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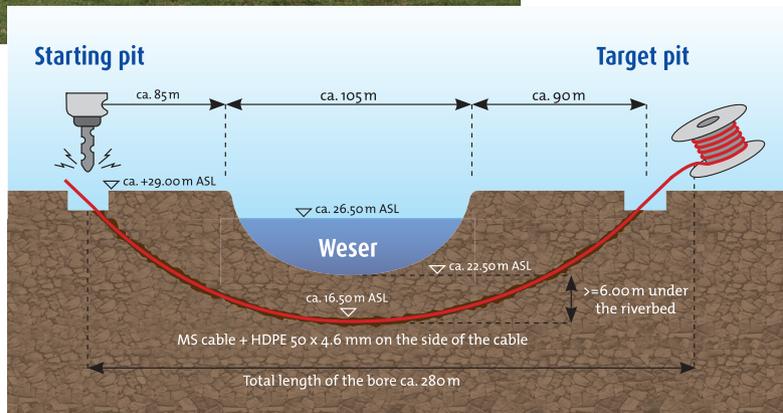


Study on infrasound and ground vibrations

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Challenges in establishing grid connections: When major obstacles lie in wait



When it comes to successfully overcoming challenges, wpd's planners could certainly fill whole volumes. This applies all the more to our colleagues at wpd infrastruktur GmbH and its Department for Construction and Electrical Engineering.

They could definitely tell tales of how they crossed the River Weser as part of the process of connecting the Schlüsselburg wind farm to the grid. This wind farm, located in the extreme north-west of North Rhine-Westphalia in the district of Minden-Lübbecke, went into full operation at the end of March 2020. The four turbines of type Enercon E-115 with a rated output of 3.2 MW per turbine supply green electricity for more than 10,000 three-person households.

However, the task was to overcome various challenges, which were waiting in secret, in the bedrock under the river bed. As the local grid is unable to absorb the volumes of electricity generated, a direct feed to the Leese transformer substation in Lower Saxony was the only remaining solution. To enable the green electricity to be fed into the transformer substation four and a half kilometres distant from the turbines, the Weser had to be crossed by means of a horizontal bore.

In the end, 7.5 km of cable routing had to be constructed for the connection, of which a total of around 40% had to be drilled including crossing the Weser for a length of around 300 m. The drilling company commissioned by wpd began working at the Weser in October 2019. The drilling had to be at least six metres below the level of the water bed. But in the very first week, unexpected problems arose as the nature of the bedrock under the river proved to be much more solid than the relevant expert reports had predicted in advance. The corresponding DIN standard divides the nature of the bedrock into seven so-called "subsoil classes" and the subsoil under the Weser corresponded to Subsoil Class 7: "rock hard to break and loosen" with high "structural strength". Altogether, drilling had to be interrupted four times. Only the fifth attempt, for which special rock drilling equipment was deployed, was finally successful.

However, massive efforts by all concerned and their joint expertise ultimately led to the success of the work. It was impossible to avoid extra costs which were assumed in full by wpd as the developer, but the prestige status of the project fully justified this action. Work on the cable route was subsequently concluded in February 2020.

"We were faced with a pretty daunting task", says Jürgen Möser, Head of the Electrical Department at wpd. "But ultimately, our teams were able to overcome all the technical hurdles together with our partners in the project." The department knows only too well that the so-called "soil risk" makes it hard to estimate the cost of cable routes and particularly of drilling work in uncertain terrain even with careful preparations. A residual risk always remains.

The example of crossing the Weser shows: wpd knows how to meet such residual risks with expertise, dedication and the right partners at its side.

Fresh wind: Poland's energy turnaround picks up speed



The wpd Polska team can see that the energy turnaround takes up speed in Poland, too. The draft bill put forward in September by the government led by the PiS, outlining an energy strategy until 2040, aims to increase the proportion of renewable energies in an energy mix currently still dominated by coal-fired power stations (80%) from their current level of 13% to at least 32% by 2030 and at the same time to switch off around two thirds of the coal-fired stations. Besides wind onshore, all the key pillars are to be added including wind offshore and solar PV.

However, to even get close to achieving these targets, the underlying conditions will have to be adjusted. Since 2016, the so-called "Wind Power Investment Act" states that wind farms must maintain a distance from residential developments equivalent to 10 times the total height of a turbine. This would mean distances of 2 to 2.5 km if modern turbines with high towers are planned to achieve economically efficient use of wind energy. This draft legislation has constructively crippled project development activity in the last few years.

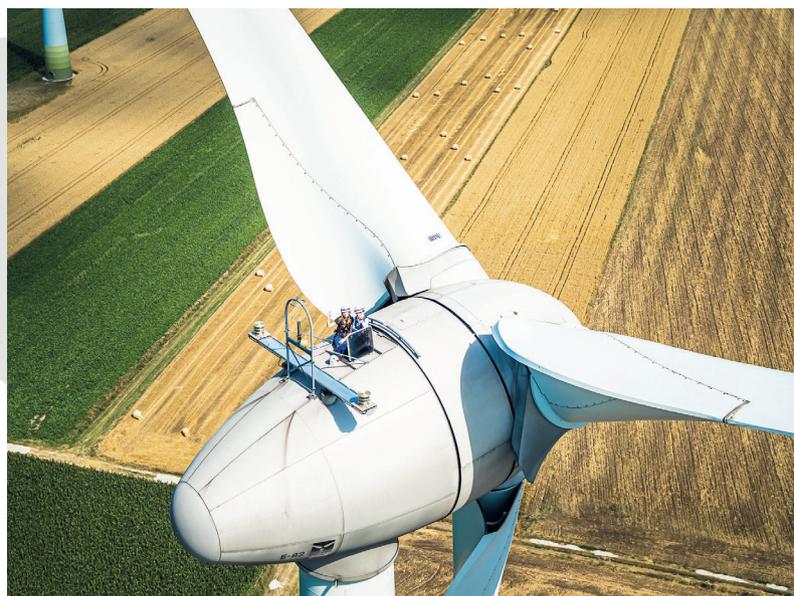
The need for action has now been recognized. Deputy Prime Minister Jadwiga Emilewicz used a visit to the site of wpd's "Jarocin Koźmin" wind farm (42.5 MW) to publicly announce an amendment to the distance rule for the first time. The plan is for local authorities to be allowed to reduce distances to a minimum of 500 m as part of a development plan. This rule is due to enter into force at the end of the year, and it will breathe life into the wind sector in Poland on a lasting basis.

The government's announcement that it will retain the auctions for renewable energies introduced in 2018 until 2026 is likewise encouraging news. wpd has already participated successfully in the first auction, emerging with a portfolio totalling

102.5 MW. Completion of the projects is now imminent, most of the turbines have already been installed and by the end of the year, all the wind farms will be generating electricity. Together with the three existing farms, this brings the installed output of wpd wind farms to 118.3 MW.

But also beyond political rethinking, the prospects in Poland are positive. The Polish energy exchange is seeing the highest electricity prices in Europe and in view of its continuing dependence on expensive coal-fired electricity, nothing is likely to change in the coming years. Many major Polish consumers are therefore on the lookout for less expensive alternatives, and the development in the market of so-called corporate PPAs ("Power Purchase Agreements") is now picking up pace. Here, too, wpd is at the forefront. In the early summer of 2020, for example, a supply contract was signed with mobile phone operator Orange Polska for 10 years with a total volume of 500 GWh.

For the Managing Director of wpd Polska, Agnieszka Plaska, one thing is clear: "With its recent success, wpd has established itself as an important player in the Polish wind market and it will devote all its efforts to bringing about the Polish energy turnaround."



Deputy Head of Government Jadwiga Emilewicz took advantage of her visit to the construction site of the wpd wind farm „Jarocin Koźmin“ also for an ascent to a wind turbine.

Our cover picture shows Jadwiga Emilewicz, who insisted on rappelling herself from the nacelle during a rescue exercise.

Right on schedule in challenging times

Around the globe, the COVID 19 pandemic is also having an impact on the economy, and a company like wpd experiences this in very different ways at different locations. It is all the more noteworthy that the wpd teams around the world, thanks to their know-how, experience and reliable partnerships, are able to ensure that projects remain largely on target despite minor delays.

Aldermyrberget wind farm in Sweden

At the Swedish wind farm Aldermyrberget, the completion of the foundation and infrastructure construction measures was announced in May and the transformer station was completed in July. At the beginning of November, all 17 turbines of the project should be in operation. In parallel, the Swedish wpd team is already pushing ahead with the planning for the implementation of the follow-up projects Tomasliden and Stölsäterberget.



Corralnuevo Project: Commissioning end of 2020

The wpd team in Spain also had to meet major challenges, where the effects of the COVID 19 pandemic led to a comprehensive lockdown. Nevertheless, the Spanish Corralnuevo project (12 x Siemens Gamesa G132-3.465 MW, total capacity 41,58 MW), which is part of the Torozos cluster, is still almost perfectly on schedule. At present, it is assumed that nothing should stand in the way of commissioning by the end of the year.

Wind on- and offshore in Taiwan

Construction of a wind turbine in fish pools in Taiwan

While wpd in Taiwan is aiming for full commissioning in H2 2021 with the Yunlin project, currently one of the largest offshore projects in Asia, progress has also been

reported onshore with the two projects Leadway and Chuangwei: The first of 17 turbines have been erected; the remaining turbines are scheduled for completion this year.



3 projects in Chile on schedule

The wpd teams in Chile continue to meet the current challenges with success and keep to schedules and deadlines. In the Negrete project, all ten turbines have been erected, all infrastructure measures have been completed and the connection of the transformer station and thus the park is planned for the end of November. In the Duqueco project, all access roads have also been completed and foundation construction will begin shortly. The wind turbines are scheduled to be delivered in 2021, so

commissioning is currently scheduled for October 2021. In Malleco, currently the largest wind project in South America and also the largest onshore wind farm in wpd's history, the infrastructure construction has been completed, as has the casting of the 77 foundations. The same applies to the construction of two internal substations. Installation of the wind turbines has also begun, so that commissioning is on schedule for July 2021.



US-American project with pioneering conception



wpd continues to position itself successfully as a developer in the North American market for wind energy. In cooperation with the American developer Scout Clean Energy a wind farm under development was redesigned, turning it into a “hybrid system project” combining wind energy, solar energy and storage technology. This redesign of the “Horse Heaven” project in the State of Washington is intended to increase the profitability of the entire

project and make it more attractive for upcoming PPA negotiations. The project, which is now conceived for 235 turbines, will be able to deliver a total output of 850 MW from wind, solar and batteries in order to guarantee a needs-based, independent and reliable power supply.

Salzbergen project awaits with special feature



This summer, wpd’s Salzbergen wind energy project went into operation with a GE-3.6-137 turbine (hub height 164.5 m). The planning process goes back to 2013 and it shows that, regardless of the size of the project, it is always worthwhile showing commitment and sticking to your guns. Green electricity has now been generated here since August. The target is

to reach 11 million kWh per year. Initially, as a second construction phase is planned at wpd. However, there is another aspect that is very striking. The turbine was erected no more than 1,500 metres as the crow flies from the production location of the nacelle, GE’s factory in Salzbergen. This must be the shortest transport route in wpd’s history.

wpd wind farm Wilstedt provides the industry with important insights

In the first study of its kind in the world, the cooperative project “TremAc” funded by university research and the sector has examined the effects of infrasound and ground vibration. wpd windmanager GmbH & Co. KG, the Wilstedt wind farm situated near Bremen and local residents played a major role in the project. This exhaustive study came to the following conclusion: There is no plausibly demonstrable link between acoustic or seismic waves and physical or psychological complaints. The results of the study are to be used for further measures to raise acceptance. Read more under:

<https://www.windmanager.de/en/wind-farm-wilstedt-first-long-term-sound-study-published/>

Fécamp offshore project: Pioneering work for French wind energy



View from the chalk cliffs of the „Côte d'Albâtre“ to the North Sea and the future offshore wind farm Fécamp (Photomontage)

Off the north coast of France, the Côte d'Albâtre with its typical chalk cliffs, some of which are over 100 meters high, the 498-MW Fécamp offshore project will become a real milestone in the development of the French energy turnaround.

wpd started developing the project in 2007 and is thus considered as a pioneer in offshore wind in France. In the first French tender round, the company was awarded the contract for „Fécamp“ in April 2012 as part of a consortium that includes EDF Renewables and Enbridge / Canada Pension Plan Investment Board (CPPIB). The project is characterised above all by the fact that the state tender guarantees a 20-year feed-in tariff, i.e. a power purchase agreement with marketing security.

Covering an area of 67 km², 71 wind turbines (SGRE 154-7.0 MW) from Siemens Gamesa will be installed in water depths of 25 to 30 m and between 13 and 22 km from the coastline. The green electricity generated will be used to cover the annual needs of more than 770,000 people and save the annual emission of 2 million tons of CO₂.

In order to build up a local offshore industry, the French tender regulation included strict local content requirements. Consequently, the wind turbines will be produced locally in the new production facility built by Siemens Gamesa in Le Havre, and the foundations will be prefabricated as reinforced concrete structures, also in the port of Le Havre. For the construction and installation of both the turbines and the substation at sea, experienced

European companies were recruited as consortium partners. wpd was able to contribute valuable experience in the implementation of the local content strategy.

In June 2020, wpd, EDF and Enbridge/CPPIB announced the financing for the approximately EUR 2 billion project. The financial close and the start of construction have now heralded the realisation of one of the first commercial offshore wind farms in France. „A great success for all parties involved“, says Matthias Boll, Director M&A at wpd. „We plan to commission the wind farm at the end of 2023.“

The same consortium responsible for the „Fécamp“ project will also realise wpd's second French offshore project in France: „Courseulles“, for which financial close and start of construction is scheduled for the Q1 2021.

wpd France has already realised wind farms with a total capacity of over 400 MW in the wind onshore sector since 2002 and has also built up a pipeline of 1,000 MWp in the solar PV sector. With „Fécamp“ but also „Courseulles“, wpd is expanding its market presence: „Fécamp's success underlines wpd's long-term commitment to wind offshore – not only, but especially in France“, says Vincent Balès, Managing Director at wpd offshore France S.A.S. „Over the past 8 years, we have always actively promoted the project together with our partners since the 2012 contract was awarded, despite numerous technical and administrative challenges during the permission and planning process. This is exactly what we will demonstrate in future projects“.

Nacelles, blades and hundreds of jobs: This is how the new Siemens Gamesa plant in the port of Le Havre is to look





Full technical support provided by the wpd wind manager Erkelenz: Solar PV rooftop system on a logistics center in Türrnich near Kerpen (North Rhine Westphalia)

wpd windmanager goes PV

With 513 wind farms, 2,445 turbines and a total output of 5,259 megawatts, wpd windmanager GmbH & Co. KG is among the leading companies for the technical and commercial management of wind farms – both domestically and internationally. Besides the management of turbines, the company is now expanding its photovoltaics division.

“Of course, we’re always looking at how we can continue to grow and expand our range of services”, states Nils Brümmer, Managing Director of wpd windmanager. “Many of our large investors also operate solar facilities as well as wind farms. So it makes sense to offer them management of the entire portfolio in the field of renewable energies.”

PV Centre of Excellence in Erkelenz

With the integration of psm Nature Power Service & Management GmbH & Co. KG with over 60 employees, wpd windmanager’s new centre of excellence for photovoltaics and ongoing operation has been created in Erkelenz. Besides the commercial and technical management of solar farms, wpd windmanager also oversees maintenance and servicing at its Erkelenz facility. “For example, our services include optimisations and upgrades. We maintain the PV module components and also take care of the solar farm infrastructure”, says Ian-Paul Grimble, Managing Director of wpd windmanager, as he explains the range of services on offer.

Synergies for customers

This expansion of the services portfolio offers various benefits to investors. Instead of several people to contact, one central team takes care of the entire renewable energies mix of wind and photovoltaics. “This saves a huge amount of time for investors”, explains Till Schorer, Director of Sales at wpd windmanager. “Instead of a multiplicity of reports from different operations managers, with us the investor can get everything from a single source – regardless of whether it’s a wind farm or a solar farm, in Portugal or Poland.” For the company, too, photovoltaics and wind energy offer many synergies. For example, in the area of reporting, in customer support or for a sales force which can now visit adjacent wind farms and solar farms together. These synergies also benefit major investors.

The entire portfolio on the extranet

Customers can call up a large part of the wind farm and PV data themselves via the extranet. With just a few clicks, major investors can view all the information on their entire portfolio. For example, they can call up the income growth of their wind and solar farms at a glance and access it anytime and anywhere. “Our investors download all their quarterly and annual reports directly on the extranet”, explains Carsten Wolters, Sales at wpd windmanager. “All current issues are recorded in an Outstanding Items List and processed.”

wpd windmanager is already managing the operations of around 100 solar farms. They are monitored in the control room in Erkelenz.

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