reports manufacturing or design faults. A degree in textile technologies or manufacturing and production engineering is required. Experience with computer design software is desirable. The garment technician works offshore. The salary ranges between £15,000 and £30,000.

Technical sales specialist: The technical sales specialist meets with clients to promote the sale of products and to identify additional products the client may require. No formal qualifications are required, but previous experience in sales is desirable. The technical sales specialist works offshore. The salary ranges between £18,000 and £25,000.

Product data controller (distributor): The product data controller ensures that a company’s product and purchasing information is industry-compliant and up-to-date. No formal qualifications are required, but experience with computer management software is desirable. The product data controller works offshore. The salary ranges between £17,000 and £25,000.
Steel plate is used for the manufacture of monopile and jacket foundations. Manufacturing monopiles is a relatively simple process but uses highly specialist equipment. Manufacturing jacket foundations is significantly increased because of the complexity of the structure and the number of welds. Current suppliers of this service include Ambari, Bladt Industries, BiFab, EEW Special Pipe Constructions, Nacantia, St Goup, Smudlers Projects and Steelend Northham. Foundation supply may be contracted separately by the developer or as part of a contract including foundation installation.

The turbine foundation provides structural support for the wind turbine and equipment. It provides a means for personnel access. The foundation will usually support a crane and provide a laydown area for equipment. Platforms are likely to be fabricated in a different location to the foundation manufacturing. Someone living in the Hull and East Riding of Yorkshire area could work for a local company offering platform fabrication. The client is the foundation supplier. Current suppliers include Hutchinson Engineering, MTL and Wilton Engineering.

Structural engineer: The structural engineer designs large structures and has an advanced understanding of materials and manufacturing processes. A degree or postgraduate qualification in structural or civil engineering is required. The structural engineer works onshore. The salary ranges between £30,000 and £50,000.

Rigger: The rigger is responsible for planning and implementing safe lifting and the movement of large structures that may involve crane operation. Several riggers may be required. The rigger will require formal training and certification such as a Construction Skills Certification Scheme (CSCS) or National Vocational Qualification (NVQ). Current suppliers include Hutchinson Engineering, MTL and Wilton Engineering. Current suppliers of this service include Ambau, Bladt Industries, BiFab, EEW RenewableUK or Global Wind Organisation for working at height, alongside appropriate health and safety qualifications, such as from the Institution of Occupational Safety and Health (IOSH). One working at height instructor is likely be part of a four-person team of instructors, each instructing four to six delegates during a training course.

Instructor: The instructor delivers commercial training courses in a specialist area such as in electrical engineering, mechanical engineering, fabrication and welding, renewables and health and safety. Typically, five years experience in the specialist field is required to become an instructor, alongside relevant qualifications to at least higher national certificate level. Previous teaching qualifications are also desirable. For example, a working at height instructor would require certification from Renewables Training Organisation (WSTO) for working at height, alongside appropriate health and safety qualifications, such as from the Institution of Occupational Safety and Health (IOSH). One working at height instructor is likely be part of a four-person team of instructors, each instructing four to six delegates during a training course. The instructor works offshore. The salary ranges between £25,000 and £40,000.

Training and resource manager: The training and resource manager manages a team of instructors for internal and external training requirements. They also develop future training packages. The training and resource manager works offshore. The salary ranges between £30,000 and £45,000.

Instructor: The instructor delivers commercial training courses for personnel whose responsibilities are related to the service, installation and operation, maintenance and service of the wind farm. Training courses include fire awareness, first aid, manual handling, rope access, sea survival and working at heights. Current suppliers include 3Sun Group, Advanced Industrial Solutions (AIS) Training, Complete Training Solutions, HETA and HOTA. There is no typical client, as all areas of the supply chain require different training courses. The instructor works offshore. The salary ranges between £17,000 and £22,000.

Personnel need specific skills and deep technical knowledge about the wind farm. Training of personnel is therefore essential for the safe and efficient installation and operation, maintenance and service of the wind farm. Personnel must be able to work onshore and offshore. The instructor works offshore. The salary ranges between £30,000 and £45,000.

Manufacturing manager: The manufacturing manager ensures fabrication runs smoothly, to budget and on time. One manager is required to deliver a contract. Managers will have experience in project management and are likely to have a technical background in mechanical or fabrication engineering. The manufacturing manager works onshore. The salary ranges between £25,000 and £35,000.

Production supervisor: The production supervisor leads the team of fabrication staff and organises their workload. One supervisor is required to deliver a contract. Supervisors are experienced members of the fabrication team. The production supervisor works onshore. The salary ranges between £23,000 and £27,000.

CNC machinist: The computer numerical controlled (CNC) machinist operates machinery to make precision components. Several machinists may be required to deliver a contract. This role does not require a formal qualification and entry may be through an apprentice-ships or an engineering-related college course. The CNC machinist works offshore. The salary ranges between £18,000 and £27,000 for an experienced machinist.

Press brake operator: The press brake operator runs the industrial machine equipment that makes and processes metal sheeting and parts. Several machine operators may be required. The press brake operator does not require a formal qualification and entry may be through an apprenticeship. The press brake operator works offshore. The salary ranges between £17,000 and £22,000.

Supervisors are experienced members of the fabrication team. The production supervisor works onshore. The salary ranges between £23,000 and £27,000.

Production supervisor: The production supervisor leads the team of fabrication staff and organises their workload. One supervisor is required to deliver a contract. Supervisors are experienced members of the fabrication team. The production supervisor works onshore. The salary ranges between £23,000 and £27,000.

CNC machinist: The computer numerical controlled (CNC) machinist operates machinery to make precision components. Several machinists may be required to deliver a contract. This role does not require a formal qualification and entry may be through an apprenticeship or an engineering-related college course. The CNC machinist works offshore. The salary ranges between £18,000 and £27,000 for an experienced machinist.

Press brake operator: The press brake operator runs the industrial machine equipment that makes and processes metal sheeting and parts. Several machine operators may be required. The press brake operator does not require a formal qualification and entry may be through an apprenticeship. The press brake operator works offshore. The salary ranges between £17,000 and £22,000.

Manufacturing manager: The manufacturing manager ensures fabrication runs smoothly, to budget and on time. One manager is required to deliver a contract. Managers will have experience in project management and are likely to have a technical background in mechanical or fabrication engineering. The manufacturing manager works onshore. The salary ranges between £25,000 and £35,000.

Production supervisor: The production supervisor leads the team of fabrication staff and organises their workload. One supervisor is required to deliver a contract. Supervisors are experienced members of the fabrication team. The production supervisor works onshore. The salary ranges between £23,000 and £27,000.

CNC machinist: The computer numerical controlled (CNC) machinist operates machinery to make precision components. Several machinists may be required to deliver a contract. This role does not require a formal qualification and entry may be through an apprenticeship or an engineering-related college course. The CNC machinist works offshore. The salary ranges between £18,000 and £27,000 for an experienced machinist.

Press brake operator: The press brake operator runs the industrial machine equipment that makes and processes metal sheeting and parts. Several machine operators may be required. The press brake operator does not require a formal qualification and entry may be through an apprenticeship. The press brake operator works offshore. The salary ranges between £17,000 and £22,000.

Supervisors are experienced members of the fabrication team. The production supervisor works onshore. The salary ranges between £23,000 and £27,000.

CNC machinist: The computer numerical controlled (CNC) machinist operates machinery to make precision components. Several machinists may be required to deliver a contract. This role does not require a formal qualification and entry may be through an apprenticeship or an engineering-related college course. The CNC machinist works offshore. The salary ranges between £18,000 and £27,000 for an experienced machinist.

Press brake operator: The press brake operator runs the industrial machine equipment that makes and processes metal sheeting and parts. Several machine operators may be required. The press brake operator does not require a formal qualification and entry may be through an apprenticeship. The press brake operator works offshore. The salary ranges between £17,000 and £22,000.
Cables deliver the power output from the wind turbines to shore. Array cables connect the turbines to each other and the offshore substation. Export cables connect the onshore and offshore substations. Array cables are manufactured using copper or aluminium cores and include fibre optic cables for data communications. Each turbine has about 1 km of array cable associated with it, depending on turbine size and spacing. Most projects have two or more export cables, but small projects can have just one. 

Cable protection is required to protect cables at vulnerable locations, such as close to shore from wave and tidal action. Key suppliers of cables are JDR Cables Systems (array cables only), Nexans, NKT Cables, KNW (General Cable) and Prysmian. Most cable suppliers also have the capability to install. Cable supply may be contracted separately by the developer or as part of a contract including cable installation.

Splicing
To achieve the length of cable required, smaller manufactured sections of cable may need to be spliced together before cable installation. Cable splicing is most commonly applied at the cable assembly (lay-up) stage of manufacture although in some cases, such as during repair, splicing takes place after lay-up and off-site from manufacturing. Someone living in the Hull and East Riding of Yorkshire area could work for a local company offering cable splicing. The client is the cable supplier. Current suppliers include Nexans, PCL and Prysmian.

Jointing supervisor: The supervisor oversees the work and ensures it is carried out in accordance with health and safety requirements. Several supervisors are employed in-house across all contracts. This role would require a Higher National Diploma (HND) in electrical engineering or equivalent although a position may also be attained through experience as a cable jointer. The jointing supervisor works onshore. The salary ranges between £35,000 and £50,000.

Cable testing engineer: The cable test engineer performs mechanical, electrical, material and dimensional testing of cables. Several engineers are employed in-house across all contracts. A HND or higher in electrical engineering, quality management or other relevant field is desirable. The cable testing engineer works onshore. The salary ranges between £35,000 and £45,000.

Cable jointer: The cable jointer carries out the cable splicing and ensures the joints match the diameter and flexibility of the power cable. Several jointers are employed in-house across all contracts. Academic qualifications are not essential and entry may be through an apprenticeship. Vocational training, such as a City & Guilds qualification in electrical engineering or similar, is an advantage. Training is usually provided by the employer. The cable jointer works onshore. The salary ranges between £25,000 and £40,000.

Storage
Storage of cables and related components is generally carried out near to the port before installation. Specialist equipment is required for the storage and handling of cables. Someone living in the Hull and East Riding of Yorkshire area could work for a local company offering cable storage. The client is the wind farm developer or installation contractors.

Ancillaries
To install and maintain subsea cables, a number of specialised ancillaries are necessary, including pulling heads, armour clamps, repair joints, hang-offs and terminations. Cable ancillaries can be designed and manufactured away from the site of cable manufacturing. Someone living in the Hull and East Riding of Yorkshire area could work for a local company offering design and manufacture of cable ancillaries. The client is the cable supplier. Current suppliers include Prysmian and WT Herley.

Design engineer: Design engineers research and develop components. They also work to improve performance of existing products. Several design engineers may be employed in-house. This role requires a degree in product design engineering or similar. The design engineer works onshore. The salary ranges between £30,000 and £40,000.

Test engineer: The test engineer is responsible for designing and carrying out the quality assurance of manufactured components. Up to two test engineers are required in-house. This role requires a degree or equivalent in design engineering. The test engineer works onshore. The salary ranges between £30,000 and £40,000.
Architectural steel converters. It will also have other facilities such as fire and blast protection systems, substation has electrical components such as the back-up generator, reactive turbines. Offshore substations are usually alternating current (AC) but direct current (DC) is considered for projects further from shore. Depending on the wind farm size, there may be more than one offshore substation.

A substation platform weighs up to 2,000t and may include a helipad. The substation platform supplier is the substation platform supplier. The client is the substation platform supplier. Current suppliers include A G Brown, Allerton Steel and MTL.

Workshop manager: The workshop manager oversees day-to-day operations, managing resources and ensuring safe working. One manager is required to deliver a contract. A college course or an apprenticeship is required. The workshop manager works onshore. The salary ranges between £30,000 and £40,000.

Design assistant: The design assistant uses computer-aided design software to design structures and components for manufacture. Several design assistants may be required to deliver a contract. A college course or an engineering related college course. The design assistant works onshore. The salary ranges between £20,000 to £30,000 for an experienced designer.

Design engineer: The design engineer leads the design team in developing structures and components for manufacture. Several design engineers may be required to deliver a contract. A degree in engineering design and manufacture is required. The design engineer works onshore. The salary ranges between £30,000 and £45,000.

Scaffolder: The scaffolder puts up and takes down scaffolding to allow workers to access external higher levels of structures safely. The role requires carrying a valid Construction Industry Scaffolders Record Scheme (CISRS) card. The scaffolder works onshore. The salary ranges between £15,000 and £18,000.

The offshore substation transforms and transfers the energy collected by the wind turbines. Offshore substations are usually alternating current (AC) but direct current (DC) is considered for projects further from shore. Depending on the wind farm size, there may be more than one offshore substation.

A substation platform weighs up to 2,000t and may include a helipad. The substation platform supplier is the substation platform supplier. The client is the substation platform supplier. Current suppliers include A G Brown, Allerton Steel and MTL.

Workshop manager: The workshop manager oversees day-to-day operations, making efficient use of the shop floor, managing resources and ensuring safe working. One manager is required to deliver a contract. A college course or an apprenticeship is required. The workshop manager works onshore. The salary ranges between £30,000 and £40,000.

Design assistant: The design assistant uses computer-aided design software to design structures and components. Several design assistants may be required to deliver a contract. A college course or an engineering related college course. The design assistant works onshore. The salary ranges between £20,000 to £30,000 for an experienced designer.

Design engineer: The design engineer leads the design team in developing structures and components for manufacture. Several design engineers may be required to deliver a contract. A degree in engineering design and manufacture is required. The design engineer works onshore. The salary ranges between £30,000 and £45,000.

Scaffolder: The scaffolder puts up and takes down scaffolding to allow workers to access external higher levels of structures safely. The role requires carrying a valid Construction Industry Scaffolders Record Scheme (CISRS) card. The scaffolder works onshore. The salary ranges between £15,000 and £18,000.

The offshore substation transforms and transfers the energy collected by the wind turbines. Offshore substations are usually alternating current (AC) but direct current (DC) is considered for projects further from shore. Depending on the wind farm size, there may be more than one offshore substation. A substation platform weighs up to 2,000t and may include a helipad. The substation platform supplier is the substation platform supplier. The client is the substation platform supplier. Current suppliers include A G Brown, Allerton Steel and MTL.
All foundations, but particularly monopiles installed in sandy conditions, may suffer from scour. scour is the erosion of the seabed by waves and tides and causes the base of the foundation or along the cable routes. Rock dumping mitigates the risk but new solutions are still being sought.

Turbine installation always involves a jack-up vessel to minimise the movement of the turbine components during installation lifts. These vessels have been designed specifically for offshore wind use and they typically have an 800t crane or greater. Turbine installation is sensitive to high winds.

All foundations are usually installed using the following:

- Tower, fully assembled with internals
- Nacelle and hub and
- Each blade separately.

Foundation installation is undertaken using a jack-up vessel or a floating heavy lift vessel. Usually, the main structure is lowered over piles that have been driven into place using a re-usable template. Gravity-base foundations have not been used in the UK yet. Future designs will be floated out to site using tugs and ballasted to sink them into position. Rock dumping follows to secure the foundation’s position and stability.

All turbines are usually installed using five lifts:

- Each blade separately.
- Nacelle and hub, and
- Tower, fully assembled with internals.

Vessel maintenance

Vessel maintenance can include engineering and fabrication of new or replacement parts, seawork and welding, pipeworkfitting, carpentry, deck repair, painting and coating, and electrical repairs. Maintenance is carried out while the ships are in a shipyard. Major repairs and service to the vessel hull require a dry dock. Workers usually live close to companies offering vessel maintenance. The client is the vessel owner or operator.

Current suppliers include A&P, Associated British Ports, MSS and MPI Offshore.

In addition to the main engineering managers, several architects may be employed to deliver a contract. A number of architects may have a degree in product management or engineering and must have experience in shipyard processes, ship systems and structures. The marine engineer is responsible for ensuring that all the main components are commissioned. The roles require experience in offshore wind operations and the recruiter is likely to have obtained a qualification in a technical area. The technical recruiter works onshore. The salary for this role ranges from £55,000 to £60,000.

Vessel maintenance is provided by recruitment companies with specialist knowledge of the skilled personnel required by the offshore wind sector. Supplier mobilisation works. The client is the installation contractor.

Current suppliers include Advanced Industrial Solutions, Boston Energy, MHP Offshore and Seajacks.

A shipyard manager works onshore. The salary ranges between £50,000 and £65,000.

Marine engineer:
The marine engineer inspect shipbuilding and repairs of vessels and their equipment, with focus on mechanical systems such as propulsion and steering. Several marine engineers may be employed to deliver a contract. The role requires a degree in marine engineering or similar. The marine engineer works onshore. The salary ranges between £45,000 and £65,000.

The shipyard manager oversees all activities within the shipyard and ensures high levels of safety and efficiency. Two managers are required to deliver a contract. A number of technical recruiters are required to deliver a contract. Two coordinators are required to deliver a contract. No qualifications are required for this role. The logistics coordinator works onshore. The salary ranges between £18,000 and £23,000.

Current suppliers include A&P, Dunston, MMS and Wilton Engineering.

The administrator undertakes a variety of marine fitting duties, including metalwork and carpentry to carry about repair and maintenance duties. Several administrators are required to deliver a contract. An administrator may have a degree in production management or engineering and must have experience in shipyard processes, ship systems and structures. The role requires experience in offshore wind operations and the recruiter is likely to have obtained a qualification in a technical area. The technical recruiter works onshore. The salary ranges from £50,000 to £65,000.

Marine engineer:
The marine engineer inspects and designs repairs of vessels and their equipment, with focus on mechanical systems such as propulsion and steering. Several marine engineers may be employed to deliver a contract. The role requires a degree in marine engineering or similar. The marine engineer works onshore. The salary ranges between £45,000 and £65,000.

The shipyard manager oversees all activities within the shipyard and ensures high levels of safety and efficiency. Two managers are required to deliver a contract. A number of technical recruiters are required to deliver a contract. Two coordinators are required to deliver a contract. No qualifications are required for this role. The logistics coordinator works onshore. The salary ranges between £18,000 and £23,000.

Vessel maintenance

Vessel maintenance can include engineering and fabrication of new or replacement parts, seawork and welding, pipeworkfitting, carpentry, deck repair, painting and coating, and electrical repairs. Maintenance is carried out while the ships are in a shipyard. Major repairs and service to the vessel hull require a dry dock. Workers usually live close to companies offering vessel maintenance. The client is the vessel owner or operator.

Current suppliers include A&P, Associated British Ports, MHS and MPI Offshore.

In addition to the main engineering managers, several architects may be employed to deliver a contract. A number of architects may have a degree in product management or engineering and must have experience in shipyard processes, ship systems and structures. The marine engineer is responsible for ensuring that all the main components are commissioned. The roles require experience in offshore wind operations and the recruiter is likely to have obtained a qualification in a technical area. The technical recruiter works onshore. The salary for this role ranges from £55,000 to £60,000.

Vessel maintenance is provided by recruitment companies with specialist knowledge of the skilled personnel required by the offshore wind sector. Supplier mobilisation works. The client is the installation contractor.

Current suppliers include Advanced Industrial Solutions, Boston Energy, MHP Offshore and Seajacks.

A shipyard manager works onshore. The salary ranges between £50,000 and £65,000.

Marine engineer:
The marine engineer inspects shipbuilding and repairs of vessels and their equipment, with focus on mechanical systems such as propulsion and steering. Several marine engineers may be employed to deliver a contract. The role requires a degree in marine engineering or similar. The marine engineer works onshore. The salary ranges between £45,000 and £65,000.

The shipyard manager oversees all activities within the shipyard and ensures high levels of safety and efficiency. Two managers are required to deliver a contract. A number of technical recruiters are required to deliver a contract. Two coordinators are required to deliver a contract. No qualifications are required for this role. The logistics coordinator works onshore. The salary ranges between £18,000 and £23,000.
Cable installation

Cables are installed using specialist cable vessels equipped with cable-handling equipment. The cables may be laid and buried in a single process using a cable plough or in two stages in which a first vessel lays the cable and a second vessel buries the laid cable using a remotely operated vehicle (ROV). The cable may be carried as long lengths and cut to size at each location or pre-cut onshore. Once the cables are pulled in to the base of the turbine tower, they are terminated and tested. Although the large cable manufacturers have their own vessels, the work is typically undertaken by specialist contractors. These contractors also work in the oil and gas and telecommunications market but offshore wind is an increasingly important part of their business.

Termination and testing

Termination provides the mechanical and electrical connection of the array cables to the turbines. Testing verifies that the cables have not been damaged during installation. The worker location is not significant. Someone living in the Hull and East Riding of Yorkshire area could work for a non-local company offering termination and testing. Current suppliers are IDS Group and H&Askham. These are highly specialist companies. The client is normally the cable installation contractor, although it can be the project developer.

Project manager and project supervisor: The manager is responsible for personnel safety, client interface and team performance. The supervisor manages day-to-day operations, such as material loading, equipment calibration and certification of personal protective equipment. Successful completion of vocational training or an apprenticeship is required to deliver a contract. Experience is required and project management qualifications are desirable. The manager and supervisor work both onshore and offshore. The salaries range between £50,000 and £75,000.

Cable jointer: The jointer acts as the onshore team leader and terminates and tests the cable cores. Four jointers are typically required to deliver a contract. Academic qualifications are not essential, but the successful completion of vocational training or an apprenticeship is desirable. Training is usually provided by the employer. The cable jointer’s role involves the design and construction of cable systems. Trekker and Veth, Tekmar and Trelleborg. These are highly specialist companies. The client is normally the developer or as part of a contract including cable supply.

Senior project engineer: The senior project engineer manages the day-to-day operations to deliver projects on time and on budget. They interface with the client, manage a team of project engineers and work closely with the lead design engineers to identify the critical cable solutions that best meet the client’s technical requirements. A degree in engineering is required alongside a higher national certificate or higher national diploma in technical engineering. The senior project engineer works offshore. The salary range between £30,000 and £40,000.

Lead design engineer: The lead design engineer produces documents, diagrams and layouts in compliance with client’s requirements and industry standards. They also use failure mode and effects analysis (FMEA) to evaluate the design of components and assemblies. A degree in mechanical engineering is required, along with proficiency in computer-aided design software. The lead design engineer works offshore. The salary ranges between £20,000 and £30,000.

Cable protection systems

Cable protection systems protect subsea cables in offshore wind and oil and gas industries. Protection can include cable burial, cable route avoidance, cable pull-in and cable trailing. There is potential for further work in the oil and gas and telecommunications market but offshore wind is an increasingly important part of their business.

Remote operated vehicle services

ROVs may perform pre-lay inspection surveys of the cable route, dig the trench and inspect the trenching equipment as the cable is being buried into the sea bed. The worker location is not significant. Someone living in the Hull and East Riding of Yorkshire area could work for a non-local company offering remote operated vehicle services. Current suppliers include Fugro Subsea, Modus and ROVOP. These are typically highly specialist companies. The client is normally the cable installation contractor.

Project manager: The manager co-ordinates work between the client and the vessel crew. One position is typically required to deliver a contract. No technical knowledge is required, but project management qualifications are desirable. The manager works onshore and offshore. The salary ranges between £50,000 and £70,000.

ROV pilot: The pilot operates the ROV underwater from the vessel. This involves operating cameras and robotic arms and judging site conditions to adjust the dive plan. The pilots complete 12-hour shifts and are rotated on a monthly basis. Two positions are typically required to deliver a contract. No specific qualifications are required and training is provided by the employer. Many pilots have previous experience in the Royal Air Force or Navy. The ROV pilot works offshore. The salary ranges between £40,000 and £50,000.

Vessel supervisor: The vessel supervisor supports the project manager in co-ordinating work between the installation contractor and the vessel crew. Two positions are generally required to deliver a contract. No technical knowledge is required, but project management qualifications are desirable. The vessel supervisor works both onshore and offshore. The salary ranges between £35,000 and £45,000.

Sub-contractor: The engineer maintains and repairs equipment on the ROV. Six to eight positions are typically needed to deliver a contract. Degree level engineering qualifications are required. The ROV sub-contractor works offshore. The salary ranges between £25,000 and £45,000.
During the installation of an offshore wind farm there are many activities which support the developer, the wind turbine manufacturer and main installation contractor to complete installation efficiently and safely. Support services include unexploded ordnance (UXO) surveys and removal, the supply of guard vessels, oil clean-up services, the supply of fuel, waste disposal and insurance. Some functions are provided by local companies, while others are supplied by highly specialist companies that work nationally and internationally.

UXO surveys and removal
UXO are denuclear explosives. Usually bathymetric surveys and desktop studies will be completed prior to project development advice on UXO locations. These early activities may inform whether and how UXO will be removed. If significant UXO are found, these can often be collected with the geophysical and geochemical surveys. Further detailed UXO surveys are undertaken at the wind farm site and the cable route before the installation of turbines and balance of plant. When potential UXO are detected, companies assess, locate or remove the UXO in an approved manner subject to the client’s requirements. Remotely operated vessels (ROVs), offshore divers and underwater electromagnetic are used to detect UXO. Sometimes UXO are detected at a site and then forgotten about. Sometimes UXO divers will consider repositioning wind farm components. Processes are put in place during destruction to monitor and act on the marine environment, for example bubble curtains are used to help marine mammals and fish. The companies are highly specialist. The client can be the wind farm owner or an installation contractor.

Current suppliers include 6 Alpha Associates, Bactec, DCMC, Fugro, Cardine and James Fisher Subsea.

UXO diver: The UXO diver supports the explosive ordnance disposal (EOD) on-site surveys to identify and confirm UXO locations. As well as a qualification in EOD, the diver must also have a valid dive ticket and Global Maritime Distress and Safety System (GMDSS) General Operators Certificate (GOC). The master is also required to complete a stability course, a Maritime and Coastguard Agency (MCA) Approved Engine Course (AEC) or Marine Engine Operator Licence (MEOL). The master works offshore. The salary ranges between £35,000 and £40,000.

EOD site manager: The EOD site manager is responsible for the team of EOD engineers and divers during on-site surveys. The manager also reports on health and safety, interfaces with clients and organises the maintenance and repair of survey and disposal equipment. An advanced qualification in EOD is required. Typically, this qualification is gained through experience in the military, or can be gained through an International School for Security and Explosives Education (ISSEE) course. The EOD site manager works offshore. The salary range between £40,000 and £50,000.

EOD engineer: The EOD engineer undertakes non-intrusive and intrusive on-site surveys. The engineer will check and confirm UXO locations. As well as a qualification in EOD, the engineer must also have a valid dive ticket and Global Maritime Distress and Safety System (GMDSS) General Operators Certificate (GOC). The master is also required to complete a stability course, a Maritime and Coastguard Agency (MCA) Approved Engine Course (AEC) or Marine Engine Operator Licence (MEOL). The master works offshore. The salary ranges between £35,000 and £40,000.

Oil spill clean-up
During installation, oil spills can occur from vessels themselves, or during the change of oil for turbine components. Spills can also occur within ports and harbours during the transfer of oil between vessels. Specialist oil spill clean-up companies put in place measures to limit the amount of pollution entering the sea. They must typically to respond within 24 hours. Responding to oil spills at sea usually uses one of three techniques: burning, dispersion or skimming. Burning, where the fuel or oil is heated on the surface and burns, or UV light. Dispersion is applied by spraying oil dispersant over the spill. Skimming uses boats and equipment to remove layers of oil from the surface. The method used depends on the weather conditions, the extent of the spill and the type of oil. The client can be any company involved in the development, installation or operation of the wind farm, for example the developer, an installation contractor or a port authority.

Current suppliers include Briggs Marine and Environmental Services, and SMIT Salvage.

Oil spill team leader: The oil spill team leader interfaces with the client and manages a team of oil spill responders. They ensure the team has the correct equipment and carry out procedures in line with current legislation. One team leader is required per oil spill response. The oil spill team leader must also be on-call for future work. Maritime and Coastguard Agency (MCA) certification is required. In-house training is also provided by employers. An oil spill team leader is expected to have 5 to 10 years experience as an oil spill responder. The oil spill team leader works offshore. The salary ranges between £35,000 and £40,000.

Oil spill responder: The oil spill responders are also known as oil spill team members or spill responders. The oil spill team members are responsible for the day-to-day tasks of responding to oil spills. The responders are usually deployed as part of a larger team. They must typically to respond within 24 hours. Responding to oil spills at sea usually uses one of three techniques: burning, dispersion or skimming. Burning, where the fuel or oil is heated on the surface and burns, or UV light. Dispersion is applied by spraying oil dispersant over the spill. Skimming uses boats and equipment to remove layers of oil from the surface. The method used depends on the weather conditions, the extent of the spill and the type of oil. The client can be any company involved in the development, installation or operation of the wind farm, for example the developer, an installation contractor or a port authority.

Current suppliers include Briggs Marine and Environmental Services, and SMIT Salvage.

Oil spill team leader: The oil spill team leader interfaces with the client and manages a team of oil spill responders. They ensure the team has the correct equipment and carry out procedures in line with current legislation. One team leader is required per oil spill response. The oil spill team leader must also be on-call for future work. Maritime and Coastguard Agency (MCA) certification is required. In-house training is also provided by employers. An oil spill team leader is expected to have 5 to 10 years experience as an oil spill responder. The oil spill team leader works offshore. The salary ranges between £35,000 and £40,000.

Oil spill responder: The oil spill responders are also known as oil spill team members or spill responders. The oil spill team members are responsible for the day-to-day tasks of responding to oil spills. The responders are usually deployed as part of a larger team. They must typically to respond within 24 hours. Responding to oil spills at sea usually uses one of three techniques: burning, dispersion or skimming. Burning, where the fuel or oil is heated on the surface and burns, or UV light. Dispersion is applied by spraying oil dispersant over the spill. Skimming uses boats and equipment to remove layers of oil from the surface. The method used depends on the weather conditions, the extent of the spill and the type of oil. The client can be any company involved in the development, installation or operation of the wind farm, for example the developer, an installation contractor or a port authority.

Current suppliers include Briggs Marine and Environmental Services, and SMIT Salvage.

Guard vessels
Guard vessels provide a safety function during offshore installation. This includes ensuring safe navigation and recording traffic data. Low cost vessels are often used and they often work across other sectors, for example fishing, oil and gas, or dredging. Crew transfer vessels (CTVs) can be also used and they will often perform more than one role. These vessels are required to be on board the guard vessel. The vessels service 24/7, usually with a monthly crew rotation. The client can be the wind farm owner or an installation contractor.

Current suppliers include Eastern Marine Services, Cardine, Minorise Offshore, offshore Marine Management and Wandelwerd support.

Master: The master is in command of the vessel and crew. They perform safety checks and complete the necessary paperwork. The master must have certifications in Standards of Training, Certification and Watch Keeping for Seafarers (STCW) to at least Master 200GT (STCW III), along with an E1C medical, STCW5 basic training and a GMDSS general communication certificate, for example Global Maritime Distress and Safety System (GMDSS) General Operators Certificate (GOC). The master is also required to complete a stability course, a Maritime and Coastguard Agency (MCA) Approved Engine Course (AEC) or Marine Engine Operator Licence (MEOL). The master works offshore. The salary ranges between £35,000 and £50,000.

Mate: The mate navigates the vessel. The mate reports to the master and works with the deckhand to ensure duties on board are completed. The mate requires an E1C medical and STCW5 basic training, along with a MCA AEC or MEOL. Certification in STCW III is desirable. The mate works offshore. The salary ranges between £30,000 and £35,000.

Deckhand: The deckhand performs regular duties on board the vessel, for example maintenance of equipment and preparing reports. The deckhand also plays a large role in ensuring the safety of the vessel. They require an E1C medical and STCW5 basic training, along with an MCA AEC or MEOL. Certification in STCW III is desirable. The deckhand works offshore. The salary ranges between £25,000 and £30,000.

These job roles are also required for CTV and service operation vessel (SOV) operations.
Wind farm operations

Operations are the actions of providing support during the lifetime of the wind farm to ensure maximum energy production. Wind farms typically have an operating lifetime of 20 to 25 years. The operation of a wind farm is managed from an onshore base. Typically, wind farm operations include day-to-day workflow management and the use of software systems are needed to make sure that all the elements are available at the right time for effective proactive maintenance or reactive service or repair.

Operations controller:
The operations controller manages a team of control room technicians who remotely monitor the wind farm 24/7, 365 days of the year. The controller manages the day-to-day work of the team and ensures they follow procedures and testing. An academic degree in an engineering subject is desirable. The salary ranges between £40,000 and £50,000.

Control room technician:
The technician remotely monitors the wind farm 24/7, 365 days of the year, responds to system faults and communicates with personnel and contractors undertaking maintenance and service work at the wind farm. Around five technicians are required to operate a wind farm. The technicians work onshore. The salary ranges between £35,000 and £45,000.

Asset integrity manager:
The asset integrity manager plans, budgets and forecasts costs associated with the maintenance and service of the turbine and balance of plant. They work closely with the operations and maintenance manager and work onshore. An academic degree in an engineering subject is desirable. The salary ranges between £55,000 and £65,000.

Operations and maintenance manager:
The operations and maintenance manager gives technical and commercial support to the project to ensure successful operations of the wind farm. The manager is based onshore. An academic degree in an engineering subject is required. The salary ranges between £35,000 and £45,000.

Communications and SCADA International.

Wind farm supervisory control and data acquisition and network communications

SCADA is a computer system used to monitor and control the wind farm during operation, maintenance and services. The services can be provided by the wind farm owner, the turbine manufacturer or a third-party service provider. If the service is provided by the turbine manufacturer or third party service provider, the client is the wind farm owner.

Data communications, for example through fibre optic cables, enable data to be transferred from the operating wind farm components (for example, from the wind turbines and offshore substations) to the onshore control room for processing.

Wind farm communications networks are supplied and supported by a wide range of different organisations which include multi-nationals such as ABB, Schneider and Siemens, and SMEs such as ACEDA, Cobham Wireless, Computer Service Centre (Norwich), Colchester Communications and SCADA International. Wind farm communications networks are supplied and supported by a wide range of different organisations which include multi-nationals such as ABB, Schneider and Siemens, and SMEs such as ACEDA, Cobham Wireless, Computer Service Centre (Norwich), Colchester Communications and SCADA International. Wind farm supervisory control and data acquisition and network communications

Wind farm supervisory control and data acquisition and network communications

SCADA is a computer system used to monitor and control the wind farm during operation, maintenance and services. The services can be provided by the wind farm owner, the turbine manufacturer or a third-party service provider. If the service is provided by the turbine manufacturer or third party service provider, the client is the wind farm owner.

Data communications, for example through fibre optic cables, enable data to be transferred from the operating wind farm components (for example, from the wind turbines and offshore substations) to the onshore control room for processing. The data communications network technician works onshore. The salary ranges between £30,000 and £50,000.

SCADA software developer:
The SCADA software developer adds functionality to the existing SCADA software to improve its ability to monitor and control the wind farm. A degree in computer science or software engineering is required and specific wind turbines SCADA experience is desirable. The SCADA software developer works onshore and offshore. The salary ranges between £25,000 and £35,000.

Communications network technician:
The communications network technician installs and maintains the communications network infrastructure. These networks operate over a range of media including fibre optics, satellite, point-to-point wireless, mesh radio networks and virtual private networks delivered by other third-party companies. An HNC in computer systems, network support or similar is required. Manufacturer-specific training, such as a Cisco Certified Internetwork Expert (CCIE) certification, may be needed. The communications network technician works onshore and offshore. The salary ranges between £25,000 and £45,000.

Electronic or mechanical design engineer:
The electronic or mechanical design engineer designs and develops electronic components for communication tools. This includes using computer-aided design software to prepare technical drawings of innovative ideas. A degree in electronic, electrical or mechanical engineering is required. The electronic or mechanical design engineer works onshore. The salary ranges between £25,000 and £45,000.

Crosscutting: Communications

Communication tools, for example satellites and radios, connect offshore workers with each other and those onshore. They are required for two main reasons, first for health and safety, and second to increase the efficiency of those working on the wind farm.

Current suppliers of communication tools include Cobham Wireless, Foresat 55 and Sams Maritime.

Electronic or mechanical design engineer: The electronic or mechanical design engineer designs and develops electronic components for communication tools. This includes using computer-aided design software to prepare technical drawings of innovative ideas. A degree in electronic, electrical or mechanical engineering is required. The electronic or mechanical design engineer works onshore. The salary ranges between £25,000 and £45,000.

Crosscutting: Communications

Communication tools, for example satellites and radios, connect offshore workers with each other and those onshore. They are required for two main reasons, first for health and safety, and second to increase the efficiency of those working on the wind farm.

Current suppliers of communication tools include Cobham Wireless, Foresat 55 and Sams Maritime.

Electronic or mechanical design engineer: The electronic or mechanical design engineer designs and develops electronic components for communication tools. This includes using computer-aided design software to prepare technical drawings of innovative ideas. A degree in electronic, electrical or mechanical engineering is required. The electronic or mechanical design engineer works onshore. The salary ranges between £25,000 and £45,000.

Crosscutting: Communications

Communication tools, for example satellites and radios, connect offshore workers with each other and those onshore. They are required for two main reasons, first for health and safety, and second to increase the efficiency of those working on the wind farm.

Current suppliers of communication tools include Cobham Wireless, Foresat 55 and Sams Maritime.

Electronic or mechanical design engineer: The electronic or mechanical design engineer designs and develops electronic components for communication tools. This includes using computer-aided design software to prepare technical drawings of innovative ideas. A degree in electronic, electrical or mechanical engineering is required. The electronic or mechanical design engineer works onshore. The salary ranges between £25,000 and £45,000.

Crosscutting: Communications

Communication tools, for example satellites and radios, connect offshore workers with each other and those onshore. They are required for two main reasons, first for health and safety, and second to increase the efficiency of those working on the wind farm.

Current suppliers of communication tools include Cobham Wireless, Foresat 55 and Sams Maritime.

Electronic or mechanical design engineer: The electronic or mechanical design engineer designs and develops electronic components for communication tools. This includes using computer-aided design software to prepare technical drawings of innovative ideas. A degree in electronic, electrical or mechanical engineering is required. The electronic or mechanical design engineer works onshore. The salary ranges between £25,000 and £45,000.

Crosscutting: Communications

Communication tools, for example satellites and radios, connect offshore workers with each other and those onshore. They are required for two main reasons, first for health and safety, and second to increase the efficiency of those working on the wind farm.
Turbine maintenance

Turbine planned maintenance typically involves a planned visit to each turbine once or twice a year. During these visits, technicians carry out inspection and maintenance activities including checks on oil and grease levels, instruments, electrical terminations the tightness of bolts, and a change of filters. Unplanned service involves technician visits to a turbine in response to an alarm or for turbine repairs and enhanced supervisory control and data acquisition (SCADA) system. Such visits can require the simple resetting of a circuit breaker on a piece of auxiliary plant such as a cooling fan, or as serious as replacing the main gear box or generator following a failure that cannot be repaired offshore.

Typically, turbines are supplied with a five-year service agreement and wind turbine manufacturers provide full turbine maintenance services during this period. Sometimes the service agreement can be for as long as 15 years. At the end of the service agreement, the wind farm owner or operator, or supplied through third party service providers that include 3Sun Group, Boston Energy, CWind, GEV Group and CLS Global Solutions. These service agreements cover different aspects of the wind farm’s operation and maintenance. The technician will also need offshore certificates, such as working at height and sea survival. Five years’ supervisory experience is desirable. The site supervisor works offshore and the typical salary ranges from £30,000 and £50,000.

Turbine wind turbine technician: The wind turbine technician maintains electrical and mechanical components on the wind turbine. They complete regular check-ups on components to ensure they are working correctly and respond quickly to faults. A degree, HNC or HND in mechanical, electrical or electronic engineering is required, although an apprenticeship may be sufficient, for example a modern apprenticeship in wind turbine operation and maintenance. The technician requires Math, Science and English GCSEs grades A-C and at least one year of hands on experience. The typical salary ranges from £20,000 and £35,000 depending on experience and level.

Blade inspection and repair

Blades need to be kept in good condition in order to continue producing energy efficiently. Blades experience physical damage such as through fatigue loading (if there is an underlying fault in the blade) and lightning strikes during operations. Blades also experience chemical and biological damage from the marine environment, for example abrasion from high-speed water droplets and other airborne particles, and salt corrosion. Technicians, and increasingly unmanned aerial vehicles, inspect blades offshore. Technicians use rope access to inspect the blades and determine the best approach to repair the type of damage and the best approach to rope access is determined on site but in some cases the blade is taken down and repaired onboard. Location work is not significant. Someone living in Hull and working in the area could work for a non-local company. The salary ranges between £25,000 and £35,000.

Blade inspection and repair technician: The rope access and blade repair technician needs to be able to work both offshore and onshore. They will have rope access and blade repair experience, and at least one year of hands on experience. The manager works mostly onshore. The salary ranges between £50,000 and £70,000.

Rope access and blade repair manager: The rope access manager ensures that technicians adhere to health and safety practices. They will need a GCSE in General, Science, English, and either Accounting or Mathematics and the appropriate IOSH certificate. Rope Access Trade Association (IRATA) Level 3 Certification is required along with industry specific training on blade inspection and repair, and at least one year of hands on experience. The manager works mostly onshore. The salary ranges between £50,000 and £70,000.

Blade inspection and repair supervisor: The rope access supervisor ensures the inspection and repair work is completed to IRATA International Code of Practice (ICOP) specifications. They supervise rope access and blade repair technicians. Supervisors need IRATA Level 3 Certification along with industry specific training on blade inspection and repair, and at least one year of hands on experience. The supervisor works offshore. The salary ranges between £30,000 and £50,000.

Statutory inspections

Statutory inspections includes the checking, maintenance and repair of personnel lifts, cranes, lifting equipment and fire safety equipment housed inside the turbine. The lift technician will fix both mechanical and electrical faults. A certification in lift engineering is required, for example level 3 NVQ Lift Access Trade Association (FIA). The fire safety technician works offshore. The salary ranges between £20,000 and £30,000.

Engineer, or a HNC or HND in mechanical, electrical or electronic engineering. The lift technician works offshore. The salary ranges between £20,000 and £35,000.

Lift technician: The lift technician supervises and oversees the lifts serving the turbine. They will have lift technology experience, or a relevant degree, diploma or NVQ Level 3 in Lift Engineering, or a HNC or HND in mechanical, electrical or electronic engineering. The lift technician works offshore. The salary ranges between £20,000 and £35,000.

Fire safety technician: The fire safety technician tests fire safety equipment to ensure it fits for purpose. A theory and practical certificate in the servicing of fire extinguishers from a recognised organisation is required, for example from British Approvals for Fire Equipment (BAFE), the British Fire Consortium (BFC) or the Fire Industry Association (FIA). The fire safety technician works offshore. The salary ranges between £20,000 and £35,000.

Fire safety technician: The fire safety technician tests fire safety equipment to ensure it fits for purpose. A theory and practical certificate in the servicing of fire extinguishers from a recognised organisation is required, for example from British Approvals for Fire Equipment (BAFE), the British Fire Consortium (BFC) or the Fire Industry Association (FIA). The fire safety technician works offshore. The salary ranges between £20,000 and £35,000.

Lift technician: The lift technician supervises and oversees the lifts serving the turbine. They will have lift technology experience, or a relevant degree, diploma or NVQ Level 3 in Lift Engineering, or a HNC or HND in mechanical, electrical or electronic engineering. The lift technician works offshore. The salary ranges between £20,000 and £35,000.
Foundations for wind turbines and offshore substation bases require structural inspection and maintenance on a regular basis. The rise of atmospheric, marine and biological corrosion can cause damage that is both expensive and difficult to repair. Inspections map the thickness of the foundations, check seals and corrosion projects, take silt samples and check scour (erosion of the seabed). Inspections can be completed by commercial divers, video or remotely operated vehicles (ROVs). ROV technology is used for structures, for example boat landing systems, ladders and railings, are inspected in addition to the main foundation structure.

Diving services © Reach Engineering & Diving Services Ltd

Foundation inspection, repair and maintenance

Foundations need to be inspected regularly for marine growth, corrosion, paint condition and scour. Inspection can be completed using planned inspection campaigns or one-off inspections.

There may be little demand for newly trained divers because there is a surplus of experienced divers in the oil and gas industry and the skills can be easily transferred. The industry is looking towards more safety-innovative ways of inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.

Diver: The diver inspects the foundation and determines if repair work is necessary. Two positions are typically required to complete the work. The supervising diver is required for the installation of the foundations. The supervising diver is responsible for inspecting, repairing and maintenance by using ROVs instead of divers. The client is normally the developer, operations, maintenance and service (OMS) contractors. Divers tend to complete inspection, repair and maintenance over a three to four month period in the summer when weather conditions are more favourable.

Current suppliers include Briggs Marine Contractors, FoundOcean, Reach Engineering & Diving Services (REDS) and ProServ.
During the operation of a wind farm, components need maintaining or replacing quickly to reduce lost energy production. If spares are transported to the wind farm by CTVs or SOVs, the vessel must be located close to the onshore base and loaded onto the SOV or CTV on a regular (usually daily) basis. Workers typically work locally to the offshore base or a non-local company. For CTVs it may be more preferable for workers to be employed locally, although someone living in Hull and East Riding of Yorkshire could be employed by a non-local company.

The warehouse operative position requires a strong understanding of health and safety and experience with computer management software are desirable. If using CTMs, the warehouse operative works onshore. If using SOVs, the warehouse operative may work both onshore and offshore. The salary ranges between £10,000 and £20,000.

CTVs and SOVs are the vessels used to move personnel and spares from shore to and within the wind farm. The operation of the vessels requires meticulous organisation of the supply chain to keep the CMS strategy efficiently. It is necessary to follow a regular vessel maintenance programme such as inspecting the hull for exterior damage and checking the engine and communication tools are working properly.

Vessel operations and maintenance

Marine coordination

Marine coordination is the organisation of personnel and vessels moving from the onshore base to the offshore wind farm. Weather conditions, visibility and tides are monitored daily in order to coordinate efficiently. It is a 24-hour service. The marine coordinator works onshore. The salary ranges between £40,000 and £50,000.

CTVs and Service operation vessels (SOVs) are the vessels used to move personnel and spares from shore to and within the wind farm. The operation of the vessels requires meticulous organisation of the supply chain to keep the CMS strategy efficiently. It is necessary to follow a regular vessel maintenance programme such as inspecting the hull for exterior damage and checking the engine and communication tools are working properly.
With an investment of £25.7m, the programme, which is supported by the Government’s Regional Growth Fund, is designed to capitalise on the renewable energy opportunities. It aims to develop indigenous business growth within the sector and secure long-term economic growth and employment for the region.

A programme of activity is delivered through six business strands, supporting development in all aspects of the renewables industry, including:

**Employment and Skills Development**

The aim of this strand is to provide employment and skills support to the renewables sector and any sectors affected by the employment churn arising from renewables sector investment. Funding is available in the form of:

- **Apprenticeship Wage Subsidies** - for employees working towards any framework or standard at Level 3 or above
- **Up-Skilling Training Subsidies** - to cover 50% of the cost of training at Level 3 or above for your existing workforce.
- **Wage Subsidies for Disadvantaged Groups** - cover 20% of the wages costs for employees from disadvantaged groups including those who have been unemployed for six months or more.

In addition, The Pathway to Employment Project is designed to help long-term unemployed people gain the skills and work experience they need to access employment in the renewables and manufacturing sectors. Over a 10-week course (five weeks training and five weeks work placement) beneficiaries will receive the national minimum wage and increase their opportunities for a permanent position.

For further information contact:
The Green Port Hub on 01482 613875

**Business Support and Advice**

The Business Support Team provides continual support to assist local businesses to access opportunities within the renewables sector supply chain. The programme provides:

- Tailored support and access to financial assistance to support individual company development plans
- Information on developments and opportunities within the renewables sector
- Dedicated Supply Chain Coordinator, facilitating business connections
- Collaboration with like-minded people
- An open door to a network of industry contacts and specialists

For further information contact:
The Business Support Team on 01482 391639

In addition, we also have Research, Development and Innovation specialists based at the University of Hull who provide:

- Renewable energy R&D experience and expertise
- Support to companies in securing external R&D financing
- Assistance with the identification and protection of intellectual property for new products or service development.

As well as a scheme that offers Capital Grants to businesses to support sustainable investment into the renewable energy sector.

For information on the full Green Port Growth Programme go to: www.greenporthull.co.uk

---

**Practical steps to a career in renewables**

There are many things you can do to research potential roles within the renewables industry and understand the skills needed to build your career in this sector. Below is a list of ways to find out more:

- Register to receive trade magazines and publications
- Use online search engines to research companies in the sector
- Attend local recruitment open days
- Register on specialist recruitment websites to receive updates
- Use Social media – Facebook, LinkedIn and Twitter to research key contacts and join specialist interest groups
- Attend sector conferences and trade shows
- Speak to local employers
- Read online literature and fact sheets and media sources such as reNEWS and OffshoreWIND.biz
- Register to receive updates from online jobs boards and search engines
- Speak to your school careers adviser
- Look out for employer open days or school/college visits
- Speak to family and friends who may have knowledge of the sector
- Seek opportunities for work experience via your school or college
- Visit www.renewableuk.com
- Visit https://nationalcareerservice.direct.gov.uk
- Ensure your CV is up to date and highlights the transferable skills for the sector

**Green Port Hull**

Situated in Hull’s Central Library, the Green Port Hull Hub provides residents and businesses in Hull and East Yorkshire with access to information on the region’s emerging renewables energy sector.

**Green Port Growth programme**

www.greenporthull.co.uk

**The Hub**

Green Port Careers and Information Centre
Hull Central Library
Albion St
Hull
HU1 3TF

**Telephone**

01482 613875

**Green Port Growth**

With an investment of £25.7m, the programme, which is supported by the Government’s Regional Growth Fund, is designed to capitalise on the renewable energy opportunities. It aims to develop indigenous business growth within the sector and secure long-term economic growth and employment for the region.

A programme of activity is delivered through six business strands, supporting development in all aspects of the renewables industry, including:

**Employment and Skills Development**

The aim of this strand is to provide employment and skills support to the renewables sector and any sectors affected by the employment churn arising from renewables sector investment. Funding is available in the form of:

- Apprenticeship Wage Subsidies - for employees working towards any framework or standard at Level 3 or above
- Up-Skilling Training Subsidies - to cover 50% of the cost of training at Level 3 or above for your existing workforce.
- Wage Subsidies for Disadvantaged Groups - cover 20% of the wages costs for employees from disadvantaged groups including those who have been unemployed for six months or more.

In addition, The Pathway to Employment Project is designed to help long-term unemployed people gain the skills and work experience they need to access employment in the renewables and manufacturing sectors. Over a 10-week course (five weeks training and five weeks work placement) beneficiaries will receive the national minimum wage and increase their opportunities for a permanent position.

For further information contact:
The Green Port Hub on 01482 613875
Offshore wind packages and their inclusion in the guide

<table>
<thead>
<tr>
<th>Sector</th>
<th>Packages</th>
<th>Included</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development and project management</td>
<td>Wind farm design</td>
<td>×️</td>
<td>Conductively well-established engineering considerations; one of which has a significant local presence</td>
</tr>
<tr>
<td>Development strategy and planning</td>
<td>Large scale survey; more companies to be surveyed; contractor to be selected</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Stakeholder engagement</td>
<td>Functions typically completed during developer or with small-scale local support</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Procurement</td>
<td>Functions typically completed in-house by developer</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Project management</td>
<td>Functions typically completed in-house by developer</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Operations, maintenance and works</td>
<td>Turbine operations</td>
<td>✔️</td>
<td>Functions typically contracted close to wind farm.</td>
</tr>
<tr>
<td>Turbine</td>
<td>Turbine rotor supply (including blades)</td>
<td>✔️</td>
<td>Functions typically contracted close to wind farm.</td>
</tr>
<tr>
<td>Turbine inside supply and assembly</td>
<td>Local supply potential only following mixed investment, which is unlikely</td>
<td>×️</td>
<td></td>
</tr>
<tr>
<td>Foundation supply</td>
<td>Several functions have the potential for local supply</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Cable supply</td>
<td>Several lower tier functions have the potential for local supply</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Substation supply</td>
<td>Several lower tier functions have the potential for local supply</td>
<td>✔️</td>
<td></td>
</tr>
</tbody>
</table>

## Acknowledgements

Green Port Hull and BVG Associates would like to thank the following companies for their support in the preparation of this guide:

- Advanced Industrial Solutions (AIS) Training
- Associated British Ports
- Allerton Steel
- AMEC Foster Wheeler
- AP Worksheet
- Arco
- Barths Pelagic Solutions
- Briggs Marine Contractors
- Briggs Marine and Environmental Services
- Carlton Shipping
- Complete Training Solutions
- CWind
- EDS Group
- FarolS
- Fugro
- GPMC
- Green Marine Solutions
- Maersk Offshore
- Marine Rescue Technologies
- Multin
- PCLS
- Pipex
- ProServ
- REDS
- Renewable Parts
- Windpower Support

## Images

- Meerwind cables: © Steve Morgan, www.stevemorganphoto.co.uk
- Crew transfer at Lynn and Inner Dowsing wind farm: © Centrica Energy
- Gwynt y Môr jack-up vessel: © Innogy SE