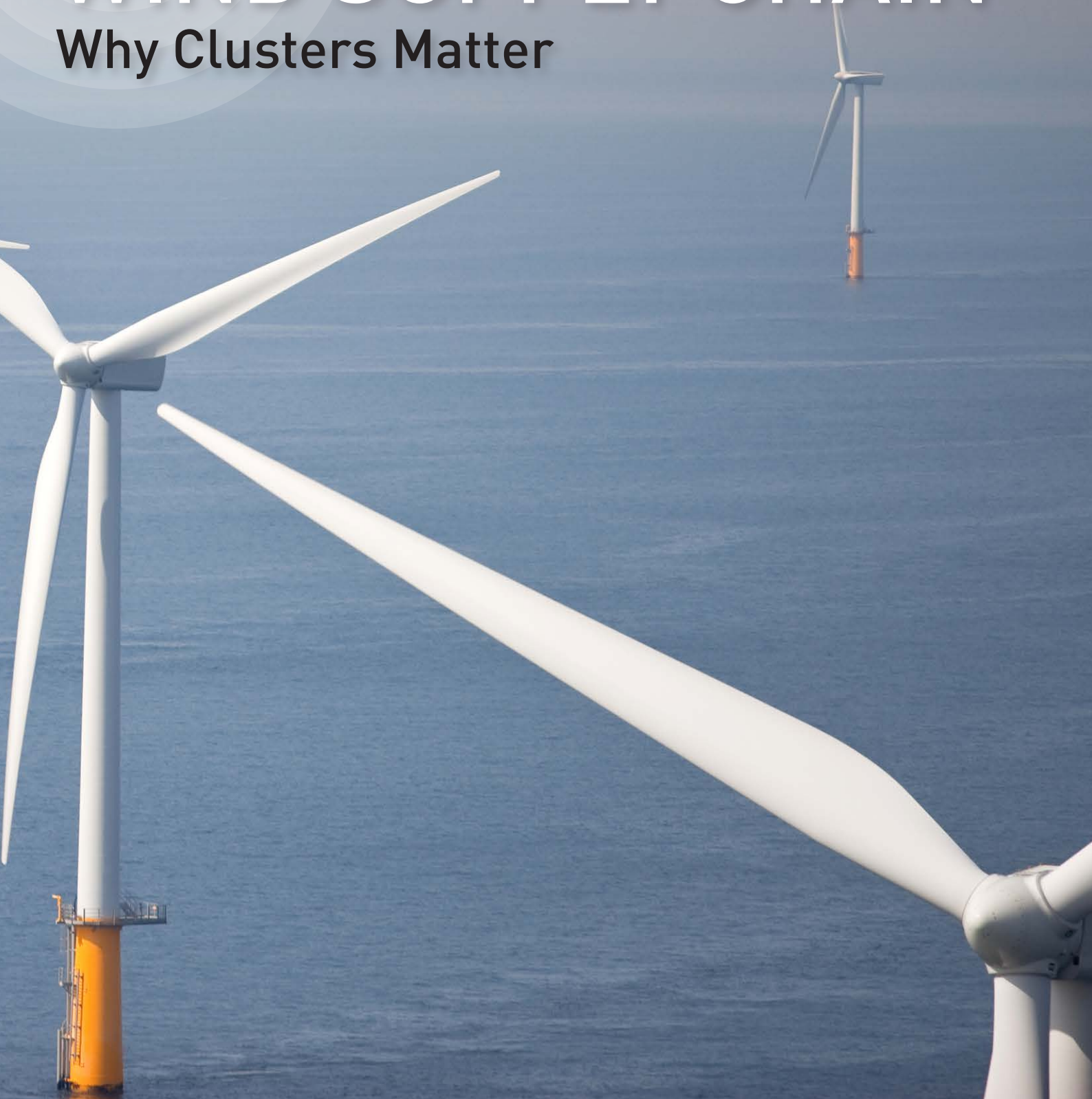


# THE UK OFFSHORE WIND SUPPLY CHAIN

## Why Clusters Matter



A Brookfield Ports Company

Research and analysis provided by



## About the research

This report analyses the rationale behind establishing clusters of offshore wind technology, equipment and services companies. It also examines the optimal strategic location for offshore wind clusters in the UK as well as those areas within the supply chain where investment is required most urgently.

The findings are based on a survey of over 70 senior executives in the European offshore wind sector, which was completed in March 2013. The survey and report was written by Clean Energy Pipeline, a specialist provider of research, data and news on the clean energy sector. Clean Energy Pipeline is a division of VB/Research.

To supplement the survey data, interviews were conducted with the following senior executives:

- **Kaj Lindvig**, Senior Advisor at A2SEA
- **Neil Etherington**, Group Development Director of Able UK
- **Peter Sayles**, Chief Operations Operator of JDR Group
- **George Rafferty**, CEO of NOF Energy
- **Jerry Hopkinson**, Managing Director Bulks, Ports & Logistics at PD Ports
- **Bill Scott**, CEO of Wilton Group



# PRINCIPAL FINDINGS

## THE NORTHEAST IS THE #1 UK LOCATION FOR AN OFFSHORE WIND CLUSTER

The northeast of England is the preferred location for an offshore wind cluster ahead of both the Scottish and East Anglian coasts. The northeast's attraction is due to its strong offshore oil and gas heritage, its close proximity to large offshore wind farms and development zones such as Dogger Bank, not to mention its extensive port infrastructure.

Innovative offshore wind companies are already starting to cluster in the northeast. Major industry names located there already include JDR Cables, MPI Offshore and DeepOcean. A full list of offshore wind companies located in the northeast is provided on page 6 of this report.

## CLUSTERS SHOULD BE LOCATED AROUND PORTS

Our survey asked companies operating throughout the entire supply chain what the most important factors were when choosing a location for production and assembly facilities. In all but one segment of the supply chain, being in close proximity to a port servicing the offshore wind sector was the most important factor.

## CLUSTERING REDUCES COSTS

It's a well known fact that the levelised cost of offshore wind energy needs to decline markedly over the next seven years for the sector to become a significant contributor to the UK's long term energy mix.

One of the core findings of this report (supported by two thirds of surveyed participants) is that clusters of offshore wind companies can reduce costs. As a starter, clusters reduce transportation overheads. They also

facilitate better collaboration between the supply chain and project developers, which is particularly crucial during the initial stages of the project lifecycle. According to the Crown Estate's Offshore Wind Cost Reduction Pathways Study, published in June 2012, improved communication between the supply chain and developers could potentially reduce the levelised cost of energy by up to 3.1% by 2020.

## THERE IS ROOM FOR MULTIPLE CLUSTERS

The northeast is not the only region striving to attract investment from the offshore wind supply chain. Indeed given their close proximity to planned offshore wind farms and strong port infrastructure, Scotland, Northern Ireland and East Yorkshire are also vying to attract offshore wind companies. Clusters are also forming in Denmark, the Netherlands and Germany.

Looking ahead, our survey data indicates that there is sufficient demand in the UK and Europe to support five offshore wind clusters with each one comprising: a large turbine assembly plant, a host of manufacturers of ancillary equipment including gearboxes, blades, nacelles and cables alongside a series of installation, logistics and operations and maintenance companies.

## POLICY UNCERTAINTY STILL REMAINS AN ISSUE

Investment in the UK supply chain is still being undermined by policy uncertainty. During the last two years turbine manufacturers Vestas, Gamesa, Siemens and Doosan have all postponed or cancelled major multi-million investments in the UK.

The main source of uncertainty surrounds the switch to the contract for difference feed in tariff subsidy mechanism, which will apply to all projects that become operational from 2017. Crucially, the government still hasn't announced the strike price for the tariff, which is essential to determine the financial viability of a project.

Many respondents also mentioned the government's vocal support for natural gas in the recent budget, the cuts to onshore wind subsidies in July 2012 and delays to offshore wind project approvals as further indications that the UK government is no longer genuinely supportive of the clean energy sector.

# The supply chain must cluster to generate efficiencies

One of the main findings from the survey data is that the supply chain needs to cluster in certain regions to drive down transportation costs and facilitate information sharing – two thirds of survey respondents believe that the establishment of offshore wind clusters will cut costs dramatically.

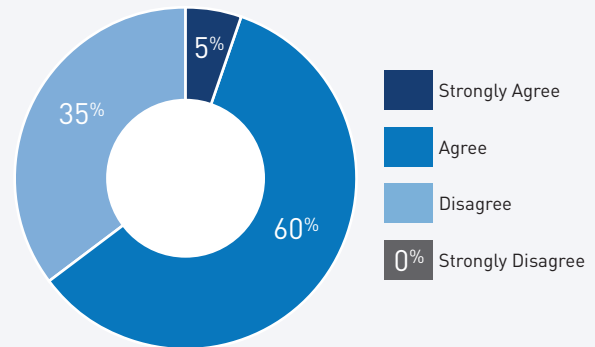
“Clusters are all about taking out a whole series of transportation, logistics and handling costs,” explained Neil Etherington, Group Development Director at Able UK. “If a UK based turbine manufacturer had to import blades and towers from continental Europe there would be significant additional transport costs and significantly added risks in terms of moving and lifting components and damaging products, all of which would have to be insured.”

Clusters create the perfect environment to become more efficient.

“I think that clustering will increase and I think it should increase,” confirmed Peter Sayles, Chief Operations Operator at JDR. “Most of the industry needs to be located on the dockside due to the sheer weight of equipment

that needs to be deployed offshore. To avoid transporting it across the country, it makes sense for the wind turbine assemblers, the monopile industry, the people making blades and the people like us doing cables to all be located together. That way everything is very organised and efficient in terms of deployment.”

**To what extent do you agree that the establishment of offshore wind clusters will drive down costs significantly?**







## Clusters should locate around ports

The obvious location for offshore wind manufacturers and services companies to cluster is at or around a port.

“Everything will be near the ports because the pieces which you have to install are so big that they can only be shipped around,” explained Kaj Lindvig, Senior

Advisor at A2SEA. “You can get things produced in Denmark, Germany and France but you then have to ship it to the UK and you have to assemble it locally if you can’t transport it directly from the factory. That will be done in the harbour or a facility near a harbour.”

### What are the most important factors to consider when choosing a location for the following facilities?

	Proximity to ports	Proximity to planned offshore wind farms	Local economic incentives (tax breaks, training grants etc)	Well trained local labour force	Good transport links	Proximity to upstream supply chain	Proximity to downstream supply chain
Offshore wind cable manufacturing facility	38%	12%	18%	8%	12%	7%	5%
Turbine blade manufacturing facility	34%	13%	15%	13%	14%	6%	6%
Gearbox manufacturing facility	14%	10%	12%	20%	19%	14%	12%
Foundations manufacturing facility	35%	20%	14%	14%	11%	5%	2%
Turbine tower manufacturing facility	38%	17%	12%	10%	10%	9%	3%
Steel fabrication works	29%	12%	15%	12%	12%	12%	10%
Port servicing the offshore wind sector	n/a	45%	17%	15%	13%	4%	6%

# The northeast leads the pack



According to 53% of survey respondents, the northeast coast of England is the prime location for an offshore wind manufacturing cluster, closely followed by the Scottish and East Anglian coasts. Essentially this is due to the following factors:

## 1. Strong oil and gas industrial heritage

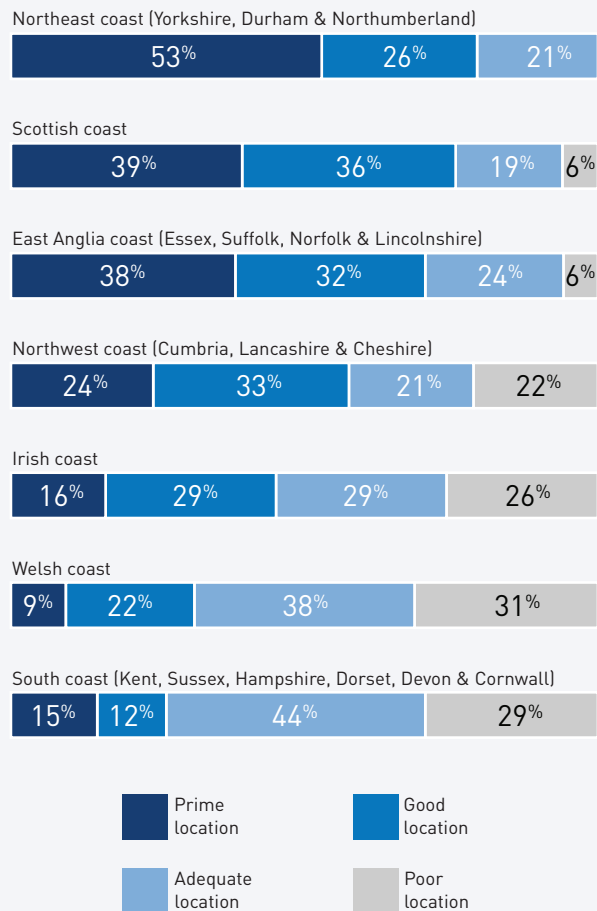
The northeast of England has been at the heart of the North Sea oil and gas industry for the last forty years and is an established hub of innovation and expertise. Many of the challenges the offshore wind industry faces today, including installing and undertaking maintenance work in harsh environments far out at sea, also affect the oil and gas sector.

“Nearly all the expertise from the oil and gas sector can be transferred to the offshore wind industry in some way,” confirmed Bill Scott, CEO of Wilton Group. “The offshore oil and gas industry has been going since the early 1970s and lots of lessons have been learned. It would be a massive wasted opportunity if the offshore wind sector didn’t learn from these lessons and buy into the technology that the oil and gas industry has developed.”

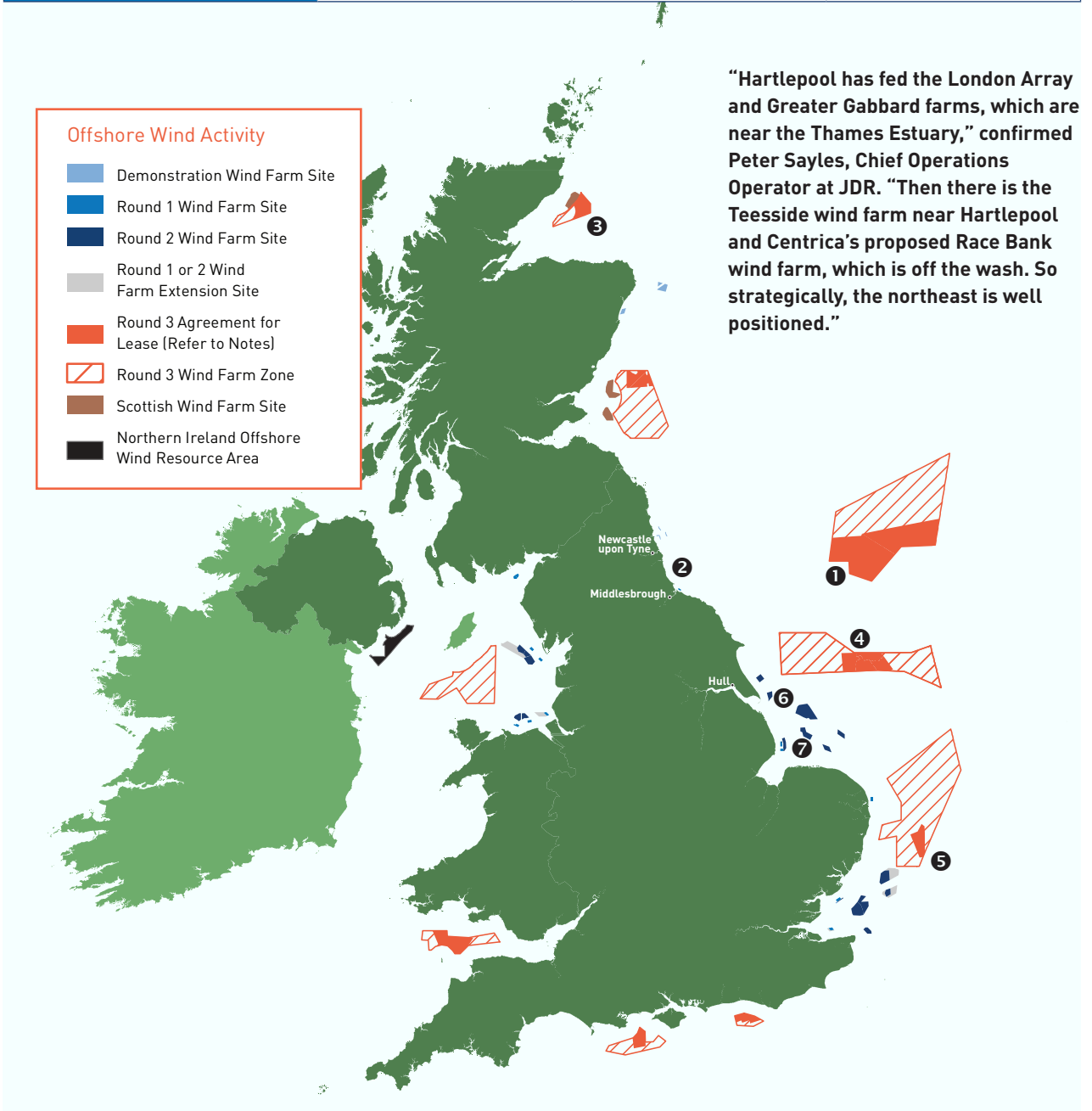
## 2. Close proximity to offshore wind farms

The northeast is geographically well positioned to serve a number of large existing and planned UK offshore wind farms and development zones. For instance, it is adjacent to Dogger Bank, the largest of all nine Round Three development zones. A list of serviceable offshore wind farms is shown opposite.

### How effectively could an offshore wind manufacturing hub situated in the following regions serve the UK offshore wind market?



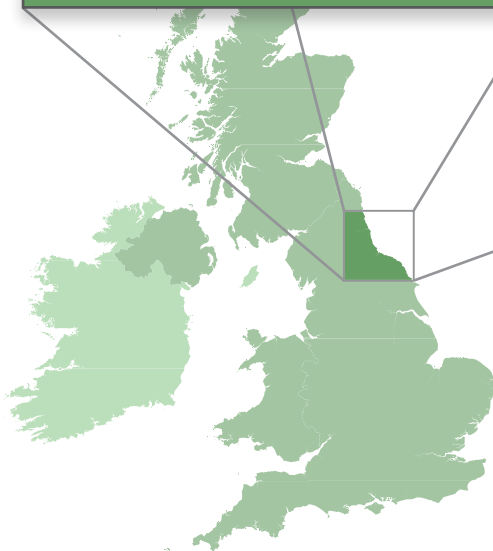
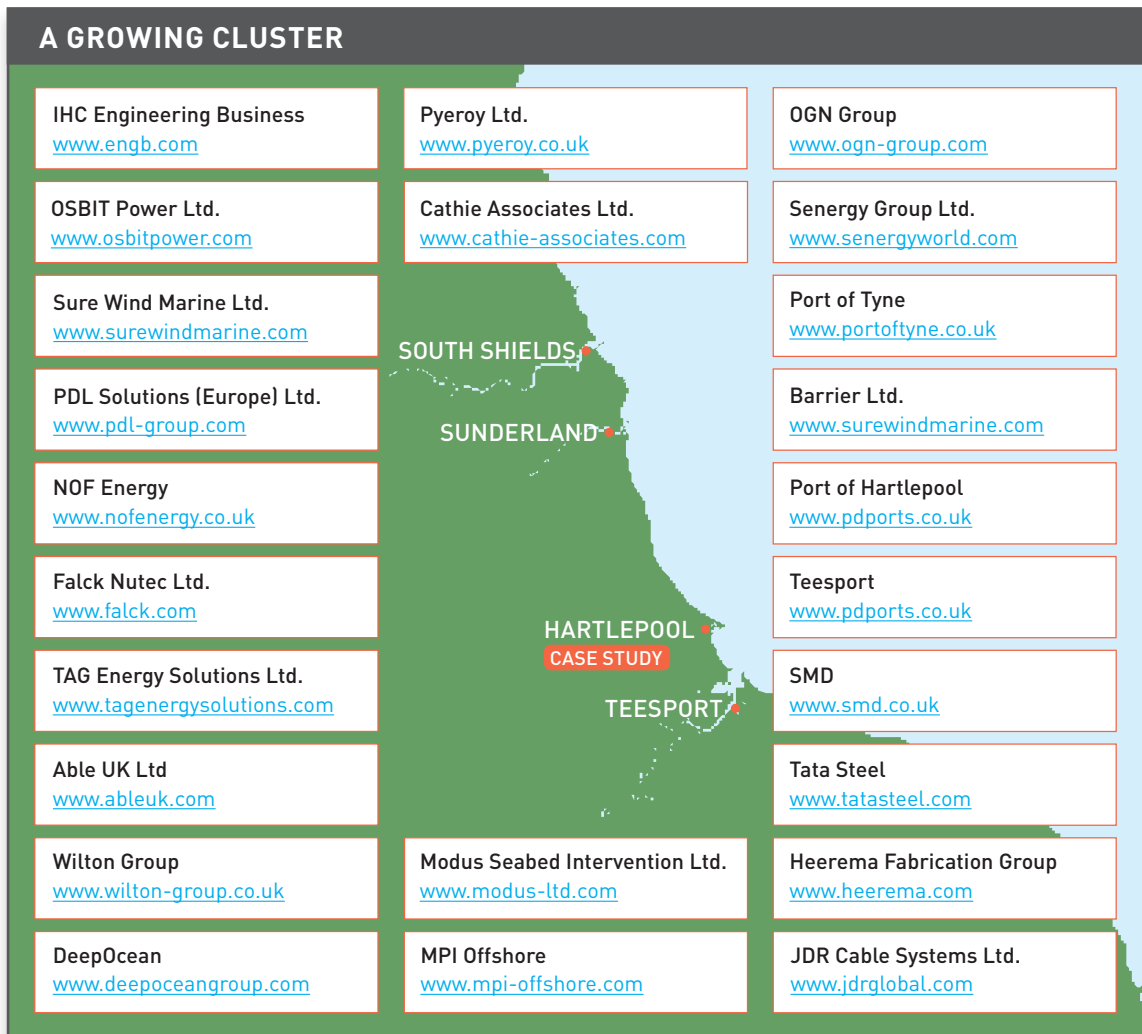
Wind farm/development zones	Capacity (Expressed as the maximum potential capacity)	Distance from the northeast coast	Construction commencement date
❶ Dogger Bank development zone	9,000 MW	82 miles	2016
❷ Teesside offshore wind farm	60 MW	2 miles	2012
❸ Moray Firth	1,500 MW	67 miles	2015
❹ Hornsea	4,000 MW	86 miles	2014
❺ East Anglia offshore wind farm	7,200 MW	230 miles	2016
❻ Humber Gateway offshore wind farm	219 MW	112 miles	2013
❼ Racebank	580 MW	143 miles	2014



**Note 1:** Agreements for Lease reserve exclusive property rights from The Crown Estate and projects are still subject to approval through the statutory consenting process. For Round 3 please refer to project developer websites for the latest status of planning activities.

**Note 2:** The Zone 3 Agreements for Lease are currently the subject of a process of amendment. Please refer to the Forewind website [www.forewind.co.uk/projects](http://www.forewind.co.uk/projects) for intended project site boundaries

Courtesy of The Crown Estate, © Crown Copyright 01 Mar 2013



**3. The major players are already in situ**

A small and rapidly growing number of companies capable of serving the offshore wind sector are already located in the northeast of England. Many of

these companies, including JDR Cables, Wilton Group and Tag Energy Solutions, have roots in the offshore oil and gas sector and have diversified into offshore wind in recent years. A map showing the growing presence of offshore wind companies in the northeast of England is shown opposite.

“The northeast could be a fantastic location for an offshore wind cluster,” affirmed Bill Scott, CEO of Wilton Group. “You have already got great companies such as TAG Energy, Technip, The Port of Tyne, MPI Offshore, JDR Cables and SMD. The regional capabilities are immense. The northeast can offer the balance of plant manufacturing, engineering, installation and commissioning, business support and operations and maintenance. It is probably the most concentrated place in the UK with all these skill sets.”



## PORT OF HARTLEPOOL CASE STUDY: THE CHAMPION OF THE NORTHEAST



360 metre quay length with an 8 metre water depth supported by a 15t/m<sup>2</sup> heavy lift pad and five general cargo berths

80 acres of idle land that can readily be built on

Great transport links – the port is only three miles from Teesport, is directly linked to the UK rail freight network and as excellent links to the A19 dual carriageway.

Ro-Ro berth with Linkspan access within the main port area

963,000 sq ft of covered warehousing and substantial open storage areas

The northeast of England is lucky to possess a number of first rate ports spanning the rivers Tees, Tyne, Wear and Blyth. However, to date only Hartlepool has actually supported the installation of an offshore wind farm in its capacity as the logistics hub for EDF Renewables' 62MW Teeside offshore wind farm.

All of our port facilities are also very industrialised, so we are good to go.

"This is the first offshore wind farm that a port on the East coast of the UK is serving and it has certainly been a learning experience for us," explained Jerry Hopkinson, Managing Director Bulks, Ports & Logistics, at PD Ports, which owns, operates and acts as the statutory harbour authority for the ports of Hartlepool and Teesport.

"The biggest issue was one we least expected, which revolved around health and safety issues arising from having so many contractors appearing on the port estate in a relatively short period of time. We carried out nearly 2,000 inductions for individuals. So it was difficult in

practical terms to accommodate the flow of these people safely. Also, managing the very complex relationships between contractors, who are working to very strict datelines in a pretty high tech industry, has also been quite a learning curve for us."

Buoyed by its success with the Teeside offshore wind farm, PD Ports is now seeking to serve additional offshore wind farms from its ports in Hartlepool and Teesport. One of the core advantages of is the sheer quantity of idle land adjacent to both ports. The Hartlepool dock alone has 80 acres of developable land on which turbine assembly facilities can be built, a significant volume considering that only 20 acres was leased for development of the Teeside offshore wind farm.

Jerry Hopkinson, Managing Director Bulks, Ports & Logistics, at PD Ports, believes that that the abundance of space, combined with the experience the company has already gained in serving the offshore wind sector, will enable Hartlepool and nearby Teesport to become a fully fledged cluster. "Importantly, we have large areas of relatively free and available land in and around our ports at Teesport and Hartlepool that is directly adjacent to quays on which factories can be built," he said. "We are therefore ready to build out the appropriate facilities to accommodate the next generation of turbine installation vessels with only a modest capital investment. All of our port facilities are also very industrialised, so we are good to go. Many other ports are not in this fortunate position."

#### 4. Strong port capacity

The northeast of England is home to a number of commercial ports on the rivers Tees, Tyne, Wear and Blyth, many of which have demonstrable experience in serving offshore oil and gas projects.

The northeast's strong commercial port network is a significant advantage given the anticipated deficiency of port capacity across the UK over the next five years. Over 40% of survey respondents believe that the lack of offshore wind port capacity is unlikely to be resolved and that this will impact European countries' ability to meet their offshore wind targets during the next five years.

"I think there will be a shortage of harbours because you need so much space," confirms Kaj Lindvig, Senior Advisor at A2SEA. "The harbour in Esbjerg, Denmark, has around 2,000,000 square meters available just for wind turbines. Where do you find 2,000,000 square meters in the UK?"

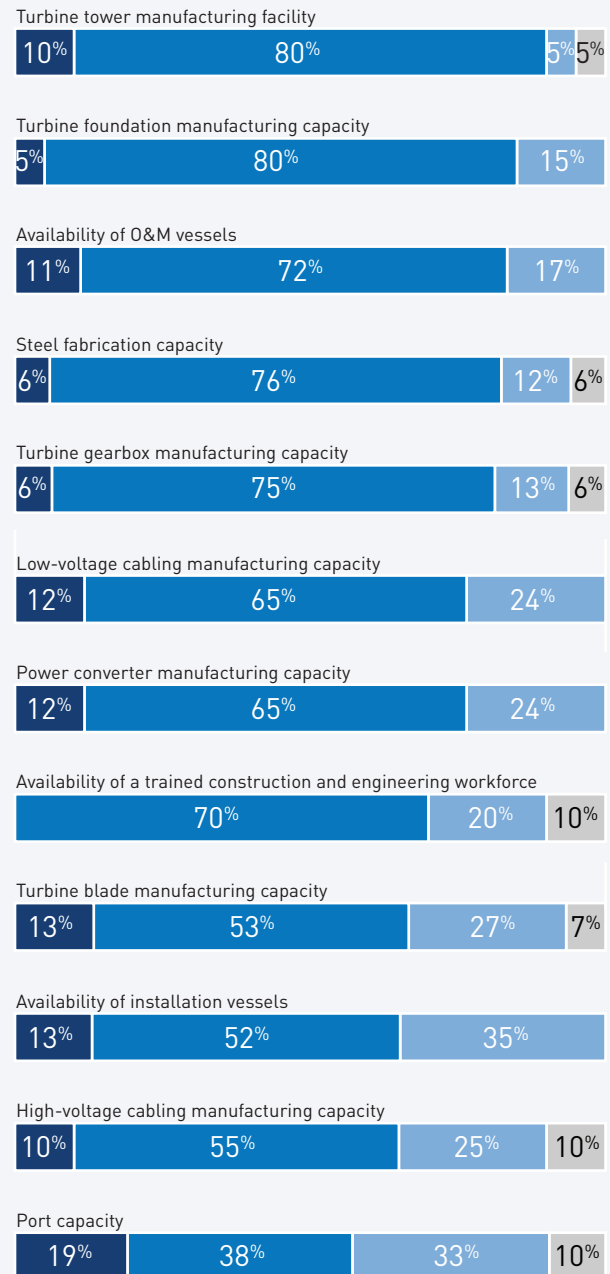
The northeast's strong commercial port network is a significant advantage.

#### 5. Access outside the UK

Another advantage of the northeast of England is that companies should be able to serve offshore wind farms situated in continental European waters. Approximately 80% of survey respondents believe that the northeast is well positioned to serve the Scandinavian, Benelux and German offshore wind markets. There is already evidence to back this up. For example, MPI Offshore, a provider of offshore wind installation services based near Middlesbrough, UK, secured a contract in March 2013 to install forty 5MW Areva turbines at the Trianel Wind Farm off the north coast of Germany.

"A hub in the northeast of the UK could definitely serve Germany, Holland, Belgium and Ireland," confirmed Kaj Lindvig, Senior Advisor at A2SEA. "France is a bit more

#### How confident are you that the following potential shortages in the offshore wind supply chain will be overcome in the next five years?



Shortage will almost certainly be overcome
  Shortage is likely to be overcome
  Shortage is unlikely to be overcome
  Shortage is very unlikely to be overcome

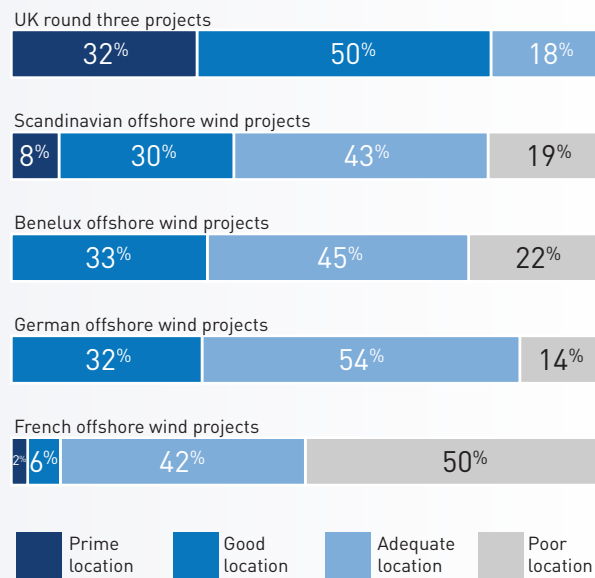


difficult because the first projects in France are being built with French turbines, so that would take a lot of years, but yes it would be possible.”

**6. Strong testing and prototyping capabilities**

The northeast has strong technology prototyping and testing facilities specifically for offshore wind in the form of Narec (National Renewable Energy Centre), which owns the UK’s leading offshore wind technology testing site. This is located in Blyth, Northumberland.

**How effectively could an offshore wind manufacturing hub situated in the northeast of England serve the following offshore wind markets?**



“A hub in the northeast of the UK could definitely serve Germany, Holland, Belgium and Ireland



## Scotland is just behind

The northeast still faces stiff competition from Scotland in attracting offshore wind companies. Scotland has established renewable energy targets that are much more ambitious than those of the UK. In May 2011, the country set itself a target of generating renewable energy equivalent to 100% of total electricity consumption by 2020. Achieving its goals requires a massive deployment of offshore wind capacity. Plans are already in place to install up to 10 GW of offshore wind capacity in Scottish waters during the next decade.

“Because of the size of Round 3, I don’t think there will be one dominant cluster or one dominant region.”

However, as Peter Sayles, Chief Operations Operator at JDR explains, Scotland has its downside. “There is an argument for a cluster in Northern Scotland, but it depends on how many people you can get to go up there,” he said. “The human capital skill set around Hartlepool and the northeast is very good, whereas the skill set is more geared towards offshore oil and gas in Scotland.”

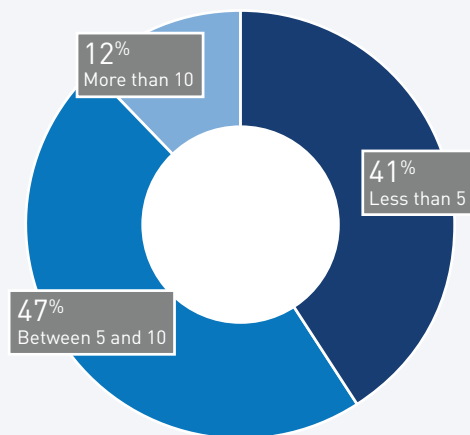
Significantly, our survey data indicates that there is sufficient demand in the coming years to support an offshore wind manufacturing cluster in the northeast of England and in Scotland. Almost all respondents believe that the projected level of demand will be sufficient to

support more than one offshore wind manufacturing cluster in the UK, while almost half believe demand will be sufficient to support between five and ten.

“Because of the size of Round 3, I don’t think there will be one dominant cluster or one dominant region,” explained George Rafferty, CEO of NOF Energy. “It may be that over many years one area develops a particularly strong offering in port facilities or cables for example but overall I don’t see one cluster coming out on top.”

Jerry Hopkinson, Managing Director Bulks, Ports & Logistics, at PD Ports, agrees. “Around 7,000 turbines will be installed in Round Three projects,” he said. “The turbine manufacturers we are talking to are looking at plans for factories with the capacity to manufacture 200 wind turbines annually. At 200 per annum there is huge scope for more than one cluster to develop.”

How many offshore wind clusters could be established in the UK given the projected level of demand?



# Cable manufacturing capacity and human capital are a cluster's top priority

For the UK to benefit economically from the rollout of offshore wind projects it needs to establish a comprehensive supply chain capable of assembling turbines, installing sub-sea cables and foundations alongside providing operations and maintenance services to projects once they become operational. Today the UK is a very long way from achieving this. None of the world's major turbine manufacturers have production facilities in the UK and only a small number of UK companies provide foundations, cables and vessels. None of these have the capacity to satisfy the demand of the Round Three projects.

"To be honest I'm not sure if the UK even has a sizeable offshore wind supply chain at the moment that can cluster," said Kaj Lindvig, Senior Advisor at A2SEA. "There are some companies, but a full supply chain needs to include foundations, turbines, cables, substations and of course all the installation activities and the logistics around ports. We don't see that many UK companies actually doing these things at the moment. For us it is a question mark. Will a supply chain materialise in the UK? Is it too late? When will it happen?"

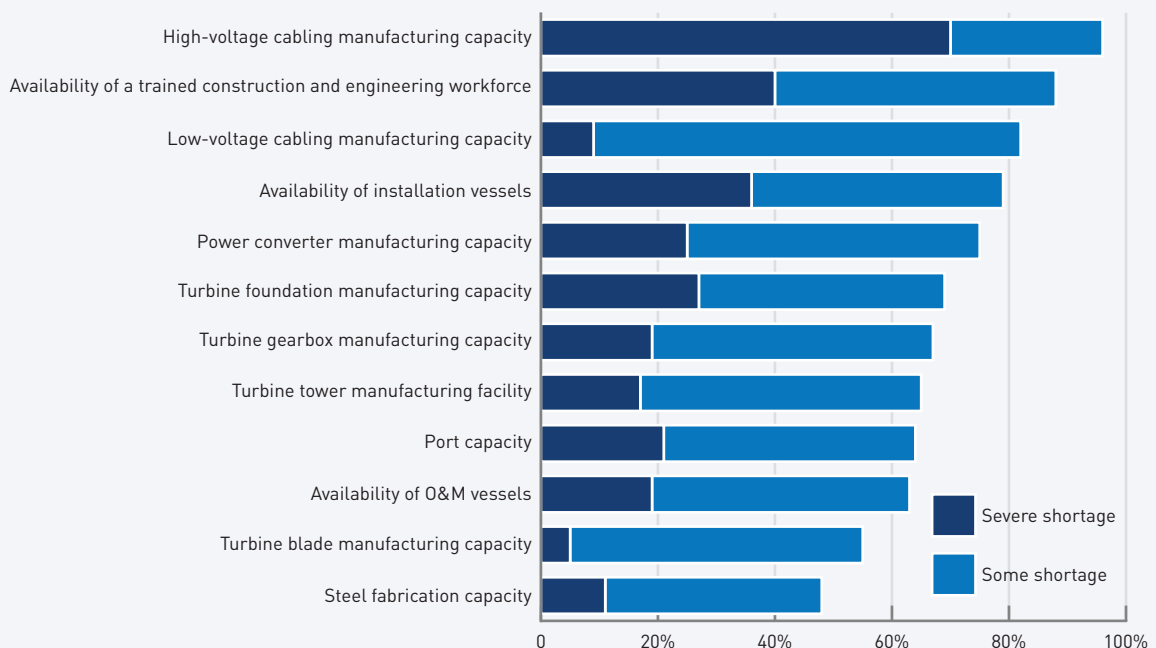
To some extent this comment isn't surprising. Only 2.8 GW of offshore wind capacity has been installed

in the UK, a fraction of the 18 GW 2020 target. The supply chain will only invest in expanding capacity when it has certainty that orders will materialise. This point has not yet been reached. The danger is that, should the UK government not provide sufficient encouragement in whatever form for the UK supply chain to invest, projects may be installed by non-UK based vessels using turbines manufactured in Germany or Denmark.

Given the anticipated steep ramp up in demand for offshore wind equipment and services in the next five years, it is vital that investment occurs now to ensure there is no weakness in the supply chain. According to the survey data, the areas of the supply chain most in need of investment are high- and low-voltage cable manufacturing capacity and installation vessels. In addition, respondents highlight the need to train a fully functioning construction and engineering workforce.

"High voltage cables could be a bottleneck because you need a lot of kilometres of cables," confirmed Kaj Lindvig, Senior Advisor at A2SEA. "The foundations eventually will become more specialised, such as jackets used in the oil and gas industry."

**Where in the European offshore wind supply chain do you believe there are the most serious capacity issues that need to be addressed in the next five years if Europe is to meet its offshore wind installation targets?**



# Government policy still makes a major impact

Due to uncertainty over the Government's commitment to offshore wind, many of the world's largest wind turbine manufacturers have delayed or abandoned plans to establish manufacturing facilities in the UK. Vestas cancelled plans for a new UK offshore wind turbine factory in June 2012, Areva has yet to commit to any UK facility despite saying last year that it was evaluating eligible ports, and Siemens has delayed its final investment decision on a £60 million turbine assembly facility in Hull. Doosan also pulled out of building a £170 million offshore wind turbine plant in Scotland in 2012.

“Delays in investment could mean that the UK will lose out because other countries such as Germany and Denmark are ploughing ahead.”

The primary cause of uncertainty surrounds the switch to the new contract for difference (CfD) feed in tariff subsidy, which will replace the existing renewable obligation (RO) for all projects that come online from 2017. The Government is yet to announce the CfD strike price for

offshore wind, a measure that will be a key factor in determining the investment viability of offshore wind farms due to come online from 2017. Without this support, developers will not be able to make investment decisions on projects scheduled to commence operations in 2015 or 2016, as any delays would mean that it could end up being installed under the CfD rather than the RO.

This is not the only cause of uncertainty. Many surveyed companies cite the government's apparent support for natural gas, cuts to onshore wind subsidies and planning delays as signs that the UK government is not fully supportive of offshore wind.

“There have been delays and there have been problems caused by the government's energy policy,” confirmed George Rafferty, CEO of NOF Energy. “The uncertainty and the lack of clarity are undoubtedly hindering investment in the UK offshore wind supply chain and delays in investment could mean that the UK will lose out because other countries such as Germany and Denmark are ploughing ahead and may take a lead on the UK. Potential offshore wind clusters are not just competing with each other, but also with hubs in other countries.”

“A lot of the current uncertainty stems from the economic climate, and this is coupled with an apparent inertia within government policy and the slow rate of electricity market reform,” explained Neil Etherington, Group Development Director at Able UK. “The strike price though will be announced later this year, and this will go some way in speeding things up.” ■

Research and analysis provided by

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