WINDBLATT

ENERCON Magazine *for wind energy*

02/11

E-101 Prototype
ENERCON installs first WEC from its new 3 MW series near Görmin in Germany

Technology
ENERCON now offers its tried-and-tested inverters also for solar projects

International
ENERCON and WindVision celebrated the official opening of the E-126 Wind Farm Estinnes

ENERCON
ENERGY FOR THE WORLD

Cover

Events

Technology

International

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Hoisting the rotor hub of the ENERCON E-101/3 MW prototype

ENERCON NEWS

Discussion about neodymium - ENERCON does not use material

In recent weeks, media reports about the use of neodymium in wind energy converters gave rise to public discussions. The element belongs to the rare earth metals and is mined primarily in China – sometimes at the expense of health hazards and considerable damage to the environment. Neodymium is needed to make the permanent magnets that are used in the generators of other wind turbine manufacturers. The reports made blanket statements about an alleged dirty side to the clean wind energy that presents itself as an environmentally friendly alternative to nuclear energy. Contrary to what the media reports suggested, ENERCON wind energy converters generate environmentally-friendly power totally without neodymium. The gearless design on which all wind turbine types – from the E-33/330 kW to the E-126/7.5 MW – are based employs an annular generator with separate excitation. The magnetic fields required by the generator to produce electricity are created electrically. Due to this design, ENERCON turbines are built completely without permanent magnets.

ENERCON thus feels that also from the point of view of environmental and health aspects, its choice of WEC design has been confirmed. «We are a high-tech company that sets great store by environmental protection,» says ENERCON Managing Director Hans-Dieter Kettwig. «Our choice to rely on separately excited generators was the right one, not only from a technological but also from an environmental point of view.» According to Kettwig, renewable energies need to be viewed in their entirety in order to offer a convincing alternative: Producing clean energy is one thing; however, sustainability in production is just as important. In this respect, ENERCON once again takes on a pioneering role in the wind energy industry.

Production of ENERCON annular generator in Aurich.

WEC Turmbau Emden extends production facilities

WEC Turmbau Emden, maker of concrete towers for wind turbines, is extending its manufacturing facilities. This summer, the company put into service a third production bay at its site on the south quay of Emden harbour. The extension to the factory building with a surface area of 7500 m² is used to produce precast concrete segments for the new ENERCON E-101 wind energy converters.

The structure that is 300 metres long and 25 metres wide was built at the end of May, says Managing Director Norbert Hölscher. The manufacturing equipment which includes an 80-tonne overhead crane was installed in June. Series manufacturing was scheduled to start in July.

The new production area is able to turn out one E-101 concrete tower per day, says Norbert Hölscher. This increases the total manufacturing capacity of WEC Turmbau Emden to up to 3 precast concrete towers per day. 80 new workers have been employed to work in the new manufacturing unit for E-101 towers.

Indefinite unit certificates for all ENERCON turbines

ENERCON has now obtained indefinitely valid unit certificates for all wind turbines in its current product range. These certificates certify that, as far as grid faults and the provision of reactive power are concerned, ENERCON wind turbines not only meet the requirements laid out in the medium-voltage guidelines of the BDEW (German Association of Energy and Water Industries), but also of Transmission Code 2007 and the SDLWindV (System Service Ordinance). These are necessary prerequisites for obtaining a unit certificate which, in Germany, is mandatory for connecting a wind turbine to the grid.

ENERCON has received indefinite unit certificates for their E-82 E2/2 MW and 2.3 MW, the E-70 E4/2.3 MW, the E-53 and the E-48 turbines. Although still with a prototype status, the E-82 E3/3 MW, E-126/7.5 MW and the E-101 are considered equal to the certified WECs until measurements have been completed.

Mechanic-employee Robin Paschant explains how a WEC is being assembled.

100 school children visit ENERCON in Aurich

About 100 boys and girls visited ENERCON in Aurich on the occasion of Future Day in early April. They were given guided tours of the manufacturing facilities in the Tannenhausen business estate that build components exclusively for ENERCON, giving them the opportunity to learn about different careers in this industry.

Klaus Peters, ENERCON's Senior Production Manager, was impressed with the enthusiasm the boys and girls, aged between 10 and 16 years from Aurich and surrounding areas, had for the event, and how the girls in particular showed a lot of interest in the technical careers. Future Day is a nationwide event in Germany – a day that allows children to learn about careers that may have the power to broaden the range of potential career choices for boys and girls, which traditionally is still much determined by gender.

ENERCON has participated in this event for the last 10 years. «For us, it's an important instrument that helps us recruit new apprentices,» says Klaus Peters. Accordingly, workers took a lot of time to explain the different aspects of their work at ENERCON to the youngsters. Many of ENERCON's full-time instructors were also present. ENERCON offers apprenticeships in 20 different careers.

Irish grid operators visited ENERCON headquarters

At the end of June, ENERCON Aurich was host to visitors from the Irish grid operators, EirGrid and SONI. The delegation of experts came to Aurich to find out about how ENERCON wind turbines meet the Irish Grid Code requirements. Another topic of discussion was the behaviour of ENERCON wind turbines under various grid conditions.

During their stay, the experts had a guided tour of the production facilities in the Tannenhausen business estate as well as a live demonstration of ENERCON wind turbine behaviour in Fiebing near Aurich. At the site Wobben Research & Development (WRD), ENERCON's construction and development department, has set up a test container to simulate various grid situations under practical conditions on an ENERCON E-82/2 MW machine.

The visitors were quite impressed, especially by ENERCON's willingness to exchange expert knowledge with grid operators.

ENERCON builds new concrete tower factory in France

ENERCON is currently building a new precast concrete tower factory in Longueil-Sainte-Marie near Compiègne, France. The plant is scheduled to be completed by summer 2012 when serial production of the towers will be launched.

Spread out over an area of 15,000 m², ENERCON's first production site in France is designed to process up to 40,000 m³ of concrete annually. With this new factory, ENERCON will be creating up to 90 jobs for the community of Longueil-Sainte-Marie – a number which could increase with a developing market. The new production complex in Oise (French Département in the region of Picardy) is not only a first for ENERCON but also the very first production site of a wind turbine manufacturer in France.

ENERCON's new plant shows that France and green energy are no longer a contradiction, said ENERCON Managing Director, Hans-Dieter Kettwig at the cornerstone laying ceremony on 24 June.

Installation of prototype in new 3 MW series

ENERCON erects first E-101 WEC

Prototype of the latest 3 MW turbine recently installed in Görmin (Mecklenburg West Pomerania) – two further machines currently being installed in Haren (Lower Saxony), Germany.

ENERCON has just finished installing the first wind turbine from their new E-101 series near Görmin. The 3 MW machine was installed atop a 97 metre precast concrete tower. While the first turbine was being installed in North Eastern Germany, ENERCON began installing two further E-101 machines in the Rütenmoor Wind Farm near Haren in Lower Saxony. In the same farm ENERCON is also installing 15x E-82 E2/2.3 MW machines on 108 metre concrete towers. Whereas erecting E-82 machines has become routine, installing the first E-101 prototypes of the new series was a particular challenge at both sites for ENERCON and its partners alike.

«The biggest difficulty in installing a prototype is that there is no prior experience to fall back on,» says Sonja Kehmeier, ENERCON project manager for the E-101 installation in Haren. Many things are new and the best installation procedure still has to be worked out. That is why Project Management has to be prepared for any unexpected changes in procedure. Most details can be calculated and scheduled in advance, but one cannot tell whether everything will run as smoothly as planned until the actual installation. In Görmin, for example, the crane pads and access roads had to be readjusted to the new circumstances several times to ensure safe transport and installation.

«Sometimes we have to improvise when installing a prototype,» says Arno Hildebrand from experience. The Engineering team leader at Wobben Research & Development (WRD), ENERCON's construction and development department, has already supervised a number of prototype installations at ENERCON. Some of the originally planned procedures often have to be modified to suit the site conditions. For the engineers, this is valuable experience to take into consideration when compiling installation and instruction manuals for later use when installing the E-101 in series. One of the major purposes of installing prototypes is to devise an efficient time-saving assembly procedure.

Devising most efficient assembly procedure

«We have to try out the entire procedure and look at all the aspects,» explains Hildebrand. Some of the items to be considered are: stress on the lifting points of the turbine components, where to store the material on site, or where to position the crane, etc. In addition, the engineers check to see if there is room for improvement – for instance, whether further components can already be assembled at the factory to save time at the construction site. «A lot of these things are difficult to plan in advance and can only be determined when actually installing the prototype,» says Hildebrand. One advantage for ENERCON is that the prototype installation teams are experienced technicians. Many of the technicians have participated in the installation of other ENERCON prototypes.

At the sites in Görmin and Haren they also had to make some changes in the work steps. In spring, ENERCON and the contractors had already set up the site and prepared the access roads, crane platforms and preassembly areas. Preparing the E-101 components to be hoisted is more involved than preparing the E-82 machine as the components are larger and have to be transported in several individual parts.

Another issue is the access roads. «For the blade transport, we had to widen the road,» says Robert Boldt, installation project manager in Görmin. Since the E-101 rotor blades are roughly 10 metres longer than the E-82 blades (48.6 metres compared to 38.8-metre E-82 blades), the planners had to make curves much larger. At least a 39 m exterior radius is necessary for the flatbed trucks to make the curve with the rotor blades and not hit anything. According to Robert Boldt, blade transport was the biggest challenge for installing the E-101 prototype. However, ENERCON is well-equipped for this – after all the company has

Mounting the E-101 machine house atop the 97-metre tower in Görmin.

E-101 prototype installed.

Whether tower assembly, blade transport or mounting the turbine – installing the E-101 prototype was full of new challenges across the line.

already installed the much larger E-126 turbine at many sites. Hence, the transport specialists and assembly teams were able to fall back on experience they had had when handling the huge E-126 components.

— Experience in transporting oversized components —

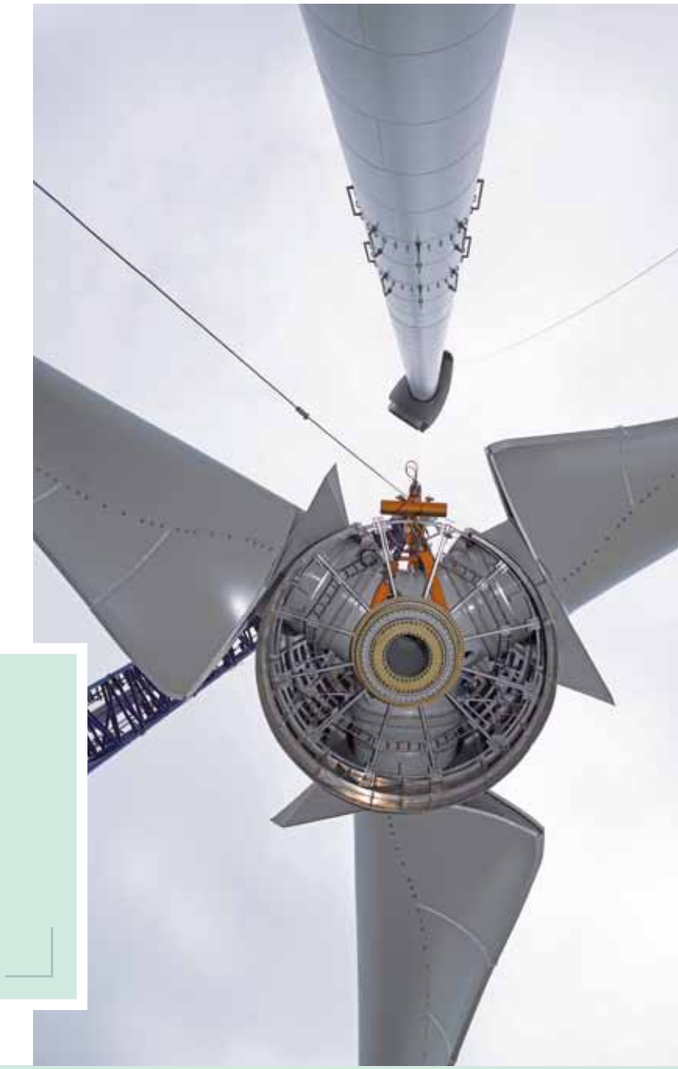
In February and March, ENERCON built the foundations in Görmin and Haren together with its subcontractors. In Haren, deep foundations were built. Here, roughly 10-metre-long precast concrete piles were rammed into the ground and then a 3.2 metre thick and 18.2 metre wide reinforced concrete slab was poured on top of these. Due to the larger dimensions of the E-101, changes also had to be made to the foundations as compared to the E-82 installation. In order to withstand the heavier load, the reinforcement steel has a tighter weave.

The first tower segments were delivered to the site in March. The 34-ton half segments were hoisted from the semi-trailers onto the cross supports where they were joined and precisely adjusted at the vertical edges to form a complete circular segment. The so-called bolted joint was also used for the first time on an ENERCON tower this size. The installation engineers stacked and assembled a total of 17x segments measuring up to 3.85 metres in height to form a 97-metre tower. Finally, the segments were interconnected with steel prestressing tendons and grouted with special mortar.

In May, the installation teams started preassembling the turbine components in Görmin. The transportable machine house modules were brought to the site from the ENERCON plant in Magdeburg. On site they were assembled and prepared for hoisting. The rotor blades were also supplied by the Magdeburg factory. Once the rotor hub was put together, they were able to begin hoisting the components to the top of the tower at the beginning of June.

First the crane heaved the machine house and then the generator onto the 97-metre tower. Finally the complete rotor hub was lifted and guided into place. Slowly, inch by inch the crane raised the hefty rotor hub up to the machine house while a large crowd of spectators watched in amazement. With millimetre precision, the cumbersome load was manoeuvred in front of the generator and securely bolted. After the final equipment was built in and the electrics connected, there it was – prototype No.1 in the E-101 series.

Exciting moments in Görmin: Hoisting the components for the new E-101.



■ ENERCON E-101

Rated power: 3,000 kW
Rotor diameter: 101 m
Hub height: 99 m / 135 m
Wind zone (DiBt): WZ III
Wind class (IEC): IEC/NVN II A
WEC concept: gearless; variable speed; single blade pitch system

Highlight at the Hannover Messe: the original machine house of the new E-101 at the ENERCON booth.

Crowds gathering at the ENERCON booth during management speeches.

ENERCON at the Hannover Messe

E-101 exhibit fascinated visitors

After the nuclear disaster in Japan and the discussion about phasing out nuclear energy, renewable energies were at the centre of attention more than ever.

At this year's Hannover Messe in early April, ENERCON presented itself in spectacular fashion. ENERCON's booth with an original exhibit of the new E-101 turbine model was among the biggest attractions. Crowds of visitors permanently thronged the platform that afforded a view into the interior of the 3-megawatt WEC. Dozens of camera teams filmed the E-101 for their TV reports. And many customers, prospective buyers, and politicians were keen to learn about the latest developments at ENERCON – in particular against the background of the nuclear disaster in Japan and the current discussion about speeding up the nuclear phase-out in Germany which has recently been providing an unexpected strong boost for renewable energies.

«The Hannover Messe 2011 was a great success for ENERCON,» says ENERCON Managing Director Hans-Dieter Kettwig with satisfaction. The ENERCON Sales team is equally satisfied with the positive results of the trade fair. «The interest this year was massive,» reports Sales Director Stefan Lütkemeyer. Customers and interested parties from Germany in particular approached our sales staff, he adds. «We also had many enquiries from politicians and the media.» One of them was Jürgen Trittin, German Member of Parliament and leading figure of the Green Party, who discussed with ENERCON's Management the feasibility of an accelerated nuclear phase-out. And there were ministers from federal states and members of state parliaments as well as local politicians of all parties who also came to the ENERCON booth for talks.

Satisfied with the results

The new turbine model garnered a lot of approval from trade fair visitors, says Stefan Lütkemeyer. «It is the fitting answer to current politics.» This efficient 3-MW turbine has been specially designed for inland sites with moderate wind conditions.

In his speech, Managing Director Kettwig explained ENERCON's vision for the continued expansion of the wind energy sector based on the E-101 model: Instead of a concentration of mega wind farms in the North Sea, the German market leader believes in a persistent, systematic development of inland sites with a decentralised energy supply system and intelligent networking of all power-generating organisations. This could be accomplished using the existing transmission networks and without building many new high-voltage power lines that crisscross the country to reach consumers, which is extremely expensive and controversial among the population. ENERCON's strategy would generate the power right where it is needed. Especially turbines such as the E-101with hub heights above 100 metres are suited perfectly for regions in Southern Germany where only few turbines have been installed to date and which therefore still have a considerable potential for expanding wind energy use.

German Member of Parliament Jürgen Trittin (2nd from right) with the ENERCON Management Aloys Wobben, Hans-Dieter Kettwig and Klaus Peters (from left).

The German WindEnergy Association (BWE) hosted a forum for owners of ENERCON WECs during the trade fair week, which was also very well accepted. About 130 owners met in Hanover for an exchange of ideas on current topics with ENERCON, said forum spokesperson Ulf Winkler.

ENERCON's Human Resources Department had its own booth in the Job Career Market section which was equally busy. Many university graduates and other applicants used the opportunity to find out about career opportunities with ENERCON, reports Burkhard May, ENERCON recruitment team leader.

ENERCON Fairs

EOLICA 2011
(Rome/Italy)
International wind energy fair
14. - 16. September 2011
www.eolicaexpo.com

Vind 2011
(Stockholm/Sweden)
International wind energy fair
14. - 15. September 2011
www.vindkraftsbranschen.se

RENEXPO 2011
(Augsburg/Germany)
12th International energy fair
22. - 25. September 2011
www.renexpo.de

Wind Power Expo 2011
(Saragossa/Spain)
8th International exhibition on wind energy
27. - 29. September 2011
www.feriazaragoza.es

CanWEA
(Vancouver/Canada)
Conference and exhibition on wind energy
3. - 6. October 2011
www.canwea.ca

RenewableUK
(Manchester/UK)
Conference and exhibition on wind energy
25. - 27. October 2011
www.renewable-uk.com

Agritechnica 2011
(Hanover/Germany)
International exhibition on agricultural engineering
13. - 19. November 2011
www.agritechnica.com

ENERCON service truck at Sonnenberg solar project near Cuxhaven.

ENERCON solar inverters

Wind turbine technology for photovoltaic projects

ENERCON wants to open up new business opportunities with solar inverters derived from its approved wind turbine components. A pilot project near Cuxhaven makes the start.

Wind energy and photovoltaic systems have a few things in common. Not only do they generate electricity from renewable energies; they also need the same technology to feed this green power into the grid. In ENERCON WECs, the alternating current produced by the generator is first converted into direct current; inverters in the E-module then convert it back into alternating current whose voltage, frequency and phase position conform to the grid. Photovoltaic systems also need inverters that prepare the direct current generated by the solar modules as needed for injection into the grid. ENERCON now offers its inverters that have proven their worth in wind turbines also for solar projects. «Our inverter technology and our control systems are among the core competencies of ENERCON,» says Andreas Wahls, ENERCON Sales specialist for solar inverters. ENERCON manufactures the grid feed units and control systems in large quantities and wholly in-house. These components have been running inside ENERCON wind energy converters for more than 25 years and are extremely reliable. To date, ENERCON has installed more than 22,000 megawatts (MW) of inverter power.

The full-scale converters ENERCON is now supplying for solar projects are standard components in wind energy converters. To use them in solar energy systems ENERCON only needed to adapt the control system, explains Alfred Beekmann, electrical engineering team leader at Wobben Research & Development (WRD), ENERCON's R&D organisation. Some new components were added to the control cabinet, and some changes made to the software.

Long experience with inverter technology

Thanks to ENERCON's deep vertical integration and its many years of experience with inverter technology, these units have inevitably several advantages. Each power cabinet is subjected to thorough, comprehensive testing before it is shipped. In addition, the solar inverters have a modular design that makes it easy to adapt the components to the size of each solar farm.

Another factor is that, when used in WECs, inverters work with much greater loads than in photovoltaic systems, explains Alfred Beekmann. When used in solar farms, ENERCON's technology thus automatically offers capacity reserves. Another benefit: ENERCON inverters already comply with the global grid codes in the event of grid faults and in the area of grid stabilisation and grid control. ENERCON's monitoring technology also reflects the many years of experience and extensive know-how.

Then there is ENERCON's decentralised global Service network that plays an important role in this context. «We can make use of what is already there. There are no market entry barriers with regards to service,» says Andreas Wahls. After all, the same technicians who service inverters in wind energy converters can just as easily also service power cabinets in solar farms in their Service area.

The pilot project with ENERCON inverters for photovoltaic systems went on the grid in Lower Saxony in Northern Germany last December. ENERCON supplied one inverter station with six and another with three power cabinets with 300 kilowatts of power each for the 2.3-MW Sonnenberg solar farm near Cuxhaven. The farm was planned by the juwi group and is operated by IFE Eriksen AG. The reliability of this technology was a crucial reason for the project owners to choose ENERCON inverters. IFE Eriksen AG started planning wind farms in the 1990s and has come to know ENERCON as «an experienced partner with the highest levels of quality and service,» says Jakobus Smit, member of the Board of Directors of IFE Eriksen AG based in Oldenburg.

ENERCON's goal is to create synergies and open up a new market by using standard components and Service structures from their wind energy converter business in photovoltaic projects. The necessary production capacities are available. Staff at Elektric Schaltanlagenfertigung GmbH currently manufacture up to 70 power cabinets per day in a series production process. «They can do more,» says Andreas Wahls. Another solar project with 7.5 MW for which ENERCON will supply four inverter stations is already in its implementation phase, and more projects are being planned. And this is only the beginning, says Andreas Wahls. «In future, wherever solar projects are being installed and ENERCON has a Service network, we want to generate business with solar projects.»

Serial production of power cabinets at Elektric Schaltanlagenfertigung GmbH.

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E-126 wind farm in Estinnes, Belgium.

Largest project with ENERCON E-126 worldwide

Estinnes Wind Farm officially opened

Eleven turbines provide 187 GWh of green power annually. ENERCON and farm owner WindVision celebrated the event with 250 invited guests on site.

In June ENERCON and farm owner WindVision celebrated the official opening of the Estinnes Wind Farm in Wallonia, Belgium. Eleven ENERCON E-126 wind turbines with a rated power of 6 and 7.5 MW are estimated to produce a total annual power output of 187 GWh supplying approx. 50,000 homes with environmentally-friendly electricity. This is the first project of its kind worldwide.

«With the Estinnes Wind Farm, ENERCON will be able to demonstrate that the E-126 – currently the world's most powerful wind turbine – is not only ideal for nearshore regions but also for lucrative high yield sites inland,» said Bernard Fink, ENERCON's Sales Manager for Belgium. The Estinnes site is situated near Mons on a plateau with excellent wind potential.

In terms of energy politics, the opening of the wind farm is a momentous event, according to Fink. The nuclear catastrophe in Japan has relaunched the discussion of a changeover to readily available reliable alternative energy sources. Wind power is one excellent option. But in order to make the transition and rapidly start replacing nuclear power plants by wind turbines, it is essential that more sites be developed inland. For this type of location, ENERCON's E-126/7.5 MW and the new E-101/3 MW turbine both equipped with state-of-the-art features and the tried and tested gearless technology present the ideal solution.

World's first E-126 project of this size

Construction at the wind farm – the world's first E-126 project of this size – began in 2008. Fink highly appreciated the close collaboration with WindVision, with whom ENERCON developed a special new logistics concept to install the mega turbines including deploying the world's largest mobile crane. The E-126 turbines were connected to the grid by means of ENERCON's most recent power feed technology providing the turbines with power plant properties. In addition, ENERCON supplied Belgium with its first transmission substation for connecting onshore wind turbines to the high voltage grid.

After three years of construction, the last turbine was connected to the grid at the end of September 2010. This event was celebrated on site together with ENERCON, WindVision, 250 invited guests, as well as a great turnout of visitors from the surrounding region.

«The event was a great opportunity for us to present our company and the finished project,» said Fink. All those who participated in realising the project were also among the invited guests. «They are all quite proud of being a part of this project, as it was a first for everyone,» reports Fink. After all, the work was completed to the satisfaction of all involved, except for a couple of unforeseen issues which were immediately resolved without further ado. «Operations of the WECs over the past months has proven the technological reliability. This shows that the E-126 is a well-engineered production model,» says Fink.

WindVision, the operator / owners of the project were also pleased with the positive results – another reason for deciding on having a big wind festival to celebrate the official completion of the farm.

And the festival went over well with all visitors. Despite the contrary weather, many people from the surrounding region took the opportunity to get a closer look at the huge machines and find out more about the turbines and the entire wind farm project. Visitors could see what the inside of an E-126 looks like, clowns and artists provided fun and games for the kids, there was live music and food and drink for all.

Impressive machines: E-126 turbines in Estinnes, Belgium.

Mobile manufacturing in Brazil

Concrete tower factory right at the wind farm

Thanks to on-site manufacturing ENERCON enjoys many advantages regarding production costs and logistics. This approach is also suitable for other export markets.

The installation of wind energy converters atop precast concrete towers is the preferred construction type for larger WEC models. However, in regions with poor infrastructure and for remote wind farm sites, the logistics of transporting tower segments that weigh many tons are especially challenging. For a wind farm project in North-eastern Brazil, far away from the existing concrete tower factory, ENERCON's tower construction engineers therefore simply moved the factory directly onto the construction site.

The mobile concrete tower factory in the Petrobras wind farm makes the segments for E-82 towers (107 metres); afterwards, it will produce segments for other E-82 towers (98 metres) in a neighbouring project. Project planning considered the distance between the existing tower factory in Pecém near Fortaleza and the construction site too far, says Norbert Hölscher, Managing Director of WEC Turmbau GmbH. Each heavy goods lorry would have had to travel 1200 kilometres. Another important argument was the large number of towers needed: «With 100 towers or more, it makes sense to set up a mobile production facility on site,» says Hölscher.

Factory was set up within 60 days

It took only 60 days to get the mobile factory in the wind farm up and running. The arched structure is 110 metres long, 40 metres wide and 20 metres tall. The manufacturing of the tower segments happens in line: In the front of the building, the reinforcement cages are made; in the centre, the concrete is poured. At the rear of the building comes the finish stage. Inside the building, gantry cranes on rails move the segments from stage to stage. The layout of the building is thus the same as that of a stationary precast concrete factory.

Light construction – ENERCON's mobile tower factory can be removed within few days.

The long distances in Brazil are especially challenging in terms of logistics.

The raw materials for concrete production are sourced locally. «Almost everywhere has a gravel pit somewhere within a 100-kilometre radius,» says Norbert Hölscher. The quality of the available water can sometimes be a problem, though. This is true for the Petrobras site. In order to meet ENERCON's exacting concrete quality standards, the mobile factory is therefore equipped with its own water desalination plant.

Because of the extreme climatic conditions, an ice machine has also been installed. The site is located near the equator in a steppe region; it is hot here. This can cause problems for the concrete pouring process. As the fresh concrete sets, additional heat is generated which causes the temperatures inside the cast tower segment to rise too much. This creates a risk of stress cracks. «The ice is used to cool the fresh concrete,» explains Hölscher.

The mobile factory took up production at the end of March and employs about 150 people. The factory also supplies the concrete needed for the foundations of the planned wind energy converters. Once these wind farm projects have been completed, the mobile factory will be dismantled and available for new construction projects. For this reason, the factory building and the container village including cafeteria have a modular design. «We can just pack up everything,» says Norbert Hölscher. The plant can operate anywhere in the world where temperatures stay above freezing. It would for example be well suited for certain regions of Spain or Italy.

ENERCON WEC at Wang-Kong project.

ENERCON in Taiwan

Three wind farms put into operation

ENERCON succeeds in Taiwan. The company currently has a market share of 59 % and is the leading manufacturer of wind energy converters in the country.

ENERCON has installed the last WECs in a project of 3 wind farms in Taiwan. This project includes a 5.4 MW wind farm on Penghu Island, a 23 MW wind farm at Wang-Kong and a 4.6 MW wind farm at Datan.

The owner is Taiwan Power Company (TPC). The company is responsible for 225 MW of installed wind energy in 16 different projects, 6 with ENERCON WECs.

ENERCON's entrance to the Taiwanese market is credited to Chung-Hsin Electric & Machinery Mfg. Corp. (CHEM). The first project on Penghu Island was realized in corporation with CHEM. Also the present projects have been implemented in cooperation with CHEM. CHEM is a pioneer within the wind industry in Taiwan with construction contracts for other projects with TPC and Independent Power Producers. Together CHEM and ENERCON expect to continue the positive corporation for additional projects planned by TPC. Today 470 MW wind energy is installed in Taiwan. ENERCON is the market leader with a 59% market share.

ENERCON in Sweden

Gabrielsberget Syd Wind Farm commissioned

ENERCON and SVEVIND erected 20 new E-82 wind turbines at the site close to the Baltic Sea. Both partners are co-owners of the wind farm which will be enlarged in 2012.

At the end of June, ENERCON and their project partner, SVEVIND, launched operations at the Gabrielsberget Syd wind farm. This was the end of the first construction phase of the Gabrielsberget wind farm in the Västerbotten region. On completion, it will contain 40 x E-82 E2/2.3 MW turbines, each with a hub height of 108 metres. The first 20 wind turbines in the southern section of the farm were officially inaugurated on 22 June and the remaining 20 x E-82 machines are scheduled to be connected to the grid in summer 2012. ENERCON and SVEVIND will be running the farm jointly.

The Gabrielsberget site is located on a plateau near Nordmaling at approx. 220 metres above sea level. From there it is only about 10 kilometres to the Baltic Sea so the wind conditions are good. According to measurements taken prior to installation, the average wind speed is roughly 7.2 m/s at hub height. So, the owners are expecting an annual yield of approx. 260,000 MWh. Once finished, the Gabrielsberget will be one of the three largest and most powerful onshore wind farms in Sweden.

Foundation pits dynamited out of the rock

In this part of Sweden the soil is rocky which required a few special solutions for construction. For instance, the foundation pits had to be dynamited out of the rock. The rock was then used to build the access roads and crane platforms. Laying out the cables to the point of common coupling was also a challenge. In Sweden the cables are generally visible. However, for aesthetic reasons they wanted to avoid this and unfortunately it was not possible to dig cable trenches because of the rocky ground. So, instead of burying the cables, they were laid out on the ground and covered with sand, geotextile fabric and gravel. In areas with particular stress, they were laid out in special plastic half-shells to protect them from damage. In addition to this, drainage channels were drilled into or dynamited out of the rock at most of the turbine locations to drain off any possible heavy rain and melt water from the foundation pits.

Photo: SVEVIND

Gabrielsberget Syd Wind Farm is situated only 10 kilometres away from the Baltic Sea.

Photo: E-Connection

Roggeplaat at Oosterscheldekering is ENERCON's first wind farm abroad.

Repowering Roggeplaat, The Netherlands

New WECs for ENERCON's first wind farm abroad

In 1992, ENERCON installed twelve E-33/400 kW turbines on the Oosterschelde flood barrier. These are now being replaced by four modern E-82/2.3 MW machines.

When ENERCON installed the Roggeplaat Wind Farm in The Netherlands in 1992, no one would have ever guessed how successful the Aurich wind turbine manufacturer would become on the international scene. Roggeplaat was ENERCON's first wind farm installed abroad. Twelve E-33/400 kW machines were installed on a small island on the «Oosterscheldekering», the Oosterschelde flood barrier. Today, nearly 20 years later, ENERCON exports more than 60% of its production and is among the top five manufacturers worldwide. Currently they are in the process of repowering their first large foreign project.

For their Dutch customer, E-Connection, ENERCON is taking down the twelve old E-33 turbines (all still with gear boxes) at the Roggeplaat wind farm in the Province of Zeeland southwest of Rotterdam and will be replacing them with four modern gearless E-82 machines (2.3 MW rated power). Each of the turbines will be mounted on 78-metre steel towers.

At the end of June, ENERCON began taking down the first E-33 turbines. First the rotor blades, hub and nacelle were dismantled and removed by crane. Then the demolition digger broke through the walls of the 35-metre towers so that the crane could heave the towers off of the foundation base. «We just take the towers down and lay them on the ground,» explains ENERCON project manager, Din Rijniers. Later on a sub-contractor will come on site, rip out the foundation, and crush the tower and foundation concrete down into rubble which will then be reused to build the access roads and crane pads for the new E-82. They are scheduled to be installed starting in April 2012.

No one is sad to see the old machines go

By then there should be nothing left of ENERCON's first foreign project. At ENERCON no one is actually sad to see the old machines go. Modern turbines offer a lot more advantages. With today's technology it is hardly worth continuing to operate old machines at a site as windy as Roggeplaat. The E-82 produces nearly six times the power of the old E-33, runs more smoothly and requires less maintenance. According to E-Connection, the old wind farm produced an annual yield of roughly 11.1 million kWh. The new E-82 will produce ca. 8 million kWh each, taking the estimated annual yield for the entire repowered wind farm up to 32 million kWh - with 8 less turbines!

Demounting of the old ENERCON E-33 turbines at Roggeplaat Wind Farm.

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