

# China establishes number one global position for wind power

According to statistics published by the Global Wind Energy Council (GWEC) in February this year, China has now overtaken the EU for total installed wind energy capacity. In fact, China installed almost three times as much wind than the EU and now has 145GW total capacity to the EU's 142GW. PES takes a closer look...

Due to China's surge of installations, the global wind power industry installed 63,013 MW in 2015, representing annual market growth of 22%. The US market reached 8.6 GW on the back of a strong fourth quarter surge, and Germany led a stronger than expected performance in Europe with a record 6 GW of new installations, including 2.3 GW offshore. Total global capacity reached 432,419 MW at the end of 2015, representing cumulative growth of 17%.

"Wind power is leading the charge in the transition away from fossil fuels", said Steve Sawyer, Secretary General of GWEC. "Wind is blowing away the competition on price, performance and reliability, and we're seeing new markets open up across Africa, Asia and Latin America which will become the market leaders of the next decade. Wind power led new capacity additions in both Europe and the United States, and new turbine configurations have dramatically increased the areas where wind power is the competitive option."

The Chinese government's drive for clean energy, supported by continuous policy improvement, is motivated by the need to reduce dependence on coal which is the

main source of the choking smog strangling China's major cities, as well as growing concern over climate change. Beijing expects renewable energy, including wind, solar, nuclear and hydropower, to make up 30 per cent of its total energy mix by 2020. Non-fossil fuel sources will still be dwarfed by coal, with a 60 per cent share.

So what has fuelled China's astonishing growth? The secret of China's success, according to GE Power can be summarised in three main points:

## 1. Using proven technologies

One of the reasons that the Chinese wind turbine industry has been able to progress so rapidly is that several of the leading firms were large heavy-machinery manufacturers and utility firms, which already had capabilities in fields relating to manufacturing, as well as in large-scale project management for deployment. In addition, licensing agreements between Chinese firms and European design houses have proved an effective method of driving forward technological advancements, allowing Chinese lead firms to develop technology using the pre-existing expertise of foreign partners.



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## 2. Ambitious government targets

Last year the Chinese government committed to 20% of its energy coming from wind, solar, nuclear and other zero-emission sources by 2030. Beijing also says it plans to increase China's wind power capacity to 200,000 MW by 2020. In comparison, nuclear is only predicted to rise to 58,000 MW over that period.

The government is also focused on cutting the cost of wind power so it can compete with the 'golden standard' set by nuclear and the low costs now experienced by coal. With recent reductions in wind subsidies, the government continues to place higher demands on technology including greater efficiency and reliability and most importantly, MW hours.

### 3. Quick learners and move fast

Chinese firms tend to work in a much faster and more agile manner, learning quickly, trying different techniques and learning from experience. The country also benefits from a number of state owned organisations which are incredibly focused on developing their own expertise within wind power, ensuring that new skills, techniques and technologies are adopted

across the country. All of this helps accelerate new wind farm deployments.

Three future challenges China needs to address to continue growth in wind:

#### 1. More unconventional locations

As wind farms become saturated in densely populated areas, many wind farms are forced to move to more remote and less conventional locations. Offshore is one of the areas where expansion is possible; here wind power could remain close enough to demand centers such as the big coastal cities, but would be away from residential areas. However, offshore does also present a number of logistical complications, from initially building the farms through to issues with servicing and maintenance. A large storm may put you down for three weeks if the conditions remain unfavorable.

Constructing wind farms at high altitude is another option. However, this puts additional stress on the equipment. As the air gets thinner due to the reduced pressure, it loses some of its insulating properties, meaning that equipment built to work at high altitudes needs to be designed with sufficient safety spacing distances to prevent high voltage arcs or breakdowns

between conductors and other electronic components. Cosmic rays are also more pronounced at higher altitude. These interact with silicon in such a way that they can cause it to puncture, which in turn, can cause the converters to fail. Therefore, additional technological considerations need to be taken into account in some regions.

#### 2. Embracing digital technologies

Embracing new technologies, such as software that can monitor and optimize the wind farm as it generates electricity, could help Chinese firms to boost a wind farm's energy production by as much as 20% and create \$100 million in extra value over the lifetime of a 100 MW farm. It works by installing dozens of sensors inside each turbine, which monitor everything from the yaw of the nacelle, to the torque of the generator and the speed of the blade tips. This data can then be used to optimize the wind equipment and power output. A select number of companies in the region have already embraced this new technology. For example, GE's Brilliant wind turbines, which harness the power of the Industrial Internet to analyse tens of thousands of data points every second,



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have been installed at the Huaneng Corporation's Huaneng Dali Longquan wind farm in the Yunnan province of China.

The challenge for wind companies throughout China, however, is to select partners with the technological expertise to drive innovation in the market and bring high-quality, reliable power to the region for many years to come.

### 3. Reforming grid operations

Large distances between wind farm locations and areas of demand are also an issue due to the need for investment to improve transmission and distribution capacity. While the government is adding new transmission lines, the integration to the grid network remains one of the most serious challenges facing the wind industry in China. A recent report from the GWEC stated that the lack of flexibility in the grid system, coupled with general lack of a real electricity market where electricity can be traded, were some of the key barriers to wind development. For example, northern China boasts good wind resources, but rapid development of wind power in this area has outpaced the local grid, leading to substantial requirement to curtail excess wind power. To help overcome this, a number of new transmission lines need to be developed, in order to link power from its source to its demand center.

The rapid development of the wind power industry has created a new set of challenges for China to address. Despite this, the GWEC still predicts that China will install an additional 100 GW by the end of 2019, exceeding the country's 200 GW target for 2020 a year ahead of time. To grow sustainably to meet this target, wind companies throughout the region must develop long-term partnerships with industry experts, such as GE, at every phase, from conception and design to installation and continued optimization and maintenance, to drive innovation and efficiency. If this collaboration continues the future will be bright for the Chinese wind industry.

Elsewhere in Asia, India chalked up a respectable 2,623 MW, pushing past Spain into fourth place in terms of cumulative capacity, after China, the US and Germany; and Japan, South Korea and Taiwan added some new capacity as well.

“2015 was a big year for the big markets – China, the US, Germany and Brazil, all of which set new records”, said Sawyer. “But there is a lot of activity in new markets around the world and I think in 2016 we'll see a broader distribution”.

But as Chinese wind and solar installations have soared, so too has curtailment, or the degree to which installed capacity is not used. Part of the reason is the power grid's continued inability to accommodate fluctuating sources of power, as well as rising overcapacity in power generation from all sources. Power utilisation hours are at their lowest since 1978 for all major generation types, according to government data for 2015.

Political issues are also a factor, industry sources complain. Local power bureaucrats are under pressure to maintain power purchases from beleaguered local coal-fired plants, as an economic slowdown softens demand from industry customers.

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China energy and ecology infographic

As each province meets its own quotas for low-carbon energy generation, power bureaucrats become reluctant to source electricity from wind or solar installations in neighbouring provinces. This has led to a particularly high degree of curtailment for wind farms in Inner Mongolia and other northwestern provinces, which were built with the intention of exporting power to the more industrialised Chinese heartland.

The political climate is something not just affecting overseas markets, as Giles Dickson, Chief Executive Officer of the European Wind Energy Association, explains: “China overtaking the EU in wind energy is watershed moment. It sends a powerful message to policymakers: if Europe really wants to be number one in renewables it needs to get its act together. We need a clear EU vision for renewables beyond 2020. And great ambition and clarity from individual Member States.

He added: “China’s ambition on wind now far exceeds Europe’s. Other emerging economies have also made big long term

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commitments. But today only 6 out of 28 EU Member States have clear commitments and policies for renewables beyond 2020. This has major industrial policy implications. Today Europe’s wind industry has a 40% share of the global wind market and the best technology. But to stay cost-competitive we need a strong domestic market. Otherwise it’ll be China and others that capture the rapidly growing global market – and eventually outperform us in Europe.

And this would hurt us economically. The wind industry supports over a quarter of a million jobs in Europe today, generates €67bn annual turnover and is the lion’s

share of Europe’s €35bn renewables exports. We can’t take this for granted.”

In October 2014, the European Council set a target for the EU to meet at least 27% of its energy needs from renewable energy by 2030. ■

**PES would like to thank the European Wind Energy Association for the information used in this article.**

**For the EWEA’s full response to the consultation on the revision of the Renewable Energy Directive please visit:**  
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