

Rebirth of UK Manufacturing

An Opportunity for a World Class Industry

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RenewableUK is the trade and professional body for the UK wind and marine renewables industries. Formed in 1978, and with 595 corporate members, RenewableUK is the leading renewable energy trade association in the UK. Wind has been the world's fastest growing renewable energy source for the last seven years, and this trend is expected to continue with falling costs of wind energy and the urgent international need to tackle CO2 emissions to prevent climate change.

In 2004, RenewableUK expanded its mission to champion wave and tidal energy and use the Association's experience to guide these technologies along the same path to commercialisation.

Our primary purpose is to promote the use of wind, wave and tidal power in and around the UK. We act as a central point for information for our membership and as a lobbying group to promote wind energy and marine renewables to government, industry, the media and the public. We research and find solutions to current issues and generally act as the forum for the UK wind, wave and tidal industry, and have an annual turnover in excess of four million pounds.

Introduction

Britain can rebuild its manufacturing base and renewables provide the perfect opportunity. There is a consensus that the recovery should feature a greater role for modern manufacturing. The switch to a sustainable energy economy can be a driver for economic and employment growth.

The search is now on for a best set of policies that can deliver a British manufacturing rebirth, in the process creating an economy less reliant on credit default swaps and more focused on delivering new energy technologies.

The big question is how best to revitalise an industry that, for various reasons, has been marginalised for much of the last three decades. Thankfully, the urgent need to de-carbonise the UK's economy for both climate change and energy security reasons has given the UK a once-in-a-generation opportunity. Right across the manufacturing spectrum, from cars to trains, IT to nanotechnology, building materials to energy infrastructure, the need to cut carbon emissions is driving the development of new technologies and opening up new markets. And nowhere is this more apparent than in Government plans for a 30-fold expansion in offshore wind farms by 2020.

The UK is already the world's largest generator of energy from offshore wind farms and, following the recent announcement of the third round of offshore wind farm projects, its market dominance will be cemented for decades to come.

The sheer scale of the Round Three projects is remarkable. Between 2003 and 2009 around 350 offshore wind turbines with a total capacity of 1GW were built in UK waters at a rate of one every 11 days. In contrast, the remaining Round Two and imminent Round Three projects will result in a further 6,400 turbines being installed, with a combined capacity of over 30GW – representing about a quarter of the UK's total electricity generation capacity.

According to figures from the Carbon Trust, delivering these turbines in time to hit the EU's 2020 renewable energy target means that they will have to be installed at a rate of one a day from 2010 to 2016, rising to 2.5 a day from 2017 to 2020. Moreover, they will be bigger and more challenging to install than any existing wind turbines. Typically anchored in up to 60m of water, in some cases more than 200km from shore, the turbines will stand hundreds of feet above the water, with the largest producing 10MW of power at full capacity – enough to single-handedly power a town of 10,000 homes.

It is easy to get swamped by these figures without fully appreciating the scale of the Round Three opportunity, either because the turbines will be miles

“ The need to cut carbon emissions is driving the development of new technologies ”



out at sea and only a few projects will be visible from the shore, or because the installation of each individual turbine does not seem that daunting. Taken as a whole, however, this is one of the largest engineering projects in history. The construction and installation of over 6,000 wind turbines in inhospitable waters, followed by the connection of the turbines back to shore via an estimated 7,500km of underwater high-voltage cables represents an engineering challenge that in terms of scale, complexity and outright ambition will put the Thames Barrier, Wembley Stadium and the Channel Tunnel in the shade.

The economic opportunities on offer to the UK manufacturing sector from a project of this magnitude will be without parallel. Estimates for the total capital investment required range from £100bn to £120bn, and while much of the focus has been on the companies that secured the right to develop the Round Three offshore zones, investment will flow down the supply chain, providing a boost to manufacturers of everything from turbine blades to concrete foundations, and installation vessels to subsea cables.

This investment will translate into jobs, with a recent study from consultancy Bain & Company predicting that if 20GW are installed offshore by 2020, the UK wind industry alone could see employment increase over tenfold, from 5,000 jobs currently to 57,000 jobs by then. In addition, the report reckons UK-based firms could serve 70 per cent of the market for offshore wind turbines, while exporting a similar volume to Europe. The Government is more optimistic still; estimating that in total Round Three will support 70,000 new jobs.

Sadly, however, nothing about this renaissance is certain. Work on Round Three projects is set to begin from 2015, but there are no guarantees investment will flow to British firms. A quick glance down the list of the consortia awarded rights to the nine Round Three offshore zones reveals huge international interest. Centrica and Scottish and Southern Energy are joined by many of Europe's leading energy and engineering firms, including RWE, Statoil, Vattenfall, Siemens and E.ON. Similarly, the manufacturers of offshore wind turbines are all based overseas, and while many British firms are gearing up to provide components, the UK does not yet have a large-scale turbine manufacturing plant to serve this burgeoning market.

“The UK wind industry alone could see employment increase over tenfold”



“ There is still time to build a world-class manufacturing industry on the back of the Round Three projects”

The largest offshore wind farm currently under construction anywhere in the world, the 1GW London Array, provides a cautionary tale. The consortium behind the £1.9bn project has no British involvement after Shell quit the group, leaving Denmark's Dong Energy and Germany's E.ON to be joined by Abu Dhabi-based investment giant Masdar. The UK will benefit from the resulting renewable energy, but many of the economic benefits will be lost overseas, with the turbines being imported.

However, there is still time to build a world-class manufacturing industry on the back of the Round Three projects. The question is how.

An analysis of those countries that dominated the first generation of renewable energy technologies reveals one common thread: consistent policy frameworks backed by far-sighted government support. Whether it is Japan's emergence as a hub for solar photovoltaics, Germany's dominance of on-site renewables or Brazil's booming bio-ethanol industry, government intervention played a key role in the expansion of the world's largest clean tech markets. Nowhere is this clearer than in Denmark, where figures suggest government investment of £1.3bn since 1993 has been integral in the development of a wind turbine industry that controls half the global market, generating annual revenues of £2.7bn.

Encouragingly, some of the policies required in the UK are already in place. The existing level of financial support provided through the Renewables Obligation is sufficient to drive investment in the Round Three projects, as evidenced by the large number of consortia that bid for the rights to develop the nine zones.

However, financial returns are not the only influence on the rate at which Round Three projects can be developed – the projects may be offshore, but they still face some of the planning and grid issues that hamper the development of onshore wind farms. Further research to resolve concerns over turbines' effects on radar is needed, while fears remain that grid connection charges could penalise offshore wind farm developers.

Moreover, wind turbines are just one part of the value chain, and there is a strong case for new policies that will drive supply chain investment. There is potential to create manufacturing super hubs around upgraded port facilities where firms can produce turbines and components, revitalising port towns with high unemployment in the process. But this scenario requires targeted investment at three or four ports to deliver the necessary infrastructure, coupled with a package of tax incentives and grants, to stimulate investment in new manufacturing plants. Meanwhile, the UK's already world-class offshore turbine testing facilities, such as Narec in the North East, need to be expanded to meet growing demand. A relatively small government investment of £200m–£300m could provide long-term foundations for a multi-billion pound industry.

There is also a case for reinforcing this investment with a 'green bank', designed to ensure sufficient capital flows into the supply chain and renewable energy projects themselves. Such a bank would have to be structured to ensure it does not undermine private capital flows, but could provide a key role in stimulating investment in capital-intensive projects that promise healthy long-term returns.

Finally, any rebirth of UK manufacturing will prove short lived unless the UK addresses its perennial engineering skills shortage. Many of the 60,000 jobs created by the Round Three projects will be high-skilled positions. If the UK wants to fill these roles it has to increase investment in skills development, and reverse the decline in school leavers and graduates with science and engineering qualifications.

The good news is that there is growing confidence these challenges can be overcome, and an array of firms are now investing in the manufacturing facilities required to take advantage of the Round Three opportunity. Most recently, Mitsubishi revealed plans to invest £100m in an offshore turbine R&D project, creating around 200 jobs and establishing the UK as a 'strong contender' to secure a larger project to create a 1,500-strong manufacturing plant. At the same time a host of firms from the oil and gas, engineering, energy and shipbuilding industries have started work on new facilities. The eight case studies in this report clearly show that the rebirth of UK manufacturing is already well underway.

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Clipper Windpower

The UK will soon be home to the world's largest wind turbine, thanks to California-based firm Clipper Windpower.

“ The size of the Round Three allocations by the Crown Estate, are what finally brought us to invest in the area”

Senior executives at the company explain that Clipper's high-profile project to build a giant 175m-tall offshore wind turbine has become remarkably 'UK-centric' and the first 10MW turbine is now expected to be installed off the North East coast.

The company also recently announced that it would build a blade manufacturing facility at Walker, on the River Tyne. The facility will initially make up to 75 of the company's giant 70-meter blades each year, employing around 60 people.

UK Managing Director, David Still, says the combination of plans for new blade and rig testing facilities at the nearby Narec centre, the imminent Round Three projects and a £4.4m grant from the Department of Energy and Climate Change all helped drive the decision to locate in the UK.

'This support, and the size of the Round Three allocations by the Crown Estate, are what finally brought us to invest in the area', he said, adding that the plant should employ around 500 people by 2020.

However, he warns that further government action will be required to ensure other firms follow Clipper's lead. In particular, he recommends greater investment in the domestic supply chain, suggesting the Crown Estate should use some of the money it receives renting out offshore zones to help support local suppliers. 'UK consumers are paying for offshore wind – so they should benefit from the extra jobs being brought into the country', he says.

Alnmaritec

Alnmaritec started life as an aluminium-manufacturing firm before moving into boat building 20 years ago, in which it has specialised in aluminium alloy workboats for the fishing, oil and gas, and rescue services sectors.

“ The offshore wind industry now accounts for around a quarter of the company’s business ”

The company is now in the midst of another transition, having moved into wind farm support boats eight years ago. Sixteen boats have already been built for a variety of wind farm developers and Alnmaritec is poised to expand further after recently opening its second plant next to the Narec testing facility in Blyth.

Chris Millman, Managing Director of Alnmaritec, says the company currently has two wind farm support vessels under construction and another on the order books. He adds that the offshore wind industry now accounts for around a quarter of the company's business, although he expects this to increase, estimating that for every 20 to 30 wind turbines that are erected, a new support boat will be needed.

The company also has a booming export business, but has no plans to open facilities overseas. ‘With a weak pound and the arrival of some major offshore wind players in the North East, [the UK] remains the most competitive place for us to manufacture the boats for the foreseeable future’, says Millman.

Tees Alliance Group

Experts have long argued that skills developed exploiting North Sea oil and gas could be transferred to support the emerging offshore wind industry.

“ The company has traditionally specialised in developing North Sea oil and gas platforms, but following a comprehensive feasibility study it has increased its focus on the offshore wind sector”

Now, engineering firm Tees Alliance Group (TAG) is to pioneer that transition with plans for a new facility at its Teesside headquarters dedicated to constructing offshore wind turbine foundations.

The company has traditionally specialised in developing North Sea oil and gas platforms, but following a comprehensive feasibility study it has increased its focus on the offshore wind sector.

The company is in the running for four contracts with European wind energy firms, and is also talking to Clipper Windpower about working on its 10MW turbine. It also recently secured £1.5m of government funding for a new automated tubular production facility, which will create up to 200 jobs constructing monopiles, tripods, jackets and transition pieces for offshore wind turbines.

However, Construction Director Stuart Dawson admits that growth plans are complicated by the fund-raising challenges.

‘We’re stuck in a chicken and egg situation where the banks won’t give us finance without the contracts but we’re not winning the contracts because the facility isn’t completely finished’, laments Dawson. ‘Ideally, we could do with a bit more support from government to win the contracts, but we’re confident the money will come through in the end, and we know the market is there for the taking.’

Burntisland Fabrications

With foundations representing one of the most complex parts of any offshore wind project, the race is on to break into what promises to be a lucrative market.

“ North Sea oil and gas engineering firm Burntisland Fabrications (BiFab) recently announced a £14m plan to build two new factories in Fife to meet growing demand for the underwater jacket substructures that anchor turbines to the seabed.”

North Sea oil and gas engineering firm Burntisland Fabrications (BiFab) is one of a number of companies beefing up its presence in the market, having recently announced a £14m plan to build two new factories in Fife to meet growing demand for the underwater jacket substructures that anchor turbines to the seabed.

‘With Round Three we really got a sense that people were starting to pay attention’, says John Robertson, Chief Executive of BiFab, predicting the company’s share of revenue coming from offshore wind projects will rise from 50 per cent currently to 70 per cent by 2015.

The company has now built 31 jacket structures for a Vattenfall offshore wind project and was also involved in the Beatrice project, which saw two 5MW wind turbines installed adjacent to the Beatrice oil field, 25km off the east coast of Scotland.

The transition into the renewable energy market was made possible with the help of Scottish Enterprise, which part-funded a project to assess the feasibility of overhauling the company’s oil and gas-focused operations. Robertson says the company is confident it will now be recognised as a tier-one supplier for Round Three projects, putting it in the running for additional funding from the Department of Energy and Climate Change.

Mabey Bridge

British engineering firm Mabey Bridge may have only just announced plans to open its first wind turbine tower manufacturing plant, but that has not stopped it going public with ambitions to become one of the UK wind energy industry's largest suppliers.

“ The new factory near Chepstow is expected to create 240 jobs, providing capacity for 300 towers ever year”

Managing Director Peter Lloyd says the decision to build the £38m factory was made after the well-documented problems afflicting many onshore wind farms began to dissipate.

‘To begin with the focus will be on onshore turbines’, he predicts. ‘There were two issues in this market, planning and grid connection. We felt enough was being done on both these fronts to justify the investment – though there is still work for government to do.’

The new factory near Chepstow is expected to create 240 jobs, providing capacity for 300 towers ever year, and the company is already seeing its investment pay off after securing a deal with turbine manufacturer REpower.

Lloyd is also in little doubt that he has the ideal location for the new facility, particularly given much of the supply chain for the towers will consist of companies Mabey Bridge works with through its existing bridge parts business. ‘If we go very remote from our current location we have to duplicate the team and the skills, so we decided to put the factory close to our existing two facilities’, he says. ‘In future we hope to export the towers too, and we think we can be competitive with other suppliers around the world.’

Welcon

Mabey Bridge is not alone in targeting the market for wind turbine towers.

“ Nearby harbour facilities should make transporting the towers to offshore sites relatively straightforward ”

Welcon, a subsidiary of the Danish Skycon group, bought a wind turbine tower manufacturing plant in Campbelltown, Scotland, from Vestas last year and is to invest £35m in expanding the facility to three times its current size.

The company says that the plant, which is expected to employ 300 people by 2012, will feature new manufacturing equipment that will enable it to produce towers that are over 100 metres tall and are suitable for both onshore and offshore wind farms.

Niels Brix, Vice President of Business Development at the firm, says the site was selected because nearby harbour facilities should make transporting the towers to offshore sites relatively straightforward.

He adds that the company has also already won a contract to supply 152 towers to the £500m Clyde wind farm project in Scotland (Europe's largest onshore wind farm), and expects to begin deliveries to the project later this year.

The Campbelltown factory represents the company's first investment in the UK, but Brix is convinced it will prove a more lucrative market than its native Denmark. 'We have invested in the UK market because we regard it as the most interesting in the whole world at the moment', he says.

Converteam

Power conversion technology specialist
Converteam is certain where its future lies.

“ With Converteam’s electrical propulsion and dynamic positioning systems already widely used by support boats for the North Sea oil and gas industry, the company can expect similar demand from offshore wind support vessels”

‘There is no doubt that the wind industry will be at least half of our business in five years time, even with other parts of the business growing’, says John Hill, Renewables Manager at the firm. ‘It’s a huge opportunity for us.’

The company, which has traditionally supplied heavy industrial sectors, was recently selected by the Energy Technologies Institute as one of two firms to design a test rig capable of hosting 15MW turbine drive trains and is now eyeing up different parts of the wind energy supply chain.

Hill predicts that, with Converteam’s electrical propulsion and dynamic positioning systems already widely used by support boats for the North Sea oil and gas industry, the company can expect similar demand from offshore wind support vessels.

Hill reveals that the company is also developing new drive train technology for use in large 7.5MW-plus turbines, which it hopes to commercialise by 2017. He says the innovative high-temperature superconducting system will make power generation more efficient whilst halving the size of the turbine’s generator. The system would in turn allow turbine blades to increase the load on generators, consequently increasing power outputs.

JDR Cables

One company reaping the benefits of an early move into the offshore wind sector is subsea cabling specialist JDR Cables.

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The company identified the potential offshore wind farm market several years ago and as a result is already providing the cabling for the London Array and Greater Gabbard wind farms.

It recently completed its second factory in Hartlepool, and is now turning its attention to the Round Three projects. John Price, Sales Manager at JDR Cables, says the firm hopes the focus on the High Voltage Direct Current cables that will be required by wind farms several hundred kilometres off the coast will clear the way for it to address projects closer to shore with the shorter alternating current cables that are the company's stock-in-trade.

He adds that it could then deliver HVDC cables for some of the later Round Three projects.

There is a competitive advantage to being in the UK, according to Price, who notes that ‘there was no real UK supply chain, whereas the marketplace on the continent was a lot more cluttered’.

However, European project developers’ dominance of the market can present challenges for British companies trying to break into it. ‘It takes time to establish yourself – we weren’t even considered for the recent Sheringham Shoal wind farm, despite it being very close to one of our factories’, says Price.

RenewableUK

Greencoat House, Francis Street
London SW1P 1DH, United Kingdom

Tel: +44 (0)20 7901 3000

Fax: +44 (0)20 7901 3001

Web: www.renewable-uk.com

Email: info@renewable-uk.com