South Africa: political affection for renewables

New ways in icing protection

Nordex’s biggest wind turbine now installed
World premiere

In August, we installed our first N149/4.0-4.5. This technology is the successful outcome of our evolving turbine development efforts: based on many years’ experience with our platforms of the Gamma and Delta generations, we are continuously optimising our wind turbine generators. In doing so, the focus is always on reducing electricity generation costs or COE, and our aim after all is for our customers to be in a position to win public tenders and to bring projects to a successful conclusion.

We are therefore particularly pleased that the N149/4.0-4.5 is already being deployed in the permits for many projects amounting to several hundred megawatts throughout Germany and in other European and overseas countries. Without our customers, who will always choose a turbine based on the factors of profitability, reliability and availability, as well as on having a trustworthy, experienced partner, this emerging new product series would not have been possible. Today, I would like to thank you for that.

It is only through energy efficiency and the deployment of state-of-the-art, ecologically sound power generation that the continuing global energy and environmental problem can be solved. We will consistently pursue this course with our products, since modern onshore wind turbines are already the most competitive source of energy.

Yours,

José Luis Blanco,
CEO Nordex SE
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New ways in icing protections: the Advanced Anti-icing System (p. 4)

The Nordex Group in South Africa donated a playground. (p. 16)
New ways in icing protection

Cold-climate locations are becoming more and more attractive for wind turbines. However, they do place increased demands on the turbine technology. Already at temperatures below five degrees Celsius and at a high relative humidity, ice formation on rotor blades can cause a reduction in output or even a shutdown of the turbine. Anti-icing Systems are therefore especially important at sites with frequent ice formation – such as in Scandinavia. With the new Advanced Anti-icing System, the Nordex Group has taken a further step towards higher yields at cold-climate locations.
System reduces costs and increases reliability

The innovative Nordex Advanced Anti-icing System comprises a sensor positioned on the nacelle and heating elements integrated in the rotor blade, which work on the principle of electrical resistance heaters. The heating elements are each composed of many individual segments and are positioned close to the surface. Hence – unlike hot-air heaters – they do not heat the entire blade structure from the inside but directly impact the aerodynamically relevant surfaces of the rotor blade threatened by ice formation.

However, the special feature is the full integration of the Anti-icing System with the lightning protection functionality. The combined function of these two systems reduces costs while the segmentation of the heating elements increases robustness, because the failure of a single segment only slightly impairs the function of the overall system.

In order to keep the energy consumption of the Anti-icing System as low as possible, the turbine control can adjust, fully variably, the heating output to the prevailing climatic conditions.

Continued operation even under harsh conditions

Thanks to improved algorithms and models for the temperature development of the rotor blade surface, no sensors are required in the rotor blade anymore, this improves reliability and reduces service cost. Instead, their task is managed by a sensor positioned on the nacelle and, in addition, the relevant environmental parameters are continuously monitored, with the data being forwarded to the control unit of the system. As soon as the data predicts the danger of ice formation, the control unit automatically switches on the heating elements. Consequently, this prevents icing of the rotor blades before it even occurs or thaws any ice that may have already formed.

After a turbine has been out of service – following events such as a grid failure – a turbine equipped with the Advanced Anti-icing System can be restarted faster in freezing conditions. In a case such as this, the turbine control unit detects the reduction in output due to ice formation and activates the Anti-icing System. The heating elements located close to the surface melt the ice within a short time and the turbine can once again produce power in the optimum output range.

The Advanced Anti-icing System for the Delta4000 has been undergoing field tests since 2014 and is already available with start of serial production. The existing proven Nordex Anti-icing System is available for turbines of the Delta generation.

The advantages of the Nordex Group’s Advanced Anti-icing System:

The new energy-optimised resistance heating only acts on the areas of the rotor surface that are particularly threatened by ice formation. As a result, the energy consumption of the system, at a maximum of 125 kilowatts for all three rotor blades, is especially low.

It is a highly robust overall system due to segmented heating elements. If necessary, individual segments can be replaced without having to dismantle the rotor blade.

Losses in output due to ice formation can be reduced by up to 80 per cent.
The company has set itself the goal of further optimising its processes and increasing the focus on digitalisation, even more so than before. For some time now, the Digital & Data Analytics department within Service has been breaking new technological ground and creating advantages for customers. However, in general terms, the goals remain unchanged: reduction of turbine downtimes, improvement of plant reliability and increased efficiency. In short – secure yields for the operator.

The initiative aims to generate a comprehensive 360-degree view of the fleet, which currently stands at more than 6,800 turbines worldwide, with a rated output of more than 16 gigawatts (GW) for the Group’s customers. For this purpose, the company is looking at it from three perspectives: Remote Service, Field Service and Information Service. Christian Busdiecker provides details in an interview.

Christian, after optimising the processes within Remote Service, what improvements can be seen, and can you describe this using a “real-life” example?

With our new Control Centre System we can now automate many frequently recurring manual activities. The system itself also learns and recommends measures that it has learnt from past operating procedures. This ensures we can significantly shorten response times.

In the past, you have also used components that were already equipped with a condition monitoring system (CMS). What is changing as a result of digitalisation?

For us as manufacturers, data analysis has become one of our core competencies; it is important to link available information. With our “Predict to Prevent” programme, we analyse which components could fail in the future. The programme delivers intelligent solutions using modern machine-learning models and artificial intelligence based on SCADA and vibration data. These solutions monitor the condition and status of components, sending warnings whenever an anomaly is detected. Due to early recognition and intervention, we can reduce downtimes as well as repair costs. The process of notifying the technicians is fully integrated into the IT tools which were introduced as part of the digitalisation programme at the Nordex Group. This enables us to offer our premium customers the greatest possible benefit.

For a long time, better service for wind turbines was synonymous with higher benefits, but also rising costs. Often enough, this was a zero sum game but this logic is now beginning to break down. “In a highly competitive environment, we are continuously working to improve the availability of our turbines and the access to information for our customers, as well as increasing our efficiency. Intelligent solutions in the area of digital systems contribute significantly here,” summarises Christian Busdiecker, Head of Service Europe for the Nordex Group.
Are your service technicians in the field still required despite the digitalisation or is the person on-site no longer an important factor?

No, on the contrary. Well-trained service technicians with a strong sense of responsibility towards health and safety and to “their” wind farms form the basis of our business. We have, and continue to need, good people who work closely with all our support departments and can use the new software tools correctly.

Are there any other advantages for the system owner in terms of the Nordex Group’s digitalisation?

Yes, definitely. In future, our customers will receive comprehensive service reports and information regarding the tasks carried out on-site. This information will be more transparent, simpler and can, for instance, be recalled using various devices. We want to gradually expand our Customer Service Portal and bring our service further in line with the current needs of our customers.

“Intelligent solutions in the area of digital systems make a significant contribution to improving the availability of equipment and information for our customers and to increasing our efficiency.”

Stefan Ewald, Head of IT, Nordex Group

**Calendar**

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
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</thead>
<tbody>
<tr>
<td>Global Wind Summit, Hamburg</td>
<td>25–28 September 2018</td>
</tr>
<tr>
<td>Colloque National Eolien, Paris</td>
<td>17–18 October 2018</td>
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<tr>
<td>Vind, Stockholm</td>
<td>24–25 October 2018</td>
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<tr>
<td>Key Wind, Rimini</td>
<td>6–9 November 2018</td>
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<tr>
<td>Windaba 2018, Cape Town</td>
<td>7–8 November 2018</td>
</tr>
<tr>
<td>Interim report Q3 2018</td>
<td>13 November 2018</td>
</tr>
</tbody>
</table>

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“Intelligent solutions in the area of digital systems make a significant contribution to improving the availability of equipment and information for our customers and to increasing our efficiency.”

Stefan Ewald, Head of IT, Nordex Group
The Nordex Group installed the new N149/4.0-4.5 in time for the Global Wind Summit.

GPS-data: N53° 21.813' E9° 47.484'
Wennerstorf II wind farm celebrates (re)launch: Nordex’s biggest wind turbine now installed

Approaching Hamburg from the south travelling on the A 1 motorway from Bremen, you can see it on the right-hand side, just before the Rade junction, still about 30 kilometres south of the metropolis on the river Elbe: the Wennerstorf wind farm. Here the first of two of the Nordex Group’s N149/4.0-4.5 wind turbines, each with a nominal power output of 4.5 megawatts, was installed August 2018.
Initially the Wennerstorf wind farm consisted of four turbines, each with a nominal output of 1.3 megawatts; these have been generating electricity since as far back as 2003. In 2015, ABO Wind AG decided to upgrade this attractive site with more advanced technology by replacing the old equipment with new turbines. They opted for the first turbine in the Delta4000 product series, the N149/4.0-4.5: once the total of 9 megawatts of nominal output has been installed, the wind farm’s capacity will be boosted by 73 per cent.

Jörg Hempel, Head of Nordex Germany within the Nordex Group, says: “We’re pleased to have completed this flagship project in time for the start of Wind-Energy Hamburg 2018. As well as our turbines that are already installed at the Port of Hamburg, we can now show our customers a further impressive project using the latest technology developed by the Nordex Group, the N149/4.0-4.5, and we can do so right next to our Hamburg Head Office.”

The perfect site for conducting surveying work

New turbines are required to undergo extensive independent testing to obtain all relevant certifications. Joachim Bock, ABO Wind Department Head of Planning, Lower Saxony and Schleswig-Holstein, explains: “Over the many years of working with Nordex on joint projects totalling 500 megawatts, we have always been very satisfied with our cooperation. This is yet another reason why we opted for the latest Nordex technology in upgrading our Wennerstorf wind farm, and to make it available for the purposes of a full and independent engineering survey.”

“We have had very positive responses from our customers. Thanks to the N149/4.0-4.5, we have already become the preferred turbine supplier for many projects amounting to several hundred megawatts.”

Patxi Landa, CSO, Nordex Group

Helmut Resing-Wörmer, in charge of surveying and operational test measurements at the Nordex Group, adds: “The site meets the requirements of IEC 61400 and offers good wind conditions of approximately 6.5 metres per second on average – which is ideal for our land-based turbine. This means that the planned power output, sound and electricity grid measurements and the validation of the mechanical loads can be carried out at the maximum power output of 4.5 megawatts.”

Residents’ acceptance enjoys top priority

Due to a total construction height of 200 metres, the turbines will be fitted with radar-activated avation lights. The lights only switch on if an object flying below 600 metres approaches within a distance of 4 kilometres from the turbines. The need for constant night-time illumination is thus eliminated.
The turbines are also well designed in terms of their acoustic aspects; the sound level generated by the equipment will not exceed 106.1 dB(A) even under full load. Moreover, they can be run in a variety of sound-optimised operating modes, which allows them to be controlled in such a way as to keep the sound power level as low as possible, taking into account the wind direction and time of day.

Safety foremost at all times

For the Wennerstorf II project, the Nordex Group left nothing to chance: from the initial concept development and the design of the turbine, the assembly work and the in-house testing, through to logistics operations and on-site installation, the team in charge of the project always paid detailed and scrupulous attention to all safety-related aspects.

For example, as far back as May, Nordex installed the entire nacelle together with the drive train and the hub back at their manufacturing plant in order to carry out internal commissioning. The aim was to reduce the time required for the subsequent commissioning on-site, and to confirm that all the steps in the work procedure can be carried out safely. Similarly, new installation and transport tools were successfully tested, while the service team performed software tests and trialled the inspection procedures.

Filed logistics solutions

In the course of the installation of Wennerstorf II, a filed logistics solution for transporting rotor blades was employed for the first time. The length of the single-piece rotor blades called for a new transport concept where the rotor blade, being the only connecting element between the front and rear axles, simultaneously performed the function of a conventional low-loader. This is how the rotor blades travelled the 330 kilometres from the production facility in Rostock to the transfer site near the wind farm.

Here they were loaded onto a self-propelled vehicle fitted with a tilting mechanism that can raise a rotor blade upwards to an angle of up to 60 degrees. In this way, travelling at walking pace and guided by remote control, the rotor blades were easily manoeuvred through the dense stand of trees and onto the construction site.

The turbines at Wennerstorf II are only the beginning. Patxi Landa, CSO, Nordex Group, says: “We have had very positive responses from our customers. Thanks to the N149/4.0-4.5, we have already become the preferred turbine supplier for many projects amounting to several hundred megawatts. Many customers have already submitted our turbines for the approval process – and not only in Europe.”

In-house manufacture of single-piece rotor blades

The production of the rotor blades for the N149/4.0-4.5 also began in May. The longest single-piece rotor blades, which the Nordex Group will be manufacturing in-house from now on, are over 72 metres in length. Their design is the result of development work to find the optimal balance between energy production, costs and weight.

The rotor diameter of 149 metres contributes significantly to the very low power-generation costs and the high yield of the turbine. As was the case with the predecessor models, the rotor blades of the N149 are made of carbon and glass fibre. In parallel to the production of the rotor blades for Wennerstorf II, bench testing required for certification is also currently under way.
Orrberget, Åliden and Brattmyrliden are not figures from Norse mythology, they are the names of wind farm projects now being built in Sweden, where the Nordex Group facilities will operate in the near future. This is why Magnus Fjelde, Sales Team Lead for Sweden, expects a rise in business in the second half of 2018. The forecast from Svensk Vindenergi, the Swedish wind-energy trade association, sounds equally promising; it is taking as its basis an additional construction of ten per cent this year compared to 2017. This is a growth amounting to more than 815 megawatts, so ultimately at year-end the country’s installed output will comprise around 7,500 megawatts.

The trend is towards large projects
Price pressure is very high in Sweden’s electricity market, subdivided into four regions – Luleå, Sundsvall, Stockholm and Malmö. Accordingly, the current price for a kilowatt hour amounts to only three cents, with a certificate surcharge added to this, comprising one to one-and-a-half cents. Yet because in the past the certificates were subject to very strong fluctuation, some planners even omit them from their calculations. Due to this demanding situation in revenue terms, the Swedish wind energy market has undergone major changes in recent years, whereby today it is predominantly large parks which are being constructed, often with well in excess of 100 megawatts of installed output.

Flexible modes of operation optimise revenues
“Because such wind farms take up a wide area, comprising many square kilometres, there are often large differences between the

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Pragmatically efficient Swedes

The Swedes aim to have switched their electricity 100 per cent to renewable sources by 2040. This goal gives a lasting boost to the Swedish wind market. In a discerning market environment, the Nordex Group is offering its clients suitable energy-efficient and cost-efficient facilities – the flexible Delta4000 product series.

Installations 2018 in megawatts

<table>
<thead>
<tr>
<th>Year</th>
<th>Megawatts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>6,691</td>
</tr>
<tr>
<td>2018e</td>
<td>7,506</td>
</tr>
<tr>
<td>2019e</td>
<td>8,321</td>
</tr>
</tbody>
</table>

For 2018 the Swedish wind energy trade association, Svensk Vindenergi, calculates that there will be additional construction comprising more than 10 per cent, with this growth continuing in 2019.

Source: Svensk Vindenergi Statistics and Forecast 2018

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respective wind conditions at the individual turbine locations,” explains Sebastian Streitz, Senior Wind & Site Engineer, regarding the technical and planning challenges presented by this size category. Precisely for cases like this, the N149/4.0-4.5 model of the Delta4000 product series is a solution that, depending on the given location, is adapted very flexibly, employing full optimisation of load buffers. “If a site used by a facility presents extremely challenging wind conditions, for instance increased levels of turbulence, the output as well as the overall operational lifetime can be adapted in a load-optimised way, where applicable,” Sebastian Streitz notes.

This gives the customer the opportunity for highly efficient, consistently cost-oriented operation of the facility, because it results in a significant reduction in costs per kilowatt hour produced. The Nordex Group offers this flexibility of operating modes, calculated in advance, based on close collaboration with planners and operators, and using robustly reliable wind-measurement data and the respective system-approval requirements (among other inputs). In addition, it offers different turbine tower heights – including, in some cases, project-specific towers. When landscape profiles are demanding, this generates further optimisation potential for the turbines that are to be installed.

Cooperation with the clients

The flexibility, both in turbine heights and in the operating modes, opens up a whole range of possible configurations. This makes the wind farm planning highly complex. For this reason, alongside advice from experts, the Nordex Group is also relying increasingly on automation and depth in the calculations with regard to the simulation models; this is done to offer the customer the best-possible planning and facility configuration. In particular, it is conducive to high energy yields and economic success if the client collaborates closely with the Nordex Group teams during the planning phase, and provides the essential data. The Swedes view this pragmatically: “Our customers are often very open to this cooperative approach, because they know exactly what advantages this ultimately provides for them,” Magnus Fjelde explains.

Outside > Sweden

Nordex Group projects in Sweden

- In operation 434.5 MW
- Under construction 150.3 MW

In Sweden the Nordex Group has installed more than 430 megawatts and is now constructing the Orberget, Åliden and Brattmyrilen projects.

Source: Nordex Group

Large wind farms with different wind conditions at the locations of the individual turbines pose a planning challenge.
Shaping the future today – NEW 4.0

How can a region with a population of 4.5 million switch to renewable energy for 100 per cent of its needs, in just a few years? An interesting topic for a seminar paper? Not even close. Rather, this is the task presented to the major cross-border project "NEW 4.0", in which the Nordex Group is participating as the sole manufacturer of wind turbine generators. Among around 60 partners from all stages of value creation in energy supply, and alongside international energy providers, there are also energy-intensive industries, research institutes and ministries.

Competences and solutions for the energy transition in the north

Specifically this is about completely switching over the north German Federal States of Hamburg and Schleswig-Holstein to the use of green electricity by 2035. "We see our participation in this as a major opportunity for the future. This practical test gets us a seat at the table with many important partners; in this way, beyond the specific research projects, we can also exchange experience and views with network operators on important questions for our industry’s future,” notes Malte Laubrock, Head of Grid Integration, who is responsible for this project at the Nordex Group.

Alongside this superordinate aspect, the Nordex Group also has specific tasks to deal with in the overall project. An example of this is the development of an OLTC transformer within the wind turbine generator; the intention is that this will enable reactive power to be used optimally in the distribution grid. The turbine thus contributes to stabilisation of the network. Equipped in this way, it is easier for wind farms to achieve their integration into modern electricity-supply systems, even having a stabilising effect on the system as a whole.
**Towards security of supply, with system services**

System services act as the key to ensuring that there continue to be no limitations in the integration of renewable energies in the future. NEW 4.0 enables those involved to keep their sights close to actual practice, maintaining their focus on the future’s grid-code requirements. Participation brings another opportunity – to secure involvement in the development both for the Nordex Group’s expertise, highly regarded worldwide, and for its proven product characteristics. Increases in operating output at short notice, like those that generators provide at classic power stations, make a very fast reaction possible in support of the grid, if there are frequency fluctuations. The Nordex Group optimises these virtual-inertia functionalities within the project at wind farm level, and combines them with other system services to draw upon this approach’s full potential.

Another intended area where the system service is to be affected positively is the development of a storage unit that supports the frequency and makes continuous electricity production possible. This storage-unit solution is being realised in collaboration with an energy supplier and a local university. The prototype was put into operation at the Balancing Power Plant in Curslack (a wind farm on the edge of the city of Hamburg). Malte Laubrock: “It is the keyword ‘storage’ that makes clear to everyone that, viewed at the highest level, this is about security of supply. Even if we are not building storage units that can store any given quantity of energy over many days.” The prototype provides the blueprint for being able to react flexibly to the most diverse range of customer requirements regarding integration of storage units into wind farm projects, also supplying proven performance in actual practice.

**When will things start looking up again?**

Politicians in Berlin have frequently considered the warnings coming from the wind power industry over the last few years to be exaggerated. Rather than declining installation numbers, the sector went from record to record in Germany. However, this changed in the first half of 2018 when new installations contracted to 1,626 megawatts for the first time.

**Development of tender awards**

After hitting a low of 3.81 €ct/kWh, the award price has levelled off at over 5 €ct/kWh since legislation providing for shorter implementation periods has been introduced.

Source: BNetzA

The reason is that, with the introduction of the bidding system, expansion was capped at around 2,800 megawatts per year, while projects for which a construction permit has not yet been issued may also take part in the system. This has caused competition to intensify, with prices for awarded projects falling to a low of 3.8 cents per kilowatthour. Given the turbine technology currently available, such prices are simply not viable. This is why there has been a delay in projects. Legislation has recently been passed to correct this and to enable shorter implementation periods.

**New installations in Germany, in MW**

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<td></td>
<td>3,761</td>
<td>4,462</td>
<td>5,343</td>
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<td>1,250</td>
<td>2,350</td>
<td>4,160</td>
<td>3,900</td>
</tr>
</tbody>
</table>

The number of new installations fell in 2018 for the first time – MAKE Consult expects to see an increase again from 2020.

Source: MAKE Consult

But problems persist in some areas. Explains Siegbert Pump, Head of Sales Germany: “It is important to take account of citizens’ legitimate interests in the awarding of construction permits. We expect politicians and regulators to define reasonable, uniform and transparent standards. There is still a strong need for regulation, especially with regard to the handling of environmental issues, so that our customers and the industry can plan more reliably. This will secure the energy transition and jobs in Germany.” On this basis, market studies such as those by MAKE Consult assume that construction volumes will pick up again from 2020.

Nordex installed the Curslack wind farm in 2017. A storage control power plant is currently being built there as part of the international “NEW 4.0” project.

The person responsible for grid integration at the Nordex Group draws a positive overall conclusion. Malte Laubrock says: “NEW 4.0 is a massive project, driving us forward in many areas of activity. It shows our innovative power, directed at an integration of wind energy facilities that is possible over the longer term; it also brings us together with important partners.”
Political affection for renewable energy in South Africa

Recent political changes within South Africa have meant a favourable increase in developments centred on renewable energies, primarily in wind and solar. In 2011, the South African government launched the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) allowing for competitive bidding within the private sector for renewable energy contracts.
On 1 June this year, South Africa’s Minister of Energy, Jeff Radebe, tweeted that a new bidding round, Round 5, would be launched later this year, showing that the renewable energy industry in the region has great support from the country’s government. Anne Henschel, Country Manager South Africa for the Nordex Group, explains what impact this has had in recent years on wind industry business within the South African market, and what we can expect here in the near future.

With all these recent changes to the political landscape, how do you view industry progress in South Africa in the medium term?

The recent political changes and instatement of new South African president, Cyril Ramaphosa, in February 2018, has already brought about monumental changes within the country. A clear example being the signing off of the long-awaited renewable energy contracts by new Energy Minister, Jeff Radebe. The support of both the President and Minister of Energy on renewable energy projects here gives a very optimistic outlook for the future of our industry in South Africa. There is still the need to establish a manufacturing industry, and respectively, a local supply chain in the renewable energy sector in the region. However, this is something that only the Department of Trade and Industry (DTI) can be the driver of, but we hope to see positive developments here in the coming years.
Back in April, the Nordex Group announced the signing of the power purchase agreement (PPA) by public-sector utility, Eskom for the 147-megawatt (MW) wind farm, Roggeveld, from Round 4 of the REIPPPP tenders; construction on this wind farm is expected to commence next year. What kind of impact does a large project like this have on the local community?

There is a significant impact on the local community for a large project like Roggeveld, particularly in the areas of job creation and in boosting local economic activities, i.e. accommodation, catering and fuel services in the area. Furthermore, within the REIPPPP, there is an obligation for socio-economic development. The owners of the wind farm are required to deliver benefits at a local level for the communities in which the wind farms are located. A percentage of the operating income is then allocated to local community social spending and to enterprise development of local businesses in the form of training and upskilling. This is also showcased in a number of our upcoming projects: Garob, Copperton and Nxuba which is adjacent to our largest wind farm in the region, Amakhala Emoyeni. All of these wind farms will all benefit from the manufacturing technology of concrete towers, which will create jobs and training opportunities in all areas from civil engineering to construction, further adding to the socio-economic development of the local area.

Preparing for the REIPPPP bidding rounds sounds like a highly involved process in itself. What does the Nordex Group do to prepare for taking part in the bid? And if the bid is successful what does the company do to prepare for realising such large contracts?

The bidding process in South Africa is similar to that of other industry auctions around the world. As an OEM, the Nordex Group is not permitted to participate directly in the bidding process, so the Independent Power Producer, or IPP, does this on our behalf. We work closely with the IPP to prepare for the bidding phase, helping them choose the best Nordex Group product for the project, as well as supporting them in deciding other factors, such as electrical work and wind farm layouts. Once preparation is complete and the bidding process is carried out, the government then makes a final decision based on what it feels will be an overall “best fit” for a particular project, but best pricing is also paramount. If our bid is successful, we then also support the IPP in finalising the contract financially with the banks as our client, and only then can work begin.

Naturally, the recent political affection for renewable energy in South Africa means we’re not the only wind energy company to be making headway in the region. But what do you feel are
the factors behind our recent success and good position in South Africa?

For the Nordex Group in which the two companies Nordex and Acciona Windpower have merged, it has a lot to do with our unique product portfolio. We offer a combined portfolio for our customers, including two reliable turbine technologies, covering all applications and market conditions.

Since the establishment of the business in South Africa, our focus has been on understanding the broader context of the South African economic environment, and not least placing Broad Based Black Economic Empowerment (BBBEE) as a principle in our governance policies. We aim to transform the energy sector through improving the lives of local people, offering skills development and training, as well as future job opportunities.

Innovation is also a key driver to furthering the success of the company in South Africa, and we strive to find new ways to optimise wind farm performance, with our customers’ satisfaction being our number one priority.

Wild at heart: safety first!

Animals are part of the natural environment on wind farms in South Africa. These animals range from sheep and cattle from the surrounding farms, to venomous snakes, including the Cape-Cobra, Boomslang and Puff Adder. For this reason, all local Nordex Group service technicians are trained in snake handling as a safety requirement for working on-site. It is not unusual to see Springbok and Kudu (both types of antelope) crossing the roads, and there is even a beehive in one of the wind farm substations. Employees in South Africa are very conscious of preserving the natural environment and work closely with local conservation teams to ensure the natural habitat of the abundant bird and wildlife is not affected by the company’s wind farms.
**N149/4.0-4.5**

**MAXIMUM FLEXIBILITY. MAXIMUM YIELDS.**

With its large rotor blade, the N149/4.0-4.5 optimises yields at sites where light winds predominate. It can be individually adapted to grid requirements, wind conditions, topography and sound-level specifications. The turbine has been designed on the basis of the successful Delta platform – meaning many intelligent steps for our development teams, and a giant step for your investment. The 4 MW class: Delta4000.

- Up to 28% higher yield
- Site-specific operating modes from 4.0 to 4.5 MW
- Hub heights up to 164 metres
- Max. 103.6 dB(A) at 4 MW nominal output

» More information at www.nordex-online.com