COFACE ECONOMIC PUBLICATIONS

November 2018

FOCUS

By Khalid Aït-Yahia
Coface Sector Economist and Statistician
based in Paris, France

Wind energy: how long will the wind stay in the industry's sails?

Wind energy undoubtedly has a bright future, with many countries around the world eager to develop this source of power due to its affordable cost of production, its ease of use, and the abundance of wind.

The rise of offshore wind, with an increasing number of turbine projects in the sea, seems to be the beginning of the creation of maritime energy infrastructures that will be able to benefit from the stronger ocean winds. Developing countries, with their restrained means, show a will to empower community with this kind of technology, helped by decreasing costs, access to funding, and the knowledge of advanced economies with a strong track record and more experience.

However, with this opportunity come risks: although wind is a worthwhile investment, it is a risky one, due to technical difficulties and a high probability of reduced access to cheap financing. Wind energy is being courted due to falling selling prices of windmills, but this advantage is also a problem for manufacturers, as it dents their profitability and may exert pressure on their will to invest. Moreover, wind energy development will have to face many challenges linked to increasing costs looking forward, including reduced access to financing for companies in the industry on the back of tightening monetary policies, and the global protectionist environment (including the US-China trade war).

Additionally, nations are currently racing to lead on the development of this technology and to become biggest producer as started; with the key players being Europe, China and the United States of America, the largest markets for this technology so far. Europe appears likely to dominate the industry over the coming years, mainly due to its technical lead, strong national and European financial support, and the size of its market.

Europe is likely to takes the lead in wind energy production

Alongside other renewables, wind energy has experienced a strong growth since the mid-2000s. European turbines makers were and still are able to deliver quality products due to their four decades of experience in the business. The leading position of European manufacturers and the quality they offer is based on a large ecosystem where innovation and competition are fostered, with a large range of steel and component suppliers (towers, nacelles, blades, gearboxes, and converters), along with numerous service providers (project developers, consultancies, engineering companies, etc.). Moreover, their footprint is much more geographically balanced than that of China or the United States. For instance, Mexican wind farms use turbines from big European players in the field, such as Siemens-Gamesa, Nordex-Acciona, and Vestas (**Table 2**).

Wind energy around the world – key figures

• According to the IRENA[1], at the end of 2017, fossil fuels provided around 73.5% of the total electricity produced in the world and renewables 26.5%.
• 16.4% of global electricity was generated by hydropower and 5.6% by wind energy at end 2017.
• China had the leadership in terms of installed wind capacity at end 2017, according to the GWEC[2] (**Table 1**)
• In 2017, China generated 19,660 MW of electricity via wind energy; Europe 15,638 MW, and the United States 7,017 MW.

TABLE 1
Installed wind power capacity per regions worldwide in 2017, in megawatts (MW)

Asia	228.684
Europe	177.506
North America	105.321
Latin America and Caribbean	17.891
Pacific region	5193
Africa and Middle East	4.528

Source : GWEC

TABLE 2
Top 10 global turbine makers' market share in 2017

Vestas	Denmark	16.7%
Siemens Gamesa	Spain	16.6%
Goldwind	China	10.5%
General Electric	USA	7.6%
Enercon	Germany	6.6%
Envision	China	6.0%
Nordex Acciona	Germany	5.2%
Mingyang	China	4.7%
Senvion	Germany	3.7%
Suzlon	India	2.6%

Source : REN21

Ultimately, the pioneering efforts made in Denmark during the 1970s and the strong support from both the Danish state and the European Union (EU) significantly helped the industry to gain a global lead. Since the mid-1990, the EU has set a series of targets on electricity generation from renewable sources to be reached in order to fight global warming. It is clear that European windmill manufacturers are generally larger (in terms of revenue) than their foreign counterparts, as they have merged with each over the time to benefit from synergies and a larger portfolio. They tend to diversify their revenues by providing services related to wind farm management, in order to obtain recurring revenues and to do some cross-selling.

Analysing the situation in other large markets offers an insight into why Europe is likely to lead the way in the future. Chinese turbines manufacturers are highly dependent on the Chinese market, and are thus at the mercy of any government decisions regarding changes in public support for renewable energy. Wind energy development has seen tremendous growth since 2008 in China, but it is slowly decelerating, as the central government is trying to reign in the subsidies it granted, as there is a deficit in the fund created to spur the development of renewable energy. Although this fund received money from a surcharge by electricity consumers (households and companies alike), the amount was never enough to cover the growing development of related projects in China. The alternative would be to hike energy prices. Nevertheless, the wind energy industry itself will continue to grow, albeit at a slower pace.

General Electric (GE) is the leader in the North American market; particularly in the United States, where it benefits from a 40% market share. Its takeover of Alstom's energy branch in 2014 has also helped the conglomerate to spur its European presence. However, European manufacturers are expected to continue to lead due to their experience, financial strength, and ability to innovate and deliver products adapted to land and seabed configurations.

Why is there such an appetite for wind energy?

The chief reasons behind the surge for wind energy are cost competitiveness, main rationales behind its surge. Compared to solar panels, wind turbines are a less a less commoditised product[3]. Moreover, the market is defined by higher barriers to entry, mainly capital intensiveness, which increases the upfront cost an investor must pay if the turbine's lifespan is not taken into account. The industry is truly a global one, expanding in all regions. According to the REN21 network[4], 90 countries had implemented a commercial scheme for generating electricity from wind farms at the end of 2017. This development was spurred by support schemes from governments, its favourable cost-competiveness ratios[5] compared to nuclear plants or coal fired utilities, and a less damaging impact on the environment than fossil fuel plants.

Even the United States – whose government has expressed agnosticism towards global warming and exited the Paris Conference on Climate in 2017 – is seeking to bolster the integration of wind power into the grid, in an attempt to "achieve American dominance in energy"[6], by allowing the lease of 390,000 acres off the coast of Massachusetts. Added to that, the US Department of Energy will fund via a loan an offshore wind farm in the Erie Lake in Ohio, after their environmental assessment found that the project should not interfere with bird migration patterns (although this result was contested). Many US states have embarked on wind power development projects in recent years;

1 - International Renewable Energy Agency
2 - Global Wind Energy Council, a trade body for the wind power industry.
3 - A product only distinguished by price and not by other factors.
4 - A political network gathering the major contributors to the development of the renewables.
5 - Lazard, 2016. Lazard's Levelized Cost of Energy Analysis - Version 10.0. [Online] Available at: https://www.lazard.com/media/438038/levelized-cost-of-energy-v100.pdf [Accessed 30 October 2018].
6 - GTM, 2018. The US Wind Sector Toasts Trump's New Love of Offshore. [Online] Available at: https://www.greentechmedia.com/articles/read/us-wind-sector-toasts-trumps-new-love-of-offshore [Accessed 30 October 2018].

given the federal state's willingness to fund some projects, there is a strong dynamic to develop it in the US. Paradoxically, the state of Texas, a leading fossil fuel producer, is at the same time one of the leading states in terms of capital invested in wind farms (around USD 42 billion at end 2017), together with Iowa, Oklahoma (both at around USD 14 billion), and California (USD 7 billion). The development of windmills there allowed utilities to shut down coal-fired plants, unable to compete with more and more attractive and cheaper alternatives (natural gas fuelled power plants included).

Wind energy development has some similar characteristics with the development of photovoltaic technology, notably the rapid cost decrease and the strong (but variant) public support schemes implemented throughout the 2000's. However, contrary to the solar panel industry, China has not been able to outperform Europe for the aforementioned reasons. Overall, as per the rationale explained earlier in this article, we anticipate that Europe is likely to continue to take the lead over the next decade.

Challenges are accumulating ahead

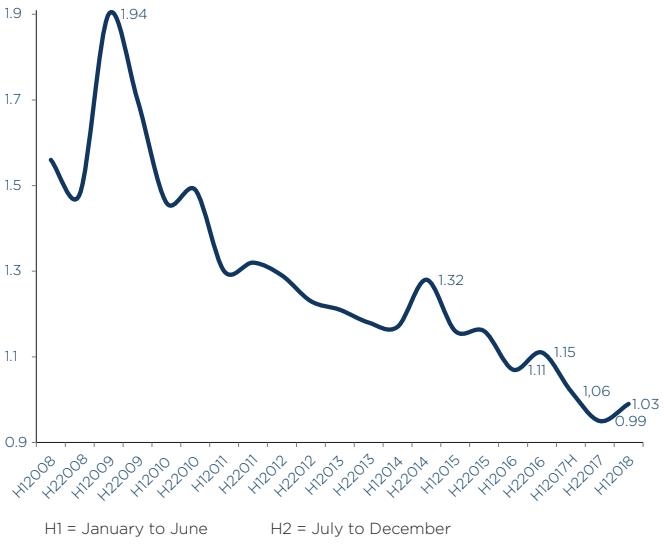
Prices of delivered wind turbines are decreasing

The overall cost of renewable energy, including wind, is decreasing. Prices of delivered wind turbines fell past USD 1 million per megawatt during the second half of 2017 and are expected to decrease further in the future (**Graph 1**). In parallel, some countries are considering the removal of subsidies to help wind energy development against fossil fuel plants. For instance, Norway will no longer subsidise wind farms as oil and natural gas prices are increasing, and the cost of operating a windmill is lessening.

In addition, the recently implemented mechanism of renewable energy auctions[7] has helped reduce prices, as they enable tough competition between developers, and subsequently windmill manufacturers. Governments rely on auctions for renewables energy to develop, notably for offshore projects. They have put this in place to bring down prices and to control the pace of wind energy development, a system also known asas Feed-in-Tariffs[8] (FiT). The FiT system has gradually reduced since its inception. It is a mechanism unable to control the growth of capacity and put pressure on the grid as well as government public finances. This system, in use in different renewable energy activities, therefore has limits. Examining the solar energy industry reveals issues that might also emerge with wind: in China, for example, some solar farms are on the brink of bankruptcy because the public agency in charge of renewable energy financing has not been able to deliver the subsidies on time. This agency owes solar farm developers around USD 17 billion worth of backlogged subsidies.

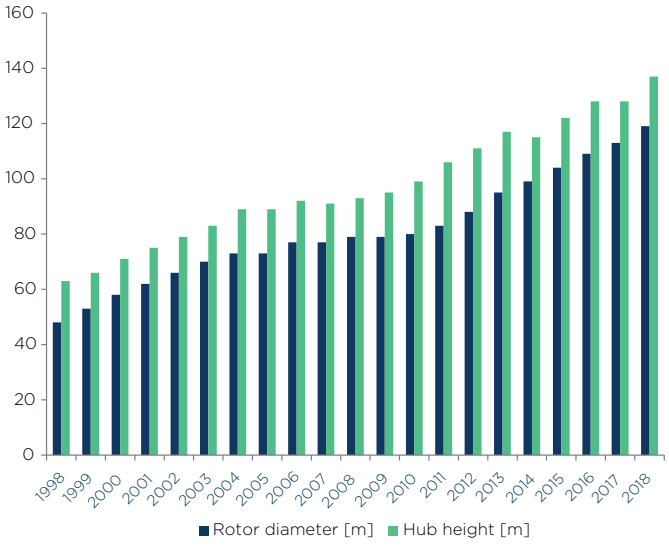
Wind turbine prices mask a reality affecting wind energy players: turbines are getting increasingly bigger, and there is a race to exacerbate this trend in order to increase the power they can deliver in one spin. Taller hub heights allow them to catch more powerful winds and to produce more electricity for a certain amount of time, a measure called "capacity factor", and are installed offshore where winds are stronger. However, this kind of hub requires a larger capital investment to acquire a competitive edge. Taller hub and other technologic advancements are required to increase capacity factor

GRAPH 1
Average prices of delivered wind turbines (USD/MW)



Source: Bloomberg New Energy Finance

GRAPH 2
Average rotor and hub heights



Source: Fraunhoffer Institute

7 - For more information about renewable energy auctions, please consult: http://www.irena.org/publications/2015/Jun/Renewable-Energy-Auctions-A-Guide-to-Design
8 - GOV.UK, 2016. Feed-in tariffs: get money for generating your own electricity. [Online] Available at: https://www.gov.uk/feed-in-tariffs [Accessed 30 October 2018].

of windmills, which is what wind farms developers are looking for (in addition to financing). This exerts pressure on the profitability of windmills manufacturers in a cut-throat competition environment. For instance, nearly all major players in this field reported decreasing prices impacted their Earnings Before Interest and Tax (EBIT) in the first half of 2018, despite strong demand in volume for their products and more integrated sales of related services.

For instance, the Swedish SOE* Vattenfall is developing a windfarm off the coast of Scotland[9], the windmills of which reach 191 metres each and is designed by GE to provide around 8.4MW of electricity to the grid. According to the Fraunhofer Institute, turbines height has more than doubled (+117%) in 20 years (**Graph 2**), with rotor diameter increasing by 150%.

Cheap financing in Europe and in the US will no longer be the norm

Wind farm development currently relies on access to financing and authorities' willingness to provide support. According to a 2017 study from the consultancy Green Giraffe[10], 81% of all added capacity in 2016 in Europe was funded with private debt, thus requiring access to liquidity. Given the tightening of US monetary policy with the recent interest hike and the end of the quantitative easing by the European Central Bank planned for the end of the year, general access to liquidity will shrink, which will also affect wind energy developers, who had until now been empowered by abundant liquidity to start new projects. However, the wind energy industry is expected to grow slightly in 2018 and to post more robust growth from 2019 onwards due to rising competitiveness, strong public support and the need to fight global warming. Therefore, the need to recourse to debt financing will grow accordingly, alongside refinancing for existing farms. For these reasons, some projects might be squeezed out due to more limited funding, therefore reducing sales prospects for turbine manufacturers. This situation will heighten the already acute competition between windmill makers, further reducing prices. We expect some mergers in this industry to gain sufficient size to put suppliers of raw materials and equipment under pressure to lower costs.

Going offshore, a needy but risky bet

Wind energy players' new strategy is focusing on offshore wind. The technology has matured, leading to an ecosystem of services companies able to anchor windmills to the seabed, a rather difficult task[11]. There are many technical risks, including cable failures, severe weather conditions damaging turbines and rotors, and deep water, among others. Offshore wind turbines are much expensive than onshore ones: according to the BNEF, the average offshore windmill cost per megawatt hour in 2017 was around USD 126, mainly for farms in the North Sea, which is too expensive to compete with coal- or gas-fired plant electricity. Bringing down costs will inevitably spur power generation from wind, which is already the case in Europe, China, Africa[12], and the United States. But it will bring another risk, as the offshore segment is not yet mature compared to the onshore one, and needs a round of industrialisation that will help further lower prices. This industrialisation should be accompanied with an emphasis on quality, as insurers are dissatisfied with the design of the cables connecting windmill and power stations, and are subsequently increasing their premium prices or refusing to cover damages if technical requirements are not met.

Trade war and input prices

The ongoing US-China trade war is impacting the wind energy segment. Windmills are mainly made of steel and will suffer from the tariffs implemented since June 2018[13]. Steel product prices in the United States rose by 15% since April 2018, and will impact the profitability of local wind turbines makers and their suppliers, if they haven't hedged their positions. From a global point of view and according to most companies' financial statements, the extra costs induced by the waging trade war will not be felt this year due to hedging and supplier contracts, but 2019 should see a rise in raw input prices. As the competition between manufacturers is intense, higher costs will not be absorbed in the selling price of turbines, and thus will impact component manufacturers further down the supply chain.

9 - Partly funded by the EU, and fought by the US President Donald Trump because of the sight of the windmills from his golf field.

10 - Green Giraffe, 2017. Offshore wind finance - evolution and outlook. [Online] Available at: https://green-giraffe.eu/sites/green-giraffe.eu/files/170911_offshore_wind_finance_-_evolution_and_outlook_pfma_1.pdf [Accessed 30 October 2018].

11 - Some turbines are floating and are not anchored to the seabed, but this technology is still in its infancy.

12 - For example, Kenya and Morocco are two African nations pushing for renewables.

13 - Since June 2018, all imports of steel and aluminium into the United States are subject to respective tariffs of 25% and 10%.

COFACE SA
1, place Costes et Bellonte
92270 Bois-Colombes
France
www.coface.com

coface FOR TRADE