BWE INDUSTRY REPORT

BWE
German Wind Energy Association

Wind Industry in Germany

Economic report
An overview of the German wind industry

Companies
Leading companies present their products and services

Industry directory
More than 350 addresses – easy access to the right contact

2024

INTERNATIONAL

Wind Industry in Germany

2024

BWE INDUSTRY REPORT

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German Wind Energy Association

Editorial

Let's get started right now!

Energy policy requires formative and active input at the state level. Following years of stagnation, the change of government in 2022 has resulted in a new dynamic: important legal guidelines aimed at bringing about the energy transition have been redrafted in rapid succession and expediting the coal and nuclear energy phase-out has created a fait accompli. All of this is to the benefit of the wind energy sector, which is the driving force behind the emerging energy landscape, by encouraging ambitious expansion and electricity targets. What we have to do now is to deliver. In the wake of the difficult, politically motivated slump in new construction projects since 2019, this represents an enormous challenge which the sector is facing up to throughout the entire SME value creation chain. This is most evident in the rising employment figures, the increasing number of new projects, and the sharp increase in permits granted.

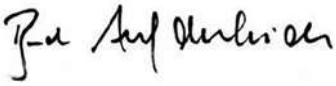
At the same time, the Russian war of aggression in Ukraine poses new challenges. Once again, the supply chains, still suffering from the disruption caused by the Covid-19 pandemic, are coming under strain. The fossil fuel crisis is driving up prices for the manufacture, construction, and operation of wind turbines, and KfW's interest rate policy is making it more difficult to obtain the necessary funding. At the same time, significant innovations are making the turbines more productive, ensuring more efficient maintenance processes, and allowing wind energy to be integrated into the power grid in a more predictable manner. Sector coupling technologies are increasingly opening up new marketing opportunities. The prospect of achieving the targets set for 2030 and 2040 respectively is now a realistic one in the wake of the tailwind that was built up in 2022/23. Let's get started right now!

Bärbel Heidebroek
President of Bundesverband WindEnergie e.V.

Driving the energy transition. Together!

We are facing significant challenges: The climate crisis is taking on increasingly clear and threatening forms with heatwaves, fires, and storms. Furthermore, the past winter in Germany has clearly shown that we are too dependent on oil and gas from other countries, and Germany's energy supply needs to become more independent. Wind energy will play a major role in both of these challenges.

At WindEnergy Hamburg 2022, after the pandemic, we were able to welcome 37,000 participants from 93 countries. Among the exhibiting companies, WindEnergy Hamburg had a more international presence than ever before, with 55 percent of exhibitors coming from 37 different countries. So, the wind energy industry was finally back in Hamburg. This clearly demonstrated that there was a strong desire for in-person exchanges and meetings, and that personal contact is essential for finding solutions. To further advance the expansion of wind energy, we need places for meetings and innovations. Solutions need to be worked on not only in Germany and Europe but also worldwide, and innovations must continue to be pushed forward. This is a significant task that can only be solved collectively. That is why WindEnergy Hamburg 2024 is themed “Driving the energy transition. Together!” and we look forward to welcoming the world of wind energy back next year!



Bernd Aufderheide
President and CEO
Hamburg Messe und Congress

Wind energy is central to transforming the energy system

In 1989, exhibitors at the 1st Husum Wind Energy Days were surprised by over 10,000 visitors. From its start in a livestock auction hall, HUSUM WIND has kept pace with technology and has since provided space for a multitude of innovations. In 2023, over 600 exhibitors from 15 countries presented themselves in 5 halls.

As a trendsetter in the wind industry, HUSUM WIND reflects the increasing decentralization of the energy system. The strong interest in technologies for wind power generation, transportation, storage, and integration into the electrical grid aligns with political support and the upswing of the industry. Consequently, we cover all the elements necessary for the transformation of the energy system, including topics like digitization, hydrogen, repowering & recycling, storage technologies, financing options, and sector coupling.

The growth exacerbates the shortage of skilled workers. WINDCAREER was in high demand, highlighting the personnel needs of the wind industry. The focus is not only on hiring recent graduates; the industry also has much to offer to career changers.

Personnel are urgently needed to continue making product innovations and cutting-edge technologies tangible in the growing renewable energy market. HUSUM WIND shows itself as a reliable pioneer in what the industry can already achieve for tomorrow's energy system.

We look forward to continuing to accompany you!

Meike Kern
Managing Director
Messe Husum & Congress

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Briefly asked

The sector is driven by its actors.

We have asked entrepreneurs of the German wind industry about their most important innovations, strategies and markets. Read their answers on **pages 13, 30/31 and 42/43.**

Industrial climbers from the company HiWork working on the 55-metre-long rotor blade of a Vestas V112 wind turbine at Albertshof wind farm. At a lofty height, they are performing routine checks and collecting photographic records along the outer skin of the blade.
Photo by Paul Langrock.

ECONOMIC REPORT:

Wind Industry in Germany

Germany has installed the most wind capacity in Europe with 66,242 megawatts. Wind power, with 123 terawatt-hours of green electricity, made the largest contribution to electricity generation from renewable energies.

Chapter 1: **Status quo**

The government is blowing a breath of fresh air into the wind industry. What have been the most important developments and what is the current economic situation of the relevant companies? We spoke with key industry representatives about upcoming opportunities and challenges.

A DEMAG lattice boom crane, model VV2800, lifts an 83-meter long rotor blade at Illmersdorf wind farm in the forest. Photo: Paul Langrock

Wind energy in Germany: "competitive without a doubt"

The government in Berlin have taken the lead with new laws and regulations. The German wind industry has delivered with significantly increasing numbers in total performance and the construction of new wind turbines. After several difficult years with only sluggish wind power expansion, entrepreneurs in the German wind industry are once again looking positively towards the future. Concerns are being raised about the lack of skilled workers, disrupted supply chains, and lengthy approval procedures.

Turbine operators aren't keen on tailwind as a rule as turbines have to be adjusted in order to once again produce optimum yields. On the other hand, the "tailwind" that the Federal Government has been blowing into the wind power sector since late 2022 has had a largely positive effect. Still, the expansion process needs to be expedited considerably if the most important goal set out in the German Renewable Energy Act is to be achieved, i.e., to increase the share of renewable energies in gross electricity consumption to at least 80 per cent by 2030.

Major advances in energy policy

Following the Covid-19 pandemic and despite (or perhaps because of) the Russian war of aggression in Ukraine, the current government coalition has made significant progress in terms of energy policy. As Robert Habeck, Federal Minister of Economics and Climate Protection explains: "the 2023 German Renewable Energy Act is the most significant energy policy amendment in decades and provides the foundation for Germany to achieve climate neutrality." However, one has to consider another aspect as Habeck said on the occasion of the G20 summit in Goa this July: "the question of energy security." The Federal Minister emphasised the fact that we have already experienced the downside of unilateral dependency on fossil fuels and pointed out that the vast majority of the G20 member states were calling for a tripling of renewable energy sources by 2030. He was unable to secure internationally binding targets to achieve this on this occasion.

Significant change

On the other hand, the Federal Government has introduced a whole raft of legislation and reform packages to promote the expansion of renewable energy sources. It will take time to implement the numerous innovations both legally and at the organisational level before their full effect will be felt, and there are still major challenges to be overcome on the path to climate neutrality.

Robert Habeck at the G20 summit:
"The 2023 German Renewable Energy Act is the most significant energy policy amendment in decades and provides the foundation for Germany to achieve climate neutrality."

Nonetheless, the stakeholders at the "Husum Wind" trade fair in September and the Industry Day in Berlin-Brandenburg in October were clearly aware of the fact that the sector is currently experiencing an upswing following years in the doldrums, having seen significant increases in installed capacity, permits, and newly commissioned wind turbines in the first half of 2023. Both the output and the efficiency of on- and offshore wind turbines have reached new levels. Modern wind turbines are up to 160 metres high and, at 5 (onshore) and 15 megawatts (offshore), achieve many times the output of older models.

Increase in newly built wind power capacity by 75 percent

The buoyant mood within the sector is also reflected in the latest statistics: thanks to larger and more powerful wind turbines, the German wind energy market is in a position to make up further ground compared to the same period last year. According to the data from the Market Master Data Register, some 420 new wind turbines with a combined capacity of 2,080 megawatts (MW) were commissioned between January and July 2023. This represents a considerable 75.2 percent increase in wind power output compared with the same period last year: the newly installed rated capacity between January to July 2022 was just 1,187 MW. Of the total capacity, 1,850 MW was produced by onshore wind turbines (January–July 2022: 1,178 MW) and approx. 230 MW by offshore wind turbines (January–July 2022: 9 MW).

Schleswig-Holstein in lead position

According to the federal state ranking "Wind energy expansion onshore 2023" (as of: end of July 2023), Schleswig-Holstein remains in first place with around 725 MW of new wind power capacity, followed by Lower Saxony (308 MW), North Rhine-Westphalia (232 MW), and Brandenburg (176 MW).

Dynamic market for wind and solar power

There has been dynamic development in the German wind and solar power sector in the current year. Wind turbines and solar plants with a combined output of

Photovoltaic near Gilching on the A96 near Munich. Under the solar panels, sheep graze on the grassland created. Photo by Ulrich Mertens.

just over 10,000 MW have already gone into operation between January and July this year (January–July 2022: 5,426 MW). This means that the total expansion of wind and solar power plants in Germany almost equals that of the whole of 2022 in just seven months (full year 2022: 10,213 MW of new wind and solar power capacity), which represents an increase of 84.4 percent compared to the same period last year. The figures quoted are based on an analysis of data from the Market Master Data Register, which is maintained by the Federal Network Agency (BNetzA).

Optimistic forecast

The IWR forecast for 2023 as a whole remains unchanged, according to which new wind and solar power input to the German grid could reach more than 15,000 MW (15 GW). The additional electricity output from the expansion of wind and solar power in 2023 alone will amount to around 20 billion kilowatt hours of electricity per year.

Continuing confidence in spite of losses

Wind turbine manufacturers, who had fallen deep into the red in recent years due to increasing costs and international competitive pressure on the one hand and the expensive technology race on the other, are once again showing confidence. As Enercon CEO Dr Jürgen Zeschky said in relation to the company's half year results for the current year: "This is due to the indisputable competitiveness of wind energy. Onshore wind power is now the cheapest form of electricity generation by far, thanks in part to continuous efficiency improvements and innovations by manufacturers. Both of these factors," he continued, "mean that the outlook for our industry has never been better. We're expecting double-digit growth rates in the European markets over the coming years."

Profitability improved

One of their competitors, Vestas, is also confident despite losses and economically challenging developments. Despite the fact that they are also not yet turning a profit the manufacturer remains cautiously optimistic. According to Vestas CEO Henrik Andersen: "Our profitability has improved during the first half of the year."

Increasing material costs

The Hamburg-based manufacturer, Nordex, also booked a slight increase in their profits as CEO José Luis Blanco confidently states: "We have made significant improvements and are expecting an even better second half of the year." That notwithstanding, he expressed concern about rising inflation, especially in Europe: in the first half of the year alone, material costs increased by almost 600 million euros compared to the previous year.

Increasing competitive pressure

As Dr Jürgen Zeschky explains: "This doesn't mean that the positive outlook should obscure the fact that European manufacturers continue to face major challenges. In spite of the increasing demand, the competitive pressure from highly subsidised wind turbines from East and West is still increasing resulting in significant competitive disadvantages for manufacturers based in Europe, which, in a market focused solely on the lowest prices, will inevitably force companies to relocate overseas." Among the most urgent challenges to be met are transport permits, the standardisation of nature conservation and species protection, the implementation of RED III, and expediting and digitalising the permit process.

Record number of new wind turbines awarded

By contrast, a positive development seems to be taking place in terms of the licensing system: in the tenders in February, May and August, 4,410 MW were awarded, the highest volume since the start of the tender model. A further 3,192 MW will be tendered in 2023. A total of 378 wind turbines with a combined capacity of 2,023 MW were newly registered in the Market Master Data Register between the last cut-off date (5 July 2023) and the upcoming cut-off date for the current bidding round, 4 October 2023.

The sector is well prepared

According to the President of the German Wind Energy Association, Bärbel Heidebroek: "This demonstrates that the federal legislation is resulting in the first clear acceleration effects." She goes on to say that: "Based on the additional 7,680 MW, 2023 will be a strong launch pad for the rapid expansion of wind power. At the same time, rounding off the year in this way would create a wave of motivation within the sector to initiate further projects right now, despite all the challenges, to invest and to continue the employment ramp-up. The sector is well prepared."

In summary, the tailwind from the political sphere has given the wind industry a powerful boost in 2023. Whether or not this will result in a sustainable upswing that could carry the industry beyond the goals it has set for itself by 2030 and beyond may already be evident in 2024.

Author: Heiko Hamann

Question: "The economic climate in Germany is clouded by global uncertainties: What risks do you perceive for your company?"

"Changing economic winds, many sunny days, but also cloudy skies have accompanied us for decades. With a high quality standard at market-driven prices and customer-oriented service, we have survived every weather situation so far, so the future gives us no reason to worry."

UWE SCHENK, Global Segment Manager eMobility & Renewable Energy, HELUKABEL GmbH

"The necessary commissioning of new networks as part of the network expansion for the energy transition and the expansion of the broadband infrastructure increase the need for a centrally available enquiry portal for planning and construction projects. The higher probability of failure, also of the new communication and data lines, as a result of construction measures and parallel relocations, makes the focus on damage prevention all the more urgent."

MARKUS HEINRICH, CEO BIL eG

"We consider the risk to our business to be low because we serve a diverse base of industries and markets that ensure our success not only in traditional markets but also in future markets such as energy, automotive and transportation."

CHRISTIAN BREMER, Director Sales & Marketing, WIWA Wilhelm Wagner GmbH & Co. KG

Question: "Where do you see the greatest progress for wind energy under the current German political coalition?"

"The current government has clearly recognised the need to speed up the energy transition. In order to achieve this, various measures, legal Acts and Ordinances are being developed that not only enable faster and easier approval procedures but also the provision of the necessary sites. The biggest advance is that society is re-evaluating the significance of renewable energies as part of all this."

RALF NIETIET, Board of Directors (Chair), enercity Erneuerbare GmbH

"The biggest driver is the breaking open of the very limited availability of land. The fact that the federal states are now obliged to set area targets increases the potential for projects."

MEIKE WELLMANNS, Team Lead Onshore Wind Project Development & Advisory, Ramboll

Mutkalampi, currently the largest wind farm in Finland. Photo by Ulrich Mertens.

Global insights

Germany is still Europe's leading producer of electricity from wind turbines but what about the neighbouring countries Sweden and Poland? At the global level, we took a closer look at the wind power markets in China and India.

Sweden

Sweden set a record for wind energy in February 2023. For two consecutive months, the Scandinavian country generated over a quarter of its electricity from wind turbines. A record 27 per cent of electricity was generated from wind turbines in February, slightly more than the previous record of 26 per cent which was achieved in January this year. This is the highest amount of electrical power generated by wind turbines in the country's history according to an analysis by the think tank Ember. Sweden has set ambitious clean energy targets and aims to generate 100 per cent of its electricity from renewable sources by 2040 and to produce zero net greenhouse gas emissions by 2045. Sweden has invested a lot of money in clean energy to achieve these targets. Wind power capacity there has doubled since 2018 and there are now close to 5,000 wind turbines in the country. They generated around 4 TW of energy in February, which covers 27 per cent of Sweden's electricity demand. Some 2.4 GW of wind power capacity was installed in Sweden in 2022, which is surpassed only by Germany which has around 2.5 GW of installed capacity. At the projected expansion rates, only four of the 27 EU countries (Finland, Croatia, Lithuania, and also Sweden) will have sufficient increases in wind capacity to produce no net greenhouse gas emissions in the future.

Poland

Poland has significantly increased its targets for the expansion of on- and offshore wind energy in recent years in order to achieve the energy transition. Among other things, this improves the framework conditions for stakeholders in the Polish offshore wind energy market. According to the Polish Wind Energy Association, offshore wind energy is expected to be expanded to 5,900 MW (5.9 GW) by 2030 and to 18,000 MW (18 GW) by 2040. They also plan to install onshore wind turbines with a total capacity of 14,000 MW (14 GW) by 2030 and have set an output target of 20,000 MW (20 GW) by 2040. One example of how they plan to achieve these targets is the fact that the country has recently opened up several areas within its exclusive economic zone for the development of offshore wind farms. The total nominal installed capacity of wind turbines in Poland was around 7.9 gigawatts in 2022.

India

At a total capacity of 42 GW, India ranks 4th in the world in terms of installed onshore wind power generation capacity, however, there has been a considerable

slowdown in the expansion rate in recent years. Since 2017 the total output capacity of new wind turbines feeding into the national grid is just 6 GW, whereas the total added was more than twice as much in the five years before that. Wind turbines in India produced around 69 terawatt hours of electricity in the 2021/2022 fiscal year (1 April to 31 March), which, as in the previous period, amounts to just under 5 percent of the overall power production mix. India is far from achieving its ambitious wind energy expansion targets, which, according to plans set out by the government, are based on increasing the grid-connected output capacity to 140 GW by 2030. The Global Wind Energy Council (GWEC) is expecting an expansion of around 20 GW by 2026/2027, which would represent a significant increase compared to the past few years. However, the framework conditions for the wind energy sector would have to be improved in order to further accelerate the expansion. Since the tendering process was amended to include reverse auctions, the bid prices have eroded to such an extent that it is no longer profitable for many project developers to make the necessary commitment.

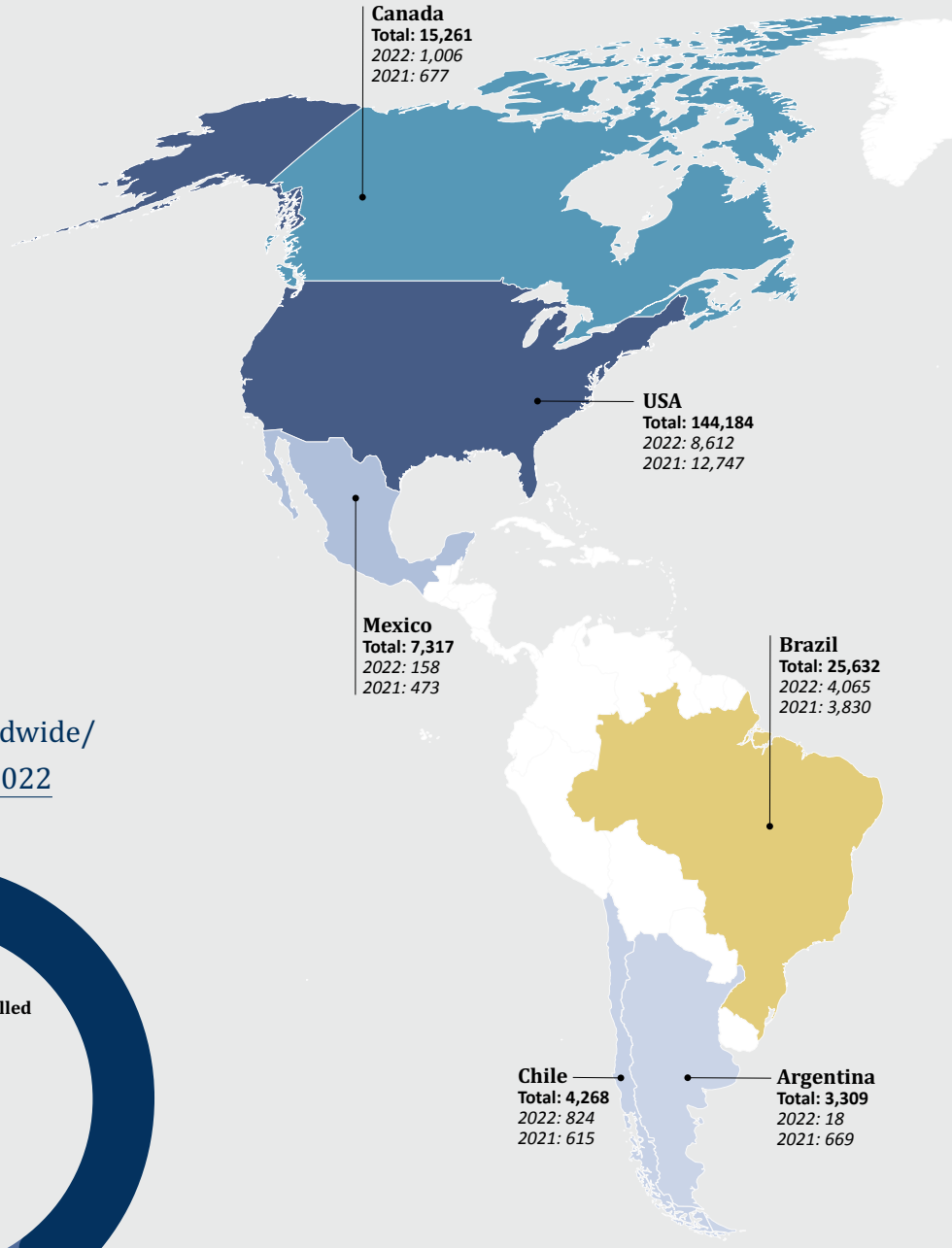
China

The People's Republic of China wants its carbon dioxide emissions to peak and obtain up to 20 per cent of its energy from non-fossil energy sources by 2030. It aims to become carbon neutral by 2060. As a result, there has been a boom in the expansion of renewable energy sources over the past several years. European companies in the battery and solar sectors have rapidly been squeezed out of the market, and even the USA is only able to maintain its position in the face of overwhelming competition by imposing protective tariffs. And there is currently no end to the boom in sight. According to China's state news agency Xinghua, the installed capacity of wind energy had risen by 12.7 per cent year-on-year to about 380 million kilowatts by the end of May, whilst solar energy stood at about 450 million kilowatts, which represents an annual increase of 38.4 per cent. China's total installed power generation capacity during the current period was 2.67 billion kilowatts, which represents an increase of 10.3 per cent over the previous year.

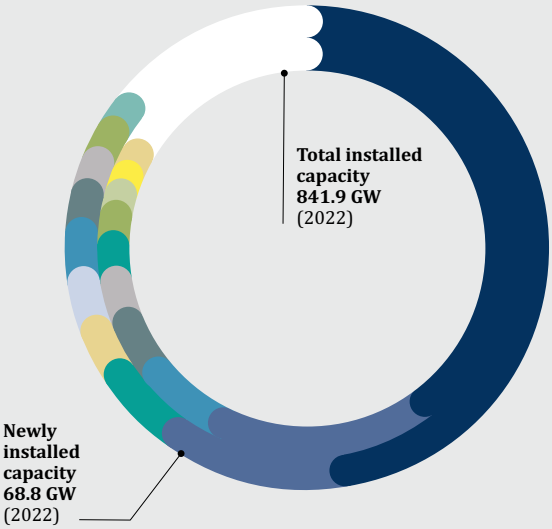
Author: Heiko Hamann

Ananthapur wind farm in India.
Photo: Siemens Gamesa Renewable Energy

Wind power worldwide (onshore)



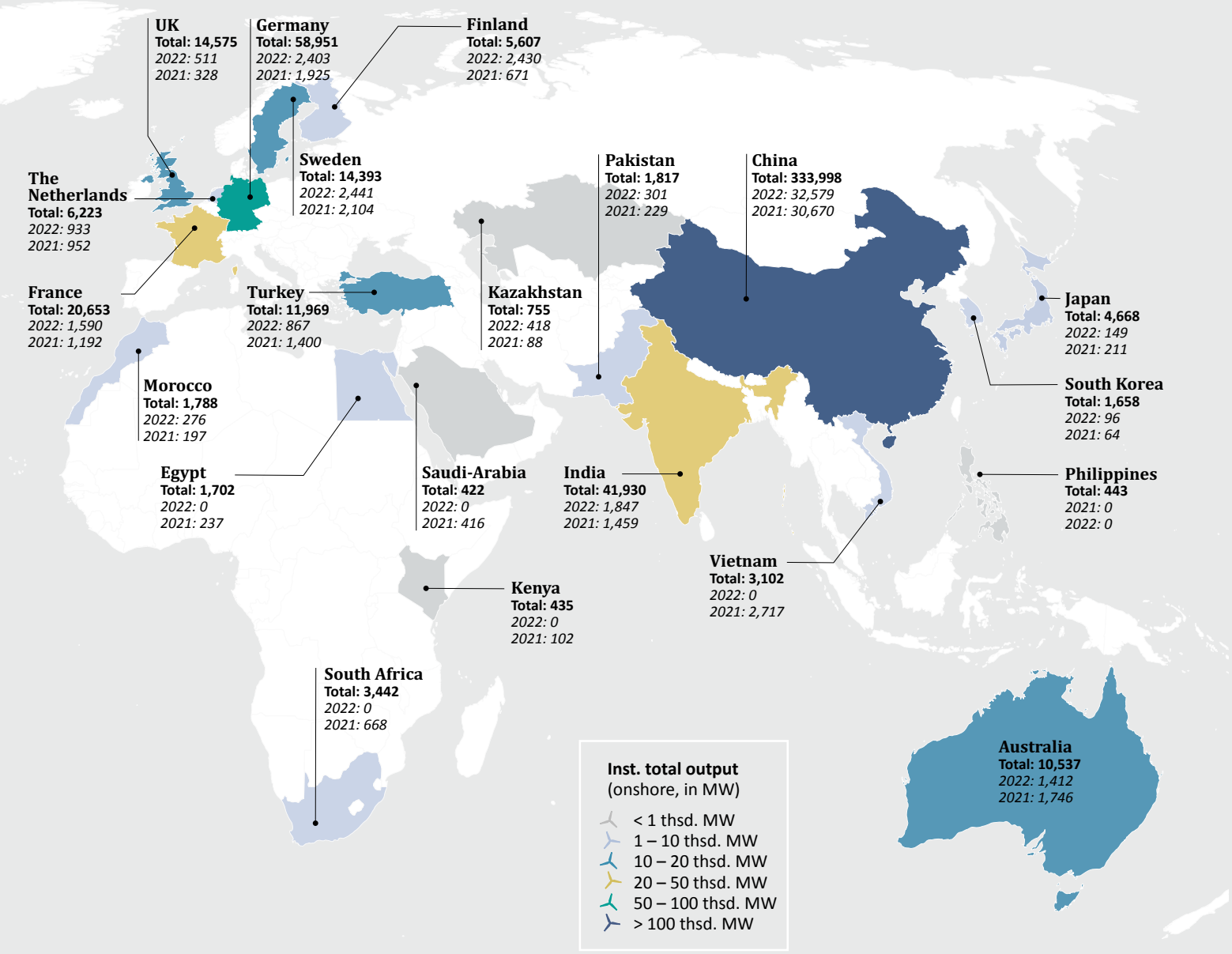
Total installed capacity worldwide/ newly installed capacity in 2022



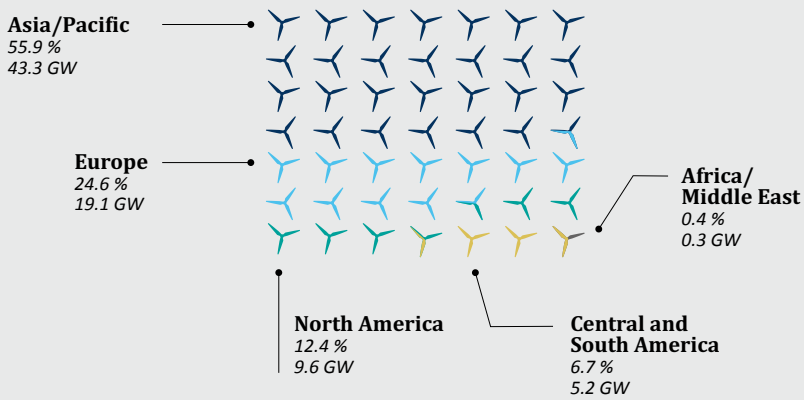
Regions Share of total capacity (GW onshore, in percent)/share of new capacity installed in 2022 (GW onshore, in percent)

China *Total: 39.7 % New: 47.3 %*	**USA** *Total: 17.1 % New: 12.5 %*	**Germany** *Total: 7.0 % New: 3.5 %*	**India** *Total: 5.0 % New: 2.7 %*	**Spain** *Total: 3.5 % New: 2.4 %*	**Brazil** *Total: 3.0 % New: 5.9 %*	**France** *Total: 2.5 % New: 2.3 %*
Finland *Total: – New: 3.5 %*	**Sweden** *Total: 1.7 % New: 3.5 %*	**Canada** *Total: 1.8 % New: –*	**Australia** *Total: – New: 2.1 %*	**UK** *Total: 1.7 % New: –*	**Rest of the world** *Total: 16.9 % New: 14.2 %*	

Data: GWEC | Graphic design: BWE



Newly installed capacity in 2022 by region (onshore/offshore, in percent)



NordseeOne wind farm.
Photo by Ulrich Mertens.

"We know very precisely how things will proceed."

AN INTERVIEW WITH STEFAN THIMM, MANAGING DIRECTOR OF THE GERMAN FEDERAL ASSOCIATION OF OFFSHORE WIND FARM OPERATORS (BWO)

You have referred to the commissioning of four offshore wind farm areas in the German North Sea and Baltic Sea by the Federal Network Agency (July 2023) with a capacity of 7 gigawatts as "a big step for the energy transition". You have spoken of "a new economic miracle based on offshore wind power". What makes you so optimistic?

Thimm: "By putting out a tender and commissioning 7 gigawatts of new electrical capacity, the Federal Network Agency has added almost as much capacity to the German offshore wind project pipeline as has been built in the German North and Baltic Seas over the past decade. Numerous companies participated in the tender process and bid enormous sums of money; in this respect, it not only represented a major step forward for the energy transition, but also sent an important signal that the sector is in good shape and determined to build offshore wind farms in Germany and to make them a mainstay of the energy transition. The plans currently being drawn up by countries bordering the North Sea indicate that this could become another "economic miracle". At a summit in Ostend in April, they agreed to install 120 gigawatts of offshore wind power in the North Sea by 2030, and as much as 300 gigawatts by 2050. The United Kingdom will supply a further 100 gigawatts. Experts estimate that this will require an investment of about a trillion euros. If we approach this in a clever manner, it will also have a significant effect in Germany in terms of value creation and employment throughout the entire value chain."

During the first six months of this year, 24 new offshore wind turbines with a combined capacity of 229 megawatts (MW) were connected to the national grid. There are currently 1,563 wind turbines with a combined capacity of 8,385 MW operating in the German North Sea and Baltic Sea. How would you rate this increase?

"Following the stagnation in 2021, in which not even a single turbine was installed, it is good that our member companies will now be able to connect new wind turbines to the national

grid. We have a good idea of what will happen between now and 2030 thanks to the offshore installation agreement between the northern federal states and the grid operators. For the sake of the entire value creation chain, we would have wished that more could be built sooner, yet the Grand Coalition has determined that the expansion will be slow for many years to come. We now have to deal with the fact that most of the expansion expected by 2030 will come in the final two years of the decade."

The offshore wind industry is expected to install an additional 22 gigawatts (GW) of offshore wind power capacity by 2030. What needs to happen in order to close the gap between the current reality and the targets that have been set?

"In order for this plan to work, we need to review the potential bottlenecks throughout the value chain, from the labour force to the industrial capacity of foundation and turbine manufacturers, the number of construction vessels, and port capacity, to name just some of the most important factors. This is why it is so important to create the industrial policy conditions, which will provide the security needed in our industry, which is mostly characterised by small and medium-sized enterprises, to encourage the necessary investments, a cause to which we are strongly committed. For example, it would be desirable to open up the KfW Offshore Wind Energy Programme to supply chain operators and to introduce a fast-track special depreciation allowance for investment costs. The Federal Government's maritime proposal, which was supported as a parliamentary motion this July, is providing further important impetus in this context."

In the past you criticised the transition to a tender-based funding model (2017). Have your fears been confirmed? What is your current assessment of the situation?

"We are looking to the future. Our current focus is on how tender rules could help us to achieve our energy policy goals and generate further positive effects in areas such as value creation and employment in Germany and Europe, as well as the compatibility of the expansion of offshore wind energy with the protection of biodiversity."

How might the tender model be structured such that it strengthens the European and, in particular, the German offshore industry in the long term?

"For one thing, it is important that politicians do not unnecessarily increase the risks for further expansion by adopting a particular tender model. This is why we criticised the unrestricted bidding model in the latest contract award round for offshore wind areas, which led to the successful bidder paying 12.6 billion euros to secure the contract. This will significantly increase the cost of the electricity generated in these wind farms and put added pressure on the supply chain. As we see it, this money, which is roughly equivalent to the investment needed for more offshore wind farms producing an additional 3.6 gigawatt of electricity, could have been used more wisely. So, qualitative criteria ought to be weighted more heavily in tender processes, just as the EU is also striving for in its Net Zero Industry Act."

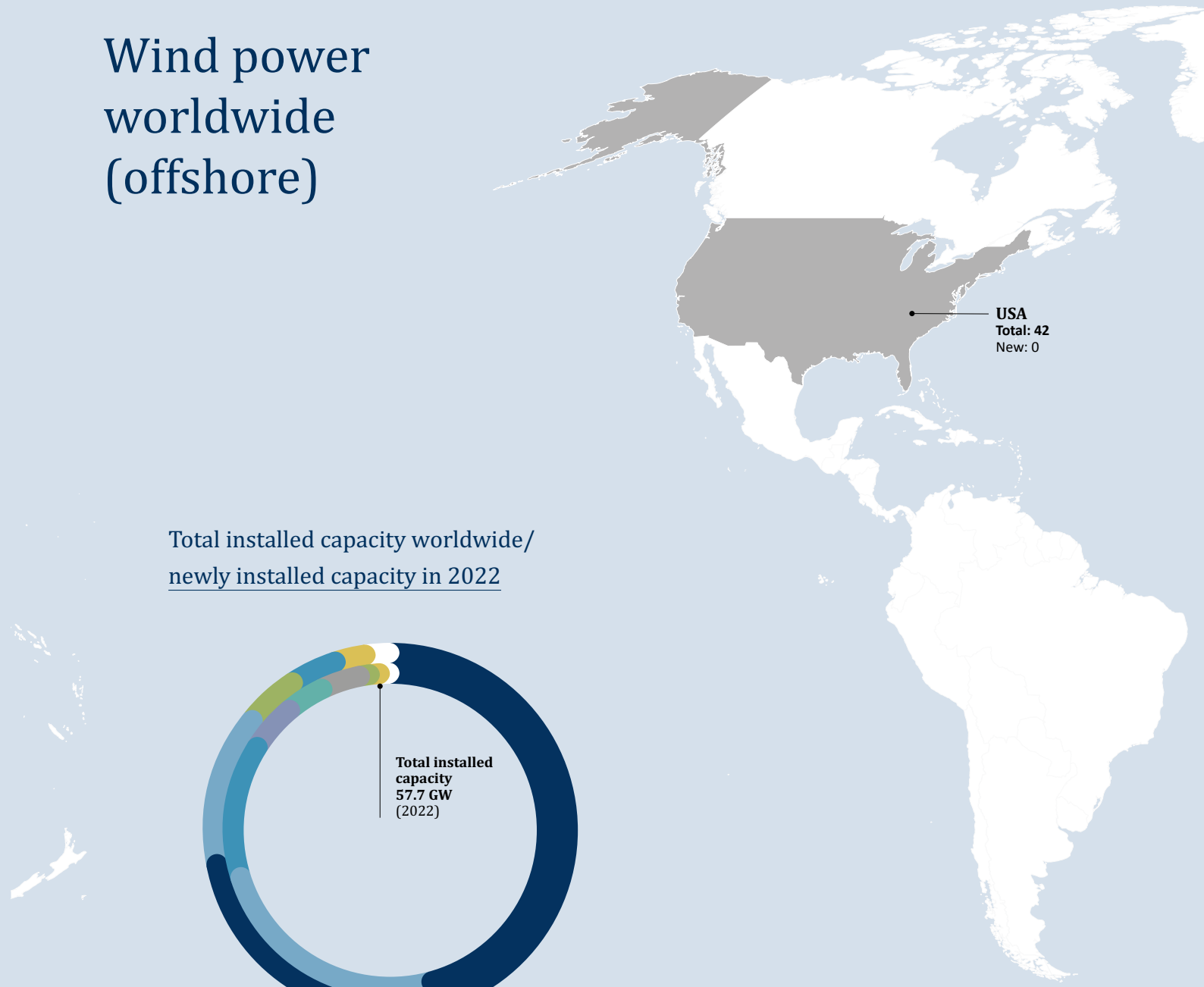
Like many sectors in Germany, the offshore wind energy industry is struggling with rising electricity prices, disrupted supply chains, and a shortage of skilled workers, to name just a few factors. What are the biggest challenges you face and what strategies are you planning to implement in order to meet them?

"We do see a number of challenges, although the future surcharge on electricity prices is one that could have been avoided in view of the unlimited bidding competition. But the 12.6 billion euros that were spent also need to be recovered. Apart from that, we, together with the onshore wind energy sector, will need good ideas and a stable environment in order to be able to recruit and train enough skilled workers. Here we look forward to a productive exchange of ideas and joint initiatives."

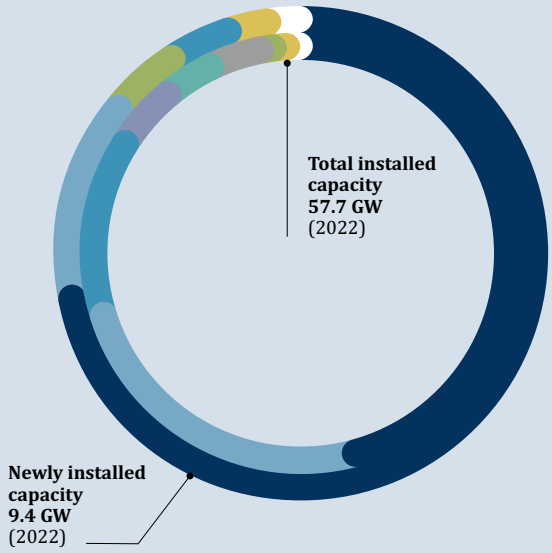
The interview was conducted by:
Heiko Hamann.

Safety training at the NordseeOne wind farm, Northland Power. Photo by Ulrich Mertens.

Wind power worldwide (offshore)



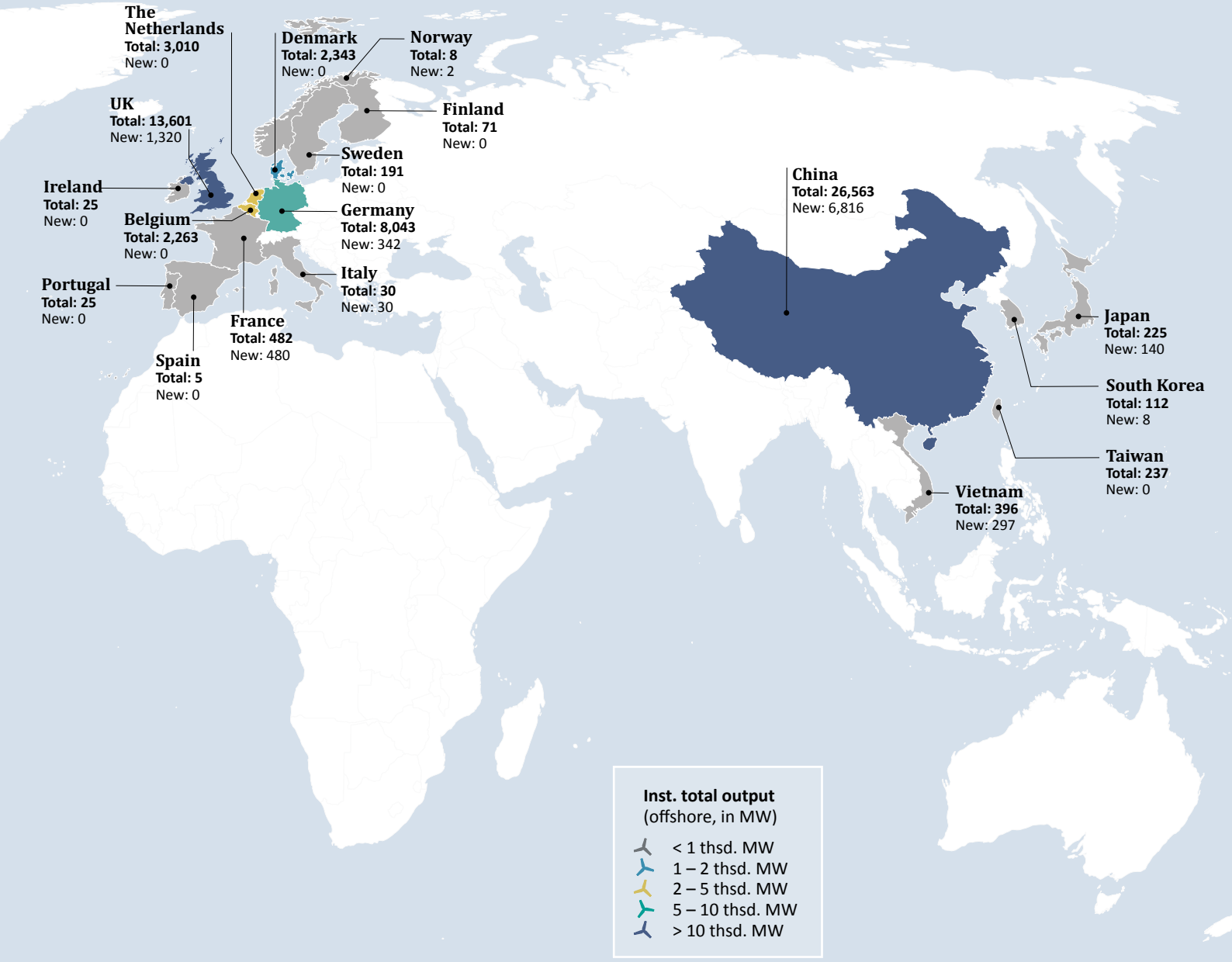
Total installed capacity worldwide/ newly installed capacity in 2022



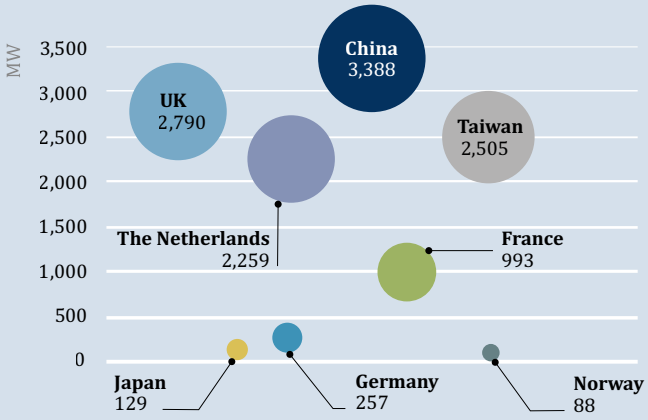
Regions Share of total capacity (GW offshore, in percent)/share of new capacity installed in 2022 (GW offshore, in percent)

China *Total: 46 %* *New: 72 %*	**UK** *Total: 24 %* *New: 14 %*	**Germany** *Total: 14 %* *New: 4 %*	**The Netherlands** *Total: 5 %* *New: –*	**Denmark** *Total: 4 %* *New: –*
Belgium *Total: 4 %* *New: –*	**France** *Total: 1 %* *New: 5 %*	**Vietnam** *Total: 1 %* *New: 3 %*	**Rest of the world** *Total: 1 %* *New: 2 %*	

Data basis: World Forum Offshore Wind (WFO) 2022
Graphic design: BWE



Under construction by the end of 2022 (offshore top 8)



Chapter 2: **Challenges**

Politicians have delivered on their promises yet the general conditions for the wind energy sector remain challenging. What is the current mood within the industry? The eleventh edition of the WindEnergy trend:index presents an extremely positive assessment of the German wind energy market across all regions.

Eleventh WindEnergy trend:index

Positive mood prevails in the German wind industry while Asia and North America see an upturn.

In the eleventh edition of the WEtix report, the positive assessments given six months ago for Germany, Europe, North America and Asia remain largely unchanged. Following a slight downturn during the last six-month assessment period, the latest survey shows a minute improvement. Asia and North America in particular are continuing their upward trend while results for Europe and the rest of the world are slightly down. In Germany, the situation in offshore wind has improved while onshore has declined somewhat; however, after the poor assessments seen in past years, the generally positive mood remains intact.

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For the first time, Australia, South America and Africa, summarily referred to as “rest of world” in this report, take last place. WEtix published the twelfth issue in the meantime, this is an older snapshot.

The importance of training and continued education is seen as very high, especially in the onshore segment. Respondents continue to see high saving potential in new technologies, surprisingly expecting turbine output to further increase significantly.

These are summary results of the new WindEnergy trend:index (WEtix) which has been compiled and published at six-month intervals since 2018. It is published jointly by WindEnergy Hamburg, the global onshore and offshore wind energy event, and wind:research, the leading market research institute for wind energy. More than 500 respondents took part in the current survey between mid-March and end of April 2023, contributing their assessments of the development of the global onshore and offshore wind industry. All in all, more than 10,000 experts have participated in WEtix surveys since 2018. The survey covers all onshore and offshore regions globally. The predefined market regions include Germany, Europe (including Germany), North America, Asia and Rest of World (RoW), comprising Africa, Australia as well as Central and South America.

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Mood has dimmed slightly across all regions but remains positive

The changes observed since the last edition of the WEtix survey in autumn 2023 are relatively minor compared to the sometimes dramatic changes in previous years.

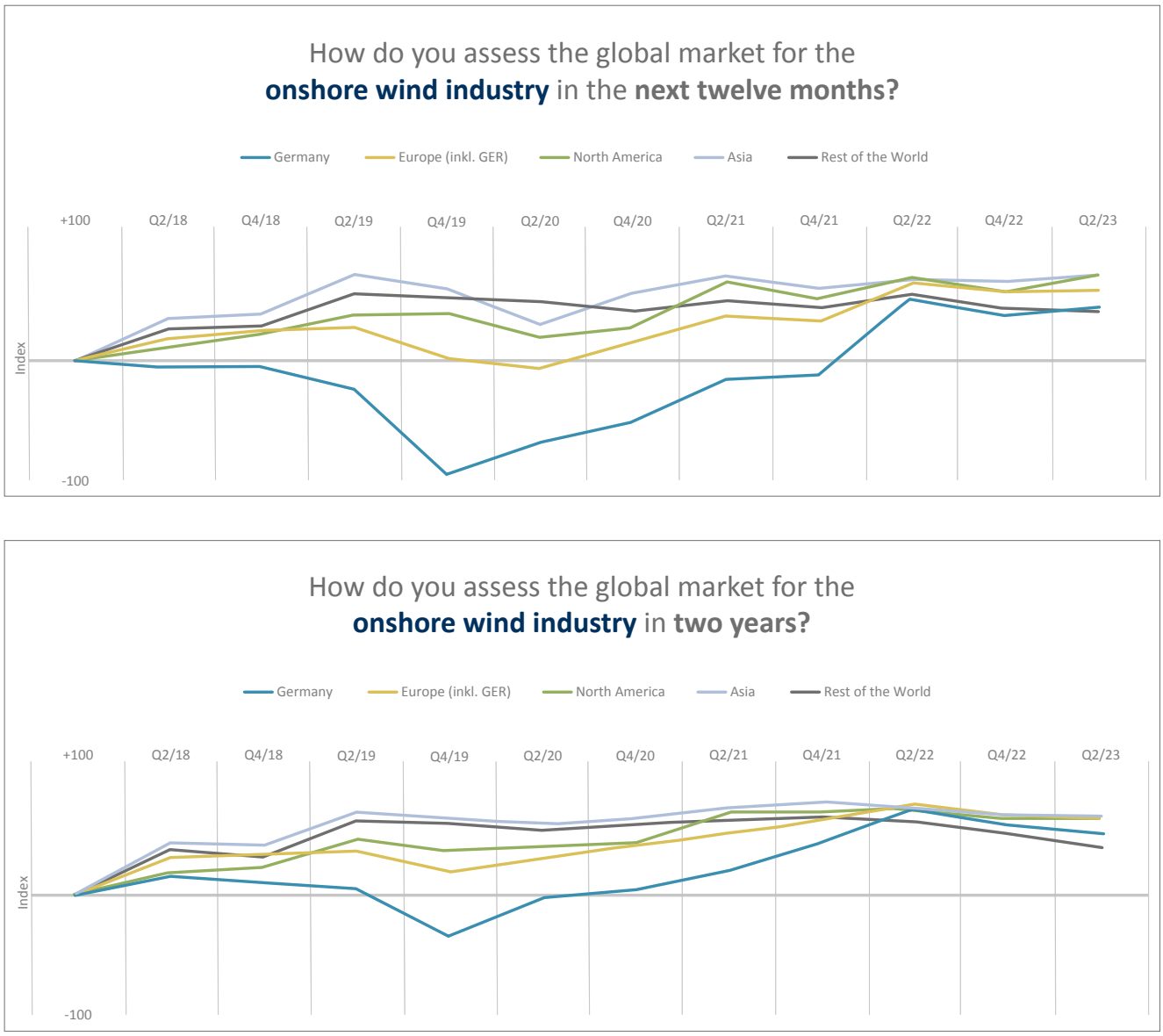


Figure 1: Assessment of the global market for onshore wind energy in the next twelve months and in two years

The general conditions for wind energy again received mostly positive assessments.

Assessments of the global markets remain quite positive and the mood is generally good for both onshore and offshore wind. In a short-term retrospective especially, all markets are showing improvements. The mood in Germany, having improved steadily from the third quarter of 2019 until the first half of 2022, is stagnating on a very high level compared to earlier years.

The overall mood remains positive: There is no industry segment, time period or region where the mood is declining into the negative quadrant; in the context of all WEtix trend surveys conducted so far, most ratings are still in the medium to upper range. Short-term developments have improved in both, Asia and North America, with both regions maintaining very high levels.

The general conditions for wind energy again received mostly positive assessments. Compared to the previous six-month survey period, some of the assessments are now trending upwards, with only Europe and the rest of the world declining slightly.

High relevance of education and training programmes; concerns about supply chain disruption

While the situation of the wind industry is, by and large, seen in a positive light, the market stakeholders are expressing some concerns. This WEtix again included a question regarding the importance of education and training for the wind

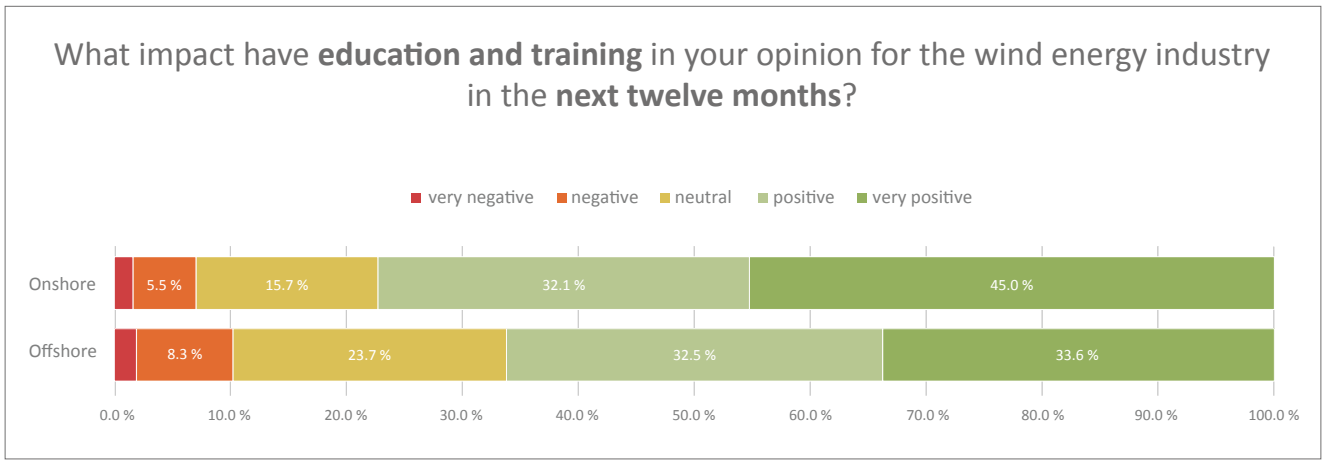


Figure 2: Importance of education, training and qualification programmes for the wind industry

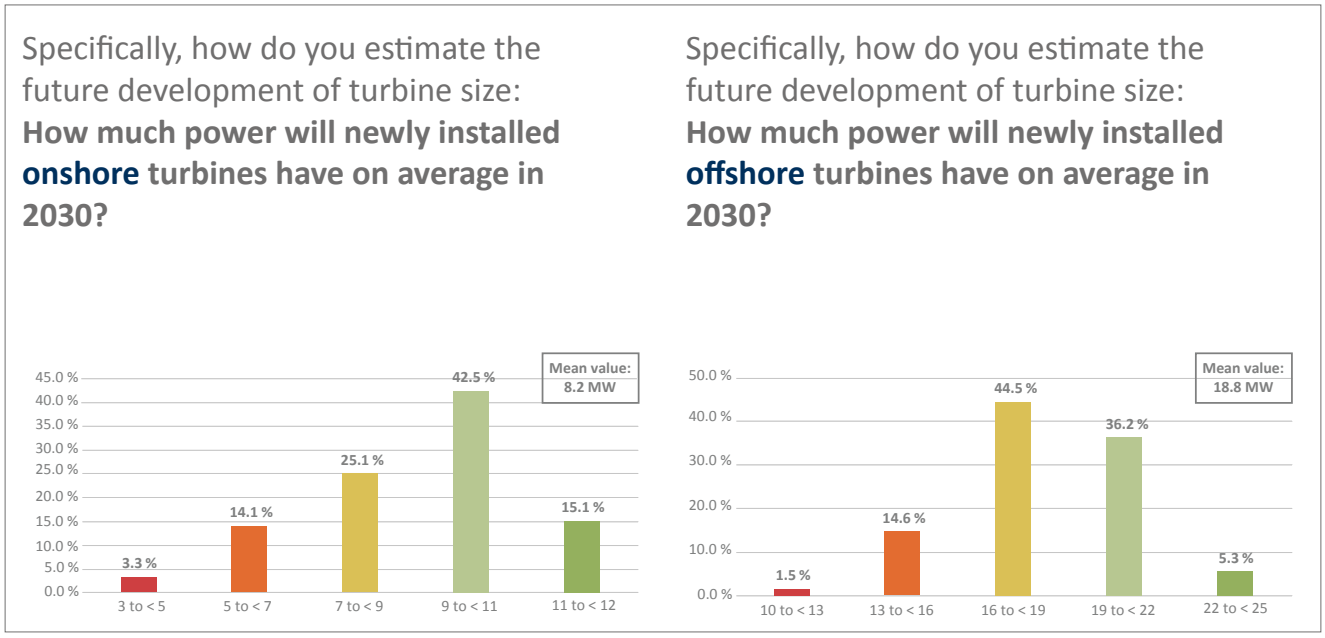


Figure 3: Assessment of turbine size developments for onshore and offshore

industry. The results speak for themselves: This WEtix again reflects wide-spread concerns regarding the availability of skilled labour. More than 66 % of respondents assign high or very high importance to the availability of education and training programmes for wind energy.

After the last issue of this report signalled an end to the period of stagnation in the assessments of saving potential, the latest survey hardly shows a change of opinions. The question about turbine sizes and power

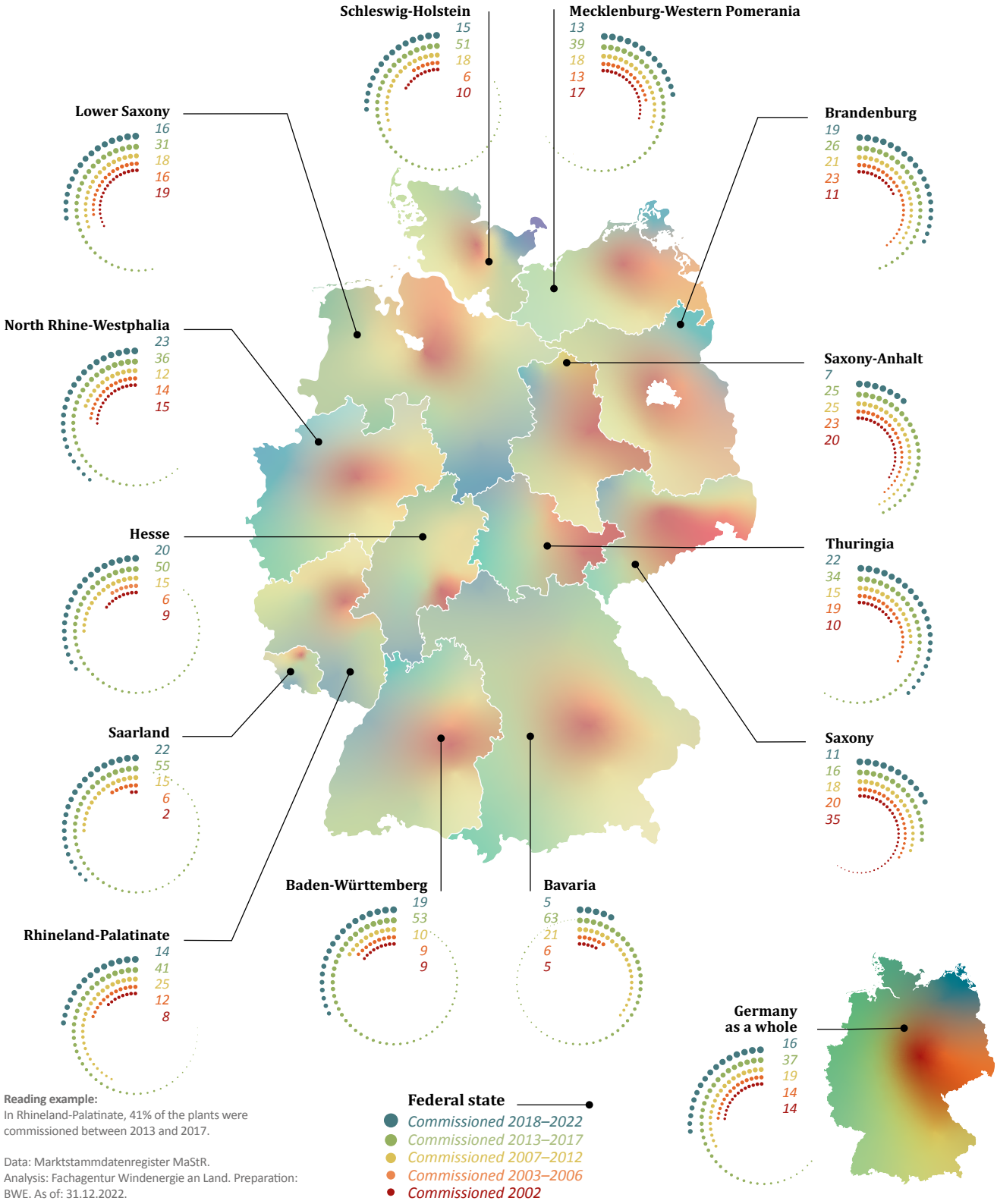
More than 66 % of respondents assign high or very high importance to the availability of education and training programmes for wind energy.

output expected for 2030 for both the onshore and offshore segments, included in this WEtix survey for the first time, addresses the potential for further technological progress. For both segments, respondents expressed expectations of a more or less significant increase of turbine output power, notwithstanding the general opinion voiced by industry experts that growth is finite. This is attributable to hopes that turbine manufacturers will finally enter the profitable zone, which is a necessity in the long term. An average size of 18.8 MW for offshore, and 8.2 MW for onshore turbines would represent an additional significant increase.

We thank WindEnergy Hamburg and wind:research for the permission to publish.

How old are Germany's wind energy plants?

We have divided the wind energy plants into 5 categories and looked in each federal state to see whether one finds predominantly younger or older plants. This provides indications of which regions have recently seen strong expansion or where repowering is a viable option.



Reading example:
In Rhineland-Palatinate, 41% of the plants were commissioned between 2013 and 2017.

Data: Marktstammdatenregister MaStR.
Analysis: Fachagentur Windenergie an Land. Preparation: BWE. As of: 31.12.2022.

Focus

Funding

Funding is a decisive factor in the economic success of wind turbines. We spoke with a number of important capital providers about current developments and challenges.

Dan Tysk offshore wind farm in the North Sea
Photo by Jan Oelker.

Beekeeper Harald Krause with beehives in the EnBW solar park Weesow Willmersdorf. Photo by Paul Langrock.

"A perceptibly positive basic mood"
The right type of funding is crucial for the economic success of a project because of the cost, duration, and complexity of many investments in the renewable energy sector. Investors need long-term secure framework conditions before making a commitment, which is precisely what the dynamic but innately volatile wind energy sector cannot offer. So, what is the current mood within the sector? We discussed this with experienced industry experts.

Geopolitical risks
On the one hand, there has been a price rally in the cost of raw materials and transportation coupled with inflation and the resulting rise in interest rates. On the other hand, there are time-consuming approval procedures and regulatory interventions such as the cap on electricity price increases: the list of challenges currently facing companies and investors is long and getting longer. There are also geopolitical risks at the international level (for example the Russian war of aggression in Ukraine) as well as challenges at the local level (for example nature conservation).

Not a simple banking operation
As Inka Klinger, Head of Project Finance in the Infrastructure and Renewables division of Commercial Bank explains: "Funding infrastructure investments in the renewable energy sector is anything but business as usual for a bank." This Hamburg-based financial institution has been providing funding in the renewable energy sector for over 25 years in which time, as Klinger continues: "we have contributed to many success stories in this sector. Our funding solutions are based on a profound commercial understanding of our partners and their objectives."

An important project partner
And that is exactly what companies are looking for. As Fabian Sösemann, Managing Director of GP Joule Plus GmbH, explains on behalf of many companies in the sector: "The bank will always be the solid pillar when it comes to project funding because, as professional institutions with two decades of experience in this sector, banks serve as important project partners."

Inflation and rising interest rates
And, in the face of rising inflation and the resulting higher interest rates, experience is crucial. These issues affect investors and project developers equally as Alexandra Pohl, Group Manager Renewable Energies Germany explains: "The new framework conditions affect the duration and amount of funding. Claims for equity capital contributions may increase due to current interest rates."

Plenty of interest in funding renewable energy projects
However, the experienced banker also adds that: "there is still plenty of interest in funding these projects." This is also reflected in DZ BANK's books. DZ BANK increased its funding for renewable energy projects to 6.5 billion euros last year, a significant portion of which is due to the German renewable energy business. On the market side, the SFIE Group deals with the expansion of renewables in Germany and, in collaboration with the relevant credit institutes, achieved a record result in terms of new loan volume last year.

Solar Park Vogtsburg Citizens' Energy Cooperative. The energy cooperative owns 75 percent of this solar park with 7.7 MW peak power and 31,000 solar modules. The remaining 25 percent are owned by FS Solar Concept. Photo by Paul Langrock.

Renewables are an attractive business proposition

The figures show that funding renewable energy projects is an attractive and important business opportunity for banks. In addition to working capital credit lines, the Hamburg Commercial Bank offers short- and long-term project funding, liquidity management, and various risk management products. "We also support our clients in the acquisition and sale of projects and companies, as well as in the search for and negotiation of power purchase agreements for projects exposed to market price risks," says Inka Klinger. "We currently provide funding for around 240 projects in the wind and solar sector alone, which amounts to around five billion euros."

Positive prevailing mood

The fresh breeze currently driving the sector forward, especially from the political sphere (see article: wind energy in Germany), is also confirmed by Andreas Euler, who is responsible for programme loans at Rentenbank: "Despite all the challenges facing the sector," he says, "the overall mood in the wind energy sector is already very positive, which is something that we also notice."

Sector coupling is the way forward

Euler sees power-to-gas as an exciting field for development for his bank going forward. Euler lists "wind power, photovoltaics and especially in combination with biogas, storage solutions, as well as heat and utilisation concepts" by way of example and goes on to say that: "This combination will be challenging over the medium term but will eventually result in real added value for the electricity market."

The challenge of electricity market design

Another challenge cited by the industry expert, is a "new remuneration system for the generation of electricity from renewable resources". "The idea of a new electricity market design is a really exciting topic that could provide new impetus for refinancing investments."

Key factor renewables

One key factor for the sustainable development of Germany and Europe will be investing in infrastructure. Whilst shifting the focus to renewable energy sources will open up new opportunities, it will also throw up new challenges. In spite of all the challenges, the financiers we spoke to are confident that they will continue to serve as important partners throughout the current and future developments within the renewable energy sector.

Author: Heiko Hamann

If you are looking for a financial service provider for your renewable energy project then please refer to the business directory towards the end of the document.

Photovoltaic and wind power plants along the A24 highway. Photo by Paul Langrock.

Focus

Repowering

Wind turbines are replaced by larger and more powerful ones after 15 to 20 years, so it is not surprising that repowering is playing an increasingly important role within the sector. Companies with in-house project development departments take on the repowering of their turbines themselves, whilst others hire external planning companies. What is the general mood among them? We spoke to several experienced industry experts.

Some are still hesitant ...

Michael Lange from Momentum sees the Easter 2022 Act as an important game changer for repowering projects: “This will be a great boon. In future, I won't have to wait for challenges to regional plans to be resolved.” According to his observations, many companies are hesitant and are rethinking their current projects. “However,” he says, “in a few years, this legislation will result in a raft of new projects. Let’s hope that all the German companies currently active in the sector will still be there by then.”

Elster wind farm: Dismantling of the 50 older Enercon E-40 units; temporary storage of the old systems. Photo by VSB Group.

... whilst others are springing into action

Other companies are already springing into action. As Ann-Kathrin Weller of EnBW reports: “we are taking on more and more repowering projects. Slowly but surely, we are making progress in this area.” In some cases, companies are purchasing sites that are known to have wind turbines suitable for targeted repowering. The benefits are that the site is available, the wind strength has already been measured, and the infrastructure and grid connections are already in place, which facilitates planning enormously and makes the projects economically attractive.

Opportunities abroad ...

Peter Spengemann (Head of Repowering, wpd windmanager) sees significant economic opportunities abroad. “Germany began repowering early on. Other European countries are closely watching us with interest. Once the political groundwork is laid and projects reach a suitable operational age, German companies operating wind farms in those countries can greatly benefit from their existing expertise.” Offshore wind farm repowering is also slowly moving into the starting position. While there are currently no concepts that include dealing with underwater components, it's only a matter of time before the first concrete projects emerge here as well.

... and pro-repowering legislation at home

The purpose of the amended Federal Nature Conservation Act is to simplify repowering procedures. The novel delta approach only takes account of the negative difference between the impact of a new installation compared to the existing legacy plant, which as Jens Schöttler of renewable energies europe e3 points out, has been a long-standing demand within the sector. In terms of species protection, “we can now continue to use the existing permit.”

Schöttler also sees significant potential in the revision of § 245e of the Building Code, which allows deviations for repowering facilities from designated priority areas. In the future, the new Section 249 of the Building Code will come into play, which provides for extensive repowering rights for existing parks, regardless of whether the basic principles of spatial planning are affected. This would turn even more existing wind turbines into repowering projects.

Author: Martin Schneider

If you are looking for a repowering company to manage your renewable energy project then please refer to the business directory towards the end of the document.

Question: "The demand for skilled workers will continue to be a challenge for the wind industry for several more years. How do you attract new employees?"

"As a rapidly growing company, this is our greatest challenge. Accordingly, investments in training and further education are given high priority at Deutsche Windtechnik. This year alone, we welcomed 38 new mechatronics trainees. In total, we currently have over 100 trainees and dual students. In addition, we continuously train lateral entrants as service technicians. We are taking the next important step with our DWT Campus. It will intensify and harmonize all our activities in these areas."

MATTHIAS BRANDT, Director, Deutsche Windtechnik

"As a company, we place enormous importance on being an attractive employer, which applies equally to our existing employees and to potential applicants. Our corporate culture is extremely important to us and, of course, we are always looking for ways to make it even more attractive. It is all about a good work-life balance and flexible working hours, but also about such things as how we deal with stress or mental health issues. Our windmanager can, for example, use the services of Likeminded at any time. Of course, we also offer other benefits such as fitness services, bicycle leasing, and our Corporate Benefits Portal."

HENNING RÜPKE, Director International Operations, wpd windmanager GmbH & Co. KG

"What characterises us at RES are our clear values and our great commitment to the cause. We are a great team and support various initiatives to offer marginalised groups of people an open and appreciative working environment. With us, everyone can contribute and develop. We love what we do and what we do is important. So if you want to get involved in the energy transition, you've come to the right place. In addition to an exciting working day, we offer potential employees attractive salaries as well as various additional benefits, discounts and flexible working time models. In addition, we are consistently pursuing new paths in order to meet the acute shortage of skilled workers and the increasing demand in our industry. For example, we cooperate across borders with our international RES colleagues in our maintenance or repair services and increasingly see supposed competitors as partners as well. The entire industry can benefit from closer cross-company cooperation and consistent coordination of scarce human resources."

PHILIP THIEMANN, Support Services Director, RES Deutschland GmbH

"We believe that team performance is more than the sum of individual performances. We promote a personal, humane, and respectful corporate culture based on mutual appreciation. The first 'Green Wind employee wind turbine' is currently going through the approval process, which will make all our employees, from student trainees to managers shareholders."

SARAH BEHRENS, Managing Director, Green Wind Managing GmbH

"Volkswind's corporate culture is based on a feel-good atmosphere which prioritises fun at work, a good work-life balance, and personal development. We practise transparency, promote proactive thinking, and enjoy a non-hierarchical corporate structure. My door is always open, even if you may have to queue up at times."

KATJA STOMMEL, CEO, Volkswind GmbH

"Wanted: Wind Energy Enthusiasts! At Wölfel, we understand that knowledge means nothing without the people who apply it. As an employer, we are distinguished not only by our expertise, but particularly by our extraordinary friendliness and open, appreciative interaction with each other. Join our team and shape the future of the wind industry with us!"

DR.-ING. CARSTEN EBERT,
CTO, Wölfel Wind Systems GmbH

"Here at wpd, we are working together with great passion on one of the greatest and most exciting challenges of our time: phasing out the use of fossil fuels and switching to green energies. Become part of wpd. Don't just do anything. Do something for the climate!"

ANNIKA SCHULTE, Senior Project Manager,
wpd GmbH

"We offer interesting jobs that involve a lot of responsibility but are flexible in terms of location. Flexible working hours and modern social benefits are a matter of course for us."

CARSTEN BOVENSCHEN, CEO, JUWI-Gruppe

Question: "How do you evaluate the potential offered by the repowering of existing wind turbines? "

"REWITEC focuses on the continued operation and value retention of existing turbines – our patented technology is applied in gearboxes and bearings to make wind turbines more durable and increase efficiency."

STEFAN BILL, Managing Director, REWITEC GmbH

"The German government's targets are very ambitious and also a great incentive for us. We are investing heavily in the expansion of photovoltaics and onshore wind. Of course, this also includes repowering our existing plants. Like our repowering project in Karstädt, that has enabled us to quadruple electricity production on the same surface area."

RALF SCHÜRKAMP, Managing Director,
ENGIE Deutschland Erneuerbare GmbH

Chapter 3: **Solutions**

There are three issues that will continue to pose a challenge within the sector for the foreseeable future: the shortage of skilled workers, acceptance among the population and digitalization. Yet companies themselves can make an active contribution in these areas. There is often untapped potential in the labour market for skilled workers from abroad, lateral entrants, older employees, and women. We have spoken to them. And we introduce you to wind farms without wind turbines and solutions for more digitalization in an infographic.

Language is the key

We can no longer do without foreign skilled workers. I'm speaking to international professionals who had the courage to relocate to Germany. They all agree it's virtually impossible to gain a foothold in the door of the German wind industry without the ability to speak German.

JUAN HERNAN

A bumpy start

I spoke to Juan Hernan, an industrial engineer at Energiequelle, who relocated to Germany from Spain 20 years ago. His first employer here had assured him that he wouldn't need to speak German. It rapidly became apparent that this was a bit optimistic as Juan worked in North Frisia where English was less common in people's everyday lives.

Upon his arrival, Juan was supported by friends and colleagues, but less so by his then employer. The challenge of becoming integrated in a new country can only be mastered through social contacts, for example through leisure activities after work, by joining clubs or through the church community. Taking new employees by the hand, helping them to take the first few steps, and perhaps even having a member of staff take them along to local events, is of little cost to the employer and facilitates integration.

PIERRE DUCHALAIS

The objective is to learn German

Pierre Duchalais, who relocated to Cologne from France in 2017, had a similar experience. "The big city was probably not helpful when it came to learning the language," he told me. There is a large French community in Cologne where, for many years, he spent much of his free time. Work in English; downtime in French. Pierre spent the first three years living in a bubble, standing in the way of his goal of learning German.

Switching to Energiequelle and moving to the smaller town of Bremen helped: he asked his new colleagues not to speak to him in English and now, after just two years, I can hold a conversation with him entirely in German. His advice to other skilled workers considering relocating to Germany is to think carefully about what they want to get out of their stay. If all they want to do is gain some short-term experience in the wind energy sector, then choosing a company in a major city with an international environment would be a good choice. If, on the other hand, they want to migrate to Germany on a long-term basis, then it would be better to move to a smaller city.

EUGENE CHANG

Cultural differences …

Eugene Chang, who first came to Germany from Taiwan to do a master's degree in business studies, talked to me about a German work culture that initially seemed foreign to him. He is currently living in Hamburg and works for Ørsted.

In Asia, he says, work and private relationships usually overlap. Going out for a beer after work to talk about work, ongoing projects, and upcoming tasks, he said was very common. In Germany, colleagues tend to go straight home after work and separate their private and professional spheres. Whilst Eugene thinks this is good in principle – he sees it as part of the more efficient and focused work ethic of many Germans – it did make it more difficult to make new friends.

Finding accommodation is another problem: there is a shortage of affordable housing, especially in the larger cities. An acquaintance who had been living in Germany for many years helped Eugene with his search and the application process. International exchange is important, Eugene tells me; in his experience, companies such as Ørsted, which operate internationally, are actively promoting it.

KENNY ROY

… and bureaucratic hurdles

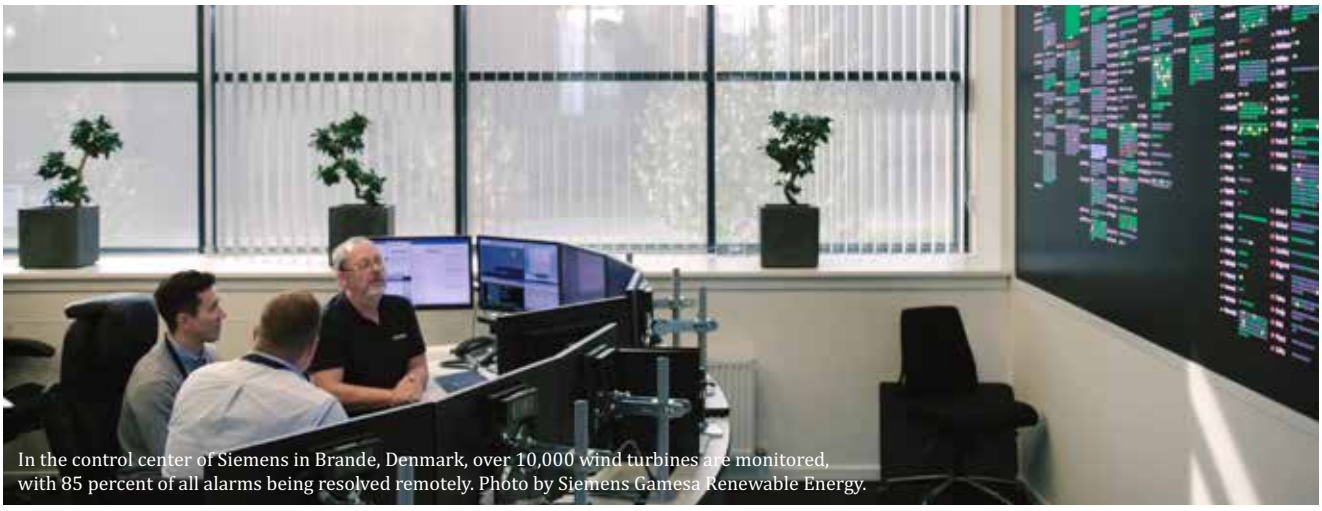
Kennie Roy came from India to do a master's degree and currently works for Prokon. When I asked him about the difficulties involved in immigration, he immediately sighed about the bureaucratic hurdles. He felt overwhelmed by the number of letters he received from the authorities in the post. Fortunately, his new colleagues at Prokon helped him. Pro-active networking, he says, is extremely important in any case: online services such as LinkedIn, Stepstone or Monster were a good place to start both in India and in Germany, but personal contact and contacts on the social networks were just as important in this country. Companies in India would often go to universities in an attempt to attract new employees, a practice which is less common in Germany, where one has to proactively visit job fairs.

What can companies do?

- → Offer help with bureaucracy, not only job-related
- → Take account of families, research contact persons if necessary and offer assistance
- → Provide support with finding accommodation and leisure activities once the person has taken up the job, e.g., asking colleagues to help
- → Actively encourage personal interactions within the company

Want to find out more?

Another three interviews in German can be found here: www.windindustrie-in-deutschland.de/interviews/ausland



In the control center of Siemens in Brande, Denmark, over 10,000 wind turbines are monitored, with 85 percent of all alarms being resolved remotely. Photo by Siemens Gamesa Renewable Energy.

How much change are you ready for? So-called lateral entry can open up new opportunities

Lateral entry is an increasingly popular way to address the shortage of skilled workers within the sector. Companies that specifically invite applications from career changers and non-specialists have a larger pool of applicants to draw upon.

I carried out a random check and searched online for jobs in the wind energy sector that explicitly targeted people from outside the field. One of the qualifications often requested by employers is vocational training in fields like mechatronics, industrial mechanics, and electronics.
However, the urgent need for skilled workers has caused a rethink within the sector, leading some companies to broaden their requirements. As an alternative to targeted vocational training, they are now inviting applications from people who have completed a general "vocational training course in any technical field or trade", or ask for skills such as "manual dexterity and technical understanding" or experience in the "maintenance and servicing of technical installations". So which kind of people tend to respond to these job offers?

DAVID HÜTTER

From bricklayer to service technician
I managed to get hold of David Hütter via his service car phone in the middle of a wind farm. He is a bricklayer by trade but had been looking for a job in the wind energy sector for a long time. He applied directly when requirements were made less restrictive and the call went out for any experienced tradesperson to apply. He had a good general technical understanding and was very willing to learn – everything else he was taught in the six-month career changers course at Deutsche Windtechnik. He received specific training in the maintenance and repair of Vestas turbines; following a few months of mentored practical experience, he will now be trained in the maintenance of other turbines and medium-voltage switchgear. Hütter is happy in the new environment and appreciates the more analytical work approach, which, he says, is much more about "understanding problems first, looking for solutions and then implementing them". According to him, a tradesman's eye is a basic prerequisite for this type of work. He learned the rest in the lateral entry course and through practical experience.

TIM WEGENER

From shipbuilder to quality inspector
Tim Wegener is a trained locksmith who went on to qualify as an industrial foreman and spent years building cruise ships and the like. He now works as a quality inspector at ENERCON. Whilst this may not be a straightforward career path, what he can bring to the table is an understanding of large, comprehensive projects in a rapidly growing sector. He is well able to cope with the recent increase in the demand for wind turbines. The fact that it is sometimes necessary to move quickly is something he still remembers from the shipyard, where he also had managerial responsibility for personnel and technology. Tim likes the fact that he now works outdoors, is becoming familiar with many other professions, and is in charge of varied projects. From ENERCON's perspective, Tim represents a successful example of opening up the company to lateral entrants.

During the interview, I asked Tim how best to identify potential lateral entrants. In his opinion, companies should make more use of social media to draw attention to themselves and present the benefits of working for them, the advantage being that this enables companies to reach people beyond the wind energy sector bubble and perhaps convince them of the good prospects and opportunities available within the sector.

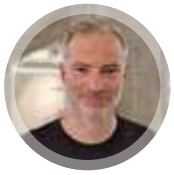
Photo by Siemens Gamesa Renewable Energy/Sören Kjeldgaard

Photo: Ulrich Mertens

JESSY FRITSCH

From a hands-on to an office-based job

Enpal, a recently founded solar power company based in Berlin, posts many adverts on social media platforms; I stumbled across some of their adverts, wrote to them and interviewed one of their senior employees, Jessy Fritsch, a few days later. Jessy originally trained as a field electrician, but now manages a team of electrical specialists from the office. Her previous employer made a clear separation between field-based tradespeople on the building site and office-based academics. Enpal takes a completely different approach focusing more on what a person can actually do rather than the academic degree they may hold. Jessy saw an advert on Instagram for a job in the solar power industry and applied. The company offered her a short theoretical training course at their own training centre followed by a practical trial under the auspices of an experienced mentor, which suited Jessy down to the ground: an interesting new job with close support tailored to her individual needs. She has never regretted the move into an office-based role.



GUNNAR LUX

From marketing professional to project developer

Gunnar Lux is the final interviewee for this article. I was still searching for someone without a background in one of the traditional trades. GP JOULE is among those companies that explicitly advertise jobs for such lateral career entrants. Gunnar spent many years in marketing before opting for a career change. “I went for interviews with several companies at that time and was always looking for a well-conceived induction and professional training programme. That was particularly important to me as a lateral entrant with only one year's experience in the industry.” Following a successful induction process, becoming familiar with further processes presented no great challenge. His new colleagues gave him every support and are always happy to help with a view to advancing projects as a group. Motivation levels at GP JOULE are high: all employees are fixated on the goal of 100 % renewable energy sources and are more than grateful to receive the support of people from almost any background. “Every conversation I have teaches me something new,” says Gunnar with a chuckle. “At the same time, I can enrich the sector based on my experiences in my previous professional career.”

Photo by Siemens Gamesa Renewable Energy/Steen Gyldendal

What can companies do?

- → Offer in-house or external lateral entry programmes
- → Explicitly mention lateral entry opportunities in job advertisements
- → Broaden their entry requirements (e.g., specific abilities rather than degrees) to increase the potential pool of applicants
- → Try to appeal to non-specialists via social media and online advertising
- → Offer a flexible, bespoke training programme to address any knowledge gaps among new employees

Want to find out more? Look for lateral entrants at the BWE career fairs (in German): www.bwe-seminare.de/kee

A proven workforce: how to retain older people in the workplace

Older employees have a lot to offer. As a millennial, I want to get this message across to directly challenge the ideas that some younger people may harbour. Older people know this already. They have many years of experience, a high degree of loyalty to their employers, and a large network of contacts. How could their employers retain them within the company given that many of them are due to retire in the next few years?

Photo: Vestas/Simon Klein-Knudsen

Seven million baby boomers will retire in the next ten years, including many of the original pioneers of the wind energy sector. Compared to career changers or skilled workers from abroad, HR departments may not yet be focusing as much on older employees. Yet they ought to as the gradual quiet loss of older employees represents a huge loss. One thing is certain: specific solutions to this problem are required.

From boss to employee

Fritz Mahrholz was on the verge of taking early retirement. At the age of 60, he had a small company that employed around 40 people. Then he received an offer from the Danish company, Momentum, to employ him and all of his existing staff. He was enticed by the opportunity of setting up a new department but not being burdened by taking on full responsibility. This is how he went from being a managing director to head of department. “I'm still one of those people who enjoy their work,” he told me. From the employer's perspective, it is about retaining older workers by offering them a job rather than their being obliged to work.

His new company offers a number of flexi-time schemes: From the end of next year, he wants to work only 3.5 days: Thursday off, Friday a half day. However, in spite of Momentum’s offer of a part-time arrangement, he is adamant that he will retire as soon as he turns 65. Now, some three years before finally retiring, Mahrholz is looking for the right tool to train his successor. He is convinced of the need for a properly planned and timely handover scheme regardless of the additional costs this will inevitably involve.

A note about the differences between younger and older workers

Gerald Riedel, a partner of the Kiel-based company getproject, has been observing changes in worker expectations: younger workers are demanding such benefits as sabbaticals, work from home or part-time work and older workers have followed their example and are increasingly demanding the same. Nevertheless, Riedel stresses the importance of personalised approaches, as some older employees would prefer to stick to the status quo that has served them well for decades.

He finds it important to ensure older employees are involved in the communication process. “It would be easy to assume that all innovations and modern approaches are inherently good,” he says: “yet such changes can easily alienate older employees despite the important experience they can contribute.” He makes sure to actively listen to employees who are usually less vocal. “Many of the structures in the wind energy sector are not yet firmly established,” he says, “so it's particularly worthwhile to learn from each other. Working on exciting projects is more attractive, especially for older employees, than team events such as a Business Run or bicycle leasing as a job benefit. These things tend to be more attractive to the younger employees.”

Author: Martin Schneider

What can companies do?

- → Increase pay for employees who do not retire at 63
- → Renegotiate responsibilities and even reduce them where possible
- → Develop personalised work-hour arrangements (X-day week)
- → Continue to place traditional vacancy notices in regional newspapers

Are you looking for a new professional challenge?

Click here to benefit from the networking opportunities at the BWE seminars: www.bwe-seminare.de (German events) and www.windindustry-in-germany.com/events (English events)

“Visibility is crucial”

Why don't we see more women in the wind energy sector? We asked three “Women of Windpower” how companies could make the industry more attractive to women.

FINJA NEUMANN

NELLY KIRSCH

HANNE MAY

160 metres high, on a platform with no guardrails with a free fall to the left and right, with the wind whistling around your ears. Acrophobia? Not Finja Neumann. For her, the view from the nacelle means one thing above all: freedom.

Neumann is a service technician for Vestas, whose job is to inspect, repair, and maintain wind turbines day in, day out. Most of her work is done in the nacelle. She only really has to climb on top of it when the lighting systems need to be repaired or when there’s a problem with the wind vane. But the view from up there and that feeling of freedom are simply too tempting, so she likes to climb the ladder up through the roof hatch just for a short break.

There is a distinct under-representation of women in the renewable energy sector, where twice as many men as women were employed in 2019. Until now, more precise figures have not been recorded for Germany; all we know is how many women have made it into management since 2022, which is just 6 per cent. Yet we need to be drawing upon all the available talent. What needs to be done to entice more women to work for companies such as Vestas, Nordex and Co.?

A need for female role models

The lack of role models was a reason for Nelly Kirsch to decide against studying mechanical engineering, although she’s’ now sure that she would have done well. Kirsch studied energy economics in Darmstadt and is now a project manager with Lanthan Safe Sky in Freiburg. “I'd like to see many more women having the courage to study technical subjects,” she says: “That’s the only way we’re going to see any change.” When considering a job opportunity, the proportion of women in the company is an important criterion for her. In her experience, the working conditions are usually better and the company more successful where there are female managers.

“Visibility is crucial”

Hanne May, head of the Communications Department at the German Energy Agency and one of the co-founders of the women of wind energy network, is only too aware that there is still a long way to go before women will play a greater role in the wind energy sector. The network opened up to other renewable energy sources in 2020 and changed its name to women of new energies. Not long ago, May was invited to the Handelsblatt's Energy Summit, which is one of the most important events in the energy sector. “Some 90 per cent of the attendees were elderly men,” she says, whereby “progressive” gender roles should really be part of the industry's “DNA”. “Supporters of progress in energy policy should also be in favour of parity,” she says, whereby she sees a clear path to achieving this goal: “Visibility is crucial”, so it is important to publicise the diversity that already exists within the wind energy sector.

Author: Tilmann Eicke, Ahnen&Enkel
Photo Hanne May: © Goetz Schleser
Photo Finja Neumann: © Frank Rumpenhorst
Photo Nelly Kirsch: Privat

What can companies do?

- → Pay attention to everyday behaviour (Can women have their say in meetings? Who makes the decisions?)
- → Promote and support competent women
- → Set and review measurable diversity targets
- → Focus on diversity in public relations activities
- → Establish an independent office to investigate transgressive behaviour

Want to learn more?

A longer version of this text in German can be found at www.windindustrie-in-deutschland.de/karriere-netzwerk/frauen

Innovative solutions for the wind industry: Wind energy without rotors

Companies of the German wind industry are among the most innovative globally. The sector is using technological developments from other fields, such as digitization and automation, to make wind power plants ever more effective and efficient.

But the use of wind energy is not limited to conventional wind turbines arranged in wind farms. The natural power of wind offers many possibilities for generating electricity. Research on unconventional solutions plays a key role in driving forward the energy transition. Given that large wind farms require open spaces and are most suited to thinly populated regions, some companies are wondering how this environmentally friendly energy source can also be tapped in places unsuited for regular wind turbines such as densely populated urban environments.

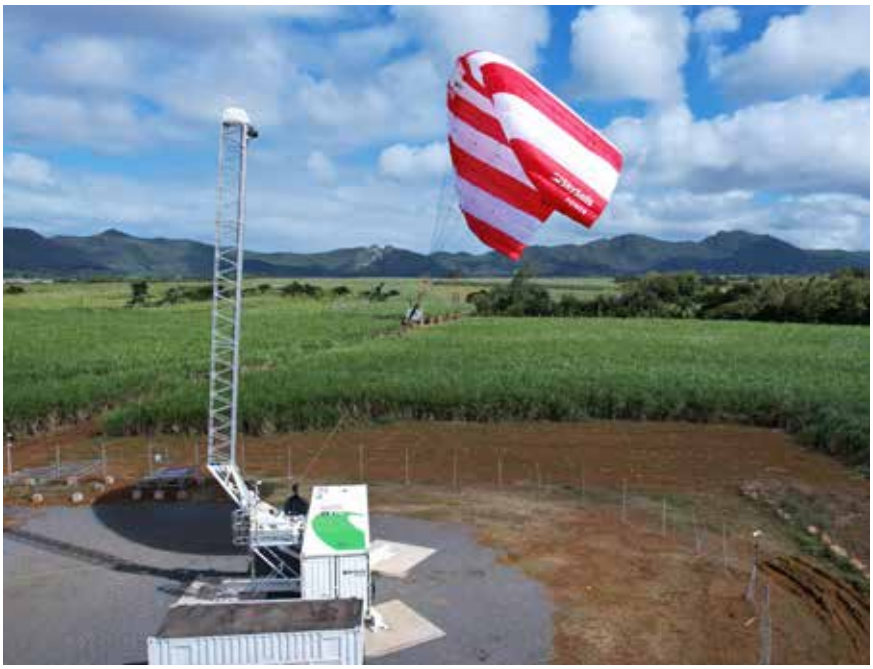
This article illustrates innovative approaches to utilizing wind energy. While they may not be able to replace conventional wind turbines, they can certainly contribute to optimizing the efficiency of wind energy, for example during days with little wind or when it comes to using wind energy in cities, between motorways or even on ships. Solutions like these also help to increase the social acceptance of wind energy.

Project 1

Wind energy above the clouds

SkySails Group GmbH is a German pioneer of the wind energy sector. The company not only offers a new form of energy generation but also a new propulsion system for freight ships and large yachts, making shipping more sustainable and efficient.

Harvesting high-altitude wind energy with airborne wind energy systems
One of the key technologies is the development of airborne wind energy systems that generate electricity from high-altitude wind. This technology enables the use of wind at high altitudes where wind speeds are higher and more consistent. This allows sea-going vessels to be supplied with clean energy which leads to significant fuel savings and reduced emissions.



A SkySails pilot plant in Mauritius already feeds electricity into the island's grid. Photo: SkySails Power

Fully automated towing kite propulsion system
Towing kite technology is another innovation that uses wind power to tow seagoing vessels. The towing kite generates a propulsive force that minimises the use of conventional fuel. This not only saves money but also significantly reduces CO2 emissions.

Greener and more profitable shipping
By implementing these technologies on ships companies can not only lower their operating costs but also reduce their ecological footprint. Using clean and efficient wind energy allows freight ships and yachts to operate more sustainably and mindful of the environment.

Energy generation from high-altitude wind onshore, offshore and to propel freight ships. Photo: SkySails Power

Hybrid wind trees also use solar cells to generate electricity. Photo: New World Wind

The aesthetically pleasing wind trees can also be a landscaping feature. Photo: New World Wind

Project 2

Wind energy from trees

The characteristic construction of wind turbines consisting of high towers, nacelles and horizontal rotors has become a global standard that still leaves much room for technological fine-tuning. Nonetheless, challenges remain, ranging from the shadows cast to noise pollution and visual intrusion. Another issue is the considerable spatial footprint of such plants which makes them hard to install in urban environments.

An energy solution for inner cities

Wind trees are an innovative solution that makes wind energy more accessible in urban environments and addresses aesthetic concerns at the same time. These unconventional wind power plants are made to look like trees. A trunk bears artificial branches onto which green microturbines are mounted. These turbines are equipped with Savonius rotors, a vertical-axis wind turbine with scoop-like wings. All the various technical components such as cables and generators are hidden within the construction. The turbines automatically turn into the wind; with 54 microturbines each tree can generate an output of 5,400 watts.

Visually integrated

Compared to a large wind turbine that can supply around 600 three-person households, this may not sound like much. Nonetheless, wind trees can contribute to powering cities in the future as they can be used in all those places where large turbines, with a height of up to 140 m, cannot be integrated into the cityscape. The microturbines start producing electricity at wind speeds of less than two metres per second – a speed at which large plants cannot even begin to operate. Another plus is that wind trees are an aesthetically acceptable solution for both urban and rural environments.

Project 3

Rotorless wind power plants

Vortex Bladeless wind power plants do not need rotor blades to generate electricity. The core principle used by the Spanish company is the same as in traditional wind turbines: the use of kinetic wind energy to produce electricity. The key difference is that these plants have no rotor blades. Their design is based instead on using wind-induced vibrations and oscillations.

Lower maintenance

Although the efficiency of the Vortex Bladeless technology is about 30 per cent less than that of traditional wind turbines, there are a number of advantages. Doing without rotor blades and generators makes the plants almost entirely silent during operation. The simplified design makes this solution cheaper and easier to transport, while the reduced number of moving components increases the life span of the system and reduces maintenance needs by up to 80%. The initial outlay for these bladeless plants is about 40% less than for traditional wind turbines.

Testing the wind generator in a wind tunnel. Photo: Vortex Bladeless

Lending support to existing wind farms

Vortex Bladeless aims for its systems to be used as an add-on to the existing wind power infrastructure, such as wind turbines, windmills and wind farms. In addition, the bladeless plants are flexible enough to be used on sites where regular wind turbines reach their limits, such as in residential areas.

Author: Heiko Hamann

A Vortex Bladeless plant is producing electricity on the roof of Ávila University. Photo: Vortex Bladeless

Energy generation is explored in sizes ranging between 85 cm and 3 m. Photo: Vortex Bladeless

Question: "How can acceptance of wind energy be further increased?"

"Only by working together with you and for you will we be able to achieve the energy transition. Switching to renewable energy sources can only succeed with the participation of the public."

SONJA HANNÖVER, Manager Corporate Finance, BDO Oldenburg GmbH & Co. KG

"The energy transition is gaining momentum, but still holds immense potential with multiple challenges that need to be steered in the right direction. Intensive networking with all stakeholders is an important step. This begins at the European level, continues with the Federal Environmental Agency and ends with the sensible assumption of tasks within the BWE. Not to forget the sponsors, financiers and other third parties."

ALEXANDRA POHL, Group Head Renewable Energies Germany, DZ BANK AG

"Our innovation of green energy balancing enables us to increasingly use power from wind turbines (and PV plants) to decarbonise industrial electricity and thus increase the industrial sector's acceptance of wind energy. "

JOSEF WERUM, Managing Director and Founder, in.power Services GmbH

"Smart implemented climate protection projects are simply necessary and we must continuously argue in their favour. The way to do that is to be open to people and to find solutions together."

HEINRICH LOHMANN, Founder and Managing Director, MLK-Gruppe

"If energy generated by wind turbines can be mainly delivered to local companies in future, everybody benefits: consumers obtain genuine and affordable green energy, and operators generate maximum profits and become more independent from market prices."

MATTHIAS KARGER, CEO, node.energy GmbH

"By demonstrating what is possible despite the challenging framework conditions and what would be possible under more favourable conditions. Also, through good communications and a fair participation practice."

WALTER DELABAR, Managing Director of Regenerative Energien Zernsee GmbH & Co. KG

"Acting responsibly is one of our core values. This includes transparent and binding communication between equals, for example in the form of regular and extensive citizen information meetings, but also participation in planning."

STEFAN-JÖRG GÖBEL, Managing Director, Statkraft Markets GmbH

Question: "Artificial intelligence is already being used in many parts of the wind industry: How do you assess the potential in your sector?"

"Even a forecast optimised by a few percentage points will save you several thousand euros, which paves the way for more reliable next day contracts and improved market sales planning. A strong focus on machine learning technology can also minimise the potential for human error because algorithms are capable of recognising patterns in the observed data, and this, combined with their scalability, is beyond the working capacity of any human being. To give you an illustrative example, chess playing algorithms have been trained by chess masters in numerous training cycles and have been continuously fine-tuned and can now beat any grandmaster of the game. As a matter of fact, given sufficient computing power, a single algorithm can beat a thousand grandmasters in a thousand different games at the same time. However, without access to existing data, machine learning algorithms are not capable of designing a game as complex as chess, so human creativity remains indispensable."

SASCHA BAUER, CEO, 4Cast GmbH & Co. KG

"In the field of planning and approval, the use of intelligent IT solutions must be tested and implemented. The approval process for wind energy facilities (subject to environmental impact assessment) takes an average of 23.5 months in the federal state of Schleswig-Holstein. Hard to believe, but this already qualifies as one of the 'fastest' in Germany. The fact that paper files are still being carried into the approval authorities is not in line with the times, especially in the era of the Online Access Act and the urgent digitalization of government agencies. We need transparent, automated processes that consider the interests of all involved parties. Artificial intelligence could also optimize and make approval processes more efficient. With our work, we support both the government and the industry in achieving the common goal: legally sound and expedited approval processes."

STEPHAN FRENSE, CEO, ARGE Netz GmbH & Co. KG

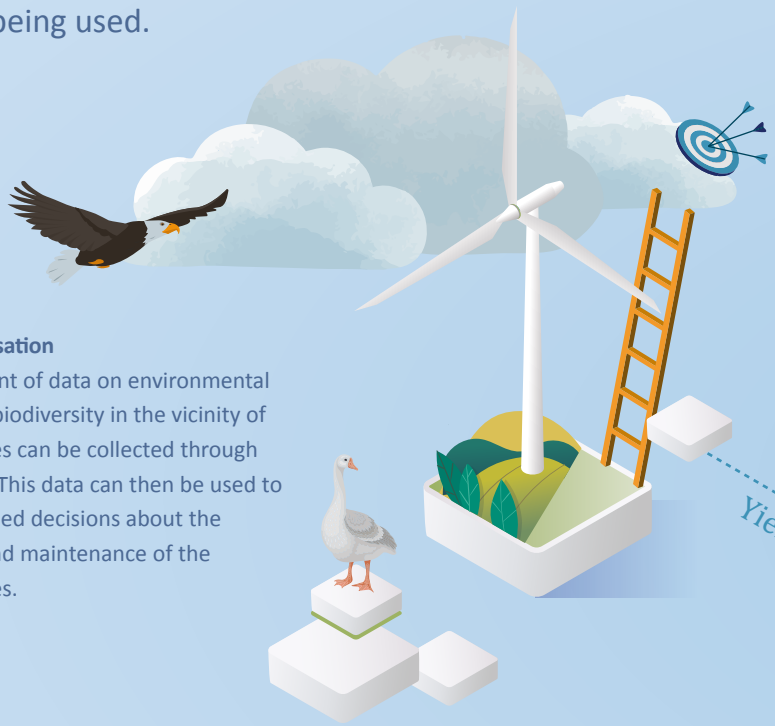
"AI's potential in the wind industry is promising, as it holds the possibility of achieving efficiency gains, cost reductions, and a better integration of renewable energy sources into the power grid. Yet we still have to overcome certain challenges, such as data protection, security, and the need to train professionals properly in order to use AI effectively. Our in-house software "Tacer", which is currently being developed by our own experts, maps the commercial and technical management of our operations. That's the future we want to move forward at CPC. The reason why we focus on developing these components from wind energy facilities to use in the wind energy sector is that our operators know exactly what they need in order to control a large system network."

MELINA TACKE, CFO, CPC Germania GmbH & Co. KG

Digitalisation and automation

The use of artificial intelligence and automation within the wind energy sector is revolutionising energy production. These technologies increase efficiency, reduce operating costs, and contribute to sustainable energy production. This infographic shows the areas in which AI and automation are already being used.

Remote monitoring and control
Monitoring and early detection of safety problems: various elements of the turbines, such as operating status, temperature, vibrations, and performance parameters, can be monitored in real time through the use of sensors and IoT technologies.



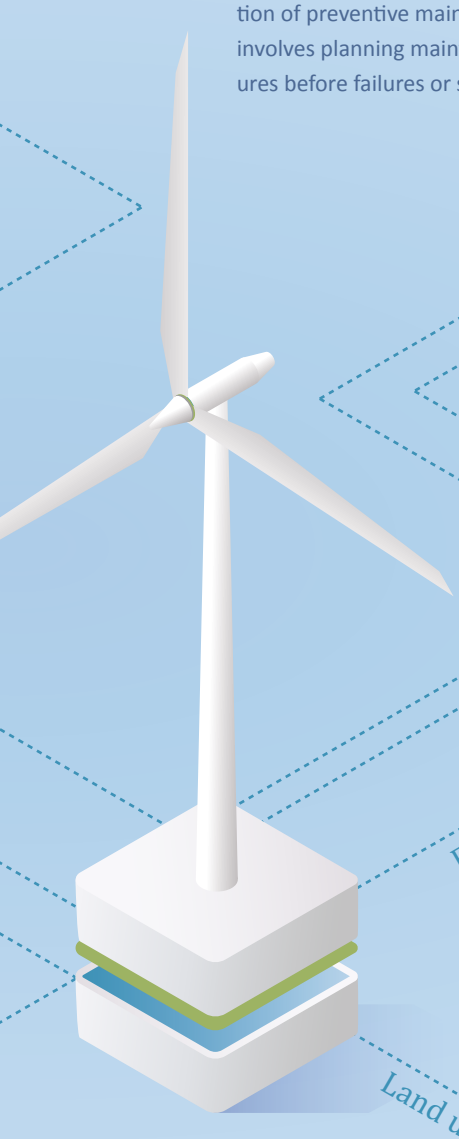
Yield optimisation
A vast amount of data on environmental factors and biodiversity in the vicinity of wind turbines can be collected through digitisation. This data can then be used to make informed decisions about the operation and maintenance of the wind turbines.

Weather forecasts
Modern wind turbines are equipped with sensors that record wind data directly on site, which is then analysed in real time and compared with third-party weather forecasts to optimise the performance of the wind turbines whilst ensuring their safe operation.

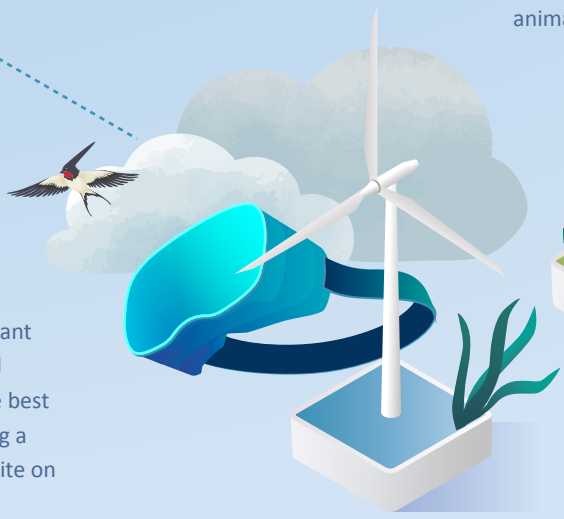
Nature and species conservation
Digitisation within the wind industry can also help to improve species and nature conservation, for example through site assessment and planning: digital tools and data analysis can be used to carefully assess and plan wind turbine sites to minimise impacts on the environment and protected species.

Servicing/Maintenance
Digitalisation enables the implementation of preventive maintenance, which involves planning maintenance measures before failures or safety risks occur.

Operational management
Complex processes can be fully automated, and data can be analysed for business decision making using AI applications.



Early warning systems
Sensors and algorithms can be used to develop early warning systems to make people aware of potential threats to animals in the vicinity of wind turbines.



Land use
Augmented reality (AR) plays an important role in providing suitable areas for wind turbines. AR can help with selecting the best location for a wind turbine by overlaying a virtual representation of the potential site on a real environment.

You can also order this infographic as a poster in German:
www.wind-energie.de/service/shop/spiele-poster-und-mehr

Photo: © Vestas/Simon Klein-Knudsen

CAREER:

The Top Employers in the Industry

Highly skilled professionals are in demand like never before. On the following pages, the top employers in the industry present themselves, offering their employees exciting career prospects. Take a look at established companies in terms of their career opportunities and gain valuable insights.

Alterric GmbH

Alterric is one of the largest green power producers in Europe. Our teams are experts in wind power, photovoltaics, and sustainable supply and are shaping the energy system of the future **with the goal of bringing about the energy transition 100 per cent.**

Working together towards a green future
Our mission is to promote renewable energy sources throughout Europe as a fundamental contribution to climate protection and sustainability. We are committed to a comprehensive project pipeline for wind and solar energy, as well as our own onshore energy parks with a combined capacity of over 2,400 megawatts. The Alterric projects in Germany and Europe are developed and operated by our experts, with a vast amount of commitment, experience, and team spirit. If you want to give your career a breath of fresh air, join us in working towards a green energy future.

You'll fit right in with team Alterric if ...
... you're serious as a person (m/f/d) about contributing to worthwhile work in an appreciative environment. We are keen to hire experienced specialists, career changers and those just starting out in their careers as well as experts in various technical or commercial fields, professionals, academics, and natural leaders. We can provide internships and working student contracts for the next generation of people who wish to help with the energy transition.

We are looking for dedicated support (m/f/d) for our teams (selection):
- Wind & PV Project Development:
- (Junior) project developer, wind farm planner, landscape designer
- Engineering & Construction:
- Site Manager, Project Manager, Electrical Engineers, Civil Works Experts
- Power Generation: Technical Operations Manager, Technical Field Staff, (Junior) Portfolio Manager
- Commercial power plant management:
- Commercial management staff

Contact
Stefanie Müller
stefanie.mueller@alterric.com
+49 (0)170 8896905

Alterric

Planers & project developers
www.alterric.com
400 employees
Aurich, Bremen, Düsseldorf, Hannover, Herrenberg, Husum, Mainz, Magdeburg, Oldenburg, Rostock and international offices
Our full profile is available on page 156 and 255

Get to know Alterric:
www.alterric.com/karriere

Contact
John Agena
john.agena@alterric.com
+49 (0)151 52343029

Our benefits (selection):

Work-life balance
Flexible working hours & mobile working

A supportive work environment
Summer party & team events

30 days holidays p.a.
Additional days off on the 24th and 31st of December.

Unlimited collective agreement contract
An immediate warm welcome to the team

BKW Energy

BKW has been active in the wind power sector since 1992 and currently manages wind farms throughout Europe with an installed capacity in excess of 800 megawatts. We offer our clients our comprehensive know-how and a broad range of services.

Who we are and what makes us special

BKW Wind Service GmbH is a wholly owned subsidiary of Swiss BKW Energie AG and ensures the smooth operation of the Group's own wind farms in Germany, Italy, France, Norway, and Switzerland. We use the latest predictive maintenance techniques, optimised synergies, and rapid response times to minimise disruptions and production downtimes and maximise the power output.

Who are we looking for?

Qualified and experienced professionals, preferably from the wind power sector who specialise in:

- O&M (service technicians)
- Operations management (technical and commercial managers)
- Asset Managers
- Trainees (commercial sales and marketing)

Should you be interested in joining our team and helping to shape a sustainable energy future, visit our online careers page to check out the current vacancies and apply.
We look forward to welcoming you to our team and working together towards a green future.

Working for BKW

At BKW Wind Service GmbH we offer our employees an inspiring and innovative working environment and are keenly interested in the professional development of our employees. We can provide you with the opportunity to continuously expand your knowledge and skills and to continue your professional development.

Open vacancies

jobs.bkw.com/de/offene-stellen

BKW ENERGY

Energy services

www.bkw.ch

approx. 1,000 employees

Berlin & Brandenburg, Bern, Milan, Paris, Oslo

Our full profile is available on page 160 and 239

Contact

Franziska Schnuhr
HR Generalist
franziska.schnuhr@bkw.de
+49 (0)160 983 887 57

Our benefits

Job security
with an established energy company

Advanced training
e.g., through LinkedIn learning licences

Healthcare
Group accident insurance, job bike, occupational pension scheme

Financial benefits
Discounts & an employee referral programme

Bundesverband WindEnergie e.V. (BWE)

The BWE advocates for a sustainable and efficient expansion of wind energy in Germany and the optimal utilization of wind power. Association work meets wind energy – **we are the wind in Germany. And you can be a part of it.**

The BWE Headquarters

The employees at the BWE's federal office in Berlin coordinate the association's work and primarily support its members. In addition to the departments of Membership and Association Organization / Wind Expertise and Legal Affairs, the federal headquarters includes the two departments of Politics and Communication. Furthermore, the editorial team of the member magazine „neue energie" also operates from here. Additionally, employees from BWE Service GmbH provide practical knowledge through seminars, conferences, or regular publications.

> "Here, you encounter a fantastic team, and you definitely won't be a lone warrior."
>
> *Current review on kununu*

Our Team

Policy and public relations experts, technical, legal, and procedural specialists at the federal headquarters work every day on current topics related to the wind industry, preparing them for members, citizens, and policymakers. They gather the latest information and pass it on to key positions within the association. Externally, the BWE informs about its work and concerns through channels such as the website, brochures, flyers, and current press releases.

We are constantly looking for:

- Lawyers
- Political scientists
- Public relations and editorial staff
- And many more

BWE
German Wind Energy Association

Organisation & Public Institutions

www.wind-energie.de

approx. 55 employees

Berlin (Office)

Our full profile is available on page 230, 232, 234 and 251

Contact

Sabine Siebert
HR
jobs@wind-energie.de

Learn more about us:

www.wind-energie.de/verband/stellenangebote

Our benefits

Mobile working
80 % home office and 20 % on-site

Working hours
flexible hours every day

Lunch
subsidy for meals on our campus

Deutschlandticket
almost full reimbursement of costs

BWE-Service GmbH

With over 1 million contacts in the industry each year, BWE-Service GmbH communicates with the people who drive the energy transition forward daily. It does so through more than 200 annual events and regular publications.
From the industry, for the industry: Join us in bringing together the energy sector.

> "I can actively contribute to the energy transition with many dedicated colleagues. Working with various associations in the renewable energy sector makes the job diverse and exciting."
>
> *Gregor Weber,*
> *Head of Events*

The Service GmbH

BWE-Service GmbH is a subsidiary of the Bundesverband WindEnergie e. V. and offers seminars and conferences on wind energy, photovoltaics, and other renewable energies.

The Service GmbH is the leading provider of continuing education events in the field of wind energy in the Federal Republic. Under the brand "Wind Industry in Germany" the Service GmbH publishes its corporate publishing products also in English.

Our Team

The Service GmbH sees itself as a service provider and partner for stakeholders in politics, business, and society. They train professionals, inform about innovative solutions, provide platforms for exchange, and support companies in being successful in the market. Employees come from the fields of event management, communication, and sales.

We are always looking for:

- Employees in project management and administration for events
- Employees in editing, design, marketing, and PR
- Media designers for image and sound (BWE-Service GmbH is an IHK-certified trainer)
- Sales representatives and key account managers
- And many more

BWE
BWE-Service GmbH

Education & training,
Media & communication

www.bwe-seminare.de

approx. 45 employees

Berlin (Office)

Our full profile is available on page 238 and 252

Contact

Sabine Siebert
HR
jobs@wind-energie.de

Learn more about us:

www.wind-energie.de/verband/stellenangebote

Our benefits

Mobile working
80 % home office and 20 % on-site

Working hours
flexible hours every day

Lunch
subsidy for meals on our campus

Deutschlandticket
almost full reimbursement of costs

Deutsche Windtechnik AG

We are the world's largest independent full-service provider for all major wind turbine technologies. Onshore and offshore. **Help us to shape the future with team spirit and expertise.**

Who we are and what we do

We specialise in the manufacturer-independent maintenance of onshore and offshore wind turbines. With our workforce of over 2,200 employees, our task is to keep more than 8,000 wind turbines running reliably in Europe, the USA, and Taiwan.

What it is like to be part of our team

We are passionate about technology and are specialists in our field. As a staff member, you can experience this passion and will enjoy a lot of creative freedom in an international and at the same time medium-sized company, whose corporate culture is characterised by short decision-making processes and mutual trust.

Jobs with a future

Whether you are a trainee, career changer, specialist, or young professional, with or without industry experience, what we can offer you is a wide range of career development opportunities, whether they be in the service, technical, R&D, quality assurance, sales, or commercial areas.

A small selection of your entry options

- Wind turbine service technician (m/f/d)
- Warehouse logistics specialist (m/f/d)
- Technical supporter engineer (m/f/d)
- Sales Manager (m/f/d)
- IT Project Manager (m/f/d)
- Scada Engineer (m/f/d)
- Wind turbine mechatronics engineer apprenticeship (m/f/d)

Click here to view our vacancies and additional information

www.deutsche-windtechnik.com/jobs/
www.deutsche-windtechnik.com/jobs/stellenangebote/

Contact and info:

Michael Glintenkamp
Recruiting
m.glintenkamp@deutsche-windtechnik.com
+49 (0)421 69105 332

Deutsche Windtechnik

Service, maintenance & repair

www.deutsche-windtechnik.com

2,200 employees

Germany: Bremen, Büdelsdorf, Ostenfeld, Viöl, Osnabrück

International: Havneby (Denmark), Châlons-en-Champagne (France), Edinburgh (UK), Utrecht (Netherlands), Poznan (Poland), Varberg (Sweden), Zaragoza (Spain), Taipei (Taiwan), Houston (USA)

Our full profile is available on page 165 and 247

Our benefits

Advanced training opportunities
In our own Training Center

Pension subsidies
Invest in your future

Supplementary health insurance
Take care of your health

Company fitness programme & bike leasing
Stay in shape

DZ BANK AG

Play an active role in shaping the expansion of the German renewable energy sources sector by acquiring, structuring, and bringing in new business at DZ BANK, the second largest business bank in Germany.

Welcome to DZ BANK

Work at a bank where you can build a successful future for yourself and for the cooperative banks. DZ BANK is the second largest commercial bank in Germany and the central institution of the Cooperative Financial Network (Volksbanks Raiffeisen-banks). We are a reliable and effective employer, and can offer you new and exciting challenges, whilst valuing your experience at the same time as demanding high commitment and encouraging personal responsibility. We combine customer-oriented action with sustainable solutions and base our corporate culture on a partnership model so that you and we can work together to achieve success.

Your Tasks

- An interesting task in the expansion of the renewable energies sector
- A wide range of tasks related to project funding
- Focus on acquiring, structuring, and arranging new business as a member of an agile deal team

Your Profile

- A successful degree in business administration, law, engineering, or a comparable field, e.g., renewable energies (m/f/d)
- Analytical vision, strong negotiating skills
- Good written and spoken English

DZ BANK

Banks, financial institutions & financial service providers

www.dzbank.com

approx. 5,400 employees

Frankfurt a. M., Hamburg, Munich, Stuttgart, Münster, Oldenburg, Nuremberg , Hannover, Leipzig, Koblenz, Berlin, Karlsruhe, Dresden Düsseldorf

Our full profile is available on page 168 and 244

Contact

Alexandra Pohl
Group Manager for
Renewable Energies Germany
alexandra.pohl@dzbank.de
+49 (0)40 35900-496

Our benefits:

Mobile working
100 % home office

Lunch
Subsidy at all locations

Germany ticket
Full reimbursement of expenses

Social benefits
Job bike, occupational pension scheme, childcare

EnBW Energie Baden-Württemberg AG

Whether it's offshore, on land or in the air – if you want to rethink the energy generation and supply sector, you'll be right in your element with us: we offer meaningful jobs in which you really make a difference – energy solutions aimed at change and impact for a sustainable future.

We are a driving force in the wind energy sector throughout Germany.
Development, acquisition, construction, operation, direct marketing, and wind turbine repowering all from a single source. We rely on partnerships and would like to work with you to promote the expansion of renewable energy sources. Whether as a project manager, project developer or service technician in the offshore and onshore sectors, you will be helping to supply Germany with renewable energy.

Help us to shape the future
We are investing in the expansion of renewable energy sources: our goal is to generate 50 % of our power exclusively from renewable energy sources by 2025 and to be completely climate neutral by 2035, which means a lot of exciting jobs that will make a difference.

Are you ready for the energy transition?
Then use your energy to help us achieve a climate-neutral future. Our offer to you is an important job in the renewable energy source sector. You've come to the right place if you want to make a difference in the world.

We welcome young talents as well as experienced professionals to our team, so come and join us.

More information available at:
www.enbw.com/unternehmen/karriere/

Find your future job here:

EnBW

Construction, operation, direct marketing

www.enbw.com

27,000 employees

Karlsruhe, Stuttgart, Trier, Erfurt, Cottbus, Hamburg, Berlin (u. v. m.)

Our full profile is available on page 170, 248, 250, 255, 258 and 239

Contacts

Martina Neumann
Offshore
Martina.neumann@enbw.com

Jan Czaykowski
Onshore
j.czaykowski@enbw.com

Our benefits (Specific employee benefits will depend on the workplace or location and may therefore vary.)

A wide range of offers
Profit sharing, flexible working hours & working from home

Inspiring working environmen
Team-oriented using the most modern methods & tools

Innovative work
Development opportunities & various promotion paths

Energiequelle GmbH

Join us as we drive the energy transition!
We develop, construct, and operate wind energy and photovoltaic facilities throughout Europe, implement grid connections and manage innovative energy supply solutions, all of which we do in a passionate, courageous, and humane manner.

Shaping the future together
Energiequelle GmbH has been active in the renewable energies market since 1997. Having 21 sites in four countries, we are one of the leading companies in the sector whereby our success is mainly due to our employees. Our corporate culture is based on team spirit and human interactions. We are all on first-name terms and enjoy a flat hierarchy. Our management exemplifies appreciation, a down-to-earth attitude, and a thirst for innovation.

Are you ready to join our team?
In order to achieve our planned growth, we are looking for skilled workers, managers, career changers, and trainees throughout Germany:

- Departmental heads
- Project managers
- Project engineers
- Business acquisition professionals
- Project developers
- Accountants
- Contract managers or notary clerks
- Banking experts
- HR, IT, and legal support staff
- and much more.

Not ready to make the move yet? No problem.
Follow us on LinkedIn, Xing, Twitter, Facebook and Instagram.

Contacts:

Kristin Herrmann
Head of HR
jobs@energiequelle.de

Christian Rosner
Recruitment specialist
+49 33769 871 237

Lena Igonkin
Recruitment specialist
+49 33769 238

You can find more information and jobs at
www.energiequelle.de/karriere

energiequelle
ENERGIE MIT ZUKUNFT.

Planers & project developers

www.energiequelle.de

450 employees

21 locations: Kallinchen, Berlin, Bremen, Oldenburg, Hanover, Putlitz, Penzing, Erfurt, Dresden, Rostock, Magdeburg, Wiesbaden, Leipzig, Guntersblum, Spremberg, Luckenwalde as well as Rennes, Dijon and Bordeaux (France), Helsinki (Finland) and Poznan (Poland).

Our full profile is available on page 172 and 255

Our staff retention rate is exemplary: the fluctuation rate in 2022 was only 6.0 %

Our benefits

Flexible working times
Hourly account, no core working hours

Individual health promotion
Health budget, job bike & fresh fruit

Regular events
Beach volleyball, summer party, health day

Family atmosphere
Owner-managed company, informal corporate culture

ENERTRAG SE

Across the globe, ENERTRAG plans, builds, operates, and maintains wind power and photovoltaic plants, grids and integrated power plants that generate renewable energy and green hydrogen. **Looking to change the world? Then join our team.**

> **"To me, it's crucial that my job has a purpose. You only live once so you should do something that's sustainable and for the common good."**
>
> *Christian Fischer, investment manager*

▶ About us

For more than two decades, we've been a driving force in the growth of renewable energy. By harnessing the power of the wind, sun, biogas, and hydrogen, we generate, store, and supply green energy to people and regions the world over. Our services cover the whole value chain. Around 1,000 employees at sites worldwide share one goal – to produce renewable energy sustainably and with cutting-edge technology. So that tomorrow's world is one we can live in.

▶ What's important to us

At ENERTRAG, we don't just dream of a sustainable world worth living in, we forge the path to that destination. And we have a specific objective in mind. By 2040, we want to replace fossil fuels entirely. Together, we're pulling out all the stops to reach that target.

▶ Who we're looking for

We're seeking people who share our vision of an emissions-free world. Who are (like us) always one idea ahead. People who are interested in gaining new skill sets and growing their potential. And we have the budget for upskilling programmes to match. We're also looking for people unafraid to use plenty of creative freedom to make tomorrow's world a sustainable place worth living in. If that sounds like you, then let's get together.

▶ We're currently looking for people to fill these and other vacancies:

- Wind/PV project developer
- Photovoltaic project engineer
- Power-to-X project manager
- Wind and solar project planner
- Wind turbine service technician
- System administrator
- Wind/PV operational manager

ENERTRAG
One energy ahead

Service

www.enertrag.com

1,000 employees

Germany: Dauerthal (headquarters), Berlin, Dortmund, Edemissen, Hamburg, Lübeck, Rostock, Prenzlau, Cottbus, Kiel, Potsdam, Neubrandenburg, worldwide: Poland, France (3 sites), Spain, Vietnam, Ghana, South Africa (3 sites), Namibia, Uruguay

Our full profile is available on page 174 and 255

▶ How to contact ENERTRAG

+49 (0)39854 6459-307

karriere@enertrag.com

▶ For more about us, go to

https://karriere.enertrag.com/en/

▶ Our benefits

Working hours
Flexible and remote; 30 days leave

Wellbeing
Health management, accident insurance

Allowances
Pension scheme and kindergarten; company bike

Creative freedom
In abundance, for a more sustainable world.

Time for change.

BWE German Wind Energy Association

BEE Bundesverband Erneuerbare Energie e.V.

RENEWABLES CAREER FAIR KEE

A fresh breeze for your recruiting

The KEE is a digital platform designed to help you effectively connect with an industry-specific audience in your region in Germany.

Engage with motivated career changers, young talents, and experienced professionals through Interactive sessions and one-on-one meetings.

KEE brings together what belongs together. Achieve greater efficiency in your recruiting efforts with KEE!

4 career fairs – 4 regions

West Fair | February 28 – 29, 2024
North Fair | May 29 – 30, 2024
East Fair | September 5 – 6, 2024
South Fair | December 5 – 6, 2024

Via Zoom Online Event Platform in German

- → Motivated talents for your region
- → Targeted and personal approach
- → Simple and individual presentation

Our recruiting offers:
bwe-seminare.de/kee24

RECRUITING OFFERS

ENGIE Deutschland Erneuerbare GmbH

Be at the forefront of renewable energies from now on with ENGIE
ENGIE is one of the TOP 5 global renewable energy companies. Our target is to increase our installed renewable capacity from the current 38 GW to 50 GW in 2025, and to 80 GW by 2030, to which end we are investing specifically in the expansion of onshore wind and photovoltaics in Germany among other places.

ENGIE Deutschland covers the entire renewable energy value chain. We are investing in onshore wind projects and have a continuously expanding project pipeline. We can take on project development and planning ourselves or in collaboration with our partners. We currently operate 18 wind farms with a combined output of over 300 MW. We draw upon the combined expertise of the ENGIE Group, which operates thousands of wind turbines and has its own research centres, to ensure an efficient maintenance and operational management service. We can also use repowering of existing wind farms to increase the amount of electricity generated at our sites. Our trading experts use direct marketing and PPAs to help companies achieve their climate targets. We can offer motivated people with a passion for renewable energy technologies a wide range of professional development opportunities as well as the opportunity to play a leading role in shaping the energy transition.

Contact
Kargiofilis „Carlo" Antonakis
Talent Acquisition Partner
at ENGIE Germany
+49 (0)221 46905 357
+49 (0)173 4736 537
kargiofilis.antonakis@engie.com

Construction, operation, direct marketing
www.engie-deutschland.de
approx. 5,500 employees
Locations: in Germany
Our full profile is available on page 176 and 239

For more information on the company please click on:
www.engie-deutschland.de/de/karriere

Our benefits

Get to work using sustainable transport
Job Ticket Grant, Job Bike

Optimal use of your energy
ENGIE Academy

The future? Secured!
occupational pension scheme, employee shares, risk life insurance

Life / work balance
Mobile working, nursery allowance, special leave

eno energy GmbH

The name eno energy has stood for top quality and innovative wind turbine technology in international wind farm projects since 1999. **Engineering, Design and Technology – by eno energy.**

▶ What is important to us

Eno energy takes pride in being a family-friendly company in which a pleasant working environment and flexible working hours are taken for granted. We offer our staff a wide range of personal development opportunities and encourage them to develop their personal skills as well as their professional expertise. We promote an open and collaborative corporate culture in which teamwork and mutual support are paramount. Another thing that is close to our hearts is the satisfaction and well-being of our employees.

▶ Would you like to be part of a green future?

The eno energy Group will continue on its path to becoming a leader in the wind energy technology sector. We are planning to intensify our activities in R&D, sales, services, and support and can always use fresh ideas and more wind in our sails: if you stand by your convictions, wish to be at the forefront of innovation and want to do your bit now to shape our future then you've come to the right place.

Whether you are a young professional, a manager or an academic, we are looking for creative and committed employees with the courage and passion to support and put their backs into helping us achieve our goals.

And if you are just starting out in your career, we also offer internships and student traineeships in addition to apprenticeships and dual study programmes.

▶ We regularly have vacancies in the following areas

- Sales and marketing (m/f/d)
- Service technicians for wind turbines and/or photovoltaic systems (m/f/d)
- Rotor blade service technicians (onshore) (m/f/d)
- Grid / grid connection engineers (m/f/d)
- Land use planning (m/f/d)
- Commercial legislation experts (m/f/d)
- Sales representatives for wind farm projects (m/f/d)
- Financial accountants (m/f/d)
- Accountants (m/f/d)
- Technical product designers (m/f/d)

ENO ENERGY
Success with wind.

Wind turbines

www.eno-energy.com

approx. 300 employees

Locations: Rostock, Ostseebad Rerik, Dresden, Leipzig, Plau am See; Paris (France), Vara (Sweden)

Our full profile is available on page 114 and 246

▶ Learn more at

www.eno-energy.com

www.eno-energy.com/karriere/stellensuche

▶ Our benefits

Flexible working hours
Family-friendly, incl. working from home

Benefits in kind
Job bike, public transport scheme, Sodexo card

Corporate culture
Flat hierarchies, open to new ideas

Advanced training opportunities
Professional & personal development

FGH – Research Association for Power Systems and Power Economics

FGH is a recognized pioneer and implementer of future energy technology topics in close cooperation with its member companies, customers, and partners – and has been for over 100 years.

Who we are

We are about 130 permanent employees, mainly engineers, computer scientists, mathematicians, and physicists, who provide energy and electrotechnical services in the order of magnitude of approx. 13 million € p.a. at our locations in Mannheim, Aachen, and Hamburg. We are supported by about 30 students, among others of electrical engineering and computer science.

What is important to us

In our dealings with each other, we are committed to the values of honesty, openness, and appreciation. We solve challenges in a goal-oriented manner as a team, committing ourselves to realism, logic, and objectivity. FGH stands for the high quality of its services, outstanding expertise, and depth in all technical issues relating to electrical power supply systems. FGH invests in and encourages the ongoing personal and professional development of every individual. We respect, maintain, and actively promote our physical and mental health. Our success is based on the commitment and development of all our employees.

Who we are looking for

We are looking for you to help shape the electrical energy supply of the future. You can start your career with us directly, complete internships, gain initial work experience alongside your studies, and write your application-oriented thesis in energy or electrical engineering

We regularly offer vacancies in these areas (selection):

- Project Engineer (w/m/d)
- Software Engineer (w/m/d)
- Software Developer (w/m/d)
- Test Engineer (w/m/d)
- Engineer for Technical Consulting (w/m/d)
- Research Assistant (w/m/d)

Grids & grid connection

www.fgh-ma.de

approx. 130 permanent employees and 30 students

Locations: Mannheim, Aachen, Hamburg; office in Paris

Our full profile is available on page 179 and 253

Your contact
Melanie Borucki
melanie.borucki@fgh-ma.de
+49 (0)241 997857-264

Learn more about us

www.fgh-ma.de/de/karriere

Our benefits

- **Appreciative working atmosphere**
- **Flexible working hours**
- **Opportunities for further training**
- **Unique team events**

in.power Gruppe

We have pioneered direct marketing and are fully committed and passionate about a sustainable and future-proof energy system.
Join our small but winning team!

Who we are

The Mainz-based in.power group has been involved in the direct marketing of renewable and environmentally friendly energy since 2006 and was one of the first in Germany to do so. The Czech Second Foundation invested in this corporate group in 2022 and supports in.power's direct marketing services through its innovative approach to energy trading. Through its several subsidiaries, in.power provides a full range of direct marketing services and is also a competitive metering point operator. One of the company's subsidiaries, grün.power GmbH, also offers a multi-award-winning regional and nationwide green power supply service. Our goal is to achieve great things and drive forward the energy transition.
We are ready to really get started and want to considerably increase our portfolio. Which is why we need you!

How working with us could benefit you

- You help us to implement the energy transition
- Flexible working hours will enable you to organise your working day to meet your own specific needs, which includes working partially from home
- A small, committed team in a dynamic market and working environment
- Flat hierarchies and everybody on first-name terms as well as a friendly working environment
- The potential to make your own personal mark and room for your own ideas
- Free beverages and underground parking

What kind of co-workers are we interested in?

We are always on the lookout for (m/f/d)

- specialists or new career entrants for sales as well as back-office in direct marketing, including new business areas such as flexible marketing or green balancing groups for the decarbonisation of industrial electricity
- Project and process managers in the energy sector
- IT developers and programmers

We also welcome applications for internships as well as from students conducting thesis research and seeking student traineeships.

in.power

Direct marketers

www.inpower.de/karriere

approx. 15 employees

Location: Mainz

Our full profile is available on page 185 and 238

Contact

Marina Hinsch
+49 (0)6131 696 57 13
marina.hinsch@inpower.de

Learn more about us:

https://inpower.de/karriere
https://inpower.de/ueber-uns

Our benefits

Working hours
individual options

Everybody on first-name terms
a friendly work environment

We encourage your personal input
much potential for putting your personal stamp on things

In addition to
free beverages & parking

JUWI

Looking for a job that will make a difference? Then you've come to the right place! We are currently looking for people who want to put their energy into building something and making a positive difference.

> "I need to draw upon all of my creativity because every project is unique: JUWI gives me the freedom to do just that."
>
> *Sebastian Brockes,*
> *Head of Acquisition West*

Should you accept a position with JUWI, you will be working for an internationally active company in a fascinating industry, committing yourself to climate protection, and becoming part of sustainable development worldwide. Explore the various opportunities JUWI has to offer and the benefits we provide at our different locations, from the first-class company restaurant in Wörrstadt to the many options for mobile working and flexible working hours.

▶ We embody our corporate values in real life

Shaping the energy transition on a large and small scale: a task that requires the cooperation of many people. The most valuable energy JUWI produces is supplied by our employees. This is not just lip service, but our profound conviction, which is why we do everything possible to ensure that our staff feel comfortable in their various workplaces. Our corporate culture is extremely accessible, which means that new employees quickly feel at home, for example regardless of where a given staff member fits in to the hierarchy, everyone is on a first-name basis. Experience the many benefits of working for JUWI. We look forward to receiving your application and talking to you.

> "The ultimate purpose of my work is important to me which is why I chose JUWI."
>
> *Ulrike Bernhardt,*
> *Manager of Marketing and M&A*

▶ Contact

Emily Hornbostel
+49 (0)5111 23573463
emily.hornbostel@juwi.de

▶ Click here for more information about our benefits and a video of our Get-Together Days 2023.

Planners & project developers

www.juwi.de

850 employees in Germany / 1,300 worldwide

Locations in Germany: Wörrstadt (headquarters), Ansbach near Nuremberg, Bochum, Brandis near Leipzig, Hanover, Melle near Osnabrück, Stuttgart, Rostock

Locations around the world: Australia, Greece, India, Italy, Japan, Philippines, Singapore, South Africa, Thailand, USA

Our full profile is available on page 187 and 256

▶ Our benefits

- **Certified** pro work-life balance
- **Sabbatical** through long-term compensation account
- **Benefit card** with monthly shopping credit
- **Business Bike**

node.energy GmbH

Our market-leading opti.node software enables our customers to implement the business models of the climate-neutral energy world with ease and maximum profitability. **Launch your career in the green energy sector with node.energy and help us to drive forward the energy transition.**

node.energy's core business

Renewable energies are now competitive, yet most companies do not even come close to exploiting their full potential because the technology is simply too complicated. Our software solves this problem by significantly simplifying the planning and management of climate-friendly energy technologies. opti.node is already being used successfully for billing and electricity tax in numerous PV and wind projects. Corporate bureaucratic hurdles are now a thing of the past.

Jobs@node.energy

To bring about a successful energy transition, we need to focus on radical simplification, which is where you come in: join our team and help us to enable the energy transition in the industrial and commercial sectors. We are always on the lookout for new talent in technological and software development, customer service, product development, and sales and marketing.

Remotework@node.energy

We use virtual tools and powerful laptops to give us the freedom to work from anywhere: our current employees mostly work from home in about 20 German cities.

Link to vacancies:

www.node.energy/karriere

node.energy

Software solutions

www.node.energy

approx. 70 employees

remote workers throughout Germany, offices in Frankfurt a. M. and Freiburg

Our full profile is available on page 196 and 253

Contact

Maria Werner
Head of HR
+49 (0)69 8700 068-67
jobs@node.energy

Our benefits

Flexible working models and regular team days & events

Backup and support Mentoring programme & feedback loops

Advanced training all employees are entitled to an advanced training allowance

Sport & Health Hansefit, urban sports & a bike leasing scheme

Prokon Regenerative Energien eG

Prokon eG is Germany‘s largest energy cooperative and has been making a tangible contribution to the energy transition for 27 years as a project developer and renewable energy plant operator. **Our motto: Living green energy together.**

Important information about us:
Having been founded in 1995, we were one of the pioneers in the renewable energy sector and have been able to establish ourselves as a successful company. Our current core competences include the development, planning and construction of onshore wind farms and their subsequent technical and commercial management, as well as supplying green electricity to domestic customers throughout Germany.

This is what drives us every day:
We are motivated by a desire to protect the basis of life on our planet for which active climate protection is essential. Together with our 40,000 members we are laying the foundations for a sustainable and secure energy supply from 100 % renewable energy sources. Having a cooperative as our economic basis, every single person is at the centre of our attention, which is something we experience every day.

Our offer to you:
A non-hierarchical working relationship, where each employee has the opportunity to contribute his or her ideas. Freedom and flexibility through flexible working hours and mobile working. Appropriate remuneration with a fixed Christmas bonus equivalent to a 13th month’s wage is something we take for granted.

We would like to invite you to support us in the following areas:
- The Project Development Department is responsible for planning and constructing wind farms throughout Germany. As a project developer (m/f/d), you will be called upon to carry out numerous interesting tasks.
- Among other things, the Wind Turbine Service and Operation section ensures the flawless technical operation of wind turbines. You could contribute to this section as a service technician (m/f/d) with an electrical or mechanical focus (career changers are always welcome).

prokon
Energie. Gemeinsam. Leben.

www.prokon.net
370 employees
Based in Itzehoe and other locations throughout Germany
Our full profile is available on page 198, 249 and 257

Your contact
Torge Gelard
+49 (0)4821 6855-165
t.gelard@prokon.net

More information available at:
jobs.prokon.net
linkedin.com/company/prokon-eg

Our benefits

Mobile working
potentially 3 out of 5 days working from home

Working hours
flexible working hours

Job bike
supported e-bike leasing scheme

Special payments
13th month’s wage and other bonuses

Siemens Gamesa Renewable Energy

For over 40 years, Siemens Gamesa has been a pioneer in the wind power sector. We currently employ over 28,000 staff to harness the power of wind and tackle the greatest challenge facing our generation, i.e., the climate crisis.
We make real what matters – clean energy for generations to come.

Who we are and what makes us special
Some 40 years ago, we recognised the potential of bringing together nature and technology in the use of wind energy. We saw the opportunity to supply people and businesses with renewable energy and protect the climate at the same time, a vision which we have since brought to life. Our wind turbines and services are delivering clean, affordable, and reliable electricity all over the world. Our on- and offshore facilities in addition to our service portfolio enable us to offer a broad range of wind power generation products anywhere in the world. Beginning with our first offshore wind farms in 1991 in Vindeby, Denmark, right through to the wind power sector's first recyclable rotor blade, which we unveiled in 2021, we have been driving innovation and looking for solutions to continuously increase the efficiency and competitiveness of wind power.

What is important to us
We pride ourselves on making a positive difference in the world. Our technologies provide sustainable and responsible clean energy and are paving the way to a climate-neutral world for future generations. We run a global business but with a local presence and approach.

Our staff
Siemens Gamesa's commitment to sustainability begins with our employees: we believe that their success is our success, which is why we place such importance on social and professional development.
We believe in a corporate culture which respects and values differences, promotes diversity, equality, and inclusion, and gives people the opportunity to unfold their full potential to contribute to the global success of the company.
Siemens Gamesa offers a wide range of professional development opportunities in a multicultural and international environment.

We are currently seeking
Around the world, Siemens Gamesa employs people from almost 100 different nationalities. We have a diverse workforce, which is something that is close to our hearts. We have a Diversity and Inclusion Policy, which applies to all geographic regions in which we operate. The primary focus of our corporate policy is to guarantee equality and inclusion and we are interested in applicants whatever their background.

SIEMENS Gamesa
RENEWABLE ENERGY

Wind turbines
www.siemensgamesa.com/en-int
approx. 28,150 employees
Headquartered in Hamburg, Germany, with other operational centres around the world
Our full profile is available on page 118 and 247

Our benefits

Flexible work
mobile working & flexible working hours

Staff benefits
Food allowance and much more.

Deutschlandticket
Pro-rata expense payments

Premiums
Christmas and holiday bonus

Energy Transition in NRW with Foresight

Since 1996, we have been realizing wind energy installations with the aim of playing a crucial role in securing the energy transition in the most populous federal state and making North Rhine-Westphalia a showcase location for green energy production.

The SL NaturEnergie Group

The SL NaturEnergie Group manages wind energy projects throughout their entire lifecycle – from planning to implementation, technical and commercial operations management, and ultimately the dismantling of the installations and repowering. We aim to jointly achieve the transition in North Rhine-Westphalia toward a responsible energy supply system that benefits us and future generations. We place great importance on involving local partners in the planning, financing, and construction of wind energy installations.

> "Direct contact and short distances: That's how we want to work – and that's why we are committed locally, not elsewhere."
>
> *Robert Daniels, Corporate Communications*

How we work

To successfully implement wind energy projects from A to Z, we all work together, fostering a familial and friendly atmosphere. Because teamwork is essential. Team spirit and open communication, even up to the executive level, are the keys to efficient work for us.

Our Location

Our office buildings are located on the outskirts of the Ruhr region, in a converted former farmhouse situated amidst green surroundings in Gladbeck. The offices are lined with a lot of wood and high-quality materials and equipped with modern, ergonomic workspaces.

We are looking for:

To ensure that NRW remains an energy hub: We are hiring, providing training, and qualifications. Let's create the energy transition together! We welcome unsolicited applications.

SL NATURENERGIE
UNTERNEHMENSGRUPPE

Planers & project developers

www.sl-naturenergie.com

approx. 60 employees

Gladbeck (NRW)

Contact

Tonja Runge
HR
t.runge@sl-naturenergie.com

Corporate Communications Contacts

Stefanie Flam
s.flam@sl-naturenergie.com
Robert Daniels
r.daniels@sl-naturenergie.com

Video: Wind wants you!

Our benefits (excerpt)

Health Conscious Lab, Sports	**Work-Life Balance** Flexible working hours	**Catering** Free food offerings	**Team** Many events

UKA – Umweltgerechte Kraftanlagen GmbH & Co. KG

UKA is a full-service provider and provides all services up to the operational hand-over of wind farms and solar parks. After that, our subsidiary UKB ensures the optimal technical and economic performance of the facilities for decades. **Become part of the energy transition!**

The energy park developer

The UKA Group has around 900 employees and is currently active in Europe as well as in North and South America. As a full-service developer, UKA not only covers the entire value chain but also operates wind and solar parks itself. Founded in 1999, the company is one of the leading German project developers. The UKA Group`s current project pipeline exceeds 19 gigawatt.

Who we are looking for (among others):

- Project Developer for wind power and PV (m/f/d)
- Approval planner (m/f/d)
- Business acquisition specialists (m/f/d)
- Lawyers (m/f/d)
- Team Assistants (m/f/d)

Let's shape the energy of tomorrow

Geographers, industrial engineers, surveyors, foresters, business economists, lawyers, and many other specialists collaborate at the highest technical and economic level within UKA. Your commitment and competence are what counts if you want to have a future in the renewable energies sector of tomorrow. UKA offers challenging and future-oriented jobs.

Contact

Stephanie Thiele
+49 (0)3521 72806-567
personal@uka-gruppe.de

More information available at:

https://karriere.uka-gruppe.de

Der Energieparkentwickler

Planers & project developers

www.uka-gruppe.de

More than 900 employees

National: Bielefeld, Cottbus, Dresden, Erfurt, Hanover, Heilbronn, Kassel, Lohmen, Lübeck, Magdeburg, Mainz, Meißen, Oldenburg, Rostock, Straubing

International: Chile, Italy, North America, Poland, Spain

Our full profile is available on page 216 and 258

Our benefits

Mobility
Bike, public transport, or car – subsidised by UKA

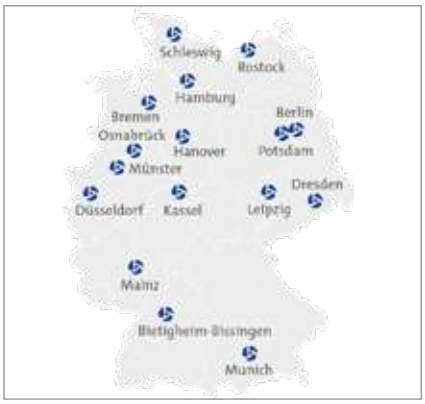
Well-being
Fitness and health opportunities

Flexibility
A good work-life balance

Talent management
Targeted promotion

wpd GmbH

wpd was founded in 1996 by just two entrepreneurs – today we employ around 1,000 people who work on wind and solar energy projects.



And our growth in all locations and within all our teams continues unabated, which is why we are constantly on the lookout for new and motivated employees from junior staff to experienced experts looking to take their next career steps. We need committed people to bring about the energy transition.

wpd as an employer

The corporate culture at wpd is one of respect, appreciation, and cooperation. All expertise or knowledge acquired at the management levels is passed on to our colleagues because we recruit many of our specialists in-house and promote them to new and exciting positions with project responsibility or to specialist areas within the corporate organisation. We see this as an essential prerequisite for the positive development of our company.
We also collaborate with our employees to assume a sense of social responsibility by supporting charitable projects and working together to protect the environment. All of us wish to bring about a positive change: for ourselves, for wpd, and for the energy transition in Germany and around the world. Don't just do anything – do something for the climate!

> "Our greatest strength are our employees, whose personal expertise, solidarity, and shared passion are essential to realising our goals."
>
> *Cornelia Schank,*
> *Head of Human Resources*

Paving the way to the future:

wpd think energy

Planners & project developers

- www.wpd.de
- approx. 1,000 employees
- see map
- Our full profile is available on page 223 and 258

Contact

Cornelia Schank
Head of Human Resources
human-resources@wpd.de

Our benefits

- **A welcome culture** Onboarding App & induction days
- **Mobile working** 40 % of your time working from home
- **Germany ticket** 20 € subsidy
- **Health culture** Corporate fitness & bike leasing scheme

wpd windmanager GmbH & Co. KG

More than just a job. We want to make a difference. Our approximately 500 employees are working to ensure a sustainable energy supply around the world. Are you ready for a new challenge? **If you are, then join the windmanager team.**

About us

We work in the commercial and technical management of wind farms and solar parks around the world and are experiencing steady growth. We manage a total capacity of over 6 gigawatts.

What you can expect: a job tailored to your needs.

We want to offer our employees an environment in which they enjoy and feel comfortable coming to work, which is why we place great importance on flat hierarchies, flexibility, and a work-life balance. For example, we have defined core working hours, which allow you to organise your working day in a way that suits you. You will also be free to choose on which days you work at the office or from home, which you are free to do for 40 per cent of your contracted working hours. Another thing that we take very seriously is the well-being of our employees, which is why we collaborate with Likeminded, for example, where our windmanager can proactively do something for their mental health. And the best part is that you can access Likeminded's services during your working hours.

Work hard, play hard

Not only do we have a great collaborative working culture, but we also offer various opportunities to come together and enjoy our free time together. Every year, we invite our staff from all locations to the big windmanager united party in Bremen to meet and exchange ideas, but also to enjoy some collective down time. But of course, we offer many more benefits, such as a corporate fitness and bike leasing scheme as well as our Corporate Benefits portal. Sounds good? Then join us as a windmanager.

Read more at:

www.windmanager.de/karriere
www.windmanager.de/jobs

wpd windmanager

Technical & commercial operational management

www.windmanager.de

approx. 500 employees

Locations: Bremen, Hamburg, Rostock, Erkelenz, Egeln, Bremerhaven, Stralsund, Oulu (Finland), Piteå (Sweden), Poznań (Poland), Arras & Vertou (France), Dubrovnik & Šibenik (Croatia), Valladolid (Spain), Los Ángeles (Chile), Taichung (Taiwan)

Our full profile is available on page 224 and 251

Contact

Lea Hesse
Human Resources
hr-wm@wpd.de

Our benefits

In the office or mobile? For 40 % of your time, you can choose where you want to work.

Good work-life balance Through flexible working hours

Mental health Access to Likeminded services

Additional benefits Fitness, bicycle, corporate benefits and much more.

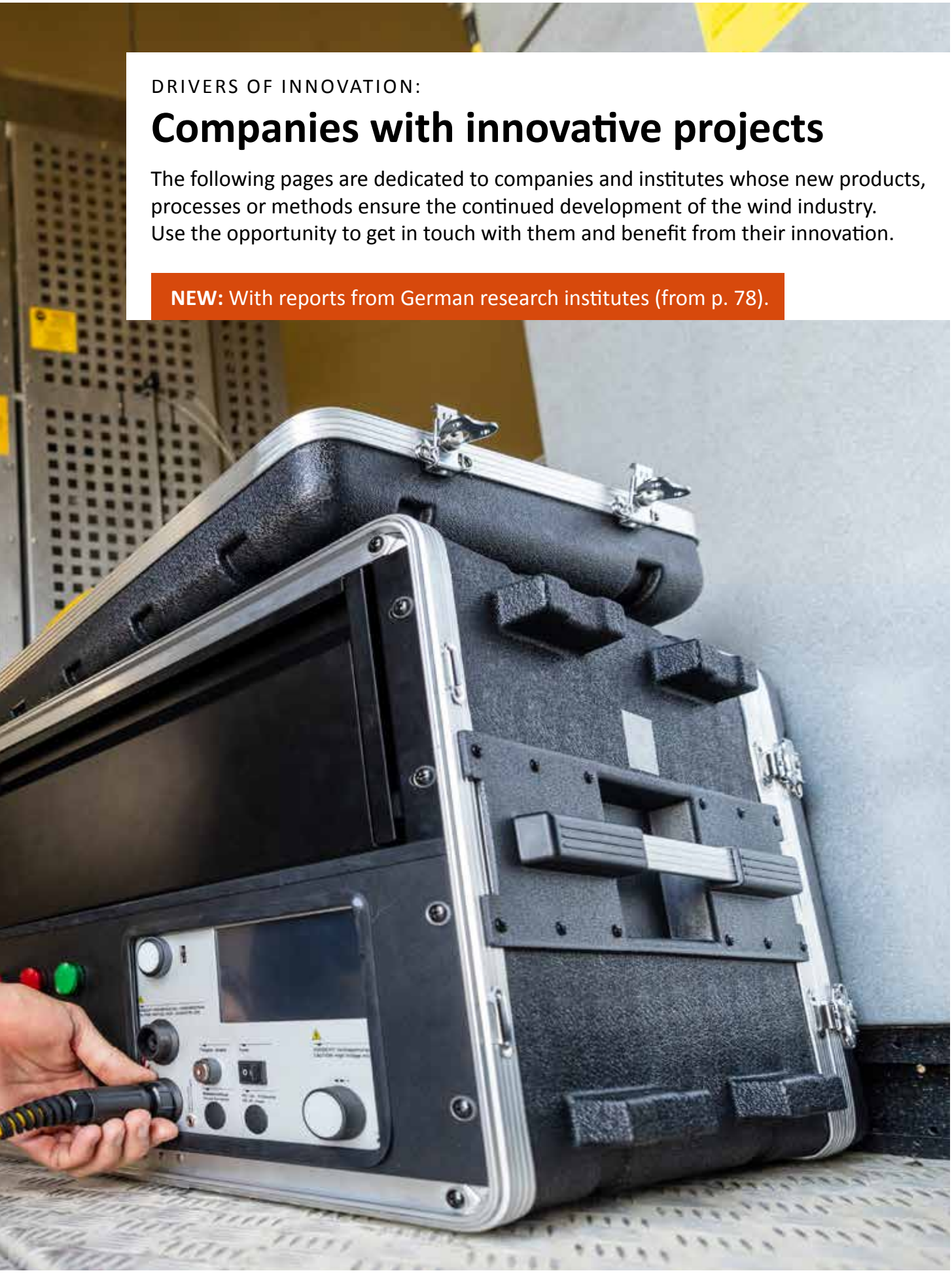
No more tangled cables: The new LPS box impresses with its robust yet slim design and simple operation.
© ENERTRAG/Silke Reents

DRIVERS OF INNOVATION:

Companies with innovative projects

The following pages are dedicated to companies and institutes whose new products, processes or methods ensure the continued development of the wind industry. Use the opportunity to get in touch with them and benefit from their innovation.

NEW: With reports from German research institutes (from p. 78).



Higher yields through retrofitting

It only took two working days for Bachmann to make three Mitsubishi MWT-1000A wind turbines fit for continued operations. This was made possible by an innovative retrofit technology that provides the operator with a significant revenue increase.

Fig. 1: Retrofitting can extend the service life of wind turbines beyond the ten-year limit. Bachmann has won awards for its retrofit solutions.

"Bachmann's retrofit technology enables energy suppliers to remain competitive by increasing productivity and extending the service life of their wind turbines."

Gabriel Schwanzer, Director of the Business Wind / Energy Unit at Bachmann

Operating older wind turbines is complex and expensive: technical failures result in unproductive downtimes and necessary maintenance tasks accumulate in addition to which spare parts may no longer be available. Access and parameterisation options are also limited resulting in dwindling yields. As Gabriel Schwanzer, Director of the Business Wind / Energy Unit at Bachmann, explains: "Bachmann's retrofit technology enables energy suppliers to remain competitive by increasing productivity and extending the service life of their wind turbines."

For the upgraded Mitsubishi systems, the retrofit ensured that a complete shutdown is no longer necessary by precisely controlling each individual system. At a required wind farm capacity of 30 per cent, the electricity yield of each modified turbine increases by a remarkable 44 per cent, and even at 70 per cent of required capacity it still increases by 17 per cent.

Bachmann's retrofit technology is focused on scalability and customer-oriented optimisation: **CMSadvanced** is an expandable modular system that provides the full range of condition monitoring for all wind turbine components. **CMScompact** provides customers with a cost-effective solution for the basic monitoring of mechanical drive train components.

CMScompact is also used for data aggregation and data transfer to the Bachmann WebLog interface, where all the necessary calculations take place. **CMSadvanced,** by contrast, performs the relevant calculations onboard, so that status information can be used directly to control the systems, for example for rapid intervention to protect the components.

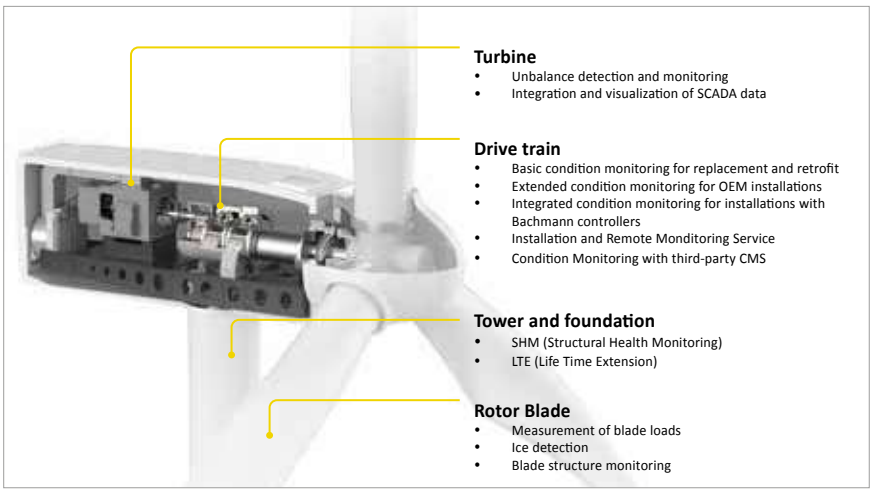


Fig. 2: Following a retrofit, Bachmann can monitor the operating parameters of a wind turbine on the turbine itself, the drive train, the tower, the foundations, and the rotor.

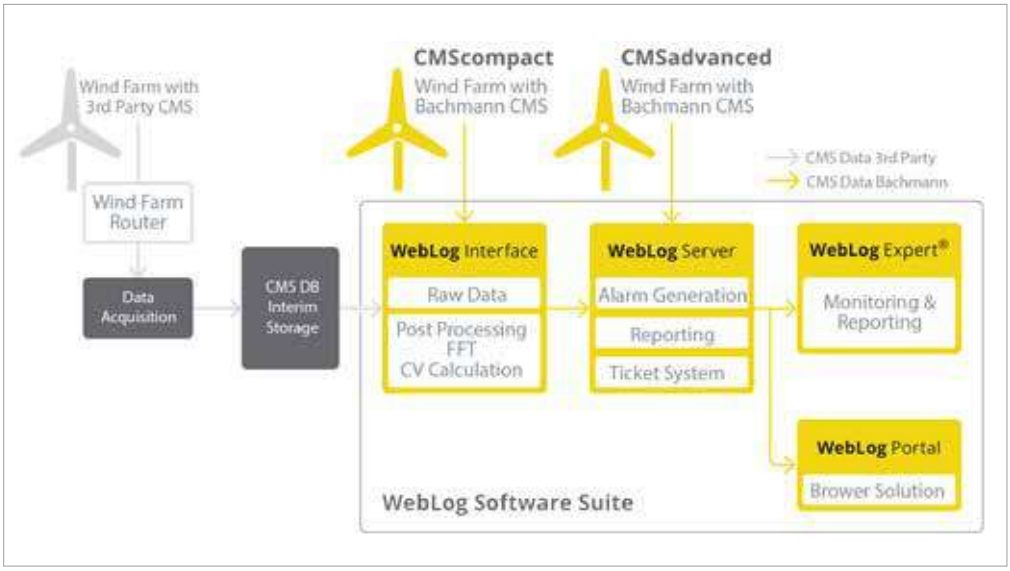


Fig. 3: **CMScompact** processes the collected raw data in the WebLog interface whereas **CMSadvanced** pre-processes the data on the system enabling the WebLog server to generate an alarm or a report immediately.

For this modular approach to control retrofit technology Bachmann was awarded the **WEU O&M Excellence Award** for the best technological innovation for wind turbines.

The basic retrofit process involves compiling an inventory of the wind turbine and measuring its performance, then analysing the data and communication interfaces followed by identifying any optimisation potential. Following this, the control software, I/O, and event lists as well as load calculations are implemented using the Bachmann Wind Turbine Template (WTT). Once various test procedures have been carried out using software in the loop (SIL) and hardware in the loop (HIL) technology, the prepared system is installed on site and put into operation.

The use of the existing turbine infrastructure is optimised during the retrofit: to the greatest extent possible, existing sensors and actuators are used whilst failure-prone or obsolete components are replaced. Bachmann's standard practice is to subject the new controller modules to a 48-hour factory test under the most extreme conditions.

The drive train fault detection rate is an impressive 99 percent following the retrofit. Operational downtime for implementation is limited to just a few days, as all hardware retrofits and software adaptations are planned and configured in advance.

Conclusion

Facilities in a competitive manner to which end the wind turbines are equipped with the latest control technology resulting in increased productivity and an extended system service life. Bachmann was awarded the WEU O&M Excellence Award for the best technological innovation for wind turbines for this innovative approach.

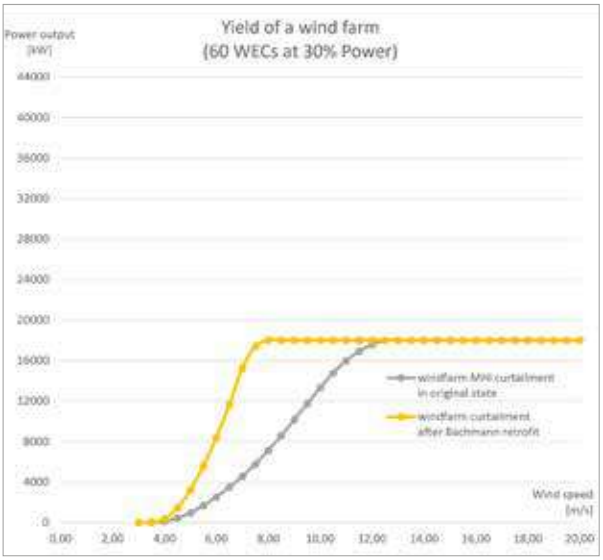


Fig. 4: This diagram shows the output of 60 Mitsubishi MWT-1000A wind turbines as a function of wind speed at 30 percent park output. The retrofit results in a 44 percent higher electricity yield, based on an average wind speed of 8.5 m/s in accordance with the IEC standard.

Project overview

Location	**Bachman electronic GmbH** Kreuzäckerweg 33 A-6800 Feldkirch Phone +43 (0)5522 3497 0 E-Mail info@bachmann.info Web www.bachmann.info

bachmann.

Are you interested in the project and want to know how your community or your business can benefit from it? Contact us. Our contact can be found in the **company profile on page 126 ►**

In 365 days to series production

Norra Hunna wind farm: The rotor blades of the Siemens SWT 4.1 are in Mercedes Star position, the 2in1 LPS Inspection is being prepared. Matrice 300 is the name of the new employee at German company ENERTRAG Operation, and she has no fear of heights.

Initialization successful: visual drone inspection creates images in high definition quality, allowing for identification of damaged areas in the 1–2 mm range. © ENERTRAG / Silke Reents

Multi Stop becomes Single Stop
Introduced in the accredited inspection department (competence confirmed by the Accreditation Body of the Federal Republic of Germany) of ENERTRAG Operation and validated by the technical inspection association TÜV Nord Group in 2022, the system is being further developed at full speed in close coordination with the company's own inspectors.

Until now, each blade has been scanned individually while in the 6 o'clock position. With the new single-stop variant, the rotor star is aligned at 12 o'clock and all rotor blades are scanned one after the other.

The new HP variant of the SSL drone has changed the position of the camera and field strength meter and a new flight algorithm has been developed. This makes flying in single-stop mode possible. The direct inspection time can thus be reduced from approximately one hour per wind turbine to just 15 minutes. As a result, the time-consuming turning of the rotor until the next rotor blade is in the 6 o'clock position is eliminated, as is the multiple take-off and landing of the drone.

Connection complexity simplified
Another important component was to reduce the connection complexity, because there are countless variants depending on the technology orientation and the wind turbine manufacturer. Currently, the company differentiates between flat and ring adapters as well as connection via test probe, so that the application in the wind field can be carried out as quickly and user-friendly as possible.

In addition, the adapter insert is aligned with the drone's new single stop flight procedure. This requires three adapters per wind turbine, as they are then in use at the same time. For this purpose, a new cable separation point will be included in

“We are continuously developing the system based on lessons learned from our day-to-day business. Our most important development partners are our own inspectors to whose needs we adapt the new system. The result of this work is easily seen in our three new developments: Single stop flight, LPS box and LPS adapter. These represent precisely this maxim. With these end products, we are also well equipped to develop a licensing model, as these three components are now compact and user-friendly.”

Matthes Schachtner, Head of Technical Services, ENERTRAG Operation

For easy use in the wind field. Here you see a ring adapter. © ENERTRAG / Silke Reents

No more cable tangle: The new LPS box impresses with its robust yet slim design and simple operation. © ENERTRAG / Silke Reents

the system in order to keep the material to be transported to a minimum and at the same time save costs. The tested adapter types are currently being prepared for series production and combined into a handy LPS adapter set.

Hardware scopes reduced

In a further step, the focus was on robust design, user-friendly operation and efficient integration into existing work processes. For improved transport logistics, the hardware has also been shrunk. For example, the drone was equipped with a new field strength meter. In addition, a smaller frequency converter has been created, which is part of a new, fully integrated LPS box that includes all other functions. The necessary equipment can thus be carried along with the team in the lift and the use of a crane in a separate work step is no longer necessary.

Conclusion

What started as an innovative concept now offers wind farm operators the more efficient and accurate way to standardize rotor blade inspection, including lightning protection testing, and still ensure compliance for the insurer. For Matthes Schachtner and his team, after completing more than 300 drone flights within a year, one thing is clear: With the prototypes presented here, the final product of the 2in1 LPS Inspection is clearly emerging. It is convenient to use, integrates excellently into inspection activities when working on wind turbines, and offers solutions to problems for large turbines for which there were previously no answers.

Project overview

Initiator	**ENERTRAG Betrieb GmbH**
Implementation:	**ENERTRAG Betrieb GmbH + Sulzer & Schmid Laboratories AG**
Numbers, data, facts:	**The 2in1 LPS Inspection has been offered as a service on the market since May 2022. As of fall 2023, the procedure and hardware have been further optimized and more than 300 drone flights have already been completed. Since then, the drone inspection has also been offered as a license model.**
Project status	**Completed**
Location	**Dauerthal**

ENERTRAG
One energy ahead
Operation

Are you interested in the project and want to know how your community or your business can benefit from it? Contact us. Our contact can be found in the **business directory on page 250.** ▶

New age for local power

Local electricity tariffs are becoming a central instrument of social participation models in the renewable energy sector. In collaboration with Naturstrom, REZ has developed a new, simple, and easily transferable concept.

REZ and Naturstrom have developed a comprehensive concept that adequately involves local residents. © Jörg Weusthoff

The aim of REZ' innovative concept is to minimise red tape and costs even for major projects.

Since 2015, Regenerative Energien Zernsee GmbH & Co. KG has implemented a number of local power supply projects for the MLK Group. This includes local electricity tariffs, i.e., green electricity tariffs that people living close to wind farms were able to sign up for and that were sponsored by MLK's local wind farms. Since then, some 300 residents around the Prenzlau site and just over 100 residents at the Jacobsdorf site near Frankfurt/Oder are being supplied with subsidised power. This made it possible to offer low tariffs at these sites which were competitive with low-cost providers even prior to the energy cost explosion. Originally, the various stakeholders resorted to a rather complex contractual structure in order to be able to make such projects as attractive as possible for neighbouring residents.

Naturstrom and REZ have now developed a new concept to streamline these projects and make them more flexible. This enables an expedited start of new projects, a flexible subsidy design as well as a simplified management concept for the beneficiaries and the participating wind farms.

> **"Community participation must have a direct local impact and must take the form of a public project, which takes all stakeholders into account."**
>
> *Prof. Dr. Walter Delabar, REZ*

Simplified management process

Within the novel structure, Naturstrom, as the supplier, and REZ, as the manager, enter into a contract for the implementation of neighbourhood electricity tariffs, which can be located anywhere in the country. The wind farms conclude contracts with REZ, which can be suspended or even terminated at short notice enabling them to manage their commitment much more easily. Vis-à-vis local residents, REZ and Naturstrom operate as partners on behalf of the respective wind farms. REZ is primarily responsible for marketing activities. The beneficiaries can also be defined in more simple terms. As such, REZ is responsible for the entire organisational effort; the wind farms only provide their framework and guidelines according to which the respective measures can be implemented.

This makes it possible to get neighbourhood projects underway at an early stage. The refinancing of subsidies, for example, can be secured by the initiators or even from the construction costs.

In addition to this, simple control mechanisms can be built in to limit expenditure, which could be relevant in difficult years or at the start of operations. The number of

This structured concept connects regional stakeholders without being limited to specific regions. © Jörg Weusthoff

local electricity contracts available could be limited for example: given a subsidy of 180 euros and a maximum of 100 contracts, the annual costs would then be 18,000 euros. On top of this, there will be expenses for advertising and administration, which could amount to the same in total, especially in the start-up years. REZ charges 10 per cent of the funding amount as basic remuneration, whereas projects such as advertising campaigns are charged separately.

Maximum flexibility and cost control

Another approach to cost limitation is to allow only the immediate neighbours to benefit. To this end, distance parameters can be specified or postcodes can be used, depending on their practicability. REZ then decides whether applications meet the criteria and supervises the implementation on behalf of the wind farms. In addition, the subsidy amounts can be staggered so that residents in the immediate vicinity receive higher subsidies on their electricity costs than those who live further away. By the same token, social tariffs can be embedded, as is already the case at the Jacobsdorf site, which are easy to manage.

The concept is easily transferable and is no longer limited to specific regions. Operators interested in neighbourhood electricity models can have them implemented in a lean and flexible manner in their areas whilst keeping an eye on the costs.

Conclusion

Involving neighbouring residents in a way that really benefits everyone, even low-income residents and those living further away, requires a well thought-out concept where red tape is kept to a minimum and the costs are manageable. REZ as a manager has developed a transferable concept in collaboration with Naturstrom, which is not tied to any particular region, and which sensibly connects stakeholders in the sector for the benefit of consumers and with a view to the expansion of renewable energies.

Excellent: REZ has analysed its experience and invested in optimisation. © Jörg Weusthoff

Project overview

Initiator	**Regenerative Energien Zernsee GmbH & Co. KG**
Project overview	**Public participation in RE projects: REZ and Naturstrom have identified local resident electricity tariffs as a key instrument for this. A novel concept is enabling interested operators to introduce flexible implementations throughout Germany with very little effort. The associated costs are manageable but there is plenty of scope for bespoke solutions.**

Regenerative Energien Zernsee GmbH & Co. KG (REZ)
Seesenerstrasse 10–13
10709 Berlin
Phone +49 (0)30 224 459 830
Fax +49 (0)30 224 459 831
E-Mail info@rez-windparks.de
Web www.rez-windparks.de

REZ

If you're interested in this project and wish to find out more about how your own municipality or company could benefit from it then talk to us. Our contact details are listed under **company profile on page 202 ▶**

RESEARCH IN GERMANY

Insight into the industry of tomorrow

Germany occupies an outstanding position in international wind energy research. The following pages present some research results of industry-related science, which can provide you with valuable insights into the latest technology trends.

Wind power plant inspection using thermography and AI

BAM (German Federal Institute for Materials Research and Testing) is conducting research on how thermography and AI can be used to inspect wind turbine blades in order to prevent breakdowns and operate wind farms more economically.

Inspection of turbines while in operation

Rain erosion reduces wind turbine power and increases maintenance costs. Modern technologies such as infra-red thermography, combined with AI, make it possible to detect rain erosion on rotor blades efficiently, minimise maintenance effort, reduce operating costs and help to avoid efficiency losses.
BAM has developed a method by which thermographic images of wind turbine blades can be taken from ground level while the respective turbine is in operation (Fig. 1). The wind turbine does not have to be stopped in order to allow the images to be taken, thus down-times are avoided.

Thermographic images are evaluated using AI

It is possible to detect thermal turbulence patterns in high-quality thermographic images of rotating wind turbine blades. Such turbulences are mostly caused by damage along the leading edges (Fig. 2). The objective of the present project is to use AI to accurately identify the thermal characteristics induced by erosion damage to the blades' leading edges. In order to assess AI performance, the models were subjected to image classification. Areas with real, existing characteristics were marked in test images (Fig. 3, green) and the predictions by the AI model (Fig. 3, red) were then validated on the basis of these test images.

Fig. 1: Visual depiction of the internal structure, based on thermal inspection of rotating wind turbine blades. Source: BAM

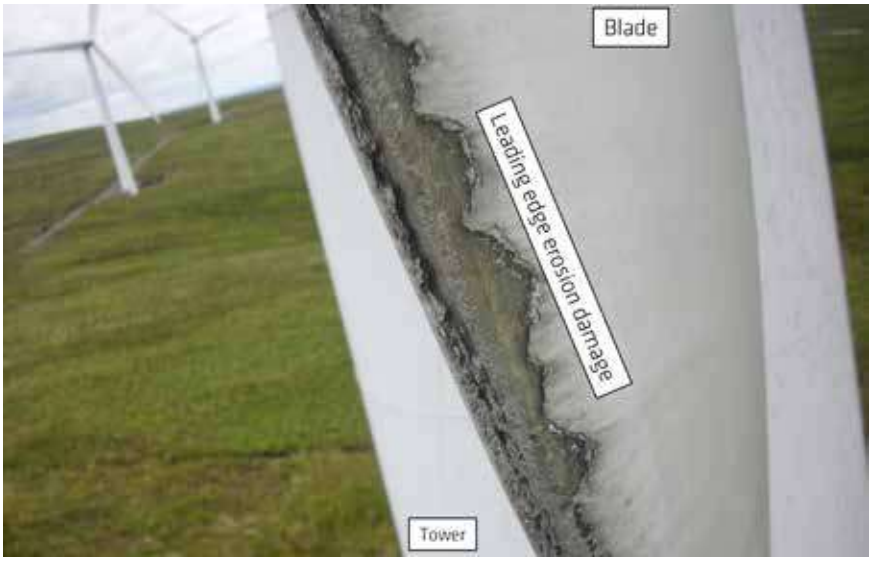


Fig. 2: Rain erosion damage of the leading edge of a wind-turbine blade

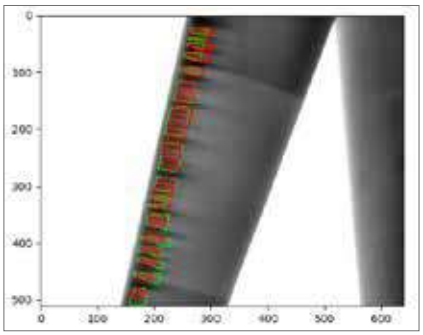


Fig. 3: Validation of the AI model: The green areas show visually detected characteristics, the red areas were detected using AI. Source: BAM

"At present, wind turbine inspection is carried out by professional industrial climbers. This is a complicated, expensive method and, in view of the planned expansion of wind energy generation, is not viable for the future. We are developing a digital monitoring method that will eliminate down-times."

Dr. Michael Stamm (BAM), thermography expert and head of the research project.

Conclusion

With the assistance of the LATODA start-up company from Marburg, BAM has developed a method which combines infrared thermography with AI-based image evaluation. In contrast to the inspection methods which have been used up to now, these being mainly visual and manual, this method allows damage to be detected and repairs to be made at an early stage, thus avoiding long down-times and efficiency losses.

Project overview

Status	**The feasibility study has been concluded. A follow-up project as part of the QI-Digital initiative is due to start in October 2023.**
Location	**Berlin-Adlershof**

Bundesanstalt für Materialforschung und -prüfung
Department: Thermographic Methods
Dr. Michael Stamm
Research Associate

Richard-Willstätter-Strasse 11
12489 Berlin
Phone +49 (0)30 8104 3884
E-Mail michael.stamm@bam.de
Web www.bam.de/thermography

Corrosion research under real-life conditions

In order to allow corrosion prevention for offshore foundations to be tested under real-life conditions, the German Federal Institute for Materials Research and Testing (Bundesanstalt für Materialforschung und -prüfung – BAM), has set up a new sea-water laboratory near the Eider barrage.

More accurate prediction of corrosion and corrosion prevention

Research on corrosion in sea water and sediments can be conducted in this sea-water laboratory, which has an area of 50 m² and has been constructed with the help of the Elbe-North Sea waterways and shipping authority (Wasserstrassen- und Schifffahrtsamt Elbe-Nordsee).

The transition zone between sea water and sediment, along with biofouling, is considered to be critical for corrosion prevention on offshore foundations, since particularly heterogeneous conditions are to be found there. Up to now, it has not been possible to adequately describe the effectiveness of protection measures in these zones. The corrosion laboratory will be operated using a sea-water circulation system with the sediments found on site since testing in artificial sea water and sediments is not able to recreate a realistic marine biofouling situation.

Continued on page 80 →

Moving the corrosion protection metrology container from BAM TTS to the Eider barrage location
Source: BAM

"Thanks to this sea-water laboratory for corrosion research – the only one of its kind in Germany up to now – it will be possible to determine the characteristics of complex corrosion systems, plan targeted protective measures and thus reliably achieve the planned service lives."

Gino Ebell (BAM), Corrosion prevention expert and head of the research facility

Five test basins

The laboratory encompasses five test basins each with a volume of 500 litres and using artificial daylight, as well as a large test cylinder holding 4000 litres and exposed to natural daylight. The entire laboratory is climate-controlled and has a supply storage basin and a fresh-water connection. All test basins are equipped with extensive metrology systems with remote control capability.

Innovative exploration tools

The items being developed by BAM in this laboratory include exploration tools which can be used to describe the corrosiveness of ocean-floor sediments. The purpose of these tools is to allow the planners of future offshore structure foundations to avoid highly corrosive regions and/or adapt corrosion prevention measures more precisely to the ambient conditions of the site.

The interior of the container. Source: BAM

The new sea-water-laboratory at the Eider barrage location. Source: BAM

Conclusion

The aim of research work in the BAM's new sea-water laboratory is to improve the safety of offshore foundations. It focusses on predicting corrosion stresses and the effectiveness of protective measures. This will increase planning confidence for offshore wind farm operators and ultimately increase the contribution of wind energy to the energy transition process.

Project overview

Status	**The sea-water laboratory is to be commissioned at the end of 2023. Research on protection measures will commence in 2024 and the results will be continuously evaluated.**
Location	**Eider barrage / Berlin-Steglitz**

Bundesanstalt für Materialforschung und -prüfung
Department: Corrosion and corrosion protection
Gino Ebell
Deputy head of department

Unter den Eichen 87
12205 Berlin
Phone +49 (0)30 8104 4353
E-Mail gino.ebell@bam.de
Web www.bam.de

BAM
Bundesanstalt für Materialforschung und -prüfung

WiValdi wind energy research farm

The German Aerospace Center (DLR) and its partners from the Research Alliance Wind Energy have set up the “Wivaldi” wind energy research farm.

View of the WiValdi wind energy research farm

> **“More than 2000 sensors are collecting a constantly growing treasure-trove of data for wind energy research.”**
>
> *Dr.-Ing. Jakob Klassen*
> *DLR, Wind energy experiments*

WiValdi OPUS 1

With partners from the Research Alliance Wind Energy (FVWE), DLR has developed and built the research wind farm. The FVWE consolidates the expertise of more than 600 researchers to provide impulses for the energy supply of the future. The three partners are: DLR, ForWind – Center for Wind Energy Research at the Universities of Oldenburg, Hannover, and Bremen, and the Fraunhofer Institute for Wind Energy Systems. This research farm enables holistic wind energy research on full-scale systems. Four metrology masts with extensive instrumentation and two modern wind power plants are already available on site for use by the research partnership. The masts and the wind turbines are aligned in a row in the direction of the prevailing wind. Using this constellation, which is otherwise commercially unfavourable, the interactive effects between individual turbines in wind farms can be investigated. In WiValdi over 2,000 sensors measure, for example, temperature, humidity, wind speed, pressure, or even the slightest deformations of the rotor blades. All these sensors collect synchronized and time-stamped high-resolution data non-stop, 24 hours data will become a constantly growing data treasure-trove for the wind energy research sector.

WiValdi is being sponsored by the Federal Ministry for Economic Affairs and Climate Action and the Ministry of Science and Culture of Lower Saxony.

Conclusion

WiValdi will enable the creation of a unique original-scale infrastructure in real-life conditions for the industrial and academic research community, making future power-plant generations more efficient and intelligent, allowing optimum utilisation of the areas suitable for wind power and contributing to increased acceptance of this technology.

Project overview

Location	**Landkreis (county) Stade** **21732 Krummendeich**

Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center
Wind energy experiments
Dr.-Ing. Jakob Klassen

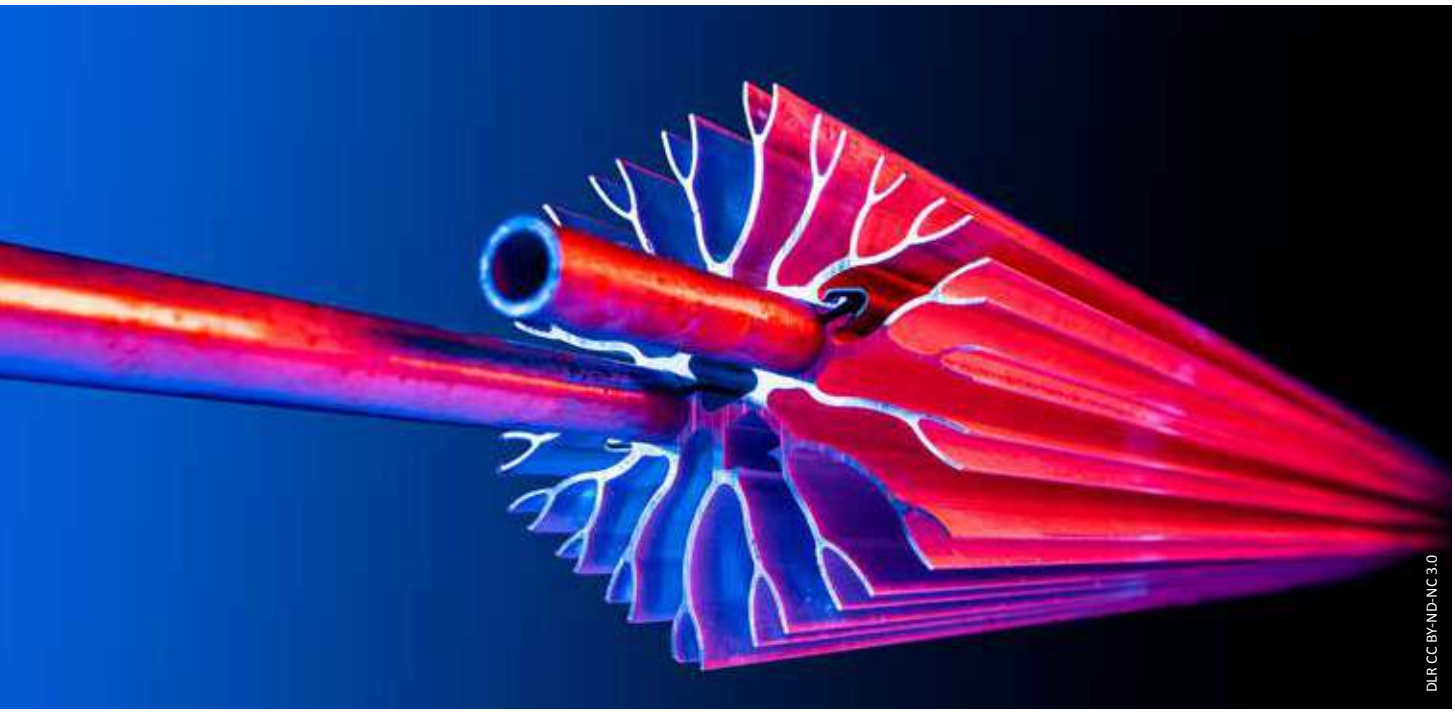
Lilienthalplatz 7
38108 Braunschweig
Phone +49 (0)531 295 3380
E-Mail jakob.klassen@dlr.de
Web www.forschungspark-windenergie.de

DLR Deutsches Zentrum für Luft- und Raumfahrt

Gefördert durch:

Bundesministerium für Wirtschaft und Klimaschutz
aufgrund eines Beschlusses des Deutschen Bundestages

Niedersächsisches Ministerium für Wissenschaft und Kultur



Using salt to bridge blackouts and peak loads in a climate-neutral manner

In collaboration with stakeholders from the industrial and research sectors, the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) has successfully built and tested a Carnot battery. **Carnot batteries are able to store electricity in the form of heat and then reverse the process to generate electricity.**

The EU research project CHESTER (Compressed heat energy storage for energy from renewable sources) uses a latent heat storage system, which was developed by the DLR Institute of Technical Thermodynamics as the core element of the pilot plant. It contains around two cubic metres of nitrate salt which is heated by the electricity to be stored via a high-temperature heat pump and melts during the process. This is referred to as a latent heat storage system because part of the heat appears to be hidden, i.e., it is latently stored in the loosening of the bonds between the salt crystals, which acts like a kind of supplementary store.

To discharge the storage tank at a later stage, a cooling circuit transfers the heat to a heat engine coupled with a turbine and generator. The electricity generated in this climate-neutral manner can then be fed back into the grid. Under test operation conditions, the pilot plant achieved a total electrical output of just under 10 kilowatts.

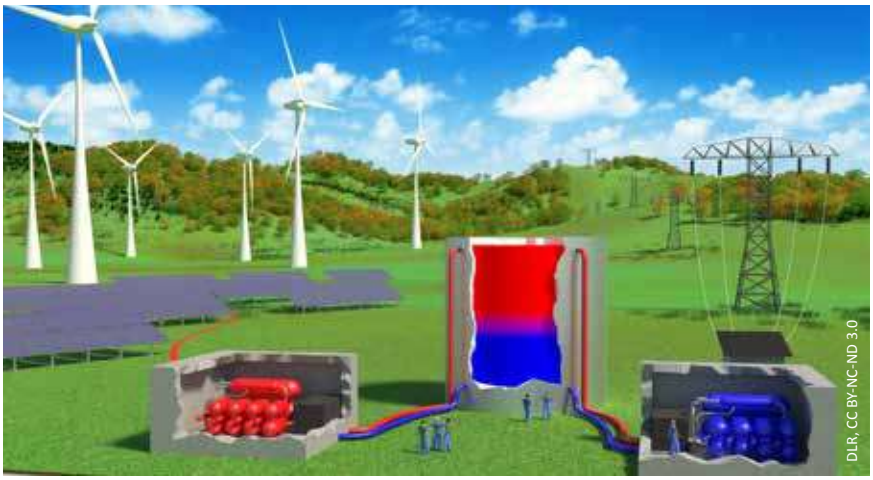
One of the major benefits of Carnot batteries is that they can supply electricity and heat at the same time. Their size and capacity can be easily adapted to the respective requirements, which makes them ideally suited for sector coupling set ups. As a result, they are particularly interesting for industrial processes as well as for local electrical grids and so-called smart district heating networks.

Conclusion

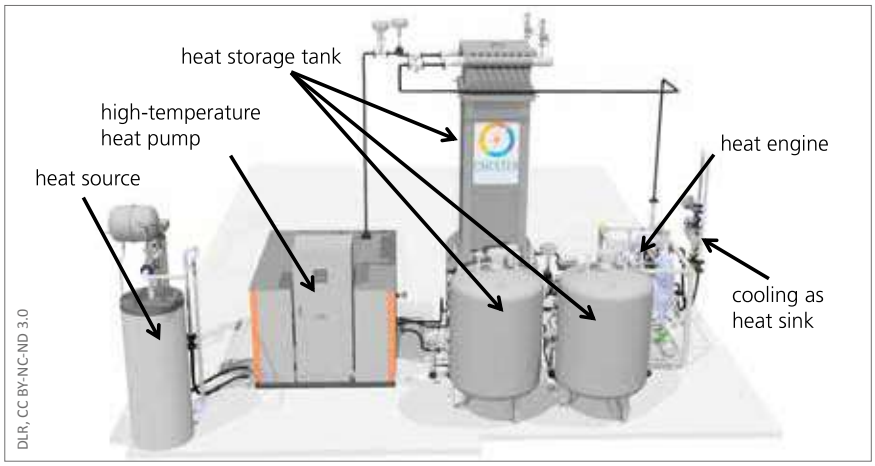
Carnot batteries can be used to compensate for fluctuations in solar and wind energy, which means that this storage technology is capable of contributing to a controllable and secure renewable energy supply.

"This technology could potentially be used to store electricity generated from renewable sources on an industrial scale, which means that blackouts and peak loads can be bridged in a climate-neutral manner when there is no wind and no sunshine."

Maike Johnson of the DLR Institute of Technical Thermodynamics



Carnot batteries are able to store electrical energy in the form of heat.



A Carnot battery pilot plant at the DLR site in Stuttgart: the main components of the storage system are a high-temperature heat pump, a heat accumulator filled with nitrate salts, and a thermal engine, which can generate climate-neutral electricity on demand via a turbine and generator combination.

Project overview

Implementation	**2018 Project launch** **2022 Pilot plant successfully tested**
Location	**Pilot plant in Stuttgart**

German Aerospace Center (DLR)
Institute for Technical Thermodynamics
Maike Johnson

Pfaffenwaldring 38–40
70569 Stuttgart
Phone +49 (0)711 6862-344
E-Mail maike.johnson@dlr.de
Web www.dlr.de/tt

DLR Deutsches Zentrum für Luft- und Raumfahrt

Cognitive Energy Systems Competence Centre Artificial intelligence in the energy sector

The aim of the „Cognitive Energy Systems (CES) Competence Centre" project is to lay the foundations for the successful use of artificial intelligence (AI) in the energy system as well as to promote the development of cognitive energy systems.

> **"The use of AI in the energy system offers the potential for a more affordable and cleaner energy supply."**
>
> *André Baier, Project Manager*

The complexity of the energy system is increasing both on the generation and consumption sides yet electrical power should not become more expensive and should always be reliably available everywhere. Artificial intelligence (AI) can utilise self-learning systems and automation to help manage increasing complexity and reduce operating costs. A wide range of applications along the entire value chain can be automated through the use of AI.

Introducing AI into the energy system will be a multi-step process. Cognitive energy systems are energy systems that can independently determine and forecast the status of their assets on the basis of the available information and that are adaptive enough to learn how to achieve predefined energy management goals. The energy system of the future will need to develop an awareness of its own condition and be able to react automatically, whereby so-called AI agents can take over complex control processes that would not be possible with the current staffing and technology in the respective companies.

Tests have been carried out in 44 so-called spotlights projects to examine which AI processes would be useful in the energy sector, in particular for grid operation, forecasting, resilience, power electronics, energy management, and energy trading.

Forecasts are important for maximising the use of wind power in the energy supply. For example, what are the consumption behaviour factors that most influence consumption forecasts – time of day, day of week, season? Temporal Fusion Transformers (TFTs) are able to forecast different time horizons whilst taking account of probabilities. Forecasting power flows in the electrical grid enables grid operators to make predictive grid calculations and detect bottlenecks early on. TFTs enable a single model to be trained for several locations at the same time (multi-task learning), which means that lessons learned at other locations, as well as spatial and temporal dependencies, can be incorporated into the forecast in order to improve it.

Trading on the power markets is either done by humans or with automated rule-based systems, which, in many respects, will be unsatisfactory in the highly decentralised energy system of the future because of the expertise required, the fact that a large part of the complexity of the electricity market is ignored in rule-based systems, and due to the loss of flexibility. Machine learning (ML) and especially reinforcement learning (RL) are capable of counteracting potential excessive or

Project overview

Implementation	**completed**
Location	**Kassel**
Project Manager	Dipl.-Math André Baier, M.Sc. Business Unit Manager Digital Portfolio Management

Fraunhofer IEE
Joseph-Beuys-Strasse 8
34117 Kassel
Phone +49 (0)561 7294-372
E-Mail andre.baier@iee.fraunhofer.de
Web https://kognitive-energie-systeme.de

Fraunhofer IEE

insufficient power supply capacities. An automated trading agent for energy trading from the perspective of wind power operators was created in the Deep Energy Trade project based on the use of wind power forecasts of Fraunhofer IEE. The outcome is a prototype in the form of a demonstrator that generates positive trading results from a small data set.

The Hessian Ministry of Science and the Arts provided 5.8 million euros in funding from 2019 to 2023 for the „Cognitive Energy Systems" start-up project.

Conclusion

The CES project has created the necessary foundation for the successful use of AI in the energy system by building up the necessary competences and tools and demonstrating its potential in a number of 44 spotlight projects.

Deep Bird Detect

Artificial intelligence is used to automatically record sensitive bird species in order to reconcile species protection and wind energy.

Wind farm construction is often delayed because the authorities require project developers to carry out comprehensive nature conservation assessments before they can be approved. The Fraunhofer IEE is collaborating with the universities of Kassel, Kiel, and Chemnitz, as well as industry partners to develop a system that can automatically recognise and classify birds and other animals on the wind farm sites using audio signals. The process is based on artificial intelligence (AI) whereby the researchers use deep-learning technology to make temporal and spatial recording of the respective species possible.

They record sound files to classify endangered species and those likely to be harmed by wind turbines. But analysing this data is extremely laborious, which is why AI-supported, automated data processing is so important. Another disadvantage of manual analysis is that it does not always capture all of the animals' audio signals – the effort required for a complete manual assessment would be far too great. This is why analyses are only conducted on a sample basis, which means some species may remain undetected, which in turn makes expert opinions contestable in a court of law. One of the results of a pilot project run by the Cognitive Energy Systems Competence Centre (see above) is a tool for classifying endangered bird species on the basis of sound recordings.

The standardised recording methodology of the „Deep Bird Detect" system also enables comparisons to be made with other ecosystems, which sheds light on long-term developments on these sites, e.g., via a monitoring network that can automatically detect geographic species-specific changes at an early stage. The technology used in the Deep Bird Detect project will also be adapted to other species groups, such as bats, amphibians, and insects, in order to broaden the scope of the ecosystem inventory.

> **"We need to make neural network decisions transparent and comprehensible, which will provide additional legal certainty."**
>
> *Dr. Christoph Scholz, Project Manager*

Conclusion

The aim of the Deep Bird Detect consortium is to help create legal certainty through AI-supported, efficient, and legally secure specialist assessments of fauna and to speed up approval procedures with a view to contributing to the expansion of wind power.

Project overview

Implementation	**Project implementation started**
Location	**Kassel**
Project Manager	Dr. Christoph Scholz Scientific Director of the Cognitive Energy Systems Competence Centre Fraunhofer IEE

Fraunhofer IEE
Joseph-Beuys-Strasse 8
34117 Kassel
Phone +49 (0)561 7294-427
E-Mail christoph.scholz@iee.fraunhofer.de
Web https://s.fhg.de/K-ES-DeepBirdDetect

Fraunhofer IEE

Subsurface investigation using multichannel seismic and hydroacoustic methods

Fugro and Fraunhofer Institute for Wind Energy Systems secure survey work for wind farm sites in the German exclusive economic zone on behalf of the Federal Maritime and Hydrographic Agency.

Fugro Pioneer running lines with seismic equipment deployed to perform a geophysical survey. ©Fugro

Fugro are collaborating with the Fraunhofer Institute for Wind Energy Systems IWES to undertake a geophysical survey contract for two offshore wind farm sites in the German exclusive economic zone (EEZ) in the North Sea, for Germany's Federal Maritime and Hydrographic Agency, the Bundesamt für Seeschifffahrt und Hydrographie (BSH).

The project started in May 2023, with Fugro mobilising a dedicated survey vessel to perform high-precision positioning, sub-bottom profiling recording and interpretation. Additionally, Fraunhofer IWES took responsibility to conduct the multichannel seismic survey, followed by dedicated data processing and interpretation. A dense data raster was generated totalling 2393 km survey lines. The sub-bottom profiler data provides detailed structural imaging of sediments up to 15 m below the seafloor while the ultra high resolution multichannel seismic data (UHR MCS) penetrates more than 100 meters to capture images of small sedimentary bodies as well as deep sediment filled valley structures.

The collaboration of know-how and resources between both teams, guarantees a safe and efficient survey that meets BSH's stringent planning schedule. The final result will be a preliminary subsurface model that can be used as the basis for future geotechnical survey campaigns as well as to reduce the risk for the future installation of the windfarms.

Conclusion

The sites are to be auctioned in the coming years and play an important role in Germany's energy transition, which aims to achieve the target of 30 GW of installed offshore wind power capacity by 2030.

Project overview

Implementation	**May 2023 to November 2023 with delivery of the ground model and final report**
Location	**North Sea**

Fraunhofer-Institut für Windenergiesysteme IWES
Gabriela Sierra Lombera
Project manager and research associate

Am Fallturm 1
28359 Bremen
Phone +49 (0)471 14290-176
Web www.iwes.fraunhofer.de

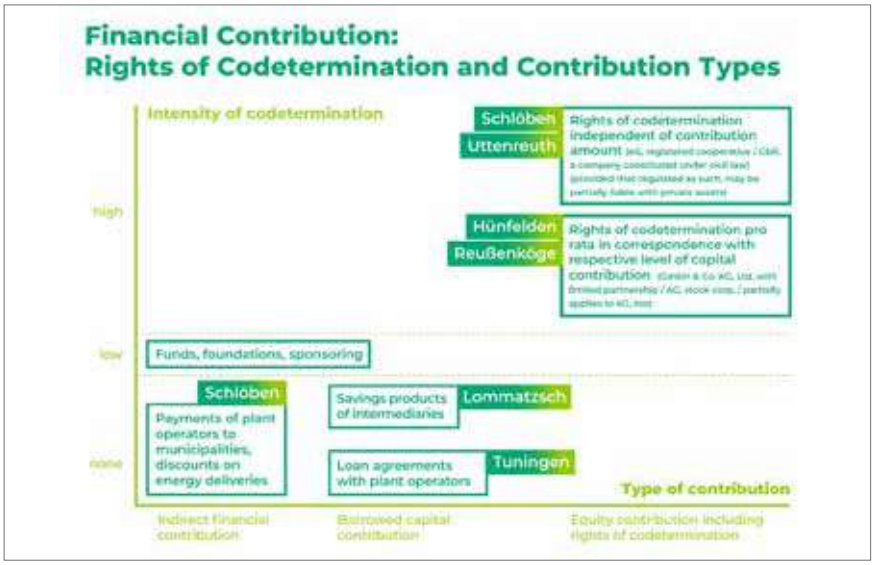
Fraunhofer IWES

Regional value creation, participation, and acceptance

The ReWA research project: Focus on the importance of regional value creation and financial participation opportunities for the acceptance of local RE projects.

The ReWA research project, which was funded by the Federal Ministry for Economic Affairs and Climate Action (BMWK), involved a collaboration between the Institute for Future Energy and Material Flow Systems (IZES), the Renewable Energy Agency (AEE), and the Institute for Ecological Economy Research (IÖW) and investigated the relationship between regional value creation, financial participation opportunities, and local acceptance of renewable energies in six selected German communities. Various RE projects (wind, PV, biomass) had been implemented with different participation approaches in the communities analysed. The overall finding was that the more that local stakeholders are involved in the respective value creation steps, the more value is retained within the community in which the project is implemented.

Whereas the proportion of the business taxes paid by the operating companies is regulated by law for the local community, other participation potentials (profit sharing, lease income, jobs, contracts) have to be addressed proactively. When it comes to wind farms, it is particularly important that citizens, the local authority, and local companies participate in the investment in the turbines so that the operator's profits remain local and citizens have a say in the process. For example, a wind farm based in Reußenköge, which is one of the world's largest publicly owned wind farms, has a policy of "earning with the wind farm, not exploiting the wind farm". The study results also show that the value created has to be communicated actively and made visible in order to have a positive effect on public acceptance.



Various forms of financial participation in the municipalities investigated in the project.
© Project ReWA/Graphic AEE

Conclusion

The acceptance of renewable energy projects is strongly influenced by regional value creation and participation opportunities, which, in turn, provide a basis for the successful and swift implementation of further renewable energy projects. In this context, local authorities have an important role to play: they should make use of their scope for action, e.g., by allocating municipal land as a basis for the managed control of this technology.

Project overview

Implementation	**completed, duration 06.2020 – 03.2023 Funding by the Federal Ministry for Economic Affairs and Climate Action (BMWK)**
Location	**six communities in Germany; 3 of them with wind turbines**

Institute for Future Energy and Material Flow Systems, IZES gGmbH
Environmental Psychology Department
Jan Hildebrand

Altenkesseler Strasse 17
InnovationsCampus Saar
66115 Saarbrücken
Phone +49 (0)681 844972-29
E-Mail hildebrand@izes.de
Web www.unendlich-viel-energie.de/projekte/rewa

Results brochure
www.unendlich-viel-energie.de/mediathek/publikationen/renews-spezial-die-energiewende-in-kommunen

ReWA Regionale Wertschöpfung. Akzeptanz. Beteiligung.

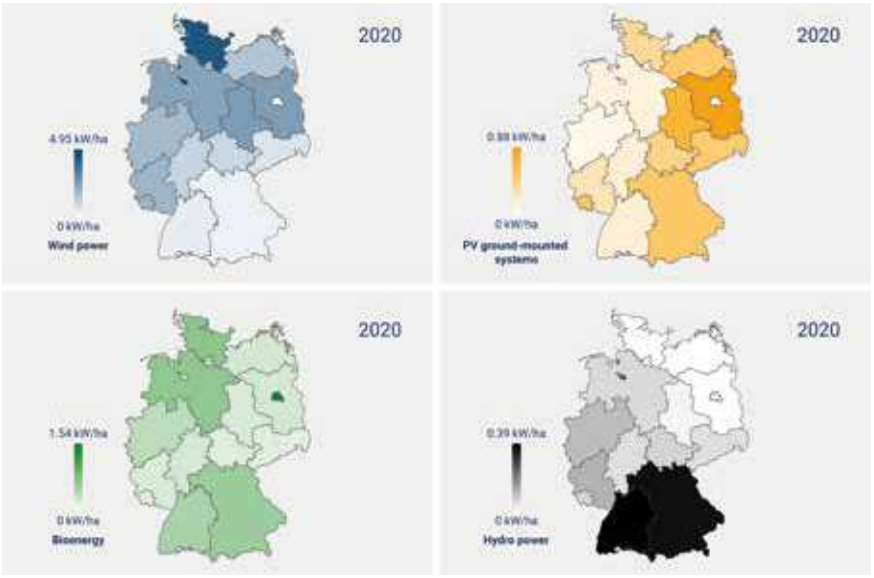
How to assess the environmental compatibility of the energy transition

The Helmholtz Centre for Environmental Research (UFZ) developed the RE (renewable energies) Monitor (https://ee-monitor.de) to identify and evaluate the environmental compatibility and goal conflicts of the energy transition.

Facilities for renewable energy generation, such as wind turbines or ground-mounted photovoltaic plants, have become an integral part of the landscape. However, in addition to their contribution to protecting the climate, they can also have a negative impact on the environment if, for example, they pose collision risks for animals or result in land use changes.

The RE-Monitor is a publicly accessible web application that uses 41 indicators to quantify the expansion of renewable energy production and to measure impacts this has on nature and the landscape. For example, there is evidence that the expansion of wind turbines and ground-mounted photovoltaic systems is mainly taking place on agricultural land and that the number of turbines in environmentally protected areas, nature parks, and forests is steadily increasing. A positive trend is that the area efficiency of ground-mounted photovoltaic systems is rapidly increasing.

> "An energy transition that is environmentally friendly can only succeed if both the available land and the energy generated from it are used efficiently"
>
> *Prof. Dr.-Ing. Daniela Thrän, UFZ*



There are significant regional differences in the power densities of renewable energy production facilities.

The accelerated energy transition is exacerbating conflicts between the expansion of renewable energies and nature conservation.

Conclusion

The RE Monitor provides the public with detailed data on current areas of conflict between the energy transition and nature conservation. Regional comparisons can be made, and the temporal development of conflicts can be traced. Nature conservation-related indicators of the RE Monitor show both technology-specific and cross-technology trends.

Project overview

Implementation	**completed, the web application is updated and extended ever year**

Helmholtz Centre for Environmental Research (UFZ), Leipzig
Funded by the Federal Agency for Nature Conservation

Nora Mittelstädt
Contact nora.mittelstaedt@ufz.de
E-Mail ee-monitor@ufz.de
Web https://ee-monitor.de

UFZ HELMHOLTZ Centre for Environmental Research

Offshore wind farms sequester carbon in sediment

Researchers at the University of Hamburg's Department of Biology have been studying the impact of offshore wind farms on sedimentary carbon deposits in the North Sea.

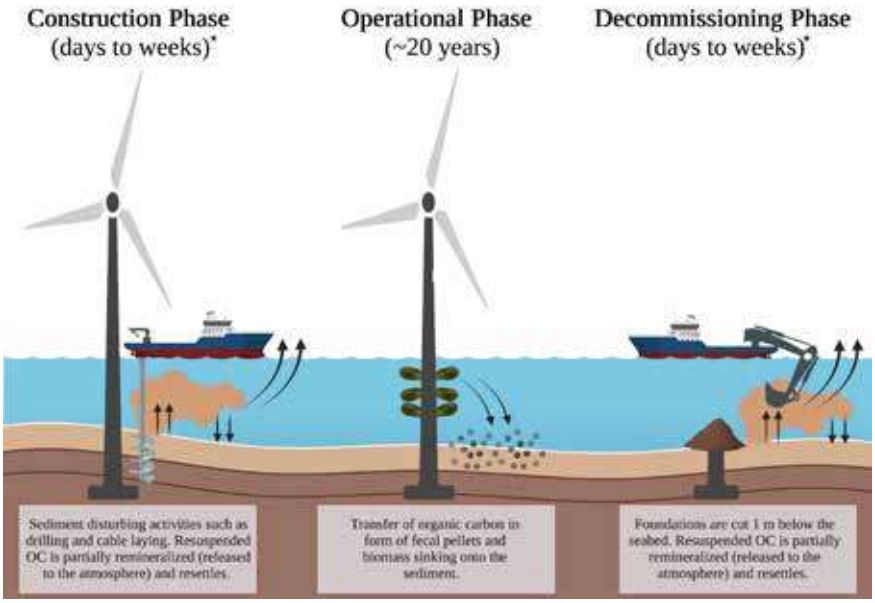
Around the world, the sediment beds in which offshore wind farms are installed harbour significant levels of carbon dioxide. Initial studies have shown that offshore wind farms affect the properties of the sediment in their immediate surroundings, increasing the natural carbon levels in the sediment during the operational phase and decreasing them during construction and decommissioning.

To find out whether the sediments in which offshore wind farms are located sequester more carbon than they release, researchers at the University of Hamburg have calculated the net carbon effect in the sediment over the entire life cycle of offshore wind farms in the southern North Sea, which includes the construction, operational, and decommissioning phases.

The results suggest that some 481,000 tonnes of carbon dioxide are additionally bound in the top ten centimetres of sediment surrounding the offshore wind farms in the respective area. By contrast, the total amount of carbon released during sediment-altering activities during construction and decommissioning is only about 100,000 tonnes. However, the intensity of carbon release in the disturbed areas is about 44 times higher than that of carbon sequestration throughout the entire offshore wind farm area. But, as the overall area that is disturbed is only about 0.50 per cent of the total area of the offshore wind farms (60 km²), it means that, in absolute terms, about **five times more carbon is subsequently trapped in the sediment than is released during construction.**

Conclusion

The relevant calculations show that five times more carbon is trapped than released by the wind turbines. Further research is needed, due to the limited nature of the data, so these results are only suggestive of orders of magnitude.



Impacts of different life cycles (construction phase, operational phase, decommissioning phase) of offshore wind farms on the sediment and the resulting trapped and released organic carbon in the upper 1 m of the sediment. © 2023 Heinatz and Scheffold

Project overview

Implementation	**completed**
Location	**Southern North Sea**

University of Hamburg, Faculty of Mathematics, Informatics and Natural Sciences
Department of Biology, Biological Oceanography
Knut Heinatz
Dr. Maike Scheffold

Grosse Elbstrasse 133
22767 Hamburg
Phone +49 (0)40 42838-6651
E-Mail maike.scheffold@uni-hamburg.de
knut.heinatz@utas.edu.au
Web www.biologie.uni-hamburg.de/en

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Green hydrogen more competitive than expected

Researchers at the Wuppertal Institute conducted a meta-study to determine the demand, costs, and development paths of hydrogen in Germany.

According to a study conducted by the Wuppertal Institute on behalf of the North Rhine Westphalian Renewable Energy Association, domestically produced green hydrogen will be able to compete with imports in many cases. This is because of the expected decrease in production costs for green hydrogen in Germany and the higher transport costs for imports, which can offset the lower production costs abroad.

However, the production cost of a future hydrogen economy is not the only factor to be considered; demand will also play a major role. The researchers argue that in order to maximise the efficiency of the hydrogen production that is possible by 2030, the focus should be on the use of hydrogen in core industries such as the steel and chemical sectors. As study author Frank Merten, co-head of the Systems and Infrastructures Research Unit at the Wuppertal Institute, points out, „This will help to limit the future demand for hydrogen and therefore also the required production and import volumes and could simultaneously reduce the need to import blue hydrogen (to support the ramp-up), which, depending on the technology used and the origin of the natural gas, emits significantly to considerably more greenhouse gases than green hydrogen.

Conclusion

The production costs of domestically produced hydrogen need not be higher than those of imports, which means that a greater effort should be made in this sector than has been the case to date. Import and production volumes could and should be limited during the ramp-up phase by focusing on crucial applications in industry and the transformation sector.

Project overview

Implementation	**from 03/2023 to 05/2023**
Location	**Wuppertal**

Wuppertal Institute for Climate, Environment and Energy gGmbH
Frank Merten (Project Lead)

Döppersberg 19
42103 Wuppertal
Phone +49 (0)202 2492-126
E-Mail frank.merten@wupperinst.org
Web wupperinst.org/p/wi/p/s/pd/2224

Wuppertal Institut

BirdRecorder – Collision-prevention system for wind energy turbines

The Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) deploys artificial intelligence for this system.

The cameras can identify endangered bird species at a distance of 700 metres.

BirdRecorder reconciles species conservation and climate protection.

Machine learning and artificial intelligence are the core elements of the "BirdRecorder" collision-prevention system developed by ZSW. AI experts at ZSW are using cutting-edge AI methods to detect birds and identify the species. As Anton Kaifel, head of ZSW's artificial intelligence team explained: "with our AI solution we are giving a new impetus to the further expansion of wind energy plants". This system can prevent birds of prey such as red kites from colliding with wind turbine blades. To achieve this aim, we need reliable detection and identification at distances where it is still possible to intervene in the control system.

Birds can already be identified at distances of 700 metres

The intervention zone of wind turbines must be at least 500 metres so that they can be put into stall mode in time to match the typical flight speed of red kites. BirdRecorder, however, can already identify bird species at distances of up to 700 metres. The collision-prevention system generates a signal causing the wind turbines to be switched into stall mode as soon as a kite enters the intervention zone. A signal to resume normal operation is then sent to the wind energy plant as soon as the bird leaves the intervention zone. The system, equipped with twelve cameras, is modular and can be adapted to all types of wind farm layout. BirdRecorder is due to be validated at ZSW's recently-opened wind energy research site near Geislingen early in 2024 in accordance with a standard developed by the Swiss Ornithological Institute. Following this, several pilot projects in wind farms are planned. Use of this system avoids complete shutdowns and thus improves the performance of wind farms. The Baden-Württemberg Ministry of the Environment, Climate Protection and the Energy Sector is funding the project.

Conclusion

In the years ahead, an increasing number of wind energy plants will be set up in forested areas. For reasons of species conservation, this will only be possible if collision-protection systems are deployed.

Project overview

Implementation	**validation in 2024**
Location	**Schwäbische Alb (Swabian Jura)**

Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW)
Anton Kaifel
Kay Ohnmeiß
Felix Ziegler

Meitnerstr. 1
70563 Stuttgart
Phone +49 (0)711 78700
E-Mail birdrecorder@zsw-bw.de
Web www.zsw-bw.de/Windenergie

Close-up view of wind turbines on the construction crane of SÜBA AG in Stockerau
Photo: MOWEA

NEWCOMERS:

Start-ups

Start-ups are entering the market with new ideas. A selection is presented on the following pages. Be inspired by their innovative power.

Baubüro Kaatz GmbH – Wind farm project implementation in the North!

If you are a project planner, farmer, or successful businessperson and need support for the construction of your projects, we would be glad to put our knowledge and our professional network at your disposal as a project partner. We can assume responsibility for the overall construction management and work with you to ensure the success of your project.

The path from the initial project idea to the operation of a wind farm is a long and often rocky one. We can provide you with competent support thanks to our many years of experience in the renewable energy sector. Based on our project implementation experience, we can support you throughout work phases 5–9 in accordance with the German Fee Structure for Architects and Engineers (HOAI).

As soon as your wind energy project has been planned and approved, it is time for the challenging project implementation phase in which a plethora of trades have to work together in a coordinated and timely manner. Our experience in construction coordination ensures that the project will run smoothly and that the costs are kept under control. Of course, we can also support you with your repowering projects.

"Our overall aim is to contribute to leaving a clean and liveable planet not only for our children, but also for future generations. Together for the future!"

Hendrik Kaatz,
Founder and Managing Director

Installation of the scar at the wind farm Reher in June 2023 (Photo J.Weidkamp)

baubüro kaatz
GmbH & Co. KG

Baubüro Kaatz GmbH & Co. KG
Dorfstr. 8, 24242 Felde
Phone: +49 (0)4340 7809846
kaatz@baubuero-kaatz.de
www.baubüro-kaatz.de

Founding year	**2022**
Focus	**External construction management service**
We offer	**Customer-side construction management service** **We provide all construction management services for the construction of wind farms and everything from a single source. We collaborate with efficient companies with an excellent reputation throughout the sector.**
We are looking for	**Reliable, future-oriented, and expandable partnerships for future project collaborations.**

View of Jevenstedt wind farm in June 2023 (Photo J.Weidkamp)

As an external construction management company, we can provide you with support in the planning and construction of wind turbines
Our team will provide you with project support right from day one. To ensure that everything runs smoothly, we take the lead in planning, coordinating, and monitoring your construction sites.

We manage the entire wind energy production process and cover:

- Implementation planning
- The tendering process
- Contract award assistance
- Site monitoring – construction supervision and documentation, deadline management, and construction progress monitoring
- Site supervision and cost control
- Official approvals coordination

A selection of our current projects

- Windpark Jevenstedt
  Construction of 9 Vestas wind turbines (8 x Vestas V136-4.2 MW, 1 x Vestas 136-4.2 MW) – Greenfield
- Windpark Reher
  Construction of 12 Vestas wind turbines (2 x Vestas V136-4.0/4.2 MW, 2 x Vestas V150-5.6/6.0 MW, 8 x Vestas V162-5.6/6.0 MW) – Repowering
- Bürgerwindpark Friedrich-Wilhelm-Lübke-Koog
  Construction of 3 wind turbines by Siemens Gamesa (3 x Siemens Gamesa SG 6.6-155) – Repowering
- Windparkprojekt Rohlsdorf
  Construction of 4 wind turbines by Nordex (3 x Nordex N133, 1 x Nordex N149) – Greenfield

Conclusion

Kaatz GmbH & Co. KG was founded by Hendrik Kaatz in 2022 in Felde near Kiel after more than 13 years of experience as a project manager and senior construction manager for wind power projects. We provide comprehensive services in overall construction management from a single source based on our many years of experience, in-depth specialist knowledge, and the best contacts in the industry.

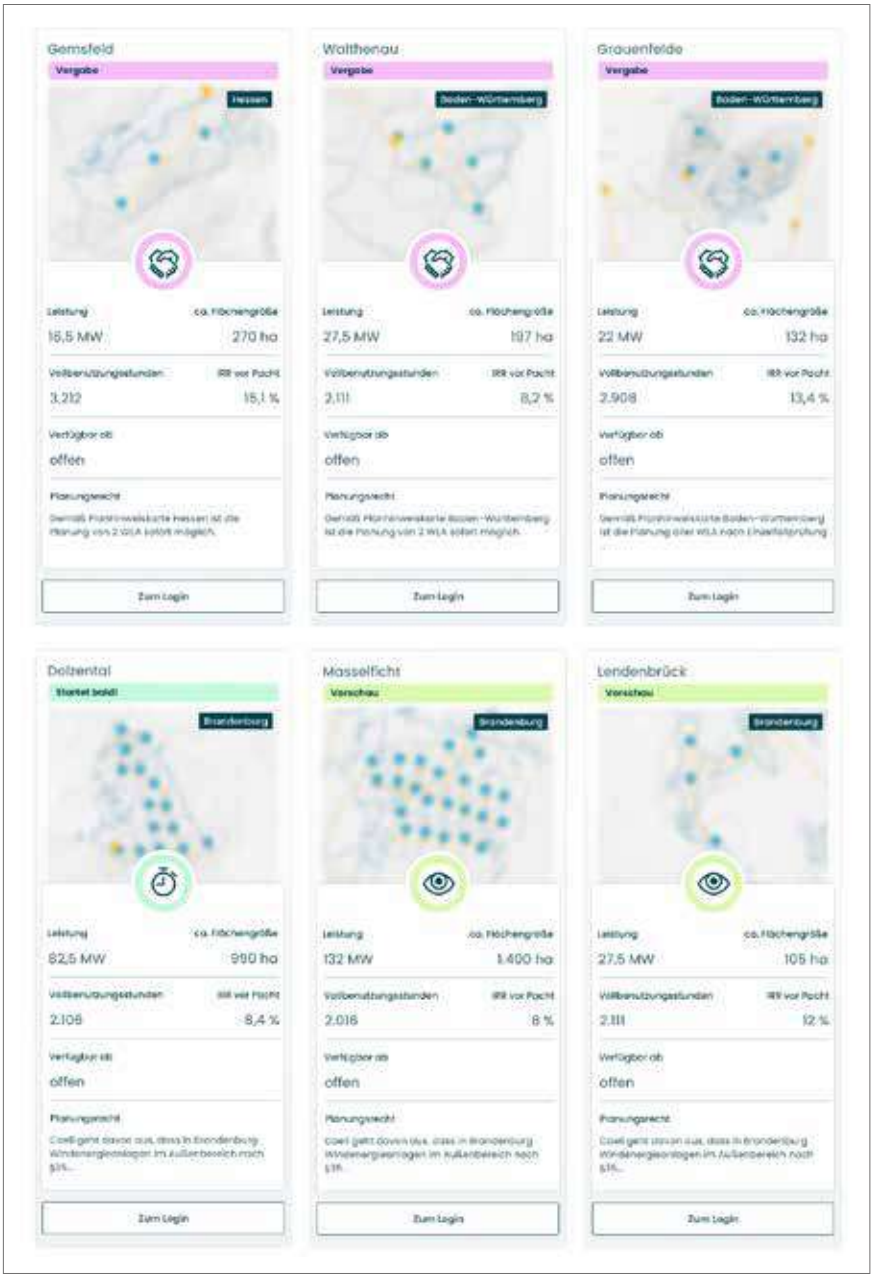
The team from Baubüro Kaatz GmbH & Co. KG (Hendrik Kaatz, Dr. Kerstin Coester, Jan Weidkamp, from left to right)

Caeli Wind – The marketplace for wind power area

Caeli Wind offers a range of potential wind sites across Germany that have been AI-checked which can be tendered quickly and easily using digital and intelligent methods.

Advancing wind power with Caeli Wind: in order to achieve the expansion targets for wind energy in Germany, we need commitment and intelligent technologies. We want to be part of this, which is why we established Caeli Wind, the first digital marketplace for wind energy sites that significantly expedites the site assessment, planning, and tendering processes. The cutting-edge software on our platform brings together landowners and project developers and supports all key wind sector stakeholders.

IT and AI for supply security: Caeli Wind is a cloud-based platform, which identifies potential sites for wind turbines on behalf of landowners and enables them to be professionally marketed. Our software verifies all the important criteria from regional planning to grid connection and economic viability, which increases the probability of implementation and expedites the development of wind energy production. This benefits landowners, the utility industry, and Germany as an energy production location.



The Caeli wind marketplace

Caeli Wind

Caeli Wind GmbH
Mollstrasse 3, 10249 Berlin
Phone: +49 (0)30 688 30 230 0
info@caeli-wind.de
www.caeli-wind.de
LinkedIn: https://de.linkedin.com/company/caeli-wind

Founding year	**2021**
Focus	• **Land marketing** • **digitalisation**
We offer	• **Identification of potential wind power sites, AI-supported analysis & marketing for landowners** • **A broad selection of wind power sites on our digital marketplace for project developers** • **Facilitation of the tender process up to the signing of the licence agreement**
We are looking for	• **Project developers** • **Collaboration partners** • **Further development opportunities**

Our analysis tool

Our product and service range:

- A wide selection of tested potential wind power sites throughout Germany
- Detailed site information relating to planning law, initial faunistic report, air traffic control, and grid connection etc.
- Open, non-discriminatory award procedure in the form of qualified auctions or direct contract awards
- A standardised neutral concession agreement from Caeli Wind
- Payment only in case of success: Performance-based commission for signing, BImSch and entry in the market master data register

“Caeli Wind is an easy-to-use platform with unique analytics that consolidates the fragmented onshore wind market.”

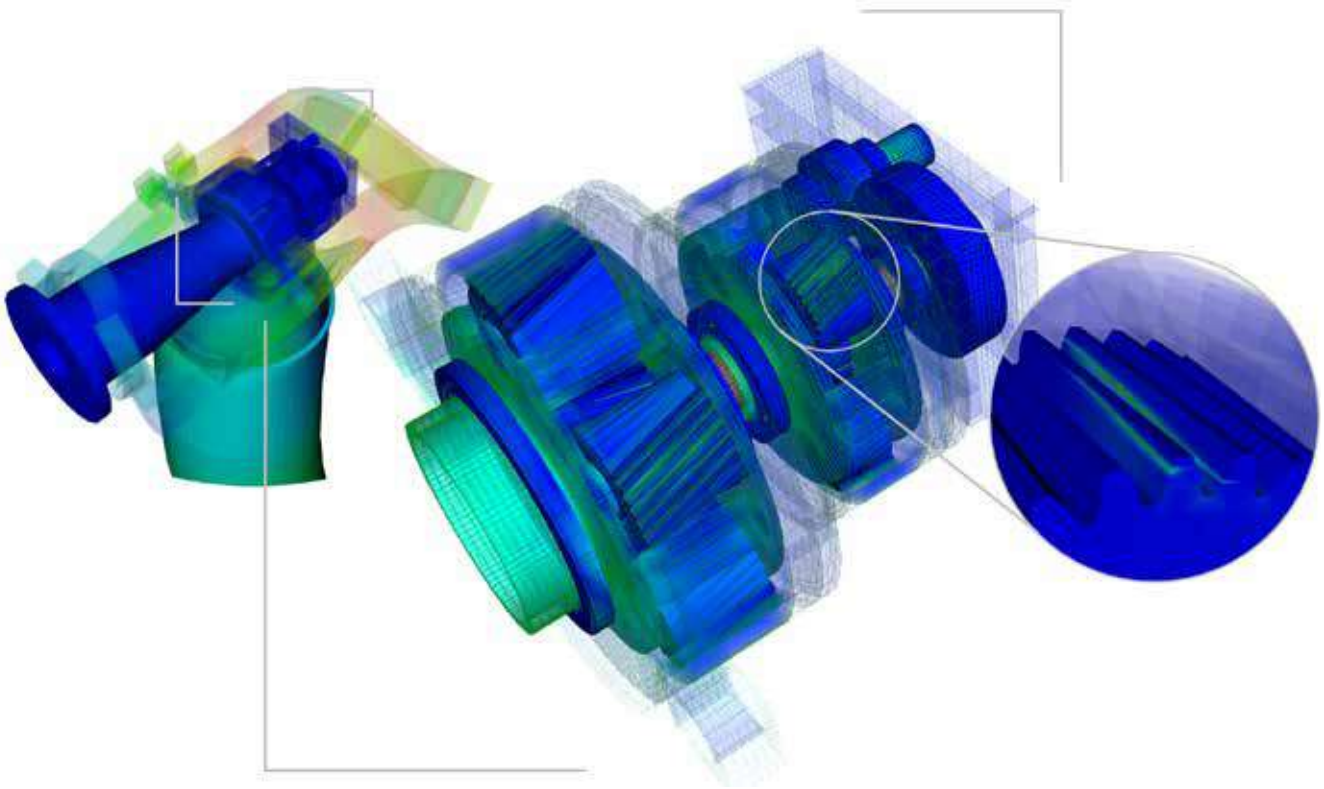
Heiko Bartels, Managing Director Caeli Wind

Conclusion

Caeli Wind is the first digital marketplace for wind power sites and significantly speeds up the site allocation process. Our expertise is at your disposal from the provision of the documents to the submission of the tender.

Simulation solutions for the wind industry – COMPOSE Technologies GmbH

Our engineering services and software technology solutions will provide you with support for strength and vibration problems throughout the entire product life cycle, from the design phase to the resolution of operational problems in the field.



Simulation result visualization: The software makes it possible to analyse the influence of small changes (in the µm range) to the gear geometry on the full wind turbine model.

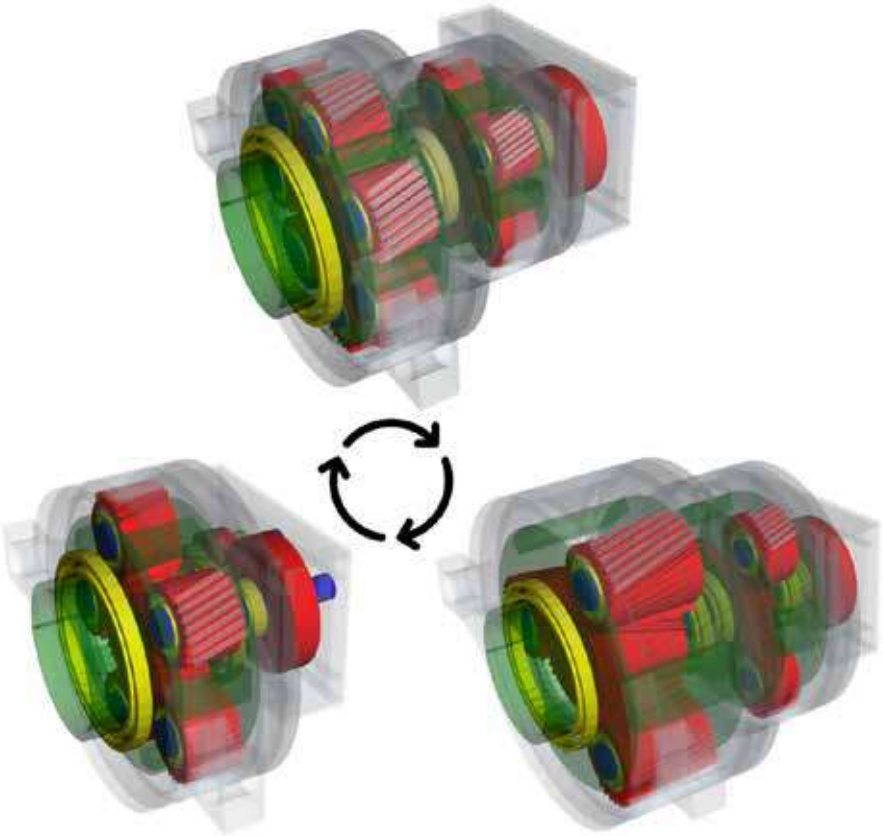
The constantly increasing market requirements for wind turbines present the industry with a multitude of challenges. Sound emissions have to be minimised, costs reduced, and materials used sparingly. Innovative solutions are more necessary than ever in this dynamic sector. Having spent many years in the wind sector our team of company founders is all too familiar with the relevant issues. COMPOSE Technologies GmbH's services and products provide the wind turbine industry with customised simulation solutions.

For the first time ever, our software enables the various mechanical components of a wind turbine (such as gearbox, machine carrier, bearings, tower and rotor blade) to be consistently simulated as they operate together in a coupled model, thus correctly predicting the interactions. We have achieved a previously unattainable ratio of result quality and calculation time through our innovative algorithms. We also offer our users an extensive library of easily customisable design templates for the various wind turbine components, which means that even those with no expertise in simulations can quickly and

COMPOSE TECHNOLOGIES

COMPOSE Technologies GmbH
Schauenburgerstr. 116, 24118 Kiel
Photo: +49 (0)431 9088 0118
info@compose-technologies.de
www.compose-technologies.de
LinkedIn: https://www.linkedin.com/company/compose-technologies-gmbh

Founding year	**2022**
Focus	**Development and distribution of simulation software.**
We offer	• **Customised simulation software for the wind sector** • **Customised extensions** • **Engineering and software development services** • **Consulting for solving strength and vibration problems**
We are looking for	• **Projects** • **Collaboration partners** • **Test users for simulation software**



Automatically generated gearbox models: design templates enable the generation of all wind turbine components based on a few parameters as well as a speedy comparison between variants.

reliably create detailed computational models and carry out parameter studies. The level of detail produced by the models can also be easily controlled so that both traditional multi-body simulations and finite element analyses can be carried out using the same model.

We also help our customers to solve operational issues, such as noise problems or serial damage to specific components. Our technology enables the development of targeted remedial measures within a short period of time. Thanks to the high quality of the results and the coupling of the entire wind turbine system, our software is also ideally suited for predicting gearbox noise problems.

This not only saves our clients from time-consuming and costly remediation, but also prevents negative impact on their reputation.

In addition to our software products, we offer a wide range of engineering and software development services.

Conclusion

With our innovative software solutions, we want to enable our customers to quickly and safely develop cost-optimized products and solve existing operational problems.

The founders Thies Hecker, Christian Schönke and Gabriel Gebre Musie (Photo: Sven Wied)

Revolutionary innovation in the wind energy sector: DronoDat‘s End-to-End Solution

The startup DronoDat is fundamentally reshaping the wind energy industry at the center of innovation in Magdeburg. DronoDat combines advanced drone technology with artificial intelligence to create an era of increased efficiency and safety in the inspection and maintenance of wind turbines.

Precise site mapping
DronoDat starts every wind turbine project by mapping the installation site, using state-of-the-art drone technology to record precise topographic data, which not only facilitates the precise construction of the foundations, but also optimises transport route planning to simplify and expedite the installation process.

Efficient transport and flawless installation
Transporting components for wind turbines presents logistical challenges, which DronoDat solves by efficiently integrating drones into the process. Ground based teams work actively with these drones to help ensure the seamless transport of critical components thus ensuring that DronoDat is able to make a significant contribution to the safe and timely transfer of essential elements.

State of the art inspection methods and real-time monitoring
DronoDat combines artificial intelligence with drone technology to fundamentally change the way wind turbines are inspected. This combination ensures accurate data acquisition and early detection of defects, from structural cracks to erosion and lightning damage resulting in a tangible reduction in downtime and increased safety throughout the entire operating process.

Comprehensive documentation and unrestricted access
One of the key added values of DronoDat is the comprehensive documentation it provides: every detail of the inspection

DRONODAT

Dronodat UG
Schifferstr. 38a, 39106 Magdeburg
Photo: +49 (0)176 576 716 08
info@dronodat.de
www.dronodat.com
LinkedIn: www.linkedin.com/company/dronodat/

Founding year	**2021**
Focus	• **Surveys** • **Mapping** • **Inspection**
We offer	• **Topographic surveys & mapping** • **Wind turbine inspections** • **PV system inspections**
We are looking for	• **Projects** • **Collaboration partners** • **O&M company for wind turbines and PV systems**

process is recorded in digital format to ensure that project managers, insurers, and stakeholders have access to key findings at all times. This seamless data availability promotes informed decision-making and collaboration.

Innovative path to the future

Far from being limited to refining wind turbine inspections, DronoDat is fundamentally redefining the face of the wind energy sector. DronoDat's seamless integration of drone technology and artificial intelligence results in a transformative effect that goes beyond inspection to encompass holistic improvements in safety protocols and operational efficiency.

Conclusion

Dronodat is a data and drone services start-up founded in 2021. Our aim is to automate conventional working methods and to provide the market with customised, digitalised solutions. Dronodat is revolutionising the way wind turbines are surveyed and inspected through a combination of drones and artificial intelligence to provide both a digitalised topographic site localisation service and a detailed and automated inspection of existing wind turbines.

Examples of defects detected in wind turbines.

enviConnect – digitalising wind energy

enviConnect is facilitating the faster expansion of wind energy by using automated workflows in the wind farm life cycle, thus enabling the expansion to be scaled up without having to hire new professionals.

The wind energy expansion targets are well-defined: in Germany alone, 115 GW of onshore wind energy will have to be installed by 2030. Despite the fact that wind energy production is booming, the industry is facing a problem: more wind farms mean more data that needs to be analysed, more decisions that need to be made, and more staff that needs to be hired to do the work, which will require tens of thousands of skilled workers by 2030.

Our app ecosystem automates workflows

This is exactly where our technology comes in: we are developing an app ecosystem that automates workflows throughout the wind farm lifecycle and digitises expert knowledge. Each of our apps is focused on a specific workflow, collects data automatically, and prepares it in such a way that decisions can be made quickly and easily. The data can be accessed at any time and can be reused and shared simply and effectively saving time and personnel as the number of wind energy projects increases.

Our first app is for wind lidar monitoring

Our first app is used during the wind farm project planning phase and digitalises wind measurements with wind lidars. Until recently, our customers have often had to manually review the data from the measurement campaigns in order to ensure the quality of the data, which took about 30 minutes per lidar every day. Our app automates the daily data monitoring reading in the data, performing a quality analysis, and calculating the availability. If measurement problems occur, automated warnings enable the user to react quickly and eliminate the cause. The app also supports campaign management, by writing automatic reports, providing a logbook function for documentation, facilitating the sharing of campaign progress with colleagues and clients, and backing up data to our online cloud.

> **"Digitisation does not have to be difficult: it can be achieved step by step by using apps that simplify and speed up workflows."**

enviConnect is developing an app ecosystem that automates workflows throughout the wind farm lifecycle and digitises expert knowledge

TGU enviConnect, TTI GmbH
Nobelstraße 15, 70569 Stuttgart
Phone: +49 (0)1745 60 20 90
info@enviconnect.de
www.enviconnect.de
LinkedIn: www.linkedin.com/company/enviconnect

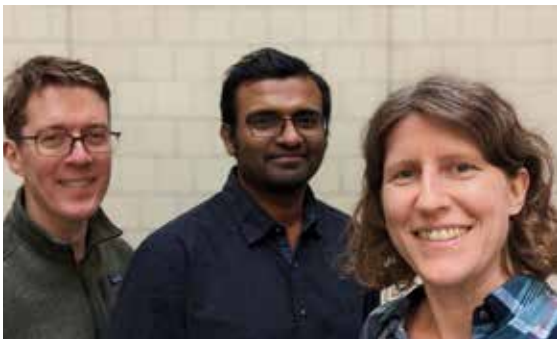
Founding year	**2020**
Focus	**Automation of workflows in the planning, construction, and operation of wind farms**
We offer	• **Wind lidar data monitoring** • **Cloud-based software** • **Centralised data storage and access management**
We are looking for	• **Early adopters for our lidar data monitoring app** • **Ideas for workflows that could be digitised** • **Investors**

We are an international, diverse team
Our team includes Dr Andrew Clifton, who is the managing director, Dr.-Ing. Ines Würth, who is the product owner and responsible for the app functions, and John Asher Rayan M.Sc., a software developer who translates our clients' needs into programme codes. Together, Andy and Ines have 25 years of experience in the wind energy sector and John worked for major software companies before becoming self-employed. Our current funding comes from the EXIST start-up grant, which is funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and EU funds.

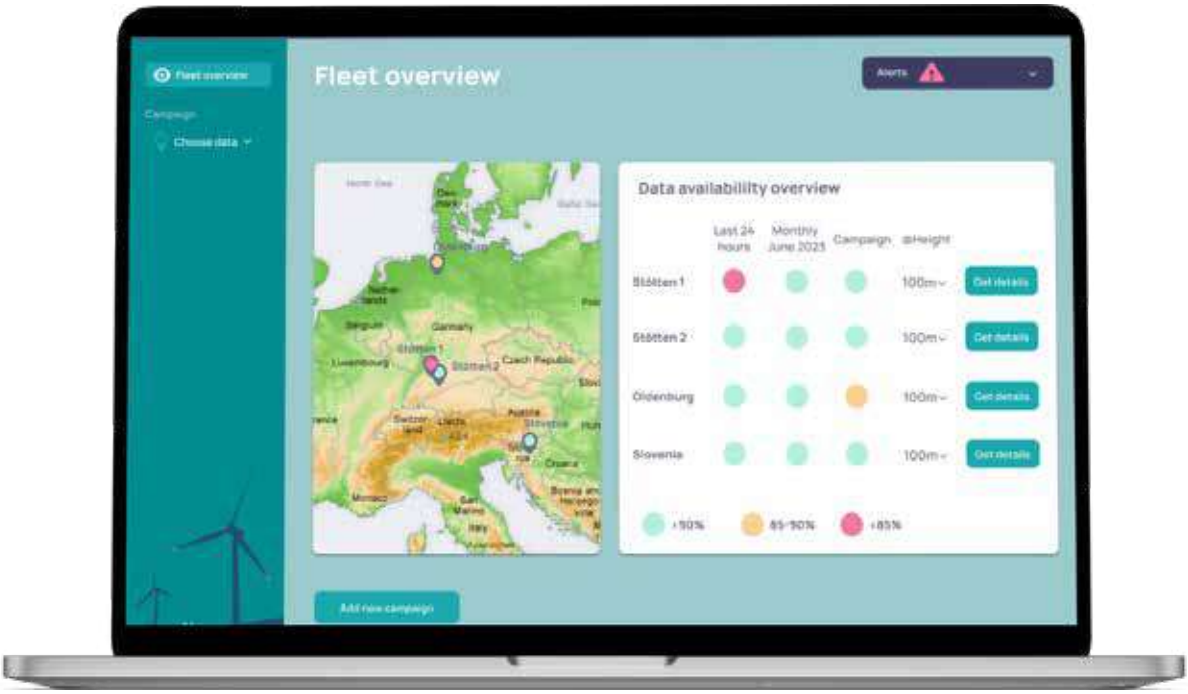
The next milestones
As a young start-up, we are only at the beginning. Our next goal is to launch our lidar monitoring app in early 2024 to which end we are looking for companies that would be willing to use our app in this early phase. We are offering a 90-day trial subscription as an incentive. The next step will be the development of the next app. We would welcome any suggestions for workflows that should be digitalised. We would love to discuss any relevant suggestions you may have.

Conclusion

It will be essential to digitalise work flows in the construction and operation of wind farms in order to expand wind energy production and increase the number of wind projects despite the shortage of skilled workers. This is precisely what enviConnect's innovative app platform does. Incoming data is processed automatically, which reduces the number of staff to be deployed and expedites decision making.



The team (from left to right): Dr sc. Andrew Clifton, John Asher Rayan M.Sc., Dr.-Ing. Ines Würth



The first app digitalises wind measurements with wind lidars.

IdentiFlight – Bird protection at wind turbines

IdentiFlight – currently the only offically recognized anti-collision system in Germany – enables the rapid and legally compliant expansion of wind energy on land by providing an effective and efficient solution to species protection conflicts.

IdentiFlight deployment above the forest canopy on a 40m steel tower.

Validated and recognised

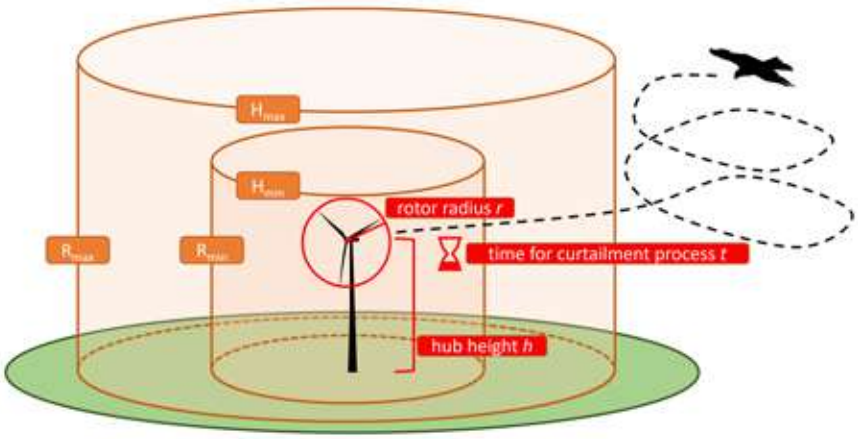
This system, which originated in the USA, has been refined and validated to meet the requirements of German species protection legislation. IdentiFlight's performance has been tested at various locations by independent assessors under the supervision of TÜV Nord. The validation process has already been completed for the red kite and the white-tailed eagle. In accordance with the Federal Nature Conservation Act (BNatSchG), IdentiFlight is currently undergoing further development to protect 11 of the 13 diurnal breeding bird species that are at risk of collision. On the basis of certified performance of IdentiFlight, the system was recognised as an effective mitigation measure through its inclusion in the BNatSchG, which makes IdentiFlight the only currently recognised bird detection system in Germany.

Efficient and operational

Considering the investment costs, which have to be assessed in accordance with the BNatSchG, the practical use of IdentiFlight is currently considered to be economical from 3 to 4 wind turbines. Provided that the operator voluntarily agrees, legally secure approval can also be obtained for projects comprising a lower number of wind turbines. Long-term tests at different locations with above-average flight activity resulted in average shutdowns of less than 1.5 % of the operation time per year. As such, the annual yield losses were significantly below the legally prescribed acceptability threshold of 3 %, as the shutdowns mainly took place during the low-wind summer months. According to the participating wind turbine manufacturers, the total number of shutdowns is within a range in which no negative effects on the service life of the wind turbine are to be expected.

On demand and effective

IdentiFlight's technology combines high performance optical systems with the latest in machine vision and AI software. It detects and analyses bird flights in the vicinity of a wind turbine in real time and, if necessary, sends a signal to the relevant wind turbine initiating turbine shutdown. The turbines are only curtailed in acute risk situations, i.e., when an individual of an affected bird species flies into a predefined area around the respective wind turbine. This effectively reduces the risk of collision for collision-prone birds and limits the yield loss resulting from the shutdowns to the absolute minimum.



Schematic overview of the outer and inner curtailment cylinder around the respective wind turbine monitored by IdentiFlight.

e3 IDF GmbH
Hugh-Greene-Weg 2, 22529 Hamburg
Phone: +49 (0)40 8222 610 0
info@e3-gmbh.de
www.e3-identiflight.de

Founding year	**2020**
Focus	**Automated bird detection system, on-demand shutdown, legally compliant approval, project support, service, and maintenance**
We offer	• **customer-oriented conceptual design** • **One-stop solution for targeted bird collision reduction** • **Available for the red kite and white-tailed eagle, and shortly for the lesser spotted eagle and other collision-prone species as specified in the Federal Nature Conservation Act (BNatSchG).**
We are looking for	• **Collaboration partners** • **Customers and projects interested in using IdentiFlight to address species protection issues on project level** • **Motivated staff**

Stand-alone installation of IdentiFlight.

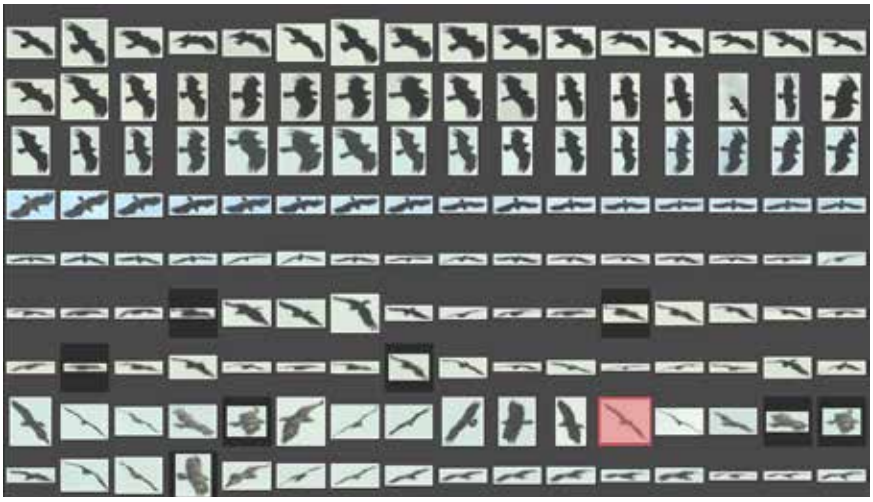
The IdentiFlight stereo camera system detects as well as identifies bird species. It allows for a targeted mitigation effort by curtailing the relevant wind turbine.

"It has been verified that IdentiFlight is able to reliably detect white-tailed eagles at a distance of about 1,200 m and kites at a distance of about 750 m, and to distinguish these collision-prone bird species from other birds. This makes it possible to initiate a timely shutdown of individual wind turbines, exclusively in times of risk and therefore reduce downtime to an absolute minimum."

Maria Rohde, Head of Department, e3 IDF GmbH

Innovative and flexible

e3 IDF GmbH offers bespoke solutions for a wide range of projects and applications. Our interdisciplinary team can provide consultation and site analyses during the project development phase as well as the permitting process. We offer reliable maintenance and service solutions to operators with short response times and ensure ongoing system performance verification, both remotely and through on-site checks, which reduces downtime to 5 % or less. Access to live data as well as the regular provision of automatically generated reports create full transparency.



A high resolution image of a lesser spotted eagle detected and identified by IdentiFlight.

Conclusion

IdentiFlight, Germany's first and currently only officially recognised bird detection system, facilitates the rapid and environmentally compatible expansion of onshore wind energy production. By selectively protecting specific collision-prone bird species and reducing annual yield loss to the absolute minimum, IdentiFlight provides a suitable and proportionate solution to species efficient conflicts.

Learn more about Identiflight in this video (in German)

Light:Guard – Aircraft Detection Lighting System (ADLS)

All wind turbines must be equipped with ADLS technology by the end of this year. The light:guard system is a proven, safe, and high-quality solution, benefitting wind farm operators and dark skies.

Wind turbines flash from dusk to dawn, regardless of whether there is a flying object nearby or not. This constant flashing has proven to be an annoyance for local residents, creating an obstacle to the acceptance of wind energy.

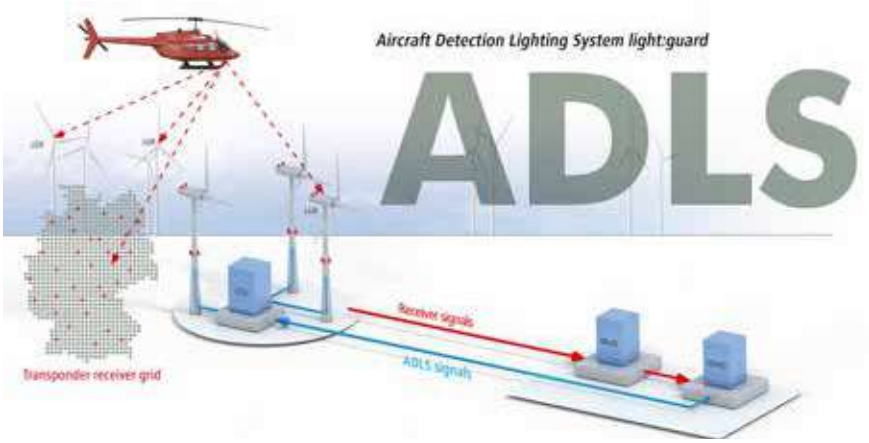
Aircraft Detection Lighting System (ADLS) technology makes it possible to minimise night-time flashing by monitoring the airspace around a wind farm and only activating the lights when an aircraft is in the vicinity.

As of 1 January 2024, the use of ADLS will be mandatory (for turbines over 100m in height that were commissioned as of 2005), and wind farm operators will face a penalty for non-compliance.
As an operator, you will be able to equip your facilities with our system in compliance with the law, and together we will restore darkness to the night.

The light:guard system
One of the leading ADLS systems is the light:guard system, which is a **transponder-based** technology that achieves particularly accurate results thanks to a method known as **multilateration,** which results in a better signal quality and increased blackout periods for each wind turbine, especially in areas with high air traffic or large wind farms.

Transponders: All aircraft are legally obliged to transmit transponder signals in order to be identifiable and these are received by the light:guard receivers.

Multilateration: Our system continuously picks up data from all receivers simultaneously, which enables it to achieve a higher network coverage than, for example, a single receiver in the wind farm.



Functionality of the light:guard system for demand-controlled night identification

Light:Guard GmbH
Krendelstr. 32, 30916 Isernhagen
Phone: +49 (0)511 474 048-30
info@light-guard.com
www.light-guard.com
LinkedIn: www.linkedin.com/company/light-guard-gmbh

Founding year	**2019**
Focus	**Demand-controlled night marking for wind turbines**
We offer	• **Provision of ADLS signals** • **Operational system maintenance** • **Approval application support**
We are looking for	**Pilot projects & partnerships abroad (France, Italy, Austria), service providers**

About Light:Guard

Founded in 2019 as a sister company of Quantec Sensors, Light:Guard develops, produces, and operates our proprietary light:guard system for demand-controlled night identification. We have around 50 employees at our locations in Hanover, Hamburg, and Dresden.

Having experience in the field of ADLS since 2008, we have been working with renowned wind turbine manufacturers such as GE, Nordex, and Vestas.

Currently we have over 3000 systems under contract and more than 300 installed receivers.

Current milestones

- ADLS infrastructure preparation on **existing Nordex turbines** completed.
- The light:guard system is now available for **new Vestas turbines** and can be procured directly from Vestas.
- We are introducing ADLS in the **Netherlands:** our experienced local partner Topwind BV is distributing the light:guard system in our neighbouring country.

“We work onshore and offshore. Like our system.”

Conclusion

We’ll turn the lights off at your wind farm in complete compliance with the law and will also get you the necessary permits. Together we can make the night sky dark again in line with the natural order of things and to increase the acceptance of wind power.

MOWEA – Modular Wind Energy Systems

MOWEA is the first company to combine micro wind turbines to create a flexible modular wind system that can be adapted to the energy needs and available space for industrial applications and can be integrated into existing infrastructures.

MOWEA wind turbines on the Europa bridge

Close-up view of wind turbines on the construction crane of SÜBA AG in Stockerau

MOWEA combines standardised micro wind turbines to create a single wind energy system. As is the case with photovoltaics, the modular principle enables a flexible adaptation to specific energy needs and local conditions.

Benefits of the modular concept:

- No additional mast and surface sealing necessary
- Increased availability: each wind turbine operates autonomously and uses its own control algorithm
- Intelligent control of the wind turbines (IoT, remote control, connectivity)
- Flexible application options
- Lower costs through standardised component scaling
- Simple logistics and transport

MOWEA's modular wind turbines can be configured to meet the client's specific energy requirements. MOWEA's technology can be integrated into existing infrastructures such as radio towers, bridges, or construction cranes.

References and pilot projects:

Telecommunications:

Vantage Towers AG, a wholly owned subsidiary of the Vodafone Group and one of Europe's leading radio mast operators, will be installing a total of 752 micro wind turbines initially on 52 radio masts in Germany.

Tower

MOWEA GmbH
Storkower Strasse 115A, 10407 Berlin
kontakt@mowea.world
www.mowea.world
LinkedIn: www.linkedin.com/company/mowea-gmbh

Founding year	**2016**
Employees	**19**
Focus	**Modular wind turbines for industrial infrastructures**
We offer	**scalable modular wind energy systems for industrial applications**
We are looking for	**(pilot) customers, investors**

View of the Europa bridge with installed MOWEA turbines

Bridges:
Both ASFINAG and MOWEA are harvesting wind power directly at the Europa Bridge, which is 140 metres high. MOWEA's micro wind turbines power the Patsch toll station on Austria's highest bridge and mark the first commercial wind power project in Tyrol, which is actually a pilot project aimed at assessing the feasibility of bridge mounted wind turbines. ASFiNAG operates more than 5,500 bridges in Austria.

Construction cranes:
SÜBA AG is Europe's first property developer to use MOWEA's modular wind power to provide its construction sites with an autonomous supply of green electricity. The company is currently evaluating whether MOWEA wind turbines could also be used on a wide scale at other SÜBA construction sites in Austria and Germany.

Wind turbines on the construction crane of SÜBA AG in Stockerau

"By seamlessly integrating our turbines into existing structures and energy management systems, we are enabling various industries to harvest wind energy directly from their existing infrastructures. Our objective is to tap into as yet unexploited potential and help companies to reduce their energy costs and CO_2 emissions."

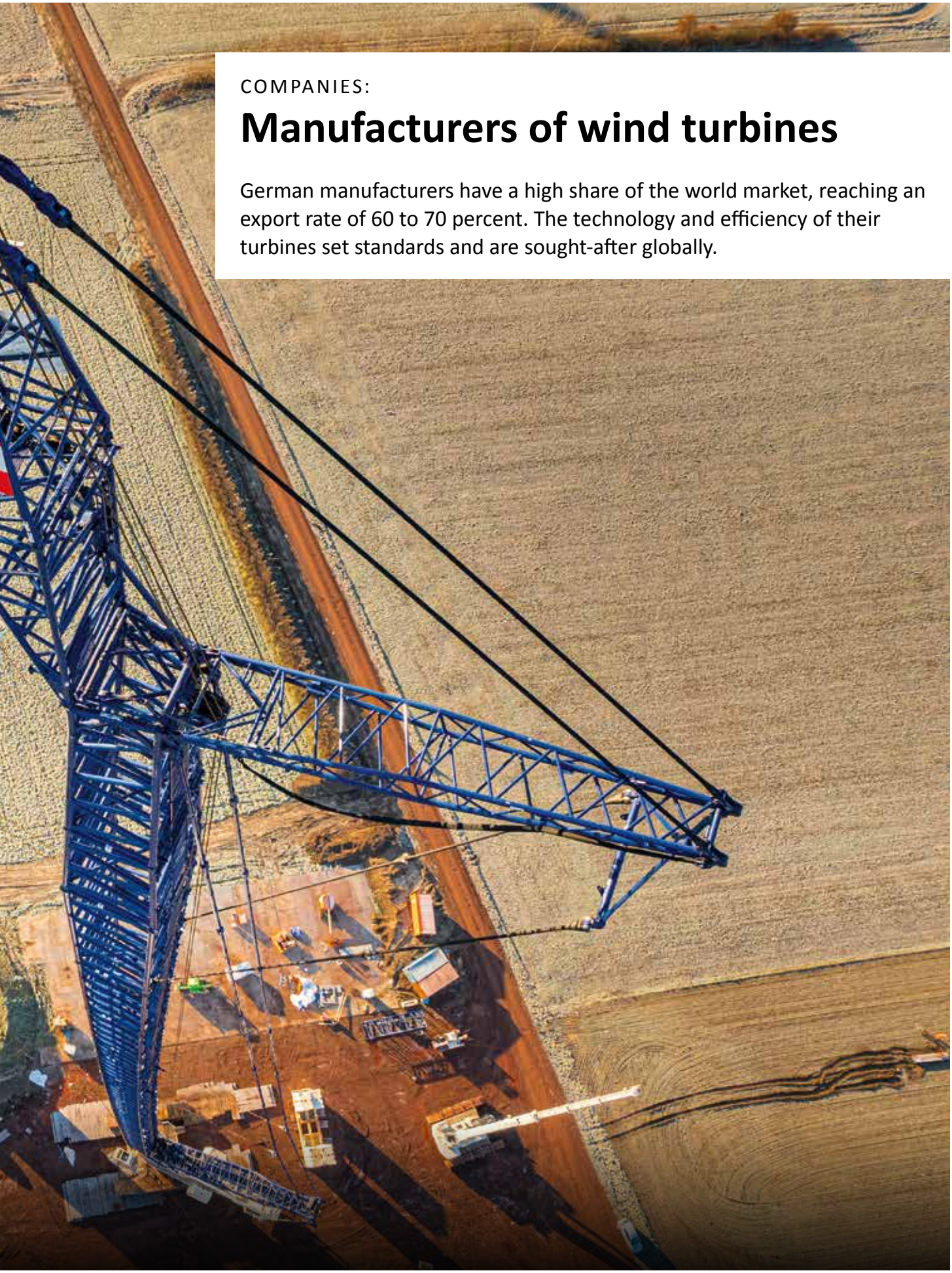
Dr. Till Naumann, MOWEA CEO

Wind turbine specifications

Conclusion

By taking this innovative approach, MOWEA is unlocking the potential to integrate wind energy into previously inaccessible applications whilst saving space. The MOWEA Cloud enables remote control, operational monitoring, and predictive maintenance.

In the E-nacelle, the electrical technology is fully integrated into the machine house. This results in cost and time advantages in production, during transport, construction, and commissioning. The construction, cabling, and commissioning of the new E-nacelle can be accelerated, among other things, due to the flatter design. Photo by Enercon.



COMPANIES:

Manufacturers of wind turbines

German manufacturers have a high share of the world market, reaching an export rate of 60 to 70 percent. The technology and efficiency of their turbines set standards and are sought-after globally.

ENERCON

ENERCON's product portfolio includes wind energy converters with nominal power outputs ranging from 2,000 to 6,000 kilowatts and readily provide models for a wide variety of wind sites. The newest ENERCON wind energy converter model is the E-175 EP5 with 6.X MW.

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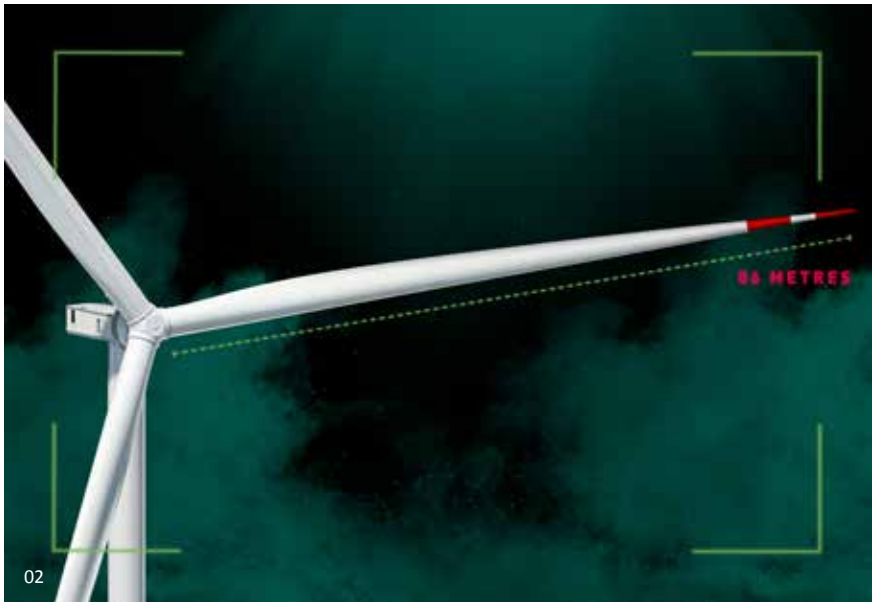
As a pioneer of wind energy technology and a partner of the energy transition, ENERCON specialises in the turbine and technology development, production, sales and servicing of onshore wind energy converters. Pursuing its mission of 'Energy for the world', ENERCON has driven sustainable energy generation from onshore wind since 1984. Thanks to its innovative wind energy converter technology, high quality standards and a total installed power of more than 59 GW, it is one of the world's leading manufacturers.

Products and services
ENERCON's product portfolio includes wind energy converters with nominal power outputs ranging from 2,000 to 6,000 kilowatts. This allows ENERCON to readily provide models for a wide variety of wind sites. For 2024, ENERCON has announced its latest wind turbine model: The E-175 EP5 turbine has a nominal power of more than 6 MW and 175 metres of rotor diameters. The e-nacelle is also used for this type of turbine with electrical systems built into the machine house.

In addition, project planners and operators can draw on a wealth of consultation and planning knowledge at ENERCON. From wind energy converter selection, site layout and approval to project financing and energy marketing, the company works together with external partners to support its customers at all steps on their path to more renewable energy. ENERCON also implements turnkey projects at the customer's request. The company also offers tailor-made solutions for the maintenance and repair of wind energy converters during ongoing operation, as well as innovative repowering and end-of-life concepts. More than 350 Service stations worldwide ensure quick and trouble-free technical support of ENERCON wind energy converters.

Research, development and production
Characterised by the inventive talent of founder Dr Aloys Wobben, ENERCON is still setting new standards in technology, quality and cost-efficiency of wind energy converters today. ENERCON was one of the first of all the manufacturers to make use of a gearless drive concept, and with its effectivity and compact design this is still a distinguishing feature of ENERCON wind energy converters all these years later. Due to a grid feed system certified in accordance with the latest grid codes, ENERCON wind energy converters can be integrated into all supply and distribution network structures without any issues. Intelligent control means they make a significant contribution to maintaining and improving grid stability. With its own research and development unit, ENERCON guarantees the high demands made by its stakeholders are included in new, ever more powerful and efficient wind energy converter models.

By having its own production network, wind energy technology trailblazer ENERCON is in possession of sound knowledge along the entire value creation chain. Today, ENERCON also brings this valuable production knowledge to its suppliers and partners the whole world



02


04

03


05

01 | E-138 EP3
02 | E-175 EP5
03 | E-175 EP5
04 | E-160 EP5
05 | E-160 EP5

over. This helps to ensure that all components meet the strict ENERCON quality standards and are optimally adapted to the end product. As a result, ENERCON wind energy converters are particularly reliable, low-maintenance, long-lasting and cost-effective. In conjunction with the ENERCON maintenance service, the company guarantees operators and owners a technical availability of 97 per cent.

Mission / Vision

The concept of sustainability is deeply rooted in ENERCON's corporate identity. All of ENERCON's economic activity and its ambitions are aimed at helping to preserve the planet in line with the wishes of company founder Dr Aloys Wobben. ENERCON therefore considers itself to be a partner of the wind energy and offers solutions for sustainable generation of energy from onshore wind.

ENERCON
ENERGY FOR THE WORLD

ENERCON GmbH

Address	Dreekamp 5 26605 Aurich
Phone	+49 (0)4941 927 102
Fax	+49 (0)4941 927 119
E-Mail	info@enercon.de
Web	www.enercon.de
Category	Manufacturers
Profile	Wind turbines (> 100 kW)
Employees	13,500
Founding year	1984

eno energy GmbH

Eno energy – Success with wind
Since 1999, the name eno energy is known for premium quality and innovative plant technology in international wind farm projects.

As an established specialist for individual energy solutions, eno energy provides independent and quality-conscious engineering services for every technical challenge and offers their customers holistic solutions. At six locations in Germany, nearly 300 dedicated employees work on the most efficient customer solutions and produce regional, durable and powerful onshore wind turbines (WTGs) in the 2.2 to 7.0 MW range, thus making a significant contribution to designing the future of sustainable energy production.

The new eno175 represents the top class of 7 MW plants and guarantees highest efficiency and power yield. With this 7 MW variant, based on the proven ENO VENTUM platform, eno energy is expanding its broad machine portfolio and thus rounding off its comprehensive product range, also for locations with weak as well as medium-strong wind conditions.

With more than 20 years of expertise in the wind energy segment, the eno energy group offers its customers, in addition to always competitive and durable WTGs, guaranteed by a permanent ongoing development of its own machine range, an incomparable service around the topic of wind energy.

01

No other European manufacturer of wind turbines is able to offer, in addition to the supply of customized optimized wind turbines, the planning of turnkey wind farms, planning and approval services, as well as the complete handling of customer-specific projects in house and from one source. In addition to the full service for WTGs by eno energy, the eno energy Group also offers a multi-brand service for third-party WTGs. The eno energy Group's range of services is complemented by a wide range of development services in the field of component and assembly development. Furthermore, our specialties include the development and marketing of our own inverters, the offer of intelligent energy storage solutions for the optimization of existing or newly planned wind farms and the innovative licensing concepts, which enable a global production of wind turbines by eno energy.

The eno energy Group will continue to evolve as a technology company in the wind energy sector and strengthen its activities in the areas of R&D, sales, and service portfolio.

01 | maintenance eno turbine
02 | eno turbine
03 | production in Rostock
04 | eno energy turbine
05 | eno energy turbine

ENO ENERGY
Success with wind.

eno energy GmbH

Address	Strasse am Zeltplatz 7 18230 Ostseebad Rerik
Phone	+49 (0)381 203 792 10-0
Fax	+49 (0)381 203 792 10-1
E-Mail	info@eno-energy.com
Web	www.eno-energy.com
Category	Manufacturers
Profile	Wind turbines (> 100 kW)
Turnover	approx. € 46 million
Employees	nearly 300
Founding year	1999

Nordex Group

The Nordex Group offers powerful wind turbines for nearly all geographical regions across the globe.

The development, manufacture, project management and servicing of wind turbines in the onshore segment has been the core competence of the Nordex Group and its around 9,000 employees worldwide for more than 35 years.

As one of the world's largest wind turbine manufacturers, the Nordex Group offers high-yield, cost-efficient wind turbines that enable long-term and economical power generation from wind energy in all geographical and climatic conditions.

The focus is on turbines in the 4 to 6MW+ class, and the Group's comprehensive product portfolio offers individual solutions both for markets with limited space and for regions with limited grid capacities.

In September 2017, the Nordex Group launched the N149/4.0-4.5, the first product in the new Delta4000 product series. This was based on the proven technology of the Delta generation turbines successfully installed since 2013 for locations with strong, medium and light wind speeds.

The N149/4.0-4.5 has a variable output of 4.0 to 4.8 MW and can be optimally adapted to the individual specifications of the grid operator, local wind conditions, and sound requirements. This worldwide first installed +4MW turbine was awarded the title of "Turbine of the Year 2018" by the trade magazine "Windpower Monthly". In April 2018, the N133/4.8, a variant of this turbine type specialized in strong wind regions, was also launched on the market.

Based on the experience gained with the N149/4.0-4.5 presented two years ago, and which has already been installed and in series production since March 2019, the Nordex Group then entered the 5MW class with its N149/5.X and the N163/5.X. The step into the 6MW class took place in 2021 with the N163/6.X, followed by the N175/6.X, which specializes in light wind speeds, in 2022.

As with the N149/4.0-4.5, flexibility is a key factor in the design philosophy and operating strategy of the new turbines. The turbines cover a wide range of power modes and suitably optimized for low and medium-wind regions. Depending on the investment criteria of the respective projects, the turbines can be operated flexibly in terms of capacity factor, rating, service life and noise requirements, and thus can also be optimized for the respective business model of the customer.

The Nordex Group can also implement wind farms as part of different project types: from simply selling the equipment to turnkey projects. A global service network, with some 280 service points throughout 30 countries, delivers service quickly to keep our systems running smoothly.

The Group covers the needs of all customer segments within the global wind market, from large energy suppliers, to SMEs operating power plants. Nordex Group systems currently deliver more than 43 GW of sustainable energy each year and can be found in more than 80% of the world's energy market (excluding China).

The management holding company is headquartered in Rostock, while the executive board and administrative offices are based in Hamburg, both Germany. At production facilities in Germany, Spain, Brazil, the US, Mexico and India, the Nordex Group produces its own nacelles, rotor blades, and concrete towers. The Nordex Group maintains offices and branches in more than 40 countries.

NORDEX acciona Windpower

Nordex Group

Address	Langenhorner Chausee 600 22419 Hamburg
Phone	+49 (0)40 30030-1000
Web	www.nordex-online.com
Category	Manufacturers
Profile	Wind turbines (> 100 kW)
Turnover	> € 5.7 billion (2022) (Wind energy: 100%)
Employees	> 9.000 (Wind energy: 100%)
Founding year	1985

Siemens Gamesa Renewable Energy GmbH & Co. KG

A market leader in renewable energy
Siemens Gamesa Renewable Energy is a global leader in the wind energy industry. With an installed capacity of more than 130 GW worldwide, we produce and install onshore and offshore wind turbines. We also offer a wide range of services.

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Siemens Gamesa unlocks the power of wind. For more than 40 years, our team of more than 28,000 colleagues has been working at the center of the global energy revolution to tackle the most significant challenge of our generation – the climate crisis.

Onshore: Innovations for optimum yield and sustainability
With the Siemens Gamesa 5.X we increase your annual energy production. The SG 6.6-155, SG 6.6-170 and SG 7.0-170 turbine models, which have a flexible output of between 5.6 MW and 7.0 MW and low electricity generation costs set new standards.

Together we can master any challenge and find individual solutions for all wind classes and site conditions.

The flexible design enables customized solutions and makes the platform, for which 35 year full service contracts are available, extremely successful with an order volume of more than 5,000 MW worldwide of which roughly 500 MW are in Germany.

In VSB Neue Energien Deutschland GmbH's Elster project, the Siemens Gamesa 5.X platform impressively demonstrates the contribution made by the latest generation turbines in repowering. In Saxony-Anhalt, 50 old turbines are being replaced by 16 SG 6.6-155. The annual energy production increases by a factor of six, while the land area required is reduced by 30 percent and the distance to the next settlement increases from 600 m to 1,000 m.

With our 185m hybrid tower for the SG 6.6-170 and the SG 7.0-170, projects can benefit from the high wind speeds at many locations at this height. Thanks to the design of our turbines and towers, the stability of our turbines is ensured even with very high hub heights.

In addition to the RecyclableBlade, the GreenerTower is now also available as an environmentally friendly option. With the same product quality, the new towers achieve a CO_2 footprint reduction of at least 63 percent.

01 | The first Siemens Gamesa 5.X turbines in Germany turn their rotor blades in the Elbmarsch region of Schleswig-Holstein. ©Siemens Gamesa

02 | Sandra Svan Them, as the responsible Technical Product Manager, is pleased with the successful installation of the SG 14-236 DD prototype in Østerild, Denmark. ©Siemens Gamesa

03 | Groundbreaking ceremony for one of Europe's largest repowering projects in Saxony-Anhalt. ©gierig media / Ben Gierig/VSB Neue Energien Deutschland GmbH

04 | The dialog between politicians and industry on what it will take to achieve the 2030 targets is intense. Here, Germany's Economics Minister Robert Habeck meets Siemens Gamesa CEO Jochen Eickholt in Cuxhaven. ©Siemens Gamesa

The energy transition as a team effort
Successfully shaping the energy transition depends on motivated and qualified employees. We welcomed almost 200 new employees to the Cuxhaven plant in 2023 and are pleased to celebrate with them the 1,000th offshore turbine that will leave the production line in late summer. In view of the rapid expansion targets in Germany, Siemens Gamesa is also focusing in particular on young talent and is intensifying its training efforts, especially in the areas of onshore and offshore service and installation.

Always on site: our Service for every wind park
Our service teams are on standby at 20 locations across Germany wherever the wind blows, servicing a fleet of around 1,500 onshore wind turbines.

To reduce downtime due to maintenance calls, we rely on digital solutions: Thanks to remote diagnostics and algorithm-based operational optimization, our services offer you the decisive advantage in profitability.

With the EnergyUp™ series, Siemens Gamesa offers a range of innovative upgrades that improve annual energy production and can be flexibly adapted to site conditions. The products are available individually or bundled, for Siemens, Gamesa, Siemens Gamesa and Senvion technologies.

We are continuously working to improve our service offering. In doing so, we benefit from our many years of experience in servicing Bonus, Siemens Wind Power, Adwen, Gamesa and Senvion turbines. In the growth market of Multibrand, we are building on this heritage to constantly expand our services to competently and reliably serve every service request, regardless of the turbine manufacturer. Your satisfaction and the availability of your wind farms are our daily motivation.

SIEMENS Gamesa
RENEWABLE ENERGY

Siemens Gamesa Renewable Energy GmbH & Co. KG

Address	Beim Strohhause 17–31 20099 Hamburg
Phone	+49 (0)40 8221 18 000
E-Mail	deutschland@siemensgamesa.com
Web	www.siemensgamesa.com
Category	Manufacturers
Profile	Wind turbines (> 100 kW)
Turnover	€ 9.8 billion (End of fiscal year 2022)
Employees	28,450
Founding year	1976

VENSYS Energy AG

More energy for our future
Globally, some 33,682 wind turbines with a combined output of ~68 GW are currently using VENSYS technology.
- Three platforms with various rotor and tower variants
- Bespoke project development and yield-optimised site adaptation
- Manufacturing and logistics capacities for projects around the world

VENSYS ENERGY develops and manufactures highly efficient gearless wind turbines for maximum yield, whose characteristic features include permanent magnet excited multi-pole generators, maintenance-free rotor blade adjustment toothed belt drives, a simple generator cooling system, and a full power converter system with power plant properties.

Our 1.5 to 6.2 MW platforms are made of just a few high-quality and durable components. Just by themselves, the simple, compact design, low maintenance requirements, and benefits of wear-free system components ensure increased output yields, but we also use our bespoke project development process to create optimised customer-specific wind turbines even for small wind farms whereby we are careful to integrate local interests and can also provide customised corporate power supply solutions. VENSYS provides municipalities and investors with low-maintenance solutions starting from the bespoke case-oriented planning process to installation and grid connection up to and including an attractive service package with guaranteed availability over the entire contract period.

Our small-scale manufacturing operation also gives us the flexibility to provide bespoke features. The ongoing transfer of new developments into VENSYS products is based on our own production operations at our central plant in Germany, so technological innovations go hand in hand with solid workmanship, a complex quality management system, and short just-in-time lead times. We and our subsidiaries offer a comprehensive range of services that can be scaled to meet specific requirements. Our ongoing and coordinated development of central plant components guarantees seamless functionality and more added value throughout the entire supply chain and wind turbine life cycle.


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The VENSYS Group's product and service offering includes full inverter and pitch systems, electronic components, grid connection, grid planning and integration, system certification, and in-house production as well as rotor blade development.

Operationally reliable and high yield regardless of the location. Proven in durability tests in four continents.

Our wind turbines, which are made in Germany are currently connected to power grids in Germany, Poland, France, Great Britain, Spain, Cyprus, the USA, and Canada. Our subsidiary in Poland and VENSYS Inc. in the USA are currently helping us to develop additional markets.

VENSYS is exporting its proprietary products around the world and driving the development of advanced wind power generation technology. Our successful licensing model combines innovative German technology and expertise with serial production, market development, and logistics operations in an international corporate network, which enables us to implement our own large-scale projects anywhere in the world.

01 | The VENSYS manufacturing hall in Neunkirchen, Germany
02 | The VENSYS training centre in Neunkirchen, Germany
03 | VENSYS' headquarters in Neunkirchen, Germany
04 | The VENSYS manufacturing hall in Neunkirchen, Germany
05 | Brake: ten VENSYS units being shipped to the USA

As rapidly growing multipliers, our most important licensees – Goldwind and ReGen Powertech – manufacture VENSYS systems for India, China, Asia, the USA, South America, Australia, and Africa. VENSYS wind energy technology has been proven on four continents under a huge diversity of climatic conditions, all imaginable power grid conditions, and even in regions with underdeveloped infrastructures. Some 33,600 VENSYS wind turbine systems have been installed around the world with an approximate combined output of 68 GW and are being supported by regionally adapted and customer-oriented service packages.

Our new 175 platform, which builds upon the expertise gained over three decades of innovative engineering and has a capacity of 6.1 MW, will be on sale as of 2023.

VENSYS

VENSYS Energy AG

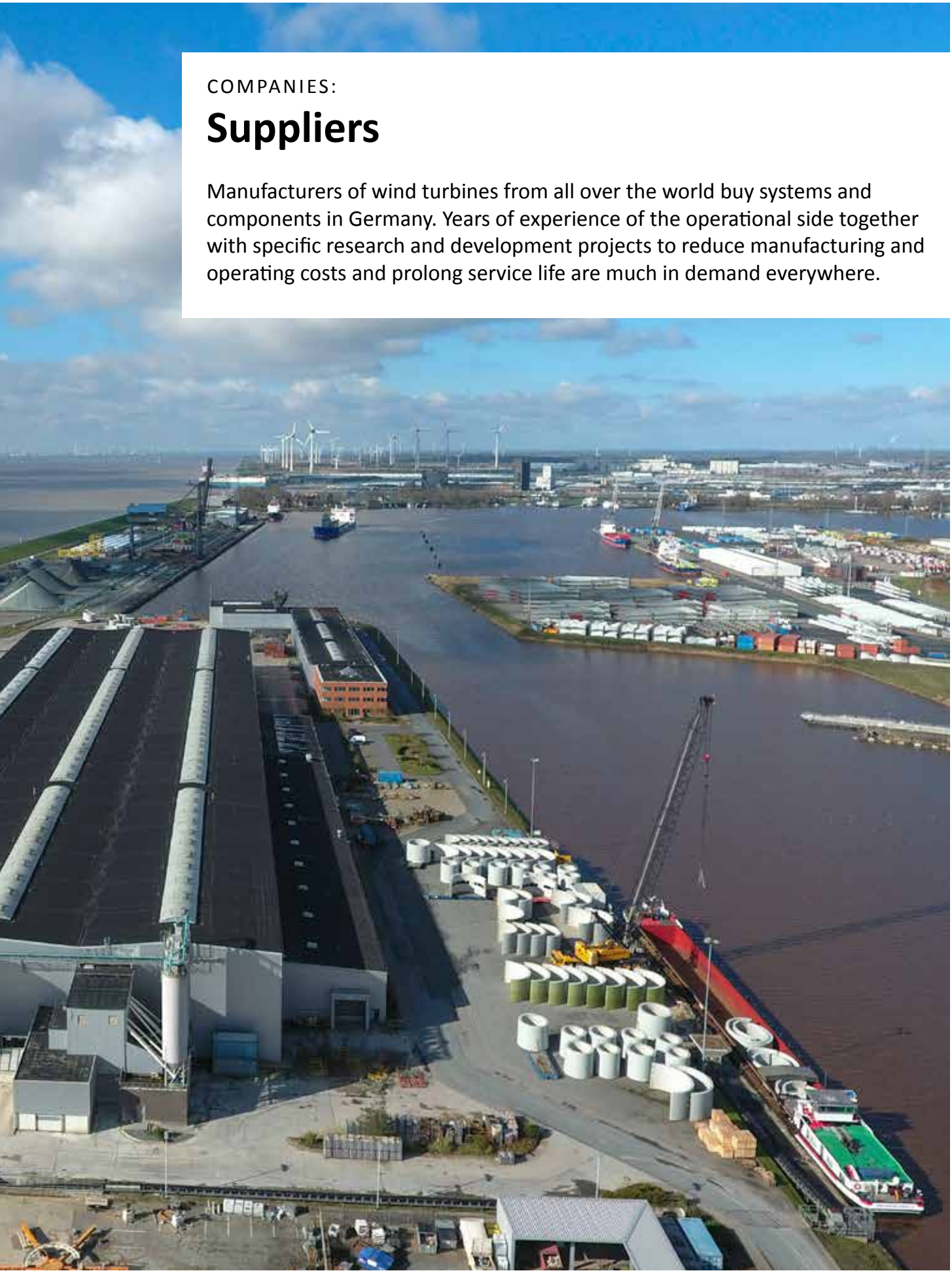
Address	Im Langental 6 66539 Neunkirchen
Phone	+49 (0)4941 927-102
Fax	+49 (0)4941 927-119
E-Mail	vertrieb@vensys.de
Web	www.vensys.de
Category	Manufacturers
Profile	Wind turbines (> 100 kW)
Turnover	€ 100 million
Employees	139 in Neunkirchen, 89 in Diepholz, in Spain, Poland and USA approx. 40
Founding year	2000

Bettels pre-cast concrete in Emden.
Photo: Bettels Betonfertigteile

COMPANIES:

Suppliers

Manufacturers of wind turbines from all over the world buy systems and components in Germany. Years of experience of the operational side together with specific research and development projects to reduce manufacturing and operating costs and prolong service life are much in demand everywhere.



August Friedberg GmbH

Focus on Stability

It is because of our technically well-engineered and high-quality fastening technology that the wind turbines are able to withstand even the most extreme conditions and the enormous forces of wind and weather. Major wind OEMs rely on products from FRIEDBERG – the global player for wind fasteners.

01 | HV-Assemblies
03 | Stud with flange nut

For more than 140 years, many companies have relied on **products from Friedberg.** Our past is not simply tradition, but grown and bundled expertise in a technology that is used today worldwide and in many areas. Friedberg connections can be found in steel and building construction, in the entire automotive industry, in machine and industrial engineering.

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Today, Friedberg is one of the leading companies in fastening technology for wind energy. Here in particular, the company's lead becomes clear: **extreme resilience, lasting stability** that has to withstand wind and weather and enormous forces. It is a tradition of trust that sustains us. It is people in companies who translate this trust into dynamic performance and enthusiastically develop intelligent products and systems that are manufactured using state-of-the-art technology.

We don't just produce fasteners and bolts, we produce stability, safety, quality and trust! These are our strengths.

Our know-how in this is certified, documented and comprehensively quality assured. We are very proud to be one of the leading producers of **safety and fastening elements,** especially in the wind industry, in addition to a comprehensive production program for many industrial sectors.

- Fasteners for wind turbines (onshore and offshore)
- HV-towerbolt sets up to M80
- double ends
- Rotor blade fastening systems
- Drawing parts
- Technical application consulting and development partner

FRIEDBERG
FOCUS ON STABILITY

August Friedberg GmbH

Address	Achternbergstr. 38a 45884 Gelsenkirchen
Phone	+49 (0)209 9132 0
Fax	+49 (0)209 9132 178
E-Mail	windkraft@august-friedberg.de
Web	www.august-friedberg.com
Category	Suppliers of mechanical components
Profile	Bolts & fasteners
Turnover	€ 135 million
Founding year	1884

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German Wind Power

The magazine about innovative technologies and services of the German wind industry

- Get to know best practice solutions from the land of wind energy pioneers
- Get in contact with German companies from various sectors
- Take a look at the latest technologies and services from the German industry
- Enjoy a modern and interactive magazine with animations and videos

www.windindustry-in-germany.com/german-wind-power-magazine

Bachmann electronic GmbH

Secure the future of your wind farm
Bachmann electronic offers automation solutions for the most demanding onshore and offshore applications. The Austrian manufacturer has equipped more than 140,000 wind turbines, making Bachmann the global number one in wind automation.

Bachmann delivers future-proof technologies, maximum availability, and the highest quality from a single source. Above all, Bachmann's customers benefit from 50 years of experience; Bachmann develops tailor-made solutions to solve the most demanding challenges in automation.

Automation solutions in every area of wind power
From controller systems and condition monitoring to Wind Power SCADA and grid connection technology; Bachmann offers complete solutions for the wind industry. The systems stand for extraordinary robustness, high performance, and open, standardized interfaces. With intelligent sensors and power management algorithms, wind farms are open, flexible, and future-proof – even under the most extreme conditions.

Innovative, comprehensive system solutions allow for the efficient development of wind turbines and integrated predictive maintenance, increasing the overall productivity of wind parks. For retrofit solutions, Bachmann offers state-of-the-art technologies and competent implementation, thereby extending the life cycle of the equipment.

01 | Smart Turbine Automation: To be future-proof, wind turbines must do their part to provide complex data. Bachmann creates an alliance of control, SCADA, park control, condition monitoring and data.

Smart turbine automation / operations management

- Modular hardware / software architecture
- Model-based engineering in PLC, C/C ++, Matlab / Simulink®
- Integrated safety technology
- Configurable access protection and logging
- Configurable, scalable turbine software templates according to the IEC standard
- Grid measurement / monitoring and grid protection
- Certified, integrated condition monitoring system

Smart grid / park controller

- Smart Power Plant Controller (SPPC) certified according to the new VDE-AR-N-4110/4120
- Scalable, configurable hardware / software
- Energy / telecontrol protocols IEC60870, IEC61850, IEC61400-25, Modbus, etc.
- Web-based user / diagnostic interface

SCADA / visualization

- Modular, flexible, web-based SCADA system (atvise®)
- "Ready-to-use": wind-specific, configurable widgets, dashboards, and reports
- OPC UA interface and IEC61400-25 based data structures
- Integrated, configurable access management
- Cascadable server structure

Lifetime Extension (LTE)

- Remote monitoring software and service
- Turbines: Tower vibration / structure monitoring
- Rotor blade monitoring (load, structure)
- Retrofit solutions for turbine control, CMS, SCADA and park controllers

Maintenance / service / diagnosis

- Comprehensive service and diagnostic tools
- "ServiceCenter" for convenient, efficient software updates
- Data recorder for network monitoring and analysis
- Comprehensive support and training program

bachmann.

Bachmann electronic GmbH

Address	Kreuzäckerweg 33 A-6800 Feldkirch
Phone	+43 (0)5522 3497-0
Fax	+43 (0)5522 3497-1102
E-Mail	info@bachmann.info
Web	www.bachmann.info
Category	Suppliers of electrical and electronic components
Profile	Controls, cables & switchgear cabinets
Turnover	105 million
Employees	> 500
Founding year	1970

Bachmann Monitoring GmbH

Condition Monitoring Systems for the Wind Industry
From hardware to software, analysis to consulting – every Bachmann Condition Monitoring System (CMS) solution is based on over 50 years of experience in automation. Thousands of installations from a wide range of manufacturers are monitored globally using the DNV-certified systems and services.


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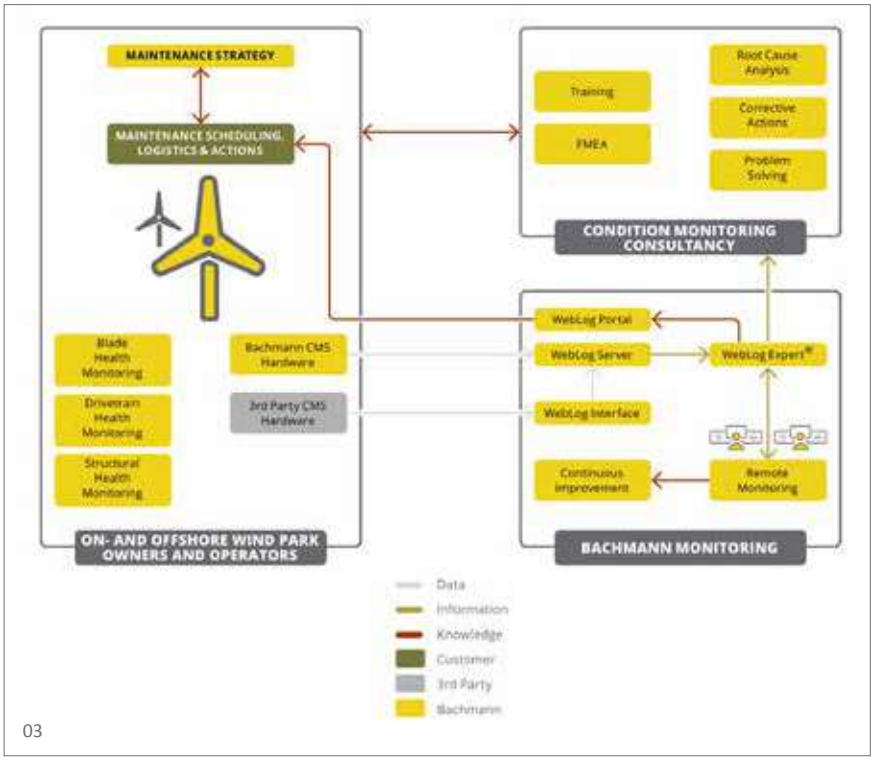
The measurement and analysis of vibrations – the core competencies of Bachmann Monitoring – enables a detailed monitoring approach for both onshore and offshore wind turbines.

Focus on the customer
Blade Health Monitoring, Drivetrain Health Monitoring and Structural Health Monitoring; Bachmann delivers specific monitoring solutions based on holistic knowledge and extensive experience that the customers actually need.

One for all
The individual CMS services can also be combined into a customized monitoring solution. Bachmann calls it HUMS. The Health & Usage Monitoring System is a combination of Bachmanns condition monitoring and structural health monitoring expertise, delivering a holistic monitoring approach for the wind turbine and entire park.

Remote monitoring: close-up and uncomplicated
The ISOCAT II and III certified remote monitoring team consists of more than 20 dedicated analysts who ensure that all diagnostic data is clearly communicated to the customer's team. The early detection and localization of any potential weaknesses make operations more secure and sustainably increase revenues. The customer chooses the best service level for its installation: full service, data pre-screening, data hosting from Bachmann, or the customer hosts the data, and Bachmann is available to support.



03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From A to Z – the CMS process safely in hand

Condition monitoring with Bachmann is more than just vibration measurement.

Bachmann offers:

- Modern hardware solutions
- Innovative, web-based analysis software
- On-site installation, commissioning and support with project management
- Certified, flexible remote monitoring services, even for diverse fleets
- Advanced training and education for independent monitoring
- BINDT-accredited training center for vibration analysis qualification CAT I-III

The modular approach allows the customer to select the appropriate measurement technologies for its business and combine them with the right software solutions and plug-ins to monitor the specific characteristics of its machines.

In good hands – Condition Monitoring Consultancy

A strategic approach to condition monitoring identifies potential cost savings and helps to avoid unforeseen operational downtime. The Bachmann CM consultants transform predictive maintenance, lifetime extension (LTE) and levelized cost of energy (LCOE) into tangible benefits and realistic impact on the bottom line.

01 | Expert knowledge and high-quality diagnotics promotes the safe monitoring of foundations, tower, drivetrain, rotor blades and unbalance.
Operator-focused. Independent. Reliable.
02 | On site – because competence is not awarded.
03 | Topology of the Bachmann portfolio.
04 | SHM – Set for surveillance from head to toe.

bachmann.

Bachmann Monitoring GmbH

Address	Fritz-Bolland-Str. 7 07407 Rudolstadt
Phone	+49 (0)3672 3186-0
Fax	+49 (0)3672 3186-200
E-Mail	vertrieb-monitoring@ bachmann.info
Web	www.bachmann.info
Category	Suppliers of electrical and electronic components
Profile	Condition monitoring systems
Employees	> 60
Founding year	1998

Beckhoff Automation GmbH & Co. KG

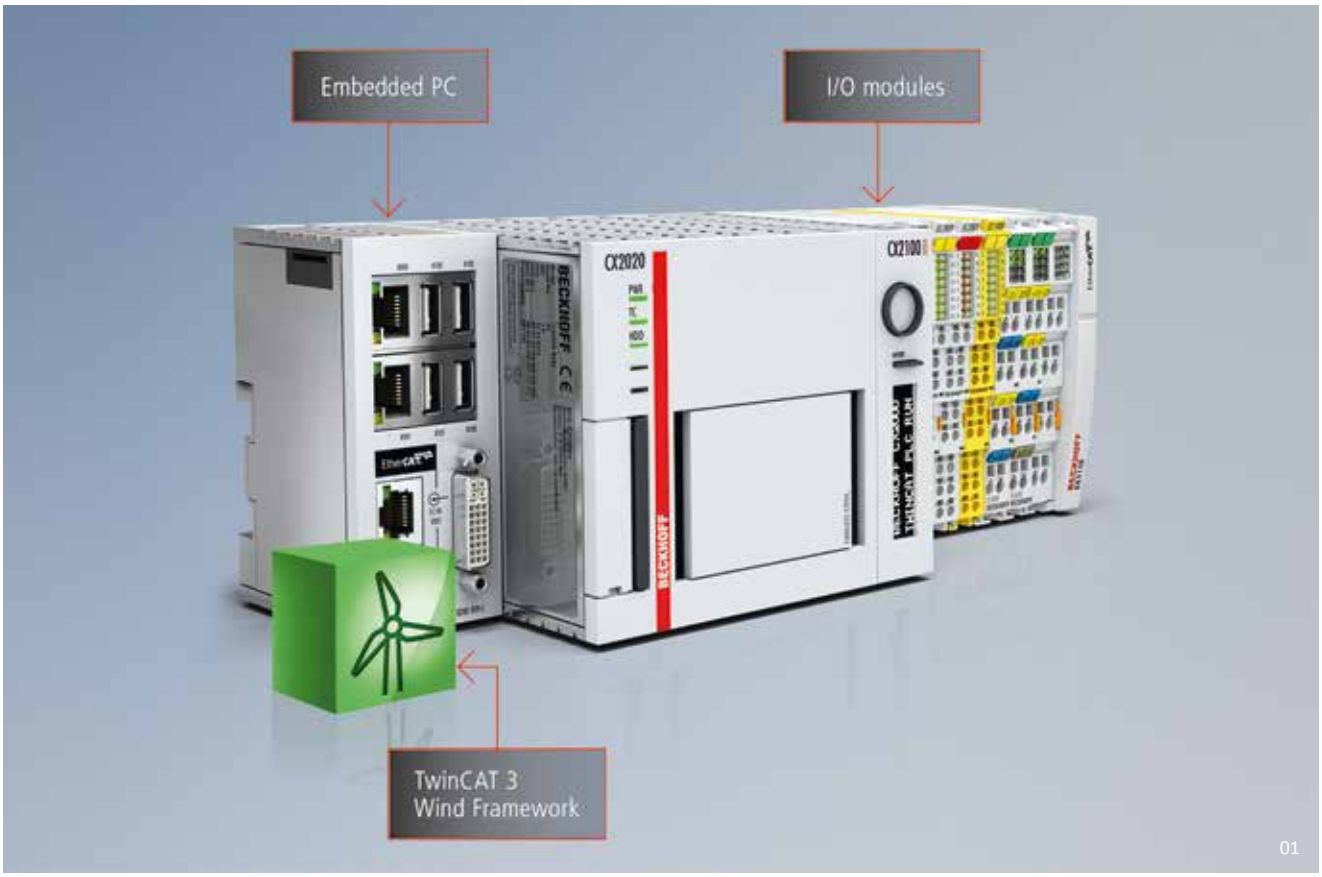
Beckhoff know-how from over 100,000 wind turbines
On the basis of the PC-based control and EtherCAT technology, Beckhoff makes system solutions available for wind turbines that have been tried and tested worldwide: more than 100,000 wind turbines all over the world up to a size of 16 MW have been automated using Beckhoff technology.

In this respect, our control architecture is perfectly suited to the requirement profile of the industry: openness and scalability, flexibility in the design of the controller and a high degree of integration.

PC-based control: the universal control platform for wind turbines

All processes, from the operational management and control of pitch, converter, gearbox and brakes through to wind farm networking, are executed in software on an Industrial PC. Safety technology and condition monitoring are integrated seamlessly into the terminal segment via corresponding I/O modules. A separate CPU can thus be dispensed with.

The real-time Ethernet system EtherCAT offers full Ethernet compatibility and outstanding real-time characteristics. Beyond that, it is characterized by flexible topology and simple handling. In the new TwinCAT 3 Wind Framework, the turbine manufacturer has a software tool at its disposal that gives it optimum assistance in the programming of its facilities and ports the Industrie 4.0 approach to wind energy.



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Another advantage: Lower-level fieldbuses such as CANopen, PROFIBUS and Ethernet TCP/IP can be relocated to the field via fieldbus master or slave terminals for the control of subsystems. Software libraries and hardware components specially developed for the wind power industry round out Beckhoff's wide range of solutions.

The expertise acquired over more than 20 years of collaboration with turbine manufacturers in the wind energy industry makes Beckhoff a reliable partner with high solution competence.

With PC-based control, you benefit from:

- a universal control platform for operational management, pitch control, farm networking and condition monitoring
- high flexibility when it comes to controller design
- performance-related scalability
- modular expandability
- reduced hardware and engineering costs
- increased efficiency and cost-effectiveness
- improved competitiveness

Together with the international Beckhoff subsidiaries, our expertise team in Lübeck offers worldwide support for all areas of wind turbine control: The services offered range from developing application-specific software libraries to support during the commissioning phase and control cabinet construction. According to the customer's specifications, the Beckhoff engineering department takes on the complete control cabinet construction, starting with wiring diagram design through to prototype or serial production.

01 | A Beckhoff Embedded PC with line-connected I/O modules, EtherCAT as the universal communication system and TwinCAT automation software functions as the central control platform for wind turbines. Sturdy, modular and scalable hardware components as well as the utilization of industrial communication standards give turbine operators optimum protection of their investment and maximum flexibility in controller design.

BECKHOFF
New Automation Technology

Beckhoff Automation GmbH & Co. KG

Address	Wahmstrasse 56 23552 Lübeck
Phone	+49 (0)451 203 988-0
Fax	+49 (0)451 203 988-20
E-Mail	wind@beckhoff.de
Web	www.beckhoff.de/wind
Category	Suppliers of electrical and electronic components
Profile	Controls, cables & switchgear cabinets
Turnover	€ 1.515 billion (2022)
Employees	5,680
Founding year	1980

Gustav Klauke GmbH

140 years of experience in connection technology and tools
“Made by Klauke” stands for highest quality. We develop, produce and supply products for the electrical industry and ensure through our own and independent test centers that our system meets the highest standards. Thereby our products are certified and tested according to ISO 17025.


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Klauke as part of Emerson has the European headquarters in Remscheid (Germany) and subsidiaries in various countries with about 1,400 employees who are working for the customer every day. In addition to Klauke, Emerson carries a comprehensive range for the plumbing trade with the RIDGID brand – from hydraulic press tools and mechanical threading machines to preparation equipment to install, inspect and maintain underground pipes networks.

Wind turbines play a crucial role in the generation of “green” electricity. High safety requirements apply to the installation. Therefore, compliance with appropriate quality criteria is essential, both for the material and for the electrical connections.

For the various electrotechnical components in a wind turbine, we offer the appropriate tools as well as the corresponding connection material. Regardless of whether you are connecting the generator, the control cabinet or the transformer: Klauke Systemtechnik will help you achieve the optimum installation result safely and reliably.

In terms of safety, ease of use and robustness, Klauke products meet the highest requirements and perform better than standards demand – feel free to contact us.

Klauke offers a wide range of services such as on-site Klauke System training: Hundreds of companies have already received training from Klauke – from medium-sized companies to DAX corporations. In addition, Klauke is on the road with the Klauke Mobil for technical consulting for customers to present tools on site.

Klauke tools are in use all over the world and should be regularly maintained and checked for function in order to meet safety requirements and this is done in Klauke's own service centers.

01 | Connection Materials and Tools for Wind Turbines
02 | Klauke-Service
03 | Perfectly Coordinated System

03

Gustav Klauke GmbH

Address	Auf dem Knapp 46 42855 Remscheid
Phone	+49 (0)2191 907 1070
Fax	+49 (0)2191 907 2010
E-Mail	klauke-anfragen@emerson.com
Web	www.klauke.com
Category	Suppliers of electrical and electronic components
Profile	Energy & data transmission
Turnover	€ 144.3 million
Employees	approx. 600
Founding year	1879

GWU-Umwelttechnik GmbH

From science to industry!
As an independent, innovative company & approved factory representative for international manufacturers, leading in their respective technology fields, we offer not only sales and rental, but also maintenance & service around the systems and accessory programs.

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Our dedicated team of experienced meteorologists, scientists, engineers and technicians offers measurement systems that are optimally tailored to the individual needs of our customers through close customer contact and the use of cutting-edge technologies.

The GWU-HPS (Hybrid Power Solution) is a hybrid energy source supported by EFOY Pro fuel cells (www.efoy-pro.com) from SFC Energy AG and solar energy. This enables a power supply characterized by high reliability, long autonomy, and low maintenance effort. It can be used both in the turnkey GWU-LiDAR trailer and as a stand-alone system, providing easy, mobile, and secure power supply anywhere, even without a grid connection.

This well-proven energy source is used daily in applications such as LiDAR wind measurement systems, environmental measurements, emergency warning systems, video surveillance, mining, and many more.

In addition to rental services for these high-quality measuring devices and systems, we offer a wide range of services and products. Our experienced project management extends beyond the German-speaking region to collaborate with international partners worldwide. For decades, customers from various industries have relied on our services, which include sensors, system integration, remote monitoring, data storage, and processing.

Reliability, accessibility, and quick response time define our daily collaboration with customers, making us a trustworthy and ISO 9001:2015 certified partner for the successful implementation of your projects.

03

01 | LiDAR wind measurement
02 | GWU-LiDAR Trailer
03 | EFOY Pro fuel cell, www.efoy-pro.com

GWU-Umwelttechnik GmbH

GWU-Umwelttechnik GmbH

Address	Bonner Ring 9 50374 Erftstadt
Phone	+49 (0)2235 955 22-0
Fax	+49 (0)2235 955 22-99
E-Mail	lidar@gwu-umwelttechnik.de
Web	www.gwu-umwelttechnik.de
Category	Suppliers of electrical and electronic components
Profile	Measurement equipment & measuring masts
Founding year	1986

HAWART Sondermaschinenbau GmbH

Wind power in motion – our passion – your success!
We use innovative solutions to meet our customer's needs. Mechanical, hydraulic and electrical engineering design and production at our site in Ganderkesee/Lower Saxony meet the highest quality standards. Our customers associate HAWART with flexibility, reliability, added value, and know-how.


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SERVICE RANGE:
- Concept and feasibility studies
- Project planning and production layout
- Construction
- Control technology
- Production
- Documentation
- Certification and load testing
- APQP4Wind qualified
- Installation and commissioning
- Training and service

PRODUCTS:
- Rotor blade production devices
- Cross beams and load handling attachments
- Assembly tools
- Logistics components
- Storage facilities
- Mechanical machining systems
- General mechanical engineering

U-BIT / Universal Blade Installation Tool
Our customers can use the U-BIT to install or dismantle a wide range of rotor blades weighing up to 27.5 t directly on the wind turbine. The U-BIT is transported in a 40' open-top container and takes as little as one hour to assemble. In just a few simple steps, the U-BIT can be folded up and loaded for repositioning within a wind farm. Offshore solutions are also available that are already being used in various applications. Going forward, it will be possible to hoist rotor blades weighing up to 60t without any problems.

Lifting adapters and logistics components
HAWART is one of the leading manufacturers of transport and storage systems for rotor blades, tower segments, and other on- and offshore wind turbine components. HAWART is an independent supplier for blade mounting interface solutions for a wide range of rotor blade types.

In collaboration with the vehicle manufacturer DOLL, HAWART has developed a U-BTS lifting adapter and tandem frame for rotor blade road transport with a load capacity of up to 35t. A tandem frame featuring a torsion compensation system developed by HAWART is mounted on the dolly, which has a precise self-steering mechanism, easily compensating for uneven road surfaces

HAWART
windpower in motion

HAWART Sondermaschinenbau GmbH

Address	Handwerksweg 8 27777 Ganderkesee
Phone	+49 (0)4222 941 39-0
Fax	+49 (0)4222 941 39-60
E-Mail	info@hawart.de
Web	www.hawart.de
Category	Suppliers of large components
Profile	Rotor blades & rotor blade materials
Turnover	€ 20 million
Employees	115 (Wind energy: 115)
Founding year	1993

01 | U-BIT – the universal rotor blade installation tool. Test run on the HAWART site
02 | Our U-BIT in offshore use
03 | Hub adapters and logistics components

HYTORC (Barbarino & Kilp GmbH)

HYTORC – mobile industrial Bolting Technologies
HYTORC, the world's leading manufacturer for mobile industrial bolting, develops ever more powerful new tools, fasteners and bolting processes to increase efficiency, profitability, safety and quality for its customers all over the world.

Battery-Tools 18V or 36V from 30Nm to 6.799Nm: The digital, battery-operated torque / angle Torque-Wrenches. The first battery-wrench series with TorcSence-Technology for documentation and monitoring of the most important bolting-parameters. Intuitive User Interface, Bluetooth Wireless Technology; Configuration directly via Display. The HYTORC Battery-Tools can also be operated via an App.

Hydraulic bolting from 60 Nm to 80.000 Nm with Eco2TOUCH-Pump: Digitized, mobile and process-reliable bolting of safety-critical bolt joints in the wind power industry, even coated components can be fastened in a process-reliable way. Automated bolting, assessment, documentation and statistics for all bolted joints with these methods:

- DGA: Torque-controlled tightening
- DGD: Torque-controlled/ angle-monitored tightening
- DGS: Torque-controlled/yield point-monitored tightening
- DDW: Torque-angle-controlled tightening
- DDW: Torque-angle controlles tightening
- SGA: Yield point-controlled tightening
- SGD: Yield point-controlled/ angle-monitored tightening
- EXT: Externally controlled tightening w/ random measuring sensors w/ standard industry interface 0..10V / 0...20mA / 4...20mA


01


02

Mobile intuitive operation and control via a TOUCH display on the pump. Optionally operable with a Scanner or via an App. Process-reliable bolting with automated documentation as texts, statistics and graphic-charts with all process-parameters for stability considerations. This ensures safe bolting processes through perfect monitoring, system transparency, system analysis, bolt administration and visualization of process data based on manipulation-proof documentation, especially for high-risk bolted joints.

More information at:
www.hytorc.de/anziehverfahren


03


04

01 | Digital, battery-operated torque / angle torque-wrenches
02 | XLCT-Trolley-Set for safe, comfortable and digitized bolting of windturbine-towers
03 | NEW: MXT-Plus: Stronger – Durable – Repeatable
04 | Digitized, process-reliable bolting in the wind power industry

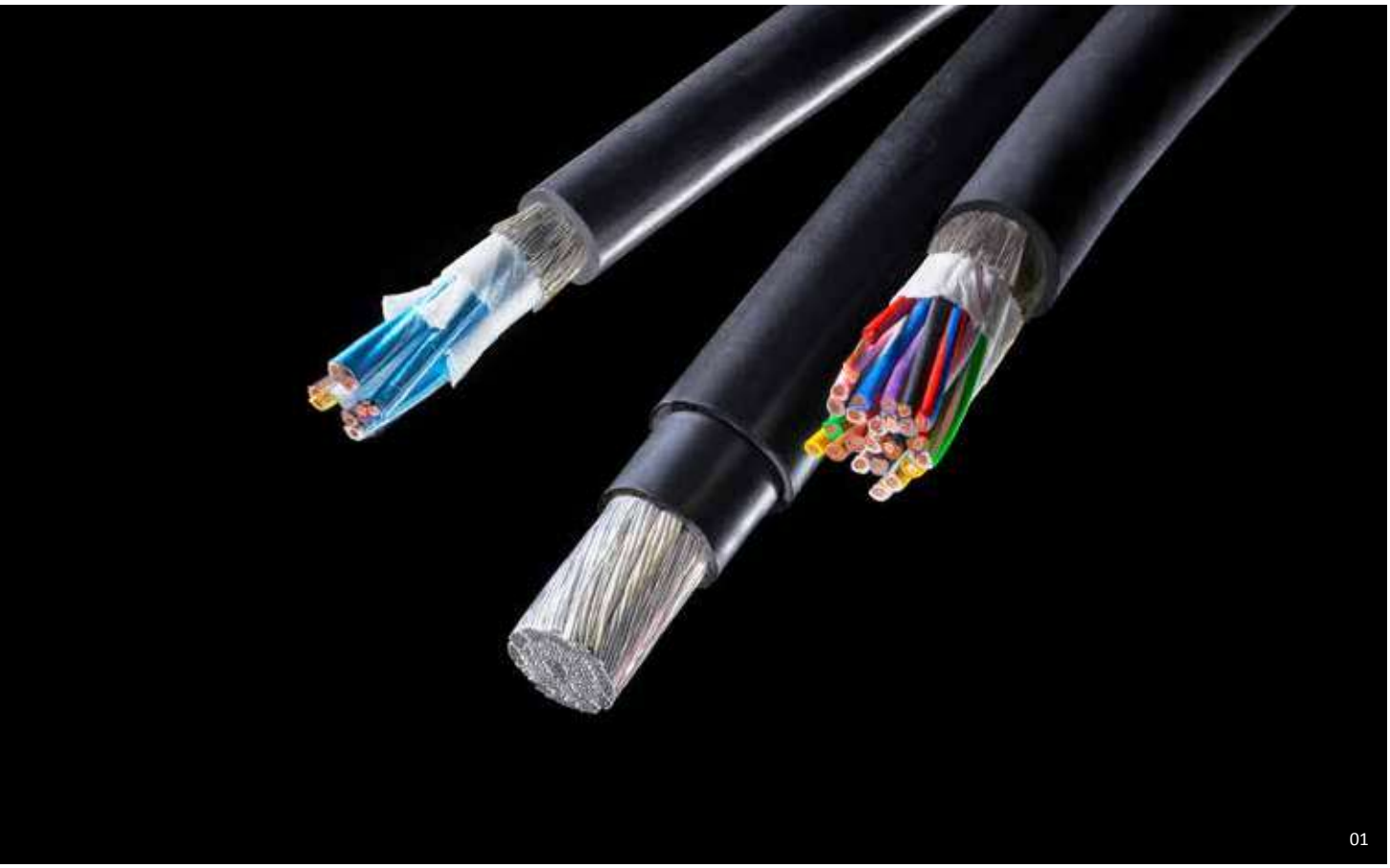
HYTORC

HYTORC (Barbarino & Kilp GmbH)

Address	Justus-von-Liebig-Ring 17 82152 Krailling
Phone	+49 (0)89 230 999-0
Fax	+49 (0)89 230 999-14
E-Mail	info@hytorc.de
Web	https://www.hytorc.de/en/mobile-digital-bolting/
Category	Suppliers of mechanical components
Profile	Tools & machine tools

HELUKABEL GmbH

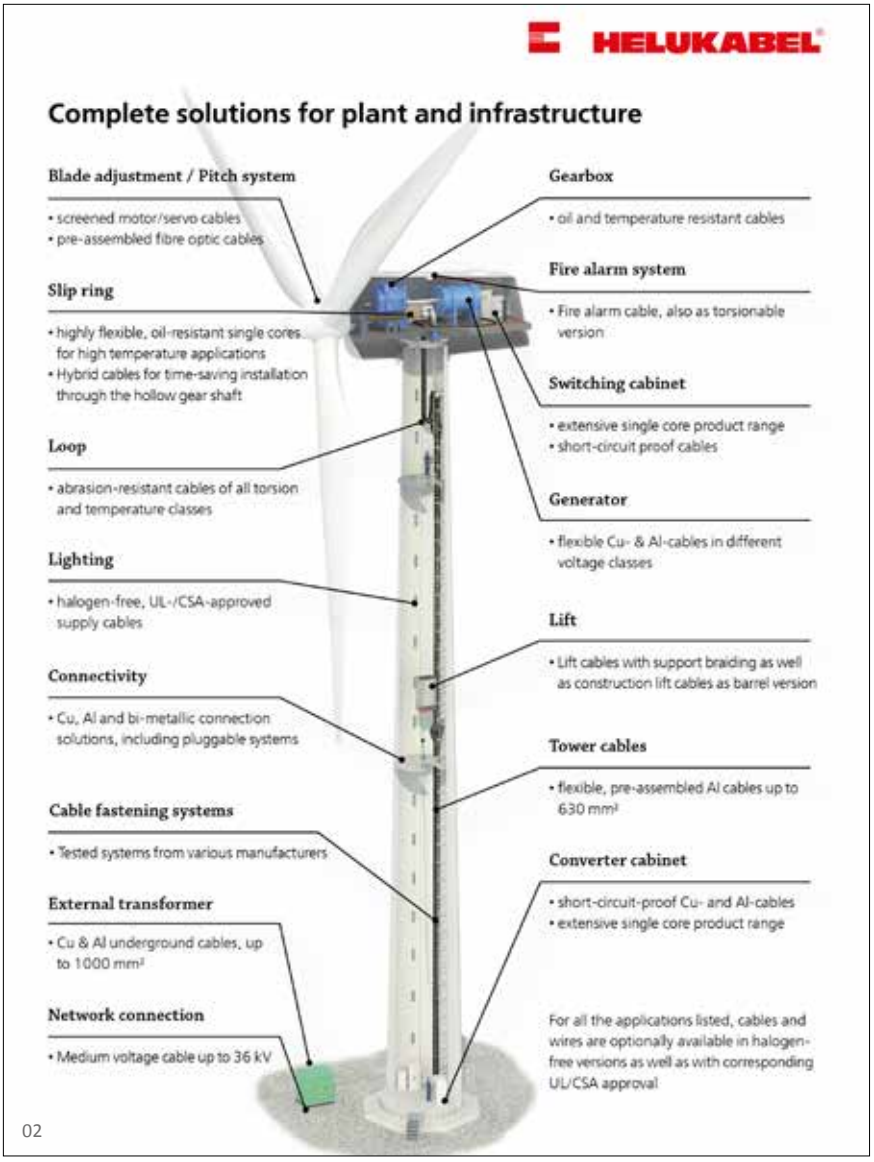
Channeling Power
From the nacelle to the tower to the grid connection: HELUKABEL supplies the right cables, wires and accessories to manufacturers and suppliers of wind turbines. Users benefit from complete cabling solutions supplied quickly and reliably, all from a single source.



01

The HELUKABEL Group, headquartered in Hemmingen, Baden-Württemberg, Germany, is a leading international manufacturer and supplier of cables, wires and cable accessories. Founded in 1978, the family-owned company has developed broad expertise and deep knowledge of many industries and key technologies over the years. Today, HELUKABEL products and solutions are found in application areas including mechanical and plant engineering, industrial automation, oil and gas, building technology, infrastructure, mobility and renewable energy.

With 63 locations and more than 2,200 employees in 39 countries, the company is a reliable and responsive partner to its customers worldwide. They benefit from expertise in the development of customised solutions, a comprehensive range of more than 33,000 stock items and a state-of-the-art logistics concept. HELUKABEL's operations include manufacturing and testing facilities, where maintaining the highest standards of quality is a top priority. Altogether, HELUKABEL offers its end-users complete solutions for electrical connection technology, all from a single source.



02

For the wind industry, HELUKABEL's portfolio includes a wide variety of cables and wires that are applied to the main components of wind turbines. The product range includes, for example, lightweight and flexible aluminium cables that can be pulled into the tower in one piece, eliminating unnecessary cost-intensive connections, and pre-assembled class 2 aluminium conductors that can be pre-installed in the individual tower segments. Torsion-capable cables with a wide variety of insulation materials and voltage levels and cross sections from 0.5 to 400 mm² are also part of the range. These are tested in HELUKABEL's test tower to ensure that they are ready for series production. Heat-resistant cables for generator connections and slip ring applications, Ethernet cables and bus technology for data communication, and pre-assembled fibre optic cables in a wide variety of designs and as plug-and-play solutions for quick on-site installation complete HELUKABEL's range for the wind energy sector.

With this comprehensive product portfolio, HELUKABEL provides optimal solutions for onshore and offshore wind turbines as well as for the infrastructure cabling of entire wind farms. The company has been supporting customers in the wind power industry for decades and, as a development partner to leading manufacturers, is very familiar with different application scenarios and requirements. Cables and conductors can be made resistant to seawater, oil, ozone or UV radiation, among other things.

At its development and manufacturing sites, HELUKABEL not only designs customised solutions from scratch, but also tests them in its own laboratories. Many products are certified according to UL, VDE or other standards, so that the right products can be found within the range for every target market. All the above makes HELUKABEL a reliable supplier of cables, wires and connection technology for the wind industry.

01 | The HELUKABEL Group is a leading international manufacturer and supplier of cables, wires and cable accessories.
02 | For the wind industry, HELUKABEL's portfolio includes a wide variety of cables and wires that are applied to the main components of wind turbines.

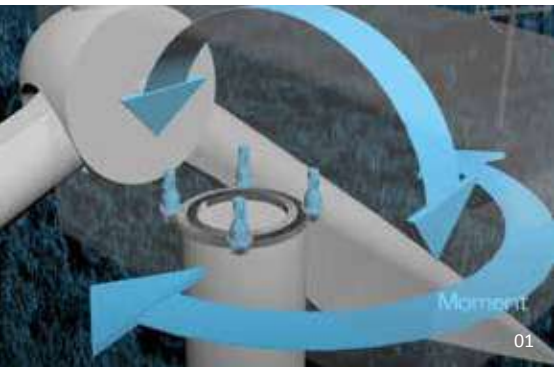
HELUKABEL®

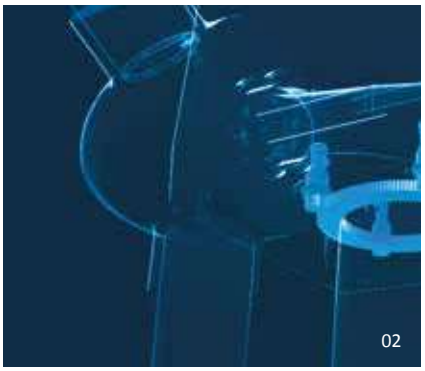
HELUKABEL GmbH

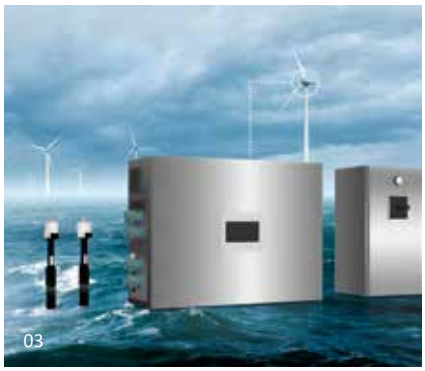
Address	Schlosshaldenstrasse 10 71282 Hemmingen
Phone	+49 (0)7150 9209-0
Fax	+49 (0)7150 81786
E-Mail	info@helukabel.de
Web	www.helukabel.de
Category	Suppliers of electrical and electronic components
Profile	Controls, cables & switchgear cabinets
Turnover	€ 1,084 million
Employees	2,200
Founding year	1978

Nabtesco Europe GmbH

World innovation: Condition Monitoring system with Fail-Safe (CMFS)
For 20 years Nabtesco Corporation has pursued the development, engineering and manufacture of yaw drive units of wind turbines. Now Nabtesco in Japan has developed a CMFS condition monitoring system with a fail-safe function.







01 | Strong winds and turbulences create high loads on the yaw slewing unit
02 | The yaw slewing unit ensures optimal orientation of the nacelles in wind turbines to the wind
03 | The Condition Monitoring system with Fail-Safe (CMFS) from Nabtesco is a world innovation
04 | The CMFS system from Nabtesco can be installed in any wind turbine

Nabtesco

Nabtesco Europe GmbH

Address	Anna-Ohl-Strasse 2 65555 Limburg an der Lahn
Phone	+49 (0)643 128 550
E-Mail	info@nabtesco.eu
Web	www.nabtesco.eu
Category	Suppliers of electrical and electronic components
Profile	Sensors
Turnover	€ 2,182 million
Employees	7,844
Founding year	2003 (Fusion of Nabco and Teijing Seiki)

Nabtesco Corporation, an international company with various subsidiaries and business units, provides precision motion in a wide range of industries and applications with its unique motion control technology. For the wind energy industry, Nabtesco has developed a CMFS condition monitoring system with a fail-safe function that protects the yaw slewing unit against failure in order to extend the service life of wind turbines and substantially reduce costs.

A real game changer for the wind industry
The decisive feature of this innovative technology is that in addition to the condition monitoring function with fault detection, it is also automatically activated in the event of excessive forces and uneven load distribution. This is a world first. It eliminates unplanned downtimes due to a damaged yaw slewing unit and the resulting high costs.

The CMFS system protects wind turbines against failure
The CMFS system consists of four components – bolt strain sensor, signal transducer, controller and power supply unit – which makes installation fast and easy. The high-precision strain sensor measures the external forces, which are processed and analysed by the controller. If the values exceed critical parameters, the controller automatically triggers the electromagnetic brake on the respective yaw drive unit to reduce the load.

All models, brands and types of wind turbines can be equipped with a CMFS system, and the system is also designed for easy retrofitting in existing wind turbines.

NGC Transmission Europe GmbH

Geared for a Better Future

With our brand NGC, we have been one of the largest international suppliers of wind main gears as well as pitch and yaw drives for onshore and offshore for over 50 years. For us, future-oriented gear solutions and professional services go hand in hand.

NGC

We understand the diverse challenges that gearbox technology has to cope with in the wind energy sector and cater to different performance classes and environmental conditions.

Currently over 100,000 NGC main gearboxes and 550.000 pitch & yaw drives are setting the pace in wind turbines in more than thirty countries around the world.

DRIVE TRAIN SOLUTIONS

Our portfolio includes standard series gearboxes of different performance classes as well as customized gearbox series.

Our engineering team ensures that every NGC gearbox is optimally designed through the application of precise calculations, extensive analyses, and the latest simulation technologies. Reliability is our highest priority.

01 | NGC – Global Player for Wind Gearboxes
02 NGC Field Service

SERVICE SOLUTIONS

Our services are characterized by speed and flexibility. In order to be ready at short notice on every wind turbine, we keep numerous spare parts and spare gears on stock. A smooth implementation is guaranteed by our own qualified service technicans and professionals from our certified service partners.

Apart from damage repairs, we also offer gearbox overhauls, and design service and maintenance contracts according to your needs.

NGC Transmission Europe GmbH

Address	Pontwert 43 47059 Duisburg
Phone	+49 (0)203 509 600 0
Fax	+49 (0)203 509 601 90
E-Mail	katja.garstecki@ NGCtransmission.com
Web	www.NGCtransmission.de
Category	Suppliers of mechanical components
Profile	Gears

NSK Deutschland GmbH

Partnership based on Trust – Trust based on Quality
For two decades NSK has been a partner of the wind industry and one of the main suppliers of roller bearings for wind energy gearboxes and bearings for main rotor shafts and generators.


01

Combined know-how
Skills from sales and application technology are combined in the wind energy team – and also include the latest research results from our technology centres. Bearings are specifically designed using highly developed calculation and simulation tools. Our experienced engineers take account of load cycles, lubrication, deformation, thermal response and also extreme and maximum conditions. This is the only way to produce a construction with cost-optimised components that also reliably function under maximum loads and have a long service life.

NSK wind standard
As the first manufacturer, NSK defined the pioneering wind standard U303 for roller bearings back in 2008 – including a one hundred percent traceability of the components of every single bearing and all essential processes. NDT methods (non destructive testing) are also available to avoid grinding burn, fractures in material and structural breakdowns.

Long service life with BOC (black oxide coating) and patented materials
BOC treatment of bearings prevents untimely bearing failures caused by white etching cracks (WEC). The patented special material AWS-TF (anti white structure-tough) is also available for high-level requirements and reliably prevents damage caused by WEC. Our STF material (super-tough) has proved ideal when it comes to increasing the load rating and service life, especially for contaminated lubricants. Certification by DNV GL confirms: Using Super-TF material means that the basic dynamic load rating can be improved by 23% in roller bearings, and 26% in ball bearings. This is equivalent to a doubling of bearing fatigue life.

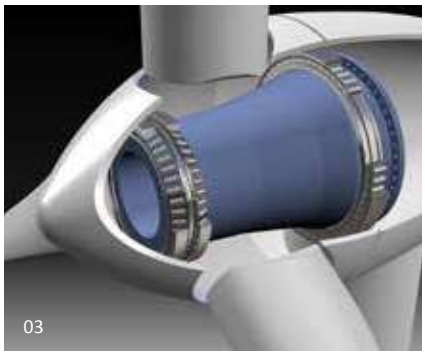
01 | Main rotor shaft bearing
02 | Planet wheel gear and bearing
03 | Main rotor shaft bearing

MOTION & CONTROL™
NSK

NSK Deutschland GmbH

Address	Harkortstrasse 15 40880 Ratingen
Phone	+49 (0)2102 481-0
Fax	+49 (0)2102 481-2151
E-Mail	info-de@nsk.com
Web	www.nskeurope.de
Category	Suppliers of mechanical components
Profile	Bearings
Turnover	global: approx. € 6,2 billion (as per March 2023)
Employees	Global: ~ 30,000 (as per March 2023)
Founding year	1916


02


03

Prysmian Kabel und Systeme GmbH

Harnessing the wind of change.
The Prysmian Group is the world's leading manufacturer for cables and systems for the segments energy, telecom, data and industrial.

To meet an ever-growing need for power, the world is increasingly turning to renewable and sustainably-sourced energy. In response to this demand, Prysmian's cables are helping wind turbine manufacturers around the globe to harness the true potential of this natural power source.

As a world leader in special cables for wind turbines, we are able to manufacture products for the wind industry for all voltages or, if required, fully assembled cable sets in our German and international production sites:

Nacelle & Loop
Special cables (optional halogen-free / flame retardant) with increased oil, heat and ozone resistance, as well as optimized torsion properties, up to 155 kV. **Our high-voltage cables are now available as lead-free version!**

Tower
Special cables (optional halogen free / flame retardant) for fixed installation with copper or aluminium conductors with excellent installation properties, up to 155 kV. **Our high-voltage cables are now available as lead-free version!**

Wind farm cabling
From the low- and medium-voltage cables for the wind farm infrastructure, through to the high-voltage grid, we supply all cables for onshore and offshore applications.

In addition, we are able to supply cables as pre-assembled cable sets, as well as a service for fitting / commissioning or maintenance / turbine monitoring.

Our certified quality management with a worldwide focus ensures that product quality is always at the highest level, from the procurement and production processes, right through to the delivery process. With a focus on sustainable and environmentally friendly production processes, the Prysmian Group ensures that the fundamental principles of sustainable energy concepts are also implemented in its own company.


01


02


03


04

01 | Moveable, free hanging or fixed. Prysmian cables can be used in many areas.
02 | New Cable laying vessel "Leonardo da Vinci" of the Prysmian Group
03 | Prysmian Group's product portfolio covers all your needs
04 | Harnessing according to customer requirements

Prysmian Group

Prysmian Kabel und Systeme GmbH

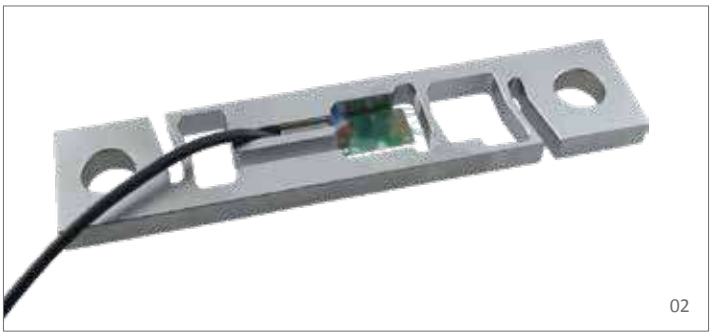
Address	Alt-Moabit 91 D 10559 Berlin
Phone	+49 (0)30 367 54-0
Fax	+49 (0)30 367 54-571
E-Mail	kontakt@prysmiangroup.com
Web	www.prysmiangroup.de
Category	Suppliers of electrical and electronic components
Profile	Controls, cables & switchgear cabinets
Turnover	€ 16 billion
Employees	30,000
Founding year	1879

Pulsotronic GmbH & Co. KG

Customizing Future

CMS Wind – from the idea to the customized application solution.
For more than 35 years, Pulsotronic has been supporting component and plant manufacturers as well as operators with customized sensor solutions for the reliable operation and monitoring of wind turbines.

01



02

03

Higher – faster – more efficient. Development and construction of wind turbines is a permanent balancing act between physically feasible and economically reasonable turbine design. With the sustained growth of renewable energies, especially under the influence of critical situations in the supply of fossil raw materials, the permanent monitoring of the wind power plants as well as predictive maintenance is becoming more and more important.

Monitoring under hardest climatic and geographic conditions requires reliable and sophisticated sensor technology. Adapted to the specific application, Pulsotronic's portfolio of sensors and systems covers a comprehensive range of signal transducers for typical parameters of a wind turbine such as mast acceleration, rotor speed, azimuth movement, blade load monitoring, vibration monitoring, pitch adjustment, acoustics, current and residual current monitoring, optical detection of shading and other geometric, optical, thermal or electrical measured variables.

The technical approach at Pulsotronic always results from a deep discussion with the customer and a resulting specification. As experienced experts we fully support our partners in the application environment of energies, signals and data.

In addition to signal generation, Pulsotronic, together with its parent company PHOENIX CONTACT, also handles data processing, interfaces and – if desired – connection to existing communication channels or cloud solutions.

Within the PHOENIX CONTACT group you will find Pulsotronic worldwide.

You search – we provide:
CUSTOMIZING FUTURE.

p·u·l·s·o·t·r·o·n·i·c
CUSTOMIZING FUTURE

Pulsotronic GmbH & Co.KG

Address	Neue Schichtstrasse 14b 09366 Niederdorf
Phone	+49 (0)3729 6930 200
Fax	+49 (0)3729 6930 280
E-Mail	info@pulsotronic.de
Web	www.pulsotronic.de
Category	Suppliers of electrical and electronic components
Profile	Sensors
Turnover	€ 30 million
Employees	200
Founding year	2001

01 | PULSOTRONIC location in Niederdorf/Erz.
02 | customized blade control with compensation by mechanical design
03 | Inclination – rotation rate – acceleration – vibration. 6DOF-sensor for precise measurement

REWITEC GmbH – A Cargill Company

Longer life and greater efficiency for your wind turbine(s)
Our innovative REWITEC technology protects and repairs the surfaces of gears and bearings in wind turbines.

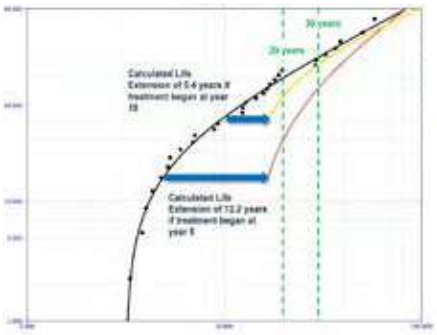
REWITEC GmbH, which was founded in 2003 and has been part of the US Cargill Group since July 2022, is a medium-sized company based in Lahnau. REWITEC has developed a patented and innovative surface-treatment technology for the protection and repair of gears and bearings, which uses nano- and micropar-ticles, the effectiveness of which has been proven scientifically.

Based on our 15-year experience in the wind industry and having treated several thousand wind turbines, we provide assistance to our customers around the world to address such issues as pitting, run-outs, downtime damage, and many other risk factors that could result in wind turbine outages. We offer our clients bespoke solutions, on-site application, and pre- and post-application surface analyses.

Our technology
Our technology utilises lubricants and bearing grease as media to form a self-repairing silicon layer of particles on the metal surfaces of gears and bearings. This ensures greater reliability, improved energy efficiency and a long service life in drive system components by significantly reducing surface roughness, friction, and temperature, which results, among other things, in a more even load distribution on the tooth flanks and in the bearing components. The technology can be used in both oil and grease lubricated systems.

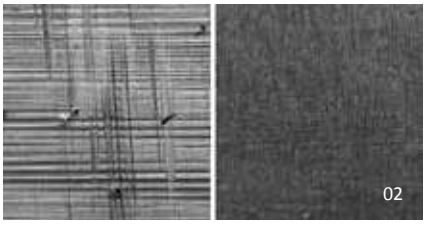
REWITEC Key Facts

- Repairs damaged gear and bearing surfaces
- Significantly extends the service life of drive components
- Reduces wear and increases operational smoothness
- Scientifically proven friction reduction and efficiency increase
- Suitable for use in old and new wind turbines
- Significant reduction in maintenance costs



01

01 | The calculated service life extension of an SKF main bearing (1.5 MW Acciona WTG) through the use of REWITEC is up to 12 years – A study carried out in collaboration with Sentient Science.
02 | The development of lateral wear on a gear cog tooth (GE 1.5 SL WTG) over a two-year period. Surface impression without REWITEC application (left) and development after REWITEC application after two years (right).
03 | Analysis of the main bearing (outer ring) of a GE 1.5 MW wind turbine, left: before REWITEC application, centre: 5 months and right: 12 months after application



02

03

REWITEC™
A Cargill Company

REWITEC GmbH – A Cargill Company

Address	Dr.-Hans-Wilhelmi-Weg 1 35633 Lahnau
Phone	+49 (0)6441 445 99-0
E-Mail	info@rewitec.com
Web	www.rewitec.com
Category	Suppliers of mechanical components
Profile	Surface technology
Employees	10
Founding year	2003

RENOLIT SE

RENOLIT – The expert for high-performance films
The **RENOLIT** Group is one of the leading international manufacturers of high-quality industrial plastic films. The independent family-owned company sets trends and standards worldwide – for more than 75 years, it stands for technical expertise, modern product design and service based on partnerships.

01

From furniture fronts and window profiles to swimming pools, from office supplies and self-adhesive products to films and tubes for medical applications, from recyclable panels and composites for the building industry to interior fittings for vehicle interiors – **RENOLIT** products boast refining, sealing, protective and stabilising properties as well as a whole range of technical and visual benefits.

As a driver of innovation, **RENOLIT** develops sustainable products and new business models, invests in new manufacturing technologies, digitalization, and the use of sustainable raw materials.

One example is **RENOLIT** CP: a corrosion protection film for wind turbines that **RENOLIT** developed and now marketed in cooperation with **RENOLIT**'s partner WP Energy (part of WP Group). The high-performance film efficiently protects the steel and metal coatings of the wind turbine towers from corrosion and offers an environmentally friendly alternative to paint. No volatile organic compounds (VOCs) are produced during the application, nor is hazardous waste generated. Thanks to the high-quality standards during production, **RENOLIT** CP can be offered according to ISO 12944-9 CX certification with a durability of 10 years.

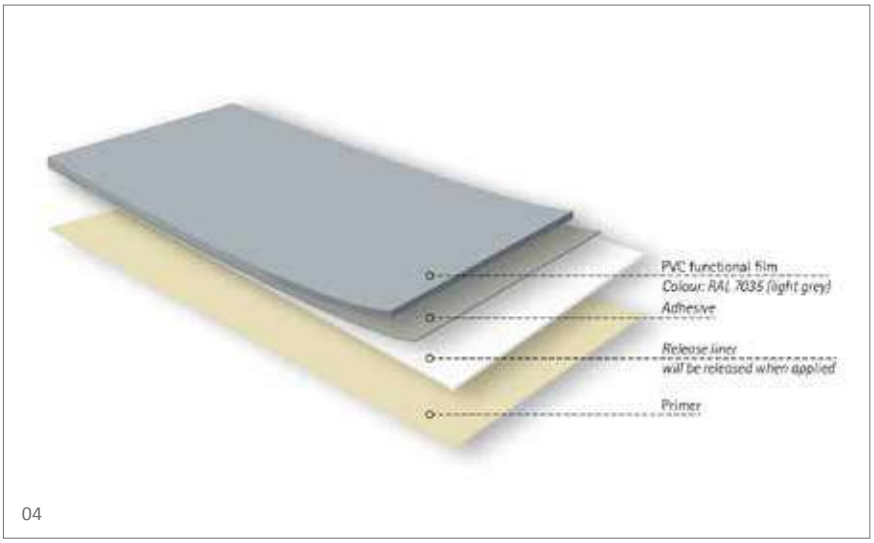
RENOLIT has developed the corrosion protection film **RENOLIT** CP with the aim of providing the wind industry with an efficient tool to better protect their wind turbines. The film supports the wind energy industry to operate more efficiently and profitably, and thus contributes to regenerative energy production.

02

03

The Green Deal, which aims to make Europe climate neutral by 2050, is pointing the way. Renewable energies are a key factor for this.

As a plastic processing company, **RENOLIT** has a special responsibility towards the environment. Through permanent process optimization and the sustainable use of energy and raw materials, **RENOLIT** makes an important contribution to climate and environmental protection. The focus is on the principle of closed-loop recycling: By 2025, **RENOLIT** intends to recycle all plastic residues internally. With its high-quality and sustainable plastic products, **RENOLIT** creates added value and improves the quality of the life of many people.



04

RENOLIT can be relied on, in line with its brand promise: "Rely on it." This is ensured by more than 5,000 employees, at more than 30 production sites and sales units spreading over 20 countries in 4 continents.

01 | RENOLIT CP – Film application
02 | RENOLIT CP – Film application
03 | RENOLIT CP – Film application
04 | RENOLIT CP – Film structure
05 | RENOLIT Headquarter in Worms

05

RENOLIT
Rely on it.

RENOLIT SE

Address	Horchheimer Str. 50 67547 Worms
Phone	+49 (0)6241 303 393
E-Mail	wind@renolit.com
Web	www.windservice-wp-renolit.de
Category	Suppliers of mechanical components
Profile	Surface technology
Turnover	€ 1,366 million (2022)
Employees	over 5,000
Founding year	1946

Rittal GmbH & Co. KG

Higher speed and lower costs

Wind turbine manufacturers face enormous challenges in the construction and operation of turbines. With this in mind, Rittal and Eplan offer effective solutions to radically accelerate the planning and production processes which can significantly reduce costs.

01 | From inverter systems and automation, to wind farm management and grid connection – Rittal offers the standard for all conditions.
02 | Rittal is one of the world's leading system suppliers of enclosures, power distribution, climate control and IT infrastructure, as well as software and services.

Rittal GmbH & Co. KG

Address	Auf dem Stützelberg 35745 Herborn
Phone	+49 (0)2772 505 2219
E-Mail	hain.f@rittal.de
Web	www.rittal.de
Category	Suppliers of electrical and electronic components
Profile	Controls, cables & switchgear cabinets
Turnover	€ 3 billion (2022, Friedhelm Loh Group)
Employees	9,200 worldwide (Rittal); 12,00 (Friedhelm Loh Group)
Founding year	1961

"We supply all wind turbine manufacturers worldwide, directly or indirectly via panel-building and switchgear engineering, and tap into significant cost-cutting potential through automation solutions and digitally integrating processes along the entire value chain," says Dr René Umlauft, Managing Director of Sales at Rittal.

In collaboration with sister company Eplan, Rittal is digitising processes in enclosure design, planning, configuration and integration that were previously manual. The result is greater efficiency leading to compelling benefits in the investment and operation (CAPEX, OPEX) of wind turbines.

Rittal products deliver the strength, vibration resistance and corrosion protection vital to turbine dependability.

Highly solid and durable AX compact enclosure system helps ensure the pitch system located in the rotor hub operates reliably. To shield frequency inverters and control and safety components in the turbine's nacelle or tower, Rittal offers modular solutions based on its new VX25 large enclosure system.

The company also provides the Blue e+ climate control system, the world's most advanced and efficient cooling units, to ensure that perfect temperature and conditions are maintained in the enclosures. Furthermore, thanks to the IoT capability of the units, targeted maintenance can be planned and organised more intelligently.

Rittal's modular VX25 Ri4Power system allows for the configuration of low-voltage switchgear in compliance with any relevant standards. In addition, options for energy storage systems range from individual enclosures to complete containerised solutions.

Finally, with modular data centre solutions ranging from micro data centres to containers, Rittal offers short latency and maximum security for data processing directly on site.

Schraubenwerk Zerbst GmbH

Fasteners for wind turbines

We fasten your wind turbine components safely and reliably. Wind turbine and component manufacturers around the world rely on Zerbst screws and fasteners.

The Zerbst plant has been manufacturing high-quality screws and fasteners for 100 years.

Schraubenwerk Zerbst has been supplying screws made of high-quality steel to the automotive industry as early as the 1920s. At that time, 30 % of overall production was exported to the US, UK, India and the Netherlands.

Nowadays the plant in Zerbst is a highly sophisticated production plant for fasteners. In addition to an extensive product range for rail track technology, Zerbst supplies industrial screws and screw fasteners to many industries. Customers around the world from the wind industry, mechanical and plant engineering, automotive engineering and the crane industry trust the Zerbst brand.

Sustainable production and sustainable business management are among the corporate principles of Schraubenwerk Zerbst GmbH. Products in the field of renewable energy and wind turbines are ideally suited to this philosophy and are a dynamically growing business segment for the company.

Tower construction: HV sets up to M72 and stud sets up to M100

Offshore: Screw fasteners joining wind turbines to the seabed foundation up to M100

Rotor blade: Specially designed combinations of cross bolts and thermo bolts, from smaller rotor blades to rotor blades over 100 m long for offshore wind turbines

Nacelle and components: Standard screws, specially designed screws and bolts in strength categories 8.8, 10.9 and 12.9

Services and logistics: From warehousing to punctual delivery to building sites around the world.

Coatings: Galvanised and lamellar zinc coated fasteners can be supplied as standard. In addition, customers can order whatever type of coating they require.

SCHRAUBENWERK ZERBST GMBH SZ

Schraubenwerk Zerbst GmbH

Address	Altbuchsland 22 39261 Zerbst/Anhalt
Phone	+49 (0)3923 713-102
Fax	+49 (0)3923 713-200
E-Mail	info@schraubenwerk.de
Web	www.schraubenwerk.de/index_en.html
Category	Suppliers of mechanical components
Profile	Bolts & fasteners
Turnover	€ 100 million
Employee	330
Founding Year	1919

STEGO Elektrotechnik GmbH

Enclosure Climatisation. Perfect.
STEGO heating elements, regulators, fans, lamps and accessories protect your sensitive electronic components against harmful climatic influences.


01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01 | Electronic Hygrotherm ETF 012
02 | Semiconductor Fan Heater CSL 028
03 | Filter Fan Plus FPI / FPO 018

STEGO heating elements, regulators, fans, lamps and accessories protect your sensitive electronic components against harmful climatic influences.

STEGO products are used in all places where sensitive electronic components must be protected from humidity and other climatic influences. Heating elements, regulators, fans and STEGO accessories help you to optimise operating conditions and to reach maximum protection for your installations. So that you can be sure of lasting success!

Perfect thermal management.
Since it was founded in 1980, STEGO Elektrotechnik in Schwäbisch Hall, Germany, has been developing, producing and selling an ever-growing range of products for the protection of electric and electronic components. All STEGO products are aimed at reaching optimum climatic conditions in the most varied environments, ensuring that all sensitive components work reliably at all times.

Tried and tested temperature and humidity control systems ensure these optimised climatic conditions. If temperature and/or humidity are too low or too high, the necessary countermeasure is immediately initiated, for example a heater is turned on or a filter fan circulates cool air. A diversity of conditions such as the change from day to night, or particularly warm or cold regions, make climatisation an ever-increasing and challenging task. To meet this challenge, STEGO offers everything that is needed to protect sensitive components from corrosion and malfunction.

Worldwide service supporting quality worldwide.
STEGO's thermal management solutions are exported internationally and find use in the most diverse areas of application and climatic conditions.

SIMPLY INNOVATIVE. BETTER FOR SURE

STEGO Elektrotechnik GmbH

Address	Kolpingstrasse 21 74523 Schwäbisch Hall
Phone	+49 (0)791 95058 0
Fax	+49 (0)791 95058 45
E-Mail	info@stego.de
Web	www.stego-group.com
Category	Suppliers of electrical and electronic components
Profile	Cooling & climatisation
Founding year	1980

TECHNO-PARTS GmbH

Innovative sealing systems and moulded parts for modern technology.
In sealing technology, the smallest details are critical for reliable functioning. Our products have been doing their job reliably for years, from the tried-and-tested to the innovative component.

Over 50 years of experience in the sealing field for hydraulics, pneumatics, chemicals and plant engineering have made us a high-performance company. We cover almost all applications – from miniature pneumatics to heavy-duty hydraulics, from chemicals and plant construction to offshore wind turbines. We continuously put our experience to work in the development and optimisation of our growing product range.

Our staff's wide-ranging expertise ensures a comprehensive service – from technical advice to our customers on-site to flexible order handling and on-time delivery.

A warehouse with well over 20,000 different items and flexible production for machined and injection-moulded products, combined with in-house toolmaking, enable us to meet most customer requests in the shortest possible time.

A well-equipped laboratory for physical and chemical testing, comprehensive experiments and certification in accordance with DIN EN ISO 9001 make a significant contribution to our high quality standards and the further development of our products.

Individual packaging is just as much a part of our services as our own eKanban system and a quick service for urgent repairs and prototypes.

For the special requirements of wind turbines, we also supply radial shaft seals with high-strength, fabric-reinforced elastomer backs and excellent sliding properties. The shaft seals are available for internal and external sealing, also in split design with diameters up to 4,000 mm. This facilitates repairs and alleviates difficult installation conditions.


01

01 | Shaft seals for wind turbines and for heavy machine construction
02 | Headquarter in Essen
03 | Most modern storage technology and more than 20,000 different articles in stock

TECHNO PARTS
Dichtungs- und Kunststofftechnik
Sealing and Plastics Technology


02


03

TECHNO-PARTS GmbH

Address	Alte Bottroper Strasse 81 45356 Essen
Phone	+49 (0)201 86606-0
Fax	+49 (0)201 86606-68
E-Mail	vk@techno-parts.de
Web	www.techno-parts.de
Category	Suppliers of mechanical components
Profile	Seals & vibration control
Founding year	1981

Winergy – Flender GmbH

Stronger Together for the Future of Wind Power!
Winergy is the brand for drive solutions in the wind industry. As the leading system supplier in the wind market, Winergy combines expertise for the entire drivetrain with gearboxes, generators, direct drive segments, couplings, multibrand drivetrain service and digital solutions.

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Winergy – Flender GmbH
With more than 40 years of experience, Winergy offers gearboxes and generators for onshore and offshore applications up to 20 MW as well as comprehensive service offerings for wind turbine drivetrains. In addition to a global service network, there are locations worldwide in Europe, China, India and the US.

03

Service360 – Experience the power of all-round service.
With our multibrand service, we offer services for the entire drivetrain and serve the individual components from the wind gearbox and coupling to the generator as well as direct drive segments over their entire life cycle. In addition, Winergy offers CMaS Evolution, a digital service solution that is hardware-independent and combines monitoring, analysis, documentation, spare parts ordering and field service planning from a single source.

Our drive components – as individual as your requirements
A detailed specification of the wind turbines forms the basis for the design so that the drivetrain meets the specific conditions. We develop products that are matched to the interaction of all components of the drivetrain.

04

Quality – the basis for our products
The quality we demand from our products is also defined for our processes. So that our customers all over the world can benefit from high-quality products and short delivery times, we rely on holistic process management, lean workflows and zero-defect tolerance.

Partner of Choice for a Sustainable Future
The first gearbox for wind turbines was delivered in 1981. Winergy has already delivered over 350 GW of gearbox and generator capacity. Reliable, efficient and with low life cycle costs, Winergy components help convert wind into electricity.

01 | Generator production in Serbia
02 | CMaS Evolution
03 | Visual Service360 Campaign
04 | Product portfolio

Winergy – Flender GmbH

Address	Am Industriepark 2 46562 Voerde
Phone	+49 (0)2871 92 0
E-Mail	info@winergy-group.com
Web	www.winergy-group.com
Category	Suppliers of mechanical components
Profile	Gears
Founding year	1981 (Delivery of the first wind gearbox)

WIWA Wilhelm Wagner GmbH & Co. KG

Your project deserves it.
WIWA produces at its founding location in Lahnau. The spectrum of applications includes painting and bonding in mechanical engineering and vehicle construction as well as large-area and thick-film coatings in the marine and offshore industry, in structural, corrosion and passive fire protection.

As with other steel structures, corrosion protection is at the top of the priority list in wind turbine construction. As a partner of many system suppliers and plant constructors from this industry sector, WIWA attaches great importance to continuous new and further developments. In addition to coating equipment for corrosion protection materials, WIWA supplies state-of-the-art pump technology for conveying epoxy resins and adhesives that are used, for example, in the manufacture of rotor blades in sandwich construction. From basic protection against weathering and defense against mechanical stress to passive and active flame and fire protection – together with international market partners, WIWA develops and implements industry-leading solutions worldwide.

From our European core market, we are successfully expanding into growth markets all over the world. With over 140 qualified employees in Lahnau, our own subsidiary in the USA and global trading partners, we focus on the targeted implementation of future requirements and pioneering solutions.

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01 | WIWA DOSYS XL
02 | WIWA 2K GLASSFLAKE-ANLAGE GX
03 | Corrosion protection of a wind turbine
04 | Wind turbine coating

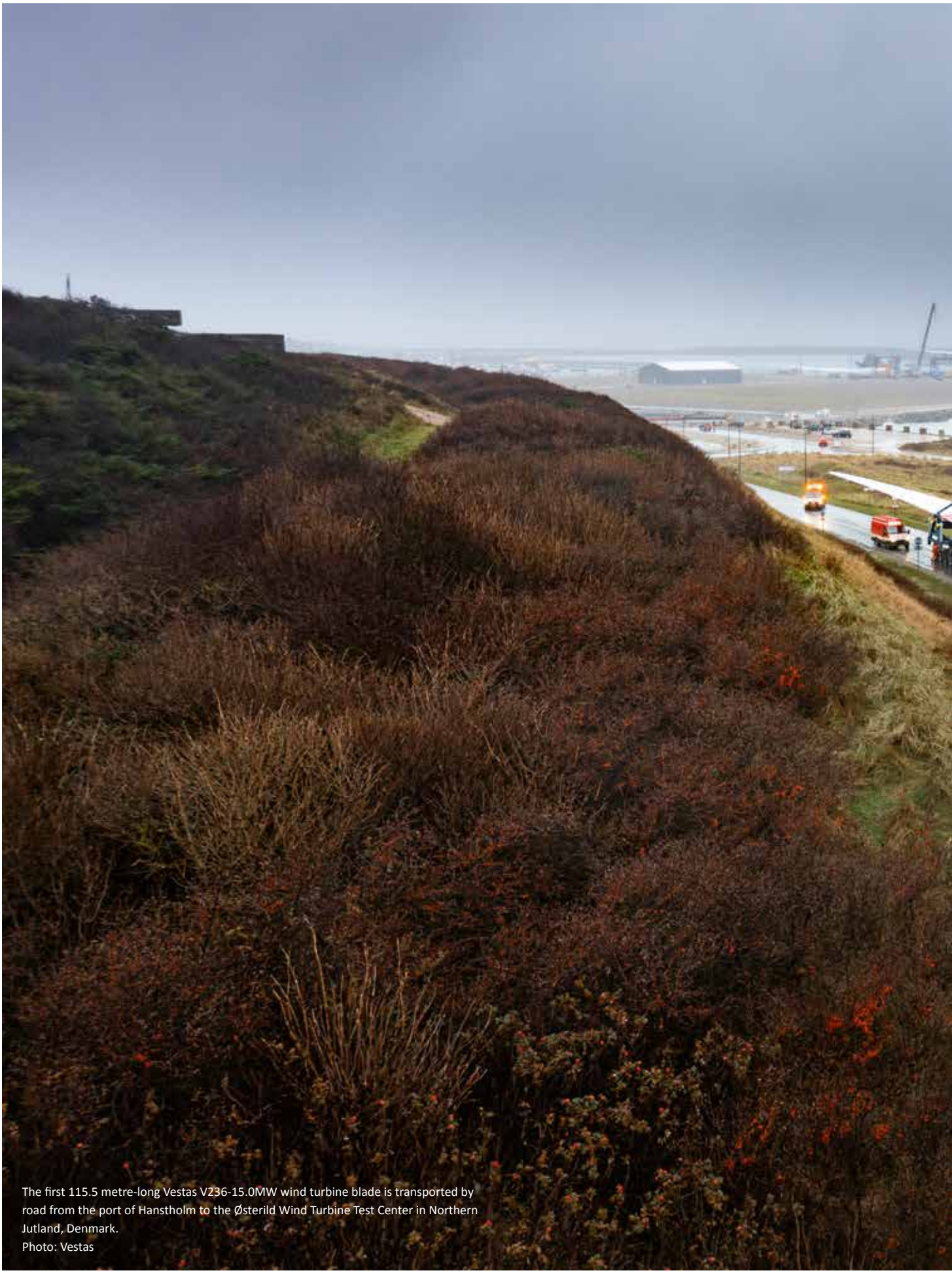
German engineering is capitalized at WIWA and means the consistent effort for highest quality and innovative solutions. Despite growing cost pressure and increasing competition, our customers can rely on the seal “Made in Germany”. When asked how much “Made in Germany” is actually still in a WIWA system, we answer not entirely without pride: Almost 100%!

Trust in the potential of all specialist departments of our company – from design and manufacturing to final assembly, the dispatch department and our service team – and use it for one big goal: your daily success!

WIWA®
Your project deserves it.

WIWA Wilhelm Wagner GmbH & Co.KG

Address	Gewerbestrasse 1–3 35633 Lahnau
Phone	+49 (0)6441 609 0
E-Mail	sales@wiwa.de
Web	www.wiwa.de
Category	Suppliers of mechanical components
Profile	Oberflächentechnik
Employees	140
Founding year	1950



The first 115.5 metre-long Vestas V236-15.0MW wind turbine blade is transported by road from the port of Hanstholm to the Østerild Wind Turbine Test Center in Northern Jutland, Denmark.
Photo: Vestas

COMPANIES:

Service & logistics

Planning, finance, transport, construction and marketing. The fields of planning and operation of wind turbines are a continuous growth market in Germany.

4Cast GmbH & Co. KG

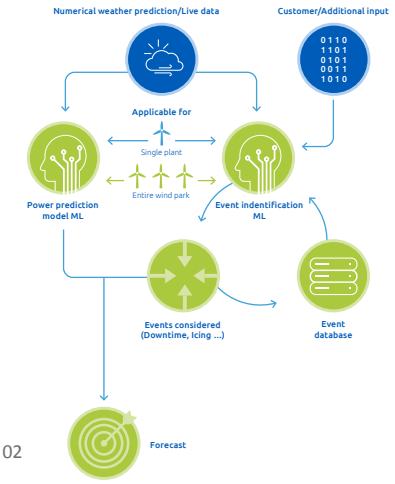
The heartbeat of renewables – making renewable energy predictable
Sustainable and market-optimised trading in wind and solar energy relies on energy yield forecasts. 4cast uses production and weather data to train its proprietary models to make forecasts of unprecedented accuracy.


01

4cast uses a learning algorithm to produce power and yield forecasts for wind power and solar facilities, which can provide you with a realistic estimate of how much energy your wind or solar park will produce within the day, the following day, or over a longer time period. These bespoke forecasts are tailored to the needs of the individual client. To generate their yield forecasts, our machine learning models also take account of the following factors, in addition to weather data and historical and current production data:

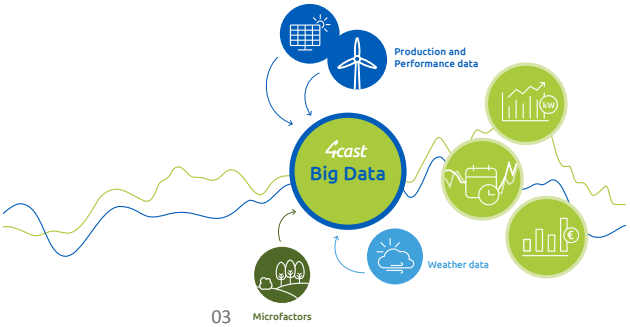
Meteorological parameters:
- Air pressure
- Temperature
- Solar radiation
- Cloudiness
- Wind speed and direction
- Altitude differences

Micro factors / events:
- Topography
- Effects specific to the energy park in question
- Icing
- Shutdown events
- Maintenance
- In-house consumption



02

The prediction accuracy is continuously optimised by regularly re-training the machine learning models. Depending on the client's needs, forecasts can be produced for the entire power generation park or for individual turbines or solar modules. They can be for the same day, next day, or longer-term, and can be optimised to support the maintenance regime or performance on the power markets.



03

01 | The 4cast team
02 | 4cast yield forecasting with machine learning
03 | Big Data Model
04 | Wind and solar energy forecasts

4cast
heartbeat of renewables

4Cast GmbH & Co. KG

Address	Friedrich-Ebert-Str. 8 14467 Potsdam
Phone	+49 (0)331 982 238 30
E-Mail	hello@4-cast.de
Web	4-cast.de
Category	Direct marketing
Profile	Forecasting services providers
Employees	30 (Wind energy: 30)
Founding year	2016

04

ABO Wind AG

Full Service Provider for Wind Farm Development, Construction & Maintenance
ABO Wind is one of Germany's renowned wind energy specialists. The company develops and constructs wind farms; it also offers operational management, service, maintenance and the exchange and repair of large components. Technical solutions such as the ABO lock system round off the product range.

More than 25 years of wind energy expertise
Since 1996 ABO Wind has implemented renewable energy projects amounting to about 5,000 MW; about half of this was constructed in-house. 500 million euros are invested annually. Currently, over 1,000 employees in 16 countries and on four continents work on the development of new wind farms, solar parks and storage systems with a total capacity of more than 21 gigawatts. In addition there are green hydrogen projects with a capacity of 20 gigawatts in the pipeline.

Project development and repowering
ABO Wind initiates wind energy, solar and storage projects, acquires land or existing projects, carries out all technical and commercial planning and engineering, prepares international bank financing and builds the plants on a turnkey basis. Among municipalities, landowners and energy cooperatives, ABO Wind is known as a fair and reliable partner.

Operational management and service
Whether it is remote monitoring, managing legal requirements, or contract management and accounting: The flexible ABO Wind operational management modules offer the perfect fit for every wind farm. In addition, engineers develop smart solutions such as the access control "ABO Lock", which allows operators to control and log access to their wind farms conveniently and without a key. The manufacturer-independent ABO Wind Service offers full and partial service, maintenance, repair, safety checks, inspections and troubleshooting from a single source.

Expert assessments and large components
BWE-listed experts inspect and assess all large components, such as foundations, towers, drive trains or rotor blades. Our experienced technicians exchange and repair gearboxes, generators and main bearings and install expertly repaired components where required.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01 | Technicians repairing a gearbox at the central warehouse in Waigandshain.
02 | ABO Wind Service inspects, tests, troubleshoots and repairs wind turbines across Germany.
03 | Plant operation is monitored from the control room of operational management.


02


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ABO Wind AG

Address	Unter den Eichen 7 65195 Wiesbaden
Phone	+49 (0)611 267 65-0
Fax	+49 (0)611 267 65-599
E-Mail	kontakt@abo-wind.de
Web	www.abo-wind.de
Category	Planning
Profile	Planers & project developers
Turnover	€ 500 million (project volume)
Employees	more than 1,000
Founding year	1996

Alterric GmbH

Wind, Sun, New Horizons: Green Electricity from Alterric
Advancing renewable energies – Alterric projects and operates onshore energy parks in Germany and Europe. Our green power asset: 2,400 megawatts of wind power. Our potential: a wind project pipeline of over 10,000 megawatts and the power combination of the elements wind and sun.


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Strong teams for a green energy future
Alterric has the best prerequisites for a successful energy transformation: three decades of experience in the planning, construction and operation of wind energy plants, plus a solid credit rating, high technical standards and energy industry expertise. Alterric's added value lies in its distinctive interdisciplinary experience, whether it is wind or solar, technical innovation, grid connection, energy trading, electricity storage or a broad range of expanded green power applications.

Things run smoothly with Alterric
The possibilities for productive cooperation are manifold; they range from land acquisition, tendering procedures or repowering to individual participation models. Alterric can also shoulder project development risks in cooperations. Since renewable energies need public acceptance, Alterric relies on dialogue: Our wind farms and photovoltaic parks are convincing to project participants, regional committees as well as citizens as wind farm neighbours. As the operator, we can always be approached on site. For an optimal energy harvest at every location, Alterric plans and builds its energy projects independently of manufacturers.

Alterric GmbH

Address	Holzweg 87 26605 Aurich
Phone	+49 (0)4941 604 1100
E-Mail	kontakt@alterric.com
Web	www.alterric.com
Category	Planning
Profile	Planers & project developers
Employees	400
Founding year	2021

01 | Alterric windfarm in Uetze, Lower Saxony
02 | Expansion target: 100 per cent renewable energies
03 | Teamwork for a green energy future

ARGE Netz GmbH & Co. KG

Ensuring a reliable power supply from 100% renewable energy sources is our great goal! Our route to becoming an energy supplier involves the intelligent networking of renewable electricity sources, the smart expansion of grids, and consumption that meets people's needs.


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ARGE Netz has been an innovative pioneer of renewable energy supply and market access for sustainable companies to all markets since its foundation in 2009. Our goals are to generate 100% of electrical power from renewable energy sources, to strengthen small and medium-sized enterprises, citizen participation, and to create value at the local level.

This is why we develop innovative concepts for a successful energy supply at our locations in Husum and Berlin and offer solutions for the storage and conversion of renewable energy. We have already established a firm foothold in innovative and sustainable markets through our investments and are preparing to enter further markets.

ARGE Netz is a reliable contact partner for businesses, associations, and governing bodies. We ensure that our shareholders are always up to date through frequent communications and the transfer of knowledge and are shaping the energy system of the future. To this end, ARGE Netz offers bespoke consultancy services in the energy sector, specialist events and participation in pioneering projects, technical innovations, and sustainable business models.

Stephan Frense, CEO: “We are a company with a face! We combine our knowledge of a mature industry and the perfect mix of skills needed for tomorrow's energy system in conjunction with a good team atmosphere and the full commitment of every member of staff.”

01 | Visit from Cem Özdemir, © Storyfischer
02 | Haus der Zukunftsenergien Husum

ARGE Netz GmbH & Co. KG

Address	Otto-Hahn-Strasse 12–16 25813 Husum
Phone	+49 (0)4841 894 4665
E-Mail	info@arge-netz.de
Web	www.arge-netz.de
Category	Sector Coupling
Profile	Sector Coupling
Employees	16
Founding year	2009

BDO Oldenburg GmbH & Co. KG Wirtschaftsprüfungsgesellschaft

We're certain that renewable energies are the future.
For many years now we have been specialising in renewable energy sources: we know all about sector coupling and synthetic energy sources as well as hydrogen and other alternative fuels, not to mention energy storage systems and power-to-X technologies.

Ever since the early nineties, BDO Oldenburg GmbH & Co. KG Wirtschaftsprüfungsgesellschaft has been actively involved in shaping the development of the renewable energy sector. We have been advising companies and project teams in the renewable energy sector for many years in relation to auditing, tax advice, legal advice, and corporate finance. In particular, we provide support to citizen wind projects in complying with regulatory requirements.

The BDO Oldenburg GmbH & Co. KG Wirtschaftsprüfungsgesellschaft has regional roots, a strong national presence, and excellent international networks.

By utilising the network of qualified partners and by collaborating with our colleagues at BDO AG Wirtschaftsprüfungsgesellschaft's Energy Industry Centre, we are able to draw upon a wide range of knowledge and guarantee our clients a broad spectrum of industry expertise. We have been organising the “Renewable Energies” forum in Oldenburg with top-class external speakers for many years.

Our main consultancy areas include:

- conceptualisation and participation/ financing concept structuring, in particular in collaboration with citizen energy societies
- business plans, profitability analyses, financial modelling
- compilation of sales prospectuses (VermAnlG, WpPG), and information leaflets (VIB, WIB) for crowdfunding
- support for BaFin proceedings
- company valuations (IDW S1/S10),
- due diligence reviews (tax, financial, legal),
- transaction advice
- yield certificates for extended initial remuneration
- complex tax declarations for investment companies, and
- annual financial statement audits in compliance with VermAnlG regulations

BDO Oldenburg GmbH & Co. KG Wirtschaftsprüfungsgesellschaft

Address	Rosenstrasse 2–4 26122 Oldenburg
Phone	+49 (0)441 980 50 0
Fax	+49 (0)441 980 50 180
E-Mail	erneuerbare@bdo-oldenburg.de
Web	www.bdo-oldenburg.de
Category	Finance & Law
Profile	Tax accountants
Founding year	1995

01 | BDO national and international

BIL eG

Double benefits for the wind energy sector

Since February 2016, nearly 900,000 planning enquiries from more than 50,000 users have been processed successfully using the BIL portal. The cooperatively organised operator community of BIL eG unites all sectors of the supply line infrastructure across all industries.

Wind turbine operators can significantly increase their operational reliability by participating in the BIL process. Since the generation and feed-in points are often located at a great distance from each other, it is particularly important for operators to be clearly identified in order to avoid damage to the underground infrastructure. Lesser-known operators in particular benefit from using the BIL construction enquiry portal, which is free of charge to enquirer, because it gives them a better overview of planned construction and planning activities in their cable area.

Enquirers receive a real-time list of responsible and non-responsible operators as a result of the BIL process when they submit an online enquiry. Automated verification of responsibility using the operator's own data identifies the operators who are actually responsible. Non-relevant construction requests do not reach the operator in the first place, resulting in significant savings in processing time. Even for small grid operators, the significant reduction of so-called zero notices is sufficient to finance the contribution to the BIL process.

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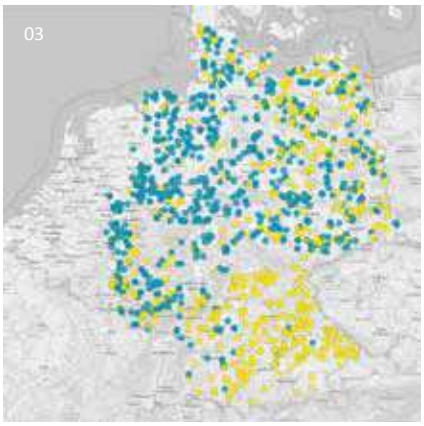

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01 | Planning and building – enquiry types, categories, projects
02 | Enquiry volume 2022
03 | The spatial distribution of wind (blue dots) and solar sites (yellow dots) is not only dependent on solar radiation and wind occurrence, but also on political factors.
04 | Enquiry area wind power

BIL offers a contribution model specifically tailored to the wind power industry. As a cooperative initiative of grid and line operators from all sectors, BIL provides the first online construction enquiry portal in Germany that is free of charge for the enquirer. The common goal is to increase the safety of underground infrastructure by establishing a “single point of entry” for construction enquiries. Currently, more than 130 companies are using the BIL portal to optimize their own planning enquiries process. BIL eG is supported by eight industry associations.

BIL
Die Leitungsauskunft.

BIL eG

Address	Josef-Wirmer-Strasse 1–3 53123 Bonn
Phone	+49 (0)228 92 58 52 90
E-Mail	info@bil-leitungsauskunft.de
Web	www.bil-leitungsauskunft.de
Category	Other services
Profile	Software solutions
Turnover	€ 1.4 million
Employees	6
Founding year	2015

BKW Energy

entrepreneurial – partnership-based – forward-looking
BKW Energy is a member of the BKW Group, an international energy and infrastructure company headquartered in Berne, Switzerland. With its subsidiaries in Germany, France, Italy and Norway the BKW Group employs more than 11,500 people, of which BKW Energy employs approximately 1,000.


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Wind power
Wind power currently accounts for one fifth of BKW's electricity production. BKW currently operates over 40 wind farms in Switzerland, Germany, France, Italy, and Norway in collaboration with its network of companies and partners throughout Europe. With an installed capacity of over 800 megawatts (MW), these facilities generate around 1 terawatt hour (TWh) of electricity per annum, and power around 222,000 domestic consumers.

BKW has been operating in the wind power production sector since 1992 and can boast first-class professional and technical skills and offer a wide range of wind power related services thanks to our comprehensive expertise.

Our industrial DNA enables us to unite the entire value chain in-house:
- Technical and commercial management of wind farms and solar parks
- Maintenance (operation & maintenance)
- Energy trading and distribution

BKW makes sustainable investments in modern hydroelectric power stations as well as wind farms and solar parks
Our strategy going forward is to further expand our portfolio of facilities and services in the relevant markets with a view to becoming a leading European provider in the renewable energy sector. By investing in sustainable energy infrastructure, we are making a further contribution to a decarbonised future.

BKW AG's registered shares are listed on the SIX Swiss Exchange. Our success is partly attributable to our top credit rating (A) and sound risk management practices. Detailed financial information is available on our website.

01 | Wind power service staff
02 | Solar park at Berne airport
03 | A BKW wind farm in Italy

BKW Energy

Address	Hauptstr. 65 12159 Berlin
Phone	+49 (0)30 240 006 010
E-Mail	info@bkw.de
Web	www.bkw.ch
Category	Energy services
Profile	Energy services
Employees	1,000
Founding year	1898


03

Centrica Energy

Energy Movers by Nature

Centrica Energy is a renewable energy trading company operating out of eight offices across all time zones to move energy from source to use. Our mission is to drive the green transition while offering sustainable and predictable energy costs for suppliers and offtakers.

We trade power, gas, and energy attributes, and provide the route to market for our upstream and power generation operations. Providing our clients with the best route-to-market services available today, we integrate sophisticated software, and trade, structure and optimize exposures all the way from long-term risk management down to physical trading seconds before delivery.

Centrica Energy moves energy from source to use – driving the green transition while offering sustainable and predictable energy costs for suppliers and offtakers. Working alongside some of the world's leading energy investors and businesses, we're looking to reshape the energy future and bridge the future to a carbon-neutral economy.

Our Services

Our key competencies in the German market are Direktvermarktung, the marketing of Post-EEG assets, and power purchase agreements (PPAs). Centrica Energy has over 15 years of experience in the PPA business in the Nordic countries where deals with complex structures are part of our day-to-day business.

Currently, Centrica Energy manages a power generation portfolio in Europe of more than 16 GW.


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01 | Turbines field
02 | Turbines in Nature
03 | Turbines
04 | Trading Setup

centrica Energy

Centrica Energy

Address	Esplanade 40 20354 Hamburg
Phone	+49 (0)160 90509308
Fax	+49 (0)40 228 676 95-8
E-Mail	cet-coordination@centrica.com
Web	www.centricaenergy.com
Category	Direct marketing
Profile	Direct marketers
Employees	500 (Wind energy: 30)
Founding year	1998

Connected Wind Services Deutschland GmbH

Service & Maintenance – Large component exchange – Up-tower repairs – Spare parts
Connected Wind Services – progress and innovation since 1987.
We are exploring new ways to optimise the operation of wind turbines in order to support the transition to sustainable energy.


01

With over 30 years of experience, Connected Wind Services is one of the leading independent service providers in the renewable energy sector. We are a top quality single-source provider of everything involved in the maintenance of wind turbines.

Maintenance and servicing are indispensable for the most efficient operation of wind turbines and wind farms. Our core competencies include maintenance and repairs to the base, tower, and rotors as well as the internal components, such as generators and gearboxes, the replacement and provision of spare parts and the refurbishment (repowering) of complete turbines, in addition to retrofitting and fault clearing. However, it is not necessary to wait until the damage has already occurred before repairing turbines:

innovative methods, such as condition monitoring and predictive maintenance, e.g., of wind turbine drive trains, can significantly minimise downtimes and major damage.

We always tailor our solutions and service concepts to reduce downtime and ensure longevity, maximum yields, and resource conservation.

We want to be a driving force for positive change. Having a strong local presence and guided by the principles of trust and transparency, our clients can rely on us. We see ourselves as your professional partner who continuously monitors the condition and performance of your turbines – to ensure that wind is always our strength.

CONNECTED WIND SERVICES

Connected Wind Services Deutschland GmbH

Address	Mühlenberg 19 25873 Rantrum
Phone	+49 (0)4848 90 128-0
Fax	+49 (0)4848 90 128-22
E-Mail	info.de@connectedwind.com
Web	www.connectedwind.de
Category	Operation & Service
Profile	Service, maintenance & repair
Turnover	€ 9.7 million in Germany / € 29.5 million in the group
Employees	70+ in Germany / 180+ in the group (Wind energy: 100 %)
Founding year	1987


02


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04

01 | Connected Wind Services – Advancing your future movement
02 | Service and maintenance
03 | Over fifty service teams will tend to your needs.
04 | You can rely on us to maintain the highest level of safety with dedicated technicians certified to the highest GWO training standards.

cp.max Rotortechnik GmbH & Co. KG

Maximizing rotor performance has been our goal for over 25 years. During this time, we have played a key role in shaping the service for rotor blades and continuously developed new solutions for repair and optimization.

When the rotor blades of wind turbines were still around 20 meters long, cp.max also started out very small. Right from the start, however, we revitalized the industry with a small revolution: the introduction of rope access technology.

Today it is an integral part of the work on wind turbines. And in the years that followed, we continued to develop our skills. We offer our range of services worldwide. At its core it currently comprises:

- Inspection and repair of rotor blades of all (blade and turbine) types
- Flexible, cost- and time-saving rope access and access using work platforms
- Drone inspections
- Balancing the rotor to prevent damage and increase yield
- Yield increase through individually adapted aerodynamic optimisation
- Noise reduction through the installation of Trailing Edge Serrations
- Customer-oriented planning with a personal contact
- Training courses on the inspection, repair and manufacture of rotor blades

Team player

Thanks to our close and trusting contact with well-known designers, as well as manufacturers of rotor blades and wind turbines, we have background knowledge that goes beyond what is customary in the industry. In this way we can, for example, draw connections between damage, manufacturing errors or problems in the design of rotor blades. This contributes significantly to an optimally adapted repair. For over 25 years cp.max Rotortechnik has stood for a balanced combination of experience and innovation with consistently excellent quality.


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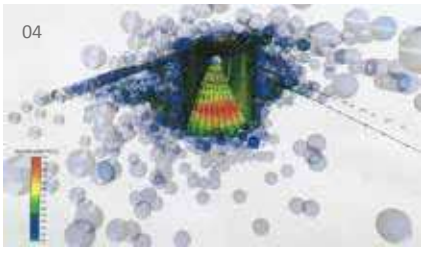
04

01 | With experience, even the biggest damages can be repaired in field
02 | Rope access is flexible, time-saving and cost effective
03 | View from above the clouds
04 | We research and develop on the most exciting topics in wind energy

cp.max Rotortechnik GmbH & Co. KG

Address	Manfred-von-Ardenne-Ring 5 01099 Dresden
Phone	+49 (0)351 85 89 345-0
Fax	+49 (0)351 85 89 345-77
E-Mail	info@cpmax.com
Web	www.cpmax.com
Category	Operation & Service
Profile	Service, maintenance & repair
Employees	60
Founding year	1997

CPC Germania GmbH & Co. KG

Future's in the air

CPC Germania is all about ecological and economic progress, planned and implemented by wind energy pioneers. As a medium-sized family business, we have been setting up wind energy projects since 1993 with passion and expertise, as well as national and international photovoltaic projects since 2018.

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Onshore: woodland, meadow, farmland ...

To the best of our ability, all of our projects are executed in harmony with nature. Whether it be pastureland, arable regions, or wooded areas, we always strive to minimise land use and maximise revenue for our clients and partners. If you own a piece of land that you are not currently using then give us a call.

Career opportunities

It's all in the mix: bright young talents and experienced pioneers in the field of regenerative energy collaborate with each other as equals to develop highly efficient projects. If you'd like to join our team then check out the “careers” section on our homepage. Welcome!

Commercial and technical operational management

The best evidence of our team's capabilities, both commercially and technically, are the hundreds of megawatts of wind energy and photovoltaics both in our own portfolio and in our third-party operational management activities. For CPC Germania, maximum availability and efficiency are a matter of course.

Investment

Energy projects involve long-term investments. Reliable planning and implementation as well as punctuality all the way from land acquisition to commissioning not only secure these investments, but also ensure that the future will be powered by green energy.

CPC Germania GmbH & Co. KG

Address	Max-Born-Strasse 1 48431 Rheine
Phone	+49 (0)5971 8608-0
Fax	+49 (0)5971 8608-60
E-Mail	info@cpc-germania.com
Web	www.cpc-germania.com
Category	Planning
Profile	Planers & project developers

04

01 | Lakiakangas wind farm, which was developed in collaboration with Google and the Helsinki Municipal Utilities corporation (HELEN).
02 | Hüselitz wind farm
03 | Franz-Tacke-Haus®, headquarters of CPC Germania
04 | Solar farm in the Izmir region (Turkey)

Deutsche Windtechnik AG

Independent full scope O&M provider for multibrand WTG technologies on-/offshore
Deutsche Windtechnik is an independent specialist in the technical maintenance of wind turbines. Over 2,200 employees ensure that more than 8,000 wind turbines operate reliably around the clock. Our system technology focusses on Vestas, Siemens, Nordex, Senvion, Fuhrländer, Gamesa, Enercon and GE.

Comprehensive expertise, flexibility and more value for lower costs – this is what sets apart the quality of our service. With our diverse range of core competencies, we are able to offer the full package of services from a single source. We now service over 8,000 wind turbines as part of permanent maintenance contracts (basic maintenance and full service). Our objectives are to ensure technical systems operation and to carry out our work in the most cost-efficient way possible.

Independent O&M worldwide
Our decentralised service network enables us to move swiftly between the customer, the wind turbine and spare parts warehouses. Our company's head office is based in Bremen, Germany. In addition, Deutsche Windtechnik is also active abroad: locations in Denmark, France, The Netherlands, Poland, Sweden, Taiwan, United Kingdom and the United States provide the foundation for high-quality system maintenance around the world.

Full scope from A to Z
Whether it is the entire wind turbine, the control system, nacelle, rotor or the foundation, from large components to the smallest electronic components, our team of experts understands your wind turbine portfolio and can provide economic benefits from a service point of view. Onshore and offshore.

Our range of services includes:
- Individual, needs-based and modular service offering from the basic service to the full maintenance contract, which also covers external damage including major components.
- Repair and optimization
- Control and power electronics
- Technical engineering, e.g. own development of ADLS system
- Expert appraisals for a range of scenarios
- Offshore operations management
- Repowering
- Development and sale of spare parts

All services are freely combinable.


01

01 | More than 400 service teams operate for Deutsche Windtechnik internationally.
02 | Our day-to-day business includes the planning and implementation of maintenance, repair, upgrading and inspection procedures.
03 | Deutsche Windtechnik offers the complete service for offshore wind farms as well from foundation, to turbine, to blade, to offshore substation.


02


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Deutsche Windtechnik AG

Address	Stephanitorsbollwerk 1 (Haus LEE) 28217 Bremen
Phone	+49 (0)421 69105 0
Fax	+49 (0)421 69105 499
E-Mail	info@deutsche-windtechnik.com
Web	www.deutsche-windtechnik.com
Category	Operation & Service
Profile	Service, maintenance & repair
Turnover	€ 265 million (in 2021)
Employees	2,200
Founding year	2004

Dolezych GmbH & Co. KG

Simple and safe lifting and transporting.
For 88 years this is what Dolezych has stood for.


01


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Bigger, more powerful, heavier: the requirements in the wind industry are visibly growing. Dolezych supports the industry with safe solutions for the assembly, transport and maintenance of wind turbines. The wind energy product range includes, for example, textile slings, (special) lifting gear, grabs and lifting points for easy, safe transport and lifting of tower segments. For customer-specific, special challenges, Dolezych offers individualized special designs and load lifting devices.

Innovative materials make users' working lives easier. Many heavy-duty products have become significantly lighter thanks to UHMW-PE high-performance fibers. Whether round slings or sling ropes, these high-tech products have other outstanding properties in addition to their lower dead weight, such as being low-wear and very compact despite particularly high load capacities.

Do*Ultra* round sling
The UHMW-PE Do*Ultra* round sling has a hard-wearing, braided hose. This ensures that it stretches with the load and is therefore less stressed at the stressed bearing surfaces. In addition, the Do*Ultra* hose prevents wrinkling at the suspension point. Together with the smaller support width in the crane hook, both result in a longer service life.

Do*TEXtreme* and Do*TEXtreme* LMT
These textile load slings and grummets, also made of high-performance fibers, achieve weight savings of up to 60% compared to steel slings or grummets. This ensures easy handling and protects surfaces of sensitive loads.

Do*Nova*®: textile chain systems
The back-friendly, feather-light textile chain systems Do*Nova*® (available as sling or lashing chain) enable sensitive loads to be lifted gently and the heaviest transport loads to be secured.

01–04 | Slings and lifting tools for wind energy


03


04

Dolezych
EINFACH SICHER

Dolezych GmbH & Co. KG

Address	Hartmannstraße 8 44147 Dortmund
Phone	+49 (0)231 82 85 -0
Fax	+49 (0)231 82 77 82
E-Mail	info@dolezych.de
Web	www.dolezych.de
Category	Transport & Logistics
Profile	Lifting technology & crane systems

DZ BANK AG

Sustainable. Together.
DZ BANK has been a reliable partner for the financing of wind power plants for over 25 years. Together with the companies of the cooperative financial network and the local cooperative banks (Volksbank Raiffeisenbank), we offer individual financing solutions.

01 | DZ BANK Renewable Energies

DZ BANK

DZ BANK AG

Address	Platz der Republik 60265 Frankfurt
Phone	+49 (0)69 7447-01
Fax	+49 (0)69 7447-1685
E-Mail	ee_finanzierung@dzbank.de
Web	www.dzbank.com
Category	Finance & Law
Profile	Banks, financial institutions & financial service providers
Employees	5,400

DZ BANK AG, Frankfurt am Main, is majority-owned by those who work directly with it – the more than 700 cooperative banks in Germany. As a central bank and central institution, its mandate is to support the business of the many independent cooperative banks in the regions and to strengthen their competitive position. The combination of local customer knowledge and central product expertise has proved to be highly effective.

DZ BANK's range of services extends from traditional and innovative products, structuring and issues, to trading and sales in the equity and bond markets. In addition, as a corporate bank, DZ BANK serves companies and institutions that require a supra-regional banking partner.

DZ BANK also assumes the holding function within the DZ BANK Group. The companies in the DZ BANK Group include Bausparkasse Schwäbisch Hall, DZ HYP, DZ PRIVATBANK, R+V Versicherung, TeamBank, Union Investment Group, VR Smart Finanz and various other specialist institutions. With its comprehensive range of financial services, the DZ BANK Group supports the cooperative banks in retail banking, corporate banking, capital markets and transaction banking. This enables them to offer their customers a complete range of outstanding financial services.

EMD Deutschland GbR

windPRO, windOPS, energyPRO – Training and Support
EMD Deutschland is the exclusive sales agency and training provider of EMD International A/S for Central Europe, the Balkan states and the German-speaking countries.

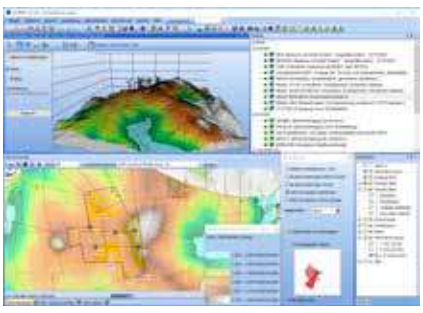
windPRO – software for wind energy project design and planning
windPRO is a module-based software package suited for project design and planning of wind farms and photovoltaic power plants. windPRO covers different areas, from energy yield calculations via wind data analysis, performance checking and environmental impact calculations to grid connection calculation. With its integrated online data services, a user friendly interface and continuous development to integrate new research and knowledge, it is now the world leading software for wind energy project design. windPRO is used by project developers, independent experts, WTG manufacturers, grid operators, banks, authorities and others.

energyPRO – software for the simulation of distributed energy systems
energyPRO is the most advanced and flexible modelling software for combined techno-economic optimisation and analysis of a variety of heat, CHP, process and cooling related energy projects. In energyPRO you can model virtually any type of technologies from well-known, fossil fuel based production units to state-of-the-art renewables.

windOPS – web software for performance analysis of your wind farm
windOPS is a web-based wind power management and analytics software service developed for the daily performance monitoring and to compare, analyse and report operational and financial data for wind farm assets on a regular basis. Present and past operation data of WTGs from different manufacturers are shown in a unified view and summarized in a well-arranged portfolio view.

01 | Our software for decentral energy systems, PV plants and wind farms
02 | Photorealistic visualisation for PV plants and wind farms

01



02

EMD Deutschland GbR

Address	Breitscheidstrasse 6 34119 Kassel
Phone	+49 (0)561 31059-60
Fax	+49 (0)561 31059-69
E-Mail	emd-de@emd.dk
Web	www.emd.dk
Category	Other services
Profile	Software solutions
Turnover	> € 5 million (EMD Int. A/S)
Employees	10 (EMD Deutschland) (Wind energy: 6)
Founding year	1999

EnBW Energie Baden-Württemberg AG

Climate protection with tailwind

EnBW Energie Baden-Württemberg AG supplies around 5.5 million customers with electricity, gas and water and with energy-related services and products. One important goal is to make the opportunities of the sustainable new energy world available to people.

01 | With 24 turbines, the Buchholz wind farm in Lower Saxony is one of EnBW's largest.
02 | The special vessel Bibby Wavemaster Horizon ensures operation and maintenance at the offshore wind farms EnBW Hohe See and Albatros.

Competent partner with know-how for third parties and abroad

With around 27,000 employees, EnBW Energie Baden-Württemberg AG supplies around 5.5 million customers with electricity, gas and water as well as energy solutions and energy-related services. Installed capacity from renewables will be 50 % of the total portfolio at the end of 2025. EnBW aims to achieve climate neutrality within the meaning of the Paris Agreement by 2035 at the latest.

Onshore, EnBW has currently expanded its portfolio across the Group to around 1,031 MW, around 735 MW of which are installed in Germany. In addition to the development, construction, operation and direct marketing of new wind farms, we are also available to third parties as an experienced partner with our know-how for existing wind farms.

In the field of offshore wind power, EnBW was one of the pioneers with Baltic 1, Germany's first commercial wind farm. At the end of 2025, the offshore wind farm “He Dreiht” with a capacity of 960 megawatts is to be connected to the grid without government subsidies.

In the expansion of renewable energies, we are focusing on the core country of Germany, but also on selected foreign markets. In addition, in 2021 and 2022 we were successful together with our partner bp in securing the land rights for an area off the east coast of Scotland for the development of the “Morven” offshore wind farm, and in the Irish Sea for the “Morgan” and “Mona” projects. Three projects with a total capacity of up to 6 gigawatts are thus pending there.

In the onshore sector, we are active through national companies in France and Sweden. In Sweden, for example, a portfolio of over 100 MW has already been developed through the purchase of ready-to-build project rights and existing wind farms.

EnBW Energie Baden-Württemberg AG

Address	Schelmenwasenstrasse 15 70567 Stuttgart
Phone	+49 (0)711 289 487 87
E-Mail	windkraft@enbw.com
Web	www.enbw.com/windkraft
Category	Energy services
Profile	Construction, operation, direct marketing
Turnover	€ 56 billion (12.2022)
Employees	27,000 (12.2022)
Founding year	1997

enercity Erneuerbare GmbH

Full wind ahead – for 100 % renewable energy!
It is not renewables that are in short supply, but time. We are growing at full speed to preserve and strengthen the wind energy industry. We are driving forward the energy transition by opening up suitable sites for onshore wind and ground-mounted photovoltaics (PV).

We develop and operate large-scale onshore wind projects and free-standing PV installations, implementing also difficult projects at unusual locations, such as the construction of wind farms on disused open-cast mining sites which is one of our specialities. In these projects, partnership-based collaboration is our highest priority.

Project development & operational management
Turn your property into a gold mine! We exploit local potential, always in close collaboration with the local public, landowners, and municipalities. When planning wind farms, we place great emphasis on collaboration, focusing on transparency and fairness so that all stakeholders benefit from a smooth and efficient project development based on our 25 years of experience in the industry.

After commissioning we provide you with qualified and tailored support for the techical and operational management of your business. Partner with us to optimise your long-term energy yields!

Our services include but are not limited to:

- Site selection, assessment, and acquisition
- Planning and approval
- Construction and commissioning
- Repowering
- Accounting, controlling, finance, and contract management.
- Insurance and claims management.
- Energy management, 24/7 remote monitoring, and on-site service
- Technical management, reporting and monitoring in compliance with the German Federal Immissions Act (BImSchG)

Portfolio
Our portfolio of wind farms, some owned and some operated for third parties, currently comprises 430 wind turbines in 100 wind farms. With a nominal capacity of just under 950 MW, we can supply approximately 640,000 households (2,500 kWh/a consumption) with green electricity.

enercity Erneuerbare GmbH is a wholly owned subsidiary of enercity AG.


01

01 | A bright outlook for the energy transition
02 | We rely on the combination of wind and photovoltaic energy
03 | 17 Vestas V112 turbines rotate in the snow-covered Groß Eilstorf wind farm


02


03

enercity erneuerbare

enercity Erneuerbare GmbH

Address	Nessestrasse 24 26789 Leer
Phone	+49 (0)491 91240 600
E-Mail	info@enercity-erneuerbare.de
Web	www.enercity-erneuerbare.de
Category	Planning
Profile	Planers & project developers

Energiequelle GmbH

Energy transition? We're doing it.
Energiequelle GmbH has been active in the renewable energies market since 1997. We are an industry leading company with over 450 employees in four countries and more than 800 installed wind turbines – passionate, bold, and innovative.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An experienced full-service provider
We have been implementing renewable energy projects for more than 25 years. We develop, build, and operate wind energy and photovoltaic plants, transformer stations, and energy storage systems at our 21 locations in Germany, France, Finland, and Poland. We also develop innovative energy supply solutions, repower older facilities and supply our customers with sustainably produced green electricity via our subsidiary eqSTROM.

We manage the electrical, technical, and commercial aspects of over 800 power production facilities. Our customers attest to our excellent customer service performance and praise our high level of customer friendliness, accessibility, and constant reliability.

In terms of funding and sales, we maintain long-term, collaborative relationships with plant manufacturers, credit institutions, and investors, the result of which are innovative and bespoke funding solutions for our domestic and overseas customers.

Collaboration and project purchasing
In addition to maintaining existing project development partnerships, we place great importance on continuously expanding our partner portfolio with a view to pooling our expertise and collaboratively driving projects forward.

We are happy to bid on national projects as well as foreign rights packages at any stage.

New business unit for innovative energy concepts
Our business development team is working on the extension of our energy source portfolio, which includes self-supply solutions for industrial and commercial clients in the electricity, heating, and mobility sectors, as well as the implementation of power-to-X projects.

References
To date we have installed over 1.600 MW of power generation capacity. We have also built and are operating a 10 MW lithium-ion storage system and a power-to-heat system in Feldheim, an energy self-sufficient village in Germany.

03

We currently have a power plant under construction in Lusatia for the production, utilisation, storage, and reconversion of hydrogen.

Corporate expansion plan

We are currently focussing on the strategic expansion of our activities both at home and abroad. More specifically, we plan to expand into at least three more countries and to double our staff count to 800 over the next five years, which is why the four former division heads took up their new activities in the recently created Executive Board on the first of May. The new Energiequelle GmbH management team consists of Gregor Weber (Project Management), Lars Schiller (Operations Management), Maik Pytzka (Sales and Finance) and Dirk Meiser (Central Functions), together with Managing Director Michael Raschemann.

Business areas

- Wind power
- Photovoltaics
- Biogas
- Grid connection
- Energy storage
- Electricity sales and distribution
- Innovative energy concepts

Services

- Project development
- Management
- Financing & sales
- Repowering
- Project purchasing & collaborations

04

Personal, fair, and down-to-earth

Our corporate philosophy has remained unchanged since the company was founded. Notwithstanding the strong growth we have experienced, we remain a family-owned company and cultivate personal interactions both with our partners and among ourselves. It is important to us to work on an equal footing in a mutually honest and fair manner and to be reliable at all times. It is this that binds us together in our shared mission.

05

01 | Energiequelle has constructed in excess of 800 wind turbines.
02 | Energiequelle has a large PV pipeline
03 | Operations management staff
04 | Sites
05 | Energiequelle GmbH's new management team, from left: Dirk Meiser, Gregor Weber, Lars Schiller, Maik Pytzka, Michael Raschemann

energiequelle
TOMORROW'S ENERGY.

Energiequelle GmbH

Address	Hauptstrasse 44 15806 Zossen OT Kallinchen
Phone	+49 (0)3376 9871 100
Fax	+49 (0)3376 9871 105
E-Mail	info@energiequelle.de
Web	www.energiequelle.de
Category	Planning
Profile	Planers & project developers
Turnover	approx. € 213 million
Employees	450
Founding year	1997

ENERTRAG SE

One form of energy ahead
ENERTRAG is your partner for renewable energies. All across the globe we ensure the participatory planning, reliable construction and operation, and efficient maintenance of energy plants and grids, including fully interconnected power facilities.

01

As far as ENERTRAG is concerned, renewable energies are more than just a business model. We have been passionately refining new technologies to bring about the energy transition for 25 years: we are making green hydrogen a realistic proposition, decarbonising CO_2-intensive industries, and providing all services involved in sector coupling projects worldwide.

ENERTRAG Projects
From the original concept to power production: anyone who wants to construct renewable energy facilities needs competent partners. We have a thorough knowledge of everything involved throughout the project value chain and have extensive experience in project planning, plant operation, and technical system optimisation. We take a holistic approach integrating wind power and photovoltaics with green hydrogen and innovative technologies to produce reliable and cost-effective electricity, gas, and heat. Another aspect of our success is our focus on species and nature conservation measures, broad public participation, and fair ownership agreements.

ENERTRAG Operations
If you want things to virtually run themselves, rest assured: ENERTRAG guarantees the smooth operation of renewable energy facilities. Working out of six locations around Europe, we currently operate in excess of 1200 wind turbines of different types on behalf of our clients, always in a profitable and efficient manner and based on accredited procedures and processes. Our operational management service is built around transparent reporting, continuous yield optimisation, and targeted maintenance including regular inspections by drones.

Our service offering includes individually packaged technical and commercial operational management for wind turbines, but also for photovoltaic facilities, hydrogen, substations, P2X, battery storage, and biogas.

ENERTRAG Software
We let the data speak for itself: the ENERTRAG Powersystem is a platform we have developed for networking renewable energy facilities and optimising their operational management. The software is used by operators, asset managers and direct marketers for accurate billing, minute-by-minute remote control, and permit compliance monitoring. It also automates recurring processes and identifies weak points and opportunities for improvement.

ENERTRAG Service
Things are moving in the right direction: the future potential of wind energy is currently greater than ever before. To keep

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the wind turbines running consistently and profitably, reliable maintenance and servicing is indispensable. Working out of 16 German service stations as well as from bases in France and South Africa, ENERTRAG provides manufacturer-independent and individual support for wind turbines. We carry out repairs and troubleshooting as well as the non-destructive testing of materials and install spare parts and large components all over the world. We also offer an environmentally friendly dismantling service.

ENERTRAG Technology

Perfect timing: the flashing red lights mounted on wind turbines can be perceived as disturbing by people in the surrounding area. ENERTRAG uses “pro-candela” to provide innovative lighting concepts for wind turbines. Our “DARK SKY®” system enables demand-controlled night marking, which is only activated when an aircraft approaches thus reducing light emissions by up to 98 percent and increasing public acceptance of wind energy.

Why you can rely on us?

Because our annual production of 1.6 terawatt hours, our own portfolio, and a service network of more than 1,200 wind turbines mean that we know first-hand what is important.

06

01 | ENERTRAG wind turbine in Brandenburg/ Germany
02 | ENERTRAG operations: 2in1 Drone Inspeltions incl. Lightning Protection Measurement
03 | ENERTRAG Service: Bespoke maintenance and servicing
04 | ENERTRAG Software: Our POWERSYSTEM creates a network between facilities and optimises their operational management.
05 | ENERTRAG wind turbine in Brandenburg/ Germany
06 | ENERTRAG Technology: The Dark Sky transponder system

ENERTRAG
One energy ahead

ENERTRAG SE

Address	Gut Dauerthal 17291 Dauerthal
Phone	+49 (0)398 546 459-0
Fax	+49 (0)398 546 459-410
E-Mail	enertrag@enertrag.com
Web	www.enertrag.com
Category	Planning
Profile	Planers & project developers
Employees	over 900
Founding year	1998

ENGIE Deutschland Erneuerbare GmbH

ENGIE – Your reliable and long-term partner for renewable energies
We develop projects ourselves and cooperate with project developers to build and operate plants. Marketing is handled by our trading experts, who also optimize our partners' revenues with customized models such as direct marketing or green PPAs.

01

01 | Repowering Karstädt wind farm (Brandenburg)
02 | Dismantling of old plants, Karstädt

Are you looking for a reliable partner for investments in or the development of wind projects?
In Germany, we plan, build and operate ground-mounted solar arrays and onshore wind farms and invest in projects. In doing so, we combine our experience from decades of partnerships with local energy suppliers with the comprehensive technical and commercial expertise and know-how of a global market leader in renewable energies.

EnergyRisk Awards 2023 Winner
Deal of the year ENGIE

Over 5,000 ENGIE employees are working with partners in the Renewables division to accelerate climate change. For this, we rely on the pioneering spirit we have retained since the company was founded in 1858 to build the SUEZ Canal. Today, our mission is to accelerate the energy transition. To do this, we rely on photovoltaics, onshore and offshore wind and hydropower. We are continuously expanding our renewable generation activities, and we offer green energy solutions for companies and municipalities.

As a reliable partner, we offer all services from a single source – from the acquisition of land to the planning, approval, construction and operation of the plants to the marketing of the green electricity. We get involved in project development at an early stage. In this way, we optimise the conditions for development and procurement and minimise the risks. With flexibly adaptable models of public participation, we involve the local residents and increase acceptance for the energy transition.


02

As the operator of 18 wind farms in Germany, we know all the levers for optimising commercial and technical operational management. In the background, we have the experience of the ENGIE Group with thousands of wind turbines. The Group's testing and materials laboratory and technical experts provide all the information needed for the best possible operation.

Direct marketing and PPAs

As one of the largest electricity market participants, we at ENGIE have concluded over two gigawatts of Power Purchase Agreements with a total volume of 90 terawatthours in over 20 countries. Our central trading platform in Brussels is staffed around the clock and has access to all European electricity markets, from forwards to the intraday market.

We offer individually designed models for plant operators who want to optimise the revenues from their wind farms, gain long-term planning security and at the same time fulfil the legal requirements:

- Direct marketing
- Short-term PPAs for post-EEG installations
- Long-term PPAs for new installations without subsidies
- PPAs for subsidised installations

ENGIE's renewables target for 2030

- 80 GW installed renewable capacity, of which 32 GW wind onshore
- 10 GW battery storage capacity
- 4 GW production capacity for green hydrogen

Do you have any questions? Please feel free to contact us:

Business Development:
Nikolaus Kraus, Director Business Development Renewables
nikolaus.kraus@engie.com

PPA and Direct Marketing:
Tobias Heyen, Head of Renewables Origination Platform Germany
tobias.heyen@engie.com

ENGIE Deutschland Erneuerbare GmbH

Address	Ella-Barowsky-Strasse 44 10829 Berlin
Phone	+49 (0)30 91581 0250
E-Mail	alexa.schroeder@engie.com
Web	www.engie-erneuerbare.de
Category	Energy services
Profile	Construction, operation, direct marketung marktung

EP New Energies GmbH

Perhaps the most important energy transition project in Germany
Largest renewable energy project pipeline in Germany on fully secured land. As a project developer for renewable energies, we are shaping the energy future.


01

01 | Visualisation Forst-Briesnig 2
02 | Project planning
03 | Visualisation of floating PV, Cottbusser Ostsee

EP New Energies GmbH is one of the leading full-scope project developers for renewable energies. Our focus is on the technologies of onshore wind energy, ground-mounted photovoltaics (PV) and Floating PV.

REGIONALLY ROOTED
We transform the opencast mining and power plant regions in Lusatia and Central Germany into ultra-modern renewable energy landscapes, for example, with the Forst-Briesnig 2 wind farm (102 MW), the Bohrau energy park (400 MWp), the Cottbuser Ostsee floating PV plant (29 MWp) or the "customised green solar park" in Dissen, which is characterised by various species and nature conservation measures in accordance with the EPNE species protection concept. In doing so, we bring the necessary power for a superlative energy transition project.


02

EXPERTISE FOR ALL CASES
EPNE manages renewable energy projects from identification and acquisition, through the development and construction of the projects, to the start of the operating phase. In doing so, we rely on our broad expertise:

- Large-scale wind and solar projects
- Complex soil conditions
- Permits based on various legal procedures

EP New Energies

EP New Energies GmbH

Address	Köpenicker Strasse 54 10179 Berlin
Phone	+49 (0)30 767 584 570
E-Mail	info@epne.de
Web	epne.de
Category	Planning
Profile	Planers & project developers


03

FGH – Research Association for Power Systems and Power Economics

Safe grid integration – knowledge, research & network since 1921
The safe and successful integration of renewable energies into the electrical grids, the further development of the energy technology systems required for this, as well as their testing and certification distinguish us.

Benefit from FGH's many years of experience, our proven and recognized expertise in four lines of competence:

1. Power Systems Technologies
We specialize in the standard-compliant design, installation, and testing of power generation plants and primary/secondary technical equipment. For manufacturers and operators of power generation plants as well as grid operators we prepare electrotechnical engineering services, inter alia grid connection studies, cable dimensioning, control concepts, electrical design planning, due diligence analyses, grid code analyses, simulation models, and support in proving grid connection compliance – nationally and internationally.

2. Testing & Certification
With our accredited test laboratory, we offer manufacturers and project planners conformity declarations and type tests for power generation plants and for components of protection and control technology as well as certifications of power generation units or plants and storage systems in accordance with national and international grid codes, e.g. VDE-AR-N 4110/4120. Our independent certification body is the world's first accredited institution for grid connection certification.


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3. Electrical Grids
We are actively shaping the successful transformation of power grids as part of the energy transition. Through research projects, software tools such as INTEGRAL, InterAss, or solutions for redispatch optimization as well as comprehensive grid and system studies, we effectively and efficiently support the work of German and European transmission and distribution system operators.

4. Academy
With its multifaceted practice-oriented training program, the Academy rounds off our service portfolio.

01 | One FGH – four lines of competence
02 | Reliable grid integration of all technologies: Wind energy, photovoltaics, combustion engines
03 | Grid Code Compliance Experts
04 | Accredited testing laboratory & certification body


03


04

FGH e.V. & GmbH – Forschungsgemeinschaft für elektrische Anlagen und Stromwirtschaft

Address	Voltastr. 19–21 68199 Mannheim
Phone	+49 (0)621 976 807-10
Fax	+49 (0)621 976 807-70
E-Mail	info@fgh-ma.de
Web	www.fgh-ma.de/en
Category	Planning
Profile	Grids & grid connection
Turnover	€ 13.5 million (consolidated)
Employees	129
Founding year	1921

GP JOULE GmbH

100 % renewable energies for all!
GP JOULE produces and markets wind and solar power, green hydrogen and district heating and uses the energy where it is most effective: in the mobility sector, in domestic households, and in the industrial sector. From its base in Germany, GP JOULE has been shaping Europe's future energy system since 2009.


01

01 + 02 | GP JOULE SERVICE

Using their knowledge and experience with RE projects, two agricultural engineers, Heinrich Gärtner and Ove Petersen, decided to found a company in 2009 and to name it after their initials: GP JOULE.

Their vision is to supply the industrial and transport sectors and the rest of society with energy from 100% renewable sources. Their approach is based on respect for all partners and a sense of responsibility towards the environment and future generations.
It was with these values in mind that GP JOULE was launched. As early as 2010, they had already installed solar and biogas facilities with a combined capacity in excess of 100 MW. In 2011, the largest solar park in Germany at the time was built on the spoil heap of a former opencast lignite mine and had a total output of 140 MW, of which GP JOULE was responsible for the installation of 70 MW. New green energy is replacing legacy energy.

GP JOULE entered the green hydrogen business in 2012, the same year in which the first wind farm planned by GP JOULE was connected to the national grid and the first GP JOULE solar farms began operations in Italy and France. And the trend continued: GP JOULE expanded into Canada and the USA, and later into Ireland and Italy, where they also planned, designed, and installed solar parks.
The green revolution is everywhere.

And GP JOULE did not stop there: a separate division known as CONNECT was founded to focus on e-mobility and charging solutions, a revolutionary hydrogen project called eFarm was pushed forward (and was awarded the German Mobility Prize in 2022), and GP JOULE is currently involved in one of the largest solar parks in Germany in Klettwitz in the Lusatia region, on another former lignite mining site, but this one will produce an impressive 300 megawatts.

GP JOULE
TRUST YOUR ENERGY.

GP JOULE GmbH

Address	Cecilienkoog 16 25821 Reussenköge
Phone	+49 (0)4671 6074-0
Fax	+49 (0)4671 6074-119
E-Mail	info@gp-joule.de
Web	www.gp-joule.de
Category	Planning
Profile	Planers & project developers


02

Grzib Elektrotechnik GmbH & Co. KG

Service provider with more than 20 years of experience in the wind industry
We are not only available in Germany, but also in other European countries:
So far, we have successfully installed around 3,300 wind turbines all over Europe.

The requirements for the planning and construction of a wind farm are diverse. Especially the external parties involved must be reliable, flexible and professional, as well as possessing a certain level of know-how so that the project can be completed successfully and without disruptions. With us, our customers have found a competent and flexible partner. We know the challenges in project planning and offer a customer-oriented execution of services to avoid disturbances and difficulties.

But not only our flexibility is one of our strengths – our range of services is also convincing:

Services in the low-voltage range
- Visible installations such as inner and outer tower lighting
- Cabling of power cables (Connection converter to transformer)
- Implementing transformer and plant protection

Services in the medium-voltage range
- Connection of medium-voltage switchgear to transformer
- Commissioning of transformers and medium-voltage switchgears
- Switching operations in the medium-voltage range up to 36 kV
- Implementation of earthing and lightning protection concept

Work in the field of measurement and control technology
- Cabling of superior parking controllers and their signal exchange

Maintenance and service of transformer, medium-voltage switchgear and converter

01 | Andreas Grzib (Managing Director)
02 | Lothar Grzib (Founder & Managing Director)


01


02

ELEKTROTECHNIK GRZIB

Grzib Elektrotechnik GmbH & Co. KG

Address	Zur Kokerei 21 46117 Oberhausen
Phone	+49 (0)208 884 839-24
Fax	+49 (0)208 884 839-26
E-Mail	info@grzib-elektrotechnik.de
Web	www.grzib-elektrotechnik.de
Category	Operation & Service
Profile	Service, maintenance & repair
Founding year	1998

Green Wind Group

With the power of wind and sun.
100 % Renewable! That is what the Green Wind Group team is dedicated to – from project development to operational management, maintenance management offshore to engineering services, from hydrogen projects to sector coupling. All supported by the independent 24/7 “greenwind control room”.

01

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“Even after over ten years of working together, we always have an ace up our sleeve for Green Wind.” Owner and Managing Director of the Green Wind Group, **Martin Kühl,** and his partner **Manuel Lasse** fully agree: “Our think tank is full to the brim. We place particular importance on maintaining an open and trusting working relationship with the team and our partners, ensuring that our projects are future-oriented, and making a significant contribution to the environment!”

Renewable energy projects with Green Wind Energy
“One of our most important concerns in project development – also if there are headwinds – is fairness, especially in collaboration with authorities and municipalities.“ **Pascal Peters,** project developer at the new site in Lübeck and project developer **Marie-Luise Mörk** agree that “this facilitates our work, which ranges from securing land to project implementation.” **Maximilian Horn** is in charge of construction management and is currently working at the wind farms in Freudenberg and Schrepkow.

Asset Management with Green Wind Operations
Milos Wimhöfer, Head of Commercial Management, is committed to bringing about a liveable future: “We ensure that the correct financing is in place and employ a forward-looking asset management strategy to achieve long-term income security all whilst keeping an eye on our clients' liquidity.”

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01 | Everything from a single source: project development, construction, operational management, and engineering services.
02 | No Green Wind project without a Green Wind team.
03 | Future now! To ensure that the latest generation will be the first to experience a world powered by 100 per cent renewable energy sources.
04 | We are harnessing wind and solar power to drive forward the energy transition!
05 | Always an ace up our sleeve: Green Wind founders Martin Kühl and Manuel Lasse.
06 | The complete programme for Denmark: Torben Post and Flemming Reinholdt.

Technical Operations Management with Green Wind Operations
Robert Kadereit is Deputy Head of Technical Operations, providing "intensive care and support aimed at a long and problem free service life for wind turbines and substations." Technical Operations Manager, **Janina Menke,** adds that: "We also offer a continued operations service. We meticulously study the applicable legislation and contracts and get the most out of wind turbines", which are currently producing around 750 MW of onshore power in Europe.

H2 with Green Wind Innovation
Kilian Fromm develops projects in the field of hydrogen & sector coupling. "Green, regional hydrogen production is a realistic prospect going forward. We are currently involved in various partnerships to make it happen, one of which is Thuringia's largest, the multi-award-winning hydrogen pilot project known as TH2ECO."

Maintenance with Green Wind Offshore
"Progressive, independent, assertive, and flexible" is how **Emanuel Fätke** describes Green Wind Offshore GmbH. His duties include maintenance management and the implementation of large-scale offshore installations from construction to dismantling, logistics, and customs clearance included. One example is the maintenance management for the DolWin3 grid connection system in the North Sea off the German coast.

Balancing with Green Wind Engineering
Green Wind's engineering service providers carry out surveys, take measurements, and perform balancing operations all over the world. **Dr.-Ing. Christoph Heilmann:** "Those who have walked across a rotor blade like I have, are well aware that turbines sway significantly if they have mass imbalances and blade angle errors." Managing Director **Michael Melsheimer:** "Professional balancing is well worth the investment and can increase the output by up to an average of 8.5 per cent!"

Everything for Green Wind Denmark
Flemming Reinholdt, Managing Director for Denmark, and his colleague from the Technical Operations Management team, **Torben Post,** are fully committed to a green future in the motherland of wind energy. "We can offer the entire programme, from repowering and project development to operational management", which, as Torben Post adds, "includes managing all the interests of our project investors in Germany, Denmark and Sweden and handling all contacts with service providers, insurance providers, and energy companies".

greenwind
With the power of wind

Green Wind Group

Address	Alt-Moabit 60a 10555 Berlin
Phone	+49 (0)30 351 2886-30
Fax	+49 (0)30 351 2886-33
E-Mail	info@greenwindgroup.de
Web	www.greenwindgroup.de
Category	Operation & Service
Profile	Technical & commercial operational management
Employees	< 100
Founding year	2011

Hamburg Messe und Congress GmbH

The global on & offshore event
With more than 1,400 exhibitors, around 37,000 participants from 93 countries, and a gross exhibition area of 71,500 m², WindEnergy Hamburg is the foremost global meeting place of the wind energy industry.

01 | The next WindEnergy Hamburg will take place from 24 to 27 September 2024.
02 | 37,000 participants from 93 countries regularly attend WindEnergy Hamburg.
03 | Free conferences take place on four stages.

Since 2014 the world's leading wind industry expo has been providing a common platform to all key players of the industry, including specialised suppliers and start-ups from all sections of the value chain for the onshore and offshore segments. The programme features product launches by major wind turbine manufacturers and component suppliers, and showcases services custom-tailored to address the challenges of the global wind industry. Equipment manufacturers and suppliers representing all stages of the onshore and offshore wind energy value chain offer a comprehensive overview of the market. Providers of everything from planning and project design to installation, operation and maintenance, and through to marketing, certification and financing take part to showcase their services.

One of the key purposes of this trade fair is to provide international companies, industry associations, and political decision-makers with a direct networking opportunity. Furthermore, the programme highlights strategies for project implementation in highly heterogeneous markets. Through its innovative featured topics, WindEnergy Hamburg looks ahead to the future of wind energy production, integration and storage.

The expo is accompanied by conference sessions featuring top-ranking experts who address the industry's current key topics and many networking opportunities. The WindEnergy Hamburg team are developing this programme jointly with their partners, including the Global Wind Energy Council (GWEC), the European organisation WindEurope, the national industry associations VDMA and BWE, leading industry media and exhibitors, among others. All of the conference sessions will take place free of charge on four Open Stages located directly inside the exhibition halls.

The next WindEnergy Hamburg will take place from 24 to 27 September 2024.
For up-to-date information go to windenergyhamburg.com and LinkedIn.

WindEnergy Hamburg
The global on & offshore event

Hamburg Messe und Congress GmbH

Address	Messeplatz 1 20357 Hamburg
Phone	+49 (0)40 356 922 60
Fax	+49 (0)40 356 969 2263
E-Mail	andreas.arnheim @hamburg-messe.de
Web	www.windenergyhamburg.com/en
Category	Other services
Profile	Trade fairs & conferences for the wind energy industry
Employees	more than 300
Founding year	1972

in.power Services GmbH

Pioneers of direct marketing – experienced. innovative. independent.
As a pioneer of direct marketing, the in.power group offers a wide range of services. Whether it is direct marketing, continued operation, flexible marketing, green energy balancing, metering point operation, or regional green power products for end customers: the in.power group is your partner!

As one of the first companies in Germany, the Mainz-based **in.power group** has been involved in the direct marketing of renewable and environmentally friendly energies since 2006. The Czech Second Foundation invested in in.power in 2022 and are supporting in.power's services through their innovative approach to energy trading.

In addition to the traditional **direct marketing** of renewable energy and CHP facilities, in.power offers innovative solutions for the **Ü20 continued operation** of wind power and pv plants. The transparent open-book model enables operators to fully participate in the market, with the option of providing end customers with regional green electricity products wherever possible. Our portfolio also includes fixed-price products.

New business areas include **flexibility marketing** based on battery storage and **green energy balancing** for the decarbonisation of industrial electricity.

01 | Josef Werum (left), Matthias Roth-Oldenbourg (right), Founders and Managing Directors of the in.power Group

in.power offers numerous services related to direct marketing via its subsidiaries.

in.power metering GmbH, for example, is an independent metering point operator. In addition to online metering and a dedicated Internet portal that enables operators to view all relevant metering and revenue variables for each facility, this service also includes the implementation of remote-control facilities.

Our subsidiary **grün.power GmbH** supplies end users throughout Germany with **regional green electricity** in conjunction with full power supply from solar, wind, and hydro facilities. Large corporations and utilities can also purchase this green electricity via in.power for their procurement portfolios. As a joint venture platform, **in.power network GmbH** can provide partners (from 200 MW onwards) with a comprehensive set of services and direct market access based on a partnership model.

01

in.power

in.power Services GmbH

Address	An der Fahrt 5 55124 Mainz
Phone	+49 (0)6131 69657-0
Fax	+49 (0)6131 69657-29
E-Mail	kontakt@inpower.de
Web	www.inpower.de
Category	Direct marketing
Profile	Direct marketers
Employees	approx. 15
Founding year	2006

infrest – Infrastruktur eStrasse GmbH

Still searching for a construction site?
Maximum turbine availability is crucial for the economic operation of wind turbines. This is why it is essential to avoid potential cable damage. Leico – Leitungs-check-online is your partner for obtaining and issuing information about buried infrastructure throughout Germany.

01


02

With around 16,500 registered infrastructure operators and other public authorities, Leico – Leitungs-check-online provides broad coverage throughout Germany. In a single step, all affected network and infrastructure operators are identified, and a central infrastructure request is sent to them. The bundled participation of public authorities saves a significant amount of time and cost compared to having to send out individual letters. The audit-compliant storage of all processes and documents within the portal also reduces administrative effort and increases legal clarity.

Free of charge
To receive enquiries, operators can upload data about their wind turbines and buried infrastructure to the portal free of charge. An automated check then ensures that only relevant requests need to be processed.

Infrest also offers an online solution for processing incoming buried infrastructure enquiries in the form of an enquiries database. It enables simple and cost-effective responses to enquiries thus making it the perfect complement to Leico – Leitungs-check-online.

Thanks to standardised processes and preconfigured response letters, online enquiries received via Leico can be processed with no media discontinuity. A direct connection to GIS or CAD software solutions facilitates the provision of information without the need to install any software. The infrest information database can also be used to manage and process any enquiries received by the operator directly by email or post.

If required, infrest can manage the entire process of providing information about buried infrastructure for wind farms and wind turbine operators as a service.

01 | Leico – Leitungs-check-online
02 | Use the infrest information database to process incoming buried infrastructure enquiries
03 | Five steps to obtaining information about buried infrastructure anywhere in Germany
04 | The area of responsibility uploaded for a specific wind farm

infreSt INFRASTRUKTUR eSTRASSE

infrest – Infrastruktur eStrasse GmbH

Address	Torgauer Strasse 12-15 10829 Berlin
Phone	+49 (0)30 22 44 52 58-43
E-Mail	vertrieb@infrest.de
Web	www.leitungs-check-online.de
Category	Planning
Profile	Grids & grid connection
Employees	approx. 20
Founding year	2010

03


04

JUWI GmbH

Energizing Sustainability

Ever since 1996 JUWI has been a leading provider of wind and solar energy as well as hybrid systems with storage for industrial application. Part of Mannheim-based MVV Energie AG, JUWI offers comprehensive project development as well as planning, construction and operational management services.

You can measure our performance in megawatts – or in the quality of life for our children.

What are we passionate about? Photovoltaic, wind, and hybrid projects! Implementing such complex projects requires experience and competence – with us you will find everything from a single source. Our experts take care of everything from site acquisition, to planning, component purchasing, construction, and funding, right through to commercial and technical management and electricity marketing.

JUWI is headquartered in Wörrstadt near Mainz and has branch offices in Hanover, Brandis near Leipzig, Stuttgart, Bochum, Rostock, and in Ansbach (Franconia). The Group employs about 1300 people around the world and has a presence on every continent.

01 | No challenge is too great: we are making the energy transition a reality right now.

To date, JUWI has installed over 1250 wind turbines with a total output of around 3000 megawatts at over 200 locations throughout the world. We specialise in both simple and complex sites from open fields to forests in low altitude mountainous areas.

Being experts in repowering, we also optimise plant locations by replacing old wind turbines with state-of-the-art models. In addition to repowering collaboration programmes, we can also purchase wind farms outright. In the past few years alone, we have successfully repowered more than 100 wind turbines.

Our operations management team currently manages wind energy and photovoltaic facilities with an output of around 5,000 megawatts around the world. To maximise returns, we offer technical and commercial management, 24/7 monitoring and maintenance services.

Our goal is to drive the energy transition. We are currently looking for people who want to commit their own energy to make a difference. Now. Together. With us.

JUWI GmbH

Address	Energie-Allee 1 55286 Wörrstadt
Phone	+49 (0)6732 9657-0
Fax	+49 (0)6732 9657-7001
E-Mail	info@juwi.de
Web	www.juwi.de
Category	Planning
Profile	Planers & project developers
Employees	approx. 1,300 (Wind energy: approx. 700)
Founding year	1996

KOOPMANN Gruppe

Professional power generation service
As one of the leading service providers for energy and electrical engineering, we ensure the safe and trouble-free operation of our customers' energy and electrical systems.

01

01 | High-performance measuring system in a sea container, cable measuring trolley, locations, business fields
02 | 260 kV resonance test system

KOOPMANN
ENERGIE- UND ELEKTROTECHNIK

KOOPMANN Group

Address	Zum Brook 19–21 49661 Cloppenburg
Phone	+49 (0)4471 9494 0
E-Mail	marketing@hk-c.de
Web	www.hk-c.de
Category	Operation & Service
Profile	Service, maintenance & repair
Turnover	approx. 100 Mio €
Employees	430
Founding year	1982

Our wind power sector services include comprehensive planning and project support, system assembly, maintenance, servicing, and repair as well as the supply of turnkey distribution and switching stations. In terms of repowering, we cover everything from the new installation of switching stations, cable lines, and transformers up to 110kV, to commissioning, repeat and protection testing. We also carry out standards compliant grounding measurements and network analyses. Our own oil laboratory alows us to carry out and evaluate all VDE oil analyses, supplemented by our mobile oil treatment plants for extensive services on transformers of any size.

Our core competencies include cable testing and diagnostics. We are equipped with 15 cable measuring and diagnostic vehicles for medium voltage as well as a test facility for high voltage cables with an output voltage of 260kV AC. We also operate a range of mobile metering devices for testing and diagnosing switchgear, insulation, transformation ratio, winding resistance, and dielectric frequency response measurements for transformer testing purposes and currently own the world's most powerful VLF testing facility for standards-compliant on-site cable testing up to an operating voltage of 33kV and a length of up to 100 km.

We also have two high-performance fault location systems, one of which is installed in a seaworthy container for the precise location of offshore cable faults and can take on the entire operational management of wind farms. We can locate your cable systems and store the respective GPS data with an accuracy of 1–2cm, and the final report and the GPS data is then passed on to you to be stored in your own database.

Our 24/7 on-call service ensures the safe and long-term operation of your energy supply facility.

02

KWS Energy Knowledge eG

Knowledge – Workmanship – Safety
In the area of wind power, we assist you with qualification measures from our basic and advanced training program as well as with client-specific courses and workshops. Get in touch with us and benefit from our strong community!

KWS Energy Knowledge eG is a globally renowned leader in basic and advanced training for the power industry. Thanks to our ever-growing lineup of advanced training offerings and bespoke instruction courses, we guarantee a uniformly high training standard for power industry businesses. With our across-the-board training array, we contribute to greater safety, environmental protection, and improved economy.

Energy providers worldwide entrust us with the basic and advanced training of their personnel. Take the opportunity to use our know-how and have a strong, dependable partner by your side. Together, we will qualify your operating, service, and maintenance personnel to make them even better professionals. This association gives your business a decisive edge over the competition. Enable your team to reach peak performance with our longtime experience and proven training concepts.


02

With our Wind Training Tower (WTT), we are able to offer matchless safety, operations, maintenance and repairs instruction.

Our program encompasses courses, seminars, workshops, and trainings covering the following topics:

- Advanced training for service technician for wind power installation technology (CCI)
- Retraining as industrial electrician operating technology for wind energy (CCI)
- Teaching fundamentals in the field of wind power installations and their technology
- Occupational safety, health and environmental protection, fire protection
- Identification and documentation
- Electrotechnology
- Interdepartmental skills
- Safety trainigs according to DGUV and GWO
- Renting the WTT

Our claim is to be –and to remain– a top service provider in basic and advanced training of the power industry's expert staff.


01

01 | Training Center of KWS Energy Knowledge eG
02 | WPI Training Tower

KWS Energy Knowledge eG

Address	Deilbachtal 199 45257 Essen
Phone	+49 (0)201 8489-0
Fax	+49 (0)201 8489-102
E-Mail	info@kws-eg.com
Web	www.kws-eg.com
Category	Education & training
Profile	Education & training
Employees	56
Founding year	1957

The Liebherr Group

A Strong Partner for the Wind Industry

For more than 70 years, the Liebherr name has stood for high-quality, user-oriented products and services. The Liebherr Group is not only one of the largest construction equipment manufacturers in the world; it is also a major supplier in many other fields of engineering like the wind industry.

01

For the wind industry, Liebherr offers convincing solutions for a wide range of requirements: On the one hand, components are installed directly into wind turbines. On the other hand, the company's mobile, crawler, offshore and tower cranes are used for erecting wind turbines and constructing wind farms.

Liebherr is the only manufacturer worldwide that supplies the entire system for electromechanical and hydraulic rotor blade and azimuth adjustment in wind turbines, including components like large-diameter bearings, rotary drives, electric machines, and hydraulic cylinders.

To enable the adjustment movements of the wind turbine's pitch and yaw system, Liebherr designs drives for all megawatt classes of on-shore and off-shore wind turbines. The range also includes single and double-row tapered roller bearings or three-row roller slewing bearings for main bearings, ensuring high precision and accuracy due to their play-free design. The slip-free, hardened, super-finished raceways of the main bearings result in longer service life and more efficient power generation. Additionally, Liebherr has developed and tested a special grease for blade and azimuth bearings.

A major element of cooperation with customers is application-specific engineering to perfectly adapt each of the components. In the wind industry, Liebherr collaborates with nearly all leading turbine manufacturers, having equipped numerous wind turbines. The product portfolio comprises components for turbines from 800 kW up to solutions for multi-megawatt offshore turbines.

Services include short-term component replacement, refurbishment of damaged or older products, and the development of components that actively address field-related issues, thus extending the lifespan of wind turbines.

Liebherr's mobile and crawler cranes are characterized by modern technology, high quality, cost-effectiveness, and long service life. They have also proven themselves in the construction of wind farms. The product range includes telescopic mobile cranes for wind turbine installation, as well as lattice boom mobile cranes and crawler cranes in various performance classes, tailored to the needs of the wind industry. To meet the demands of more powerful installations and taller towers, the company group offers performance-optimized cranes and new jib systems with high load capacities.

02


04

Cranes on narrow crawler travel gears especially developed for the construction of wind farms can move on the narrow tracks from one unit to the next in full setup condition, that is including jib and full ballast. This is especially economical, because machine and equipment have to be mounted only once.

For erecting wind turbines with hub heights above 110 m in low-wind areas, Liebherr provides specially developed tower cranes with load capacities of up to 125 t. These are mounted on the wind turbine and configured to achieve the required lifting height with just one tie-in to the wind turbine tower. Advantages include the crane's small footprint, the ability to work at high wind speeds, and precise load handling with micromove.


03

Liebherr offers convincing solutions for loading and erecting offshore wind turbines. Harbor mobile cranes handle the loading of rotor blades, generators, nacelles, and monopiles for both on-shore and off-shore wind turbines. The tandem lift-assist system Sycratronic is often used for this purpose. In tandem lift mode, two mobile harbour cranes of the LHM 800 type can lift up to 616 t. Heavy lift cranes for offshore use have load capacities of up to 5,000 t and a lifting height of up to 180 m above the deck. This enables them to meet all requirements, including diesel or electric drive units, explosion-protected cranes, and cranes suitable for operating temperatures between +40°C and -50°C. These cranes have also been successfully used in the construction or modification of oil and gas platforms and for pipeline laying and deep-sea operations down to 3,600 m below sea level.

01 | From single components to final assembly, Liebherr offers the matching solution for different demands of the wind industry.
02 | Liebherr LTM 1750-9.1 mobile crane installs the rotor star at a hub height of 80 m.
03 | Liebherr tower cranes of the type 1000 EC-B are specially designed to erect wind turbines and work extremely precise with a space-saving design.
04 | Heavy duty CAL 64000-1500 Litronic® offshore crane during the installation of rotor stars in the North Sea.

LIEBHERR

The Liebherr Group

Address	Hans-Liebherr-Strasse 45 88400 Biberach an der Riss
Phone	+49 (0)7351 41-0
E-Mail	info.lho@liebherr.com
Web	www.liebherr.com
Category	Transport & Logistics
Profile	Crane companies, crane hire & special transport
Turnover	€ 12,589 million (2022)
Employees	51,321 (2022)
Founding year	1949

Lintas Green Energy GmbH

Lintas – Project Future
Our expertise lies in sustainable, integrated energy concepts. For many years, we have seen renewable energies as an opportunity for developing business locations, because we believe that public acceptance requires shared goals by companies, municipalities, and local communities.


01


02


03

01 | Roteberg wind farm
02 | Brilon wind farm
03 | Knippen wind farm

Lintas Green Energy partners with municipalities to help them create their own wind farms. We also create sustainable, highly self-sufficient supply concepts for industry and local large-scale consumers. Our services cover everything from project development and construction to operational management. We differ in our approach because we place a particular focus on local value creation as well as on economically, technically, and legally viable local energy concepts.

Suddenly it's all about energy – and nothing happens without energy.
We Europeans are being forced to rethink energy due to climate change and the loss of Russia as a supplier of raw materials. What we are also seeing is something that has long been invisible to many people, namely that oil and gas not only provide energy, but are also the raw materials needed to produce the items we use in our daily lives, to build our houses and the parts we use to produce our cars.

It can only work if we work together
To achieve broad public acceptance, people need to feel tangible local benefits of renewable energy projects. This is where the Lintas Green Energy team comes in. We always begin the development of our wind and solar power projects with the question of local benefits. Consumer needs and requirements are usually very specific and depend on local conditions. Working in collaboration reveals new perspectives and ways to get rising costs under control and to secure jobs and prosperity.

Recognising and exploiting opportunities
We must push ahead with the energy transition – if we take the interests of the municipalities and the local people into account, it will be easier to gain a broad majority for the necessary changes. It is time for action.

Lintas Green Energy

Lintas Green Energy GmbH

Address	Alter Stadthafen 3B 26122 Oldenburg
Phone	+49 (0)441 925 139-250
Fax	+49 (0)441 925 139-29
E-Mail	info@lintas-greenenergy.de
Web	www.lintas-greenenergy.de
Category	Planning
Profile	Planers & project developers

Messe Husum & Congress GmbH & Co. KG

HUSUM WIND – Transforming Energy
With around 600 exhibitors on 25,000 sqm of exhibition space and over 12,000 trade visitors from 51 countries, HUSUM WIND is the themed trade fair for renewable energies for the German-speaking market.

With renewables, a climate-friendly energy system can emerge – and wind energy is the most important driver for the transformation: the green electricity turnaround, a CO_2-neutral transport sector, the decarbonization of industry. HUSUM WIND is at home in the north. Here, in the living room of the wind industry, the industry meets every 2 years for the industry meeting of the year. In the middle of Germany's largest wind farm network between the North Sea and the Baltic Sea, the trade fair offers a unique contact platform that is characterized by practical relevance, networks that have grown over decades and a personal atmosphere. It is the yardstick for the forward-looking technology status of the industry. Exhibitors from Germany and abroad present product innovations and cutting-edge technology along the entire value chain during four days of the trade fair. And at HUSUM WIND they will show what leading onshore/offshore and green H2 technology can do for the energy system of tomorrow. The Husum trade fair location offers companies optimal conditions to present themselves in a dynamic innovation environment. Outside the gates of the trade fair, an integrated energy system is already becoming a reality with wind power and green hydrogen. For more than thirty years, the dynamic trade fair in the north has accompanied the wind industry in its transformation, offering practical relevance, product innovations and networking. Specialist forums, networking events and the WINDCareer job fair round off the HUSUM WIND offering.

The next HUSUM WIND will take place from September 16–19, 2025. Be there!

Follow us on
www.husumwind.com or LinkedIn.


01

01 | Wind energy and hydrogen: transformation technology at HUSUM WIND 2023
02 | 600 expected visitors
03 | Sales success through personal talks


02


03

HUSUM WIND
Transforming Energy

Messe Husum & Congress GmbH & Co. KG

Address	Am Messeplatz 12–18 25813 Husum
Phone	+49 (0)4841 902-0
Fax	+49 (0)4841 902-246
E-Mail	info@husumwind.com
Web	www.husumwind.com/en/home-en/
Category	Other services
Profile	Trade fairs & conferences for the wind energy industry
Founding year	1986

MLK-Gruppe

Sustainable at all levels

Wind energy is not a short-term business; it is based on long-term sustainability. Investing in it takes careful consideration, not only in terms of funding, but also in terms of social capital. Because the energy transition is a long-term plan, not just for a few years.

The MLK Group's focus is on sustainability by helping to drive forward the expansion of renewable energy sources. But the important thing is how we do it. Our main assets are reliability and the ability to react flexibly to new requirements and to use them as efficiently as possible.

The group, which is headed by founder Heinrich Lohmann, who has been active in the European wind industry sector for more than three decades, collaborates reliably and in a spirit of trust with project partners, municipalities, and local residents. The MLK Group is involved every step of the way, from the initial project concept to plant disassembly whereby our primary focus is on transparency, proximity, and neighbourhood participation.

Local value creation and innovation

When it comes to project development, the MLK Group focuses on local value creation, sustainable implementation, and long-term links to the region in question as well as a social commitment and innovation. For example, the first battery storage systems have already gone into operation at the MLK Group's transformer stations in Brandenburg and additional combined wind energy and photovoltaic projects are planned.

MLK is creating more jobs: The group opened a new office in Hamburg in 2023, and the employee base is growing continuously. Projects with a total output of around 100 megawatts have been completed in the past few years. Another 100 megawatts will follow over the next two years.

MLK-Gruppe
Erkelenz, Berlin, Jacobsdorf, Hamburg

Address	Seesener Strasse 10–13 10709 Berlin
Phone	+49 (0)30 22 44 598-30
Fax	+49 (0)30 22 44 598-31
E-Mail	projekte@mlk-gruppe.de
Web	www.mlk-gruppe.de
Category	Planning
Profile	Planers & project developers
Employees	75 (Wind energy: 60)
Founding year	2005

01 | MLK offers reliability in the expansion of renewables.
02 | The company is planning to install another 200 MW in the next two years.
03 | MLK is focussed on local value creation and sustainable implementation.
04 | MLK has already implemented projects with a total output of almost 100 MW.

N.T.E.S. GmbH

Maintenance • Repair • Inspection • Optimisation
Service for wind turbines since 2000. Manufacturer-independent maintenance and repair across Germany using the latest technology.

N.T.E.S. GmbH Windkraftservice is a service provider in the wind energy sector.

What drives us: to provide top-level maintenance and repair – manufacturer-independent and across Germany.

Our competencies include **maintenance, optimisation, inspection, repair, thermography and measurement.** We are specialists for AN Bonus and Siemens turbines in the range of 150 kW to 2.3 MW.

More than 20 years of experience in the wind energy sector are an ideal foundation for achieving the best results both in repair and preventatively in maintenance or inspection. Our well-trained teams work across Germany.

Flexibility and fast response times are our key qualities.

01 | On the road for you....

Our services in brief:

- **Maintenance**
- **24/7 trouble-shooting**
- **Repair**
- **Recurring inspections** (DGUV V3, crane, arrester and ladder inspections)
- **Inspections** (blade and transmission inspections, blade assessment and damage analysis)

N.T.E.S. WINDKRAFTSERVICE

N.T.E.S. GmbH

Address	Handelshof 8 27432 Bremervörde
Phone	+49 (0)4761 926 12-0
Fax	+49 (0)4761 926 12-99
E-Mail	wkas@ntes-service.de
Web	www.ntes-service.de
Category	Operation & Service
Profile	Service, maintenance & repair
Employees	25
Founding year	2000

node.energy GmbH

Energy is that simple.
node.energy develops software and services to radically simplify the planning and management of renewable energies. Our offer is directed at PV plant and wind turbine operators keen to implement their business models with maximum profitability and legal certainty.

01

01 | Simply generate reports for central customs offices and transmission grid operators automatically.
02 | Managing Directors: Michael Blichmann, Matthias Karger and Lars Rinn (from left to right)

In the coming years the energy market is set to undergo a profound transformation. On- and offsite PPAs are just some of the business models operators need to implement. It is no longer enough to simply feed energy into the grid and get paid by the grid operator. The greatest profits can be made with business models that deliver power directly to the users. However, many operators are still put off by the energy management and administrative processes this involves.

Our software solution opti.node allows wind turbine and PV plant operators to access these attractive business models. opti.node works during ongoing operation and enables simple, automated management and billing for the electricity supplied. It also takes care of reports to authorities such as electricity tax.

opti.node has been available since 2019 and is already being used by many large companies to efficiently plan and manage the electricity generated from their own renewable sources. Currently the software manages more than 12,000 wind turbines, 2,500 wind and solar farms and 650 commercial and industrial properties. Using the automated support system for reporting to authorities, users of opti.node have so far generated more than 50,000 forms just by pressing a button and legally watertight.

node.energy is based in Frankfurt/Main and is the market leader for digital reporting to authorities in the field of renewable energy. It was founded in 2016 by Matthias Karger and Lars Rinn. In 2022 node.energy won the Hesse State Award for Energy. Currently node.energy employs more than 70 staff.

02

node.energy GmbH

Address	Carl-von-Noorden-Platz 5 60596 Frankfurt am Main
Phone	+49 (0)69 99 99 939-80
Fax	+49 (0)69 99 99 939-81
E-Mail	info@node.energy
Web	www.node.energy
Category	Other services
Profile	Software solutions
Employees	70+
Founding year	2016

NOTUS energy

Power on your side.
As an independent clean energy producer and project initiator, we plan, construct and operate wind farms and solar parks, from the initial idea to the final grid connection.

Over the last 20 years, NOTUS energy has installed wind farms and solar parks with an output of over 1.700 MW. Today we operate 376 megawatts of wind power in-house. Most of the plants we construct in Germany today remain in our ownership.

As an **Independent Power Producer (IPP),** we are continuously expanding our wind and solar portfolio. This provides us with the **financial independence** we require to be able to invest in new projects and continue to grow the company.

Our ambition is to bring together the best professionals in the field. NOTUS energy is **a flexible and financially strong partner** for **municipalities, planners, and investors.** We are convinced that renewable energies result in win-win situations: sustainable investment, regional value generation and a future for our children.


02


03

Wind Power:
1639 MW installed
2278 MW in development

Solar energy:
1079 MWp in development
376 MW in our portfolio
426 MW in operational management

339 employees, active in 15 countries

GENERAL CONTRACTOR: EVERYTHING FROM A SINGLE SOURCE
As one of Germany's leading general contractors for wind and solar energy we construct turnkey wind farms and solar parks around the world. Fast, flexible, on time and ISO 9001 certified.

ARTIFICIAL INTELLIGENCE: IMPROVED WIND FORECASTS AND POWER LOAD CALCULATIONS
Together with our partners, we are developing intelligent software solutions: for optimised wind forecasts, power load calculations and automated wind or solar power plant inspection using drones.


04

01

ASSET MANAGEMENT: A MODERN TAKE ON OPERATIONAL MANAGEMENT
As asset managers, we not only take on technical and commercial management roles but fully represent the owners in every way by continuously optimising the technology as well as operations.

01 | Wind Farm Regesbostel
02 | front: Sebastian Eberhardt – Team Lead Structured Finance, back: Alexandre Colin-Seguin – Junior Manager Finance
03 | NOTUS Headquarters in Potsdam
04 | Lale Evke – Managing Director of NOTUS energy Construction GmbH & Co. KG

NOTUS ENERGY

NOTUS energy

Address	Parkstrasse 1 14469 Potsdam
Phone	+49 (0)331 62043-40
Fax	+49 (0)331 62043-44
E-Mail	windkraft@notus.de
Web	www.notus.de
Category	Planning
Profile	Planers & project developers
Employees	339
Founding year	2001

Prokon Renewable Energy Service GmbH

Pros – Professional Wind Service

Pros (Prokon Renewable Energy Service GmbH), based in Itzehoe, is a manufacturer- and operator-independent onshore wind energy service provider. The company combines the expertise of two service specialists, StiegeWind and SH Wind, with Prokon Energiegossenschaft's own service division.

01 | The Pros service team in action
02 | The Pros service team in action
03 | Wind turbine made by Prokon
04 | Own warehousing and repair of large components

Flexible, competent, fast.

These three words symbolise the new manufacturer-independent service brand for onshore wind energy. The company which was spun off from Prokon eG, comprises two former companies, SH Wind and StiegeWind and combines the collective know-how of these two service specialists with the 27 years of experience of Prokon eG of wind turbines from all common manufacturers. Prokon is Germany's largest energy cooperative.

Pros offers the entire range of services for wind turbine operators, from basic maintenance up to full maintenance with major components as well as all repair works, from a single source. Service teams based at more than 10 locations throughout Germany are currently servicing a total of over 500 wind turbines with a total output of almost 800 megawatts, together with Prokon eG's own portfolio, 365 days a year.

Our own warehouse and workshop

In addition to the basic equipment we keep at our service centres which include consumables and spare parts, we also operate a large spare parts warehouse at our headquarters in Itzehoe, which guarantees a delay-free materials supply at all times and minimises wind turbine downtime. We also operate a workshop here in Itzehoe, where we repair major components as well as a warehouse for major components such as gearboxes, generators, and transformers. This not only makes us more independent of service providers and manufacturers, but also has a favourable impact on costs.

Wide range of turbines

Our expertise covers the technology of turbines from Enercon, General Electric, AN-Bonus/Siemens, Vestas, NEG-Micon, Nordex, Senvion, REpower, DeWind, and many more.

pros Professional Wind Service

Prokon Renewable Energy Service GmbH	
Address	Kirchhoffstrasse 3 25524 Itzehoe
Phone	+49 (0)4821 6855-395
Fax	+49 (0)4821 6855-200
E-Mail	pros@prokon.net
Web	www.prokon.net/pros
Category	Operation & Service
Profile	Service, maintenance & repair
Employees	52 (Wind energy: 52)
Founding year	2019

Qualitas Energy Deutschland GmbH

POWERING CHANGE.
With today's actions, we are shaping tomorrow's world. We believe in this, as well as our partners. Qualitas Energy works according to this principle. As a team, we drive the expansion of renewable energies. Our colleagues work in an interdisciplinary way on unique projects.

Qualitas Energy is a leading investment and management platform focused on investments in renewable energy, the energy transition and sustainable infrastructure.

Sustainable investments
Since 2006, the Qualitas Energy team has invested more than €11 billion in renewable energy. Globally, Qualitas Energy currently holds a portfolio of more than 5 GW in wind energy, photovoltaics, solar thermal power (CSP), battery storage, biogas (RNG) and hydro run-of-river (RoR). With a development portfolio of more than 3 GW, the focus in Germany is on the expansion of wind energy.

Top performance and professionalism along the entire value chain
As part of the Qualitas Energy Group, Qualitas Energy Deutschland GmbH focuses on the acquisition, development, construction and operation of renewable energy projects. With an experienced team and efficient management, we cover the entire renewable energy value chain.

Our investments focus on repowering as well as greenfield and whitefield projects of all sizes and stages of development. We bring these projects to the finish line, either alone or in cooperation with local project developers.

Innovative project development & consideration of local interests
We are committed to speeding up, innovating and pragmatising project development. Our experts are pioneers in digital solutions for project management. At the same time, we are leaders in the conceptualisation of tailor-made solutions for a successful and transparent implementation of projects with the integration of all local interests.

Pragmatic, financially strong and passionate, we bring our projects to success.

01 | Qualitas Energy Solarfarm Milkowice in Poland
02 | Qualitas Energy Windfarm Ahrensbök near Lübeck
03 | Solar Thermal Power Plant (CSP) in Andalusia

Qualitas energy

Qualitas Energy Deutschland GmbH

Address	Unter den Linden 21 10117 Berlin
Phone	+49 (0)30 863 2362 20
E-Mail	info.berlin@qenergy.com
Web	www.qualitasenergy.de
Category	Planning
Profile	Planers & project developers
Employees	600 (Wind energy: 250)
Founding year	2006

R+V Allgemeine Versicherung AG

R+V offers comprehensive insurance cover for wind turbines.
From planning and installation through to the operational phase, wind turbines require comprehensive insurance cover. This is now available all under one roof with R+V's new wind insurance concept.

01 | R+V consultant Jan Kehnappel with the customer Mr Petersen
02 | First-hand knowledge all under one roof – AgrarKompetenzCenter

R+V is part of the German cooperative banking group Volksbanken Raiffeisenbanken (VR), making it part of a strong alliance. What we offer our customers, in addition to the latest products and extensive knowledge, is our local presence. Across the 700 VR banks and their 7,500 branches, our customers find a named contact for all their insurance matters. You can be sure that we are always there for you.

First-hand knowledge all under one roof – AgrarKompetenzCenter
As one of the largest insurers for renewable energy plants, R+V has over 30 years experience in this field. To strengthen our position in the rapidly growing renewables market, we have bundled our knowledge and expertise in the so called AgrarKompetenzCenter. Our team of experts implements new product ideas across all areas and continuously develops the existing product offer.

Our staff are always identifying the latest trends in the fields of wind power, solar energy and biogas in cooperation with leading companies and associations. Helping you make sustainable use of our solutions well into the future.

R+V insurance solutions for your wind turbines
Wind turbine operators are making an important contribution to the success of the energy transition. This way of generating power is especially climate-friendly and particularly lucrative – provided you are sufficiently well insured.

From planning and installation to the operational phase, R+V offers comprehensive cover all under one roof with its new insurance concept especially for wind energy.

Let us join forces at the early stages of your project so we can offer you the very best support and advice.

Agrar KompetenzCenter

02

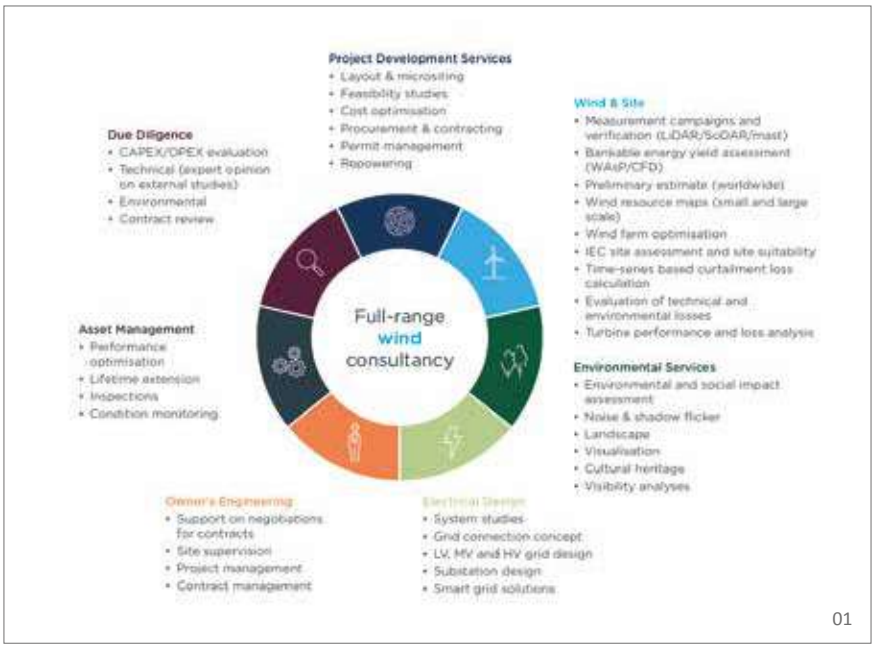
R+V Allgemeine Versicherung AG

Address	Raiffeisenplatz 1 65189 Wiesbaden
Phone	+49 (0)611 533 70261
E-Mail	AgrarKompetenzCenter@ruv.de
Web	www.ruv.de/firmenkunden/erneuerbare-energien/windenergie
Category	Finance & Law
Profile	Insurance companies
Employees	16,500
Founding year	1922

Ramboll

World-leading wind consultancy

As a full-service provider for wind energy projects, Ramboll offers comprehensive expertise for the entire project lifecycle: from wind farm planning and approval to project realisation, preparation of technical as well as economic studies and strategic advice.



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Ramboll is a leading international engineering, architecture, and consultancy company. We provide individualized services, supporting our clients in wind energy project development and implementation processes. Ramboll has a strong focus on understanding our clients' needs, and we strive to provide sustainable and long-term technical and commercial solutions to our clients.

In-depth knowledge and experience

With more than 30 years of consultancy experience from onshore and offshore wind projects, Ramboll has built up comprehensive knowledge and competencies within wind energy. We have performed designs for more than 65 offshore wind farms around the world, totaling more than 50 % of all installations.

Within the field of onshore wind, we have provided expert services to wind farms with a nominal output of +60,000 MW in more than 60 countries.

Ramboll has the expertise to support our clients from due diligence and environmental studies over planning and construction to commissioning and operation of the wind farm and can provide assistance at every step of the project.

Access to global knowledge

With 300 offices in 35 countries, we strive to combine our local presence with our global resources and expertise. This means that our clients worldwide can get globally leading consultancy with an in-depth knowledge of local conditions.

01 | Our service portfolio
02 | Planing and implementation of onshore wind farms
03 | Full-service provider for offshore wind energy projects

RAMBØLL Bright ideas. Sustainable change.

Ramboll

Address	Jürgen-Töpfer-Strasse 48 22763 Hamburg
Phone	+49 (0)40 302 020 0
E-Mail	info@ramboll.de
Web	www.ramboll.de/wind
Category	Planning
Profile	Offshore
Turnover	€ 2.2 billion
Employees	17,500 (Wind energy: approx. 600)
Founding year	1945

Regenerative Energien Zernsee GmbH & Co. KG

A little bit of magic
Of course, operational management is just a bit of magic that almost takes care of itself. In reality, it involves... what can we say: accounts management, contracting, meeting demands – managing everything really. Yes you could but you don't have to. We'll gladly take care of these tasks for you.


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Real life can be fairly mundane: REZ's services include the commercial and technical management of wind farms as well as site management via our dedicated on-site service and, if desired, the assumption of overall responsibility for wind or solar farms, up to and including the preparation of direct marketing contracts and the optimisation of marketing processes. A one stop shop!

Included among our standard services are negotiations with service providers, PPAs, redispatch and demand-based night-time obstruction lighting, as well as project development, engaging in industry training and professional dialogue within the sector. In other words: everything that REZ specialises in can be booked and used.

Efficiency and quality

So, we make things easy for you, but not for others. To ensure the safety of would-be burglars, we use alarm systems and cameras to prevent them from exposing themselves to the risk of electrocution in substations or wind turbines. The same cameras also function as a kind of remote maintenance aid, saving unnecessary site visits – another of the many points that characterise our efficient and high-quality operational management.

We can even give you that in writing, because REZ was once again DIN EN ISO 9001 certified in 2023, which involved a complete reassessment of the company's quality management processes. The result: REZ meets every single one of the extremely high demands. This certification demonstrates to our clients, partners, and employees that the company is focused on high standards, professionalism, and client orientation. Interim audits are carried out every year, and the next full audit is scheduled for 2025.

01 | An aerial view can help at times – a bird's-eye view of the extension to the Odervorland wind farm near Frankfurt (Oder).
02 | From the smallest tasks to the whole shebang – everything is in the REZ portfolio and everything is bookable.
03 | You can manage everything yourself – but you certainly don't have to. Jacobsdorf wind farm near Frankfurt (Oder) – just one of REZ's various project clusters.
04 | REZ offers technical operational and site management services.

REZ

Regenerative Energien Zernsee GmbH & Co. KG

Address	Seesener Strasse 10–13 10709 Berlin
Phone	+49 (0)30 2244 598-30
Fax	+49 (0)30 2244 598-31
E-Mail	info@rez-windparks.de
Web	www.rez-windparks.de
Category	Operation & Service
Profile	Technical & commercial operational management
Employees	28
Founding year	2004

RES Deutschland GmbH

Your renewable energy systems are in good hands

RES is the world's largest family-owned renewable energy company. It has more than 40 years of experience and manages power plants with a total capacity of over 12 gigawatts. With this expertise, RES maximises the yield of wind turbines worldwide.

01 | Prechtaler Schanze wind farm in the Black Forest
02 | RES ensures reliably high yields not only in the Black Forest

Asset Management

24/7. RES' service is tailor-made. Technical and commercial operational management includes remote site monitoring, planning of all maintenance work, budget forecasts, data management and transparent evaluation of the operational performance of renewable energy plants. Through 24/7 remote monitoring, RES responds quickly to potential plant malfunctions. This minimises downtime and maximises yields. With success: the plants managed by RES generate at least one percent more than others. This is proven by a comparative study by DNV.

Maintenance & Repair

Up and running. RES focuses on individual solutions, which are available both as part of long-term contracts and individually. Thanks to specially developed analysis tools, maintenance and repair work is planned and implemented in such a way that downtimes are kept as low as possible and the turbines serviced by RES run reliably.

Continued operation, repowering and dismantling

So what comes next? At the end of the regular lifetime of renewable energy plants, operators are faced with the decision of what to do with their plants. Dismantling, continued operation or repowering? RES advises and supports them in developing and implementing the right strategy.

Owner's Engineering

All inclusive. The RES team is at the disposal of owners of wind energy projects with its expertise. Whether in the planning, realisation or expansion of renewable projects: RES' Owner's Engineering offers an all-inclusive package and also provides support with approval processes, expert opinions, technical issues, the coordination and monitoring of service providers and the acceptance of renewable energy plants.

power for good

RES Deutschland GmbH

Address	Reutener Str.18 79279 Vörstetten
Phone	+49 (0)7666 618 99 02
E-Mail	resdeutschland.info@ res-group.com
Web	www.res-group.com/de
Category	Operation & Service
Profile	Service, maintenance & repair
Employees	60+
Founding year	1981

Rosendahl Windtechnik GmbH

Experts for wind energy

As an independent, accredited inspection body for wind turbines, we use our many years of expertise, experience and impartial knowledge to ensure the longest possible, safe and economical operating life for each and every wind turbine.

Every year, our inspectors inspect more than 800 wind turbines of various manufacturers and power classes throughout Europe according to individually developed inspection plans. In particular, numerous operators rely on our expertise for inspections of Enercon WTGs. We are a member of the expert advisory board of the BWE and an inspection body accredited by the German Accreditation Body (DAkkS) according to DIN EN ISO/IEC 17020 for the scope specified in the certificate D-IS-21476-01-00.

Keep the overview

With our manufacturer-independent expert reports and with our experience as experts, you can keep track of the condition of your wind turbine or wind farm. These inspections form the basis for the longest possible trouble-free operation and high plant availability.

Accredited inspections

- Lifetime extension expert reports (BPW)
- Periodic inspection (WKP)
- Rotor blade inspection (RBK) incl. lightning protection measurement by rope access technique
- Condition-oriented inspection (ZOP)
- Commissioning report
- Out of contract/warranty inspections
- Damage reports
- Technical due diligence


01

Supplementary analyses

- Vibration analyses (offline and online)
- Video endoscopies
- Thermographies
- Oil and grease analyses


02

Continued operation

The continued operation of wind turbines beyond 20 years is close to our heart. Therefore, it is our goal to provide our customers with services that enable them to keep their wind turbines in operation for as long as possible. As an accredited inspection body, we carry out the assessment and testing for continued operation of wind turbines (BPW) and are available as an independent contact for all questions.


03


04

01 | The Rosendahl Windtechnik Team
02 | The inspection begins
03 | Carrying out a vibration analysis
04 | Rotor blade inspection via rope access

Rosendahl Windtechnik GmbH
Sachverständige für Windenergie

Rosendahl Windtechnik GmbH

Address	Hermann-Scheer-Str. 1 26736 Krummhörn
Phone	+49 (0)4923 383993-0
Fax	+49 (0)4923 383993-59
E-Mail	info@rosendahl-windtechnik.de
Web	www.rosendahl-windtechnik.de
Category	Experts
Profile	Technical consultants
Employees	18
Founding year	2006

SCADA International A/S

Empowering a renewable future

SCADA International supports customers around the world to execute projects at any point in the SCADA value chain. With more than 8000 SCADA solutions installed, the customer range encompasses manufacturers, utilities, asset owners, and independent power producers, among others.

01

02

Headquartered in Denmark, with offices in Germany, Spain, Poland, Ukraine, Romania, and the USA, SCADA International specializes in renewables, developing intelligent data solutions to streamline operations and reduce the Levelized Cost of Energy (LCoE).

01 | SCADA International at a glance
02 | On the OneView ® Energy Control Unit
03 | Providing the whole SCADA value chain

Removing barriers among data and technology

Businesses depend on data to optimize operations, and since SCADA International's foundation, we have been developing solutions to enable data access. We believe that anticipating tomorrow's problems will solve today's difficulties. That is what our intelligent software solutions achieve: giving access to reliable data from various sources in real time to customers worldwide. We strive to reduce complexity by providing our customers with solutions that optimize performance and competitiveness.

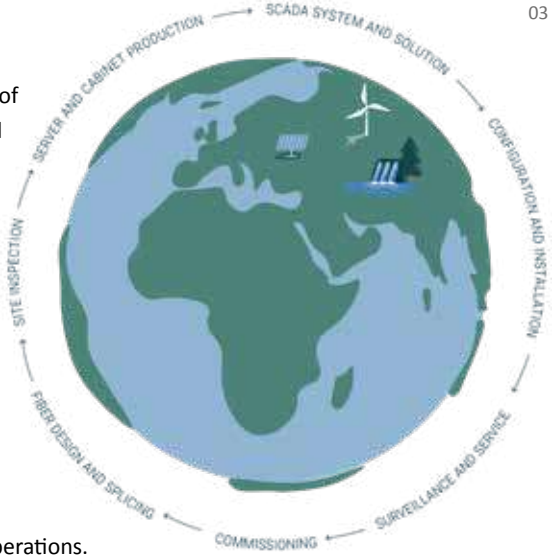
Flexibility at your fingertips

Data and control are at the core of any machine. SCADA International offers control and regulation software for various setups and power sources. With a DNV GL component certification for medium and high voltage, the OneView® Energy Control Unit is one of our flexible control solutions. It provides multiple options for power control, regardless of unit type and manufacturer brand, ensuring reliable and efficient operations.

Covering the full SCADA value chain

At SCADA International, we cover the full SCADA value chain – from hardware and software, installation and commissioning into consulting. Our highly skilled specialists support the value chain at any point, resulting in efficient and cost-saving solutions for our customers.

03



SCADA international

SCADA International A/S

Address	A. C. Illums Vej 4A DK-8600 Silkeborg
Phone	+45 (0)9641 9200
E-Mail	scada@scada-international.com
Web	www.scada-international.com
Category	Other services
Profile	Software solutions

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German Wind Power

The magazine about innovative technologies and services of the German wind industry

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- Get in contact with German companies from various sectors
- Take a look at the latest technologies and services from the German industry
- Enjoy a modern and interactive magazine with animations and videos

www.windindustry-in-germany.com/german-wind-power-magazine

SpanSet Axzion GmbH

Lift. Erect. Transport. Secure.
Since 2019, the “double name” SpanSet Axzion has manifested the close interaction of two traditional companies. It is about a comprehensive range of products and services for the erection of onshore and offshore wind turbines.

01

One part of the company name: Axzion. Founded in 1991, the company specialises in the development of lifting beams, gripper and other load handling equipment for the assembly of wind turbines. The second part: the parent company SpanSet GmbH & Co. KG, a specialist in lifting technology, load securing and personal protective equipment against falls from a height (PPE). Also represented in the group: SpanSet secutex GmbH, market leader in the field of coated lifting straps and protective hoses. Each of the three companies brings individual products for individual tasks to the market. Or even better: as a “trio”, they provide coherent overall solutions for all aspects of transport as well as the assembly and disassembly of wind turbines.

Upending tool erects monopiles
Since 2016, the Upending Tool has proven to be SpanSet Axzion's most impressive lifting device. This is the world's largest grab for raising monopiles weighing up to 2,500 tonnes with a diameter of up to eight metres. The tool with three grippers and six tongs works on jack-up and floating installation vessels. Customers use it on their own or opt for offshore service support from SpanSet Axzion staff. Prominent locations where the Upending Tool has been used: Hornsea 2 and Dogger Bank A in the North Sea, as well as the Yunlin offshore wind farm in western Taiwan.

01 | The Upending Tool erects monopiles with a dead weight of up to 2,500 tonnes
02 | Application of the PPE from SpanSet on a wind turbine
03 | The customisable SBI rotor blade traverse for single blade mounting
04 | Round slings of the parent company SpanSet


02


03


04

With DNV certificate
Axzion SpanSet simulates the lifting of loads on its own test stand in Neustrelitz (Mecklenburg-Western Pomerania). The facility is designed for up to 3,000 tonnes. DNV (Norway, Hamburg branch) has certified the site as a manufacturer of load lifting equipment for offshore use. SpanSet Axzion 2023 has commissioned another test facility in Grossefehn (district of Aurich).

SBI rotor blade lifting beam
For the assembly and disassembly of rotor blades in the air (Single Blade Installation, SBI), SpanSet Axzion has developed a special lifting beam together with a manufacturer of wind turbines. It has a load capacity of 30 tonnes and is controlled via remote. The telescopic design allows the lifting beam, which weighs only 15 tonnes, to be transported to the construction site with a standard truck. This lifting device was designed especially for use in adverse wind conditions, when it is not possible to bring the rotors, which are completely mounted on the ground, safely upwards.

Round slings made from high-performance fibres
The premium products of the parent company SpanSet are in demand for lifting operations in the onshore and offshore sector – above all the Magnum-X round sling with a load capacity of up to 500 tonnes. Its special feature: the fibre core and protective cover contain high-performance fibres, which is why the Magnum-X is significantly lighter and up to 50 percent narrower than comparable round slings. The smaller volume reduces wrinkling during the lifting process and ensures a long service life.

Working safely at height
As a specialist in height safety, SpanSet develops personal protective equipment against falls from a height (PPE). On wind turbines and metrological masts, fitters prefer to use the Clima Tec system. It combines a safety harness and a work positioning harness. SpanSet offers various systems for the rescue and evacuation of casualties.

SpanSet Axzion GmbH

Address	Winkelsweg 172 40764 Langenfeld
Phone	+49 (0)2173 208 92-0
Fax	+49 (0)2173 208 92-28
E-Mail	info@axzion.de
Web	www.axzion.de
Category	Planning
Profile	Offshore
Turnover	> € 100 million (SpanSet Group)
Employees	350 (SpanSet Group)
Founding year	1991

Statkraft Markets GmbH

Renew the way the world is powered
We create a positive and sustainable future for people, communities, industries, and for you as a business partner.


01

A secure future for your renewable energy plant
As a leading marketer of renewable energy, Statkraft is a strong partner that accompanies developers and operators in the market over the long term – whether as a partner in direct marketing or purchasing power from new unsubsidised plants or plants that have run out of subsidies. Over 125 years of experience with our own power plants, in project development as well as in trading create the best conditions for reliable direct marketing. We purchase electricity volumes on fixed terms, assume commercial risks, and thus enable the operation of renewable plants. With price fixing, we offer you the possibility of additionally generating plannable and reliable profits. In addition to standard services such as generation forecasts, marketing of electricity on the spot market and balancing, we support you at all times and make everyday energy life easier. With our many years of expertise, we also make it possible to generate additional revenue from the marketing of wind turbine flexibility, storage and e-mobility solutions.

Sale, cooperation, or continued operation of your wind farm
Are you operating an older wind farm? Many of these plants can continue to be operated economically and play an important role in the energy transition. Statkraft not only offers operators and owners viable, long-term power purchase agreements, that ensure the continued economic operation of existing plants. We also think beyond this and offer you to purchase older wind farms or to enter individual cooperations in which we would also take over the dismantling. Together with you, we ensure that clean energy continues to be renewed.

Our team is a reliable partner with in-depth know-how.

We accelerate the expansion of renewable energy
Statkraft has been developing, building, and operating wind farms for more than 20 years, and solar parks for 10 years. We have set ourselves the goal of becoming one of the global leaders in the field.

Germany is one of our core markets for wind and solar energy. In a few years' time we want to become one of the leading developers in this sector. We are focusing on greenfield projects, taking over repowering or partially developed projects or entire portfolios. We do this independently, or in partnerships with other developers.

02

01 | Renew the way the world is powered
02 | The Statkraft direct marketing team: we make it possible!
03 | From 2030 we will operate 2,000 megawatts of wind, solar and battery assets.
04 | The energy system of the future: we manage it!

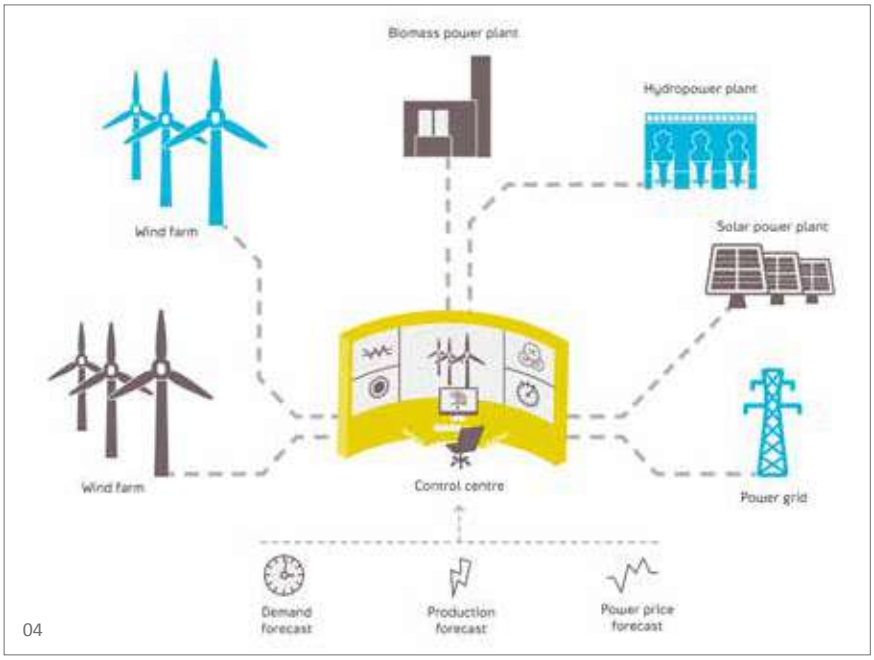
From 2027 onwards, we plan to develop and build 300 to 500 megawatts of wind, solar and battery projects every year. By 2030, we want to commission 2,000 megawatts of wind and solar plants and thus more than double our power plant capacity in Germany.

Green power for green hydrogen in Germany

Our contribution to the renewal of the energy world does not stop at the development of solar parks and wind farms. We also have ambitious plans for the ramp-up of hydrogen: in 2030 we want to have at least 250 megawatts of installed capacity operational to produce green hydrogen in Germany. Up to 200 megawatts of this will be at our power plant site in Emden. We are planning a 10 MW pilot project there, which should go into operation in 2025/26, provided the necessary permits and funding are available.

Please feel free to contact us if you have any questions about direct marketing or specifically about the continued operation of your plants. Are you looking for a partner to realise your wind or solar projects? Do you want to join us in shaping the green hydrogen ramp-up? Please do not hesitate to contact us. You can also meet us in person at wind industry days and trade fairs. Just have a look at our website.

03



04

Statkraft

Statkraft Markets GmbH

Address	Derendorfer Allee 2a 40476 Düsseldorf
Phone	+49 (0)211 60 244-100
Fax	+49 (0)211 60 244-199
E-Mail	info@statkraft.de
Web	www.statkraft.de
Category	Direct marketing
Profile	Direct marketers
Turnover	€ 34.24 billions
Employees	650
Founding year	1999

STEIL KRANARBEITEN Gmbh & Co. KG

Heavy things – moved easily!
We tackle difficult tasks with many years of experience, trained employees, and a highly specialised fleet of more than 100 cranes. We serve our customers throughout Germany and around the world from our 7 bases distributed throughout the Saar-Lor-Lux region.

01

02

With our highly specialised vehicle fleet, we are well equipped to face the technical challenges of the future. Three highly modern self propelled vehicles (blade lifters) of the latest generation are ready to transport the rotor blades to the wind farm. We collaborate with a large number of subcontractors throughout Europe, that partly can be reached quickly from other regions, always with the goal of finding the best possible and most economical solution. We also provide our customers with a complete service range and take care of all necessary details from feasibility studies, crane engineering, and the selection of suitable resources trough to approvals and CAD planning.

Safety and quality is always the focus in everything we do. We can look back on many years of experience both in our home country and abroad, especially in the construction of wind power turbines. The skills of our crane operators as well as our office-based and field staff play a crucial role in this. Wherever heavy loads need to be moved safely and precisely, the designers and project engineers involved have to rely on our expertise.


03


04

STEIL KRANARBEITEN GmbH & Co. KG

Address	Auf dem Adler 3 54293 Trier
Phone	+49 (0)651 146 56-0
Fax	+49 (0)651 146 56-50
E-Mail	info@steil-kranarbeiten.de
Web	www.steil-kranarbeiten.de
Category	Transport & Logistics
Profile	Crane companies, crane hire & special transport
Employees	260
Founding year	1924

01 | Wind engergy
02 | Precision work
03 | Wind energy
04 | Blade lifter

Sterr-Kölln & Partner mbB

Legal experts for wind, PV and heat in Germany and France
We support you during the development, implementation, operation, sale of, and investment in renewable energy projects. We offer interdisciplinary solutions based on our profound knowledge of the market and answer legal, business and tax-related questions from a single source.

Reliability for project developers
We understand the complexities of project development, not least because framework conditions keep changing. As reliable partners we support project developers in dealing with legal and business-related questions both at the development and implementation stage.

Project transactions and financing
Our experts bring together selling parties and investors. Our long years of experience helps us to accurately assess risks, to clearly set out the legal aspects of a transaction and to efficiently manage the transaction. We also successfully implement tailor-made financing for renewable energy projects, providing our customers with sustainable and pragmatic solutions.

Wind, PV and heat for municipalities
Municipalities are increasingly challenged to implement wind and PV projects. We highlight the scope that exists for project design and show how this can be used in the best interest of the various actors and citizens. We comprehensively support the initial planning process and implementation of municipal heating projects: Working with partner companies where needed, we provide advice on legal, business-related and technical questions from the initial feasibility study through to implementation and operation.

Save the Date: GO WEST FRANCE
In 2024 we will once again team up with Spreewind to invite you to our seminar Go West France. The seminar addresses project developers, banks and investors who are already active in France.

01

02

01 | GO WEST FRANKREICH 2024
02 | The future of energy. Boldly. Redesigned.

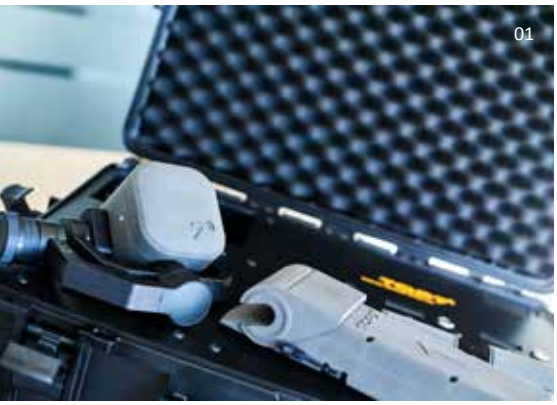
STERR-KÖLLN & PARTNER

Sterr-Kölln & Partner mbB

Address	Emmy-Noether-Strasse 2 79110 Freiburg
Phone	+49 (0)761 490 540
Fax	+49 (0) 761 493 468
E-Mail	info@sterr-koelln.com
Web	www.sterr-koelln.com
Category	Finance & Law
Profile	Lawyers
Employees	40
Founding year	1978

TOPseven GmbH & Co. KG

TOPseven – MAKING DRONES SMARTER.
TOPseven – unassisted inspection by autonomously flying drone.
This highly automated application is possible thanks to the AI-based control software, the globally patented solution for non-contact lightning protection measurement, and the cloud-based wind turbine application software.



01 | Contactless lightning protection measurement
02 | Autonomous drone flight – no specialised pilot necessary
03 | Drone-based visual inspection
04 | Automated reporting via TOPseven software application

The innovative use of drones for the efficient inspection of wind turbines has been available for some time. TOPseven is now taking the technology to a new level through a combination of AI and specialised hardware. Our drones fly autonomously, deliver high-resolution images, detect defects in lightning protection systems and can be used independently by our customers after a short training course. Drones offer the promise of efficient wind turbine inspections, but until recently they have had to be flown by specialists and generated images that were difficult to analyse, but TOPseven has refined the use of drones with an AI control and analysis solution. Our “drone robots” navigate automatically calculated flight routes and fly completely autonomously:

- Only requires a short training course: AI-controlled autonomous drone flight with no need for specialised pilots. Reports generated in compliance with industry-standard damage assessment criteria using the TOPseven software application.
- Fast and flexible: visual inspection of all rotor blades and the tower during a single turbine shutdown.
- Simple and transparent: the surveyor can record any damage along with precise positional data.
- Efficient analysis: the AI-controlled camera delivers seamless, quality assured images with evenly minimal overlaps.
- Unique, worldwide patented lightning protection mensuration: contact-free testing of the lightning protection system in just a few minutes. Special sensors precisely detect and localise any defects.

TOP7
MAKING DRONES SMARTER.

TOPseven GmbH & Co. KG

Address	Meglingerstraße 29 81447 München
Phone	+49 (0)8151 959 66-0
Fax	+49 (0)8151 959 66-99
E-Mail	info@TOPseven.com
Web	www.TOPseven.com
Category	Operation & Service
Profile	Service, maintenance & repair
Employees	60
Founding year	2020

TÜV NORD EnSys GmbH & Co. KG

Full-Service Provider with over 35 years of experience in the wind industry
TÜV NORD certifies on- and offshore wind turbines to all international standards and regulations, evaluates specific site conditions and supports operation of wind turbines over their entire lifecycle. With more than 35 years of experience, TÜV NORD is your competent partner in the wind industry.

TÜV NORD GROUP is with more than 14.000 employees active in over 70 countries. In the area of wind energy, TÜV NORD offers site and technical assessments as well as inspection services and is one of the leading certification bodies for on- and offshore wind turbines and projects.

We support your wind project from the planning and approval process, while operation up to lifetime extension. As an experienced partner, we provide comprehensive services throughout the entire lifecycle of your project.

Our services include amongst others:

- Wind measurements using LiDAR technology
- Site assessment services such as site-specific wind potential and energy yield assessment, site quality assessment, site-suitability assessments, noise immission and shadow flicker prognosis, risk assessments and assessment of minimum distance to overhead lines, site specific load comparison
- Geotechnical site investigation and foundation assessment
- Litetime extension expertise of wind turbines beyond 20 years/design life

- Technical inspections of wind turbines, e.g. end of warranty inspections, periodic inspections and condition-based inspections of wind turbines and components
- Commissioning inspections
- Inspection of approval-related additional subsystems, e.g. ice detection, blade monitoring and obstruction marking/ aviation lights
- Inspection of cranes and services lifts on- and offshore

We are accredited according to DIN EN ISO/IEC 17025:2018 by the DAkkS for LiDAR wind measurements, energy yield assessments (TG6) as well as site quality assessment (EEG 2021). Our inspection body wind, type A, is accredited according to DIN EN ISO/IEC 17020:2012 for technical inspections of WTG. Furthermore, we offer inspections, e.g. of lifts and elevators as “Zugelassene Überwachungsstelle (ZÜS)”.

TÜV NORD EnSys GmbH & Co. KG

Address	Grosse Bahnstrasse 31 22525 Hamburg
Phone	+49 (0)40 8557-0
Fax	+49 (0)40 8557-2552
E-Mail	windenergy@tuev-nord.de
Web	www.tuev-nord.de
Category	Experts
Profile	Wind resource evaluators
Turnover	€ 1,451.8 million
Employees	14,863
Founding year	1869

UKA – Umweltgerechte Kraftanlagen GmbH & Co. KG

The wind and solar park developer
UKA plans, builds, manages and operates wind and solar farms and the associated infrastructure. With more than 70 grid-connected power plants and a project pipeline of more than nineteen gigawatts for wind and solar projects, UKA is one of Germany's leading project developers.

01


02

Complete solutions for decentralized power production
As a full-service provider, the UKA Group provides all services up to the handover of operationally-ready renewable energy parks. At the point of commissioning, our energy park operations subsidiary, UKB Betriebsführung GmbH, ensures that the turbines operate for decades with optimal technical and economic performance.

Our project management subsidiary, which is based in Lohmen (Mecklenburg, Germany), UKA Projektträger GmbH & Co. KG is responsible for the implementation of all of the UKA Group's construction projects. Due to our large purchasing volume, UKA is able to work in a particularly cost-efficient manner and also offers its services to other partners – a win-win situation for all parties.

All projects are accompanied by our expert team, every step of the way, up to the point of permit-compliant implementation. This involves providing support for everything from the construction of pathways and


03

The UKA Group has around 900 employees and is currently active in Europe as well as in North and South America. As a full-service developer, UKA not only covers the entire value chain but also operates wind and solar parks itself. Founded in 1999, the company is one of the leading German project developers. UKA has also grown strongly internationally in recent years. The UKA Group's current project pipeline for wind and solar projects now exceeds 19 gigawatts.

04

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foundations to grid connection, turnkey construction and commissioning as well as following up on all official requirements and acceptance tests in compliance with the German Federal Immission Control Act.

Complex projects and exemplary solutions

As an expert in wind energy in forested locations, UKA has already commissioned several wind power installations in commercial forests. A specialist agency – Fachagentur Windenergie an Land – has identified the "Göllnitz-Lieskau-Rehain" project as a good-practice example of sustainable wind projects in forest locations. It exemplifies project development in close coordination with citizens.

The Group successfully executes repowering projects. For this purpose, UKA examines whether local conditions such as height or distance regulations, planning law and turbine firing of potentially suitable wind power plants, allow for repowering. In 2021, for example, twelve turbines were modernized and optimized at the Warnsdorf wind farm in Brandenburg, Germany. The new wind turbines produce even more green electricity with an increase of the rated output of 3.6 times more than that of the old turbines and they can now supply energy to more than 40,000 households.

UKA effectively leads conservation compensation and replacement measures in the context of wind energy projects. The project "Schäferwiese" in Mecklenburg-Western Pomerania, Germany compensates the wind turbines of Parchim wind farm, which were planned and built by UKA, in an exemplary way.

Local partnership and global presence

The energy park developer supports all phases of a project as a financially strong and implementation-oriented partner – regardless of the plant type. Flexible and situation-specific cooperation models enable mutual collaboration and the shaping of the energy transition with joint forces.

The UKA Group is currently expanding its business activities in other European markets like Italy (Rome) and Poland (Szczecin) including UKA Iberia which operates from Madrid. In addition, UKA North America from Florida, Texas and Illinois as well as UKA Chile from Santiago de Chile are driving promising renewable energy projects in North, Central and South America.

01 | UKA wind energy park in Leeskow
02 | Planning – construction – management – operation: Full service from a single source
03 | UKA solar energy park in Luechow
04 | Renewable energies in harmony with nature
05 | Compensation and replacement measures "Schäferwiese" in Mecklenburg-Western Pomerania
06 | UKA offices

Der Energieparkentwickler

UKA – Umweltgerechte Kraftanlagen GmbH & Co. KG

Address	Dr.-Eberle-Platz 1 01662 Meissen
Phone	+49 (0)3521 72 80 60
Fax	+49 (0)3521 72 80 6410
E-Mail	info@uka-group.com
Web	www.uka-group.com
Category	Planning
Profile	Planers & project developers
Employees	900
Founding year	1999

Volkswind GmbH

Making your life a breeze!
Volkswind has been committed to the energy transition with expertise and passion for the past 30 years. Our objective is to increase the percentage of wind powered energy in the electricity mix and thus create a future worth living for generations to come.

01 | An employee from the Volkswind service team in action

We plan, construct, and operate onshore wind farms throughout Europe, taking care of everything from the initial concept, development, and operational phases to maintenance.

Volkswind's interdisciplinary and international team has already erected over 80 wind farms with a total output of almost 1,500 MW, a level of power production of which we are justifiably proud and will continue to expand. We are one of the top 10 project developers, especially in our core market in France, where we are the leading tender winner.

Ever since we were taken over by the Swiss energy group Axpo in 2015, Volkswind has been even more strongly positioned to continue expanding its pipeline and diversifying its project portfolio.

Axpo is the European leader when it comes to marketing renewable energies and currently manages a portfolio of 95 TWh. Long-term power purchase agreements (PPAs) will enable Axpo to achieve further growth in the renewable energies sector. Axpo's expertise in the energy sector and its many years of marketing and industry experience make for a strong strategic partnership in the wind energy sector.

In addition to our previous core markets in Germany and France, Axpo, and Volkswind are also focusing on project developments in Romania and Finland and are continuing to expand our technical operations and asset management services.

VOLKSWIND

Volkswind GmbH

Address	Gustav-Weisskopf-Str. 3 27777 Ganderkesee
Phone	+49 (0)4222 941 38 0
Fax	+49 (0)4222 941 38 99
E-Mail	info@volkswind.de
Web	www.volkswind.de
Category	Planning
Profile	Planers & project developers
Employees	150 (Wind energy: 150)
Founding year	1993

VSB Gruppe

Project development |Planning| Construction| Operational Management| Repowering
Trust in more than 25 years of experience and more than 1.300 megawatts of installed capacity. We provide profitable solutions throughout the entire value chain of wind energy projects.

Wind is our passion and project development is our core competence. As a full-service provider, we accompany every step of the process, from securing land through approval planning to the implementation of wind farms, for which we are also your contact when it comes to operational management. We are also your strong partner in the field of energy services. We develop individual energy concepts for your company, taking into account all consumption sectors, and work out solutions so that you can produce, store and consume energy that is environmentally friendly and conserves resources.

Empathy and Acceptance
The energy transition can only succeed if all stakeholders act in concert. Therefore, our projects are put into practice in close cooperation with residents, municipalities, and local representatives. This results in highly individual solutions regarding turbine locations, windfarm layouts and compensation measures. Above that, scheduled receipts and financial rewards for citizens add to making renewable energies a long-term benefit for local communities.

Tested Quality
VSB has received certification according to the DIN EN ISO 9001:2015. It ensures that responsibilities are clearly assigned, processes are bindingly defined, and knowledge is documented in a systematic manner. Hence, you can put your trust in legal compliance, reliable yield projections and a strict monitoring of project costs.


01

In Your Vicinity
Climate action does not stop at regional borders. Consequently, our experts work internationally on implementing a sustainable energy supply. With our headquarters in Dresden and five regional German offices as well as numerous locations abroad we are always in reach when accompanying your project from the beginning to the end.

01 | Wipperdorf wind farm (Thuringia, 14.4 MW)

VSB
energy for you

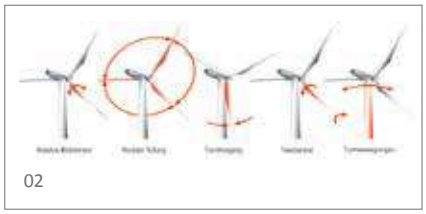
VSB Gruppe

Address	Schweizer Strasse 3 a 01069 Dresden
Phone	+49 (0)351 21183-400
Fax	+49 (0)351 21183-44
E-Mail	info@vsb.energy
Web	www.vsb.energy
Category	Planning
Profile	Planers & project developers
Employees	approx. 500
Founding year	1996

windcomp GmbH

Optimize and protect your wind turbine with the ROMEG measuring system
windcomp GmbH is specialized in the optimization of wind turbines. We have developed the ROMEG measuring system, with which we can quickly detect both aerodynamic and mass imbalances. It is a dynamic measuring process during normal plant operation.


01


02

01 | Romeg setup
02 | Measurement parameters
03 | Profiles with blade angle deviations and without blade angle deviations
04 | Tower vibrations with a blade angle deviation and without blade angle deviation

windcomp develops and produces laser measuring systems for wind turbines and offers as service the measurement of the turbines through our experts.
ROMEG is a laser-based measuring system for the dynamic measurement of wind turbines. ROMEG can detect and measure aerodynamic imbalances, caused by blade angle deviations, as well as mass imbalances.

FUNCTIONS OF THE ROMEG SYSTEM
The following parameters and functions are measured by the ROMEG System:
- Relative Blade angle – The main function of the ROMEG system is to measure relative blade angle deviations.
- Mass-excited unbalance. Detection of unbalance-generating mass differences in the rotor blades
- Tower vibrations – The oscillation pattern of the axial tower movement is a good indicator for the evaluation of the detected blade angle deviations.
- Vibration analysis of the tower movement (FFT Analysis)
- Measurement of the tower clearance of the blade tips

ADVANTAGES OF ROMEG SYSTEM
- The laser measurement takes place on a running turbine under real operating conditions.
- No loss of yield due to downtime while measurement
- Fast measuring process – entire wind farms within a short time
- Results are quickly available on site and can be used immediately to optimize the turbine.
- By comparing the vibration pattern before and after the correction, the success of the optimization is immediately visible and provable.

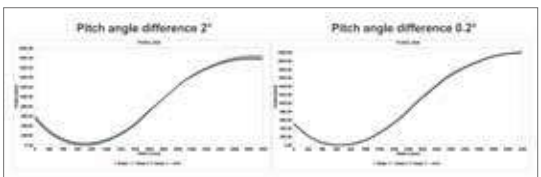
WHY MEASURE?
In contrast to an imbalanced turbine, a turbine with well-balanced rotor shows the following attributes:
- Better performance/higher yield
- Higher availability
- Longer service-life of turbine
- Less tower stress
- Reduced maintenance costs
- Lower noise emission

The ROMEG system is available as ground- and nacelle based measurement system and can therefore also be used for offshore turbines

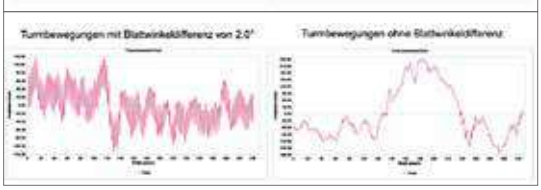
windcomp

windcomp GmbH

Address	Glogauer Str. 21 10999 Berlin
Phone	+49 (0)30 319 85 54-75
Fax	+49 (0)30 319 85 54-99
E-Mail	info@windcomp.de
Web	www.windcomp.de
Category	Operation & Service
Profile	Service, maintenance & repair
Founding year	2008



03



04

wind-turbine.com GmbH

Get wind projects off the ground digitally and implement them efficiently
With the help of our portal, you can increase your international influence. As a marketing, procurement or sales platform for equipment, spare parts or services: You benefit from our enormous global reach and the network effects of more than 8,500 companies from over 190 countries.

The story of wind-turbine.com began in 2011. The two minds behind the portal are Bernd Weidmann, founder and managing director, and Heiko Werner, partner and technical developer. The entrepreneurs each bring over 25 years of experience in the digital platform economy, i.e. sales, marketing and development of online platforms, to the wind-turbine.com project.

Our vision:
We bring together supply and demand of the global wind industry directly on a central platform, accelerate projects and thus the global energy transition. More than 15,000 (> 8,500 companies) registered market participants from more than 150 countries, including investors, manufacturers, operators, project developers, service companies, etc. are already benefiting from the network effects of our B2B platform.

Access to international business:
As is already the case with B2C platforms, B2B value chains will map onto platforms in the future. Many German companies also lack online visibility . However, visibility and reach on the internet is essential for future business.

The enormous visibility of wind-turbine.com gives German companies both international awareness and access to new business opportunities and new customers, which can secure their existence. Those companies that use platforms as a sales channel will also be able to profit from the growth market of wind energy in the long term.

Position your company on wind-turbine.com in good time, get your sales up and running digitally and actively shape the energy transition together with us!

wind-turbine.com –
Made & operated in Germany!

wind-turbine.com

wind-turbine.com GmbH

Address	Barbarossastrasse, 61 63571 Gelnhausen
Phone	+49 (0)6051 971 10
E-Mail	info@wind-turbine.com
Web	wind-turbine.com
Category	Other services
Profile	Media & communication
Employees	11 (Wind energy: 4)
Founding year	2016

Wölfel Wind Systems GmbH

How do you make profits with knowledge?
We are experts in vibration and signal analysis, provide information on structural damage, lifetime consumption and the associated potential continued operation, monitor material fatigue and help you meet legal requirements in the field of noise emissions.


01


02

01 | Structural monitoring of the entire wind energy installation – offshore and onshore
02 | Long-standing expertise in automated ice detection

High vibration levels, varying wind speeds or noise emissions – onshore and offshore, a wide variety of areas require professional engineering in order to make the operation of wind turbines (WTG) safe and efficient and to comply with licensing requirements.

By reliably detecting ice build-up, our IDD.Blade® ice detection system impressively reduces the downtime of your WTG. With SHM.Tower® and SHM.Foundation® you are best prepared for the topic "continued operation". With exact information about the structural condition of foundation and tower, you can achieve a precise asset evaluation and an optimized lifetime extension. The use of AI enables a new dimension of damage detection at the foundation. With SHM.Foundation individual, we are the market leader in the German offshore sector and offer customized solutions for foundation monitoring that enable condition-based inspections.

Low-frequency vibrations of the entire WTG can cause high stresses on the tower and thus significantly reduce the lifetime of the tower structure. Furthermore, if the vibrations are too high in the assembly state, e.g. the installation of the rotor blades may become impossible or may only be carried out in weather conditions that are very limited in time. Especially resonant vibrations can be reduced (cost-) effectively by our TMD.Tower dampers.

Noise-reduced operation can massively reduce the yields of your wind farm. With ADD.Sound® you minimize tonalities and return to normal operation mode. With more than 1000 systems on the market, we can justifiably call ourselves a technology leader in active solutions for reducing gearbox tonalities.

Wölfel Wind Systems GmbH

Address	Max-Planck-Strasse 15 97204 Höchberg
Phone	+49 (0)931 49 708-0
Fax	+49 (0)931 49708-150
E-Mail	info@woelfel.de
Web	www.woelfel.de
Category	Experts
Profile	Technical consultants
Employees	130
Founding year	1971

wpd GmbH

think energy

With strong pipelines, wpd is on a successful growth course. wpd is advancing the energy transition worldwide and is constantly expanding its activities, locations and teams.

From its foundation as a two-man operation in 1996 to its current position as one of the nationally and internationally market-leading project developers and operators of wind and solar energy parks, wpd has undergone rapid development. The company continues to grow unabated in the central markets for wind and solar energy in Germany and Europe as well as overseas.

Worldwide, wpd is active with over 1,000 employees in 29 countries. New markets are being opened up, so that the current number of almost 60 branches is constantly growing. The implementation of the extensive project volumes in Germany and abroad is being advanced with reinforcements in all areas of project development, construction and operation. This applies not least to the German domestic market, where wpd is currently contributing to the success of the German energy transition at 17 locations.

Here, the political course set for achieving the expansion targets is having a noticeable effect and wpd can report a strong increase in the number of permits issued.

For 2023, wpd expects approvals for wind farms with more than 400 MW – in total, the pipeline in Germany comprises 4,800 MW. wpd solar GmbH also records a dynamically growing workforce and at the same time continues to expand its strong project pipeline. Currently, the company is active in the solar energy sector in a total of 10 countries and has over 3,200 MW of PV projects in planning. The main focus here is on the markets in the USA, Canada, France, Greece, Italy, Germany, Taiwan, Indonesia and the Philippines.

Thus, the company's history is successfully continued and the company will further advance the global energy transition with a strong combination of projects of wind and solar energy.


01


02

01 | wpd Havelland wind farm
02 | wpd headquarters in Bremen


03


04

03 | wpd solar park in Minturno, Italy
04 | wpd Leadway wind farm, Taiwan

wpd GmbH

Address	Stephanitorsbollwerk 3 (Haus LUV) 28217 Bremen
Phone	+49 (0)421 16866-10
Fax	+49 (0)421 16866-66
E-Mail	info@wpd.de
Web	www.wpd.de
Category	Planning
Profile	Planers & project developers
Employees	1,001
Founding year	1996

wpd windmanager GmbH & Co. KG

Over 6 gigawatts under operational management
Being on a steady growth path – from Pitea to Taichung – wpd windmanager can look back over many years of success, which saw the introduction of new wind farms, new sites, new target markets, and new services.

01 | wpd windmanager experts monitor the turbines around the clock in their 24/7 control room.

02 | Currently, wpd windmanager has a total output of 6 gigawatts under operational management.

Our core focus is on the commercial and technical management of wind farms and solar parks around the world where we are experiencing steady growth.
In addition to our core market in Germany, we also have an active presence in various other European countries, South America, and Asia. We currently employ about 500 people and manage over 6 gigawatts of wind farm output.

“Over the past few years”, says Till Schorer, Director of Customer Relations at wpd windmanager, “we have once again undergone an enormous expansion. The German market has regained its momentum, but we have also added a large number of new projects around the world. The 6 gigawatts”, he continues, “represent an important milestone for us. There are not many wind farm operators in the market with a comparable output volume.”

International growth: Over 2.5 gigawatts under operational management
Our international operational portfolio has now increased to over 2.5 gigawatts and the trend is rising: we are planning to access further markets and launch additional projects in the coming years, both from the wpd AG pipeline and through external customer projects. In particular, our operations in France, Poland and Finland have increased dramatically in recent years, and many more projects are already in the late planning stage.

“Our international operations are set to grow even more strongly going forward,” explains Henning Rüpke,

03

Director of International Operations: "On the one hand through new target markets and on the other through a series of new projects in the countries in which we are currently operating."

New operational management requirements

Managing wind farms is a task continually beset by new challenges such as new technical requirements, legal regulations, reporting obligations, and bespoke customer requests.

In many new projects, for example, our technical management team is dealing with a new generation of significantly more powerful turbines such as the Enercon E-138, the Vestas V-150, and the Nordex N-149 all of which are already in service in Finnish, Swedish, Taiwanese, and German wind farms. "This new generation of turbines presents new challenges", as Henning Rüpke explains: "which increases the need for us to exchange information between locations and countries and to benefit from one another's know-how."

But new legal regulations also present new challenges. We at wpd windmanager are constantly developing our service portfolio to further optimise the operation of our customers' wind farms by addressing current issues such as demand-controlled night marking (BNK), redispatch 2.0, revenue skimming, and municipal levies.

"The workload for wind farm managers is increasing continuously," Till Schorer explains. "Our work is no longer limited to traditional business management tasks. Developing new services is becoming more important and we are increasingly being called upon to function as problem solvers and drivers of innovation."

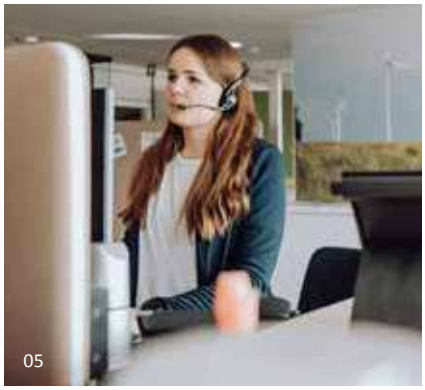
Long-term experience

Wind farm and solar park operators, funding bodies, public utilities, and investors have been relying on the expertise of wpd windmanager in commercial and technical management for over 20 years and our success has been extremely impressive: 9 out of 10 operators say they would recommend our business management services. We also provide an asset and portfolio management service for many operators around the world – from Oulu to Los Ángeles – as well as taking care of the overall operational management on their behalf.

We are also supporting the further development of renewable energies and pushing new industry standards through various research and development collaborations.

03 | 9 out of 10 operators say they would recommend our operational management services.
04 | In addition to wind farm management, wpd windmanager is also expanding its solar farm management operations.
05 | The Key Account Management team takes care of all issues.
06 | Since 1998, the Bremen-based company has been taking care of all services related to wind farm management.

04



05

06

wpd windmanager

wpd windmanager GmbH & Co. KG

Address	Stephanitorsbollwerk 3 28217 Bremen
Phone	+49 (0)421 8976 600
E-Mail	windmanager@wpd.de
Web	www.windmanager.de
Category	Operation & Service
Profile	Technical & commercial operational management
Employees	520
Founding year	1998

XERVON Wind GmbH

Working for the future

Wind energy has to pay off twice – in terms of sustainability and from an economic point of view. Our services ensure what is necessary for this: the highest possible system availability, operating states with optimal performance values and consistent.

01 | XERVON Wind colleague in front of a wind turbine

XERVON®
IM AUFTRAG DER ZUKUNFT

XERVON Wind GmbH

Address	Bernardstraße 29 49808 Lingen
Phone	+49 (0)591 6100 37 0
Fax	+49 (0)221 7177 338
E-Mail	wind-xn@xervon.com
Web	www.xervon-wind.de
Category	Operation & Service
Profile	Service, maintenance & repair
Employees	100 (Wind energy: 100)
Founding year	2021

As a partner to the wind energy industry, XERVON Wind offers all relevant technical services competently and independently of the manufacturer. Onshore and offshore, we support you with the construction of the system and smooth commissioning. During operation, our service teams ensure that your systems run efficiently and reliably. In addition to maintenance work and safety checks, maintenance with condition monitoring is part of the service profile.

Mechanics, electrics, sensors: We carry out any repairs for all components, including the rotor, gearbox and large component replacement. Our retrofits open up new, higher performance classes for you – either via standard solutions provided by the manufacturer or with optimization packages that we design individually using engineering. Last but not least, we equip wind turbines with protective coatings. A service that counts above all for offshore wind farms.

In cooperating with its customers, XERVON Wind delivers based on its tailor-made service concepts, customer orientation and a high degree of innovation. We operate nationwide and employ around 100 people at our locations in Lingen, Geilenkirchen and Cologne. Organizationally, XERVON Wind is part of the XERVON group and therefore belongs to REMONDIS Maintenance & Services. For you this means: In addition to our own work, we can involve specialists from other trades at any time and open up potential for you that only a strong group of companies can offer.

Our services at a glance:

- Service & maintenance
- Repairs
- Retrofits
- Installation & commissioning
- Safety reviews
- Gear boxes
- Towers
- Main component replacement
- Engineering
- Surface technology

BWE
German Wind Energy Association

The Who's Who of the German wind industry

Your company is not listed in the publication?
You'd like to be included again next year?
Then don't hesitate!

Print & Online

Specification:

Company profile and/or **Address entry**
- in the German print publication
- as pdf (German and English)
- and in the online database

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We'll be glad to advise you:
Klaus Barkeling:
k.barkeling@wind-energie.de

Nikos Fucicis:
n.fucicis@wind-energie.de

Published in German and English.

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www.windindustry-in-germany.com

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Wind energy sector meeting in Schleswig-Holstein.
Photo: BWE/Tim Riedige

ASSOCIATIONS:

German Wind Energy Association (BWE)

The German Wind Energy Association is the voice of the German wind energy sector. The companies of the wind industry meet in its advisory councils and discuss its technical and political orientation. At its events and in its publications, it passes on its knowledge – to newcomers and experts alike.

The expert committees in the German Wind Energy Association e. V.

Various perspectives – one common interest: the accelerated expansion of onshore wind energy. The German Wind Energy Association provides its diverse members with the opportunity to organize themselves both professionally and politically in order to pursue this very goal. Through targeted exchange of expertise and the associated political coordination, the association derives policy recommendations as well as essential information for its members.

01

02

Thus, the broad expertise of the BWE relies on the diversity of its members. In fact, the association includes a wide range of stakeholders, such as plant operators, operations managers, project developers, experts, lawyers, financiers, investors, and community energy organizations, as well as equipment manufacturers, suppliers, and service providers. The BWE consolidates their expertise and experience in advisory boards and working groups. The largest group within the BWE, the plant operators, also have the opportunity to exchange ideas in operator forums.

In all of these specialist committees, members discuss and address current technical issues in their respective fields, developing both technical and political solutions to all key industry topics. They form the basis of the association's technical and political work, advising the board of directors and the executive committee. The concrete technical work of these experts often results in position papers and statements. These documents are heard and considered during the frequent regulatory changes at both the European and national levels.

In practice, over 800 individuals serve as voluntary members in the BWE's specialist committees. The committee members typically convene two to four times a year. The departments primarily responsible for the thematic and organizational support of these committees are the Wind Expertise Division, along with the Legal Department and the Policy Division. The collaboration between these policy areas enables well-founded technical work and politically effective association activities. The information papers, statements, and position papers developed are made available to all BWE members.

01 | Expert Advisory Board (Photo: Weidmüller)
02 | Wind Consultant Advisory Board (Photo: Christina Hasse)

ADVISORY BOARDS

Operator Advisory Board

In principle, all of the approximately 2200 wind turbine operating companies registered with the BWE are eligible to participate in the Operator Advisory Board. However, the representatives of the six manufacturer-related operator forums, in which operators discuss matters relating to wind turbines from the same manufacturers, form the core of the advisory board's work.
Operating companies with one or more wind turbines are organised in these six forums, which convene one or two meetings a year. Representatives of the manufacturers' service divisions and independent service providers are invited to these meetings. The Operator Advisory Board also organises an annual survey of all BWE operator companies to determine the service quality of the service providers and manufacturers.

Operational Managers Advisory Board

The Operational Managers Advisory Board deals with all commercial and technical aspects of wind turbine operations and also liaises with other associations to help develop guidelines. Temporary working groups are established to discuss specific subjects and produce reports or recommendations for action, which benefit all stakeholders in the wind energy sector.

Citizen's Wind Energy Advisory Board

The Citizen's Wind Energy Advisory Board is a body that brings together citizen's energy associations which it represents within the BWE. It is committed to bringing about the energy transition through citizen's wind energy projects.

Funding Body Advisory Council

The Funding Body Advisory Council is open to all banks and funding bodies operating within the wind energy sector. It is a forum for the inter-company exchange of ideas and deals with the financial ramifications of relevant legislation.

Legal Advisory Board

In the legal advisory board, more than 100 lawyers and legal experts discuss current legal issues related to wind energy. The primary focus is on evaluating numerous ongoing legislative processes, with concrete proposals for changes being formulated in statements. Additionally, information about current legal proceedings and the associated rulings is exchanged. The Legal Advisory Board is overseen by the Legal Department.

Project developers

The Planning Advisory Board is an important platform for the exchange of information between the planning companies organised within the BWE. Discussions about key issues such as planning law at the federal and state levels, the future design of the German Renewable Energy Sources Act and European energy policy are frequently accompanied by specialist lectures. The members support the BWE's positioning on planning issues in collaboration with the relevant specialist committees.

Expert Advisory Board

The Expert Advisory Board discusses and develops guidelines and procedural instructions for the technical inspections of wind turbines. These are widely accepted beyond the association and form the basis for the long-term safe operation of wind turbines in Germany.

Communication Advisory Board

The Communication Advisory Board meets to discuss how to present issues relating to the wind sector in the press and public relations work. The member companies plan campaigns, brochures, and social media activities. The Communication Advisory Board is supervised by the Communications Department.

Wind Consultant Advisory Board

The BWE Wind Consultant Advisory Board's main focus is on improving wind forecasts in inland areas based on a continuous exchange of experiences and regular lectures on the subject, resulting, in particular, in the definition of minimum standards for expert reports.

WORKING GROUPS

They are organized across advisory boards, able to act swiftly, and can involve external experts. In addition to the Energy Policy and Conservation advisory boards, there are active on topics such as Direct Marketing, Networks, Air Traffic and Radar, Labeling, Continued Operation and Plant Safety, and Participation.

Energy Policy Advisory

The exchange of current political topics takes center stage in the work. Across advisory boards and topics legislative initiatives of the federal government are discussed, and recommendations are developed to assist the Federal Board in forming its positions.

Grids Advisory

The diverse aspects of the grid topic are reflected in the responsibilities. This includes politically-strategic questions such as the future share of conventional energy in the network, grids expansion and redevelopment, grids optimization, flexibility options, and the system transformation towards renewable energy supply.

For more information about the work of various expert committees, please visit www.wind-energie.de/english/association/committees/

BWE
German Wind Energy Association

The expert committees at the German Wind Energy Association (BWE)

Address	EUREF-Campus – Haus 16 10829 Berlin
Phone	+49 (0)30 212341-210
E-Mail	info@wind-energie.de
Web	www.wind-energie.de
Category	Organisations & Public institutions
Founding year	1996

German Wind Energy Association (BWE)
EVENTS

INFORM. EDUCATE. NETWORK.

The German Wind Energy Association – a strong partner

With around 20,000 members it is the world's largest association for renewable energies. The BWE has been campaigning for a sustainable and efficient expansion of wind energy in Germany for many years.

With its ambitious expansion targets, the wind energy sector is the main driver of the energy transition. Together with its members, the BWE is fully committed to continuing the success story of German wind energy and to ensuring that the vision of "100 percent electricity from renewable energy" in Germany becomes a reality soon.

The German Wind Energy Association – knowledge & networking

In addition to political work, knowledge & networking is a central impetus for the German Wind Energy Association.
BWE has accompanied the economic and technical progress of the industry for many years with its education events and publications from which everyone, novice and expert alike, can obtain the latest facts about the growing wind industry and beyond.

01 | The BWE's Green Screen Studio
Photo: BWE
02 | Specialist Conference Wind Energy & Species Protection
Photo: BWE/Volker Krah
03 | Energy Transition MAKERS Stage
Photo: BWE/Tim Riediger
04 | BEE Summer Festival
Photo: Carsten Koall

04

BWE events

With approximately 50,000 participants at around 250 events per year, BWE is the market leader in the education and training of the wind industry and also offers various topics related to renewable energies. The diverse formats provide professionals and executives in the renewable energy sector with the opportunity to stay informed on current topics and expand their networks.

The Wind Branch Days are an established platform for dialogue among industry professionals and for engaging with policymakers at the regional level. With up to 800 participants, these are the largest events, and numerous politicians from all levels of government attend each year.

During conferences, practical workshops, and seminars, participants stay up to date in their respective fields as selected industry experts share their practical knowledge. It's not uncommon for new business relationships to be established in these settings.

BWE WebAcademy

From 90-minute webinars to three-day web seminars, the BWE WebAcademy provides you with the very latest information and knowledge. As usual, you can ask our experts questions, but from the comfort of your home or office. More than 150 offers are available every year, allowing you to tap into a wide range of topics and stay abreast of developments surrounding the wind energy sector, PV and other renewables without much effort.

An overview of all events can be found here: **www.bwe-seminare.de**

BWE PolicyBriefing

Several times a year, BWE provides information via live video streams on political developments related to wind energy and answers industry questions in real-time. This allows legislative processes and challenges to be followed and assessed on a daily basis. Through BWE Policy Briefings, BWE offers an interactive and transparent way for member communication with significant reach.

BWE
German Wind Energy Association

German Wind Energy Association (BWE) Events

Address	EUREF-Campus – Haus 16 10829 Berlin
Phone	+49 (0)30 20164-222
Fax	+49 (0)30 212341-362
Web	www.bwe-seminare.de
Category	Organisations & Public institutions
Profile	Education & Training
Founding year	1996

German Wind Energy Association (BWE)
CORPORATE PUBLISHING

From ONLINE to PRINT: expert knowledge for the sector, attractively delivered
Under the brand name Wind Industry in Germany, the BWE publishes various products for a specialist audience within the wind energy sector. With these products the BWE provides its readers with comprehensive information on current developments within the sector.

ONLINE FORMATS

windindustry-in-germany.com

The website is the leading portal for specialist information within the wind energy sector. It offers current information on companies, a comprehensive collection of expert interviews and a broad range of further education and job opportunities, while the online company directory presents the who is who in the wind energy sector.

In short: This site invites you to explore its content and to make the most of its information and educational opportunities!

Sector newsletter

The sector newsletter provides a weekly update of the most important news from the wind energy sector. Reaching about 12,000 recipients it is a press review that draws on the online presence of the sector.

German Wind Power Magazine

The idea of this new online format is to help German companies access international markets. Published in English, the German Wind Power Magazine offers a stage to present German companies to an international audience.

www.windindustry-in-germany.com/german-wind-power-magazine

PRINT FORMATS

Wind Industry in Germany

The central aim of the present directory is to build connections within the German wind industry. It is the flagship of the wind energy sector where companies can present their services and products to a broad audience. The comprehensive address section makes it a real reference book for anyone looking for partners in the wind industry. The publication also presents innovative projects and start-ups.

BWE Wind Energy Yearbook

For the last 30 years the BWE has published the wind energy yearbook which offers an excellent overview of facts, figures and data and the development of both the market and technology in Germany, Europe and the world. The results of the BWE service survey and an overview of the German service market give insights into developments within this special segment of the industry.

BWE operators' newsletter

The operators' newsletter is a print format that is mailed to around 2,200 operators. It provides this important group with relevant information, covering current issues and forthcoming changes and offering tips for efficient operation.

BWE posters

The posters always reflect current issues, such as the development of wind power in Germany, repowering, continued operation, or nature conservation and species protection. The high print run of 20,000 to 30,000 ensures that the posters are widely distributed within the sector and beyond.

Customised marketing options

The **Wind Industry in Germany** brand is a market leader when it comes to offering a wind energy sector-specific advertising platform for those engaged in marketing. Our range of marketing options includes:

- Online company listings
- Banners
- Newsletter announcements
- Stand-alone newsletters
- Company presentations
- Advertisements
- Event sponsoring
- And much more

Our well-established publications give you direct access to every **sector-relevant target group**. Contact us, we'll be happy to advise you!

Interested in realising your own corporate publishing project?
With our **long publishing expertise in the field of renewable energies** we are more than able to implement your project. We are good at what we do, fast, and affordable. We know the sector better than anyone! We look forward to hearing from you!

BWE
German Wind Energy Association

Wind Industry in Germany

German Wind Energy Association (BWE)
Corporate Publishing

Address	EUREF-Campus – Haus 16 10829 Berlin
Phone	+49 (0)30 212341-164
Fax	+49 (0)30 212341-410
E-Mail	WID-Redaktion@wind-energie.de
Web	www.windindustry-in-germany.com
Category	Other services
Profile	Media & Communication
Founding year	1996

Over the last months, ABO Wind has dismantled nine wind turbines that started operating 20 years ago in the municipalities of Berglicht, Breit, Büdlich and Heidenburg in the Hunsrück region. A new wind farm is being built on the site. From 2024 onwards, three modern wind turbines will produce significantly more electricity than the nine old ones. This is one of many projects currently being implemented by ABO Wind, particularly in Germany.
Photo: ABO Wind

COMPANIES:

Industry directory

More than 350 addresses of leading companies in the wind industry.

Direct marketing

Direct marketers

BayWa r.e. Energy Trading GmbH
Katharinenstrasse 6, 04109 Leipzig
Phone: +49 (0) 341 339 676 00
E-Mail: energytrading@baywa-re.com
www.baywa-re.de
As a direct marketer, we provide plant operators with a comprehensive, transparent service. Our offer includes direct marketing as well as remuneration models for wind plants with expiring subsidy.

Centrica Energy
Esplanade 40, 20354 Hamburg
Phone: +49 (0)160 90509308
Fax: +49 (0)40 228 676 958
E-Mail: cet-coordination@centrica.com
www.centricaenergy.com
Centrica Energy is a leading European provider of energy management services . Our main competencies in Germany are Direct Marketing, Post EEG contracts, and PPAs for renewable assets.

EWE TRADING GmbH
Am Weser-Terminal 1, 28217 Bremen
Phone: +49 (0)421 696 253 07
Fax: +49 (0)421 696 253 09
E-Mail: direktvermarktung@ewe.de
www.ewe.com
The company offers operators and project planners of renewable energies individual solutions for PPA and direct marketing contracts.

in.power Services GmbH
An der Fahrt 5, 55124 Mainz
Phone: +49 (0)6131 69657-0
Fax: +49 (0)6131 69657-29
E-Mail: kontakt@inpower.de
www.inpower.de
The in.power group provides a wide range of services: direct marketing, continued operation, flexible marketing, green energy balancing, metering point operation, regional green power products etc.

naturstrom AG
Parsevalstrasse 11, 40468 Düsseldorf
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E-Mail: Direktvermarktung@Naturstrom.de
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Phone: +49 (0)331 982 238 30
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4-cast.de
Precise energy yield forecasts Intraday, next day and long-term forecasts for wind and solar power.

Education & training

Education & training

blade care GmbH
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Phone: +49 (0)163 886 00 79
E-Mail: post@bladecare.de
www.bladecare.academy
blade care Academy is a DNG-GL certified training provider for administrators & rotor blade technicians & GWO Blade Repair course, with 25 years experience in rotor blade service by blade care GmbH.

BWE-Service GmbH – WebAcademy
c/o Bundesverband Windenergie e.V.
EUREF-Campus 16, 10829 Berlin
Phone: +49 (0)30 212 341-222
E-Mail: seminare@wind-energie.de_
www.windindustry-in-germany.com/events
We impart practical knowledge in face-to-face seminars, at conferences, via internet or livestream. Our portfolio covers all areas of renewable energies.

Wind assessement advisory board | Financing advisory board | Communication advisory board
Legal advisory board | Project developers | Community Wind Energy Committee

Deutsche Windtechnik Training Center Viöl
Mühlengrund 3, 25884 Viöl
Phone: +49 (0)4843 20 448 163
Fax: +49 (0)4843 20 448 149
E-Mail: Trainingcenter@deutsche-windtechnik.com
www.deutsche-windtechnik.com
The Training Center Viöl offers a practical training in original turbines of the leading manufacturers. Well-equipped training rooms offer optimal conditions for the theoretical knowledge transfer.

EMD Deutschland GbR
Breitscheidstrasse 6, 34119 Kassel
Phone: +49 (0)561 31059-60
Fax: +49 (0)561 31059-69
E-Mail: emd-de@emd.dk
www.emd.dk
EMD Deutschland, exclusive sales agency of the Danish software manufacturer EMD International A/S, arranges courses for the software products windPRO and energyPRO on a regular basis.

KWS Energy Knowledge eG
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Fax: +49 (0)201 8489-102
E-Mail: info@kws-eg.com
www.kws-eg.com
For more than 60 years, KWS has been a service provider and an educational institution with its customized and up-to-date training and consulting offerings for the power industry.

Safety training

Deutsche WindGuard
An der Weinkaje 4, 26931 Elsfleth
Phone: +49 (0)4404 9875-100
Fax: +49 (0) 4451-9515-29
E-Mail: buchung.training@windguard.de
www.windguard-training.de
Safety Training f. onshore & offshore wind industry, GWO basic safety trainings & refresher, Helicopter Underwater Escape Training, trainings acc. to DGUV; Training Centres: Elsfleth, Norden, Borkum.

Deutsche Windtechnik Training Center Bremen
Hüttenstrasse 20a, 28237 Bremen
Phone: +49 (0)421 62677 10
Fax: +49 (0)421 62677 11
E-Mail: Trainingcenter@deutsche-windtechnik.com
www.deutsche-windtechnik.com
The Training Center provides certified safety courses in accordance with GWO, DGUV & FISAT. All relevant safety aspects are trained in a realistic environment with experienced trainers.

OffTEC Base GmbH & Co. KG
Lecker Strasse 7, 25917 Enge-Sande
Phone: +49 (0)4662 89127-0
E-Mail: training@offtec.de
www.offtec.de
OffTEC is a safety and technology training provider, certified according to GWO & DGUV. The Maritime Training Center is one of the most modern of its kind. Overnight stays on-site are possible.

SHE Solution Bergmann GmbH & Co. KG
Im Sundernkamp 2, 32130 Enger
Phone: +49 (0)5224 939 38 50
Fax: +49 (0)5224 939 38 52
E-Mail: info@she-solution.de
www.she-solution.de
SHE is your training provider for safety trainings according to GWO and DGUV standards. The trainings are conducted realistically by experienced trainers, if desired also as in-house training.

Energy services

Construction, operation, direct marketing

EnBW Energie Baden-Württemberg AG
Schelmenwasenstrasse 15, 70567 Stuttgart
Phone: +49 (0)711 289 487 87
E-Mail: windkraft@enbw.com
www.enbw.com/windkraft
Development, acquisition, construction, operation, direct marketing or repowering of wind turbines from a single source. We rely on partnerships and also make our know-how available to third parties.

ENGIE Deutschland Erneuerbare GmbH
Ella-Barowsky-Strasse 44, 10829 Berlin
Phone: +49 (0)30 91581 0250
E-Mail: alexa.schroeder@engie.com
www.engie-erneuerbare.de
ENGIE is one of the TOP 5 renewable energy companies in the world. We develop and operate wind farms and ground-mounted photovoltaic arrays and market the green electricity.

Energy services

BKW Energy
Hauptstr. 65, 12159 Berlin
Phone: +49 (0)30 24 000 60 10
E-Mail: info@bkw.de
www.bkw.ch
As part of the BKW Group, we can provide our customers, partners, and investors with a comprehensive range of energy services in addition to the production and procurement of electricity.

Expert consulting advisory board
Expert consulting advisory board
Scientific advisory board
Operators' advisory board

Experts

Certification

Landstrom GmbH & Co. KG
Watenstedter Str. 11, 38384 Gevensleben
Phone: +49 (0)5354 26600-66
Fax: +49 (0)5354 26600-19
E-Mail: info@landstrom-landwind.de
www.landstrom-landwind.de
Climate-neutral electricity and gas from a single source, direct marketing, service and consultancy across the entire spectrum of renewable energies in co-operation with Landwind at competitive prices

FGH – Testing and Certification
FGH Zertifizierungsgesellschaft mbH
Voltastr. 19-21, 68199 Mannheim
Phone: +49 (0)621 976807-50
Fax: +49 (0)621 976807-73
E-Mail: info@fgh-zertifizierung.de
www.fgh-zertifizierung.de/en
Accredited certification body and accredited testing laboratory for grid code compliance certification and type testing of generating units, generating plants and components, inspection services.

M.O.E. – Moeller Operating Engineering GmbH
Kirchhoffstr. 1, 25524 Itzehoe
Phone: +49 (0)4821 6453-100
Fax: +49 (0)4821 6453-140
E-Mail: info@moe-service.com
www.moe-service.com
M.O.E. is an accredited test laboratory and certification and inspection body, which offers services to ensure the long-term and conformen operation of wind turbines.

TÜV SÜD Industrie Service GmbH
Westendstr. 199, 80686 Munich
Phone: +49 (0)89 5791-3177
Fax: +49 (0)89 5791-2956
E-Mail: windenergie@tuvsud.com
www.tuvsud.com/wind-power
Type certification, Project certification, Offshore certification, Site assessment, Operating time extension, Photovoltaics, Hydrogen applications

WIND-certification GmbH
Reuterstrasse 10, 18211 Bargeshagen
Phone: +49 (0)38203 7483-10
Fax: +49 (0)38203 7483-11
E-Mail: info@wind-certification.de
www.wind-certification.de
Certification body: system certificates, unit certificates, component certificates

WindGuard Certification
Oldenburger Str. 65, 26316 Varel
Phone: +49 (0)4451 9515-0
Fax: +49 (0)4451-9515-29
E-Mail: info@windguard-certification.de
www.windguard-certification.com
Certification body & test laboratory for WTG & other renewable energies: Certif. of PGU, components & PGP, type & project certification, SSDA, lifetime extension, measurement of grid characteristics.

Technical consultants

8.2 Group e. V.
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Fax: +49 (0)421 438 41 77
E-Mail: info@allgeier-inovar.de
www.allgeier-inovar.de
AURELO Energiepark-Manager – ERP industry solution based on Microsoft D365 BC for planners, project managers, operations managers: projects, business management, contracts, finance, CRM.

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Phone: +49 (0)228 92 58 52 90
E-Mail: info@bil-leitungsauskunft.de
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BIL provides developers and operators of wind power plants with a central inquiry portal for planning enquiries.

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E-Mail: sales-de@emd.dk
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node.energy GmbH
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Our online buried infrastructure information portal is an easy way for planners and construction companies to make enquiries throughout Germany and to answer any queries they may receive.

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ALTUS renewables GmbH operates as an experienced project developer of wind power and photovoltaic installations with services ranging from planning and implementation to operational management.

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With about 27,000 employees, EnBW relies on partnerships for development, acquisition, construction, operation, direct marketing and repowering. It also makes its expertise available to third parties.

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EP New Energies GmbH is one of the leading full-scope project developers for renewable energies with a focus on onshore wind energy, ground-mounted photovoltaics (PV) and Floating PV.

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Prokon Regenerative Energien eG
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With 40,000 members, Prokon Regenerative Energien eG is Germany's largest energy cooperative. It develops and operates wind energy and PV plants in DE, PL and FI, providing citizens with green energy

Prowind GmbH
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Companies A – E

An overview of all categories
is provided on the back inside cover. ▸

C

D

E

Companies E – M

An overview of all categories
is provided on the back inside cover. ▸

Companies M – V

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is provided on the back inside cover. ▸

Companies V – X

W

X

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bestellung@wind-energie.de

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BWE-Service GmbH
Phone: +49 (0)30 212341-210

Klaus Barkeling
(k.barkeling@wind-energie.de; Phone: -177)

Nikos Fucicis
(n.fucicis@wind-energie.de; Phone: -178)

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Julia und Sonja Multhaupt GbR,
info@die-multhaupts.de

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Category overview

Here you'll find all companies sorted by the services and/or products they offer.
An alphabetical list of all companies is provided from page 268.

Direct marketing

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Energy services

Experts

Finance & law

Manufacturers

Operation & service

Organisations & public institutions

Other services

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