

Riding the winds of change

Wind power is a powerful tool for tackling greenhouse gas emissions and is increasingly the technology of choice for utilities and system operators seeking to decrease the risks posed by volatile fossil fuel prices, argues the Global Wind Energy Council. But negotiators at the upcoming climate change conference in Paris need the courage to stand up to the incumbent lobbies. **Steve Sawyer**

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With the next big international climate summit coming up at the end of 2015, it's useful to review where the global wind sector is at the moment, and what role the wind industry is already playing in reducing carbon emissions, while at the same time looking at how much more it could do with the right signals coming out of the COP21 climate change conference in Paris.

Wind had a very good year in 2014, installing more than 50 GW of clean, affordable power for the first time in a single year. This year looks like it will be a pretty good year as well, with the global market passing 400 GW of total installed capacity. This was welcome news after four years of essentially flat markets due to the financial crisis and associated economic slowdown.

Markets continue to expand across the world, with exciting new developments across Asia, Latin America and most recently in Africa. The market advance has been slow but steady across the OECD, with the exception of Chile, Mexico and Turkey where the growth has been robust, and disappointing performance in Japan and Korea.

The global market grew by over 16 per cent in 2014, to bring total installed capacity to nearly 370 GW, while the annual market grew by an astonishing 44 per cent, which in part reflects the recovery of a disastrous 2013 for the US market, but is mainly driven by

the impressive 23 GW installed in China last year.

The top 10 markets for cumulative installed capacity were relatively unchanged, except that Brazil has now joined the list at #10, and India has during the course of 2015 overtaken Spain for fourth place in terms of cumulative capacity, behind China, the US and Germany. Wind power generated about 40 per cent of Denmark's electricity in 2014, and the number of national and local markets where wind penetration is in double digits grows on an annual basis.

The German market outperformed the US for the second year in a row in terms of annual installations in 2014, but that situation is unlikely to continue into 2015, with a substantial recovery foreseen in the US market for 2015 and 2016. However, after 2016 the US is facing another potential policy vacuum of the sort which caused the down market in 2013. The main surprise in the annual installation figures for 2014 was the emergence of Brazil as the fourth largest annual market. Despite the economic and political difficulties in the country at present, Brazil looks to improve on its 2014 performance with around 3 GW of annual installations which will probably keep it in fourth place.

Asia continues to dominate global markets, fueled largely by China and India, although a number of new and potentially fast-growing markets are emerging in the Philippines, Viet Nam, Thailand and Mongolia, with the early signs of market activity in Malaysia and Indonesia. Asia passed Europe in 2014 as the region with the most cumulative installed capacity.

Despite policy uncertainty and low or no demand growth in a number of markets, Europe continues its steady march towards its 2020 targets, although an unhealthy reliance on a few markets such as Germany is a worrying sign.

North America, dominated as it is by the US, is the most volatile and difficult region to predict, which will continue to be the case as long as energy policy in the US relies on on-off politically driven policy shifts. However, both Canada and Mexico have shown strong growth and Mexico should become a major global market in the next few years as the energy market reforms get embedded in a new regulatory framework.

Latin America, led by Brazil, but with increasing contributions from Chile, Uruguay and a number of smaller markets in Central America and the Caribbean is beginning to make a strong showing, with plenty of opportunity for growth in places such as Colombia, Peru, Venezuela

and Argentina.

Exciting developments in sub-Saharan Africa, led by South Africa, Ethiopia and Kenya have begun to unlock wind energy potential in that rapidly growing and power-hungry part of the world, while the North African markets in Egypt, Morocco and Tunisia are starting to move again after several years of political unrest.

New projects in Jordan and what may be the 'sleeper' market of the second half of this decade in Iran mean that this region is a key market for the future.

The Pacific region continues to be dominated by Australia which continues to move ahead despite an overtly hostile national government, whose prime minister has recently been replaced, although it is too early to tell whether or not that's going to make a difference.

The offshore sector continues to be an almost exclusively northern European affair, despite some movement in China, Korea and Japan and the first commercial project starting construction in the US during 2015. About 2 GW has been installed so far off Germany's coast alone in 2015, boosting global installations beyond 10 GW. Costs are beginning to come down in the sector, although it still has some way to go to be competitive.

Looking ahead, we expect about 53 GW of new installations in 2015, bringing the global total up to more than 420 GW by the end of this year. According to our annual rolling five-year projection, annual markets are expected to cross the 60 GW mark by 2018, with global totals reaching about 666 GW by the end of 2019.

In terms of technology, the developments continue to be incremental rather than revolutionary, with a focus on continuously decreasing the cost of energy. More efficient, larger, more reliable and more sophisticated turbines are being offered by manufacturers in Europe, North America, India and China, and new market entrants continue to join the competition to deliver the largest number of carbon-free electrons at the lowest possible costs, and through more sophisticated power electronics do so in a way which increasingly supports grid stability and flexibility.

Wind power costs continue to come down, although they vary widely due to a number of factors: wind resource, of course, but also the cost of capital and the regulatory and fiscal framework employed cause wide variations between markets. Among other places, in Brazil, Mexico, South Africa, Turkey, New Zealand, and some parts of China, the US and Australia, wind power is the most cost-effective

means to add new capacity to the grid, and is increasingly the technology of choice for utilities and system operators seeking to decrease the risks posed by volatile fossil fuel prices and of course against (in most cases) future costs associated with air pollution and CO₂ emissions.

The largest machine now commercially available is the new Vestas V-164, with a nameplate capacity of 8 MW, and a rotor diameter of 164 m, but the quest for larger, more powerful machines continues, particularly for the offshore market. The other major development is a new generation of turbines developed for lower wind speeds, aimed at exploiting wind power in areas previously deemed uneconomical, but which are often closer to load centres where they are needed. Longer blades, smaller generators, taller towers and lower cut-in speeds are employed to create a situation where even at lower wind speeds, wind power can deliver commercially competitive power in an increasing number of geographies.

Integration of wind power is relatively straightforward in markets where demand is growing, as 'a rising tide floats all boats', but the challenge of integration becomes greater in the larger markets, both at a national and local level. New management techniques and market designs are under development to accommodate the increasing penetration of wind (and solar), whose marginal generation cost is effectively zero, and create market structures, which take maximum benefit from this fact, along with effectively rewarding more flexible generation.

So what does all this mean for Paris? Two things: first, governments now have at their disposal technologies to combat the climate crisis affordably, but the lobby from polluting incumbents remains strong and for the most part bound and determined to delay their obsolescence as long as possible; and second, the drafts of the treaty text so far have very little or nothing in the way of incentives for the market to invest in a clean energy future.

The negotiators and politicians in Paris will need both courage, to stand up to the incumbent lobbies, as well as the political will to put their money where their mouths are. Both seem to be somewhat lacking at present, but the renewable energy revolution is under way and unstoppable. The question is whether COP21 will help it go fast enough to save the climate.

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