ABOUT THE RESEARCH

This report analyses the potential for cost reductions and efficiencies in the offshore wind supply chain in Europe. It examines the areas of the supply chain where the most significant cost savings may be achievable and what might underpin cost reductions.

The findings are based on a survey of over 200 senior executives in the European offshore wind sector, which was completed in January 2014. The survey and report were 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:

• Jens Frederik Hansen, CEO, A2SEA
• Neil Etherington, Group Development Director, Able UK
• Jerry Hopkinson, Managing Director Bulks, Ports & Logistics, PD Ports
• David Varey, General Manager, Conservancy and Port Development, PD Ports
• Mark Riemers, Managing Director, SPT Offshore
EXECUTIVE SUMMARY

The offshore wind industry is confident that significant cost reductions are achievable across the supply chain during the next ten years. On average, the 200 executives in the European offshore wind industry surveyed for this report expect the cost of developing and constructing offshore wind farms to fall to £2.8 million per MW for projects that reach a final investment decision (FID) in 2018 and to £2.4 million per MW for projects that reach a FID in 2023. This represents a 10% and 23% decrease respectively on the £3.1 million per MW cost at the beginning of 2014.

This is encouraging news for the industry. In the past six months some of Europe’s largest utilities, including SSE, RWE and Iberdrola, have announced significant cuts to the size of planned offshore wind farms and even cancelled some projects entirely, in part due to concerns over costs. Realising cost efficiencies across the entire supply chain, from component manufacturing to equipment installation, will be essential to encourage continued investment in offshore wind.

The survey data points to three specific areas of the supply chain where cost reductions are most likely to be realised – equipment installation, foundation manufacture and turbine tower production. The cost of these processes are expected to fall by 6.6%, 6.1% and 5.4% respectively in the next five years.

The survey also questioned the industry on its expectations regarding reductions in the levelised cost of offshore wind energy, which measures projects’ lifetime costs. On average, respondents expect the offshore wind LCOE to decrease to £123 per MWh for projects that reach a FID in 2018 and £111 per MWh for projects that reach a FID in 2023, a significant decrease on the £133 per MWh current cost. If these predictions are accurate, the industry will not achieve the UK Government’s target, set in 2011, for offshore wind costs to decline to £100 per MWh by 2020.

Survey respondents clearly identified economies of scale, higher capacity turbines and technology innovation as the most important drivers of cost reductions. In fact, survey respondents cited economies of scale as the driver most likely to reduce costs for the three most capital intensive areas of the offshore wind supply chain – installation, foundations and turbines.

In addition, 70% of survey respondents believe geographic concentration of the supply chain can reduce offshore wind costs. Survey respondents judge the Northeast Coast of the UK as the prime location for offshore wind manufacturing capacity, followed by Scotland.

However, nearly all survey respondents and industry experts interviewed for this report added the qualifier that significant cost reductions are only achievable if governments across Europe adopt stable and adequate incentive mechanisms that provide developers and the supply chain with the certainty needed to invest. Indeed, seven out of ten survey respondents stated the best thing governments can do to encourage investment in offshore wind technology innovation is to create a stable subsidy environment.

Opinion is divided as to whether this certainty is currently present. On the one hand, the UK Government’s finalisation in December 2013 of the strike price that UK projects subsidised under the contract-for-difference (CFD) feed in tariff will receive provides certainty on the revenue line. This was crucial in Siemens committing to a major £160 million investment in two turbine manufacturing facilities in the UK in March 2014. However there are still ongoing concerns about the delivery mechanism for CFD contracts, not to mention the UK Government’s long term commitment to offshore wind in light of vocal support for nuclear energy and fracking.
The European offshore wind industry is shifting through the gears. Some 1,567 MW of offshore wind capacity was connected to the grid in 2013, a 34% increase on the 1,166 MW installed in 2012. The capacity installed during 2013 includes some of the world’s largest offshore wind farms, including the 630 MW first phase of London Array, the 270 MW Lincs project and phase II of the 144 MW Thornton Bank project.

This growth is spurring the supply chain to make major investments in ramping up manufacturing capacity. In March 2014 Siemens and Associated British Ports announced they will jointly invest £310 million into two major wind turbine manufacturing facilities for the offshore wind sector in Yorkshire on the UK’s east coast. This will be the UK’s first major wind turbine manufacturing facility for the offshore sector.

Despite the considerable progress made during 2013, the industry still faces two major challenges - policy uncertainty and the need for cost reductions in the supply chain. For these reasons, a number of major European utilities, including SSE, RWE and Iberdrola, announced significant cuts in the size of planned offshore wind farm development zones in the past six months and even abandoned entire projects.

Stripping costs out of the supply chain will be essential to encourage utilities to continue to invest in offshore wind, not least due to the planned degression in offshore wind subsidies in the UK and Germany during the next decade.

This report examines the areas of the offshore wind supply chain in which there exist the greatest potential for cost reductions and what may catalyse the realisation of cost efficiencies.
The potential for cost reductions

The offshore wind industry is confident that significant cost savings are achievable. On average, survey respondents expect the cost of developing and constructing offshore wind farms to fall to £2.8 million per MW for projects that reach a final investment decision (FID) in 2018 and £2.4 million per MW for projects reaching a FID in 2023, a 10% and 23% decrease respectively on survey respondents’ estimation of costs at the beginning of 2014 (£3.1 million per MW).

This improvement will be driven by declining costs of wind farm installation, foundations and turbine towers, which are expected to fall by 6.6%, 6.1% and 5.4% respectively in the next five years.

In terms of the levelised cost of energy (LCOE), survey respondents expect offshore wind costs to decrease to £122.70 per MWh for projects that reach a FID in 2018 and £111 per MWh for projects that reach a FID in 2023, a 8% and 17% decrease respectively on the current cost (£133 per MWh). This means the industry will not achieve the UK Government’s target, set in 2011, for offshore wind costs to decline to £100 per MWh by 2020.

What do you expect will be the cost of developing and constructing offshore wind farms that reach a final investment decision five years from now?

What do you expect will be the LCOE for offshore wind farms that reach a final investment decision five years from now?
Installation costs

If the cost of developing and constructing offshore wind farms is going to decrease significantly it is vital that cost savings can be realised during the installation process. This comprises the transportation of turbines, foundations and other equipment to the offshore site as well as onsite construction and engineering.

On average, survey respondents expect installation costs to decrease by 6.6% during the next five years. This is significant given that installation accounts for approximately a quarter of the total cost of developing and constructing offshore wind farms, making it the largest single expense after the capital cost of turbines. This means that a more efficient installation process alone could result in a 1.65% decrease to the total cost of developing and constructing offshore wind farms.

Economies of scale and increasing deployment of higher capacity turbines will underpin the anticipated decrease in installation costs, according to survey respondents.

As Jens Frederik Hansen, CEO of offshore wind installation group A2SEA explains, the creation of a robust pipeline of projects for installers to work on is also critical in reducing costs. “The processes involved in turbine installation are already very well optimised,” he said. “We can continue to optimise processes but this will not get the industry to where it needs to be in terms of cost reductions. “What is really missing right now is a proper pipeline of projects to work on so that we can work every day and go straight from project to project. A pipeline contributes to efficiently optimising all of the tools we have to bring down costs of energy. By annualising the cost of our vessels over 365 days rather than the period of an individual project we are able to quote lower rates to the market.”

It is interesting to note that survey respondents are pessimistic about the potential for floating wind turbines – only 23% of survey respondents expect floating turbines to be a significant driver of installation cost reductions during the next five years, making it the second least important driver.

Despite this, there has been significant investment in floating turbine technology around the world in the past 18 months. For example, a consortium led by
Japanese trading group Marubeni is developing a 16 MW pilot floating offshore wind project 12 miles off the coast of Fukushima. The first floating turbine was connected to the grid in November 2013 at a capital cost of £12 million per MW. Marubeni expects the second two turbines to be installed at a cost of £6 million per MW, which is still significantly higher than the capital cost of installing turbines with conventional monopile foundations.

Elsewhere, the Scottish Government announced in June 2013 that it will introduce higher subsidies for floating offshore wind technology to drive innovation in the sector, while the French government has mooted it may launch a pilot auction for floating wind turbines this year or next. Norwegian energy company Statoil has also announced plans to build a 30 MW floating offshore wind farm off the coast of Aberdeenshire in Scotland. But despite the numerous investment plans in floating offshore wind technology, survey respondents remain unconvinced about its ability to reduce costs.

Nearly all survey respondents expect that the emergence of dedicated offshore wind installation vessels will drive cost reductions in the next five years. As David Varey, General Manager, Conservancy and Port Development at PD Ports, explains, this trend is already starting to materialise. “Three to four years ago the supply of installation vessels was very tight and unsuitable vessels were being used,” he said. “Certainly the vessels for the first phase of Tees Bay were less than ideal. But a lot of crafts have come out in the last 12 months, such as the Fred Olsen craft and the MPI and A2SEA crafts.”

### What will drive your forecast DECREASE in installation costs during the next five years?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Strong driver</th>
<th>Minor driver</th>
<th>Not a driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economies of scale</td>
<td>71%</td>
<td>25%</td>
<td>4%</td>
</tr>
<tr>
<td>Increasing deployment of higher capacity turbines</td>
<td>68%</td>
<td>26%</td>
<td>6%</td>
</tr>
<tr>
<td>Innovation in installation processes</td>
<td>65%</td>
<td>31%</td>
<td>4%</td>
</tr>
<tr>
<td>Natural cost savings through experience as the sector matures</td>
<td>56%</td>
<td>41%</td>
<td>4%</td>
</tr>
<tr>
<td>Emergence of dedicated offshore wind installation vessels</td>
<td>47%</td>
<td>50%</td>
<td>3%</td>
</tr>
<tr>
<td>Further development of port infrastructure and logistics</td>
<td>32%</td>
<td>60%</td>
<td>8%</td>
</tr>
<tr>
<td>New market entrants increasing competition</td>
<td>32%</td>
<td>46%</td>
<td>22%</td>
</tr>
<tr>
<td>Increasing use of lighter wind turbines easing installation processes</td>
<td>28%</td>
<td>49%</td>
<td>23%</td>
</tr>
<tr>
<td>Increasing use of floating wind turbines easing installation processes</td>
<td>23%</td>
<td>23%</td>
<td>54%</td>
</tr>
<tr>
<td>Increasing sophistication of weather measurement tools, meaning installation resources can be allocated more efficiently</td>
<td>21%</td>
<td>63%</td>
<td>17%</td>
</tr>
</tbody>
</table>
Foundation costs

On average, survey respondents expect foundation manufacturing costs to decrease 6.1% during the next five years. This is significant given that foundation manufacturing costs (excluding the costs of transportation and installation) account for approximately 20% of the total cost of bringing offshore wind farms to fruition. This means that a 6.1% reduction in foundation costs will reduce overall offshore wind costs by 1.2% alone during the next five years.

According to survey respondents, four primary drivers will underpin foundation cost reductions – economies of scale, the deployment of higher capacity turbines, technology innovation and standardisation of foundation designs.

Unlike the turbine manufacturing industry, survey respondents see little potential for increased competition in the foundation market to decrease costs. This is likely the case because the foundation industry already has a relatively strong degree of competition. Danish steel group Bladt Industries manufactured 37% of all offshore wind foundations installed in Europe in 2013, followed by Ambau GmbH with a 15% market share, Per Aarsleff (13%), Sif (12%) and Siag (11%) according to the EWEA.

How do you expect the manufacturing cost of offshore wind turbine foundations to evolve in the next five years on a per MW basis (in € 2013 constant)?

- 15%+ increase: 1%
- 10%-15% increase: 3%
- 5%-10% increase: 7%
- 0%-5% increase: 7%
- 15% No change: 15%
- 12% 0%-5% decrease: 0%
- 22% 5%-10% decrease: 5%
- 14% 10%-15% decrease: 10%
- 11% 15%-20% decrease: 15%
- 7% 20%+ decrease: 20%

What will drive your forecast DECREASE in costs during the next five years?

- Economies of scale: 67% Strong driver, 30% Minor driver, 3% Not a driver
- Increasing deployment of higher capacity turbines: 63% Strong driver, 31% Minor driver, 6% Not a driver
- Technology innovation: 60% Strong driver, 36% Minor driver, 4% Not a driver
- Standardisation of foundation designs: 59% Strong driver, 35% Minor driver, 6% Not a driver
- Natural cost savings through experience as the sector matures: 49% Strong driver, 45% Minor driver, 6% Not a driver
- New market entrants increasing competition: 31% Strong driver, 45% Minor driver, 25% Not a driver
- Geographical concentration of foundation supply chain: 23% Strong driver, 47% Minor driver, 30% Not a driver
- Decreasing raw material costs: 21% Strong driver, 33% Minor driver, 45% Not a driver
There is little optimism that grid connection costs will decrease materially during the next five years. On average, survey respondents forecast a 3.8% cost reduction, which would only translate to a 0.57% total decrease in the costs of bringing offshore wind farms online, assuming grid connection accounts for 15% of total project costs. Survey respondents expect innovation in cable laying processes to underpin this cost reduction.

Respondents are perhaps pessimistic about the potential for grid connection costs to fall because offshore wind farms are increasingly being developed further out to sea, thus increasing the volume of cables required to connect to the onshore grid. For example, a large number of UK Round Three development zones are located more than 70km from shore, with Dogger Bank situated 195km from shore at its outermost point. The average distance to shore of offshore wind farms installed in 2013 was only 30km.
Turbine costs

Capital expenditure on wind turbines accounts for approximately 40% of the cost of bringing offshore wind farms online, so any cost reductions in the turbine supply chain will have a material impact on total costs. Turbine blades and towers are the most expensive components of offshore wind turbines, accounting for roughly half the total turbine cost and about 20% of the total cost of bringing offshore wind farms online.

Encouragingly, survey respondents expect the cost of turbine towers and blades to decrease by 5.4% and 4.5% respectively during the next five years. If these cost projections are realised, turbine costs will decrease by 2.4% during the next five years, even if the cost of other turbine components, such as gearboxes and power converters, remains constant.

“Encouragingly, two new joint ventures have been formed in the past six months that should result in greater competition and more competitive pricing.”

Survey respondents most frequently cited economies of scale as a strong driver for turbine cost reductions, while some 80% of respondents believe greater competition in the offshore wind turbine sector will be a minor driver of cost reductions. The offshore wind market is currently dominated by Siemens, which manufactured 69% of turbine capacity installed in European waters in 2013 and which is responsible for 60% of all operating European offshore turbines.

Encouragingly, two new joint ventures have been formed in the past six months that should result in greater competition and more competitive pricing. In February 2014 the EU approved an offshore wind
What will drive your forecast DECREASE in turbine tower and blade costs during the next five years?

- **Economies of scale**: 73%
- **Technology innovation**: 65%
- **Increasing deployment of higher capacity turbines**: 58%
- **Natural cost savings through experience as the sector matures**: 52%
- **New market entrants increasing competition**: 38%
- **Decreasing raw material costs**: 26%
- **Geographical concentration of blade supply chain**: 21%

### **Strong driver of blade cost reductions**

### **Strong driver of tower cost reductions**

**Offshore wind turbine market share as a percentage of turbines installed in 2013**

**SIEMENS** 69%

**BARD** 15%

**Vestas** 8%

**SENVION** 7%

Source: EWEA

Logos are copyright of Siemens, BARD Offshore GmbH, Vestas Wind Systems A/S and Senvion SE, all rights reserved.

More importantly, it will also assign development rights to its new V164-8.0 MW offshore turbine. In return, MHI will invest an initial Eur100 million into the JV and a further Eur200 million based on certain milestones. The JV will contract Vestas to continue development of the V164-8.0 MW turbine. In the future, the JV will explore opportunities to integrate MHI’s hydraulic direct drive technology into the 8 MW platform.

A month earlier, French nuclear and renewable energy equipment producer Areva and Spanish wind turbine maker Gamesa confirmed that they have entered talks to form a 50-50 offshore wind joint venture. The partnership will initially market Areva’s 5 MW M5000 offshore turbine, but will also seek to develop a new 5 MW model that also features Gamesa’s technology and, in the longer term, an 8 MW turbine.
The main cost reduction drivers

Economies of scale are required

Survey respondents cited economies of scale as the most important driver of cost reductions in the three most expensive components of the offshore wind supply chain – installation, foundations and turbines. The greater volume of projects being built should result in cost reductions through natural ‘learning by doing’ and the standardisation of processes. Greater capacity should also provide companies in the supply chain with more bargaining power to procure components at cheaper prices due to volume discounts. In addition, a greater number of vessels should minimise the impact of installation delays.

While the theoretical justification for economies of scale is obvious, it is unclear whether the volume of projects commissioned in the next ten years will be sufficient for economies of scale to be realised. In the UK, the Department of Energy and Climate Change’s estimates of installed offshore wind capacity by 2020 range from 8 GW to 15 GW. At the lower end, it is hard to envisage how economies of scale could be achieved, since this would only result in around 700 MW being installed per year between 2014 and 2020, which is in line with the 733 MW installed in the UK in 2013.

Germany has also cut its offshore wind targets. In November 2013, the Christian Democrats and the Social Democrats agreed a cut in the country’s offshore wind installation targets from 10 GW to 6.5 GW by 2020 and from 25 GW to 15 GW by 2030. This further reduces the potential for economies of scale.

Despite the uncertain market outlook, there are encouraging signs that the supply chain is investing in building out capacity. Most notably, Siemens and Associated British Ports announced in March 2014 that they will jointly invest £310 million into two major offshore wind equipment production facilities in Yorkshire, UK. This will be the UK’s first major wind turbine manufacturing facility for the offshore sector.

“My immediate reaction to the Siemens plant was very positive and I think the announcement will be a catalyst for people to move forward,” explained Jerry Hopkinson, Managing Director Bulks, Ports & Logistics, at PD Ports. “I would hope other turbine makers come in if the likes of Siemens, which is a very measured business, are confident that this is a market with a great opportunity. Markets don’t permit monopolistic positions to prevail, so the Siemens announcement will quite definitely now signal the opportunity for other manufacturers.”

If economies of scale are to have a major impact on cost reductions, it is vital that governments across Europe provide clear long-term support for the offshore industry to encourage additional companies across the supply chain to invest.
Higher capacity turbines can underpin cost reductions

Survey respondents repeatedly cited higher capacity turbines as the second most important driver of cost reductions for individual offshore wind components, behind economies of scale. Higher capacity turbines enable projects to be built with fewer turbines, thus reducing installation, foundation, cable and maintenance costs on a per MW basis.

Encouragingly, all of the leading offshore wind turbine manufacturers are working on higher capacity designs, some of which could be ready for installation from 2017. For example, a prototype of Vestas’ new V164-8.0 MW turbine produced its first kWh of electricity at the Danish National Test Centre for Large Wind Turbines in January 2014. Production is expected to commence in 2015. In February 2014, Vestas received its first bulk order for the new V164-8.0 MW turbine from DONG Energy for its 258 MW Burbo Bank Extension offshore wind farm.

Siemens, the world’s largest manufacturer of offshore wind turbines by units installed, is also developing larger turbine models. In October 2013 it completed installation of a market-ready 6 MW gearless turbine at a test site in Hunterston, UK. In January 2014, Siemens was awarded a £516 million turbine supply and engineering, procurement and construction contracts for the 400 MW Dudgeon offshore wind farm. Siemens will supply 67 of its 6.0 MW turbines for Dudgeon and will commence installation in 2017, subject to Statoil, the project’s developer, reaching a final investment decision.

These larger models represent a significant increase on the 3.9 MW average size of turbines installed in 2013, according to EWEA statistics. While Siemens and Vestas are working on higher capacity turbines, average turbine size will not significantly increase in the next two years due to the current dominance of Siemens 3.6 MW model.

Average installed offshore wind turbine size

Source: EWEA
Survey respondents frequently sited technology innovation as the third most important driver of cost reductions in the offshore wind supply chain, behind economies of scale and higher capacity turbines. There is potential for technology innovation to reduce costs throughout the supply chain, from new foundation structures and installation methods to gearless wind turbines.

Aside from work being undertaken by all major turbine manufacturers to create larger turbines as described above, significant investment is being allocated to create new innovative foundation structures. For example, market leader DONG Energy, which owns 48% of all offshore wind turbines installed in 2013, will install a full-scale demonstration of a new Suction Bucket Jacket foundation, designed by SPT Offshore, in 2014. The pilot will be funded by a £6 million grant from the UK Carbon Trust through its Offshore Wind Accelerator programme (OWA).

Suction Bucket Jacket foundations, which consist of a welded tubular space frame, with suction buckets anchoring the foundation to the seabed, have been used for over 30 years in the North Sea oil and gas industry and could significantly reduce costs in the offshore wind industry.

“We can achieve major cost reductions through reducing installation times,” confirmed Mark Riemers, Managing Director of SPT Offshore. “Our new foundation can be installed in 12 hours, which is a lot faster than monopiles and jackets, which can take up to five days and multiple offshore operations. No seabed preparation is required as with gravity based structures. The costs to fabricate are similar to jacket foundations, but we are much simpler in terms of installation. Typically fabrication costs of jackets are in the same order of transport and offshore installation costs. Our transport and installation costs are only half of fabrication costs, so there could be a 25% cost benefit. The cost benefit increases for larger wind turbines of 5-8 MW.”

New jacket-based foundations are particularly suited to turbines installed in water depths of over 25 metres so will likely feature prominently in the future, when projects in deeper waters, such as those in the UK’s Round Three, are installed. For the time being, conventional monopile foundations continue to dominate – monopile foundations accounted for 79% of all foundations installed in Europe in 2013, according to the EWEA.

“Currently the most used foundation structure by far are monopiles,” confirmed Mark Riemers. “People are also widely discussing the use of XXL monopiles, which could weigh in excess of 1,400 tonnes each. There is a general feeling that at 25-35 metres deep, jacket foundations will become more applicable in place of monopiles. There is also a tendency to go for jackets rather than monopiles for larger 7-8 MW turbines.”
The majority of survey respondents stated that geographical concentration of the offshore wind supply chain could have at least a minor impact on reducing costs of every component of offshore wind farms – 70% stated supply chain consolidation can reduce foundation costs on a per MW basis while 72% believe clustering can reduce grid connection costs. Clustering not only reduces transportation costs, but also facilitates better communication between the supply chain and developers.

“Clustering around a port would take a lot of costs out of the overall process and also reduces risk,” explained Neil Etherington, Group Development Director at Able UK. “If suppliers are co-located they can easily share information ensuring project management is much more robust and that quality monitoring is done much more effectively. Due to its large components you need to have an integrated supply chain that is co-located. This is evidenced by the success of Cuxhaven, Bremerhaven and Esbjerg.”

Unfortunately, the absence of any turbine manufacturing capacity in the UK means that clustering has been limited. “The UK supply chain is very nascent and as such has not had time to form any clusters,” continued Neil Etherington. “Not a single large offshore wind component deployed in UK waters has been manufactured in the UK. By contrast Germany’s supply chain is already very clustered.”

Encouragingly, momentum towards clustering has grown in recent months. In December 2013 the UK Government granted planning approval for the £450 million Able Marine Energy Park offshore renewables port hub in Humberside. The 800-acre hub, located at Killingholme, North Lincolnshire, will support the production and deployment of offshore wind components such as turbines and foundations. Construction will begin in 2014 and will include a 1,289 metre quay that will be operational from late 2016.

As described earlier, Siemens and also committed to a major £160 million investment in two turbine manufacturing facilities in the UK in March 2014.

According to survey respondents, offshore wind manufacturing clusters must be located at ports due to the necessity to import and export large components via vessels. More specifically, respondents believe the Northeast Coast of the UK is the prime location for an offshore wind manufacturing cluster, followed by Scotland.

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

<table>
<thead>
<tr>
<th>Facility</th>
<th>Proximity to Ports (38%)</th>
<th>Proximity to Planned Offshore Wind Farms (12%)</th>
<th>Local Economic Incentives (18%)</th>
<th>Well Trained Local Labour Force (8%)</th>
<th>Good Transport Links (12%)</th>
<th>Proximity to Upstream Supply Chain (7%)</th>
<th>Proximity to Downstream Supply Chain (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore wind cable manufacturing facility</td>
<td>38%</td>
<td>12%</td>
<td>18%</td>
<td>8%</td>
<td>12%</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>Turbine blade manufacturing facility</td>
<td>34%</td>
<td>13%</td>
<td>15%</td>
<td>13%</td>
<td>14%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Gearbox manufacturing facility</td>
<td>14%</td>
<td>10%</td>
<td>12%</td>
<td>20%</td>
<td>19%</td>
<td>14%</td>
<td>12%</td>
</tr>
<tr>
<td>Foundations manufacturing facility</td>
<td>35%</td>
<td>20%</td>
<td>14%</td>
<td>14%</td>
<td>11%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Turbine tower manufacturing facility</td>
<td>38%</td>
<td>17%</td>
<td>12%</td>
<td>10%</td>
<td>10%</td>
<td>9%</td>
<td>3%</td>
</tr>
<tr>
<td>Steel fabrication works</td>
<td>29%</td>
<td>12%</td>
<td>15%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Port servicing the offshore wind sector</td>
<td>n/a</td>
<td>45%</td>
<td>17%</td>
<td>15%</td>
<td>13%</td>
<td>4%</td>
<td>6%</td>
</tr>
</tbody>
</table>
How effectively could an offshore wind manufacturing hub situated in the following regions serve the UK offshore wind market?

- Northeast coast (Yorkshire, Durham & Northumberland):
  - Prime location: 53%
  - Good location: 26%
  - Adequate location: 21%

- Scottish coast:
  - Prime location: 39%
  - Good location: 36%
  - Adequate location: 19%
  - Good location: 6%

- East Anglia coast (Essex, Suffolk, Norfolk & Lincolnshire):
  - Prime location: 38%
  - Good location: 32%
  - Adequate location: 24%
  - Good location: 6%

- Northwest coast (Cumbria, Lancashire & Cheshire):
  - Prime location: 24%
  - Good location: 33%
  - Adequate location: 21%
  - Good location: 22%

- Irish coast:
  - Prime location: 16%
  - Good location: 29%
  - Adequate location: 29%
  - Good location: 26%

- Welsh coast:
  - Prime location: 9%
  - Good location: 22%
  - Adequate location: 38%
  - Good location: 31%

- South coast (Kent, Sussex, Hampshire, Dorset, Devon & Cornwall):
  - Prime location: 15%
  - Good location: 12%
  - Adequate location: 44%
  - Good location: 29%
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.

“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 the location is the sheer quantity of land adjacent to both ports. The Hartlepool dock alone has 80 acres of available 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 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.”
Everything rests on long term government support

According to survey respondents, the best way for governments to encourage investment in offshore wind technology innovation is to create a stable subsidy environment that will provide the private sector with the certainty needed to invest – 69% stated that this approach is very effective in fostering innovation in the offshore wind supply chain, more than double the number describing any other strategy as ‘very effective’.

However, there is much debate in the industry over whether such certainty currently exists. One positive development is the finalisation in December 2013 of the offshore wind strike price that UK projects subsidised under the contract-for-difference feed in tariff will receive. The strike price for offshore wind will start at £155 per MWh from 2014/2015, the same level outlined in the draft announcement in June 2013. The difference is that it will no longer decline as fast or as steeply as previously planned. The strike price is now scheduled to fall to £140 in 2017/2018 and 2018/2019, rather than the previously announced £135 by 2018/2019.

This is intended to address concerns put forward by the industry and the government’s own advisory body the Committee on Climate Change that the strike price would fall too quickly to incentivise the giant Round 3 offshore wind farms due to come online after 2017.

The UK Government also confirmed a further de-risking measure in December 2013 by granting developers the right to lower the size of projects by up to 25% between the date of CfD allocation and the final investment decision, providing relief against delays to connection caused by unexpected events. Developers of multi-phase projects will also be permitted to secure a set strike price for the entire asset based on the incentive awarded to the first phase, which may comprise up to 25% of an offshore wind farm’s final capacity.

“The announcement in the Autumn Statement and the new strike price did display that the government has listened to its consultation and ruminated on the feedback they received,” explained Neil Etherington, Group Development Director at Able UK. “They have adapted the strike price to give longer term visibility to the market, and the phasing aspect is also a positive development.”

However, there are still considerable areas of uncertainty regarding the process by which offshore wind projects will be allocated a CfD. Most importantly,
concerns exist that offshore wind projects might at some point in the future be required to enter an auction process to obtain a CfD contract, which would add an extra layer of uncertainty. The UK Government announced that onshore wind farms will be required to enter an auction process for CfD contracts in December 2013, sparking fears that offshore wind farms might also face a similar requirement in the future.

There is also still great uncertainty regarding whether the EU will grant State Aid approval for the new CfD mechanism. In February 2014 it was reported that EU regulators were concerned that the early form of the CfD, which will be awarded without a price auction or through a technology neutral tender, could represent an overly generous subsidy and be harmful to competition.

The British government has yet to submit a formal application for State Aid approval to the EU, but has already been asked to provide more information on the pre-CfD scheme. UK legislators have drawn up the subsidy with EU state aid laws in mind, but if a full investigation is required it could delay award of the contracts by months or even years.

State Aid issues aside, there is also uncertainty in the industry about the UK government’s level of ambition for offshore wind in the context of vocal support for alternative energy sources such as nuclear and gas. “I’m quite dismayed at the lack of activity in the sector at the moment,” commented Jerry Hopkinson. “The most fundamental issue is the need for absolute certainty on the sentiment of UK and European governments on their commitment to offshore wind. This is missing at the moment, not least due to the support for nuclear and the implementation of shale gas and support for fracking.”

“In addition I don’t think there is certainly with regard to the CfD regime. A number of developers are scaling back on their initial plans as it doesn’t provide a sufficient subsidy when set against the costs of development.”