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CE has an extensive track record of innovative quantitative analysis, including the development and application of economic models to fields such as energy and environmental policy; labour market analysis and forecasting; and regional development issues in the UK and Europe.

Past clients include, in the UK: the UK Commission for Employment and Skills, the Committee on Climate Change, BIS and DECC. CE also carries out analysis, including Impact Assessments, for several Directorates General of the European Commission.

CE was established in 1978 to provide commercial access to research in the University of Cambridge. The company is now majority-owned by a charity, the Cambridge Trust for New Thinking in Economics.

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The Institute for Employment Research (IER) was established by the University of Warwick in 1981. The IER is one of Europe’s leading centres for research in the labour market field. Its work focuses upon the operation of labour markets and socio-economic processes related to employment and unemployment in the UK at national, regional and local levels. It includes comparative European research on employment and training. The IER’s research fields involve addressing major issues of socioeconomic behaviour and policy in their local, national and international setting.

The work of the IER covers a wide range of research-related activities; basic and strategic research; labour market assessment and evaluation; household and employer surveys; technical assistance and consultancy; and an advanced study programme.

The IER provides a range of research and analytical services to customers in both the public and private sectors. It has conducted major research projects for all the main UK government departments as well as for various international organisations, including the ILO, OECD, European Commission, and Cedefop. In recent years, in conjunction with Cambridge Econometrics, IER has undertaken a number of projects on demand for green skills across Europe.

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IFF Research is a long-standing full-service research agency set up in 1965, and employing 55 staff. It specialises in studies on employment, learning and skills, working regularly for government departments and agencies including BIS, DWP, Sector Skills Councils, Skills Development Scotland, the Skills Funding Agency, and the UK Commission for Employment and Skills (UKCES).

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Forewords

RenewableUK

It is a pleasure, once again, to present this important research into current and future employment in the UK from the wind, wave and tidal energy industries.

This report, which updates research carried out in 2010, shows the role that wind, wave and tidal energy is playing as a growth engine to the UK. In the last three years, direct jobs in our industry have increased by 74% to just under 18,500, a fantastic leap which shows the growing importance of this industry. This year’s research also shows the number of jobs which the wind, wave and tidal industries support in the broader economy: from lorry drivers to gearbox manufacturers, there are now some 16,000 people who do not work directly in, but owe their employment to, our industries. The industry should feel rightly proud of the 34,500 people who now work for or are supporting it. It’s important we remember these tens of thousands of individuals who take pride in their work, building out a new generation of low carbon energy projects, and who make up a highly skilled, highly trained workforce. These are people who deserve our support, and the confidence that their decision to seek a career in this market means they can plan for their future while playing an important role in helping the UK shift to a low carbon economy.

The scale of the opportunity is greater still. Looking ten years ahead, this report’s high deployment scenario shows the potential for a further 70,000 additional direct and indirect jobs over the next decade, with nearly half of these in the offshore wind sector.

However, this research also makes clear that there are a range of scenarios for growth, and that potential job numbers are closely tied to deployment. To continue to develop jobs in significant numbers, we need substantial levels of deployment. Ambition and investment in our technologies will see an increasing percentage of our electricity needs coming from wind, wave and tidal sites. This will translate not only to the powering of millions more homes, but also to the creation of tens of thousands of jobs. This report clearly shows that if this ambition falters, we could see not only a failure to develop our sectors’ workforce, but also the threat of job losses. This is particularly true for offshore wind, which needs to see substantial growth in deployment over the next decade to enable it to achieve its employment potential.

To achieve this new greener economy, Government and industry must work together. Government has a role to play in policy development, in ensuring that a long-term vision for the wind, wave and tidal sectors is clearly set out so that business has the confidence to invest in hiring and training the next generation of workers. This means both a communication of the long-term ambition for the sector, and the right policy framework to make it happen in terms of the market support arrangements. With changes to both large- and small-scale renewables support, it is not an exaggeration to talk about the UK being at a crucial juncture in terms of whether it will develop to its true green employment potential.

There is also work to do to ensure that employers are able to procure talent local to them. I was pleased to see that 91% of employees in the wind, wave and tidal sector are UK citizens, and we want to ensure that this continues. The report alerts us to the fact that one third of employers surveyed reported hard-to-fill vacancies; it is crucial that as our sector grows, our people’s skills grow with it. The industry, as detailed in our newly published Skills Manifesto, would like to see stronger leadership from Government, capped by a national Government-led skills strategy, with an emphasis on furnishing workers with the skills that industry needs. There are many creative solutions to this, from funding courses in areas where there are skills shortages, to incentivising and encouraging more students into STEM subjects. This includes ensuring even more women enter the industry – 20% of employees in our sectors are female, a good comparison with the rest of the energy sector, but as in many areas, we wish to be trailblazers and see that figure grow even further. Through the Renewables Training Network established by RenewableUK and the excellent apprenticeship schemes that our members run, and with the help of providers such as Energy and Utility Skills, industry is also ready and willing to do its part to ensure that our sectors have the workers we need.

What this report demonstrates is the huge scale of opportunity. A growing sector today can be a booming one tomorrow, with the potential for a trebling of employment over the next decade. Challenges are in place – namely the need for a long-term policy framework to allow industry the confidence to invest, and the need to grasp the skills challenge by the mettle – but these can be overcome to allow us to be a truly green collar nation.

Maria McCaffery
Chief Executive, RenewableUK
Energy & Utility Skills

I am delighted to present this second round of research on the workforce and skills needs of the UK’s wind and marine energy industry.

This report, which builds on the research carried out in 2010, reports that the growth in employment in the wind and marine energy industries over the last two years has been considerable – in fact, direct jobs have increased by 74% to just under 18,500. In a period of economic uncertainty, this growth is a good news story for the sector.

While the growth over the last two years has been higher than anticipated in the 2010 report, the projections looking forward show less ambition than previously reported. Lack of clarity in Government policy and financial uncertainties are likely to have played a key role in this situation. Despite this, the report highlights the continued potential for growth, and we must therefore make sure we are ready to meet the ongoing demand for labour, where and when it is needed.

The highly skilled nature of the wind and marine energy workforce means that many employers are finding it increasingly difficult to attract the required skills and experience when projects start. In fact, the proportion of employers reporting hard-to-fill vacancies has increased by 42% over the last two years. These shortages are

most severe in managerial and technical professional disciplines, representing a clear demand for Science, Technology, Engineering and Mathematics (STEM) skills. Exacerbating this problem will be the increasing demand from other sectors of the UK economy for these same skills.

This situation is not necessarily due to a lack of training or qualifications, but rather the experience and context that underpin the skills of the individual. Due to the uncertainties surrounding the future development of the industry, it is very difficult to predict the quantity and timings of demand, and to prepare the workforce accordingly.

Bringing in skills and experience from other sectors of the UK economy (for example, from the armed forces), up-skilling and re-skilling experienced staff, as well as recruiting through non-traditional entry routes, will be essential in meeting future skills demand. In relation to this latter point, it is encouraging to see this report present evidence that significant progress has been made in the recruitment of women into skilled manual and technical professional roles in the industry, even if more work needs to be done at a managerial level.

We must also continue to encourage new entrants into our apprenticeships and other such entry-level schemes. We are continuing to work with educators and employers on encouraging more young people to undertake STEM subjects. I am very excited about the launch of Green STEM this year, which provides increased support to employers, educators and learners to develop their knowledge skills and understanding of work within STEM-related sectors such as the renewable sector.

The insights contained within this updated report will be instrumental in preparing employers and the providers of skills to meet the future demands of the industry in a timely and effective manner. The challenge will be to ensure that the UK has the skills available in the workforce to capitalise on this job creation and maximise the economic benefit to the UK. The consequences of not achieving this could be significant in terms of increased levels of “poaching” between employers, as well as employers being driven to recruit more of their skilled labour from outside of the UK.

Working in collaboration and partnership with organisations like RenewableUK, and through the continued support from our members and the UK Commission for Education and Skills, we have developed a strong network of education and skills providers across the UK to support the wind and marine industries, and we will continue to work with them to share best practice and further develop their capability to deliver against industry needs.

This is clearly a rapidly changing landscape that requires us all to work together to ensure that we maintain an understanding of the evolving picture and develop solutions that will deliver the right people, with the right skills, at the right time. Taking such a collaborative approach is the only real solution to ensure that the UK’s wind and marine energy sector is able to meet its medium and long-term skills needs from the domestic labour market.

Neil Robertson
Chief Executive, Energy & Utility Skills and the National Skills Academy for Power
Executive Summary

Working for a Green Britain and Northern Ireland

Use and generation of energy is changing. The British and Northern Irish markets are both seeing rapid growth of renewable energy as older generating capacity is replaced in the progression to low-carbon electricity generation.

A significant part of this growth is wind and marine renewable energy. Onshore and offshore wind now provides half of the UK’s renewable electricity provision. As we near 2020 these two technologies are expected to play a major part in meeting UK 2020 renewable energy targets. Beyond 2020 both onshore and offshore wind, alongside an increasing presence of wave and tidal stream power, are expected to remain important in the UK’s efforts to build out new sources of generation as it decarbonises electricity generation while reducing price volatility and dependence on imported fuel sources.

Alongside the important role wind and marine energy can play in keeping the lights on and tackling climate change, this research looks at how these sectors are making a contribution to our economy as important sources of employment. The value of wind and marine comes not just from the electricity generated, but also through the jobs they create in communities across Great Britain and Northern Ireland. Employment in the sector is growing, and under healthy market predictions it looks set to continue to grow, providing a diverse range of employment in manufacturing, construction, development maintenance and wider support industries.

Since 2010 the number of people directly employed in the industry has increased by 74% from 10,579 to 18,465, evidencing the sector’s importance given the slowdown in the wider economy. This increase can be seen across different types of employment. The largest increase has been in construction and installation, with an additional 2,367 now employed.

Across the industry, up to 30% of people work in construction and installation, 25% in planning and development, 18% in support services, 16% in operations and maintenance and 10% in manufacturing. This reflects an industry that is actively building out new projects, supplying equipment and maintaining existing plant. Significantly, the number of indirect jobs has also increased. Some 15,908 indirect jobs are now supported by the wind and marine industry, up from 10,555 in 2010. This means that more employees working in companies who might not be principally identified as renewable energy companies are now supporting the industry as a result of a greater degree of interdependency and specialisation in parts of our economy.

A UK-wide highly skilled employment base

Since 2010, direct employment in the sector has increased by 7,886, and 5,353 more jobs are indirectly supporting the sector through the wider supply chain. The 34,373 full-time equivalent jobs supported directly and indirectly by wind and marine energy are an important reminder of the growing size of the sector, and its influence throughout the UK economy. 10% of the direct workforce is mobile, a flexible, responsive workforce moving around the UK to meet demand. The remainder is rooted more firmly in one place. 60% of employment in wind and marine energy is based in England, 20% in Scotland, and the remainder in Wales and Northern Ireland. And of this UK-based workforce, the vast majority – 91% – are UK citizens, a fact which demonstrates the ability of the industry to recruit, attract and retain employment on a domestic level.

The skillsets required in the wind and marine energy sector are similar to those demanded in other sectors of the economy; however, as a workforce, the sector has proportionally more highly skilled occupations than the UK economy as a whole. This highlights the need for a coherent strategy to promote the supply of highly skilled workers, but also illustrates the competition that the wind and marine energy sector faces in order to attract future talent.

The level of growth also means that the sector is experiencing the problem of hard-to-fill vacancies, with a third of firms now reporting they had ongoing vacancies, up from a quarter of firms in 2010. This is an economy-wide issue, but demonstrates how there is competition within the UK economy for a highly skilled workforce. 20% of the sector’s workforce are women – this is lower than the proportion of women in technical and professional occupations in the UK, but proportionally higher than in the power sector overall, thereby demonstrating the sector’s success in attracting women to the workforce. However, women are still under-represented in management occupations, indicating that more needs to be done to attract women into this sector and to provide opportunities across different roles.

Looking at how our people are employed, since 2010 the sector has seen a significant shift away from contract jobs towards permanent employment, which signals confidence in the growth of the industry. This trend will continue across all scenarios in the future. The size and type of employer is also diverse: more than 80% of all employers in wind and marine employ fewer than 250 people; 56% employ fewer than 25 people. The fact that SMEs are at the heart of the sector, and are driving the growth in employment, shows the depth and diversity of the industry. As a consequence, skills and enterprise support needs to be structured in a way that can be easily accessed by these companies.
The sector by technology & turnover

The overarching growth in wind and marine is evidenced from looking at each of the technologies individually. In onshore wind there are now 9,911 direct FTE jobs, an increase of 3,371, or 50%, since 2010. Notably, employment in the small-scale wind sector has increased by a factor of four from 590 to 2,464 FTEs. The workforce in the offshore sector has doubled in size since 2010, from 3,151 to 6,830. And this growth is mirrored in marine, where the number of direct FTE jobs now stands at 1,724, up from the 800 jobs recorded in 2010.

Turnover of our sector has increased from an estimated £2.8bn in 2010 to £8.1bn in 2013, a near trebling in the size of the sector. This comes against a tough economic background and highlights an increasingly important role that the sector has played in underpinning economic growth throughout the UK. At the same time, labour productivity has increased. There has been a more than 50% increase in nominal labour productivity since the last survey, showing that industry is managing its costs well and learning how to deliver more cost-effectively as it grows. While increased labour productivity may lessen potential employment growth, the sector is still likely to see strong growth in a highly skilled and productive workforce.

Future industry growth

Projecting out ten years to 2023, our model predicts continued growth in employment, but this is dependent on a healthy market. Companies working within the wind and marine sectors are investing in premises and people across the UK. The scenarios in Working for a Green Britain and Northern Ireland demonstrate high growth potential in this sector – over 70,000 additional direct and indirect jobs could be created by 2023 in the high scenarios. The high scenarios are achievable – however, lower growth scenarios are also possible. With lower deployment levels come smaller opportunities for growth. Low levels of growth in onshore, offshore and wave and tidal would mean employment in the industry would fail to double in size in the next ten years. In many traditional sectors or individual companies, to double in size over ten years would be recognised as a significant achievement. However, for a sector which has grown by over 74% in three years, this would represent a marked scaling back of ambition, and in some parts of the industry could actually result a fall in numbers employed.

The critical issue is momentum. Our report shows the industry is currently going through a period of policy uncertainty, and the scenarios considered take into account the implications of the lower levels of deployment possible under Electricity Market Reform and fundable in the Government’s levy control framework. Rising employment between 2010 and 2013, which was broadly in line with our 2011 medium scenario predictions, highlights an industry which has invested in anticipation of the growing market. The scenarios show that to maintain substantial growth in employment there needs to be a clear trajectory of increased deployment.

Our more conservative mid-range scenario is that by 2023, 52,540 people could be employed directly and indirectly. This represents a reduction in forecast employment from the equivalent 10-year period in our 2011 report due to the lower levels of deployment now assumed. The scenario reflects an industry that is maturing and learning how to deliver in a more cost-effective and productive manner. However, it would also reflect a slowdown in the sector because of policy uncertainty and resulting caution in the industry as to levels of investment and recruitment. The fact that under this scenario more than 50,000 people would be employed in wind and marine technologies and their supply chain means that these industries would still represent a significant opportunity for the UK economy. A certain level of deployment and continued momentum is needed to get there, however, and industry needs to maintain installation progress to 2020 to have the capacity to continue building and growing out to 2023 and to the end of the decade. Our report shows that below a certain deployment rate, growth slows or even stops. The consequence of this is that the UK would secure a lower proportion of the economic benefit per MW developed.
While the sector has delivered strong growth in these difficult years, policy support is critical to ensure that this continues apace in the coming decade. Our report demonstrates the importance of a healthy and consistent build programme. The high scenarios demonstrate what can be achieved with strong levels of deployment and policy certainty. Here exists a virtuous circle in which continued growth leads to continued confidence, high growth in employment and cost reduction, which makes future growth more likely. However, between the mid- and low-range scenarios a vicious cycle exists, in which low levels of deployment mean industry fails to get past a certain tipping point; this level of investment is insufficient to trigger the skills development and training of a workforce for the industry. This report shows a burgeoning industry with substantial levels of growth in employment, and even greater potential over the next decade provided the conditions are right.
1. Introduction

Working for a Green Britain, published in 2011, provided the first detailed assessment of the UK wind and marine energy sector and its prospects. Since that first study there have been major developments in the sector, with installed capacity nearly doubling since 2010.

However, in the wake of a global recession and a shift in policy sentiment, the industry faces greater challenges than were envisaged back in 2011. This is reflected in a more cautious outlook on renewables deployment in the coming decade in this report compared to the previous one.

This report provides an up-to-date assessment of employment in the wind and marine energy sector, its current challenges and its future prospects. It follows a similar approach to the original Working for a Green Britain study, combining a detailed survey of companies with projections modelling to examine the employment potential of alternative renewables futures. Where possible, comparison is made with the results of the earlier study.

This study goes beyond the previous analysis with the following three extensions:

• Current employment in the sector is reported in more detail
  – at the level of countries, as well as for the UK as a whole
  – by gender
  – by UK citizenship;
• The large- and medium-scale onshore wind sectors are now identified separately, whereas before they were not distinguished
• The analysis of the installation life cycle has been extended to include decommissioning/repowering at end of life.

The report is structured as follows. Chapter 2 provides an overview of the study approach and Chapter 3 summarises the key findings from the survey. Chapter 4 then reviews in detail the current structure and future prospects of the sector, by individual technology. Chapter 5 presents the breakdown of current employment by nation, while Chapters 6 and 7 provide information on the current structure of the labour market, and current and future challenges, respectively. The report concludes in Chapter 8.

Further details on the study approach can be found in the Appendix at the end of this report.
2. Method of Approach

2.1 Overview

The approach taken in this study builds on that applied in the previous 2011 study, comprising:

- A survey, in mid-2013, of companies in the wind and marine energy sector, to identify current employment in the sector (and to compare it to the employment measured last time), as well as to identify wider labour-market issues such as the demand and supply of critical skills and competences;

- A modelling exercise to project future employment potential, out to 2023, based on three alternative projections about future deployment of wind and marine energy in the UK and the rest of the world. Further detail on each can be found in the Appendix at the end of this report. Note that the survey for the 2011 study was carried out in late 2010. Consequently, comparisons to the previous survey are comparisons to employment in 2010, while references to the accompanying report are to 2011.

2.2 Key definitions

Employment

The study considers direct (wind and marine energy-related) employment as well as indirect employment (jobs in the rest of the UK economy), on a Full-Time Equivalent (FTE) basis.

Full-Time Equivalent (FTE) employment is a measure of the number of employees in a firm or sector. Employees who regularly work more than 30 hours per week are counted as one FTE, while those that work part-time (less than 30 hours per week) are counted as half a FTE. This is in order to measure the ‘effective’ number of full-time employees. The implication is that one FTE may represent more than one actual employee.

Direct employment covers employees who spend the majority of their working day on activities specific to wind or marine energy.

Indirect employment covers employees whose principal activity is not wind or marine energy-specific, but who work in sectors that supply goods and services to the wind and marine energy sector. In that sense, their employment is indirectly supported by the UK wind and marine energy sector. An example might be a supplier of gearbox components which has 100 employees and sells a fifth of its output to the wind and marine sector; the remainder is sold elsewhere in the UK or abroad. In this example, the company has 20 jobs which are indirectly related to wind and marine energy.

The technologies covered

The ‘wind and marine energy sector’ in this study refers to five technology types:

1. Large-scale onshore wind, consisting of wind turbines over 500kW in size;
2. Medium-scale onshore wind, consisting of wind turbines between 100kW and 500kW in size;
3. Small-scale wind systems, for wind turbines less than 100kW in size;
4. Offshore wind, covering wind turbines deployed in a marine environment;
5. Marine energy, for wave and tidal stream energy technologies.

Of the above, medium-scale onshore wind is now separately identified (whereas in the previous study it was included in large-scale onshore wind).

What activities are identified?

This study identifies the following activities within the UK wind and marine energy sector, covering the entire asset lifecycle of these sites:

- Site planning and development;
- Manufacturing and design;
- Construction and installation;
- Operations and maintenance;
- Specialist transport;
- Decommissioning/recommissioning;
- Specialist Support Services and Other.

Of the above, Decommissioning/recommissioning is a new category added since the previous study that recognises that some installed capacity in the UK has reached the end of its life and has either been decommissioned or repowered. Specialist transport was previously included as part of Specialist Support Services and Other.

Contracted and permanent employment

This study distinguishes between:

- Contracted employment, which concerns temporary employment in activities sustained by the construction of new (or decommissioning/repowering of old) wind and marine sites;
- Permanent employment, which is employment sustained by the requirement to operate and maintain current installed capacity, i.e. these jobs exist for the entire operational life of the assets.

In this context, permanent employment is long-term in nature, whereas contracted employment depends on (continued) construction of new projects.

2. Method of Approach

2. The model applied for this study also considers induced employment, which arises from workers spending (part of) their additional income, further increasing economic activity. It is usually more relevant for analysis at the local level, rather than at the level of nations or the entire UK (in part because it includes an element of double-counting). As such, the results reported are for direct and indirect employment only, excluding induced employment.
2.3 The scenarios

There are three sets of projections considered and presented in this report.

- High deployment: this scenario posits strong and consistent support specifically for wind, wave and tidal in order to meet renewable targets in 2020, as well as to enhance energy security and capture cost and wider economic benefits thereafter, including, as far as possible, to maximise employment in the sector in the UK.

- Medium deployment: in this scenario, support for wind, wave and tidal exists but is weaker and inconsistent. A wider set of renewable technologies is relied on to meet 2020 targets, resulting in lower delivery of the technologies under consideration here, and growth thereafter is strongly dependent on cost reduction. The lack of clear support for the sector results in the UK capturing a lower proportion of the industrial benefits, particularly from offshore wind, which is reflected in the fact that this scenario is revised down from the previous report.

- Low deployment: this scenario assumes that support is substantially withdrawn from wind, wave and tidal, resulting in low or zero growth. Only the cheapest ‘low-hanging fruit’ projects are developed, which are limited due to higher planning hurdles being imposed (particularly on onshore wind), and dependent on cost reductions that have come forward due to deployment in other countries. In the extreme, this scenario results in no deployment of the marine technologies after 2018 as they are not deemed to be worth the long-term investment required.

The scenarios considered in this 2013 study are less ambitious than those used in the 2011 study. This reflects recent and expected future periods of greater policy uncertainty, and takes into account the implications of the proposed levy-control framework in the case of the higher-growth scenarios. The lower-deployment scenarios in this study represent policy failure, rather than simply lower rates of growth (as was the case in the 2011 study).

In addition to the assumptions around deployment, the scenarios also embody alternative views on:

- The extent to which the UK will be able to supply manufactured components to support wind and marine energy in overseas markets;
- The extent to which the UK will be able to meet its supply-chain requirements with UK production (rather than imports).

In each case, higher export opportunities and larger increases in domestic supply correspond to higher levels of UK deployment, while lower exports and little-to-no increase in indigenous production correspond to lower levels of UK deployment. The high scenario is thus optimistic from both a UK and global deployment point of view, and the low scenario is similarly pessimistic across the board.
3. Overview of Survey Results

3.1 Current employment

Direct employment

The sector is larger and more broad-based than in 2010

Based on the results derived from the survey, the wind and marine energy sector in 2013 directly employed 18,465 FTE across the sector and had a turnover of £8.1bn (predominantly in the more developed large onshore and offshore technologies). The 2010 survey reported employment of 10,579 FTE, meaning that employment in the sector has increased by 7,700 jobs (74%) over 2010–13. Turnover in the sector in 2010 was estimated to be around £2.8bn (indicating a near-trebling in the size of the sector in the last three years, by turnover). The new survey results imply a greater than 50% increase in labour productivity (as measured by turnover per worker).

Of those 18,465 direct jobs, just over a third each are associated with the offshore and large onshore technologies. The next largest technology in terms of direct employment is small onshore, which employs around 13% of the total wind and marine energy workforce. Some 10% of the workforce is employed in the marine sector and 5% in the burgeoning medium-scale onshore sector.

Employment in each technology type has increased since 2010, with the largest increases seen in offshore and small- and medium-scale onshore technologies. As a result the profile of employment by technology is more evenly distributed than it was in 2010, when more than half of all employment was in the large onshore wind sector. The largest single activity within the sector in terms of employment is construction and installation, which accounts for 25–30% of the workforce. A further 25% of the workforce is engaged in site planning and development. Operation and maintenance and support and other activities each account for 15–20% of jobs in the sector, while a further 10% are in manufacturing and manufacturing design. There are relatively few jobs associated with decommissioning (as the number of sites that have been decommissioned or repowered is much smaller than the amount of new build) or specialist transport activities.

Compared to 2010, employment in all activities has increased, with the largest increase in overall jobs in construction and installation (an increase of 2,367) as a result of increases in the amount of newly built capacity. The number of jobs in manufacturing and manufacturing design and maintenance and operations activities has also increased, by a total of 2,224, since 2010. The increases in the former reflect continued growth in new build, while the latter reflects the consequent increases in operational capacity in the system.

The latest survey indicates that the vast majority (91%) of employees in UK wind and marine energy are UK citizens. In all technologies the proportion exceeds 90%, with small onshore wind reporting a proportion closer to 95%.

The majority of the jobs directly associated with the wind and marine energy sector are in England (more than 60%). The sector in Scotland accounts for about 20% of the overall jobs (3,827 FTE), with the remainder in Wales, Northern Ireland or considered ‘mobile’ (not allocated to a specific nation). Mobile employment accounts for some 10% of employment in the sector, with the majority operating in offshore wind. These mobile workers are UK-based and involved in activities across Great Britain and Northern Ireland, travelling to sites to carry out activities wherever the need arises. Although the total number of direct jobs in the sector is lower in Scotland than in England, the sector accounts for a higher proportion of total employment in Scotland than it does in England. As a proportion of total employment, the wind and marine...
energy sectors in Wales and Northern Ireland account for a slightly larger share than in England, but not as high as in Scotland.

Across the four nations, most employment is in onshore wind (comprising large, medium and small-scale turbines). Between one-third and one-half of employment is accounted for by large onshore wind, and 10–20% by small onshore, depending on the nation. Offshore wind accounts for the next-largest proportion across the nations, though, in the case of mobile employment, there are more workers in offshore, rather than onshore, wind.

The vast majority of employment relating to small onshore wind systems is located in England (almost 1,436 jobs, or 60% of the total employment in that technology), followed by Scotland (645 jobs, or just over 25% of the total). The remaining 15% of employment in this sector is split more or less evenly across Wales, Northern Ireland and the mobile workforce (equating to between 100 and 150 jobs in each case).

The majority of employment in marine technologies is located in England and Scotland. Marine employment constitutes the highest proportion of direct wind and marine energy employment in Scotland, reflecting the area’s larger number of test facilities and operational devices.

**Indirect employment**

The 18,465 FTE jobs directly identified with the wind and marine energy sector in turn support employment elsewhere in the economy, further up the supply chain. As defined in this study, the firms that are further up the supply chain are not classified as wind and marine energy sector firms; they are not engaged in ‘direct’ activities. Instead, these firms supply more generic goods and services as would be required by a range of UK businesses, including manufactured components (e.g. computers, as well as various engineering equipment and structural components) and services (e.g. auditing of accounts). Such activities are ‘indirectly’ related to wind and marine energy because they represent employment that arises elsewhere in the UK economy as a result of activity within the wind and marine sector. It is estimated that some 15,908 indirect FTE jobs are supported in this way. Of these, 3,649 are in manufacturing and 5,849 in business service support activities. In total, UK wind and marine energy supports 34,373 direct and indirect jobs.

The ratio of indirect jobs to direct jobs in this 2013 study is higher than that reported in the 2011 study. The implication is that one job in the wind and marine energy sector supports more jobs in the economy now than it would have back in 2010. This is a feature of more recent official data on the structure of the UK economy, which indicate a greater degree of interdependency and/or specialisation in UK economic sectors with links to wind and marine energy.\(^3\) For example, indirect firms may now outsource more functions to other firms, whereas previously they might have opted to carry out those activities themselves.

### 3.2 Future prospects

The outlook for employment in the wind and marine energy sector is...
considered under three alternative scenarios, providing a range of potential employment outcomes.

- The high scenario: this scenario posits strong and consistent support specifically for wind, wave and tidal, in order to meet renewable targets in 2020, as well as to enhance energy security, and capture cost and wider economic benefits thereafter, including, as far as possible, to maximise employment in the sector in the UK;

- The medium scenario: in this scenario, support for wind, wave and tidal exists but is weaker and inconsistent. A wider set of renewable technologies is relied on to meet 2020 targets, resulting in lower delivery of the technologies under consideration here, and growth thereafter is strongly dependent on cost reduction. The lack of clear support for the sector results in the UK capturing a lower proportion of the industrial benefits, particularly of offshore wind, which is reflected in the fact that this scenario is revised down from the previous report;

- The low scenario: this scenario assumes that support is substantially withdrawn from wind, wave and tidal, resulting in low or zero growth. Only the cheapest ‘low-hanging fruit’ projects are developed, which are limited due to higher planning hurdles being imposed (particularly onshore wind), and dependent on cost reductions that have come forward due to deployment in other countries. In the extreme, this scenario results in no deployment of marine technologies after 2018, as they are not deemed to be worth the long-term investment required.

Direct employment in wind and marine energy in 2023 could fall slightly, to 16,443 in the low scenario, or rise, to 55,683 in the high scenario (which would in turn support almost as many jobs again indirectly through the supply chain).

The largest increase in direct employment over 2013–23 will be in offshore wind; it accounts for more than half of all direct employment by 2023 in each scenario, reflecting its importance in a renewables-led low-carbon future, particularly in the new high scenario (an ambitious, but achievable, level of deployment). Due to the more advanced nature of onshore wind deployment, and its expected slower rate of future growth, large onshore employment is not expected to increase so significantly. Indeed, overall employment associated with this technology could fall if installed capacity only increases modestly (although the employment would favour operational jobs, rather than the kind sustained by continued growth in construction activity). Marine and small onshore are the technologies where there is the greatest divergence in employment growth between the scenarios.

While direct employment in a technology could fall back from current levels in the more pessimistic scenarios (e.g. large onshore in the low growth scenario), the falls are seen in activities associated with the early phases of a facility’s life, such as planning and development; employment in the more sustained activities such as operations and maintenance are generally higher than current levels. This reflects the transition from an industry where employment is sustained by construction activity to one where most of the activity is in operations to supply renewable electricity.

For the wind and marine energy sector as a whole, there is a large projected increase in ‘permanent’ jobs – those which are in place as long as the asset is operational – in each of the three scenarios.

The current projections predict slower growth in direct employment in the wind and marine energy sector than did the earlier 2010 survey-based set of projections. In the analysis from the previous study, the low scenario projected direct employment of 28,700 in 2021, while the high scenario projected a potential employment figure 2.5 times the low scenario value, at 72,600 direct jobs. Depending on the scenario chosen, much of the reason for the lower growth now projected lies in a more cautious set of projections for future UK deployment of wind and marine energy. This reflects delays in the construction pipeline owing to policy uncertainty (principally around the Electricity Market Reform). Current assumptions for future wind and marine energy capacity in 2021 range between 25.8GW and 42.6GW, while the 2010–based projections for the same year were between 25.7GW and almost 52GW.4

4. Differences in the technology mix between vintages of assumptions will also be a factor behind the variation in projections, as will differences between the latest survey and levels of employment previously projected for 2012.
3.3 Other labour market issues

Most firms in the wind and marine energy sector are engaged in the onshore wind subsector, within which the large-scale subsector is the largest employer. Around 60% of firms are involved in offshore wind, and just under 40% are engaged in wave and tidal energy. These figures imply that many firms in the sector are diversified (and more so than in 2010), operating in multiple technology areas. There are, perhaps unsurprisingly, substantial overlaps between the wind technologies, with more than half of firms in engaged in onshore wind also engaged in offshore wind, and vice versa. There are also substantial overlaps between offshore wind and marine energy, though fewer companies are likely to be involved in a combination of onshore wind and marine energy.

The proportion of firms engaged in all activities has increased since the 2010 survey, suggesting that firms have become more vertically integrated as the sector has matured: the typical firm operates in more activity types than it would have back in 2010, reflecting the changing needs of the sector. Site planning and development remains a dominant activity among firms in the sector (particularly in onshore wind), but the latest survey does begin to show a shift in emphasis towards activities further along the lifecycle as deployment increases. In particular, a much greater proportion of employers are now engaged in installation and maintenance activities than was the case in 2010. A high proportion of employers are engaged in both construction/installation and operations/maintenance. Many of those are also engaged in planning/development and manufacturing, though the degree of overlap is somewhat lower.

A high proportion of employers are small businesses; over half of all employers in the sector employ fewer than 25 people, and 84% of employers have 250 employees or fewer. There has been a small increase in the representation of large firms in the sector since 2010.

The occupational profile of the wind and marine energy sector is skewed towards relatively higher-skill occupations than the UK economy as a whole, with a higher proportion of jobs in management and technical and professional occupations reported. Within the industry, there is a relatively high proportion of people working in skilled trade occupations in the offshore sector, while the large- and medium-scale onshore wind sector and maritime sector have a relative dependency on professional and associate professional occupations.

The industry is increasingly experiencing the problem of hard-to-fill vacancies, with around a third of firms reporting they had such a vacancy during the past year. In 2010 only a quarter of firms reported the issue. Overall, there were 1,000 hard-to-fill vacancies in the previous year, representing around 8% of the workforce. The most common factor for not being able to fill a vacancy is reported to be a lack of skills, qualifications or experience for the job. Across all industries in the UK, a large proportion of hard-to-fill vacancies are in an occupation on which the wind and marine energy sector is particularly dependent. The sector is therefore in competition with many other sectors for people with the same skills.

Just over 20% of the wind and marine
energy workforce is female. This is similar to the power sector as a whole but below the UK average, with women particularly under-represented in management occupations. However, compared to the power sector as a whole, the wind and marine energy sector has been more successful in employing women in technical and professional occupations, with over a quarter of the jobs in this category held by women. The wind and marine energy sector also does somewhat better than the power-sector average for employing women in skilled trades. Overall, there remains a need for more effort to attract women into the sector and to provide opportunities across the range of available careers.

5. A degree of caution is advised when drawing comparisons with other sectors of the economy, because the wind and marine energy survey undertaken for this study is survey of employers, whereas the existing surveys for other sectors are of individuals (employees).
4. Future Employment by Technology

4.1 Large-scale onshore wind

Recent developments

Large-scale onshore wind schemes are those with turbines over 500kW in size. They account for the vast majority of current installed onshore wind capacity. Since 2010, installed capacity has increased by 2GW. Schemes that have started operating recently include the 144MW site at Fallago and the 53MW in Ballie, both in Scotland, while work is currently underway on constructing arrays such as the 66MW Berryburn site in Scotland. Development of onshore wind farms overall has continued apace over the last three years, and there is the potential for further strong growth in capacity in the future. Among the schemes to gain consent recently are the 76MW scheme at Strathy North, the 177MW Dorenell project, the 370.8MW Viking Wind Project (all in Scotland), and the 228MW Pen Y Cymoedd site in South Wales.

Current employment

From the survey it is estimated that employment in large-scale onshore wind stands at 6,609 FTE, an increase of 600 FTE since 2010. Of these 6,609 FTE jobs, 1,328 FTE jobs are in construction and installation. Operation and maintenance activities employ 1,038 FTE, and 645 FTE are engaged directly in manufacturing or manufacturing design.

Future prospects

Overview

Three scenarios have been modelled, with the following outcomes:

- High deployment scenario: 16.95GW capacity in 2023; 4,740 direct FTE, 3,302 indirect FTE
- Medium deployment scenario: 15.2GW capacity in 2023; 6,515 direct FTE, 4,489 indirect FTE
- Low deployment scenario: 11.55GW capacity in 2023; 4,470 direct FTE, 3,054 indirect FTE

Key assumptions made in each scenario relate to the extent to which the UK also provides goods and services to supply large onshore deployment elsewhere in Europe. In the high scenario, the UK is projected to be able to contribute to the development of some 17GW of cumulative capacity elsewhere in Europe by 2023 (2–3GW a year beyond 2020). This is approximately the same total capacity as that anticipated to be installed in the UK by 2023. UK supply to overseas markets is much lower in the medium and low scenarios, amounting to 2,100MW and 850MW respectively, with correspondingly lower annual
rates of deployment (100-150MW in the medium scenario and almost no growth in the low scenario over the entire period).

These scenarios are less optimistic about the future level of installed capacity than the earlier 2010-based scenarios due to ongoing policy and political uncertainty in a number of areas. These previous scenarios had a range for installed capacity in 2020 of 10–16GW, supporting employment of between 6,500 and 11,900 FTE. In comparison, the current scenarios have capacity in 2020 ranging from 10.2GW–14.2GW.

These revisions to the scenarios reflect greater policy uncertainty than was felt previously, with the implications for the UK onshore wind industry dependent on forthcoming policies (such as the Electricity Market Reform) as well as on the longer-term consequences of recently concluded policy debates, such as those on Renewables Obligation (RO) banding levels and national planning reforms. These recent and forthcoming legislative and policy changes will affect industry confidence and, in turn, future deployment. The management of the industry’s transition from the RO to Contracts for Difference (CFDs), for example, and the scale of future political ambition, will have a significant bearing on the growth trajectory of the sector.
High scenario for large-scale onshore wind (16.95GW capacity in 2023; 8,596 direct FTE)

This scenario is one in which installed capacity rises from its current level of 5.5GW to 16.95GW in 2023. Compared to the previous study, the optimism of the high deployment scenario has been scaled back, with projections for 15.2GW of installed capacity in 2021 (from 16GW previously, a reduction of 5%), and deployment continuing at the current rate of about 1GW/year rather than increasing. Higher deployment is possible, however, as this scenario is achievable with the current project pipeline and delivery capability, coupled with consistent policy support. The growth in installed capacity is stronger in the earlier part of the period in this scenario, with annual increases in capacity of 1.1–1.2GW, after which they slow. Looking further out, the annual increase in installed capacity continues to slow in this scenario. While policy support is assumed to be high, limits on the rate of deployment arise as the number of suitable sites falls. As time goes on, deployment activity will be bolstered by the repowering of sites, but by 2023 this will not be a large effect.

Figure 4.4 illustrates the outcome for the high scenario for large-scale onshore wind.

The effect of the slowdown in new capacity being installed over the second half of the period lowers the number of jobs associated with planning and development during this period, as well as the number of construction and installation jobs. Planning and development activities made up around 30% of employment in 2013, and construction and installation jobs a further 20%. By 2023, they each account for about 10% of direct employment in this scenario.

At the same time, the number of operation and maintenance jobs rises through the period as the requirement to service the additional capacity exceeds the efficiency effects. By 2023 employment in operation and maintenance activities reaches 2,844 FTE, up from just over 1,038 at present.

The shift in the composition of jobs away from planning and other pre-operations activities and towards operations, maintenance and support represents a shift away from contracted jobs and towards permanent jobs.

Permanent jobs relate to longer-lasting elements of the asset lifecycle and remain for as long as the corresponding capacity is in place, rising steadily through to 2023. In contrast, there is only a demand for contracted jobs in the year that a particular activity is required (the work is not repeatable in the way a permanent job is). In that sense, the increase in operations and maintenance jobs both offsets the reduction in planning and development jobs and also marks a longer-term shift towards more permanent job roles.

Demand for manufacturing and manufacturing design activities is influenced by the rate of deployment of the technology in the UK and overseas (and included in the ‘contracted’ classification in Figure 4.5). In 2023 employment in the activity is almost double current levels, at 1,177 FTE. Employment levels might turn out higher a few years earlier, depending on the profile of the capacity increases.

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6. The majority of these jobs will relate to new build, with a comparatively small number associated with repowering activities. Employment opportunities in repowering are likely to become more important in the mid-2020s onwards (i.e. beyond the horizon of this current study).
Medium deployment scenario
(15.2GW capacity in 2023; 6,515 direct FTE)

For the medium deployment scenario, large-scale onshore wind capacity increases to just over 15GW in 2023. This means capacity in 2023 is 10% lower than in the high deployment scenario. The scenario assumes a marked slowdown in additional capacity for several years after 2015, due to posited uncertainty regarding future support for this technology, but also projects that the rate of new deployment will increase again in the latter half of the period at something like the rate seen recently as Government focuses on the need to meet its 2020 targets and recognises the low-cost nature of onshore wind up to that point and beyond.

Figure 4.6 shows that in this scenario direct employment is lower in 2023 than is currently the case. Employment does rise from current levels during the period, with a peak of 7,548 jobs in 2019.

The main factor behind the fall in employment projected over the latter part of the period in this scenario is the lower level of people employed in planning and development. This reflects both a decrease in the rate of deployment in the long-term (lower planning activity) but also economies of scale as learning rates increase (entailing fewer planners per MW).

The number of jobs in construction and installation fluctuate through the period alongside the profile for annual increases in installed capacity. Employment in 2023 is forecast at about half what it is now, at 706 jobs.

In contrast, the number of jobs in operation and maintenance and other support activities increases through to 2023 in this scenario, despite efficiencies achieved though learning effects as overall capacity increases. As Figure 4.7 shows, these ‘longer-term’ jobs related to the operational phase of the asset’s lifecycle almost double, going from 2,703 at the start of 2013 to 4,936 by 2023.
Low deployment scenario (11.55GW capacity in 2023; 4,740 direct FTE)

In this scenario the deployment of large onshore wind reaches 11.5GW by 2023. The scenario sees a sharp slow-down in the rate of deployment from that seen recently, to 300–700 MW.

As Figure 4.8 shows, overall direct employment in the sector is generally on a downward trend through to 2023, though there is a modest pickup in employment in the middle of the period. By 2023, employment is projected to be some 1,800 lower than current levels, and almost half that estimated in the high-deployment scenario, though we do see a rise in the number of permanent jobs from current levels, as explained below.

The slowdown in deployment in this scenario impacts on those engaged in manufacturing and designing equipment. Their number could fall to a few hundred (alongside a drop in the value of demand).

As in the other deployment scenarios, the lower number of jobs is associated with planning and development and construction and installation. The number of jobs in operations and maintenance and other business support activities rise. With lower capacity than in the other scenarios, the sector is not able to realise the same level of learning efficiencies. As a result, operations and maintenance jobs per MW installed are higher than in the high or medium deployment scenarios, but direct employment is lower.
4.2 Medium-scale onshore wind

Recent developments

The Medium-scale onshore wind sector covers turbines between 100kW and 500kW in size. It is a relatively new segment of the market and currently accounts for just 16MW of installed capacity. Although comparatively small in scale, this segment of the market is expected to grow very quickly, even under the least optimistic assumptions. Medium turbines are predominantly designed for the agricultural sector and provide generation for on-site use. A typical unit is 30m to hub height and 37m to tip height. Common developments consist of a single turbine, although more commercial developments (for export only) often comprise two or three turbines. Due to the 100kW to 500kW Feed-in Tariff bracket, this segment of the market represents a valuable opportunity for the wind industry.

Current employment

From the survey it is estimated that employment in medium-scale wind stands at 838 FTE. Of these, almost a third of jobs are engaged in site planning or development activities and a further quarter in construction and installation. In this respect, the structure of the medium-scale onshore wind sector resembles closely that of large-scale onshore wind. However, a larger proportion of jobs are in manufacturing or manufacturing design and a lower proportion are in supporting services than for the large-scale wind sector.

Future prospects

Overview

Three scenarios have been modelled with the following outcomes:

- High deployment scenario: 506MW capacity in 2023; 6,065 direct FTE; 2,675 indirect FTE
- Medium deployment scenario:
369MW capacity in 2023; 4,478 direct FTE, 1,901 indirect FTE
• Low deployment scenario: 122MW capacity in 2023; 1,451 direct FTE, 502 indirect FTE

The number of direct jobs increases in each scenario, with the majority of the increase occurring among those in operation and maintenance and business support services. The very large increases in capacity in each of the scenarios offers the opportunity for significant gains in efficiency of manufacture and operations as the sector matures. The number of jobs in manufacturing, construction and installation, and planning and development are determined by the profile for new capacity being installed. In the low-deployment scenario, with very little change in installed capacity after 2015, the number of people employed in these activities drops sharply.

For medium onshore wind, all employment relates to UK deployment of this technology: there is no presumption that the UK is able to extend its reach overseas in terms of manufactured components for export.
High deployment scenario for medium-scale onshore wind (506MW capacity in 2023; 6,065 direct FTE)

This scenario is based on this sector receiving strong and consistent policy support, including financial support from the small-scale Feed-In Tariff and appropriate planning policy. Such support allows the cost of this technology to fall substantially due to economies of scale and learning effects. Capacity rises from its current level of just 16 MW to 506MW in 2023. The rate of increase is relatively steady over the period, at about 50-55MW pa.

The steady growth in installed capacity to 2023 means that the number of jobs in planning and development and construction remain at or around their current levels over the period. The pace at which additional capacity is installed also influences demand for capital equipment manufacturers and those designing new systems. It is not thought likely that UK manufactures will be able to secure a notable share of the global market for medium-scale wind technologies. Given this, the relatively steady pace by which new capacity is introduced does not offer much opportunity for higher employment among capital equipment manufacturers in the long-term.

In sharp contrast, there is strong growth in the number of jobs in operations and maintenance and other business support functions. By 2023 as many as 2,756 FTE could be engaged in operations and maintenance, and a further 2,068 in supporting roles.
Medium deployment scenario
for medium-scale onshore wind
(369MW capacity in 2023; 4,478
direct FTE, 1,901 indirect FTE)

For the medium deployment scenario, medium-scale onshore wind capacity increases to 369MW in 2023. This is some 30% lower than in the high deployment scenario. In the short term the increase in capacity is broadly similar to that in the high deployment scenario, but the pace of change slows sharply after 2015, to average just 30 MW pa. Therefore, somewhere close to twice the level of current installed capacity is being added every year in this scenario.

The slowdown in the scale of additional capacity from 2015 means that the number of jobs in activities related to new build drops at this point, but then remains stable. In 2023 there are projected to be 236 jobs in construction and installation (compared to 196 currently) and slightly fewer in planning and development.

With the still substantial increase in additional capacity over the period, the main area of jobs growth is expected to be in operations and maintenance and other business support activities. By 2023 employment in these job roles could reach 2,079 and 1,546 FTE respectively.

As Figure 4.16 clearly shows, these more permanent jobs related to the running of the facilities, rather than the more short-term jobs related to planning and construction, will soon make up the majority of the sector’s employment.
Low deployment scenario for medium-scale onshore wind (122MW capacity in 2023; 1,451 direct FTE, 502 indirect FTE)

In this scenario capacity increases from 16MW currently to 122MW in 2023. Although this is substantial growth, capacity in 2023 is just a third of that in the medium deployment scenario and a quarter of than in the high deployment scenario. The scenario sees relatively strong increases in capacity for the first few years (20–30MW pa), with a sharp slowdown thereafter and very little additional capacity added annually after 2017. This can be viewed as a scenario in which the industry works through the permissions that it already has but the planning system will not accommodate any further development.

The effect of no further capacity being added at the end of the period, rather than just a slow-down in the increase seen in the more optimistic scenarios, is to accentuate the underlying trends in the other scenarios.

In this scenario, the number of jobs in construction and installation and planning and development initially rise, alongside the rising level of capacity installed each year. However, as additional capacity falls back and all but ceases, there is no call for these early-stage activities and employment drops sharply. Manufacturing activity in the form of constructing the capital equipment similarly disappears.

The number of jobs in operation and maintenance and business support initially rises in this scenario, but there is little prospect of growth in the long term without further increases in overall installed capacity.

Figure 4.17: Direct Employment in Medium Onshore Activities, Low Growth Scenario

Figure 4.18: Permanent and Contracted Jobs in Medium Onshore Activities, Low Growth Scenario
4.3 Small-scale onshore wind

Recent developments

The Feed-in Tariff scheme was introduced in 2010 and has proved to be a significant stimulus for growth in the small-scale wind sector (which consists of turbines of less than 100kW in size). At present, it is estimated that there is 86MW of installed capacity in the UK, some five times more than is currently provided by medium-scale schemes.

An amendment to the Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2011 saw the addition of small wind turbines under permitted development. In principle this should have made it easier for domestic users to install small wind turbines. However, the unrealistic size restrictions imposed in the permitted development criteria have unfortunately meant that the amendment has had no impact on deployment. Despite this, rejection rates for small-scale wind schemes are running at less than 15%. Alongside advantageous Feed-in Tariff rates, this has resulted in an increased deployment of small wind turbines over the last two years. Nevertheless, predictions for the future of the small-scale market are made difficult by the decrease in Feed-in Tariff support since December 2012. This has the potential to harm future employment rates in the sector, and will need to be closely monitored.

Current employment

From the survey it is estimated that the small-scale onshore wind sector employs 2,464 FTE directly, a four-fold increase from 590 FTEs in 2010. Of these, almost a third of jobs are engaged in site planning or development activities, and a further quarter in construction and installation. Similar numbers are employed in each of operation and maintenance, manufacturing or manufacturing design, and supporting services. The proportion of manufacturing roles is relatively higher than for large-scale onshore wind owing to a greater emphasis on indigenous manufacturing in this technology.
Future prospects

Overview

Three scenarios have been modelled, with the following outcomes:

- High deployment scenario: 821 MW capacity in 2023; 8,408 direct FTE; 4,955 indirect FTE
- Medium deployment scenario: 370 MW capacity in 2023; 4,326 direct FTE; 2,304 indirect FTE
- Low deployment scenario: 232 MW capacity in 2023; 2,240 direct FTE; 962 indirect FTE

The three scenarios cover a wide range of potential employment outcomes, with direct employment increasing by almost 6,000 FTEs by 2023 in the high-deployment scenario, compared to a modest fall in employment in the low deployment scenario even though the amount of installed capacity increases greatly. In this way, the sector’s prospects are similar to those of the large-scale onshore wind sector.

The modest fall in direct employment in the low-deployment scenario is due to the sharp fall in employment in activities at the start of a scheme’s lifecycle such as planning and development as a result of what is effectively a halt in new capacity being commissioned. The medium and high deployment scenarios both assume a steady increase in new capacity throughout the period and this supports jobs in construction, planning and the manufacture of equipment.

In all three scenarios the number of jobs associated with the running of sites and associated business activities rises sharply.

In addition to the growth in UK deployment, the scenarios also incorporate alternative trajectories for export opportunities to the rest of the world. These opportunities generate additional sales for the manufacturing sector, in addition to the role it plays in delivering new capacity in the UK itself.

- In the high scenario, the export opportunities are substantial, at more than twice the size of total UK deployment in 2023 (around 2,000MW).
- In the medium scenario, the UK is able to supply the equivalent of 1,600MW of components, roughly four times the UK deployment in 2023.
- In the low scenario, the UK supplies components to support the overseas deployment of around 500MW (just over twice the UK deployment in 2023).
High deployment scenario for small-scale onshore wind (821MW capacity in 2023; 8,408 direct FTE)

This scenario sees capacity increase from the current level of 86 MW to 821 MW in 2023. It is based on the small-scale wind sector receiving strong policy support through effective planning and the small-scale FIT. This allows many individuals and small businesses to benefit from owning such devices, which further increases demand for turbines through a virtuous cycle.

The growth in capacity is faster over the first half of the period, when annual increases average 80–90MW (equivalent to current capacity). The pace of increase then slows after 2017 to about half this rate in this scenario.

Employment in the sector is expected to peak in 2017 at 8,649 FTE before falling back as the rate of new capacity slows and recovering slightly again towards the end of the forecast.

The early growth in employment is due to an increase in planning and manufacturing and associated design activities. Both activities benefit from the initial pickup in the rate of new capacity. In addition, UK manufacturers are also expected to secure a share of the strongly expanding international market, which in this scenario grows much faster than the domestic market.

The long-term growth in the international market will sustain employment in the providers of the capital equipment when the pace of growth in the UK slows after 2017. The activity makes an important contribution to overall employment in the sector in the long term as jobs in planning and development and construction and installation activities fall back. By 2023 employment in manufacturing could account for a third of all direct jobs in the sector.

In this scenario, the number of jobs associated with operating and maintaining small schemes and supporting business functions (i.e. sustained jobs) rises steadily through to 2023 alongside the increase in overall capacity. In 2023, employment in these activities could reach 2,106 and 1,631 FTEs respectively.
Medium deployment scenario for small-scale onshore wind (370MW capacity in 2023; 4,326 direct FTE)

In this scenario capacity increases from the current level of 86 MW to 370 MW in 2023, less than half the level of the high deployment scenario. This reflects less-consistent policy support and overall lower demand for ‘grow-your-own' power.

The underlying trend in installed capacity is relatively steady through the period, with annual increases of around 25MW. Looking further out, the annual increase in capacity is expected to drop by about 50% over the following decade.

A steady increase in installed capacity in this scenario means that there is a fairly stable demand for planning and development activities, and construction and installation functions in particular, throughout the period. Post-2023, slower increases in capacity will begin to put downward pressure on planning and development jobs at the end of the forecast.

Manufacturing and associated design activities are also supported by the steady increase in capacity being installed. Firms engaged in these activities should also benefit from a growing overseas market. Growth in the international market is still expected to be rapid, but to be much weaker than in the high-deployment scenario. Overall, employment in manufacturing activities could reach 1,219 by 2023 in this scenario.

Employment in operations and maintenance and business support services rises through the forecast period at a relatively steady rate as the upward pressure on jobs from much higher levels of capacity exceeds the efficiencies from learning as the technology matures. By 2023, employment in these two activities reaches 1,144 and 875 FTE respectively. This is about 45% of the level reached in the high deployment scenario.
Low deployment scenario for small-scale onshore wind (232MW capacity in 2023; 2,240 direct FTE)

The low deployment scenario sees installed capacity increase from the current level of 86 MW to 232 MW in 2023, about 40% below the medium deployment scenario and 70% below the high deployment scenario. The scenario represents a failure to support this technology and its potential for future cost reduction as deployment increases, as has happened with other small-scale technologies, with no consideration of the wider benefits.

The underlying profile for capacity is a relatively steady increase through to 2023, of around 10MW pa. The rate of increase post-2023 then falls back, as it does in the other scenarios for this sector, and this will have a downward pressure on planning and development activities at the end of the forecast period.

Overall, direct employment in 2023 is estimated at 2,240 FTE, around 200 jobs lower than current levels. Compared to either the high or medium deployment scenarios, a key factor behind this outcome is the forecasted fall in the number of manufacturing jobs. This results both from small annual increases in capacity (and hence lower demand for capital equipment) and weak growth in international demand being insufficient to overcome the underlying efficiency gains that can be achieved in manufacturing.

Employment in operations and maintenance and business support activities increases through the period in this scenario, and could account for 814 and 593 FTE respectively in 2023. This is only 40% of the jobs that the high deployment scenario would support in these activities. The increasing importance of these more “sustained” jobs over those supported by the provision of new capacity is clearly shown in Figure 4.27 below.
4.4 Offshore wind

Recent developments

Since 2010, installed capacity in offshore wind has grown from around 1.3GW to over 3.5GW by mid-2013. In the first six months of 2013 alone around 1GW of capacity became operational, including notable projects such as the London Array, the world’s biggest offshore wind farm, and Greater Gabbard, off the coast of East Anglia. In addition, there are now around 17GW of projects in construction, with planning consent and in planning. The capacity in the immediate pipeline is expected to pass 20GW as Round 3 projects in development continue to submit planning applications over the next two to three years.

Current employment

From the latest survey, employment in offshore wind has more than doubled since the 2011 study, from 3,100 FTEs to more than 6,830 FTEs. Of those 6,830 FTEs, 2,503 (36%) are engaged in construction and installation; this is double the employment seen in 2010. Employment in operations and maintenance has more than doubled since 2010, to around 1,225 FTEs. The other major activity in this sector relates to site planning and development, in which employment has almost tripled (from an estimated 450 FTEs in 2010 to 1,276 now) ahead of the construction of the Round 3 wind farms. Manufacturing and manufacturing design accounts for a further 10% of employment and the remaining 17% is in specialised transport and other support services (see Figure 4.28).

Future prospects

Overview

Three scenarios have been modelled, with the following outcomes:

- High deployment scenario: 26.7GW capacity in 2023; 23,465 direct FTE, 21,188 indirect FTE;
- Medium deployment scenario: 14.6GW capacity in 2023; 9,853 direct FTE, 6,566 indirect FTE;
- Low deployment scenario: 10GW capacity in 2023; 6,565 direct FTE, 4,073 indirect FTE.

The medium scenario represents a lower rate of deployment than the medium scenario from the previous 2011 study. The reason for this medium scenario being chosen is that it is closer to some scenarios discussed elsewhere’ and is consistent with policy support being weaker and less consistent than in the high deployment case. The high deployment scenario remains fully feasible.

The lower level of optimism reflected in all three scenarios is due to continued uncertainty (as expressed by the industry) regarding the effects of the levy control framework cap, particularly on the availability of offshore wind contracts during any future allocation process, as well as uncertainty as to the effect of proposed strike price regression on project viability post-2017.

The size of the opportunity for UK export of components to support new build elsewhere in Europe varies from as much as 9.7GW in the high scenario to as little as 1.3GW in the low scenario. In the high scenario, it is also anticipated

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that the UK will be able to meet more of its supply-chain requirements domestically, with the share growing from 37% now to 55% by 2023. In the medium scenario, this share rises to 40%, while in the low scenario, the share is unchanged.

In all scenarios, offshore wind is the largest source of potential employment in the entire wind and marine energy sector, reflecting its importance in the transition to a low-carbon UK economy. Figure 4.29 shows that the employment potential is greatest in the high scenario, with the potential for 23,465 FTE jobs in 2023, reflecting a sustained commitment to offshore wind and, as a result, continued employment in development and construction activities. This would constitute almost half the potential employment across all wind and marine energy sectors.

Growth prospects are more modest in the medium and low scenarios, with employment more ‘long-term’ in nature, to support the capacity now in the system. These longer-term jobs generate relatively fewer indirect jobs in the rest of the economy compared to the sustained employment in planning, manufacturing and construction in the high scenario (hence the much higher ratio of indirect to direct employment).

In the low scenario, direct employment in offshore wind in 2023 is projected to be slightly lower than it is now, although many more of those jobs will be ‘permanent’ in nature, to operate and maintain the installed capacity. In contrast, much more of the current employment is temporary in nature, to build new capacity. In the medium case, employment would increase by around 50% over the next ten years, to 9,853 by 2023.

As a result of greater policy uncertainty, the three scenarios represent a much lower level of optimism compared to that in the previous study, where, in the high scenario, 31GW was projected by 2021. The low scenario from the previous study was also more optimistic, at 13GW by 2021 (the new low scenario barely reaches 10GW by 2023).
**High scenario for offshore wind**
(26.7GW capacity in 2023; 23,465 direct FTE)

In the high scenario, offshore wind capacity grows steadily by around 1GW each year to 2016, before a more rapid growth of 2–3GW thereafter (see Figure 4.31). By 2023, offshore wind capacity is projected to stand at almost 27GW. This is feasible given the amount of projects currently in planning and the known plans of turbine manufacturers and other supply chain players.

This acceleration in deployment gives rise to the employment profile shown in Figure 4.31, which shows steady employment growth followed by a sizeable increase in employment. This increase begins before the actual deployment of new capacity because of the requirement for planning, manufacturing and construction jobs. Employment in these activities persists over the entire period due to the expected continued UK commitment to offshore wind. These contracted jobs account for almost half of the total employment projected by 2023 (this compares to a share of about two-thirds at present).

Permanent employment also increases to 2023, to 12,795, to support the new capacity brought online. As already mentioned, there is a mild shift towards more permanent jobs over time (see Figure 4.32).

In the high scenario, the UK is expected to supply a substantial proportion of the EU market for offshore wind components, and there is expected to be an increase in the proportion of the supply chain located in the UK. This helps to drive continued employment in design and manufacturing activities from less than 671 at present to over 3,196 by 2023 in this scenario.
Medium deployment scenario (14.6GW capacity in 2023; 9,853 direct FTE)

The medium deployment scenario for offshore wind is characterised by slow, steady growth of 500–1,000MW to 2017, before a burst of higher growth (1–2GW each year) to 2021. The rate of growth steadies to around 500MW each year thereafter. This is consistent with a number of scenarios that have been placed in the public domain, although industry argues that the actual level of deployment could far outstrip this. By 2023, there are 14.6GW of installed capacity in the UK in this scenario. Figure 4.33 and Figure 4.34 show that capacity under this scenario generates a temporary increase in employment around 2018 to support the installation of new capacity (through contracted jobs). At this peak, total employment reaches 11,967 FTEs.

Lower deployment later in the period reduces the requirement for contracted jobs in planning, manufacturing and construction. The employment of 9,853 FTEs by 2023 is dominated by permanent jobs to operate and maintain the installed capacity. This is around 50% higher than current employment. By 2023, there is also a much higher share of permanent jobs compared to now.

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Low deployment scenario (10GW capacity in 2023; 6,565 direct FTE)

In the low scenario, deployment of offshore wind is steady but slow, at 400–600MW each year from 2015 onwards. By 2023, capacity is just under 10GW (little more than three times total installed capacity at the end of 2012). In this scenario, lower levels of deployment (at the most cost-effective sites only) limit the opportunity to establish an industrial base producing the equipment in the UK, creating a corresponding opportunity elsewhere in the world.

In this scenario, employment in 2023 is actually slightly below the current level, although much more of it is concentrated in permanent, rather than temporary, activities (see Figure 4.35 and Figure 4.36).

By 2023, employment in offshore wind in the low scenario is projected to be 6,565 FTEs (compared to 6,830 now). Of those 6,565 FTEs, four-fifths are in permanent offshore activities, compared to one third at present.
4.5 Marine

Recent developments

The wave and tidal stream (marine) energy industry has reached an important phase in its development as the first small arrays are now being developed and commissioned. Technology development has progressed quickly in the past year – there is now almost 10MW of wave and tidal stream energy installed in the UK, compared to 2.4MW in 2010, with 12 large-scale prototype devices now operating or having been commissioned in the last year. Current levels of UK deployment exceed the combined deployment in the rest of the world, and strong partnerships between major engineering firms and utilities are well established.

The 40MW Aquamarine Power Wave Farm off the Isle of Lewis now has full consent. This is a significant milestone for the industry as it is the largest marine-energy project ever to be consented. Scottish Power Renewables’ Islay project received consent for 10MW of tidal turbines and was awarded New Entrants Reserve 300 funding from the European Commission. In addition to this, funding for the Marine Energy Array Demonstrator has been awarded to two of the world’s leading array projects: MeyGen in the Pentland Firth and Marine Current Turbine’s Skerries project off the coast of Anglesey were awarded £10m each to develop the first array projects.

Current employment

Employment in marine power has more than doubled since the last Working for a Green Britain study, standing at 1,724 FTEs compared to the 800 FTEs recorded in 2010.

Employment has increased in all activities:

- Site planning and development has tripled, to 459 FTEs;
- Construction and installation employment, at 347 FTEs, is 2.5 times larger than previously;
- Operation and maintenance has almost quadrupled, to 273 FTEs.

Growth in design and manufacturing has been more modest, increasing by 50% to 325 FTEs.

Activities directly relating to deployment of marine devices account for 66% of employment in the sector, with a further 16% working in operation and maintenance (see Figure 4.37).

Future prospects

Overview

Three scenarios have been modelled, with the following outcomes:

- High deployment scenario: 676MW capacity in 2023; 9,148 direct FTE, 13,873 indirect FTE;
- Medium deployment scenario: 328MW capacity in 2023; 5,631 direct FTE, 6,476 indirect FTE;
- Low deployment scenario: 56MW capacity in 2023; 1,447 direct FTE, 649 indirect FTE.

The wave and tidal energy industry has developed significantly in 2013, and the UK now has more full-scale marine energy devices installed than the rest of the world combined, with the potential for much greater levels of deployment in the coming years. However, the scenarios in this study reflect lower expectations about future build compared to the 2011 study. This is in line with concerns among the wind technologies regarding policy uncertainty, but also reflects the high transmission charges faced by marine technologies and a more cautious consenting regime. The new scenarios illustrate the extent to which the early development of the sector is still closely
tied to government support in order to realise longer-term competitive gains once the industry has matured and can stand on its own.

All scenarios project high growth in marine deployment compared to the low levels of capacity deployed now, but also predict a shift in the sector, from its current nascent form (with a heavy emphasis on R&D) to more generalised manufacturing, construction and operation techniques as the technologies mature. In all scenarios, this will be accompanied by some degree of outsourcing, such that the proportion of the supply chain located in the UK will fall from 100% now to around 70% by 2023.

The scenarios diverge due to different assumptions about the level and consistency of Government support for this emerging industry. In the high scenario, the opportunity to establish the UK as the premier country for marine energy is recognised, and therefore deployment of generation capacity is maximised and the supply chain fully supported. In the medium scenario, more tentative support is given due to limits being imposed on the amounts that consumers are expected to pay and taxpayers contribute, leading to growth, but with the UK less distinctly the world leader. The low scenario posits that initial arrays are supported, but with a sharp Government focus on value for money, the cost reduction pathway is deemed too shallow and the industrial opportunity not large enough to justify support, which is withdrawn, halting deployment in 2018.

As a world leader in marine technologies, in each scenario the UK supplies a substantial proportion of manufactured components to the rest of Europe, to support European deployment of renewables technologies (although this still pales in comparison to the potential UK deployment):

- High: 160MW;
- Medium: 100MW;
- Low: 45MW.

This difference in export capability across scenarios is a reflection of:

- Diminished UK-export opportunities in the low case, where policy support to help develop the technology is weak, leading to a lower rate of development in the sector and less opportunity for the UK to consolidate its expertise and market position;
- Stronger policy support to develop the UK’s position as the market leader in marine energy, with correspondingly stronger demand for UK knowhow and its manufacturing base.

Export opportunities in the higher-deployment scenarios increase at slower rates than UK deployment owing to the somewhat lower potential for marine energy elsewhere in Europe compared to the UK.

Figure 4.38 shows that in the low scenario, marine employment would be slightly lower than it is now (1,447 FTEs compared to 1,724 now). There is much greater employment potential in the medium (a three-fold increase by 2023) and high scenarios (a five-fold increase).

In contrast to the previous study, the current projections are much more cautious about the rate of deployment of UK marine energy: 50–700MW by 2023 compared to 1,300MW by 2021 in the lowest scenario last time, and 2,000MW in the highest case.
High scenario for marine energy (676MW capacity in 2023; 9,148 direct FTE)

In the high scenario, UK marine deployment grows substantially, from around 12MW of capacity now to almost 700MW by 2023, with faster growth from 2019 onwards (more than 50MW each year) as the technology becomes more widespread. Accelerating deployment in this scenario leads to strong growth in design and manufacturing (from 325 FTEs now to almost 2,917 by 2023). Design and manufacturing is the largest source of employment in 2023, followed by Operation and maintenance (1,931) and Construction and installation (1,080) (see Figure 4.40). This compares, in all three cases, to current employment of less than 350.

In terms of the split between permanent and contracted jobs, around one-third of current employment in the sector is permanent in nature while, by 2023 that share is projected to grow to 50% (see Figure 4.41).
Medium deployment scenario (328MW capacity in 2023; 5,631 direct FTE)

The medium deployment scenario for marine energy projects a level of installed capacity that is around half that of the high scenario (328MW compared to 676MW). Slow growth is projected to 2020, followed by more rapid growth of 50–70MW in the remaining three years of the period.

Employment in marine energy in the medium scenario grows to 5,631 FTEs compared to the current level of 1,724.

The emphasis in this scenario is on employment in design and manufacturing (including export sales to other countries deploying marine energy systems) and operation and maintenance to support installed capacity in the UK (see Figure 4.42).

At 1,531 FTEs, employment in design and manufacturing is almost five times larger than current levels, with more of that employment in manufacturing rather than R&D-intensive design. There are projected to be 1,360 FTEs employed in operation and maintenance by 2023, to support the 328MW of capacity in place by that time. This is a substantially lower jobs-per-MW figure than currently, reflecting rapid increases in efficiency as the sector matures.

Employment in construction and installation almost doubles to 2023, from 347 FTEs now to 679.

As with the high scenario, the split of permanent to contracted jobs in 2023 is 50:50, compared to one-third of jobs relating to contracted activities at present (see Figure 4.43).
Low deployment scenario (56MW capacity in 2023; 1,447 direct FTE)

In the low scenario, marine deployment grows to just 56MW in 2023, compared to around 12MW now. Due to continuing uncertainty around levels of support, this is a substantially less optimistic outlook than any of the scenarios from the previous Working for a Green Britain study where, in the low case, capacity was projected to exceed 1GW by 2020. In this scenario, employment in 2023 will likely be lower than the levels seen now, although a much higher proportion of those jobs will be permanent in nature, to support operational capacity.

In the new low scenario, between 5MW and 10MW of new capacity is installed each year until 2018, at which point no new devices are deployed in the UK: there is no requirement for planning and development or construction and installation in the years that follow (see Figure 4.44).

After 2019, the number of permanent jobs in UK marine energy stabilises at 1,005 FTEs, while employment in design and manufacturing is sustained entirely by overseas markets for UK production (see Figure 4.45). In this scenario, by 2023, two-thirds of UK marine employment is permanent in nature, a reversal of the current situation.
5. Employment by Nation

The profile of employment by technology is similar in England and Scotland, with just over one-third of the direct jobs associated with large onshore activities.

In Wales, more than half of the sector’s employment is associated with large onshore schemes, while in Northern Ireland, the share is just over 40%. Onshore wind (at all scales) is by far the most important source of wind and marine employment in these two nations. This is followed by offshore wind (though not nearly to the same extent as in England or Scotland).

Onshore wind (at all scales) accounts for less than 60% of total wind and marine-sector employment in England and Scotland, owing to relatively higher diversity in the technology mix. By contrast, in Wales the share approaches 80%, and in Northern Ireland the share is closer to 70%.

Within onshore wind, small onshore is the next largest employer (10–20% of total employment in each nation) while medium-scale onshore wind remains relatively undeveloped, at less than 10% of wind and marine employment in each nation. As a proportion, the latest survey suggests that medium-scale onshore wind is somewhat more prevalent in Northern Ireland than in the other nations, although the technology remains underdeveloped when compared to other forms of wind and marine energy.

The share of employment accounted for by marine technologies is, unsurprisingly, highest in Scotland, where over 15% of wind and marine energy sector employment is marine-specific. In England the share is somewhat lower, at 9%. Currently, marine technologies have a limited presence in Wales and Northern Ireland, accounting for less than 4% of wind and marine energy employment in each of these nations.

Overall, employment in wind and marine energy accounts for a relatively higher share of total employment in Scotland than it does in the other three nations of the UK.

Of the employment classified as mobile, and thus not connected to any single nation (but still within Great Britain and Northern Ireland), most of the employment (almost 75%) is accounted for by offshore wind, followed by large onshore wind (just over 15%).
6. Other Characteristics of the Labour Market

This section draws on the detailed results from the company survey to examine other important labour market issues facing the sector.

6.1 Company structure

Figure 6.1 shows the structure of firms in the renewable sector as reported through the survey. It shows that most firms are engaged in the onshore wind sub-sector (around 70% of employers reported that they were engaged in this type of activity). The large onshore wind sector accounts for the most employers in the onshore sub-sector. Just over 60% of firms reported that they were engaged in the offshore sector, and just under 40% in the marine sector.

Compared to the 2010 survey, the latest survey suggests greater diversification in the wind and marine energy sector, with firms more likely to be engaged in multiple technologies compared to three years ago. The rise of offshore and marine technologies also means that, relatively speaking, onshore wind is not as dominant a technology as it once was. This explains the reduction in the proportion of employers involved in onshore wind, from 80% last time, to 70% now (although there has still been an overall increase in employment) and the increases in the share of employers engaged in:

- Offshore wind: 62% now compared to 41% in 2010;
- Marine energy: 39% now compared to 16% in 2010, a substantial increase in the proportion of firms in this technology segment.

This diversification is evident in Table 6.1, which shows the percentage of employers by broad technology that are involved in other technologies. For example, 53% of employers engaged in onshore wind are also involved in offshore wind. Table 6.1 also highlights a somewhat larger overlap between offshore wind and marine energy: 85% of employers engaged in marine energy are also engaged in offshore wind development.

The shift in emphasis away from onshore wind and towards a more balanced portfolio of wind and marine...
technologies has potential implications for skills requirements, as each sector engages in a slightly different mix of development activities.

Figure 6.2 shows the types of activity in which employers are engaged. It shows that the percentage of employers engaged in all activities has increased since 2010, suggesting that the sector has become more vertically integrated. In particular it shows that in percentage terms, a much greater share of employers are now engaged in installation and maintenance than in 2010. The data suggest that employers are likely to have become more diverse in the activities in which they engage compared to three years ago. The data clearly show that employers are involved in multiple activities (for example, of those engaged in manufacturing, 44% were also involved in construction activities, 64% in installation, 58% in maintenance, and 46% in operations).

Table 6.2 shows the distribution of employers by the types of activity in which they are engaged. It reveals that firms are engaged in multiple activities. Employers in the onshore sector are more likely to be engaged in site planning and development (55% of employers) compared with the offshore sector (37%) and the marine sector (44%). Other than this, there is relatively little variation in the data, except that the offshore and marine sub-sectors are more likely to be engaged in installation and maintenance.

Overall, around half of all employers in the renewable sector employ fewer than 25 people, and over 80% have 250 employees or less (84%). The percentage of larger employers operating in the industry has increased since 2010, with 16% of employers now reporting that they employed more than 250 employees compared to less than 10% in 2010.

In general, there is little variation in the size of firms engaged in onshore technologies, while employers in the offshore and marine sectors are likely to be larger (see Table 6.3).
6.2 Occupational structure

Respondents to the survey were asked how many people were employed in the following occupations:

- management jobs, which would typically require employees to be qualified to degree level or equivalent;
- technical professional jobs, such as professional engineers, which would typically require employees to be qualified to degree level or equivalent;
- skilled manual or technical jobs, where employees would typically be qualified through an advanced Apprenticeship or equivalent;
- semi-skilled or operative jobs, where employees would have a lower level of qualification than those discussed above;
- other employees, including administrative support staff.

Figure 6.3 shows the occupational structure of employment in the renewable sector, and reveals the relative dependence of the sector upon people working in professional and associate professional occupations. In general, the data reveals that the occupational profile of the new renewable sector is skewed towards more relatively high-skill occupations, especially in its reliance upon technician/professional jobs.

The occupational structure of employment varies according to the type of renewable energy in which the employer is engaged. The latest survey reveals:

- The relative dependency of large and medium onshore and marine employers on people working in professional and associate professional occupations;
- The relatively high share of people working in skilled trades occupations in the offshore sector;
- The relatively low percentage of people working in semi-skilled occupations across all types of technology.

Table 6.4 provides data on the occupational structure by the type of activity in which employers are engaged. The table shows that:

- Site planning, manufacturing/manufacturing design and support services have a relatively high demand for people working in technical/professional occupations; and
- Maintenance activities are relatively dependent upon people working in skilled trades jobs.
7. Labour market challenges

7.1 Hard-to-fill vacancies

Employers were asked if they had had any vacancies over the past 12 months which had proved hard to fill. Overall, 37% of employers had experienced hard-to-fill vacancies (HtFVs), compared with 26% in 2010 (see Table 7.1). On average, these employers each had just under six vacancies which had proved hard to fill (compared to 2.5 in 2010).

The industry has had around 1,000 hard-to-fill vacancies over the past year (equivalent to around 5.7% of all employment in the renewable sector). Of companies which had HtFVs, 77% of these (which is equivalent to 30% of all employers) had experienced HtFVs for technical professional staff. This is more or less the same as in 2010, when 30% of all employers reported that they had experienced difficulties recruiting technical/professional staff.

In general, when employers experienced HtFVs, most reported that these were due to applicants lacking the skills, qualifications, or experience to undertake the job. And where HtFVs arose, they were seen as being damaging to the business, especially in relation to increasing the workload on other employees, but also in losing business to competitors (see Figure 7.1).

The underlying causes of HtFVs in the industry could not be determined from the survey but, given the rapid growth of the industry, it would be reasonable to attribute them, at least in part, to a fast-growing skills demand continuing to outpace supply. In an industry characterised by many small firms, this puts forward a case for more targeted measures to improve skills provision.

The UK-wide Employers Skills Survey 2011 reported that overall, 31% of HtFVs in the economy were in professional/associate professional jobs, and 15%...
were in skilled trade occupations. The method used to calculate HtFVs in the Employers Skills Survey is different to that used in the renewable survey, but it does illustrate that a relatively large share of HtFVs in the economy as a whole – just under half – are in occupations upon which the renewable energy sector is particularly dependent. In other words, renewables is facing similar resource constraints to those faced by the economy generally, and is therefore in competition with many other sectors for the same skills.

7.2 Gender representation

Overall, around 20% of employment in the sector is accounted for by women, a similar figure to that of the oil and gas industry according to research conducted in 2009. This is also a similar proportion to the UK power sector in 2013. An indicative assessment has been made of the percentage of jobs filled by women in the economy as a whole and in the renewable sector, to show how the renewable sector differs from the overall economy (see Figure 7.2).

As can be seen, when compared to the economy as a whole, women appear to be relatively under-represented in management occupations, technical and professional occupations.

However, this is also the case for the UK power sector as a whole. Compared to the power sector average, the wind and marine sector has been more successful in attracting women to the sector in technical and professional-level jobs (26%, compared to 18%).

7.3 UK citizens

Overall, 91% of employment in the sector is accounted for by people who are UK citizens. This is similar to the UK economy-wide average. The proportion is 90% or more for all technologies, with small onshore wind reporting a somewhat higher percentage than the others (94%).
8. Conclusions

8.1 The sector today

The UK wind and marine energy sector has endured a difficult period, with a global economic downturn and an environment of greater policy uncertainty here in the UK (around Electricity Market Reform, in particular). Nevertheless, the sector has achieved substantial growth, with employment increasing by some 74% (7,886 jobs) between 2010 and 2013. In marked contrast to many other UK industries, the sector has also seen a near-trebling in turnover in that time.

The latest survey points to a more balanced technology mix than was the case in 2010, with particularly strong growth in offshore wind (a doubling to 6,830 jobs) and small onshore wind (2,464 jobs; four times the number in 2010). The emergence of medium-scale wind is also evident in the latest survey. The sector is maturing, and higher levels of installed capacity are reflected in a gradual shift away from early-stage activities like planning (though it remains extremely important) and towards construction and operations jobs (which account for around half of all employment). Employment growth in construction and installation has been particularly rapid, with 2,367 more jobs in 2013 than in 2010.

The sector is maturing, and higher levels of installed capacity are reflected in a gradual shift away from early-stage activities like planning (though it remains extremely important) and towards construction and operations jobs (which account for around half of all employment). Employment growth in construction and installation has been particularly rapid, with 2,367 more jobs in 2013 than in 2010.

The previous study highlighted the risks of Hard-to-Fill Vacancies (HtFVs) in the wind and marine energy sector, particularly for technical professional staff, an occupational type on which the sector is highly dependent. This is a more pressing issue for companies in 2013, increasing workloads for existing staff and reducing capacity, possibly at the cost of losing business to competitors. In the past year, we estimate there to have been in the region of 1,000 HtFVs. In a high-growth sector such as wind and marine energy, recruitment difficulties represent a significant challenge to maximising future growth.

The skillsets required in the wind and marine energy sector are similar to those demanded in other sectors of the economy. This highlights the need for a coherent strategy to promote the supply of highly skilled workers, but also illustrates the competition that the wind and marine energy sector faces in order to attract future talent.

Firms in the sector are, for the most part, SMEs: over half of employers have workforces of fewer than 25 people, and 84% have fewer than 250 employees. This, combined with the labour shortages in the sector, highlights the importance of carefully directed skills funding to support growth in the industry.

The sector generates substantial value (with estimated turnover of over £8bn) and, moreover, supports other sectors of the UK economy further up the supply chain, accounting for 15,908 ‘indirect’ jobs. In total, UK wind and marine energy supports 34,373 direct and indirect jobs.

8.2 Future prospects

This study also considers the future employment potential in the sector. Recent developments present a more challenging future outlook for the industry than was predicted in 2011, and the scenarios modelled are now more conservative, reflecting both greater policy uncertainty and a lower level of optimism within the sector. In particular, the higher deployment scenarios consider the constraints of the proposed levy control framework, while the lower deployment scenarios represent the implications of policy failure to support wind and marine energy (in contrast to the previous study’s projection of simply lower growth).

• In the high scenario, 55,683 direct jobs are projected by 2023, supporting a further 49,109 indirect jobs in the rest of the UK economy;
• In the medium scenario, there is the potential for 30,804 direct jobs and 21,736 indirect jobs;
• In the low scenario, there could be as many as 16,443 direct jobs and 9,488 indirect jobs.

This time around, it is the high scenario, rather than the medium one, that bears the closest resemblance to the current outlook for the industry.

Over time, the projections show a shift in emphasis away from activities that relate to the early stages of deployment, such as planning and development, and towards more operations- and maintenance-oriented functions. This is a feature of the future maturation of the industry and, crucially, also marks a transition to more permanent jobs, which are sustained by the requirement to supply renewable electricity, rather than jobs that depend on continued construction (and which are temporary in nature). In that context, more of the industry’s future jobs will be long-term, rather than short-term, in nature.

While the sector has delivered strong growth in these difficult years, policy support is critical to ensure that this continues apace in the coming decade.
Appendix

Key definitions

Technologies

The ‘wind and marine energy sector’ in this study refers to five technology types:

1. **Large-scale onshore wind**, consisting of wind turbines over 500kW in size;
2. **Medium-scale onshore wind**, consisting of wind turbines between 100kW and 500kW in size;
3. **Small-scale wind systems**, for wind turbines less than 100kW in size;
4. **Offshore wind**, covering wind turbines deployed in a marine environment;
5. **Marine energy**, for wave and tidal stream energy technologies.

Of the above, medium-scale onshore wind is now separately identified (whereas, previously, it was counted within large-scale onshore wind).

Types of employment

**Full-Time Equivalent (FTE) employment** is a measure of the number of employees in a firm or sector. Employees who regularly work more than 30 hours per week are counted as one FTE, while those that work part-time (less than 30 hours per week) are counted as half a FTE. This is in order to measure the ‘effective’ number of full-time employees. The implication is that one FTE may represent more than one ‘actual’ employee.

**Direct employment** covers employees who spend the majority of their working day on activities specific to wind or marine energy.

**Indirect employment** covers employees whose principal activity is not wind or marine energy-specific, but who work in sectors that supply goods and services to the wind and marine energy sector. In that sense their employment is indirectly supported by the UK wind and marine energy sector.

**Induced employment** comes about from direct and indirect employees spending (part of) their additional income on goods and services in the UK economy. This leads to further UK output and employment through (Keynesian) spending effects. Induced employment effects are usually more relevant at the local, rather than national or UK, level. They also include some element of double-counting (such that the total across all sectors would exceed UK output and employment). Moreover, the spending effects per unit of additional income are assumed to be common to all sectors: workers in the wind and marine energy sector are assumed to have the same spending patterns as workers in any other sector of the UK economy. In that sense, the induced effect is not distinctive to the sector. Thus, while the model does generate projections of induced employment (which would add to the direct and indirect jobs figures), they are not reported in this study.

Types of activity in the UK wind and marine energy sector

This study identifies the following activities within the UK wind and marine energy sector, covering the entire asset lifecycle of these sites:

- **Site planning and development** refers to all activities that relate to the planning and development of wind and marine energy sites;
- **Manufacturing and design** covers activities that relate directly to the design and manufacture of wind and marine energy components. It excludes the manufacture of generic components such as gearbox components (which would be classified as an indirect economic activity). This activity thus comprises:
  - Technology R&D;
  - Assembly and sale of complete devices (complete wind, tidal stream and wave power generation units);
  - Manufacture of specialist key components (such as nacelle covers and blades, rotor hubs and towers);
  - Manufacture and assembly of main units related to ‘balance of plant’ (foundations, substations, cables, etc).
- **Construction** refers to the construction of civil/maritime industry-specific components of wind/marine farms, including ‘balance of plant’ (but excluding general infrastructure, such as roads leading to sites);
- **Installation**, covering the installation of wind and marine energy devices and electrical components of device-specific ‘balance of plant’;
- **Operations and maintenance**, covering activities related to the operation and running of wind and marine sites, as well as servicing of devices on those sites, electrical components and ‘balance of plant’;
- **Specialist transport** covers transport activities that relate specifically to transport of employees and components to and from wind and marine sites, possibly requiring specialist transport equipment to specifically service wind and marine sites;
- **Decommissioning/recommissioning** concerns wind and marine energy sites that have reached the end of their operational life and are either dismantled or repowered;
- **Specialist support services and other** covers the wide range of wind and marine energy-specific activities not covered by any of the above, including:
  - Technical consultancy;
  - Environmental consultancy;
  - Specialist legal services;
  - Specialist financial services;
  - Specialist insurance services.

Of the above, Decommissioning/recommissioning is a new category compared to the previous study that recognises that some installed capacity
in the UK has reached the end of its life and has either been decommissioned or repowered. Specialist transport was previously included as part of Specialist support services and other.

**Contracted and permanent employment**

This study distinguishes between:

- **Contracted employment**, which is temporary employment in activities sustained by the construction of new (or the decommissioning/repowering of old) wind and marine sites;
- **Permanent employment**, which is employment sustained by the requirement to operate and maintain current installed capacity.

In this context, permanent employment is long-term in nature, whereas contracted employment depends on (continued) construction of new projects.

**Other terminology**

**Learning rates** refers to the changing relationship between the cost of developing and operating a particular technology and the scale at which that technology is deployed. This is in order to capture increases in efficiencies and reductions in costs as a technology matures, such that the cost reductions from deploying earlier units are greater than the reductions from subsequent units. Learning rates are expressed in percentages and refer to the additional cost saving that arises from each doubling of capacity. In the projections reported herein, learning rates have been translated into changes in labour productivity, under the assumption that labour costs are the same as other business costs and thus subject to the same gains from learning.

**Original Equipment Manufacturers (OEMs)** are companies that supply equipment to other companies for resale or for incorporation into other products, using the resellers’ brand names.

**Methodology**

**The survey**

The first step in the study was to carry out a new survey of UK wind and marine energy companies, to obtain an up-to-date picture of the sector. The survey approach was similar to that followed for the first Working for a Green Britain study, to achieve a similar set of aims:

- To measure employment in the sector in mid-2013, by technology, activity and nation;
- To assess the demand for skills in the sector and the nature of skills shortages (i.e. supply);
- To obtain additional supporting information (including turnover in the sector), for incorporation into the employment projections model.

The survey was undertaken by IFF Research as a series of telephone interviews between 25 February 2013 and 9 April 2013, with some follow-up calls between 7 June 2013 and 17 June 2013.

The sample of companies was provided by RenewableUK, with 691 companies identified as being within the scope of the study. The companies were notified by email ahead of the actual interviews, and were also provided with a data sheet listing the information that would be asked of them (giving them time to gather more detailed data in preparation for the interview). In total, 237 companies were interviewed. This is slightly fewer than the 253 companies that responded last time and may be due, in part, to some consolidation in the industry (i.e. mergers and acquisitions). This is supported by the observed increase in the number of different activities that individual companies are engaged in.

In order to gross up the sample data to a population estimate, the survey data were weighted. There were 691 companies in the scope of the study; however, for 93 companies no contact details were found and it was assumed that they no longer existed. An adjustment was also made to the number of large companies, since it was easier to identify how many large firms had participated in the survey. Further investigation of the data suggested a population total of 598 employers (i.e. by assuming that non-respondents would have the same characteristics as respondents). The data were grossed up to reflect this total.

**The employment model**

The employment model applied for this study is an improved and updated version of that used for the first Working for a Green Britain study. The purpose of the model is to generate projections for UK employment under alternative trajectories of renewables deployment in the UK (across the asset lifecycle) as well as in the rest of the world (through UK exports of manufactured components).

The model distinguishes two main types of employment, matching the definitions above:

- Direct employment; and
- Indirect employment.

In order to do this, the model must not only be able to relate projections of future installed capacity to (direct) employment, but must also capture the relationship between the wind and marine energy sector and the rest of the UK economy, in order to identify (indirect) employment further up the supply chain.

The model also captures jobs supported by the additional direct and indirect employment income that goes towards further spending. As mentioned in the previous section, these figures are not reported in this study.

Three scenarios were modelled and reported in this study (high, medium and low), each consisting of a set of assumptions relating to:

- Future UK deployment of wind and marine energy devices;
- The extent to which UK manufacturing will supply manufactured components to support wind and marine energy deployment elsewhere in the world;
- The extent to which the wind and marine energy sector will locate manufacturing activities in the UK, leading to more of the sector’s supply requirements being met by UK production (and thus UK employees).
Modelling direct employment

Direct employment in the UK wind and marine energy sector is linked to the alternative projections for future UK and world deployment of such devices. A key feature of the modelling approach is the way in which it makes a distinction between different activities over the lifecycle of the wind and marine energy devices, from the initial planning stages, through to construction and subsequent operation, before the sites are either decommissioned or repowered at the end of their life.

Appendix Figure 1 shows an indicative time plan for the deployment, operation and end-of-life of a notional wind or marine device. The diagram divides the lifecycle into three key phases:

- Planning and construction, before the site becomes operational;
- Operations and maintenance, while the site is operational;
- Decommissioning/recommissioning, after the site has reached the end of its life.

A further implication is that some employment relates to the amount of capacity actually installed (employment required to operate and maintain wind and marine sites) while other forms of employment relate to changes in the amount of capacity installed (to bring new sites online or to take old sites offline). This gives rise to a distinction between ‘permanent’ jobs, which are those that relate to the installed assets (representing a sustained source of employment), and ‘contracted’ or temporary jobs, which depend on continued construction activity (and thus ever-increasing UK capacity).

The nature of the deployment lifecycle means that, in any given year, there are employees engaged in activities that relate to:

- Future installed capacity (planning, manufacturing and construction);
- Current installed capacity (operations, maintenance and various support services);
- Past installed capacity (decommissioning or recommissioning).

Moreover, depending on the technology, some activities may take a number of years, such that, for example, construction work in a given year will relate in part to capacity due to come online in the following year, but also to capacity in the years after (for multi-year construction projects).

Construction and installation, and all activities that support current installed capacity, benefit from learning over time, such that the numbers of jobs per MW in 2023 is (somewhat) lower than the current figures. The rate of learning varies by technology, with slower efficiency gains in relatively more established technologies (large onshore and offshore wind) and faster gains in others (medium and small onshore, and marine energy). This treatment of direct employment gives rise to employment profiles (shown in the main report) that follow the capacity projections broadly, but far from exactly. This is because it is not just the level of capacity in each year that matters, but where that capacity lies on the overall deployment trajectory (the rates of change/growth). This is perhaps clearest in the difference between the high deployment scenario for offshore wind and the medium and low scenarios, where part of the difference in employment relates to the UK making a sustained commitment to new offshore wind to 2030 in the high scenario, generating planning, manufacturing and construction employment not required in the medium and low scenarios.

In a number of scenarios, it is common to see more capacity deployed at the beginning of the period, followed by a more gradual increase later in the period. This leads to employment profiles that place more emphasis on contracted jobs earlier in the period (for construction of new capacity) and permanent jobs later in the period (when most of the activity in the sector relates to operating and maintaining the stock of installed capacity).

Thus, for each technology, the annual cumulative and incremental capacity in each projection is translated into an activity profile through time, in order to account for the entire asset lifecycle. This is also the reason why it is important for the model to project through time, to acknowledge the time profile.

Future UK capacity is the main driver behind the projections, with three other factors governing the final employment results:

- Learning: as relatively nascent technologies, wind and marine devices can be expected to become cheaper over time, as technologies and working practices improve. In the model, as more capacity is deployed, ‘learning-by-doing’ effects emerge, leading to capacity installed earlier in the period being relatively more costly (and labour-intensive) than capacity installed later in the period. The ratio of jobs to MW falls over time, particularly so in the case of marine energy, where the structure
of the sector now (with a heavy emphasis on R&D, etc.) will likely be quite different to the future structure of the industry, as the technology matures.

- Global deployment of wind and marine devices: deployment of wind and marine devices will not be confined to the UK and, depending on the technology, the UK will be in a position to export manufactured components to the rest of the world. In all but small onshore wind, the assumption is that these components will not be exported any further afield than Europe (confining the potential market to future European deployment). It is assumed that UK production relating to small onshore wind can service demand globally. High, medium and low scenarios were developed that vary in the extent to which the UK could supply components overseas in the future. High proportions of the UK marine supply chain is located in the UK, but this is likely to fall to 70% with outsourcing over time (in all scenarios). In the case of offshore wind, the medium and high scenarios incorporate projections of more overall contract award in the UK to support UK deployment, from 37% now (based on a UK content analysis of the Robin Rigg offshore wind farm10), rising to 40% in 2023 in the medium scenario and 55% in the high scenario (also in 2023). Under the assumption of a fixed ratio of UK contracts to UK content,11 this is consistent with a 32% UK content share (in line with the Robin Rigg analysis), rising to 35% and 48% by 2023 in the medium and high scenarios, respectively.

Site planning and development

For the most part, employment in site planning and development relates to capacity due to come online in later years. As an example, large onshore wind projects that are expected to be built between 2015 and 2019 generate requirements for planning and development activities now, in 2013. The lead times to consent vary by technology, with longer lead times on large onshore, offshore and marine energy (two to six years) and much shorter lead times on medium- (one year) and small-scale onshore (within the same year).

In the case of offshore wind, the average size of future sites (in MW) is expected to increase, and an adjustment factor is applied to account for the fact that an increase in future installed capacity (expressed in MW) will not translate, one-for-one, into an increase in jobs.

Manufacturing and design

Employment in manufacturing and design activities depends on the following factors:

- The level of UK deployment each year (accounting for differences in the length of time to bring a site online);
- The level of global deployment and the extent to which the UK is able to supply manufactured components to support that deployment;
- The extent to which productive capacity changes in the UK, increasing (or decreasing) the amount of the supply chain located in the UK (with implications for jobs).

With the exception of small-scale wind systems, where potential consumers are global, the potential for export to overseas markets is confined to Europe. The assumptions on overseas deployment are similar to those from the previous Working for a Green Britain study, and are based on data and projections from the Global Wind Energy Council, the European Wind Energy Association and the EMEA.

As mentioned previously, in all the projections, the domestic share of the marine supply chain is expected to fall from 100% now to 70% by 2023, while the domestic share of offshore wind supply increases in the medium and high scenarios only, to 40% and 55%, respectively.

Construction and installation

As with planning and manufacturing, construction activity takes place before the new capacity becomes operational. The lead and construction times vary by technology:

- An average of three years for offshore wind and marine;
- An average of two years for large onshore wind;
- Medium and small onshore wind sites are completed in one year.

Operations and maintenance

Operations and maintenance activities each year are tied directly to the amount of capacity in the system at that time, adjusted for learning (productivity gains).

Specialist transport

Specialist transport activities each year are tied directly to the amount of capacity in the system at that time, adjusted for learning (productivity gains).

Decommissioning/recommissioning

At the end of life, wind and marine energy sites must either be decommissioned or recommissioned (repowered). The updated employment model does incorporate assumptions on the average life of capacity built over the projection period, but this activity takes place after 2023 (the end point for this current study). As such, for now, the assumption is that the number of jobs in decommissioning/recommissioning is constant to 2023, and set at the level of employment identified in the survey. In any case, the current figure is small and thus has little bearing on the results across scenarios.

Specialist Support Services and Other

Specialist Support Services and Other
activities each year are tied directly to the amount of capacity in the system at that time, adjusted for learning (productivity gains).

**Modelling indirect employment**

Indirect employment relates to jobs that are generated outside of the wind and marine energy sector through supply-chain linkages. As an example, wind turbine manufacture generates direct employment in UK wind-energy manufacturing (because such turbines are a sector-specific technology), but also indirect employment elsewhere in the UK because there will also be requirements for more generic components (such as gearbox components) which are not specific to the wind energy sector.

In order to identify indirect employment, it is necessary to link the wind and marine energy sector identified from the survey (and for which direct employment is projected according to the approach outlined above) to other sectors in the UK economy. This requires the reconciliation between the information obtained from the survey conducted for this update with official statistics on the UK economy, from the UK Office for National Statistics (ONS).

There is currently no single ‘wind and marine energy’ sector identified within the Standard Industrial Classification. Instead, such activities are grouped within sectors such as manufacturing, engineering, electricity, construction and various types of business service (e.g. architecture, in the case of planning and development). The first step in the method involves separating out the activities identified in the survey from the broader aggregates in the UK data (the ‘parent sectors’). This leads to the construction of a modified UK ‘input-output table’.

An input-output table is a key part of the economic accounting framework from which the well-known economic indicator Gross Domestic Product (GDP) is derived. The purpose of an input-output table is to depict an economy’s industrial structure in terms of industry sectors and their purchases of inputs from other UK industries, as well as labour. These purchases are expressed in monetary units (pounds sterling). In this way, an input-output table describes the supply chain of an economy.

An input-output table implies that a one-unit increase in output entails a more-than-one-unit increase in economy-wide output, because industries must purchase inputs from other industries, which must in turn purchase further inputs from elsewhere in the economy. These effects are expressed as (output) multipliers: the ratio of economy-wide (direct plus indirect) output to the initial (direct) change in output.

The application of productivity figures (output per FTE worker) to the output multipliers leads to a set of employment multipliers: the ratio of economy-wide (direct plus indirect) jobs to the initial (direct) change in jobs arising from employment in the wind and marine energy sector.

The starting point for the analysis is the most recent official UK input-output table (for 2005). Additional rows and columns to represent the various activities in the wind and marine energy sector (differentiated by technology) are then created based on the turnover figures from the survey and UK turnover data from ONS. The wind and marine activities have been split out from the most appropriate sectors identified in the original table. For example, planning and development activities are split out from the Architecture and technical consultancy sector of the original table. UK-level employment figures are similarly adjusted to account for the parts of each sector that are wind and marine energy related.

A number of further adjustments have been made to the supply chains, in order to better reflect the specificities of the wind and marine energy sector. For example, the operations component of wind and marine energy differs from the electricity sector of the UK as a whole, because there is obviously no requirement for fossil fuels for generation. Such flows have been set to zero.

Having formed projections of direct employment (and output) as described above, indirect employment arises from calculating the indirect output generated by the direct jobs and converting back to employment using current and projected productivity figures for the rest of the economy (sourced from Cambridge Econometrics’ MDM-E3 model of the UK economy).

**Revisions in approach**

The approach is very similar to that developed for the previous Working for a Green Britain study, with the principal differences arising from:

- New data (from a more up-to-date survey, but also because new economic data have become available).
- Greater disaggregation/more direct activities identified in the modelling. In particular, the model now separately identifies medium onshore wind from large onshore wind, and also distinguishes Specialist transport and Decommissioning/ recommissioning as activities in the sector.

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12. The Standard Industrial Classification (SIC) is the statistical system in the UK to which all businesses and other entities are categorised, according to their economic activity. It distinguishes a wide range of agriculture, manufacturing, utilities, construction and service activities.
Our vision is for renewable energy to play a leading role in powering the UK.

RenewableUK is the UK’s leading renewable energy trade association, specialising in onshore wind, offshore wind, and wave & tidal energy. Formed in 1978, we have a large established corporate membership, ranging from small independent companies to large international corporations and manufacturers.

Acting as a central point of information and a united, representative voice for our membership, we conduct research, find solutions, organise events, facilitate business development, advocate and promote wind and marine renewables to government, industry, the media and the public.

Energy & Utility Skills (EU Skills) is the Sector Skills Council (SSC) for the gas, power, waste management and water industries, licensed by Government and working under the guidance of the UK Commission for Employment and Skills (UKCES). Employer-led, our purpose is to ensure that our industries have the skills they need now and in the future.

The energy and utilities sector is fundamental to the success of the UK economy and is crucial to the way modern society functions. It is critical to facilitate an adequate supply of competent people to develop, maintain and enhance the sector.

A skilled workforce is vital for meeting the challenges of an increasingly competitive global economy and particularly during this tough economic climate, where skills are the key lever for successful competition.

Our commitment is to raise employer engagement, demand and investment in skills, to ensure that we have authoritative labour market information for all of our industries and to develop National Occupational Standards (NOS) to ensure that qualifications meet employer needs.