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The Future of Wind Power: Perspectives on Global Wind

In an online survey sponsored by Mobil Industrial Lubricants, Renewable Energy World magazine asked readers where they think wind power is headed, and where the threats and opportunities lie. Readers across Europe, the Middle East and North Africa responded to give their views on the future of wind power. Quizzed on issues related to policy, costs, public perception, threat from non-renewable 'carbon-free' technologies, potential markets, and more, the responses reveal much about the industry perceptions of future across more than sixty countries.

A lack of policy leadership is still the most important single factor holding back the development of the wind industry in Europe, the Middle East and North Africa, according to a recent survey of more than 1000 readers of Renewable Energy World magazine from throughout (greater) Europe, North Africa and the Middle East. The group also identified the current high prices for conventional electric power and gas as key drivers behind the growth in wind power.

Poor policy leadership was cited by respondents as the single largest barrier faced by the wind industry – despite the fact that many of those replying came from EU countries which are subject to renewables targets. Both EU member countries and those replying from nations with no similar renewable energy targets, such as Algeria and Libya, believe that national governments are doing too little to encourage the development of wind power, suggesting that even where targets have been set they are viewed as inadequate by renewable energy experts. Some 63% of the respondents are directly involved in the wind sector. Of that group, over a quarter are project developers, while others work with utilities, own or operate wind farms, or are involved in turbine manufacture or R&D.

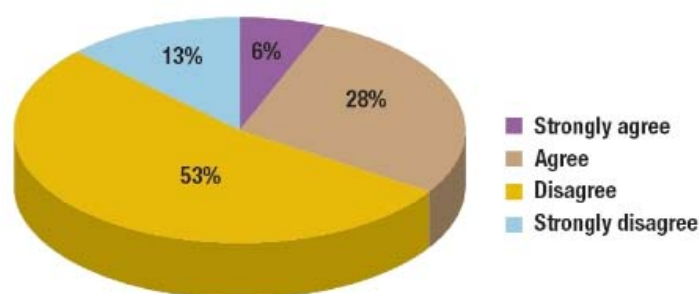


Figure 1. Is the promise of carbon capture and storage a threat to further development of the wind industry?

Almost as crucial to the future development of the wind sector are grid access and site availability, factors perceived by respondents as holding up the wind industry both in their own countries and across the board, one respondent even describing these as 'draconian planning rules in many European and other countries worldwide.' Succinctly put, another said that 'wind power will only be accepted as a mainstream supply when ... its connectivity to the grid is resolved.' Indeed, neither the cost of building wind farms, perceived or real, nor the availability of wind as a resource were seen as key reasons for progress in the wind energy sector to be held back.

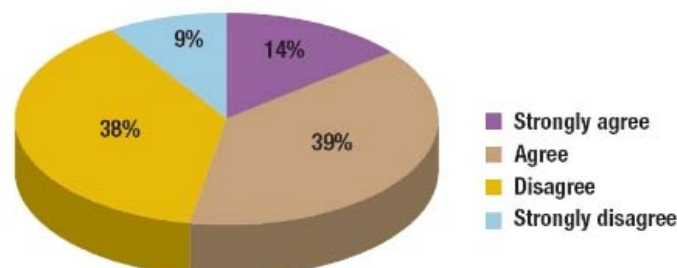


Figure 2. Is the promise of carbon-free nuclear energy a threat to further development of the wind industry?

Although less significant, opposition to wind farms at a local level, or nimbyism (not-in-my-back-yard), is also cited as a factor that stalls wind development. However, since policy issues, grid access and site availability are all considered more important, it is clear that respondents see governments and their unwillingness to push through necessary changes, rather than the power of individuals or communities to object, as the key issue blocking the wind industry's future development. As one respondent said 'for the industry and the individual I think that there's more of a push required than a pull', adding: 'things won't change without legislation'. Another agreed that 'surveys show that the public perception of wind farms has changed a lot in recent years and [they] are now deemed acceptable in most cases, subject to environmental issues etc.'

What's the impact 'low-carbon' competition?

Slightly more than half of those polled agree or strongly agree that a current threat to the development of wind is the promise of carbon-free nuclear power (whether or not respondents agree this promise is well founded). However, almost half disagree, believing wind power does not face a threat from nuclear, either because the two technologies are established and independent, or that wind power has inherent advantages.

The concept of nuclear power has enjoyed a renaissance in recent years in some countries polled, due to an increased awareness of the need to reduce harmful emissions of greenhouse gases and, in many cases, because existing nuclear generators are coming to the end of their working lives. The issue is one especially hotly debated in the UK – as well as in Germany – where an estimated 12% of electricity consumption comes from nuclear power. The German government had stated that it planned to shut down all its nuclear reactors by 2020, but there are concerns that the decision could propel the country into an energy crisis.

In the UK, most existing nuclear power stations are due to close by 2023 and the government has said its 'preliminary view' is that new nuclear stations should be built – to both reduce carbon emissions and Britain's reliance on foreign oil and gas imports.

However, many of the respondents to the survey are strongly of the view that the renewal of the UK nuclear fleet would stymie growth in the wind sector and believe instead that the future closure of UK nuclear plants should offer an opportunity for the government to push forward with a stronger renewables policy and think creatively about how renewables could be better deployed. 'Anyone ... can realise that renewable energy is faster to deploy than nuclear and is obviously much safer. The argument that nuclear is cheaper is not borne out by the history of the industry', said one respondent.

Others took the view that the closure of 'ageing nuclear power systems which are prohibitively expensive to replace and environmentally unacceptable', combined with depleted oil and gas supplies available from abroad were precisely the factors that may be exploited to ensure that a future 'energy crunch' could be best resolved by investment in renewables, with wind leading the way.

Unlike nuclear, carbon capture and storage (CCS) – a means of effectively 'cleaning' the emissions released by fossil-fuelled plants – was seen as far less likely to threaten the wind industry. Only a third of respondents agreed or strongly agreed that the promise offered by CCS is a threat to development of wind power.

This could suggest that respondents can more easily envisage a future energy balance that includes renewables alongside coal, rather than one where nuclear and renewables can co-exist comfortably. However, many respondents view the promise of carbon-free coal-powered generation offered by CCS technology as distant or unrealistic. The reasons are several. Unlike nuclear, CCS is not yet able to be deployed on a large scale and will not be a commercial reality for some time – perhaps not before 2020, as at least one respondent stated. Even once this technology becomes available, the view of many is that it will remain costly and will probably be little more than an 'interim solution' bridging the gap between hydrocarbons and renewables. Indeed, some respondents take the view that the expense of fitting CCS would mean that renewables would, by comparison, become an even more viable solution. 'CCS and particularly transport and storage is neither easy nor cheap if the cost of reverse engineering for coal-fired



power stations is properly calculated, [whilst] wind and other forms of renewables will not need the benefit of support mechanisms’.

Others even see a symbiotic relationship forming between CCS and wind in the future. ‘CCS allows coal to remain as a flexible form of generation for calm days. CCS is an enabler for wind once we get past 20% wind penetration into the market’, said one. Another respondent commented that the two technologies could indeed work within the same generation complex, saying: ‘Wind energy could become part of the carbon capture and storage solution. With a little imagination wind turbines have enormous potential beyond their perceived boundaries.’

What’s driving windpower forward?

Whilst placing the blame for a lack of progress in the wind sector firmly in the hands of governments, respondents also agreed that targets, where they have been set, are important drivers pushing the wind industry forward, suggesting that the wind sector recognises that policy is both key to its success and yet also lacking. This tension was summed up by one industry expert, who said: ‘The targets are a must for our very existence [but] governments need to pro-actively push for wind energy.’

Almost 95% of respondents agree that European Union renewable energy targets are helping drive forward the wind industry overall, whilst a similar number agree that a national renewable energy policy is an important factor in the growth of the wind industry in their own country.

Similarly high numbers also see the price of gas and conventional electricity as a major factor behind the development of wind power. Expressing both of these elements one respondent said: ‘Renewable sources will become very important during the next decades, due to the high price of oil and diminishing conventional fuels. The creation of EU targets for renewables is very important to overcome these problems and mitigate climate change.’

Also cited are the utilities’ desire to diversify, a public desire for ‘green’ electricity and the price of carbon now and in the future – forcing generators to diversify.

Indeed, climate change features prominently as a reason why wind must play a significant role in the world’s future energy balance. According to one ‘the need to develop all carbon-reduced, carbon-neutral and carbon-free sources of energy is inescapable. The true total costs of utilizing fossil fuels, including those items traditionally considered externalities, must now be recognised.’ Taking a bigger picture, another respondent commented that ‘wind power is an essential energy for the future of mankind, as it is the most economical way to generate electricity without generating CO₂.’ Consensus on this topic emerged in relation to the price of carbon. As the carbon price rises (when the survey was conducted it stood at €23.70/tonne) wind electricity production will accelerate. ‘The initial price was too low due to the issue of a flood of permits in Europe’, explains one respondent who believes that ‘future carbon prices may be of greater importance.’ Others, however, believe that carbon prices would better serve the wind industry if they were set by government rather than subject to market forces.

A call for more feed-in tariffs

Though the survey did not ask a specific question on feed-in tariffs versus other incentive mechanisms, many respondents put forward comments on the subject. This market-versus-regulator debate was one on which many respondents agreed. Indeed, a clear outcome of the survey was that wind professionals appear united in their support for feed-in tariffs over other forms of financial incentives for the wind sector. Feed-in tariffs, set by the energy regulator, mean developers are better able to predict the revenue that will be generated by the sale of renewable energy. They are widely used across the EU, including in Germany, Spain, Portugal and France. ‘One very important factor is to put feed-in tariffs in place. Germany is a good example with 53% market share in solar electricity production. This should be adopted and legislated at EU level’, said one.

The UK government, however, opted for an alternative support mechanism – renewable obligation certificates or ROCs. The view of many professionals is that ROCs offer developers less certainty as the market, rather than the energy regulator, sets the price at which the ROC can be traded and this price is therefore subject to greater fluctuations. ‘The UK should adopt a feed-in tariff like its EU neighbours. The system obviously works’, said one, whilst others commented that feed-in tariffs have been vital to the development of the wind sectors in Germany, France and Portugal.

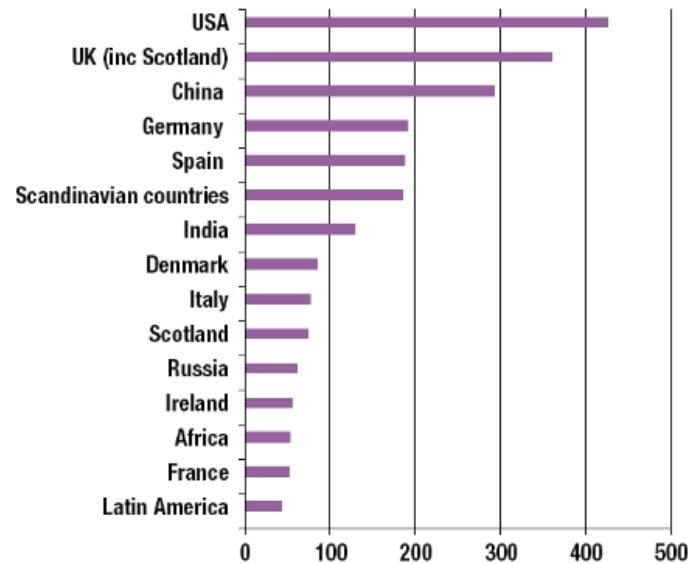


Figure 3. Which countries (or regions) do you think offer the most opportunity for growth in wind power from now to 2015?

Hypothecated taxation was also touched upon as another useful means to help promote wind, with some commenting that the fossil fuel-based economy is still too cheap. ‘These collected taxes should then be targeted fully towards greener forms of energy production’, said one.

How much wind, how big and where?

Given the very large numbers of respondents who back wind as a vital energy resource for the future, it is perhaps unsurprising that over 75% of them believe that wind power could be used to generate more than 5% of the electricity consumed in their own country. Of these, more than 20% can see wind alone contributing more than 20% to the electricity consumed by 2020, surpassing proposed EU targets. Respondents were also keen to cite countries and regions within the EU which are already able to generate significantly more electricity from wind than predictions would suggest. The German state of Saxony-Anhalt, for instance, ‘already has more than 40% renewable electricity usage, the majority of which is supplied by wind power’ and ‘Denmark is likely to generate half of its electricity renewably in the near future’, commented another.

In order to achieve this level of wind penetration, respondents favour small, local wind installations of two or three turbines, or slightly larger plants, rather than large-scale wind farms of 100 MW or more. This small-scale approach would be especially beneficial to the wind sector in developing countries, which need, according to one respondent ‘small wind energy converters in the power range of 0.5 to 20 kW, which are of high efficiency, easy and safe to handle, efficient and which represent a good return on investment.’

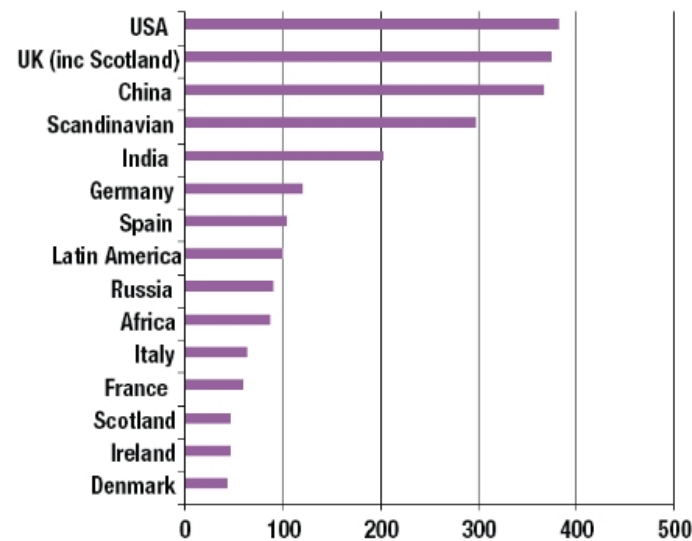


Figure 4. Which countries (or regions) do you think offer the most opportunity for growth in wind power from 2015 to 2025?

Offshore wind farms also get the backing of a quarter of those who replied as a long-term wind solution to run alongside onshore wind generation. Whilst many concede that offshore wind is still expensive and grid issues exist in terms of infrastructure and coastal grid connections, many say that 'onshore success will be duplicated offshore after 2020' and the North Sea is prominent in terms of the potential it offers in this regard.

Promising markets?

Between now and 2015 the countries seen as offering the most potential for wind growth are the USA, the UK and China (all far out in front), with Germany, Spain and the Scandinavian countries (dominated by Denmark) also featuring strongly. Italy and Ireland are other EU countries that make the top ten in terms of those perceived by respondents as offering good opportunities for wind power development in the near term.

Indeed, China was cited as an example of a country that respondents believe should provide a model for others wishing to move their renewables industries forward. 'I think the future is an exciting time ... just have [a] look at China. A few years ago it was a closed country but now it is embracing renewable energy in all its forms and it will soon lead the world in megawatt capacity installed of wind energy alone.'

India's and Russia's appearance above France, Greece and Portugal demonstrates that opportunities for development are already established beyond the EU, China and the USA. However, neither Africa nor the rest of Asia or Latin America were listed as areas offering short-term wind opportunities. Within the UK, Scotland's potential for wind power generation was noted, as was the UK's poor track record given the potential it offers. 'The UK has the most wind potential in Europe and should be a leader in the technology, instead we lag way behind Germany and Denmark who have been much quicker to implement green technology. The UK government and industry need to shake off their poor investment and go hell for leather to catch up', one UK respondent commented.

Over the following decades, to 2025, the same countries (USA, UK and China) are perceived as offering by far the greatest wind opportunities, with Spain and the Scandinavian countries again featuring strongly in the top ten. But Africa and Latin America now also appear as areas where potential will emerge longer-term. India moves up the ranking to take fifth place and all are rated higher than Italy, France and Ireland in terms of the potential they offer for long-term investment. South Africa is tipped as somewhere where growth could, longer-term, be strong. Certainly the long-term picture is less dominated by EU countries, demonstrating that wind power potential is truly global.

Diversify and prosper

With greater policy support, and given the global potential for wind growth, at least in the long term, a brighter future for wind clearly emerges from the experts polled in the survey. So too does a strong message

of diversity both within the wind sector, the broader renewables sector, and the future energy mix as a whole. Many respondents echo the sentiment expressed by one that 'wind has a role to play in the overall energy mix but can't be viewed as a solution on its own.'

The experts agree that wind will need to demonstrate its ability to diversify if it is to thrive, which will mean the development of urban micro-generation, embedded turbines in buildings, large-scale facilities, offshore plants and even floating wind turbines. And many take the view that wind must be supported within the renewables portfolio as a whole by other allied technologies, including tidal, solar, geothermal, hydro and even hydrogen, depending on the natural resources available. 'To reiterate', said one respondent, 'wind power should be considered within the context of a meaningful and effective energy strategy where it may form part of a wider portfolio of energy options.'

These options should, according to the majority of experts polled, also include other forms of energy if the energy mistakes of the past are not to be duplicated in the future. For the purposes of baseload generation, some back nuclear while others see CCS as playing an important future role, but all agree that a mix is vital to ensure stability. 'I strongly believe that the future will be a mix of renewable technologies. There is room for biofuels, wind, solar, CCS, nuclear, conventional generation ... tidal, wave, etc', said one. 'The world will hopefully not latch on to a single source of energy, as we have done with hydrocarbons, and indeed it will be more difficult to do so as each technology has certain drawbacks on its own that make it unsuited for baseload power generation', he explained.

Upbeat

The mood overall is an upbeat one. For the majority polled the idea of generating our future energy needs renewably is becoming a certainty. To quote Victor Hugo, as one expert did, 'nothing will stop the strength of an idea of which the time has arrived'.

The survey was compiled by, and its results interpreted by the Renewable Energy World magazine editorial team. The survey was sponsored by Mobil Industrial Lubricants.
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