



From niche energy source to global standard

Wind energy meets PC Control for the next energy boom

With around 19,800 megawatts of newly installed wind power capacity, 2007 was a record year for the wind energy sector. The capacity installed worldwide increased to 94,000 megawatts. Germany was top of the international ranking list with 22,200 MW, followed by the USA with a total capacity of around 16,800 MW, Spain with approx. 15,200 MW and India with approx. 8,000 MW. China was in fifth position with an installed capacity of around 6,000 MW. The global wind power boom is a result of growing concern about climate change, security of supply and dwindling oil resources in combination with the fact that wind power is becoming increasingly cost-effective.

Few would have believed predictions made in the early 1980s that today Germany would produce approx. 40 billion kilowatt-hours – i.e. around 7 percent of total electricity consumption – from wind power plants. At the time, such figures appeared just as utopian as the idea that PC-based automation could become established as a worldwide standard in a wide range of industries. However, in both cases expectations were not only met, but exceeded. According to calculations produced by the German Wind Energy Association (BWE), an installed capacity of 45,000 MW onshore and 10,000 MW offshore is quite a realistic prospect for Germany by 2020. This would correspond to around 150 billion kWh of CO₂-free electricity per year, equivalent to 25 percent of total electricity consumption. In order to achieve this ambitious target, existing wind power installations will have to be expanded and so-called first generation systems will have to be replaced with new, high-performance multi-megawatt systems (repowering), and new wind farms will have to be built.

In August, the go-ahead was given for the construction of "Alpha Ventus", the first German offshore wind farm at sea, located around 45 kilometers off the coast of the island of Borkum. Beckhoff contributed its expertise as control equipment supplier for this pilot project consisting of six wind energy converters from the Multibrid M5000 5 MW class (see p. 39).

Beckhoff entered the wind power market as an automation supplier at an early stage, and today we have a wind power competence center at our Lübeck branch offering sound industry know-how.

Compared with a conventional solution, the Beckhoff PC-based control system has the advantage that only a single computer is required for control and data

interfacing purposes. EtherCAT, our high-speed-fieldbus system, is able to demonstrate its strengths: maximum performance, flexible topology, integration of subordinate fieldbus systems (e.g. for the connection of autonomous pitch control systems), 200 kHz sampling rate in the field for future expansion of the control system to form a condition monitoring system, and cost-effective conversion between copper and optical fiber technology (e.g. for the fieldbus connection between the tower base and the nacelle). The Beckhoff system also offers superior safety performance: While previously, the nacelle and tower were "hard wired", today all safety sensors and actuators are integrated in the Bus Terminal system via TwinSAFE technology. Beckhoff is probably the only supplier able to offer control systems, automation components, control cabinets and even system management software from a single source – a considerable advantage for customers.

In addition to Europe and the USA, we are also active in the Chinese market as an automation partner for producers of wind energy converters. The Chinese wind power market is also booming, which is not surprising in view of the voracious appetite for energy associated with the country's rapid economic growth.

The Chinese government has an ambitious target of 30,000 MW installed wind capacity by 2020. This means that China is likely to become the leader in the wind power market over the coming years. Meanwhile, there are around 60 manufacturers of wind energy converters in China. The majority are currently still owned by foreign investors, although the number of Chinese business start-ups is increasing steadily. Beckhoff supplies control equipment for e.g. Mingyang (see p. 40) and Goldwind, the market leader in China. Goldwind supplied the wind energy converters for the recently opened Beijing Guanting Wind Farm, which is the first wind farm in Beijing and served as a showpiece for clean energy generation during the 2008 Olympics. The wind farm meets 5 percent of the electricity demand of the Olympic stadium.

On this note, we hope you enjoy reading PC Control 02/2008 and the integrated "Wind Special" and wish you high availability for your systems.

Dirk Kordtomeikel

Wind power expert and manager of the Lübeck branch