A glimpse into the future of German wind

While German wind turbine manufacturers have become active in nearly all markets in the world, in Germany it is facing a profound upheaval. Now that renewable, decentralised energy transition technology has become a major pillar for power generation in this industrial nation. Matthias Zelinger, Managing Director of the Power Systems trade association and VDMA (German Mechanical Engineering Industry Association) gives PES the benefit of his insight.

Since the beginning of the year the federal government has started organising the expansion of new installations by implementing a tendering system, following a major, international trend. This increases competition and cost pressure, along the process chain. At the same time, they are striving to achieve fair conditions on the world market and develop a new integrated energy system in Germany.

The expansion of wind energy in Germany was very successful over the last three years. 2016 saw a capacity increase of approximately 4,600 megawatts onshore and 800 megawatts offshore. With more than two gigawatts going online, 2015 was a record year for offshore wind energy.

The reason for this great leap was in fact due to a delay: the completion of a number of offshore grid connection points in 2015 meant that an unusually large number of wind turbines that had been installed over the previous year could finally feed into the grid. Land-based wind energy achieved a record year in 2014 thanks to a variety of concurrently occurring effects. The obvious one was that many investors pressed for completion in the same year so that they could finalise before the new amendment to the Renewable Energy Sources Act came into force. This was following a long and unhealthy row of boom and bust cycles caused by regulatory changes.

![Development of the market in Germany](image-url)
The German wind industry’s export business has also done very well. German manufacturers now export 2/3 of their production and have achieved an approximately 20 per cent share of the world market. Finally, the market exhibited over all a sustained phase of large-scale wind power expansion.

Despite the slight decrease in world market volume in 2016, the international markets with the exception of China remained stable, with around 55 gigawatts, according to GWEC figures. The world market size was however still dominated in particular by China, still largely inaccessible for foreign manufacturers, which according to preliminary figures achieved an increase in capacity of 23 gigawatts. It is estimated that the world market will experience a slight but continuous rate of annual growth until 2020.

It is safe to say that Germany is still one of the most interesting international markets for wind turbine manufacturers. Energy transition technology has become a relevant factor for the German industrial base in terms of production capacities, its wealth of know-how and renowned scientific institutions. Wind energy provides around 150,000 jobs in the country, with some 55,000 of these in the mechanical engineering sector, one that plays a key role for Germany. In 2016 the wind industry’s German production generated a turnover of around 14 billion euros.

The icing on the cake is that Germany is home to the leading international wind industry trade fair, WindEnergy Hamburg, which has together with the WindEurope Summit established itself as the leading event for the wind industry.

Renewable power generation is now more or less the norm, but it is going through a sea change, an upheaval that harbours some risks, but many opportunities. The 2017 Renewable Energy Sources Act (EEG) represents a profound transformation for the German market, changing from a remuneration system with fixed feed-in tariffs to competitive tendering combined with quantity control of the annual expansion of wind turbines both offshore and on land.

The first tenders for the construction of wind energy projects will be submitted this spring. In the transition phase between 2017 and 2018 it is possible to complete projects that will be subject to the old remuneration system with fixed feed-in tariffs to competitive tendering combined with quantity control of the annual expansion of wind turbines both offshore and on land.

As of 2019 the annual expansion on land is expected to be 2,800 megawatts. That is considerably less than in the boom years 2014-2016, but still relevant enough for Germany to retain its position as a key market. It becomes difficult, however, when the implantation rate is not high. In other words, when projects were awarded the tender, but have not been built.

There is reason to fear that such a low implementation rate is possible is: the volume of the significant German market could shrink, because depending on the scope of the tenders awarded to local community energy projects and the construction time, it is to be expected that there will be long average installation periods.

The situation of the offshore wind industry will be predictably critical when we look at 2021 and 2022, where federal government has restricted expansion to 500 megawatts a year. Because of the long production lead-time involved, reducing the expansion volume and rigidly fixing annual quantities will already begin to put a strain on value creation for the offshore wind industry in Germany over the next few years.

Cost reduction through improved turbine technology, turbine efficiency, economies of scale, digitisation – we are using the term Industrie 4.0 and cooperation with suppliers has long been a global imperative for the industry. The cost-saving aspect is once again becoming increasingly more important, because the tendering process creates even more competition along the whole project chain.

The international trend towards tendering schemes for renewable energy generation is shaping the demand for cost-optimised, reliable wind turbines and system solutions. Industrial production, innovative supply chains, investment in research and development for future-oriented turbines that are optimised to specific wind and weather conditions – these are the things that made it possible to reduce the cost of generating electricity by 60 per cent over the last twenty years.

Land-based wind energy is now one of the cheapest power sources in the energy system. We have gone through a steep learning curve in recent years. Greater power
yields and more operating hours have made up for the reduced remuneration permitted by the EEG, have sustained system stability, and will continue to do so in 2017. Offshore, recent results of tenders in Denmark and the Netherlands have shown that appropriate project volumes can significantly reduce costs. This can also be expected in Germany, even if it is not possibly to apply the conditions exactly in the aforementioned two countries to Germany: lifetime and project size, which have a very significant impact on the project costs for a wind farm, can vary. Unlike in Germany, operators in Denmark and the Netherlands do not have to bear the costs for the transformer platform. Their projects are also far nearer the shore and in shallower water, which makes them less costly.

Due to growth in other parts of the world, seeing especially large scale projects and due to the stagnation of the German market export and the globalisation of the industry gains even more importance. The original German wind industry partnering with players from other countries and being present in nearly all major markets is successful on the world market. It develops turbines for specific climates and systemic requirements, has the capability to enter new markets fast and to educate people for production, service and maintenance tasks. The UN’s Paris Climate Treaty opens up more markets for renewable energy technologies and provides a more sustain market perspective.

Fair competition conditions on the world market are however crucial for the future of the wind turbine industry and for a cost effective transition towards carbon neutral energy supply. The removal of trade barriers opens up an opportunity to offer competitive products more quickly on the world market. National regulations with requirements for local conditions are quite common. They specify that a certain proportion of the value creation of a wind energy project must be rendered in the country.

Local value creation is needed and the mechanical engineering industry is used to producing all over the world, which also creates employment in Germany. However, rigid local content requirements, often also result in slower market development and higher costs. Local content grows reasonably with the market, the maturity of local industry and the sustainability of regulation.

The upheaval in the market structures and in legislation is an expression of an even more fundamental change of energy systems as a whole. The energy system of tomorrow is characterised by the phrase integrated energy. The meaning behind this is the idea of an energy system that is greater than the sum of generating capacities, grids, storage systems and consumers. Integrated energy connects them all digitally in order to harmonise supply and consumption, with one another, in a way that is intelligent and efficient. A generator that is fit for the future is flexibly integrated into the overall system, efficient and – even in the case of thermal generators - potentially climate-neutral.

Manufacturers are preparing themselves for this and they are gathering their experience in Germany, the country behind the concept of energy transition. In 2016 more than 30 per cent of Germany’s electrical power consumption was provided by renewable energy, with around half of that coming from wind energy.

With just 15 minutes a year of power outage, the power supply in the country is world class. This is due not only to a good infrastructure, but also to system-assisting plants that are increasingly stabilising the grid. These must have full access to the market for system services. Technically we are often ready but what is lacking is a regulatory framework and a business model for system services, for energy storage systems and for the flexibility of everything in the energy system.

Despite this, the wind turbine industry is still investing in system-assisting technologies because it is obvious that a properly functioning energy system will be dependent on advanced wind turbines and grid technology. Wind energy will also increasingly have to make its way into the heating and mobility sectors if energy transition is also to be possible in these sectors.

The wind industry has a positive future in Germany, but it must take three things to heart: firstly, it must push ahead with the competition in the domestic European and global markets triggering innovation. Secondly, it must further reduce electricity generation costs. Thirdly, we must use our technologies to support the stability of the energy system and accelerate the energy transition in the heating, the industrial and transport sectors.

The chair of von VDMA Power Systems, Siemens Wind & Renewables Division CEO Dr Markus M. Tacke earlier summed up the opportunity the German wind industry is facing as follows: “If we succeed, then our wind industry will play a significant role in ensuring that solutions from the German Energiewende can be successfully adapted worldwide.”

Because we, as an industry association, know that this does not depend on the firms alone, we advocate a political framework that encourages competition, industrial growth and innovation.