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# Green Jobs:

## Prospects for creating jobs from offshore wind in the UK

by Jenny Bird

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**Institute for Public Policy Research**

Challenging ideas – Changing policy

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## About ippr

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Any omissions or errors remain the author's own.

## Abbreviations

BERR	Department for Business, Enterprise and Regulatory Reform
BWEA	British Wind Energy Association
CO <sub>2</sub>	Carbon dioxide
DECC	Department of Energy and Climate Change
DIUS	Department for Innovation, Universities and Skills
EU	European Union
EWEA	European Wind Energy Association
GW	Gigawatt
IPC	Infrastructure Planning Commission
kWh	Kilowatt hour
MW	Megawatt
NaREC	New and Renewable Energy Centre
NPS	National Policy Statement
O&M	Operation and maintenance
R&D	Research and development
RD&D	Research, design and development
RDA	Regional Development Agency
RO	Renewables Obligation
ROC	Renewables Obligation Certificate
STEM	Science, Technology, Engineering and Mathematics
UKTI	UK Trade and Investment
WTO	World Trade Organisation

## Foreword

*'We are taking action to speed recovery, but not simply to turn the economy back to what it was...we're on the edge of a new low carbon industrial revolution. The shift to low carbon technologies and production will transform how we live and work... We need to take the big decisions about the UK's energy and transport infrastructure so that they are ready for the shift to renewables... We have committed to a shift to low carbon as a country and an economy.'*

Lord Mandelson, Cumbria Economic Forum, 20 February 2009

The world is facing an unparalleled economic crisis. As recession follows the credit crunch and banking collapse governments around the world are contemplating fiscal stimulus – the use of public money to stimulate economic activity – to keep the recession from turning into a decade-long depression.

But the world also has another crisis to face – climate change. Current trajectories show there is little time left to stop the climate changing beyond the widely-agreed threshold of a dangerous two degree Celsius rise.

Climate change itself is a result of the failed economic model, so any initiatives to address the financial crisis must address climate change. This means that economic recovery cannot be delivered by inflating consumption or subsidising carbon-heavy industries.

Since most climate emissions are connected to our infrastructure – houses, offices, power stations, roads and so on – many commentators such as Lord Stern recognise that spending money on tackling climate change now is the best way of killing two birds with one stone. Through renovating our homes and businesses to be more energy efficient, building renewable power systems and upgrading public transport we will not only stimulate the floundering economy but also kick-start the change to a low-carbon future.

Converting the world to a sustainable energy system will involve significant finance. According to leading investment analysts New Energy Finance we will need to invest at least US\$515bn per annum in clean energy between now and 2030. Most of this investment will need to be in renewable energy.

Currently the UK renewables sector is heading for a crisis where the targets set by the European Union and supported by the UK government will not be met. We need a long-term policy framework with clear financial support mechanisms and a simple, effective planning system that gives confidence to investors, coupled with direct support for delivery of the necessary infrastructure. The direct support can come, in part, from a green fiscal stimulus package for the flagging economy. But further, it also requires an effective financial support mechanism, key upgrades to the transmission system, low-interest loans and a faster, more transparent system of planning offshore.

Measures outlined in this report for the delivery of offshore wind include upgrading infrastructure around ports to allow new ships and factories to access the necessary facilities and ensuring cabling to the new offshore wind sites is established. Support via low-interest loans for the early stages of development when cash-flow on projects will be very tight and a green investment bank charged with supporting renewable energy would also help. The Irish government has taken a further step and instructed the banks – many now effectively in public ownership – to have a major clean energy fund as a condition of

government refinancing<sup>1</sup>. This is the sort of prioritisation that can give confidence to potential investors from the private sector that the Government means business.

Both Prime Minister Gordon Brown and Secretary of State for Energy and Climate Change Ed Miliband, have made it clear that green jobs are part of the recovery plan for the UK. But if the UK is to benefit from the jobs that 30GW of offshore wind would generate then we need urgent action now. Looking to what Germany has achieved offers great encouragement – there are already 250,000 jobs in its renewable energy sector and the German government expects that number to triple by 2020 and hit 900,000 by 2030<sup>2</sup>.

We need renewable energy to play a pivotal role in creating a sustainable economy for the UK. We have ambitious targets – but, as this report outlines, there are significant policy and practical issues to be dealt with before delivery can be assured. The efforts to start a recovery from the current economic downturn provide an opportunity for the UK to get its share of the benefits of this renewable revolution, but – and this is especially key for offshore wind – success demands that financial support and a new policy framework must be focused on making sure we deliver on our renewable targets.

A handwritten signature in black ink, appearing to read 'Sauven', with a stylized, overlapping initial 'S'.

John Sauven, Executive Director, Greenpeace

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1. New Energy Finance newsletter, 24 February 2009

2. 'Germany Says Green Jobs Will Shorten Recession', Reuters, 25 February 2009

## Executive summary

As unemployment in the UK continues to increase with the global recession, it is only natural to look for opportunities to create new jobs. At the same time, the imperative to tackle climate change and drastically reduce emissions of greenhouse gases means that we need to have a radical rethink of how the UK economy will be structured in the future.

This report compiles evidence from industry players abroad and in the UK of the kind of interventions needed to deliver a successful offshore wind industry in Britain.

### **The importance of offshore wind to the UK**

Offshore wind is a strategically important sector for four reasons:

- It is likely to provide a large portion of the renewable energy needed to meet our 2020 renewable energy targets and carbon budgets
- It provides long-term job opportunities
- It is a sector in which there is scope for the UK to develop a strategic advantage with the potential for export opportunities
- It has the potential to provide good quality jobs in the right geographical locations.

Without a rapid expansion in offshore wind capacity, the UK will struggle to meet its target to achieve 15 per cent of energy from renewable sources by 2020 and to meet the carbon budgets set out by the Committee on Climate Change. The scale of the expansion is still uncertain with estimates of likely capacity in 2020 varying quite significantly. The Government has stated very ambitiously that Round Three of the offshore wind programme could deliver 33 gigawatts (GW) of capacity by 2020, but the forecasts in the Renewable Energy Strategy present a much more conservative estimate of 14GW.

Estimates of the numbers of jobs that could be created by increasing offshore wind capacity range widely, from 23,000 to 70,000. These figures depend in part on the size of offshore wind capacity that the UK is able to secure, but also on the extent the Government is prepared to follow an active industrial strategy in this area. Further, there is no guarantee that all of the jobs would be located in the UK. For example, the offshore wind turbines currently operating in UK waters are manufactured overseas.

There are some areas where the UK is more likely to benefit from increased job capacity. These include technical consultancy (for the development of new wind farms), installation of turbines, operation and maintenance of the wind farms and associated legal and financial services. In terms of gaining new manufacturing jobs, there appears to be greatest opportunity in manufacturing some specific components that draw on the UK's existing skills and knowledge base in the offshore oil and gas sector – for example, manufacturing foundations and towers.

### **Learning from successful wind industries overseas**

Denmark, Germany and Spain have all been successful in developing a local onshore wind industry. All three countries recognised the potential for economic and employment advantages in addition to the environmental benefits and used effective strategies to develop onshore wind.

The UK can benefit from three key lessons that emerge from the approaches taken by these countries:

- **A stable and sizeable domestic market** was needed and was achieved through a combination of strong political commitment and the use of feed-in tariffs as an economic support mechanism.

- **Industrial activism** was important, in the form of tax incentives, favourable customs duties, quality certification, R&D support and – in the case of Spain – local content requirements.
- **An available skills base** was crucial: turbine manufacturers were able to draw on an existing manufacturing skills base in each country and in many instances, existing local companies diversified into the wind supply chain.

### **Securing the domestic market**

Investors need to have confidence that the ambitions set out for developing the UK's offshore wind capacity will be delivered. The targets set for 2020 have helped to build confidence that the Government is serious about developing renewable energy but there are still a number of factors that are creating uncertainty that will need to be overcome if the sector is to develop as planned.

The first of these is the economic support mechanism – the Renewables Obligation (RO). The RO has come under a lot of criticism because it has not been able to deliver the deployment of renewables to the extent that the use of feed-in tariffs has in other countries. The Government has responded by making some changes to the RO and by introducing a feed-in tariff for small-scale installations. The key question is whether these changes – which will result in increased support for emerging technologies like offshore wind – go far enough to make the industry economically viable. Government should be prepared to readjust the support mechanism if it is found not to be working.

The second factor is removing barriers to delivery. The barrier causing most concern is the grid infrastructure: major upgrades to capacity and new offshore connections will be needed in order to accommodate such a large amount of new offshore wind. There are currently several processes underway to address this problem but the credit crunch may add another dimension. Government should consider underwriting investment in the grid if a lack of available finance threatens to prevent the necessary grid upgrades from occurring.

The planning system and supply chain also pose threats to the delivery of offshore wind. An Infrastructure Planning Commission (IPC) is currently being established and it is hoped that this will help to speed up the consent process. This must be monitored as any slippage in timetable could jeopardise delivery of new capacity by 2020.

Government should also consider targeting support measures at companies that could help overcome bottlenecks in the supply chain. This includes manufacturers of foundations, offshore substations, cables, installation vessels and turbines.

### **Industrial activism**

Improving the economic support mechanism and removing barriers to delivery will help to build confidence in the UK market. However, the UK market is not likely to be big enough to guarantee that new jobs will be created domestically. The extent to which the UK economy and workforce will be able to benefit from new opportunities in offshore wind will depend on how willing the Government is to employ 'industrial activism' and be strategic in the choices it makes.

Some other European countries already have a strong onshore wind industries so the UK Government will need to take advantage of the 'game-changing' nature of the offshore wind market compared to current onshore arrangements in order to reap significant UK employment rewards. Without a proactive strategy there is a significant chance that the UK offshore wind market will continue to rely on imports from continental Europe. From the point of view of the climate this matters only a little. From the point of view of enhancing UK manufacturing industry it would clearly be a missed opportunity.



Combining the evidence from interviews conducted by ippr with industry players with other evidence suggests that the Government should develop an ‘offshore wind investment programme’ for the UK that would be run by the Department of Energy and Climate Change (DECC) and administered through Regional Development Agencies (RDAs) and UK Trade and Investment (UKTI). The programme would consist of the following elements:

- **Financial and tax incentives.** Current Government grant programmes and support for R&D are spread too thinly. They must be drawn together into a much more clearly defined and focused package that will be easier to market to potential investors.
- **Facilities and infrastructure development.** This will help make the UK a more attractive place to invest. It should include identifying a site for a nearshore test facility and use of public and private investment to upgrade port facilities. These measures should be targeted at a specific geographical area in order to promote a ‘growth cluster’.
- **Short-term guarantees.** The recession could make raising finance difficult in the short term so Government should offer to underwrite borrowing for this sector and/or encourage banks to lend to this sector.
- **Consider requirements for using locally produced content** (components and so on). This approach has been effective in other countries but may run into difficulties with World Trade Organisation and European Union trade rules. Government should consider whether it might be possible to implement such an approach in determining successful bidders in Round Three of the offshore wind programme.

### Skills

As well as maximising the number of jobs available, government also needs to think more strategically about ensuring that the workforce has the right skills to take advantage of these job opportunities. There is a shortage of engineering and manufacturing skills in the UK and this could pose problems for the delivery of offshore wind capacity, and makes the UK less attractive to investors.

An analysis of the likely size of the skills gap is needed, followed by a strategic plan for how the gap will be closed, to include:

- **Training.** As a first step, a more effective approach to encouraging young people to study Science, Technology, Engineering and Mathematics (STEM) subjects needs to be found.
- **Attracting the workforce.** A comprehensive strategy for attracting more people into the sector will require input from industry representatives, universities and sector skills councils (among others). It could include: engaging with careers advice services to ensure they have the most up-to-date information on opportunities, highlighting efforts to forge links between universities and industry, and providing incentives for people to take up low-carbon-sector jobs.

### Conclusions

The UK currently has the world’s largest installed offshore wind capacity as well as ambitious plans for expansion and its growth offers a real opportunity for job creation and to remove bottlenecks in the wind supply chain. However, as international experience shows, without a more interventionist approach from government, the UK will struggle to capture a significant share of these jobs given that nearby countries already having thriving industries on which to develop the new capacities required for offshore wind.

By removing the barriers to investment, providing additional focused support to the industry and by creating a strategy to build up the necessary skills base, the UK will be well placed to

reap the employment benefits of the shift to a low-carbon energy system. Conversely, failure to act to gain jobs in this sector will be a significant missed opportunity as the UK moves towards a low-carbon economy.

## Introduction

The UK is facing tough targets to reduce its emissions of greenhouse gases and to increase its use of renewable energy by 2020. At the same time, as the global economic slowdown hits the UK and unemployment figures begin to rise, many have looked to the environmental sector as a potential new growth area that could help to create new jobs and boost the economy. The idea that tackling our environmental problems could simultaneously provide good quality employment opportunities has led to numerous calls for a 'Green New Deal', from organisations ranging from the United Nations, to the Environment Agency to the New Economic Foundation's 'Green new deal group' (UNEP 2008, nef 2008, Environment Agency 2008).

The offshore wind sector has potential to be part of a Green New Deal. There are ambitious plans to scale up the UK's offshore wind capacity over the next decade under Round Three of the Crown Estate's site allocation process and achieving this goal will require a large workforce to plan, manufacture, install and run the wind farms. Yet many considerable barriers remain to deploying offshore wind power in the UK and, even if Round Three ambitions were realised, there is no guarantee that the jobs created would go to the UK.

This paper investigates the barriers to deploying more offshore wind turbines in the UK, the potential for creating UK-based jobs in this sector, and whether there are lessons that can be learnt from the experience of other countries in developing indigenous onshore wind industries.

The report is based on a literature review and interviews with key stakeholders in the wind industry across Europe, including industry associations, developers, turbine and component manufacturers and providers of key services (a full list of interviewees is included in Annex 1). The interviews were conducted in January and February 2009.

- Section 1 examines the opportunities for job creation in offshore wind in the UK as well as the key barriers to delivering these jobs.
- Section 2 goes on to look at the successes of building onshore wind industries in Denmark, Germany and Spain and identifies key lessons from these experiences.
- The following three sections then apply these lessons to the UK context, focusing on offshore wind. The first lesson regards what needs to be done to provide a stable and predictable domestic market; the second, what forms of 'industrial activism' are necessary; and the third, what kinds of 'skills activism' will be needed.
- The final section provides a conclusion and summary of key policy recommendations.

## 1. Offshore wind and employment

As the fall-out from the credit crunch continues to spread across the UK economy, the prospect of creating ‘green-collar’ jobs as a route out of recession has gained more and more currency. At the launch of the Low Carbon Industrial Strategy, the Prime Minister said:

*‘I want to construct a global “green new deal” that will pave the way for a low carbon recovery and help us build tomorrow’s green economy today.’ (Number 10, 2009)*

Jim Murphy, Minister for Europe, has also highlighted Government support for developing ‘green-collar’ jobs:

*‘Countries that take early action in developing green technology will have a competitive advantage as this boom industry grows in the future. The Government is committed to making sure the UK is ahead of the pack – in the future we want an economy offering a mix of good blue collar jobs, good white collar jobs and good green collar jobs. Our aim is to have over a million UK workers in environmental industries within the next two decades.’ (Foreign and Commonwealth Office 2008)*

While the term ‘green-collar jobs’ applies to many different industries (including renewable energy generation, installation of energy efficiency measures, providing low-carbon transport and more) the focus of this report is on job creation in the offshore wind supply chain.

This section begins by describing why offshore wind could be a good source of green-collar jobs and why the Government should pay particular attention to this sector when developing strategies to tackle the recession and stimulate employment. We then go on to consider how many jobs could be created in offshore wind, before looking at each step of the supply chain in more detail to identify some of the barriers and opportunities for job creation.

### **Why offshore wind?**

The global economic slowdown has understandably focused minds on where new jobs might be created to build a path out of recession. At the same time, the imperative of tackling climate change is forcing Government and businesses alike to radically rethink the future of the UK economy in a low-carbon world.

The Government is committed to developing a ‘Low Carbon Industrial Strategy’ (HM Government 2009) that seeks to ensure that the UK is best placed to benefit from the opportunities presented by moving to a low-carbon economy. This includes installing the new low-carbon infrastructure that will be necessary to achieve our emissions reduction targets, developing and producing new low-carbon vehicles, helping businesses to improve their energy efficiency and making the UK an attractive location for low-carbon industries (ibid).

The Secretary of State for Business, Lord Mandelson, has suggested that an approach of ‘industrial activism’ that would ‘widen and diversify the specialist bases of the UK economy and focus on how we further commercialise and internationalise these bases’ (Mandelson 2008) would leave the UK better placed to deal with the consequences of the slowdown and to build a new low-carbon economy. The Government also has a £158 million fund to support and provide training opportunities for the unemployed (Department for Work and Pensions 2009). The question, of course, is where should this attention be focused?

We recognise that there are many different sectors that have the potential to drive the new low-carbon economy. While the Low Carbon Industrial Strategy must encompass all of these sectors, such a broad analysis was beyond the scope of this research. Although the focus for this report is offshore wind, this does not mean that we believe offshore wind should receive attention at the expense of other renewable energy technologies. Rather we seek to provide an example of the kinds of measures that are likely to be needed to bring forward jobs and economic benefits from new green industries.

We have chosen to focus on offshore wind for four main reasons:

### **1. Offshore wind is a sector with growing importance for the UK**

The UK currently has the largest installed offshore wind capacity in the world and has ambitious plans to promote a rapid and large-scale growth in offshore wind farms. Offshore wind is expected to make a large contribution to meeting renewable energy targets and carbon reduction budgets for 2020, unlike many other renewable and low-carbon energy technologies, which will not be able to be deployed on such a short timescale (this is explored in more detail below). It is clear that if the UK expands its offshore wind capacity as planned, then a large workforce will be needed to plan, manufacture, install and operate the new wind farms.

### **2. Offshore wind provides good long-term prospects**

While it is understandable to want to focus on short-term job creation opportunities that will help tackle the current recession, it is important to consider the long-term prospects for these jobs – will they still exist in decades to come?

Offshore wind may not provide instant new jobs, but it does offer good medium-term prospects. In addition, jobs in offshore wind are likely to be sustainable over the longer term because – unlike jobs in carbon-intensive industries – offshore wind is likely to be a prominent feature of the new low-carbon economy that is necessary to meet our climate change obligations.

### **3. Offshore wind has potential for competitive advantage and export opportunities**

This is clearly a sector where the UK has the potential to develop a competitive advantage. Germany is also developing its offshore wind market and it is possible that other countries, including the USA (the Cape Wind Project – America's first offshore wind farm – is currently going through the permitting system [Cape Wind 2009]), China and other European countries will follow suit. Developing an experienced offshore wind workforce could therefore provide opportunities in the future to export these skills as other markets mature. Similarly, if we are able to attract manufacturing facilities to open in the UK, there is scope for future export of components and turbines. There is also the potential that once companies are established, they may innovate and create new markets – an opportunity that would be missed if companies locate overseas.

### **4. Offshore wind has the potential to provide good quality jobs in the right places**

It is important to give consideration to the quality of the jobs that will be created through a Low Carbon Industrial Strategy – will they provide good career development opportunities? Will more economically deprived areas of the country be able to benefit from the new jobs? And will people who are currently unemployed or working in industries that are likely to decline in the future be able to benefit from the new job opportunities?

Although there have not been many studies in this area, there is some evidence to suggest that offshore wind does have the potential to offer good quality, career-track jobs. For example, studies of the Spanish and German renewables industries have shown that they offer good job prospects, career paths and job security (UN 2008).

It is also likely that a UK offshore wind industry is likely to be located in some of the more economically deprived regions of the UK. Offshore wind could offer an alternative career option for those currently employed in the offshore oil and gas industry, which is likely to decline over the next decade as reserves in the North Sea deplete. Many of the skills from this sector can be transferred to offshore wind and the jobs are likely to be located in roughly the same geographical areas. There are also opportunities for people working in the automotive and aerospace industries to move into offshore wind.

Taken together, these four reasons suggest that offshore wind is an area of strategic importance for the UK and as such would be a good subject for 'industrial activism'.

### **The opportunity: job creation from expanding UK offshore capacity**

The case for pursuing a strategy to support the creation of jobs in offshore wind has been made. We now turn to the question of how many jobs are likely to be created in this sector. However, before we can look at numbers of jobs, it is first necessary to understand the level of ambition for increasing offshore wind in the UK.

#### **Targets and forecasts**

The UK has two important targets for 2020 to which offshore wind is expected to make a significant contribution:

- The first is a European target, to achieve 15 per cent of energy from renewables, set out in the new European Directive on Renewable Energies, which was adopted in December 2008 (EurActiv 2009).
- The second is a domestic target, set out in the Climate Change Act, to reduce emissions of greenhouse gases by at least 26 per cent from 1990 levels. However, the Committee on Climate Change has recommended budgets that imply a reduction of 29 per cent until a global agreement is reached and 40 per cent once an agreement is reached (Committee on Climate Change 2008).

The Government's Renewable Energy Strategy consultation document suggests that in order to meet the renewables target, around a third or more of our electricity will need to come from renewable sources and offshore and onshore wind are expected to provide a large proportion of this (the Government's illustrative scenario shows offshore wind contributing 40 per cent of renewable electricity needs and onshore 28 per cent by 2020) (HM Government 2008a). Other technologies, such as marine power, are unlikely to be sufficiently developed to make much of a contribution to the 2020 target, but may become more significant in later years.

The 2020 targets are ambitious. Less than 5 per cent of the UK's electricity comes from renewable sources today (HM Government 2008a), so a large expansion in renewable generating capacity will be needed to meet both targets. Offshore wind is expected to provide the lion's share of renewable electricity by 2020 yet there is still a great deal of uncertainty about whether there will be enough wind farms up and running to meet this requirement.

A number of studies have made estimates of the capacity likely to be available in 2020 (see Table 1.1 below). For *offshore* wind, estimates range from 10.7GW (Douglas Westwood 2008) to 18GW (Renewables Advisory Board 2008). However, the Carbon Trust calculates that 29GW will be necessary to meet the 2020 renewables target (Carbon Trust 2008) and the timetable for Round Three of the offshore site allocation process contains a target for an additional 25GW to be built by 2020 (which would give a total offshore wind capacity of 33GW when combined with the existing 8GW in operation, construction or planning) (The Crown Estate 2008). The Government is currently consulting on its Strategic Environmental Assessment of these plans (DECC 2009).

Table 1.1. Estimates of offshore and onshore wind capacity in 2020

Study	Onshore and offshore wind capacity in 2020
Government's Renewable Energy Strategy (HM Government 2008a)	<ul style="list-style-type: none"> <li>• Up to 33GW of offshore wind may be possible by 2020, but modelling shows that deployment may be closer to 14GW</li> <li>• 14GW onshore wind</li> </ul>
Douglas Westwood supply chain study for BERR (Douglas Westwood 2008)	<ul style="list-style-type: none"> <li>• 10.7GW offshore wind</li> <li>• 14GW onshore wind</li> </ul>
Bain & Company study for BWEA (Boettcher <i>et al</i> 2008)	Contains three scenarios: <ul style="list-style-type: none"> <li>• Static scenario: 22GW onshore + offshore wind</li> <li>• Solid progress: 27GW onshore + offshore wind</li> <li>• Dynamic scenario: 34GW onshore + offshore wind</li> </ul>
Renewables Advisory Board (RAB 2008)	<ul style="list-style-type: none"> <li>• 18GW offshore wind</li> <li>• 13GW onshore wind</li> </ul>
Carbon Trust (2008)	<ul style="list-style-type: none"> <li>• 29GW of offshore wind will be necessary to meet 2020 renewables target</li> </ul>

### Job forecasts

The UK wind industry (onshore and offshore combined) currently employs around 4,000 to 5,000 people (EWEA 2009, Boettcher *et al* 2008) and this figure will increase significantly if the rapid expansion of offshore wind capacity goes ahead as planned. Forecasts of job numbers in 2020 vary quite considerably from just 23,000 jobs in the wind sector to 133,000 jobs in centralised renewable energy (Table 1.2).

Table 1.2. Forecasts of jobs created renewable energy, wind and offshore wind in 2020

Source	Job forecast (2020)	Sector	Assumptions
Government's Renewable Energy Strategy (HM Government 2008a)	133,000	Centralised renewable energy generation	<ul style="list-style-type: none"> <li>• These jobs may not necessarily all accrue to the UK</li> <li>• 14GW offshore wind</li> <li>• 14GW onshore wind</li> </ul>
Carbon Trust (2008) <i>Offshore wind power: big challenge, big opportunity</i>	40,000 – 70,000	Offshore wind	Based on 29GW capacity installed by 2020
Boettcher <i>et al</i> (for BWEA) (2008) <i>A closer look at the development of wind, wave and tidal energy in the UK</i>	Depending on scenario: <ul style="list-style-type: none"> <li>• 23,000</li> <li>• 36,000</li> <li>• 57,000</li> </ul>	Onshore + offshore wind	Scenarios: (total wind capacity in 2020) <ul style="list-style-type: none"> <li>• 22GW</li> <li>• 27GW</li> <li>• 34GW</li> </ul>
Douglas Westwood (2008) <i>Supply-chain constraints on the deployment of renewable electricity technologies</i>	Depending on scenario: <ul style="list-style-type: none"> <li>• 5,000</li> <li>• 14,000</li> <li>• 34,000</li> </ul>	Wind power	Scenarios (based on number of turbine manufacturers locating in UK): <ul style="list-style-type: none"> <li>• Low (one manufacturer)</li> <li>• Mid (two manufacturers)</li> <li>• High (three manufacturers)</li> </ul>

Table 1.3 gives a more detailed breakdown of job creation across the offshore wind supply chain.

<i>a) SQW Energy (2008)</i>	Max. no. jobs	Min. no. jobs
Planning and development	5,965	2,060
Design and manufacturing	14,095	4,865
Construction and installation	15,720	5,420
Operations and maintenance	13,550	4,680
Technical, financial and legal services	4,880	1,685
<b>Total additional jobs</b>	<b>54,210</b>	<b>18,710</b>
<b>Total jobs (wind only)</b>	<b>56,900</b>	<b>23,100</b>
<i>b) Carbon Trust (2008)</i>	Max. no. jobs	Min. no. jobs
RD&D, engineering and design	4,000	3,000
Turbine and component manufacturing	15,000	7,000
Services	22,000	22,000
Installation and Operations and maintenance	29,000	8,000
<b>Total</b>	<b>70,000</b>	<b>40,000</b>

There is clearly huge potential for job creation as a result of expanding offshore wind capacity, but what is less clear is how many of these jobs will occur in the UK and to what extent local people will benefit. (On the other hand, these estimates do not include opportunities for job creation in the UK as a result of other countries developing offshore wind capacity). We now consider where these different jobs are likely to be located.

### **Opportunities for and barriers to UK-based jobs in offshore wind**

Since creating new jobs is important for tackling the recession, Government will want to ensure that as many of the jobs created by offshore wind are located in the UK as possible. Some jobs in offshore wind are more likely to accrue to the UK than others – for example, jobs in operation and maintenance, which require regular visits to the wind farms in question, are much more likely to be recruited locally (UN 2008). However, other jobs, such as those in installation and manufacturing, will not necessarily be as closely tied to the UK.

For example, companies involved with UK offshore wind projects currently bring over high-level staff from the countries in which they are based to oversee projects and also hire migrant labour where there are skills shortages in the UK (for example, in construction). A study of the Scroby Sands wind farm development in Norfolk showed that UK labour accounted for 73 per cent of the total man-hours in development, 70 per cent in construction and 82 per cent in operation (Douglas Westwood 2005). There is clearly a risk here that unrealistic expectations could be raised among members of the public about how many new jobs will be created with the expansion of offshore wind, and this could pose political difficulties. However, it should also be remembered that the development of offshore wind in other countries could result in employment benefits for the UK, which are not generally accounted for in the job projections.

In this section we look at the different types of job across the offshore wind supply chain and examine what the opportunities and barriers are to locating these jobs in the UK.



### Technical consultancy

Some of the first jobs to be created in the offshore wind sector will be generated by the need to put together planning applications and carry out environmental impact assessments. Successful bidders in the Round Three offshore allocation process will be awarded exclusive rights to develop wind farms in a number of specifically defined 'zones' around the coast of England and Wales. Producing plans for these developments will be likely to increase demand for technical consultancies.

This is an area in which the UK already has a base of expertise and much of this type of work for Round One and Round Two has been done by British firms. It is therefore considered to have good potential for future growth.

*'Quite a lot of the supply-chain activity to date has been focussed on the manufacturing of turbines and components and not enough on the wider value chain including technical consultancy, logistics and Operations and Maintenance where the UK has some strong capabilities.'* Regional Development Agency, interview with ippr

### Research, design and development (RD&D), engineering and design

The Carbon Trust notes that although many RD&D, engineering and design jobs are likely to occur in other countries (because manufacturing hubs are already established for both turbine manufacturers and component suppliers – see below), there is still scope to generate some jobs in this sector within the UK. The Carbon Trust estimates that it is possible to attract 20 to 30 per cent of global offshore wind RD&D to the UK (Carbon Trust 2008).

### Turbine and component manufacture

Jobs in turbine and component manufacture are highly sought after since they account for a large proportion of the jobs and value created by expanding the use of wind power. The European Wind Energy Association estimates that a total of 59 per cent of the workforce directly employed in the European wind sector either work for component manufacturers or turbine manufacturers (EWEA 2009a). Establishing a turbine and/or component manufacturing base can have knock-on benefits as jobs are also likely to be created among second-tier supply companies.

It is important to distinguish between the three different types of manufacturing model that countries can have:

- Full, local, turbine manufacturing
- Local manufacturing of selected components
- Assembly of turbines from imported components by local employees.  
(Lewis and Wiser 2005)

Below we consider each of these, while also reflecting on the question of whether local manufacturing companies could diversify into the wind sector, or whether existing foreign companies could be encouraged to set up factories in the UK.

#### Full turbine manufacturing

Clearly, the ideal from a UK economic point of view would be to establish a full turbine manufacturing base because this would create the maximum number of jobs, maximise tax revenues and also potentially lead to export opportunities.

Most commentators agree that the route to establishing full turbine manufacturing is to first attract a turbine manufacturer to locate in the UK, which will in turn draw in component manufacturers to set up near by (Carbon Trust 2008, Douglas Westwood 2008).

But how likely is this to happen? Although the Government is working to attract a major turbine manufacturer to set up in the UK, and despite the success story of Clipper Wind establishing a centre to develop a new offshore turbine in Blyth (see Box 1.1), many stakeholders are still sceptical about the chances of achieving full turbine manufacturing in the UK.

There are two primary reasons for this. First, the UK will have to compete with countries like Denmark, Germany and Spain, which already have established wind industries and skills bases (and potentially China and India in the future if production costs are lower than transportation costs).

Second, the size of the offshore wind market in the UK may not be sufficient to make it worthwhile investing in a factory, particularly when components can be shipped from nearby European countries. For manufacturers who have existing component or turbine factories in mainland Germany, expanding existing capacity to supply the offshore wind market looks more appealing than starting a new factory from scratch in the UK because the skills and knowledge of production processes are already there. As long as the factories have good access to the sea, it will not be too difficult for them to supply the UK market.

*‘There are the major players and they’ve been based in Denmark, Germany and they’re quite happy still to be based there to supply their market so why should they move?’* Turbine manufacturer, interview with ippr

An additional barrier to attracting investment from foreign companies is the uncertainty caused by the exchange rate. As a general rule, manufacturers like to operate in the same currency as the market they are selling into because exchange rate fluctuations introduce uncertainty into the business model. At first glance this may appear to put the UK in a stronger position since – in the short term at least – the market for offshore wind is going to be mainly in the UK. But this is not necessarily the case, for two reasons. First, the UK market may not be large enough to warrant dedicated factories, therefore they will be supplying other markets as well as the UK and hence dealing in other currencies. Second, since all of the existing major turbine manufacturers are foreign companies, setting up factories in the UK would increase risk in terms of labour costs, which would be paid in Sterling.

#### **Box 1.1: Clipper Wind Power investment in the UK**

American wind company Clipper Wind Power has recently established an offshore wind turbine development operation in Blyth, North East England. The company is working to develop a prototype offshore wind turbine and the project will make use of the blade testing and manufacturing facilities at the Centre of Excellence for New and Renewable Energy (NaREC), which was established by the local Regional Development Agency, One North East (NaREC 2009, UK Trade and Investment 2009). One North East is also investing a £5m package of support into the project.

The development of the turbine is expected to create 25 skilled engineering jobs in the first instance, but there are also hopes that once the technology has been successfully developed, manufacturing will also be carried out in the UK (NaREC 2009).

Clipper Wind has announced that it will build an offshore wind turbine factory in Northern England that will be able to manufacture turbines by 2015 (Nakanishi 2008, One North East 2008).

The initial investment came about through a collaborated effort between BERR, One North East and UK Trade and Investment (Douglas Westwood 2008).

While it might be difficult to attract manufacturers who already have established bases elsewhere in Europe, there may be scope for drawing in other turbine manufacturers, who have yet to establish a base in Europe, or new entrants to the market.

Therefore, efforts aimed at attracting foreign companies to invest in the UK should be focused on those who do not already have an established European base.

#### Component manufacturing

Many of the stakeholders interviewed for this project felt that it might be more fruitful to focus efforts on developing manufacturing capacity on a few areas of the supply chain in which the UK could have a comparative advantage. The UK currently has only one factory manufacturing turbine components – a Vestas blade factory on the Isle of Wight. Further components that were identified by interviewees as ones that could be manufactured in the UK were: foundations, towers, cables and electrical components. The market for manufacturing other components – particularly the nacelle (the part of the turbine that contains the rotor hub, gearbox, generator and drive train) and the internal components – was thought to have been already captured by other countries in Europe who would be reluctant to see other nations taking on this work, given the high financial value of these components.

*‘The UK’s good at certain things and not at other things so we don’t have, for example, the capacity for big castings but we do have a lot of the other skills which are required: on generators, the assembly of the things, electrical components – the inverters, transformers etc. – there’s no reason why some of the steel work can’t be done here – making towers and foundations – and obviously things like fibreglass that we use in blades.’* Turbine manufacturer, interview with ippr

Towers and foundations in particular stand out as likely candidates for local manufacturing. This is partly because, given their size and weight, these components are difficult to transport, and partly the UK already has a knowledge and skills base in making these components, gained from the offshore oil and gas industry; the other main player in offshore wind – Germany – does not have the same history of offshore industry. In addition, foundations have been identified as a bottleneck in the supply chain that could jeopardise the 2020 target, so growing an indigenous foundation manufacturing industry would also make sense for this reason (Carbon Trust 2008).

There is scope for UK companies to diversify into component manufacturing: in particular, the automobile and aerospace industries have been identified as having potential to move into offshore wind, as well as companies producing cables and those manufacturing foundations and platforms for offshore oil and gas and those operating at the second tier of the supply chain. However, no comprehensive analysis has been conducted to identify which existing companies have the potential to diversify. We recommend that Government conduct a mapping exercise to better understand which companies could move into the offshore wind supply chain.

However, these companies may need financial support (for example, through capital grants) in entering the supply chain because costs are high. They may also require assistance in marketing the quality and reliability of their products as quality control is a primary concern for turbine manufacturers (Douglas Westwood 2008). And they will need to be persuaded that there is a genuine and stable market for offshore wind components.

*‘We need to prequalify any supplier that we procure equipment from and that can take time. Depending on the component it may take months or a year. We want to know that our suppliers are financially stable, they can work with our procurement processes, that they have the design, quality, and reliability that we demand. That they are willing to work within our social, environmental and ethical requirements and that they are willing to work with us to develop a strong long-term relationship. Many potential suppliers do not realise how long it may take for them to be approved.’* Turbine manufacturer, interview with ippr

The experience to date in the UK, where a market has been promised for years but has not yet materialised, has not built confidence in the offshore wind market. Interviewees told of new entrants in the UK who had tried to move into supplying the offshore market but failed because there was not a big enough market for their products. In order to attract new entrants and diversification, it will therefore be necessary to increase confidence in the size and certainty of the market. There is a sense that views towards the UK market are starting to change, but there are still many uncertainties about the future of the market that are currently undermining investor confidence. This is explained further in Section 3 below.

*‘Heretofore the market hasn’t been stable enough on- or offshore to get the kind of volume and stability that’s necessary.’* Industry spokesperson, interview with ippr

*‘Since the first UK offshore wind project at Blyth Northumberland there have been a number of on/off initiatives and the market has never really kicked off. Now the company strategies have started to change and business confidence appears to be growing on the back of a stronger government drive and momentum through Round 3. Although it might take longer to implement in today’s economic climate than they expected six months ago it’s an opportunity that companies are investing in now.’* Regional Development Agency, interview with ippr

Barriers to attracting foreign-owned companies to establish component manufacturing factories in the UK are similar to those mentioned above regarding full turbine manufacture. Namely, that the market may not be large enough to justify a new factory, it may be easier to expand existing facilities in Europe and export to the UK market and uncertainty introduced by the exchange rate may be unattractive (for example, some current Danish suppliers always agree their contracts in Euros rather than Danish Krone, so dealing with UK-based subcontracts would add an additional risk).

*‘[The Government] really should go for additional jobs production phases ...they need to encourage the manufacturing industry really to create a larger number of jobs...all these things [turbine components] are pretty expensive to move around...but nevertheless it’s much more economical today to import these from Europe into the UK.... And they need to change the picture if they want to create jobs.’* Component manufacturer, interview with ippr

### Assembly

Turbine assembly looks a viable option for the UK. The main barrier to achieving this is ensuring that the right infrastructure is in place. This will require investment in port facilities

and other local infrastructure as well as ensuring there is sufficient space available to set up an assembly plant.

A final important factor that applies to all manufacturing jobs is the question of whether the UK market will be large enough to make it worthwhile for companies to set up new manufacturing facilities in the UK.

### **Installation**

Installation of wind turbines is another area where the UK could draw on its existing skills base from the offshore oil and gas industry. There is also potential to export these jobs as the offshore wind market develops globally.

*‘There is massive potential to export skills [in construction and operation and maintenance].’* Developer, interview with ippr

### **Operation and maintenance**

Most industry experts would agree that operation and maintenance (O&M) – which includes monitoring of the turbines, routine servicing and maintenance and repairs – is the area where the majority of the jobs are likely to accrue to the UK. This is because the workforce will be required to live near to the wind farm. Again, there is potential to build on knowledge and skills from the UK’s existing offshore oil and gas workforce.

Stakeholders also note that O&M jobs are likely to be good quality skilled jobs with long-term stability over the lifetime of the wind farm.

The barriers to creating O&M jobs for planned offshore capacity expansion are the lack of suitable skills and a lack of suitable infrastructure. The Carbon Trust identifies a lack of port facilities in particular as a barrier (Carbon Trust 2008).

### **Services**

A growing offshore wind industry will also create opportunities in the financial and legal sectors (for example in financing wind farms). This is also considered to be an area where the UK has a comparative advantage and existing skills base and again there is potential to export these jobs. The Carbon Trust estimates that the UK could provide these kinds of support services for over 50 per cent of the global offshore wind industry by 2020, creating 22,000 jobs in the process (Carbon Trust 2008).

In general, interviewees tended to agree that technical consultancy, operation and maintenance and service jobs were more likely to accrue to the UK, while manufacturing jobs were more likely to be based overseas.

*‘A lot of jobs will be created obviously through the operations and maintenance and virtually all our work we do on environmental surveys and consultancies goes to Brits – a lot of the engineering for our projects is done by British consultancies so the workload and the opportunities are booming and it’s in the knowledge sectors...it’s quite a boom time for those sectors but when you come down to manufacturing plants there will be I’m sure more British input but I can’t see an easy way of us making substantial inroads.’* Developer, interview with ippr

## 2. Creating jobs – lessons from the onshore wind industry

There is clearly much potential for job creation in the offshore wind industry but, as we have seen, a great deal of uncertainty remains about the number of jobs that might be created and where they are likely to be located. This uncertainty stems from many factors, including the effectiveness of government policy, economic conditions and public acceptability.

This section looks at the examples of Denmark, Germany and Spain – all of which have been very successful in developing local *onshore* wind industries – to identify which factors were important in their success. We ask whether there are lessons for the UK in building up an offshore wind industry and in maximising the job creation opportunities.

### Denmark

Denmark capitalised on its ‘first mover advantage’ to build up a significant wind energy industry (Centre for Sustainable Energy 2005, EWEA 2009a). Approximately 23,500 people are directly employed today by wind energy companies and many significant global turbine and component manufacturers, as well as service providers, are Danish companies. This includes Vestas, the world’s leading turbine supplier, and another of the world’s top 10 manufacturers, Siemens (whose wind power operations are based in Denmark after Siemens acquired Bonus Energy, a Danish wind turbine manufacturer in 2004) (BTM Consult ApS 2008, EWEA 2009a). Denmark also exports a significant number of wind turbines and components – around 40 per cent of current global capacity is produced in Denmark (EWEA 2009a).

One of the main factors behind Denmark’s success has been the way in which the market for wind was developed. Installed capacity in Denmark rose steadily from less than 1GW in 1996 to just over 3GW in 2003 (Danish Wind Industry Association 2009). This stable annual growth was facilitated by a strong political commitment to the development of wind and the use of a feed-in tariff support mechanism which provided a consistent financial support mechanism (Lewis and Wiser 2005, Centre for Sustainable Energy 2005, Toke *et al* 2008). The certainty of this market was important in giving companies the confidence to invest in R&D and manufacturing facilities in Denmark.

The Danish government also provided some direct support mechanisms to aid the development of the wind industry. These included:

- Guaranteed loans for large projects using Danish-made turbines (the Wind Turbine Guarantee)
- Using customs duties to favour the import of components rather than assembled turbines
- Providing ‘tied-aid’ whereby grants to developing countries were made on condition that Danish wind turbines would be imported
- Providing a well targeted R&D budget
- Using quality certification to effectively demand the use of Danish-made wind turbines for projects in Denmark (since manufacturers from other countries could not meet these standards).  
(Lewis and Wiser 2005)



## Germany

Germany has Europe's largest wind workforce with 38,000 people directly employed today (EWEA 2009a). It is also home to two of the world's top ten turbine manufacturers – Enercon and Nordex – and has a 28 per cent share of the world market (BTM Consult ApS 2008, German Wind Energy Association 2008).

Like in Denmark, the growth of Germany's wind manufacturing industry was made possible by a strong political commitment to wind and a stable financial support mechanism – the feed-in tariff. The introduction of the feed-in tariff was supported by all major parties (with only one exception) and despite revisions over time, has maintained its essential features of 'guaranteed returns to investors, low levels of risk and long-term stability' (Szarka and Blühdorn 2006: 6). This in turn has created an attractive climate for investment in wind energy and Germany's capacity grew from around 2GW in 1997 to over 18GW in 2005, with an installation rate of 1,500MW per year between 1999 and 2004 (German Wind Energy Association n.d., Lewis and Wiser 2005).

The development of the wind market stimulated growth in manufacturing and jobs and, of course, Germany also had the advantage of already having a strong engineering base (Szarka and Blühdorn 2006). This did not happen by accident: the potential economic benefits of increasing the use of renewable energy were recognised by the German government. In his foreword to the 2000 Renewable Energy Sources Act, Federal Environment Minister Jürgen Trittgen acknowledged that the Act 'opens up great opportunities not only to enhance our future energy-mix but also in terms of skilled jobs and exports' (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2000: 3).

The feed-in tariff was key to developing Germany's wind industry, but additional support mechanisms helped to stimulate the sector. These included:

- The precursor to the feed-in tariff, which was a per kWh subsidy offered under the 100MW Wind Programme (later expanded to 250MW). This programme helped to develop German wind technology and to establish a manufacturing base
- 'Soft' loans for capital investment in German wind energy projects were available from the state-owned banks under the Environment and Energy Conservation Programme and the Environment Programme
- The use of favourable custom duties (to favour the import of turbine components rather than turbines)
- The use of 'tied-aid' export credit assistance
- Quality certification
- R&D funding  
(Lewis and Wiser 2005, Szarka and Blühdorn 2006)

## Spain

Although Spain's wind industry developed later than Denmark's and Germany's, it is still a major player in the world's wind market. Approximately 20,500 people are employed directly in the wind industry in Spain in component manufacture (32 per cent), specialised service provision (31 per cent), turbine manufacture (16 per cent), and development and operation (21 per cent) (EWEA 2009a). Two of the world's top ten turbine manufacturers are Spanish companies (Gamesa and Acciona) and there is a large manufacturing base in Spain itself, with over 70 turbine and component factories across the country (AEE 2008, BTM Consult ApS 2008). Spain also has a healthy export industry, having installed 8.5GW of capacity in 25 countries around the world to date (AEE 2008).

Spain has perhaps been more explicit in its aim to grow a local wind industry than has Denmark or Germany (although a pursuit of economic benefits was undoubtedly important to both of these countries too). As a result, policies have aimed not only to increase the use of renewable energy but also to attract foreign companies to establish manufacturing bases in Spain (Lewis 2007a, Centre for Sustainable Energy 2005).

Politically, there has been clear support for increasing wind capacity from all major parties. At the policy level, Spain has also employed a feed-in tariff – introduced in 1994 – to encourage the growth of the domestic wind market. The subsequent expansion in the market has been attributed to the consistent application of this policy and to the high level of incentive that was provided (Spain has the second highest level of feed-in tariff in Europe, after the Netherlands) (Bolon *et al* 2007, Lewis 2007a, Toke *et al* 2008). Total installed capacity has risen from less than 1GW in 1997 to over 15GW in 2007, giving Spain the third largest installed capacity in the world (AEE 2008, EWEA 2009a).

A key difference between the approach taken by Germany and Denmark to develop local wind industries and that of Spain has been the use of local content requirements. These have been applied by Spanish regional governments and essentially require local assembly and manufacture of turbines before wind farm development concessions are granted. The result has been the growth of Spanish companies like Gamesa as well as job creation as a consequence of foreign companies setting up manufacturing facilities locally (Lewis 2007a, Lewis and Wiser 2005, Centre for Sustainable Energy 2005, UN 2008). In addition to local content requirements, Spain has also aided the development of its local wind industry through the provision of a production tax credit that is only granted on turbines meeting local content requirements (Lewis and Wiser 2005).

Spain was able to build on its existing manufacturing base to develop its wind power industry. A history of automobile and aircraft manufacture provided a suitable skills base for the industry; indeed, Gamesa – now one of the world’s largest turbine manufacturing companies – was originally an aircraft manufacturing company that diversified into wind (Bolon *et al* 2007).

### **Lessons for developing an offshore wind industry in the UK**

Drawing on the experiences of Denmark, Germany and Spain in developing their wind industries, three key messages stand out:

- A sizeable and stable domestic market has been essential in each case to developing local industry
- High-level political support for developing domestic wind power was not sufficient – additional policy and financial support was necessary to develop the industry.
- An existing skills base allowed new industry to set up.

#### **Domestic market**

The overriding message from the successes of Denmark, Germany and Spain in developing their wind industries is that a stable and sizeable domestic market is vital. In all three countries, local manufacturers began by supplying the domestic market before looking for export opportunities. Numerous reports on this topic reiterate the important role the domestic markets have played in the development of wind power industries:

*‘A stable home market signals to both local manufacturers and to foreign firms that they have the long-term planning horizon necessary to allow them to reasonably invest in the market. Companies facing unstable or small markets, on the other hand, will be less willing to*



*spend money on R&D, product development, and local manufacturing facilities.’ (Lewis and Wiser 2005: 11)*

*‘The manufacturer survey...underlines the importance of a stable domestic market as the basis for success in the continually growing international market.’ (German Wind Energy Association 2008)*

In all three of these countries a strong political commitment to increasing wind capacity was combined with consistent application of policy mechanisms that provided long-term stability, guaranteed returns and a low-risk investment environment. This combination has proved successful in attracting investors.

Most commentators agree that the UK has high-level political support for increasing the UK’s renewable electricity supply, demonstrated most recently by the passing of the Climate Change Act. Some also praised the Crown Estate’s commitment and proactive attitude towards Round Three. The next task will be to translate this ambition into a credible policy framework that will give businesses the confidence to invest in offshore wind.

### **Industrial activism**

Although each country had high-level political support for wind power, this in itself was not enough to catalyse the development of a local wind industry. All three of the examples here enjoyed cross-party political support for increasing wind capacity (which is important because it gives assurance to potential investors that policy in this area will not change even if there is a change of government) and all three had high-level targets for renewable electricity production. However, it is clear that the policy frameworks that supported the development of the market and encouraged a local industry were an important part of the success story. Each government took a strategic decision to pursue growth in the wind sector and established a policy framework to boost this industry. The German Government, for example, is committed to developing ‘ecological industrial policy’ to take advantage of the job opportunities and environmental benefits brought about by ‘green’ industries and this includes a need to ‘strengthen strategic industries of the future and make our industry fit for the markets of the future’ (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2006: 21).

A variety of policy mechanisms have been used to support the wind industry, including local content requirements, financial and tax incentives, favourable customs duties, export credit assistance, quality certification and R&D (Lewis and Wiser 2005). Of course, the indirect support from the feed-in tariff was important, too.

This experience implies that the UK will need to develop a suite of policies over and above the Renewables Obligation to support the development of the offshore wind industry if it is to create UK-based jobs in this sector.

### **Skills**

Each of the countries studied here had an existing skills base that turbine and component manufacturers could draw on. Germany in particular is well known for its manufacturing capacity.

The lesson for the UK here is to identify where existing skills might be transferred to the wind industry. The offshore oil and gas industry is one area that warrants attention in this regard. There are also opportunities in financial and legal services and there may be scope to use skills from the automobile and aerospace manufacturing sectors.

The next three sections of this report take these three lessons – on the market, industrial activism and skills – and apply them to the UK context to consider how the offshore wind sector in the UK can be successfully developed.

### 3. Securing the domestic market

As the experiences of Germany, Denmark and Spain show, the domestic market has a vital role to play in delivering new green-collar jobs. It is clear that the size of the domestic market will determine the number of new jobs that are created. Market certainty also has an important role to play because inward investment will only occur when companies have confidence that they will be able to sell the products and services.

Confidence in the future market will be driven in the first instance by high-level political commitment to increasing offshore wind capacity and then by the perceived effectiveness of the policy framework drawn up to deliver this vision.

Many of the people we interviewed for this research felt that the Government has conveyed a strong commitment to developing renewables in the UK – for example the ambitious nature of the targets set out in the Climate Change Act were felt to demonstrate a good level of ambition, as were statements about creating green jobs. But many agreed that there is still a gap when it comes to more detailed policy measures on how the targets will be met. In particular, for one interviewee, much more detail about the strategy for meeting the 2020 targets was needed before investment decisions could be made.

There is still a large amount of uncertainty about whether it will be possible to deliver on the Government's renewable energy aspirations in practice and this is problematic for industry – there is a large difference between the aspiration of achieving 33GW by 2020 through the Round Three process and the 14GW projection in the Government's Renewable Energy Strategy. Government needs to clarify a credible, yet stretching target for offshore wind capacity.

Beyond high-level targets, there are a number of factors that contribute further to uncertainty about delivery: infrastructure investment requirements, the planning system and the supply chain. This uncertainty is acting as a barrier to investment. The economic support mechanism and perceptions of its effectiveness are also key to delivering the market.

This section looks at the main factors that are likely to affect the UK market. We begin by discussing some of the factors that affect confidence in the market: the Government's economic support mechanism and barriers to delivery that are causing market uncertainty. We then consider whether the size of the market will be sufficient to attract new investment.

#### **Economic support mechanism**

The main policy tool for delivering renewable electricity in the UK is the Renewables Obligation (RO). This requires electricity suppliers to obtain an increasing proportion of their electricity from renewable sources each year (6.7 per cent in 2006–07). Generators of renewable electricity are awarded a Renewables Obligation Certificate (ROC) for each megawatt hour (MWh) of electricity generated. These are then passed on to electricity suppliers at the point of sale. ROCs are tradable and suppliers must present a sufficient number of ROCs to the regulator, Ofgem, to meet their requirements each year. If suppliers are not able to meet their obligation, they must pay a 'buyout price', which is then returned to all suppliers according to the level of ROCs they have provided. The buyout price is set each year by Ofgem and is adjusted to reflect changes in the Retail Prices Index (Ofgem 2009).

The RO has come under criticism because it has not been as successful at increasing renewable energy as feed-in tariffs, which have been used in other European countries, most notably Denmark, Germany and Spain (even when differences in planning regimes are taken

into consideration). Feed-in tariffs provide a guaranteed payment for each kWh of electricity generated and their success has been attributed to three factors:

- Feed-in tariffs provide long-term certainty for investors. For example, in Germany, the feed-in tariff is guaranteed for the first 20 years of a generating plant's lifetime. The RO, when it was originally introduced, was set to end in 2027.
- Feed-in tariffs provide more certain returns because the level of payment per kWh is fixed in advance. By contrast, the returns from the RO are uncertain because they depend on the market prices of ROCs, which is more difficult to predict. This uncertainty increases the cost of capital.
- Feed-in tariffs have been differentiated according to type of technology so that more mature technologies were given less support than those at earlier stages of the development and deployment process. In the UK, the same number of ROCs have been awarded regardless of the type of technology used to generate the electricity, with the result that mature technologies – such as landfill gas – have received an unnecessarily high level of subsidy, while those that are still developing have not received sufficient support.  
(See, for example, Stern *et al* 2006)

The Government has now reformed the RO in response to two of these criticisms. In his last Pre-Budget Report, the Chancellor of the Exchequer announced that the RO would be extended to 2037 (Darling 2008). The Government also hopes to introduce a 'banding' system for the RO in April 2009 (subject to it meeting European state aid rules). Under this system, mature technologies – such as landfill gas – will receive fewer ROCs per MWh of electricity generated, while emerging technologies – such as wave and tidal energy – will receive more. Under the proposed system, onshore wind will receive 1 ROC/MWh while offshore wind will receive 1.5 ROCs/MWh (HM Government 2008a).

The criticism about the uncertainty of returns under the RO remains and as a result, there have been calls for the Government to scrap the RO and replace it with a feed-in tariff (see for example, Barker *et al* 2008). However, those within the renewable energy industry have opposed such a radical reform of policy, claiming that the time required to design and legislate for a new scheme would seriously jeopardise the 2020 target. Industry representatives interviewed for this project were clear that the policy uncertainty (that the RO may be changed for a feed-in tariff at some point in the future) was a greater hindrance to investment than the current uncertainty of returns under the RO. One interviewee explained that a cross-party agreement not to change the economic support mechanism for the next decade or so would be helpful in bringing forward investment decisions.

*'Basically, if pressed, we would say it doesn't matter what the regulatory framework is – whether it's feed-in tariff or ROCs or a combination as long as it's stable and so just decide what it is and then get cross-party agreement.'* Developer, interview with ippr

It appears that a consensus among the major political parties is emerging. The Government's response to calls for a feed-in tariff has been to introduce one for small-scale installations (less than 5MW) and to reform the RO by introducing a 'banding' system and extending it until 2037 (BERR 2008, HM Government 2008a, Darling 2008).. This response succeeds in ensuring a continuous policy framework for large-scale operators, which is necessary for building confidence among investors, while at the same time providing a new incentive for smaller actors, such as households and businesses. The Conservative Party has demonstrated a commitment to continuing the Government's policy in this area (Conservative Party 2009). The Liberal Democrats, however, advocate replacing the RO with a feed-in tariff (Liberal Democrat Party 2008).

Perhaps a more important question is whether 1.5 ROCs for each kWh of energy produced by offshore wind will be sufficient to make investment in wind farms economically viable. Several industry representatives interviewed for this project suggested that it was probably not enough. The British Wind Energy Association (BWEA) is carrying out a study on this question, which should be published later in 2009.

*‘On the economic side, it’s not the mechanism, it’s more the level compared to the costs. Is 1.5 ROCs going to be enough? Does the multiple need to be raised or can costs be reduced to make it enough?’*  
Industry spokesperson, interview with ippr

An important feature of Germany’s success in developing its wind capacity is that the feed-in tariff mechanism was modified over time to ensure it was delivering the desired outcomes. Commentators have recommended that the UK Government takes a similar approach and monitors progress towards the 2020 renewables target annually to ensure that the RO is delivering (Boettcher *et al* 2008).

ippr recommends that government should monitor the deployment of renewable energy capacity on an annual basis to determine whether the levels of bands under the RO have been set correctly. If deployment is not happening as fast as is necessary, Government should be prepared to alter the ROC allocations. Similarly, Government should also be prepared to move allocations downwards as technologies mature.

### **Removing barriers to delivering offshore capacity**

Despite the ambitious scale of Round Three of offshore licensing, and Government statements supporting the development of offshore wind, there is still a great deal of uncertainty about how much capacity will be delivered by 2020. This is because there are still a number of significant barriers to delivery that could disrupt offshore development projects or even prevent them from happening. The most important of these are issues to do with the grid, planning and the supply chain.

#### **The grid**

The uncertainty around whether or not the grid will be upgraded in time to support new generating capacity is regarded as the biggest threat to achieving the 2020 renewables target by many of the industry experts interviewed for this report.

*‘The main barrier [to meeting the 2020 renewables target] will be grid capacity and grid connection.’* Developer, interview with ippr

Significant work on the grid will be necessary to connect the new capacity that is expected to come on line by 2020. This includes providing connections from offshore sites to onshore, laying new cables to connect to the onshore grid (which is many miles inland in some cases) and expanding the carrying capacity of the grid to deal with increased loads in some areas. There are also questions about how the grid can be reinforced to deal with the intermittency of wind power, for example through interconnection with other European countries. Numerous reports have argued for the need to focus on improving the grid and providing connections as a matter of urgency (for example, RAB 2008, Carbon Trust 2008).

A lack of upfront investment in offshore connections could make it less likely that offshore wind capacity will be delivered because it increases risk and may increase the cost of capital. This could in turn discourage investment.

*‘Lack of grid capacity is a major issue because if we can’t get a grid connection, we can’t build anything...nobody will give us the money to*

*build an offshore wind farm unless we can guarantee we're going to get revenue from selling electricity so I would say that's **the** major issue.'* Developer, interview with ippr

DECC and Ofgem are currently in the process of developing a new regulatory regime for offshore electricity transmission and for licensing offshore transmission connections as part of the offshore transmission project. A final consultation is scheduled for early 2009 and the new regime is planned to 'go live' in mid-2010 (BERR 2009).

The current regulatory regime has caused some difficulties to date, particularly around National Grid's timetabling of providing connections (which has not taken account of what stage in the planning process projects were at) and because of a lack of coordination between Ofgem and National Grid. In 2008, Ofgem and BERR jointly published the Transmission Access Review, which contains measures to overcome some of these timetabling issues (Ofgem and BERR 2008).

The lack of a strategic plan for the grid has also caused concern. The grid has evolved over time in a 'piecemeal' fashion with individual projects being connected one by one. Commentators have argued that future investments should be made in a more structured and logical way (Boettcher *et al* 2008, RAB 2008). This issue was also covered in the Transmission Access Review and the Electricity Networks Strategy Group, which is chaired jointly by DECC and Ofgem, is currently developing a strategic vision of where new transmissions lines will be required to meet the 2020 targets. This is expected to be published in spring 2009.

There is a risk that the recession may make financing the new offshore connections problematic. Government should monitor progress towards providing offshore grid connections to ensure progress is occurring at a sufficient rate to meet the timetable set out for Round Three. Government could offer to underwrite loans or work with financial institutions to encourage lending to offshore grid companies to ensure they are able to raise sufficient finance to allow the work to take place.

### **Planning**

The planning approval process has long been a point of concern for future wind project developers. The long time taken to receive planning consent and high levels of local opposition to wind farms have been problems for the onshore wind sector, and this experience has weakened confidence among potential investors that the UK will be able to deliver on its aspiration to have 33GW of operational offshore wind installed by 2020.

*'So many in the industry are cynical about the offshore market, because onshore wind should be easier to deliver than offshore and yet the UK has struggled to get onshore MWs in the ground. So many critics of the wind industry say, "If you can't do it onshore what confidence are you going to have that it's going to be any different or easier to do offshore?'"* Turbine manufacturer, interview with ippr

This problem has been acknowledged by the Government and the Planning Act sets out provision to establish an Infrastructure Planning Commission (IPC) and National policy statements. The IPC will be a Non-Departmental Public Body and its role will be to determine planning application for nationally significant infrastructure projects. For offshore wind, this will include offshore wind farms in England and Wales that are larger than 100MW (HM Government 2008b). The IPC's decisions will be guided by a framework of National Policy Statements (NPSs), which will be devised by Government and will set out the need for certain types of infrastructure, such as energy, ports, airports and water supply.

The new IPC process is expected to reduce the planning and consenting process for offshore wind to around three years. Industry experts interviewed for this report were hopeful that the process would be sped up to some extent. However, the IPC is still an unknown quantity and the timetable for its introduction is tight. The IPC and NPSs are scheduled to be in place by mid-2010 and the planning and consenting process for Round Three is timetabled to begin immediately so that construction can begin in 2014 (see Annex II for a more detailed timetable). Clearly if there are delays in establishing the IPC, in agreeing the NPSs (which must be laid before Parliament) or if the new process of obtaining planning consent is not as fast as anticipated, then the delivery of offshore capacity for 2020 will become less likely. One interviewee suggested that investment in staffing and resourcing the IPC should be at the top of the list when considering how to ensure the delivery of offshore wind capacity.

*'The first thing [that government should invest in] is making sure that the Infrastructure Planning Commission is properly set up and resourced and staffed so that isn't a kind of bureaucratic bottle neck. That's the most important thing.'* Developer, interview with ippr

*'Obviously one of the most significant constraints is planning and consenting process and the IPC and the MMO [Marine Management Organisation] will potentially play a really vital role in mitigating consenting risk...what impact the new consenting regime will have on the success rate and timescale for gaining consents on offshore projects I don't know...it's an unknown process and this scale of development is new to the industry.'* Consultant on offshore wind, interview with ippr

It is clear that Government must now monitor the progress of the introduction of the IPC the NPSs and the speed with which applications are approved under the new regime and ensure that the timetable for delivering offshore wind capacity for 2020 is kept on track. This includes ensuring the IPC has sufficient resources to operate effectively.

### Supply chain

Many commentators recognise constraints in the offshore wind supply chain as a barrier to meeting the UK 2020 targets. Recent studies on this topic have identified the supply of offshore wind turbines, installation vessels, cables and offshore substations as being key areas of constraint (Carbon Trust 2008, Douglas Westwood 2008, Boettcher *et al* 2008, BWEA 2007). The Carbon Trust identifies foundations as being an additional area among the key components that is prone to shortages (Carbon Trust 2008).

A report by Douglas Westwood (2008) notes that globally, there are currently only three main companies supplying offshore wind turbines. Other onshore wind turbine manufacturers are in the process of developing offshore turbines while others are not yet convinced that the future global market for offshore wind is certain enough to begin producing turbines. Increasing certainty in the future of the offshore market (as discussed above) is key to attracting new players into the offshore wind turbine market and to reducing lead times for turbines.

Some interviewees did recognise supply-chain difficulties as an issue for offshore wind. However, most were confident that suppliers were scaling up their activities and that the shortages that had been experienced to date would not exist in the future.

*'One of the biggest issues we've had in the industry is with the capacity for some key component suppliers to deliver the volume we have demanded. When the onshore wind market is booming we can't get all*



*the components we need fast enough from the suppliers to be able to run at full capacity in some of our factories. We have invested a lot of time and money to improve this over recent years.’* Turbine manufacturer, interview with ipp

*‘I don’t think we see the supply chain (vessels, cables, transformers, turbines) as such being a major critical issue on delivery of Round Three in the scheme of things – it might delay a project a year or so – the real showstopper is grid.’* Developer, interview with ipp

ipp believes that Government should initiate a mapping exercise to identify UK-based companies with the potential to diversify into the offshore wind supply chain and should make this information available to turbine manufacturers to encourage them to set up in the UK.

Government should also provide support to industries that are most likely to cause bottlenecks in the supply chain, including foundations, offshore substations, cables, installation vessels and turbine manufacturers. Section 6 describes in more detail the form this support could take.

Although supply-chain issues are not considered to be as big a problem as fixing the grid, the credit crunch adds another dimension to the problem. Suppliers looking to increase their capacity in order to meet greater demand in the future may face difficulties in securing finance to expand. Again uncertainties in the size of the future market compound the problem; without a minimum number of long-term contracts, it can be difficult for some players in the supply chain to raise the finance needed to increase capacity.

*‘Even if the economics of projects can be made to stack up, the current crisis in the financial markets means securing the amounts of capital required for these large developments is challenging, even for large companies with strong balance sheets.’* Industry spokesperson, interview with ipp

Where possible, government should consider providing guarantees for loans to supply-chain companies looking to expand their capacity in the UK but who are struggling to raise finance because of the recession. Government should also work with financial institutions to encourage lending in this sector.

### **Maximising market size**

As the examples of Denmark, Germany and Spain show, the size of the local market is very important when it comes to investment decisions from manufacturers. Companies need to know that the local market for their products will be sufficiently large and predictable to outweigh the set-up costs.

When it comes to the UK, although the ambitions for offshore wind are very strong, there was still doubt among many of the interviewees that we spoke to that the UK market alone would be sufficient to attract new manufacturing capacity to set up locally. For example, the minimum size that some interviewees said they would need in order to warrant setting up a factory ranged from 1GW to 6GW per year for five to 10 years. The total UK market would need to be much greater than this (to account for the fact that the total market size needs to be divided by each company’s market share) and so on this basis the UK market alone does not look like it will be sufficient to attract manufacturing.

One interviewee suggested that increasing the UK’s onshore market as well as the offshore market would help to overcome this problem because the total domestic wind market would

be greater (and because onshore wind is less costly than offshore). However, other interviewees disagreed with this because the component parts for onshore and offshore wind are different and therefore may not be able to be supplied by the same factory and also because they do not have confidence in the UK's onshore market given the slow progress that has been made to date compared to the onshore market in other countries.

Although the UK offshore wind market may not be big enough in itself to attract new investment, the European market as a whole is likely to be big enough to generate new manufacturing capacity. For example, Germany also has plans to increase its offshore wind capacity in the medium term (EWEA reports that a total of 16GW is planned in the UK and Germany by 2015, on top of existing capacity and projects currently under construction [EWEA 2009b]). Large companies who are already operating at an international level are more likely to make investment decisions based on projections of international market size rather than national markets and so the growth of the European market is perhaps more relevant than considering the UK alone (although it is clear that improving certainty in the UK market through the measures outlined above will make an important contribution to perceptions of the European market for offshore wind).

The question is, then, which other factors would tip the balance when it comes to deciding which country will be the base for supply a regional market? We argue in Section 4 below that the local 'industrial activism' and the local skills base are key features for attracting investment.



## 4. Industrial activism

Section 1 described why offshore wind might be a strategically important sector in future for the UK and it is clear that its expansion in the UK will create jobs. Estimations of the number of jobs vary quite significantly across different modelling scenarios but even the most pessimistic forecasts of job creation in the UK show a significant number of jobs being created by 2020 – from 23,000 in wind, onshore and offshore combined (Boettcher *et al* 2008) to 40,000 in offshore wind alone (Carbon Trust 2008).

The key uncertainty is whether it will be possible to achieve the job forecasts at the more optimistic end of the spectrum – from 57,000 jobs in wind, onshore and offshore combined (Boettcher *et al* 2008) to 70,000 jobs in offshore wind alone (Carbon Trust 2008). These scenarios depend in part on the eventual size of the offshore market, but they also depend on to what extent jobs are based in the UK as opposed to other European countries.

Given the strategic reasons for developing the offshore wind sector and that meeting our 2020 targets through an expansion of offshore wind capacity will create new jobs, it would seem sensible for the Government to aim to maximise the potential economic benefits arising from activity in this area.

This raises two important questions about how to maximise benefits.

- First, how can companies across the offshore wind supply chain be encouraged to base their operations in the UK rather than serve the UK market from centres in other European countries?
- Second, what is the best way to ensure that the UK workforce is well placed to compete for jobs in the sector?

It is also important to bear in mind not just the number of jobs being created, but also whether the more economically disadvantaged regions of the country will stand to benefit, whether people currently working in declining industries will be able to access the jobs and if the jobs will provide decent-quality, career-track opportunities.

This suggests that a more strategic approach to maximising offshore wind jobs in the UK and ensuring the UK workforce is well placed to take advantage of these jobs will be needed. This has already been recognised by the Government – in his speech to the recent jobs summit, Lord Mandelson said:

*‘We will need a smart, strategic approach from government that makes sure that the business environment is absolutely fine tuned to that outcome [increasing the low carbon industry sector]... That means government that ensures that we are developing the right skills base and investing strategically in the right research commercialisation and process innovation.’ (Mandelson 2009)*

In this section we argue that ‘industrial activism’ will be necessary to address the first concern of how to encourage offshore wind supply-chain companies to base their operations in the UK, both by encouraging existing firms to diversify into this new sector and by attracting inward investment from foreign companies. The next section will focus on ways to develop the right skills base.

### **What is ‘industrial activism’?**

The experiences of Denmark, Germany and Spain show that although a large and predictable domestic market is a prerequisite for developing a local wind industry, it is not a sufficient condition. All of these countries employed additional support mechanisms to support the

growth of a new sector, both directly (for example, through grants and local content requirements) and indirectly (through feed-in tariffs). By ‘industrial activism’ we are referring to the various ways in which Government can help to shape the economy to reinforce our strengths. This includes ensuring sufficient direct support mechanisms are available to developing industries as well as removing barriers for those industries that are identified as being strategically significant to the UK economy.

### **The need for industrial activism for offshore wind**

UK governments have been keen to avoid ‘picking winners’ by choosing particular technologies or sectors to champion, arguing that the market should decide whether firms succeed or fail. As a result of this outlook, incentives aimed at encouraging renewable electricity generation have been applied at an equal rate across all technologies (under the RO). However, this approach has caused difficulties because not all renewable electricity technologies are at the same level of maturity. The result has been that mature technologies, like landfill gas, have been over-subsidised, while others, like marine renewables and offshore wind, have been under-subsidised because they are not yet fully mature and hence have higher costs. The Government is now advocating an approach of varying the level of support according to the maturity of the technology.

The same approach should be applied when considering wider mechanisms for incentivising renewable energy technologies. Government should seek to provide support for new technologies when industries are still in their infancy. This support should then be phased out over time as the industry matures until it is able to stand on its own two feet and compete in the market without being ‘propped up’ by Government.

In order to extract the maximum economic benefits from expansion of offshore wind, the Government will need to ensure that companies across the offshore wind supply chain are able to benefit from additional support, while the industry is still in its infancy. This support should be phased out over time, as the industry matures. Government should target this support on areas of the supply chain where the UK has a competitive advantage and on areas that may pose barriers to delivery.

A further – and more fundamental – reason for industrial activism for offshore wind is that other countries, particularly Germany, have already put support packages for offshore wind in place (this is described in more detail below) and if the UK wants to compete for economic benefits and jobs, then Government will need to ensure that the investment opportunities are at least as attractive as those in other countries.

### **Measures to support offshore wind**

Here we set out some of the ways in which the UK could encourage offshore wind companies to locate in the UK and to persuade existing UK companies to diversify into offshore wind. The methods outlined are based on the views of the interviewees we spoke to and the experiences of other countries in developing local wind industries.

#### **Financial and tax incentives**

A whole raft of financial and tax incentives have been used by other countries to encourage local wind industries. These include:

- Providing loans or subsidies to offshore wind projects that incorporate locally-built components
- Tax credits or reductions for local investments in manufacturing or R&D or in local labour costs (for example, Canada provides a tax credit on wages paid in the wind sector)

- Reductions in sales tax or VAT for turbine components and technology
- Tax or financial incentives to encourage joint ventures between local companies and foreign companies
- R&D subsidies.  
(Lewis and Wiser 2008)

Perhaps unsurprisingly, there was clear support from interviewees for the idea of providing financial support for capital costs for wind energy companies setting up facilities in the UK, in the form of either grants or loans. This approach has also been advocated by other commentators (for example, see Douglas Westwood 2008). Some commentators have recommended that this assistance should be focused on smaller UK companies, who might otherwise have difficulty in breaking into the market (ibid) while others suggest focusing on targeting problematic sections of the supply chain, such as foundations (Carbon Trust 2008).

*‘For a new supply-chain company trying to break into the sector, and supply turbine manufacturers, it could be useful for [the Government] to help a company produce the first item. So if I went to somebody and said I want some gears, there’s quite a lot of tooling costs to make this new gear and on that basis it would be quite useful for government to help company “x” upskill so that it can get involved in the new market and take some of the risk out of the segment.’* Turbine manufacturer, interview with ippr

Several interviewees acknowledged that there are already many capital grants and subsidies available for offshore wind in the UK. These include – among others – Grants for Business Investment from RDAs, and the Offshore Wind Capital Grants programme (for more detail, see Annex III). However, they felt that although the total sum of money available was quite large, it was spread too thinly and through too many different channels to be useful in attracting large companies to diversify or invest in the UK. There was agreement that consolidating some of these schemes into a more targeted package, which could potentially provide larger sums of money and be more easily marketed, would help to attract investment.

Government support for R&D in offshore wind is also considered to be vital by many commentators. For example, the Carbon Trust has recommended that government should invest between £0.1bn and £0.6bn in a research, development and delivery programme (Carbon Trust 2008).

Like capital grants, spending on R&D also needs to be properly targeted – indeed, some commentators have claimed that the targeting can be more important than the total sum spent in developing local industries (Lewis and Wiser 2005). This sentiment was shared by interviewees for this report, who commented that there are too many different UK R&D support schemes and that policy in this area needs to be clarified (see Annex III for a description of different funding streams available currently).

*‘R&D and innovation policy is going to be quite interesting – there’s a plethora of support bodies, for instance the Technology Strategy Board, Energy Technologies Institute, NaREC [New and Renewable Energy Centre], various institutes in universities, Supergen under the ESRC [Economic and Social Research Council] – we need to get some clarity into all of that. What the Carbon Trust is doing around that [the Offshore Wind Technology Accelerator] is quite interesting – we need more initiatives like that.’* Industry spokesperson, interview with ippr

### Providing facilities and infrastructure

As well as fiscal incentives, Government and the Regional Development Agencies can also make the UK more attractive for investment by ensuring that the right facilities and infrastructure are in place to allow companies to operate successfully in the UK. As far as the UK offshore wind industry is concerned, there are a number of areas where investment in facilities and infrastructure could have a very important role to play. Two examples are testing facilities and ports.

Several interviewees praised the New and Renewable Energy Centre (NaREC) set up in Blyth by the RDA One North East, which provides testing facilities for offshore wind turbines and has been credited with attracting Clipper Wind Power to set up in the area (see Box 1.1). However, it was also noted that the UK still does not have any offshore test sites and interviewees felt that these will be necessary for developing new offshore wind turbines since turbine manufacturers need to be able to demonstrate that their equipment is reliable before developers will place orders. ippr recommends that Government should work with the Crown Estate to identify a potential nearshore test site location.

*‘A site where people could put up versions of new offshore wind turbines could be helpful.’* Developer, interview with ippr

Ports are another area where the UK is felt to be lacking compared with some other European countries. It is widely acknowledged that British port capacity is not sufficient for offshore wind installation and O&M activities. Ports need to be deep enough to allow access to installation and O&M vessels, to have sufficient space and be strong enough to support turbines and turbine components (Carbon Trust 2008, Douglas Westwood 2008, BWEA 2007). There are ports elsewhere in Europe that have these attributes (BWEA 2007) and interviewees described how Continental ports are already used for the installation of offshore wind farms in UK waters. Developing the UK’s port capacity will be an important step for attracting companies to locate in the UK. Commentators have suggested that a mixture of public and private funding should be used to achieve this, using a similar model to the approach taken by the East of England Development Agency for the upgrades to the port at Great Yarmouth (Douglas Westwood 2008, Carbon Trust 2008). Government should work with successful Round Three bidders to identify ports.

As well as ports, Government needs to learn from investors what other infrastructure needs they may have and should work with RDAs to deliver this. For example, new road and rail links may be required.

Several commentators have recommended that financial incentives and public investment in facilities and infrastructure should be targeted at the same location in order to promote a growth ‘cluster’ (Carbon Trust 2008, Douglas Westwood 2008, Boettcher *et al* 2008). An example of where this approach has been taken is in the German port of Bremerhaven, where public investment in infrastructure (such as improving port facilities) has helped to leverage private investment (see Box 4.1).

*‘Another lesson from Germany and Denmark and Spain is the need to focus where you’re doing the work – clustering the activities is very important. If you go to Denmark, the industry’s all clustered in Jutland, there’s a couple of zones in Northern Germany and similar in Spain. We need to get the Government to decide to focus and actually choose an area to focus on and start putting in incentives and grants to make some place in the UK a manufacturing focus.’* Industry spokesperson, interview with ippr

Of course, this ‘clustering’ approach is more straightforward in Germany, where federal governments have more power than regional government in Britain has. To achieve a ‘cluster’ in the UK will require greater intervention from central government.

The Centre for the Production and Installation of Offshore Wind Turbines in Bremerhaven, Northern Germany, was cited by many interviewees as an example of best practice in developing an offshore wind cluster.

The Centre was established in Luneort, an industrial estate in Bremerhaven, by the Bremerhaven Economic Development Company (BIS Bremerhaven). BIS Bremerhaven is a public organisation funded jointly by the municipality of Bremerhaven and the Federal State of Bremen. BIS Bremerhaven and the State of Bremen have invested a total of €13 million in the development of the site and this has catalysed significant additional investment from private sector firms who have located in the area.

#### **Short-term guarantees**

Like many industries, offshore wind may face difficulties in the short term in raising finance to invest in new capacity as a result of the credit crunch. This could result in delays to the delivery programme to meet the 2020 targets. Government could help overcome this difficulty by offering to underwrite borrowing for companies across the supply chain.

#### **Local content requirements**

The use of local content requirements has helped Spain to develop its local wind industry (see Section 2 above) and this approach has been taken by other countries too, including China, Canada and Brazil (Lewis and Wiser 2005, UN 2008). This practice means that the proportion of components of a wind turbine that are manufactured locally is taken into consideration when awarding development contracts for wind farms. For example, in China, concessions for new wind farms are

#### **Box 4.1: The development of an offshore wind cluster in Bremerhaven, Germany**

BIS Bremerhaven has supported the development of the Centre in a number of ways:

- Creating a local wind industry network, which currently has 140 members (Wind Energy Agency Bremerhaven)
- Building a research institute for wind energy at the University of Applied Science in Bremerhaven
- Offering grants for investment and R&D projects (some investment projects were co-funded by the Federal State of Germany and the EU)
- Providing inexpensive, high-quality office premises, workshops and laboratories in start-up and technology centres
- Providing one-off, non-repayable grants of €2,500 to companies that create a new apprenticeship training position.

BIS Bremerhaven has also invested in infrastructure for offshore wind turbine production, which includes:

- Production and assembly areas for making foundations, towers, nacelles and rotor blades, as well as for storage and final assembly
- Traffic areas with the load-bearing capacity and dimensions for industrial trucks for offshore components
- A test stand for complete nacelle systems
- A deepwater cargo handling terminal with connection to inland waterways.

The Alpha Ventus test site for offshore wind turbines is located near to the Luneort site and 12 turbines and six of the foundations for the Alpha Ventus testfield will be produced in Bremerhaven.

Sources: WAB (2009), Grabs, Mathias (2009), FK Wind (2009), Power Cluster (2009) BIS Bremerhaven (2009)

given on the condition that 70 per cent of the content is manufactured locally. The result has been that wind turbine manufacturers have set up in China either manufacturing factories or assembly sites that source locally-produced components (Lewis 2007b).

While this approach does appear to have been successful, particularly in Spain and China, the downside is that it can increase production costs, which therefore increases the costs to developers and, ultimately, the electricity price paid by consumers. There are also questions about whether the use of local content requirements contravenes WTO trade rules and EU State Aid rules.

There is a view held by some stakeholders that the UK only really stands a chance of developing an offshore wind manufacturing base if some kind of local content requirements are introduced. However, most also agree that this is an unlikely route for the UK to take, as it would go against the political philosophy of government and opposition parties in favour of free trade and would potentially break international trade rules.

*‘If government said we’ll only give you contracts for offshore wind if you’re contributing to creating job creation in the country that is the only way I think they’ll make a big difference.’* Turbine manufacturer, interview with ippr

The UK should investigate whether local sourcing requirements similar to those in other states could be applied to the UK. Government should consider whether this kind of approach could be used in establishing preferred bidders for Round Three offshore.

Relevant industry associations should also consider issuing guidelines to companies using non-UK contractors along similar lines to those set out by the Engineering Construction Industry Association (ECIA), which include guidance to:

*‘Always consider whether there are competent workers available locally. If there are, it is good practice for the non-UK contractor to explore and consider the local skills availability and to consider any applications that may be forthcoming.’* (ECIA 2009: 3)

### **An offshore wind investment programme for the UK**

We have argued that offshore wind is a strategically important sector for the UK and that Government needs to use ‘industrial activism’ in order to support this nascent industry until it is fully mature and in order to compete effectively with other countries that are already providing incentive packages to attract offshore wind supply-chain companies.

Although there are already a lot of support mechanisms in place in the UK, these tend to be fragmented and are often implemented by different bodies. This can make the UK appear less attractive to investors or companies looking to diversify into offshore wind, who may not be fully aware of all of the support available. Government should aim to provide a more focused support package – an ‘offshore wind investment programme’ – that would be run by DECC and administered through the RDAs and UKTI. The programme would draw together these incentives into one place and would be easier to market than the current dispersed incentives.

The programme should include the following elements:

- Financial and tax incentives
- R&D support
- Identification of a potential nearshore test site location

- Public funding for infrastructure upgrades, with a particular focus on ports
- Short-term loan guarantees to prevent delays resulting from the credit crunch.

The Government should also investigate whether local content rules, similar to those used in other countries, could be applied to Round Three offshore.

To be most effective, the investment package should be focused on a particular geographical area, in order to promote a 'cluster' of growth. In selecting the area, Government should consider the need for economic development and whether the local workforce is likely to be able to benefit from new jobs that will be created.



## 5. Skills

A lack of suitable skills in the UK has been identified as a problem for the offshore wind industry for two reasons: British workers will not be well placed to compete for new jobs being created in the offshore wind sector; and it acts as a barrier to investment because companies are reluctant to set up in areas where it will be difficult to recruit a suitable workforce.

Most industry experts agree that the UK does not have enough skilled workers to develop, manufacture, install and operate the scale of offshore capacity that will be necessary to meet the 2020 target. The shortage is attributed to a number of factors, including a general lack of engineers (particularly at the skilled technician level), competition with other sectors – such as oil and gas – which are generally able to offer higher salaries, and the low esteem in which construction, manufacturing and engineering jobs tend to be held in the UK (Douglas Westwood 2008, Boettcher *et al* 2008).

This view appears to be particularly strongly held by manufacturers based outside of the UK who perceive the UK's manufacturing base to have been in decline for many years. They are less likely to consider setting up new manufacturing premises in the UK as a result.

*'My strong impression is that engineering is not held in high regard, manufacturing is not held in high regard... and that for me is a problem... If I was a wind turbine manufacturer would I go to the UK and set it up? Well, possibly if I think that the market is here and there are favourable conditions...but I would certainly question it from the point of view of "Will I get the people? Will I get the workforce? Will I get the engineers? Will I get the engineering management to make sure it works well?"'* Europe-based component manufacturer, interview with ippr

The view is also shared by some companies operating in the UK:

*'The big problem is we've got so little fundamental skills set that if you were going to choose a particular part for a turbine – say a gearbox – and you're faced with a brand new factory in Tyne and Wear or an established German manufacturer you'd probably go for the Germans because they've been doing it for a long time and they've got a sector that's focused on quality engineering.'* UK-based developer, interview with ippr

However, it should not be forgotten that the UK workforce does already have some particular skills that will be of use in developing an offshore wind industry – most obviously, the existing skills base from the offshore oil and gas industry. This skills base could help the UK to develop a competitive advantage in relevant parts of the offshore wind value chain and could help to establish manufacturing in the UK (in particular, of towers, foundations and offshore substations) as well as a local installation, operation and maintenance workforce. In fact, the existence of the offshore industry has been cited as one of the reasons that Clipper chose to set up a facility in Blyth.

*'We have a huge heritage of offshore work in the UK from offshore oil and gas and all those skills are relevant. We do have skilled people here to work offshore. And we do have people who can design and build large, complex structures offshore.'* Developer, interview with ippr



*‘[Skills are not a problem] in all cases – especially up in the Northern part of the UK where there still are quite a number of manufacturers who manufacture to the offshore industry – that’s the kind of skills you need, for instance when you’re producing these huge steel constructions that are used as foundations for the wind turbines.’* Component manufacturer, interview with ippr

*‘I think the key thing is to bring those developers into parts of the UK where those skills are available. The position we’re in is we continue to attract oil and gas investment and for those companies there’s a confidence that the skills and the skilled people will be there for them. You’re talking hundreds and hundreds of jobs related to each one and skills have not been the show stopper for any of those companies.’* Regional Development Agency, interview with ippr

There is clearly a need to develop more skills in this area but the question is how to achieve this. Some interviewees pointed out that if there is a successful offshore wind industry operating in the UK, then people will naturally look to pursue a career in that sector and would pursue relevant qualifications in order to be eligible to do so. This chimes with the Government’s current focus on creating a demand-led skills system.

However, there is clearly a ‘chicken and egg’ type of problem when it comes to developing new industries – in the short term, the demand for training programmes in green jobs will not be there if the relevant employers are not yet located in the UK but potential investors are hesitant to open new facilities if they are not confident that there will be a suitably skilled workforce available.

There is a need for Government to take a more strategic approach if the UK workforce is to benefit from the new opportunities provided by expanding offshore wind capacity. Just as ‘industrial activism’ is needed to create new jobs and deliver new economic benefits, so ‘skills activism’ will be necessary to ensure the workforce is suitably equipped. Lawton (2009) has argued that the Government’s approach to skills should be targeted at sectors which are strategically important – offshore wind would be a good candidate for this.

There are three elements to developing a skills strategy for offshore wind:

- Identifying the size and nature of the gap
- Ensuring training programmes are provided
- Finding ways to attract people into the sector.

These are examined further below.

### **Closing the skills gap**

Both the literature on offshore wind and people we interviewed for this report highlight a lack of appropriate skills among the UK workforce as a problem for delivering offshore wind and for attracting investment in offshore wind industries (see, for example, Boettcher *et al* 2008). However, to date, there has not been a detailed analysis of the likely size of the gap and the specific skills sets that will be required. Government should therefore conduct a strategic assessment of what skills will be needed to deliver on our carbon reduction commitments and what the size of the skills gap is likely to be.

The assessment should be broad enough to consider what the skills demands are likely to be in other parts of the economy as it is clear that a rapid decarbonising of the economy

could lead to competition between different sectors for the same people. For example, electrical engineers will be needed to deliver the planned increase in other energy sources, complete upgrades to the grid and to complete other infrastructure projects like providing electrified high-speed rail links as well as installing offshore wind capacity.

It will also be important to take into account the potential for existing skills within the workforce to be redeployed into offshore wind. This will involve analysing where jobs utilising a relevant skills set are currently situated and where offshore wind jobs are likely to be located.

### Training

One reason offshore wind companies are hesitant about investing in the UK is the lack of appropriate skills. Several interviewees suggested that one way to boost confidence would be to launch a large-scale training programme.

*‘The other thing that would help to attract industry to the UK is training – if John Denham [Secretary of State for Innovation, Universities and Skills] were to come out and say we are extremely committed to renewables and therefore we are massively expanding the training of engineers and if the UK then began to do that that would be a strong signal to industry to invest.’* Developer, interview with ippr

Some companies have started to establish their own training schemes and there are currently more than 50 courses across the country providing relevant training at different levels but most stakeholders believe greater investment in training and skills will be necessary to ensure the UK workforce will be up to the task (SQW Energy 2008).

An appropriate first step towards building a suitably skilled workforce is to promote Science, Technology, Engineering and Mathematics (STEM) courses and apprenticeships as a route into ‘green’ industries. This would provide people with a suitable foundation for a range of jobs, not just in the offshore wind industry.

However, the current lack of skills in the STEM area is a well known problem and to tackle it the Department for Innovation, Universities and Skills will need to understand the reasons for many teenagers preferring to give up STEM subjects before A-level. While exhorting young people to do these subjects does no harm it will require a sophisticated understanding of motivations of individuals in the context of formal teaching structures to intervene to promote STEM subjects to provide a larger pool of talent to draw from in the manufacturing industry.

As understanding of the nature of the skills gap improves, a more detailed skills strategy can be developed for the offshore wind sector, and more specific training can be provided to those who already have less specialist STEM qualifications.

*‘We already have [skills] shortages. We need skilled, trained individuals straight off so there’s a real, prime need for immediate-term people, but also in the medium to long term then we’re looking at potentially up to 60,000 people in the wind sector. We’re at around 5,000 now so you’re seeing a very large increase over the next 11 years. So there’s a need for action to bring forward those courses for people who want to get into the sector.’* Industry spokesperson, interview with ippr

### **Attracting the workforce**

It is well known that there have been difficulties in attracting people to pursue careers in the engineering and manufacturing sectors in the UK, despite Government's efforts to promote STEM subjects. The Government will need to develop a comprehensive strategy for attracting people to work in the sector.

Government should work together with industry representatives, universities, the Learning and Skills Council, sector skills councils and careers advisers to develop a coherent plan for attracting people to work in offshore wind. Some suggestions for the kinds of elements this kind of strategy could contain include:

#### **Engaging careers advisory services**

As a first step, Government should encourage the relevant skills sectors to work more closely with career advice services for both young people and adults to ensure they have the most up-to-date and useful information about pay, conditions and progression opportunities in offshore wind so that careers advisers feel confident in raising this as an option with clients. They should also advise people at an early stage on which subjects will provide people with the right skills to work in offshore wind. For example, it may be difficult for someone who has a degree in a humanities subject to move into offshore wind, even if they want to work in the environmental sector (Parliament 2009).

#### **Highlighting partnerships between industry and universities**

Several interviewees suggested that the Government should encourage universities to form partnerships with offshore wind companies to work on R&D with the aim of raising the status and profile of the sector. This approach has been successful in Denmark and Germany. One interviewee suggested that UK universities should aim to attract the 'big names' in the sector by creating Professorships or Chairs in relevant subjects.

*'You need the engineers, you need the expertise, you need to make conditions so that these people, wherever they are – maybe they are in Europe today – are attracted to come here. [For example, use] Professorships, and Chairs – use those facilities to really profile the country... as [having] a long term, [commitment]... for renewable energy.'* Component manufacturer, interview with ippr

Although the Government is already working to achieve this, it should aim to raise the profile of these efforts (as many interviewees appeared unaware that this activity was already occurring) in order to better market the UK as a leader in offshore wind technologies.

#### **Providing incentives**

Finally, Government could consider offering financial incentives to people who take up engineering jobs in the low-carbon/renewable energy sector in the same way that incentives are offered to new school teachers. It could also consider offering training subsidies to offshore wind companies.

An additional problem for the offshore wind sector is that it currently faces competition for skills from other sectors, most notably offshore oil and gas, which are generally able to provide much better remuneration than the offshore wind sector currently can. A report commissioned by BWEA also notes that many offshore oil and gas workers enjoy tax breaks that are not available to offshore wind workers and recommends that the playing field should be levelled (Boettcher *et al* 2008).

## 6. Conclusions and policy recommendations

The UK Government has expressed a commitment to developing offshore wind and said that it expects thousands of new ‘green-collar’ jobs to be created. But although such a high-level commitment should be welcomed, further action is needed to turn these aspirations into reality. The Government faces two challenges: first, getting sufficient capacity built to meet our 2020 targets and second, maximising the potential for job creation and economic benefit from this process.

It is clear that offshore wind is expected to play a major part in meeting the UK’s renewable energy targets for 2020 and expanding the UK’s offshore capacity will undoubtedly create jobs. The question is how many of the jobs are likely to be UK-based and to what extent the Government is prepared to take action to ensure that local people, particularly in economically deprived areas, are well placed to benefit.

We argue that the Government should focus on the offshore wind sector for four reasons:

- It is a sector with growing importance as it will play a key role in meeting our 2020 emissions targets
- Offshore wind offers good, long-term job prospects
- There is potential for developing competitive advantage and export opportunities
- Jobs in the offshore wind sector have the potential to be good quality, career-track jobs and may be available in economically deprived areas of the UK.

Many interviewees noted that there are already companies with suitable skills and processes in place to diversify into offshore wind in the UK. As a first step, Government should carry out a mapping exercise to identify which existing UK companies could have the potential to diversify.

**Creating jobs in the offshore wind sector will require two main steps to be taken.**

- The first and most fundamental step to creating jobs in offshore wind is to clarify a credible, yet stretching target for offshore wind capacity.
- Next, Government needs to address the barriers that could still delay or even prevent the delivery of offshore wind capacity on the scale and timetable necessary to meet our 2020 targets. Then there needs to be a focus on the supply chain, to ensure that bottlenecks do not prevent delivery.

These two steps will ensure that some jobs are created but in order to maximise economic benefits, Government will need to engage in ‘industrial activism’ to support the UK offshore wind supply chain as it develops into a mature industry. We look at each of these steps in more detail below.

### **Overcoming uncertainty to deliver offshore wind capacity**

A number of significant barriers remain to the large-scale deployment of offshore wind that is envisaged to be necessary to meet our 2020 emissions targets. Without overcoming these hurdles, the offshore wind market is not likely to materialise on the timescale necessary. The most important areas to tackle are ensuring that the Renewables Obligation is working effectively to promote the delivery of renewables capacity, providing the necessary infrastructure (in particular grid upgrades and connections) and speeding up and providing more certainty about the planning process. Experience from countries that have successfully developed onshore wind industries shows that the planning systems and economic support mechanisms have been important factors in the development of a local industry.

### **Economic support mechanism**

In response to criticism about the Renewables Obligation (RO), the Government has proposed introducing a banding system and extending the RO until 2037. They will also bring in a feed-in tariff scheme for small-scale renewables projects. Interviewees for this project were clear that fundamental changes to the economic support mechanism (such as replacing the whole RO with a feed-in tariff) would create greater market uncertainty than has existed under the RO to date, thus making investment even less likely. Some also question whether the proposed new band of 1.5ROCs/MWh for offshore wind would provide a sufficient incentive to overcome the costs involved of establishing new offshore wind capacity.

**Government should continue to monitor whether the forthcoming changes have been successful in accelerating deployment of renewables (that is, whether 1.5 ROCs/MWh is sufficient for offshore wind); and be prepared to propose further amendments to the system if it is found not to be successful.**

### **Grid**

The Government is currently working with Ofgem and National Grid to address the issues associated with offshore grid connection through the development of the Offshore Transmission Regime and through the Transmission Access Review. The Electricity Networks Strategy Group, which is chaired jointly by DECC and Ofgem, is currently developing a strategic vision of where new transmission lines will be required to meet the 2020 targets. This is expected to be published in spring 2009. Hopefully these processes will help to build confidence in the delivery of grid upgrades to meet the needs of new renewable capacity.

There is a risk that the recession may make financing the new offshore connections problematic. Government should monitor progress towards providing offshore grid connections to ensure progress is occurring at a sufficient rate to meet the timetable set out for Round Three.

**Government could offer to underwrite loans or work with financial institutions to encourage lending to offshore grid companies to ensure they are able to raise sufficient finance to allow the work to take place.**

### **Planning**

It is hoped that the new Infrastructure Planning Commission (IPC) and National Policy Statements (NPS) will help to speed up the consenting process and eliminate some of the uncertainty that has been problematic for onshore and offshore wind farm developers to date. However, there are only five years to establish the IPC and National Policy Statements and grant consents for offshore wind farms to allow construction to begin in 2014 (see Annex II for more detail).

**Government must monitor progress on all of these processes and ensure they are kept on track.**

### **Assisting supply-chain development**

Many turbine manufacturers and component suppliers are already scaling up their production to overcome current supply-chain bottlenecks. However, there are still concerns about some aspects of the supply chain, such as foundations. **Government should focus on ensuring that shortages in the supply chain do not delay or prevent the installation of offshore wind capacity.**

The global financial crisis presents a new barrier to increasing supply-chain capacity in the short term. **Where possible, Government should consider providing guarantees for loans**

to companies looking to expand their capacity in the UK. Government should also work with financial institutions to encourage lending to this sector.

In addition to helping to prevent bottlenecks in the offshore wind supply chain, supporting these industries will also help to create jobs in the UK. This is explored further below.

### **Maximising the potential for job creation**

Expanding offshore wind capacity will create jobs in the UK. Even the most pessimistic forecasts of job creation in the UK in 2020 (under scenarios with low growth of the offshore market or little activism from Government in creating jobs) show a large number of jobs in the sector ranging from 23,000 (Boettcher *et al* 2008) to 40,000 (Carbon Trust 2008).

Jobs in technical consultancy, operations and maintenance (O&M) and services are most likely to accrue to the UK. For O&M this is because it makes sense for the workforce to be located close to wind farms. For technical consultancy and services this is because the UK already has expertise and skills in these sectors. Manufacturing, installation and R&D jobs are less likely to naturally locate in the UK because the market is not perceived to be big enough to warrant building new factories (when existing facilities in other countries could just be expanded), there is a lack of infrastructure (for example ports), and there is a lack of skills.

If the UK is to maximise the number of jobs created in the UK – and in particular to gain some of the manufacturing, installation and R&D jobs that are less likely to locate in the UK – then Government will need to take additional action to that outlined above, and develop a more strategic approach to developing the offshore wind sector.

### **Support for a new industry**

Section 4 looked at some of the options available in terms of industrial activism for supporting the offshore wind industry. Government should seek to encourage local manufacturing and R&D and should aim to provide additional support for the offshore wind industry while it is still in its infancy. The support should be phased out over time, as the industry matures.

Government should launch a high-profile ‘UK offshore wind investment programme’ that would be run by DECC and administered through the RDAs and UKTI. It should be targeted at areas that have a suitable geographical location and where there is potential for workers in declining or carbon-intensive industries to retrain and move into the offshore wind sector.

It should also focus on parts of the supply chain where the UK has a competitive advantage or that could become bottlenecks in the delivery of new capacity. Government should be aware of similar incentive packages being offered in other countries to ensure that the UK offer is comparable or better. For example, the approach taken by BIS Bremerhaven in Germany to develop a Centre for the Production and Installation of Offshore Wind Turbines was cited by many interviewees as an example of best practice that could be replicated in the UK.

Four ways in which the UK offshore investment programme would provide support:

#### **i) Financial input**

This should include:

- Investment support (including subsidies for capital investment and training, providing low-cost premises and providing financing support in the form of underwriting loans or working with financial institutions to encourage lending to the sector)
- R&D support

- Investment in the local infrastructure that will be necessary to support the industry.

Support should be focused on industries that are most likely to cause bottlenecks in the supply chain and/or industries where the UK already has a competitive advantage. These could include foundations, offshore substations, cables, installation vessels and turbine manufacturers.

#### ii) Facilitation

Government should be aware of other ways in which it can make the UK attractive to potential investors and facilitate their development. A good example would be to **assist with developing a nearshore test site in UK waters**, which would enable new entrants to develop and demonstrate new technologies – a process that is essential for gaining access to the market. **Government could do more to facilitate this process.**

Another example is to **assist with upgrading the UK port infrastructure**. Without better port facilities, it will be difficult to perform installation and O&M operations from the UK and these activities may have to be carried out from other European ports. **Government should work with successful Round Three bidders and RDAs to identify suitable ports and promote investment to upgrade these ports.** The approach taken by the East of England Development Agency, which used a combination of public and private funding to upgrade the port at Great Yarmouth, is a good template to follow.

#### iii) Guarantees

Market uncertainty is a problem that feeds down through every stage of the supply chain. Turbine suppliers are not willing to invest in new capacity until they are certain there will be a market for their product. Component suppliers are not willing to expand their capacity until they are certain that turbine manufacturers will increase their orders. Likewise, companies with the potential to diversify will not consider doing so until they know there will be a demand for the new products. RDAs are unwilling to invest in major new infrastructure until they know it will definitely lead to economic benefits for the region. The steps outlined regarding the economic support measure, grid and planning above should help to improve certainty for developers on the demand side which should then feed down the supply chain.

Uncertainty about the supply of finance is also a problem, particularly in the short term as the recession may make it more difficult for companies to access finance. **Government could increase certainty by offering to underwrite borrowing for companies across the supply chain.**

#### iv) Requirements

Some other countries have used local content requirements to increase the local economic benefits of wind deployment.

**The UK should investigate whether local sourcing requirements similar to those in other states could be applied to the UK or whether other options would be available to grow UK involvement in the supply chain. Government should consider whether this kind of approach could be used in establishing preferred bidders for Round Three offshore.**

Relevant industry associations should also consider issuing guidelines to companies using non-UK contractors along similar lines to those set out by the Engineering Construction Industry Association, which include the guidance to:

*‘Always consider whether there are competent workers available locally. If there are, it is good practice for the non-UK contractor to explore and*



*consider the local skills availability and to consider any applications that may be forthcoming.’ (ECIA 2009: 3)*

### **Skills**

Government needs to take a more strategic approach to developing the skills base for offshore wind in the UK. A purely demand-led approach will not attract people in the short term (since many of the relevant employers are not currently located in the UK) and may leave UK citizens in a poor position to compete for jobs in the future.

The first step is to improve understanding about the size and nature of the skills gap. Specialist roles that have been identified as being difficult to fill include: project managers, electrical engineers, turbine technicians, planners, mechanical engineers, offshore operators, marine engineers, environmental specialists, structural engineers, civil engineers, health and safety specialists and operations supervisors (Boettcher *et al* 2008).

**Government should commission a detailed analysis of the size of the likely skills gap for delivering the 2020 renewables target and greenhouse gas reduction targets.** This should take into account other industries that are likely to draw on the same skills base.

Government then needs to build a strategic plan for closing the skills gap and this needs to encompass two elements: ensuring that training opportunities are appropriate and adequate and considering ways to attract people to work in the sector.

As a first step on training, Government needs to more proactively promote Science, Technology, Engineering and Mathematics (STEM) training and courses to ensure that enough people have the right set of basic skills to enable them to undertake further training specific to offshore wind when that industry takes off. There is a lack of skills in the STEM area and to tackle it DIUS will need to understand the reasons for many teenagers preferring to give up STEM subjects before A-level. While exhorting young people to do these subjects does no harm it will require a sophisticated understanding of motivations of individuals in the context of formal teaching structures to intervene to promote STEM subjects to provide a larger pool of talent to draw from in the manufacturing industry. As mentioned above, **Government should also provide training subsidies to offshore-wind companies to help employers develop the skills of their workforce.**

Further analysis is needed to identify whether the existing training infrastructure will be sufficient to allow the existing workforce to retrain in order to take advantage of new opportunities and for those currently coming through the education system to take up jobs in offshore wind.

It is also important to consider ways in which people will be attracted to work in the sector. Government needs to develop a comprehensive strategy for doing so. It is beyond the scope of this work to suggest how a full strategy could look, but we provide some examples below of the kinds of elements that could be included.

First, **Government could encourage closer working between the relevant skills sector councils and career advice services** to ensure advisers have the most up-to-date and useful information about careers in the offshore wind sector.

Second, **Government could raise the profile of efforts to encourage working between private sector organisations and universities** in the offshore wind sector, which are not necessarily apparent to potential investors at the moment.

Third, consideration should be given to **levelling the playing field for renewable energy and oil and gas firms with regard to tax breaks for workers.**

Finally, Government should consider providing financial incentives to encourage people into the sector. These could take the form of one-off grants to attract people to study suitable subjects or when they take up jobs in the renewables sector (in the same way that incentives are offered to new teachers).

### **Summary of recommendations**

#### **Strategic planning:**

- Government should conduct a mapping exercise of existing UK companies that have the potential to diversify into offshore wind.

#### **Overcoming short-term investment difficulties resulting from the recession:**

- Government could offer to underwrite loans for the offshore wind supply chain to enable access to lower interest loans
- Government could work with financial institutions to encourage loans to the offshore wind supply chain.

#### **Overcoming delivery barriers:**

- Government should monitor progress on the new Infrastructure Planning Commission and National Policy Statement planning system to ensure it delivers the quicker consenting times that are envisaged
- Government should monitor whether the banding of Renewables Obligation Certificates is successful in accelerating deployment of offshore wind and other renewables and be prepared to propose further amendments should it not be successful
- Government should provide investment support (such as subsidies for capital investment, training and R&D, providing low-cost premises and providing financing support) for offshore wind supply-chain companies looking to establish R&D or manufacturing facilities in the UK. Support should be focused on industries that are most likely to cause bottlenecks in the supply chain, including foundations, offshore substations, cables, installation vessels and turbine manufacturers.

#### **Maximising job creation:**

- Government should develop a support package for the offshore wind supply chain that enables the industry to develop while it is in its infancy. Support should be phased out over time as the industry matures.
- This package should take the form of a high-profile 'UK offshore wind inward investment programme' that would be run by DECC and administered through the RDAs and UKTI. It should focus on areas of the supply chain where the UK has a competitive advantage or areas that could become bottlenecks in the supply chain. It should include:
  - Investment support (including subsidies for capital investment and training, providing low-cost premises and providing financing support in the form of underwriting loans or working with financial institutions to encourage lending to the sector)
  - Government assistance in developing a nearshore test site in UK waters by working with the Crown Estate to select an appropriate site
  - Government assistance in upgrading the UK port infrastructure by working with successful Round Three bidders and RDAs to identify suitable ports to be upgraded
  - Guarantees – government should offer to underwrite borrowing for companies across the supply chain

- An investigation into whether local sourcing requirements similar to those used in other countries could be applied to the Round Three allocation process.
- Industry associations should consider issuing best practice guidelines to companies using non-UK contractors on the use of local skills
- Government should take a more strategic approach to developing the skills base for offshore wind in the UK to ensure that UK workers are well placed to compete for jobs in this sector. This should include:
  - A detailed analysis of the size of the likely skills gap for delivering the 2020 targets across all energy and transport industries
  - Training subsidies for offshore wind supply-chain companies
  - A level playing field for renewable energy and oil and gas firms with regard to tax breaks.
- Government should develop a strategy to encourage people to move into the sector, including:
  - Government encouragement of closer working between the relevant skills sector councils and career advice services
  - Highlighting of work to build partnerships between universities and companies
  - Consideration of providing financial incentives.

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## Annex I: List of interviewees

1. Rob Sauven, Vestas
2. Mike Rolls, Siemens
3. Gordon Edge, BWEA
4. Mark Petterson, Warwick Energy
5. Stephen Tindale, RWE nPower
6. Dion Metzemaekers, nkt cables
7. David Still, Clipper Windpower
8. Jens Frederik Hansen, A2Sea
9. Ramon Fiestas, AEE
10. Jesper Byberg, MT Højgaard
11. Chris Hill and James Lowe, Mainstream Renewables
12. Mark Pearson, One North East
13. Megan Arnold, GE
14. Sam Pryor, SeaRoc
15. Colin Smith, Rolls Royce
16. Dave Rogers, E.ON
17. Peter Clusky, Mitsubishi
18. Bengt Hansson SKF

**Annex II : Implementation timetables**

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Infrastructure Planning Commission	Recruitment of IPC												
	IPC ready to receive applications												
National Policy Statements	Scoping of NPS on non-nuclear energy and ports												
	Consultation and Parliamentary process												
	NPS on non-nuclear energy and ports designated												
Round Three	Crown Estate awarding of Round Three Development Zones to selected partners												
	Planning and consenting												
	Construction												
	Operation												
	25GW delivery target												

IPC=Infrastructure Planning Commission; NPS=National Policy Statement

Sources: Communities and Local Government 2009 and Crown Estate 2008

## Annex III: Funding available in the UK across the innovation cycle

	1	2	3	4	5	6	7	8	9
	Basic research		Applied research and development			Demonstration		Pre- commercial deployment	
National support	Research councils (£300 million on energy research)								
	Technology Strategy Board (£1bn over next three years)*								
	Energy Technologies Institute (£1.1bn over the next 10 years)**								
	Environmental Transformation Fund (ETF) (£125 million per year)***								
						ETF – DECC and BERR aspects			
								ETF – Energy Saving Trust aspects	
			ETF – Carbon Trust aspects						
	R&D tax credit								
European support			European Commission						
Scottish and regional support			ITI Energy Scotland						
						RDA schemes			

Taken from BERR, Defra and DIUS 2008

\*The Technology Strategy Board is a Government-funded arms-length business-led organisation that aims to promote energy-focused innovation in the UK. Funding is likely to be around £1bn over the next three years.

\*\*The Energy Technologies Institute is a public private partnership aiming to create a £1.1bn investment fund for new energy technologies. Half of the funding will be from public money.

\*\*\*The Environmental Transformation Fund brings together low-carbon-technology funding programmes that were previously administered by Defra and BERR. These include the Offshore Wind Capital Grants programme, the Carbon Trust's Offshore Wind Accelerator