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Utility Focus February 2010

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FocusOn…

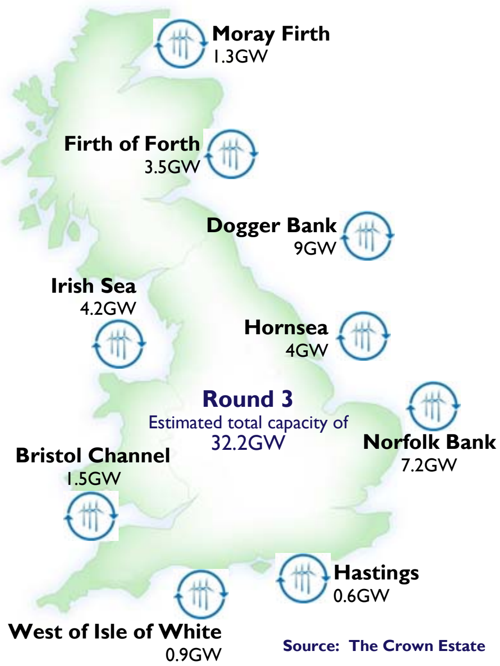
Britain's ambitious offshore wind expansion

Since merging the energy branch of the Business Department with the climate arm of DEFRA in late 2008, the government's amalgamated Energy and Climate Change Department has undoubtedly been able to forge more cohesive policies, ultimately striking a balance between energy security and low-carbon transition. While a succession of stringent emission reduction declarations have been widely endorsed by energy professionals and environmentalists alike, Downing Street has – at times – attracted criticism for being strong on rhetoric but short on action, most notably from the Tories who have promised a more interventionist energy strategy. There is little doubt, however, that Whitehall has lofty aspirations when it comes to the progression of renewable energy in Britain, and with the offshore wind industry as its cornerstone, it has taken strides to encourage private sector investment. The conclusion last month of the Crown Estate's third round licensing process signifies a step change and potentially massive growth in the UK's offshore wind capacity; it also reaffirms the government's ambitious green credentials, irrespective of last December's disappointing global climate talks in Copenhagen. **Focus**On… sheds light on Britain's planned windfarm expansion and the challenges that lie ahead.

Crown Estate's third round tender process

The Crown Estate, owner of the UK's coastal seabeds, unveiled the successful applicants last month of its third tender round for offshore windfarms. Nine strategically located zones (see Figure 1) were allocated to companies and consortia, including many of Europe's leading energy groups, who will henceforth develop windfarms totalling a combined power generation capacity of some 32-gigawatts [GW]. This latest leasing round has the potential to add a further 6,400 turbines on the top of those already operational or in development, which if realised could provide Britain with a quarter of its overall electricity needs by 2020. The UK Energy Department said that the eventual outcome of the Round 3 tender was considerably larger than the 25GW originally envisaged and could eventually equate to £75-100 billion of private sector investment. The nine offshore zones vary in size, although altogether represent a huge step up, not only for the UK, but also for the global wind energy industry. The largest Round 3 zone, Dogger Bank, is located off the coast of Yorkshire and dwarfs any previous windfarm, either active or under construction; the winning Forewind consortium has earmarked a total installed capacity of 9GW, although the site has the potential for approximately 13GW according to the Crown Estate, offering further scope of expansion. By and large, foreign-owned companies seized the lion's share of the tender contracts, Germany in particular setting the pace, with E.On, RWE Npower and Siemens all notable winners. Norwegian energy groups, Statkraft and Statoil, also feature, as do Sweden's Vattenfall and Portugal's EDP Renováveis. Independent UK utility firm, Scottish and Southern Energy, is involved in two of the developmental regions, whilst Centrica – the parent company of British Gas – has taken a majority holding in the third largest, Irish Sea zone (see Figure 2).

Figure 1: The nine offshore Round 3 windfarm zones



Source: The Crown Estate

Figure 2: The developers who have signed exclusive zone agreements

Moray Firth zone (1.3GW) – Moray Offshore Renewables Ltd, which is 75 per cent owned by EDP Renováveis and 25 per cent by SeaEnergy Renewables

Firth of Forth zone (3.5GW) – SeaGreen Wind Energy Ltd equally owned by Scottish & Southern Energy and Fluor

Dogger Bank zone (9GW) – The Forewind Consortium equally owned by Scottish & Southern Energy, RWE Npower Renewables, Statoil and Statkraft

Hornsea zone (4GW) – A joint venture between Mainstream Renewable Power and Siemens Project Ventures, involving Hochtief Construction

Norfolk Bank zone (7.2GW) – East Anglia Offshore Wind Ltd equally owned by Scottish Power Renewables and Vattenfall Vindkraft

Hastings zone (0.6GW) – E.On Climate and Renewables UK

West of Isle of Wight zone (0.9GW) – Eneco New Energy

Bristol Channel zone (1.5GW) – RWE Npower Renewables, the UK subsidiary of RWE Innogy

Irish Sea zone (4.2 GW) – Centrica Renewable Energy, involving RES Group

UK leads the way in offshore wind

A number of obstacles have hindered the worldwide development of coastal windfarms, culminating in a paltry one per cent share of the global wind power industry (versus onshore sites), the British Wind Energy Association [BWEA] claims. Impelled by emissions and renewables legislation, offshore wind has begun to find its feet in Europe, however, with installed capacity growing 54 per cent in 2009, according to recent statistics from the European Wind Energy Association. The UK and Denmark currently lead the way, with 44 and 30 per cent respectively of the continent's overall 2,056-megawatt [MW] capacity. There are also 17 offshore windfarms – representing some 3.5GW – under construction in Europe, just under half of which are in British waters. Offshore wind is administered in the UK by the Crown Estate, whom act as landlord and steward of the country's surrounding waters and effectively lease out targeted windfarm zones by means of a series of competitive tender rounds. Britain's first offshore site was commissioned in December 2000 off Blyth Harbour in Northumberland, coinciding with the launch of the Crown Estate's first tender process. Intended as pilot phase, Round 1 sites were initially small in scale, limited to a maximum 30 turbines. With developers expressing an interest in larger projects, a second round of tenders was competed in December 2003, granting companies the rights to develop 15 sites totalling 7.2GW. While some are yet to be determined, Round 2 windfarm projects have mostly completed the consenting process and – pending final investment decisions – await construction. The first two tender phases have a combined target of 8GW, which puts the magnitude of the Round 3 process into context; the scale of some of these zones is much larger than anything seen before. By the BWEA's latest reckoning, Britain has just nine operational offshore projects, totalling 688MW, but the Round 3 announcement means that over 40GW is due to be brought forward from the three collective licensing phases, posing a truly massive rate of expansion. The UK government hopes that a sizeable portion will come to fruition in time to make a contribution to its 2020 targets; Whitehall has an agreement with the European Union to produce 15 per cent of all its energy from renewable sources by 2020 and has a self-imposed goal of cutting greenhouse gas emissions 34 per cent against 1990 levels.

Figure 3: Key players applaud Crown Estate announcement

Prime Minister, Gordon Brown:
"Our policies in support of offshore wind energy have already put us ahead of every other country in the world. This new round of licences provides a substantial new platform for investing in UK industrial capacity. The offshore wind industry is at the heart of the UK economy's shift to low carbon and could be worth £75 billion and support up to 70,000 jobs by 2020."

Energy and Climate Change Secretary, Ed Miliband:
"Our island has one of the best wind energy resources in Europe and today's news shows that there's a huge appetite for capacity to be built here. We now need to make sure we're poised to harness the potential that appetite brings for business for UK companies and new green jobs. We did it before with oil and gas in the North Sea and we'll do it again for offshore wind."

The benefits of offshore wind

Aside from the obvious environmental benefits, a sizeable expansion in offshore wind could be advantageous in many other respects. Independent government-backed group, the Carbon Trust, estimates that that the industry could support as much as 70,000 new jobs over the next ten years, the bulk of which will come direct via planning, manufacturing and construction opportunities. The major concern is whether new manufacturing facilities will actually be built in the UK, or whether they will be based on the continent where there are already established onshore wind turbine manufacturing facilities, dominated by the likes of Denmark, Germany and Spain. Rather than acting as a business offshoot for the onshore wind industry, however, it is hoped that Britain's coastal developments will attract new entrants and place the UK as the market leader in innovation and the supply of technology, creating a British-based supply chain. The scale of Round 3 will require a dramatic increase in manufacturing capacity for offshore wind, such as turbines, foundations, offshore electrics and installation vessels. Key to attracting new investment will be the creation of coastal manufacturing and research hubs, much like how Aberdeen is a centre for the North Sea oil industry, which will require upgrades to UK ports and quayside facilities. Increasing the proportion of electricity generated from wind could also prove positive for the UK's energy security. With less reliance on imported gas, the country will be able to limit its exposure to supply constraints abroad and the impact on wholesale prices by extension. Around a third of the UK's existing power stations are due to come offline over the next decade, causing industry regulator Ofgem to warn of a hike in gas-fired generation, which could push energy prices up by as much as 60 per cent in the interim (see December 2009's **Utility**Focus).

Renewable energy funding mechanism

Spiralling production costs have acted as a key impediment to offshore wind, with the BWEA pointing to a major "cost hump" in recent years. The cost of construction has effectively doubled from £1.5 million per MW for early projects to £3 million per MW at present, driven by numerous factors including the falling UK exchange rate and rising commodity prices (such as steel). A lack of competition among manufacturers has also conspired to push up prices, as just two main turbine makers, namely Siemens and Vestas, currently dominate the market. Limited risk appetite among investors and tight credit amid the current economic climate has also compounded the situation, ultimately stifling investment. As the industry expands and more players enter the market, however, costs are expected to fall significantly. Offshore wind is still a relatively new enterprise and as experience and technology evolve, costs will invariably ease. The Renewables Obligation will also stimulate investment in the UK; having extended the levy by 10 years to 2037, Chancellor of the Exchequer, Alistair Darling, pledged as part of his latest Pre-Budget Report to extend the uplift of offshore wind from one to two Renewable Obligation Certificates until March 2014. With the banding set to become less generous thereafter, investors will nevertheless require assurances over the future of the subsidy scheme.

An integrated European "supergrid"

The growth of offshore wind will ultimately depend on new grid connection points being put in place to link up with the onshore power distribution network. The huge scale of Round 3 will therefore require a drastic overhaul of the UK's existing grid infrastructure. Coincidentally, large sections of the electricity grid are coming to the end of their life expectancy and up to 60 per cent will have to be upgraded or entirely replaced with the next 5-10 years. This creates an opportunity to rebuild the grid system to accommodate decentralised green energy supplies, including a new offshore grid network. Work is already underway through the Government's Electricity Network Strategy Group, who have analysed the existing network to identify the major upgrades and map the new grid routes required. As more offshore capacity in accommodated, the UK's transmission system operator – National Grid – will be required to take more of a proactive role in managing the grid. Steps will need to be put in place to handle the intermittency of wind output and thermal plant will need to operate more flexibly, picking up the slack when wind speeds are low. Greater demand-side will also be required, facilitated by a 'smart' grid and large-scale interconnection with the rest of Europe, which will allow for peaks and troughs in generation to be shared out between countries. With this in mind, the UK government recently signed an agreement with eight other European countries to develop a "supergrid" in the North and Irish Seas, with the aim of optimising output from offshore windfarms.

News this month...

Norway flows in the spotlight amid freezing weather

The freezing conditions and widespread snowfall experienced in early January lifted UK gas demand to unprecedented levels, peaking at a record-high 468 million cubic metres [Mm3] during the final trading session of Week 1. While plummeting temperatures sparked a sizeable hike in consumption at the beginning of 2010, gas supply was pushed severely short by a raft of production issues on the Norwegian continental shelf, forcing Britain's transmission operator, National Grid, to issue a series of Gas Balancing Alerts. This rarely used back-up mechanism was introduced during the winter of 2005/06, as a way of signalling to the market that demand-side reductions and additional supplies were needed in order to prevent a supply shortage emergency. The freezing weather reaped havoc on Norway's offshore infrastructure at the turn of the New Year, causing the Kollsnes processing plant and Troll field to shutdown unexpectedly. Langeled imports – the main pipeline route to Britain – consequently dropped from 70Mm³ (near maximum capacity) in late December to a meagre 20Mm³ at its lowest. Although gas deliveries soon ramped back up, adverse weather triggered a second round of Norwegian supply hiccups at the start of Week 2, causing the Ormen Lange field to stem output and the Kårstø processing plant to undergo maintenance. Despite exaggerated reports of a UK gas crisis within the media, however, the physical gas network coped admirably under the circumstances. Having already given their prior consent, several large industrial users had their gas supply interrupted, whilst alternative supply sources stepped up to plug the gap in Norwegian flows. Increased nominations were reported from Britain's LNG sites and the UK/Belgium Interconnector delivered notably more gas from the continent. With medium and long-range storage facilities withdrawing at hefty rates throughout January, much was made of the UK's dearth of stored gas provisions. Although this latest episode undoubtedly raises the need for more capacity, the situation was nowhere near as dire as many had suggested. Midway through the first week of January, for instance, the Shadow Energy Secretary, Greg Clark, made the misleading comment that the UK only had 8 days of storage gas remaining, making the typical comparison with our European neighbours. The Tories calculations ignore maximum deliverability rates that essentially require the UK to eke out its remaining gas reserves over a considerably longer time period.

King Street gas storage given the thumbs up

UK planning authorities have given the go-ahead to a new gas storage facility in Cheshire. The King Street project, which is being developed by Glaswegian property group NPL, was given the green light last month by the Department for Communities as well as Local Government. On completion, the site's 10 underground salt caverns will have a combined storage capacity of 270 million cubic metres, which is comparable to the medium-range Hornsea facility, already in operation. The firm was also granted consent for an associated twin pipeline, running from the Northwich-based site to the Mersey Estuary, which will enable sea water to be used to create the caverns more quickly. It is also hoped that construction of the pipeline asset could help to speed up the development of other gas storage facilities in the Cheshire basin, where many of the geologically suitable areas for onshore sites are located. The recent cold spell offered as timely reminder of the UK's need for more storage provisions in order to safeguard against interruptions in sourced gas from abroad (see above article). Britain has been a net importer of gas since 2004 and currently has enough storage capacity to cover just 5 per cent of its annual consumption – compared with around 20 in Germany and 18 per cent in the US – leaving it exposed to supply inconsistencies, especially in the height of winter. Due to its strategic importance, the King Street proposal therefore obtained government approval within five months of the planning enquiry ending, compared with a wait of 8 to 18 months for previous projects. A letter of approval on behalf of Communities and Local Government minister John Denham read: " There is clearly a need for additional gas storage in the UK in order to maintain a secure supply of energy into the future."

"Big freeze" calls Met Office forecasts into repute

The dark clouds of discontent gathering over the UK's national weather service have begun to look even more ominous of late, with the BBC allegedly considering dropping the Met Office as the source of its weather forecasts after almost 90 years of service. The existing contract expires this coming April, when the BBC will put it out to tender. The broadcaster insists that it is doing so to ensure "best value for money," but the timing coincides with a storm over the validity of the Met Office's long-range weather projections. Most recently, the Exeter-based organisation said that Winter 2009/10 would be relatively mild, predicting temperatures to be near or above average, which clearly represents a far cry from the bitterly cold conditions and widespread snowfall that has engulfed many parts of the British Isle over the past month. There was also the embarrassing prediction in April 2009 of an odds-on "barbeque summer," a tremendously resonant phrase designed to attract headlines, which turned out to be a washout. On closer inspection, the Met Office's woes extend further back. It failed to predict the last three wet summers, while its annual global mean forecasts have repeatedly suffered from a "warming bias," meaning that it has predicted higher temperatures than have occurred for nine out of the past ten years. The BBC is understood to be in talks with Metra, the commercial arm of New Zealand's national weather forecaster, as a possible replacement for the next five-year tenure. Metra's UK subsidiary, Weather Commerce, already produces graphics for the BBC and supplies forecasts to likes of Tesco, Sainsbury's, Marks & Spencer and Waitrose, which aid sales predictions and weather-related distribution issues. A source close to Metra told *The Times* newspaper: "The BBC is not happy with the service it has been getting from the Met Office: it thinks it is too expensive. We have the ability to provide a bespoke service that will undercut it. Because we already produce the graphics, we've got a foot in the door, so we're optimistic."

UK contingency plan required for nuclear new-build

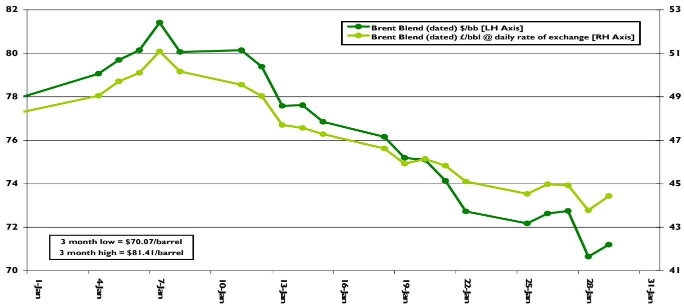
The UK government's spending watchdog cast fresh doubt last month on whether a new generation of atomic power stations can be achieved in the absence of public subsidies. The National Audit Office [NAO] said Whitehall had received a "good price" when selling its 36 per cent interest in nuclear plant operator British Energy for £4.4 billion last year, but cautioned that there were no guarantees that beneficiary, EdF Energy, would stump up the funds to build a new fleet of atomic stations. British Energy operates the bulk of the UK's current nuclear energy portfolio, although many of its aging stations are due to come to the end of their intended lifespan by the middle of the decade. Downing Street's primary objective for the sale was therefore to ensure that new plant would be built from the earliest possible date in order to avert an extended production deficient. Despite being of strategic priority, however, the Energy Department did not seek, nor EdF offer, any binding commitment to construct new stations as part of the deal. EdF has stated publically that it intends to construct four new reactors in the UK, but it is under no obligation and consequently it remains to be seen whether it will do so. With the exception of renewable technologies, nuclear power stations are the most costly to build, causing many would-be generators to suggest some form of financial inducement. If Whitehall is unable to negotiate a floor price on European carbon allowances (thereby incentivising 'cleaner' fuel sources), it may have to consider introducing public subsidies to kick-start private sector investment. As such, the NAO claimed that Downing Street should press ahead with contingency plans in the event that EdF be unwilling to proceed off its own back.

PriceFocus...

Brent Blend (dated) crude oil

The month reviewed… Oil advanced to a 15-month high at the beginning of 2010, before embarking on a downward trajectory for the remainder of January. Plummeting temperatures across the Northern Hemisphere – implying increased heating fuel demand – and upbeat manufacturing data from China and the US contributed to upside initially. News Beijing was to tighten its monetary policy in order to prevent the Chinese economy from overheating conspired with Barack Obama's proposals for a far-ranging overhaul of the US banking system to spark a commodity sell-off latterly. Rising US crude reserves also contributed to losses.

January 2010	Brent crude (dated)
Opening Price:	$77.91/barrel
Closing Price:	$71.20/barrel
Maximum Price:	$81.41/barrel
Minimum Price:	$70.65/barrel
Overall Change:	-8.6%

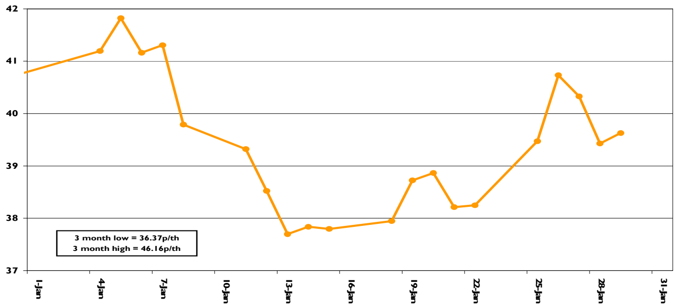


The month ahead… The crude oil sector continues to display fundamental weakness; refining activity in the US is nearing its lowest level in 25 years, indicating weak demand for fuels. Concerns the Chinese government's efforts to clampdown on bank lending could slow the country's demand for raw materials also offers downside potential to prices in the short-term. But oil continues to be driven by sentiment – an underlying recovery in equity markets is stimulating confidence over a potential rebound in energy consumption. According to a Reuters poll of 29 market analysts, US crude oil is expected to average $77.50 a barrel in 2010.

April 2010 gas contract renewal

The month reviewed… Freezing weather conditions and Norwegian supply disruptions saw the gas NBP commence the New Year in bullish fashion, although a significant upward shift at the front end of the market failed to fully translate through to longer-dated products. Gas futures shed value into Week 2 as an improved supply/demand picture teamed with a softer US natural gas sector and downside in crude oil. Near-curve gas contracts were then bid notably higher during the remainder of the period on a forecast return to sub-zero temperatures into February. An April 2010 renewal settled just over 1p lower on the month.

January 2010	April 2010 gas
Opening Price:	40.74p/th
Closing Price:	39.63p/th
Maximum Price:	41.82p/th
Minimum Price:	37.70p/th
Overall Change:	-2.7%

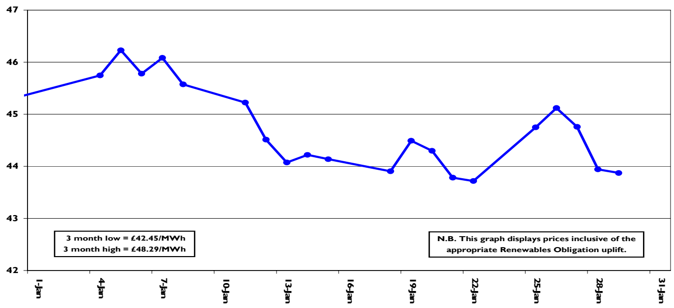


The month ahead… Weather forecasts and storage levels will be pivotal to price movements at the front end of the NBP gas market in the month ahead. If predictions by Weather Services International of below-seasonal-normal temperatures for much of February and March emerge, prompt and near-curve contracts will find support. The possibility of strong storage withdrawals in the next month or so – implying strong injections over the summer – will prove supportive for Sum-10 gas. Forward gas products are increasingly following developments with US natural gas, both in terms of a physical LNG link and a sentiment-based link.

April 2010 power contract renewal (including RO)

The month reviewed… Forward power values bounced higher during the first few sessions of 2010, in line with strength at the front end of the electricity and gas markets. Seasonal power futures generally tracked their NBP gas counterparts lower throughout Weeks 2 & 3, although overall movements were limited in contrast. Expectations of a return to chilly weather at the end of January supported prompt contracts latterly, which again fed through to the curve. An April 2010 renewal including Renewables Obligation ultimately posted a monthly loss of 3.2 per cent, with the bearish influence of coal helping to supersede falls in gas.

January 2010	April 2010 power
Opening Price:	£45.32/MWh
Closing Price:	£43.87/MWh
Maximum Price:	£46.23/MWh
Minimum Price:	£43.72/MWh
Overall Change:	-3.2%



The month ahead… With temperatures anticipated to be generally cold across many parts of the UK through much of the first half of February, National Grid is likely to upwardly revise demand projections for the period. But unless there are widespread plant outages, power generation margins should remain fairly comfortable, negating any dramatic price hikes for the prompt and residual Win-09 component months. Further along the electricity pricing curve, trade will predominantly be influenced by developments at the gas NBP, although the European coal and carbon markets will also have an influence.

Explained...
Offshore wind turbines

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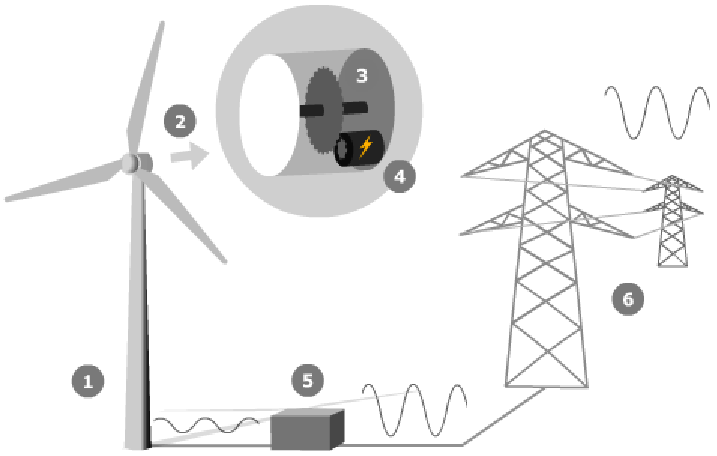
How do wind turbines work?

1. The wind blows on the blades and makes them turn.
2. The blades turn a shaft inside the nacelle (the box at the top of the turbine)
3. The shaft goes into a gearbox, which increases the rotation speed enough for...
4. The generator, which uses magnetic fields to convert the rotational energy into electrical energy. These are similar to those found in normal power stations.
5. The power output goes to a transformer, which converts the electricity coming out of the generator at around 700 Volts (V) to the right voltage for distribution system, typically 33,000V.
6. The national grid transmits the power around the country.

Simplified diagram showing how a turbine converts the kinetic energy in the wind to electricity



Source: British Wind Energy Association

Instruments to measure the wind speed and direction are fitted on top of the nacelle. When the wind changes direction motors turn the nacelle, and the blades along with it, around to face the wind. The nacelle is also fitted with brakes, so that the turbine can be switched off in very high winds, like during storms. This prevents the turbine being damaged.

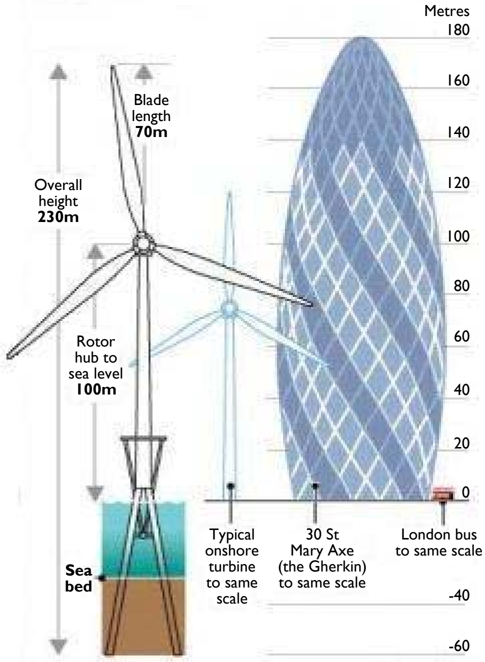
The benefits of offshore vs onshore

The costs of installation are higher for coastal developments and there is the added difficulty of connecting to the electricity grid. Even so, there are higher wind speeds offshore and therefore more electricity and revenue to be made. Planning permission can also be easier to come by, given the local opposition faced by many proposed onshore windfarms.

The technology

Offshore wind turbines are based on the same technology as their onshore counterparts and their expected lifespan is the same, approximately 20 years. Currently the main difference is their size. A typical offshore turbine has a tower height of 80 or 90 metres (m) and a height to the uppermost blade tip of about 130 m. Turbines currently being used offshore are rated at 3 MW, 3.6 MW and 5 MW. Larger turbines are currently in development, with a prototype 10MW turbine being developed in the UK at Blyth.

The scale of offshore wind turbines



Source: Financial Times

UK funding mechanism

The offshore wind industry is supported in the UK by the Renewable Obligation – a mandatory scheme that requires power suppliers to source a growing proportion of electricity from green technologies. Sustainable technologies are banded differently to ensure varying levels of support, with offshore wind coming under the highest i.e. eligible for 2 Renewable Obligation Certifications per megawatt-hour of output.

February

Monday	Tuesday	Wednesday	Thursday	Friday
1	2	3 • US Crude Inventory Data	4 • Weekly Elexon Electricity Margin Data	5 • European Central Bank policy meeting • Bank of England policy meeting
8	9	10 • US Crude Inventory Data	11 • Weekly Elexon Electricity Margin Data	12
15 • US Presidents' Day holiday – Nymex closed	16	17	18 • US Crude Inventory Data • Weekly Elexon Electricity Margin Data	19
22	23	24 • US Crude Inventory Data	25 • Weekly Elexon Electricity Margin Data	26

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