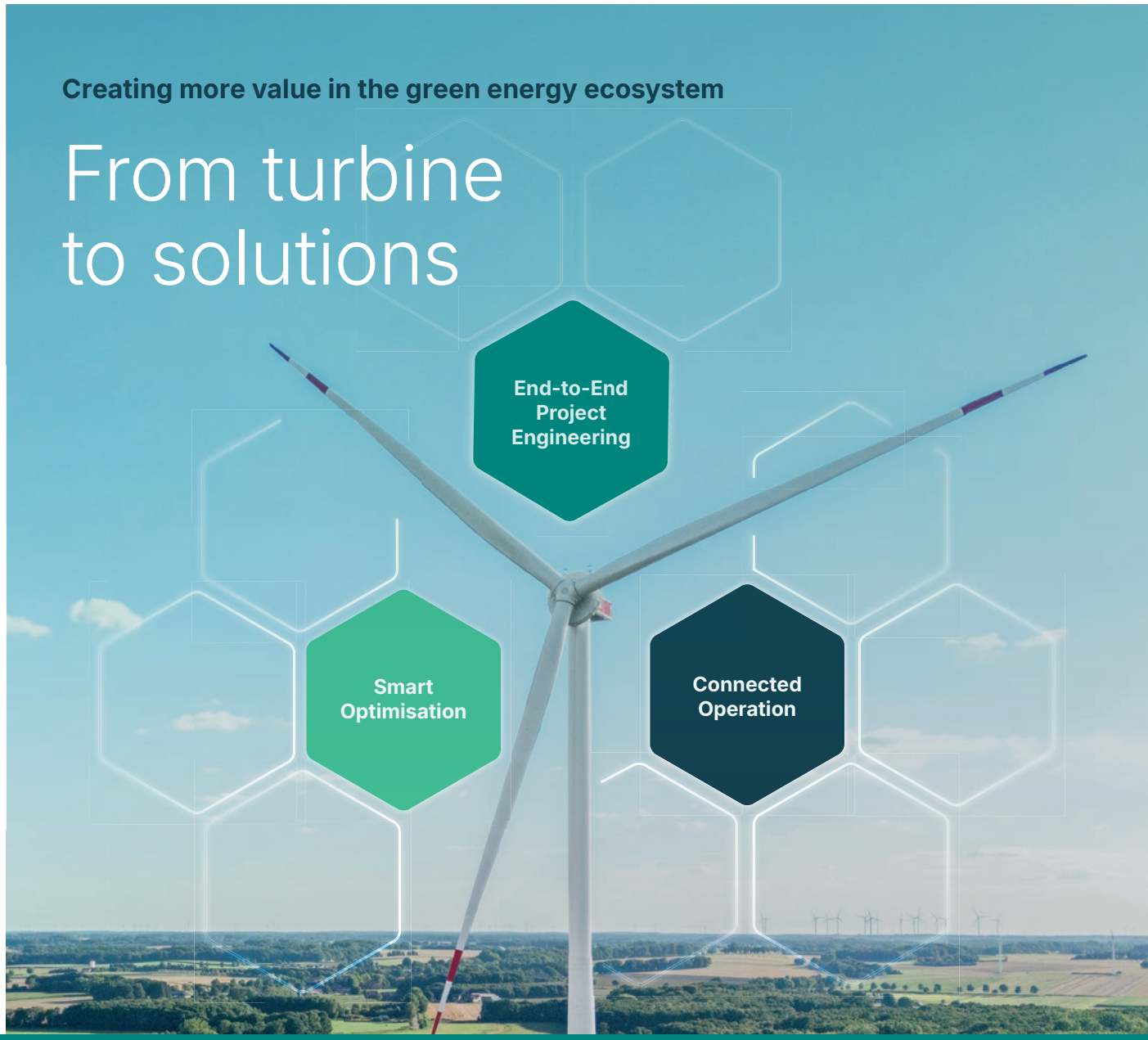
ENERCON WB MAGAZINE

WindBlatt 02|25

Creating more value in the green energy ecosystem

From turbine to solutions



LEAN PRODUCTION, STRONG PERFORMANCE

Modular manufacturing increases efficiency across the production network.

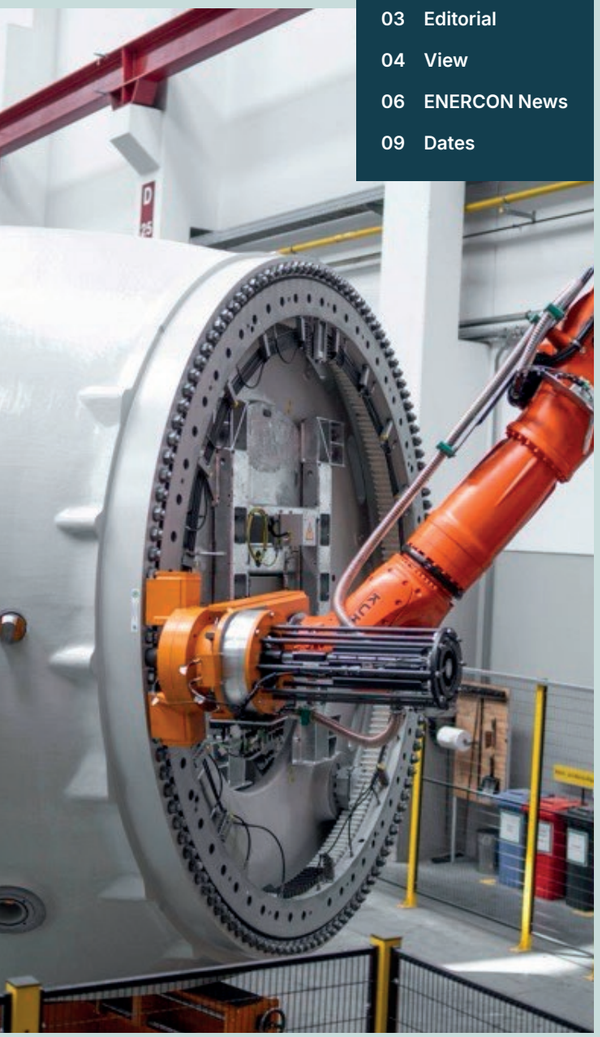
WIND+STORAGE AS AN ALL-IN SOLUTION

ENERCON opens up new opportunities for flexible energy marketing.

REPOWERING IN VILA DO BISPO

Technical upgrades and a strong partnership in southern Portugal.

ENERCON



STANDARDS

Content

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Added value makes the difference

Dear readers,

The supply of energy is changing – and so are the demands placed on all of us who are actively helping to shape the energy transition. It is becoming more and more complex to design a profitable wind energy project: competition is increasing, there is a higher share of renewables in the energy mix, and political and regulatory framework conditions are intensifying. Established revenue models for green kilowatt-hours are coming under increasing pressure. The energy transition has reached a point where high-performance turbines and maximum energy yield are not enough.

Now is the time for us as an industry to show what we are capable of. The next phase of the energy transition calls for more than just the expansion of capacities – it calls for intelligent, networked and sustainable solutions. Today it is more important than ever to generate green energy intelligently, store it flexibly and use it sustainably – embedded in a digital and future-proof energy system that provides ancillary services. For our customers this means more efficiency, more reliability and more future. And that is precisely what we are working on – with our innovative strength, experience and a real passion for the energy transition.

This is exactly where our new orientation comes in. We focus consistently on the benefits for our customers and combine high-yield ENERCON wind turbines with innovative solution elements for a complete green energy ecosystem. By intelligently connecting technology, data and services we create new opportunities to exploit the full potential of each and every project – economically, securely and sustainably.

What is it that sets us apart? Our added value and our focus on the customer. As a pioneer of renewable energies with over 40 years of experience, a strong partner network and a deep understanding of the needs of a transforming energy market, we have always thought outside of the limits of the wind turbine itself. This mindset, coupled with our innovative strength and customer focus, makes us a reliable and powerful partner for the next phase of the energy transition.

We truly believe the energy transition is a springboard for new growth – for us, our partners and our customers. Let's seize this opportunity together. Let's work together to get more out of green energy. We look forward to talking to you!

Together we can unfold the future of a reliable, affordable and clean energy supply.

Kind regards

Udo Bauer
ENERCON CEO

E-175 EP5 E2 prototype completes initial runs of test campaign

ENERCON is making progress in validating the new E-175 EP5 E2. The prototype at the Wachendorf site in Lower Saxony has successfully completed the initial practical runs for the thermal validation of the new separable PM generator. During this test series, the wind turbine is gradually ramped up to its nominal power.

Since commissioning, the prototype has completed over 200 hours of testing and fed more than 320 MWh into the grid. The E-175 EP5 E2 is ENERCON's new top model. With a rotor diameter of 175 metres and a nominal power of 7.0 MW, it ranks among the highest-yielding onshore wind turbines in Europe.

A fresh breeze at ENERCON – and for windblatt

A new look, a clear direction – and added value for our customers.

You may have already noticed: the windblatt has a brand-new look – perfectly in tune with ENERCON's rebranding and strategic realignment. Our new visual identity is more than just a logo refresh. It reflects who we are today: a reliable partner in the energy transition, a provider of integrated wind energy solutions, and a driving force behind a connected green energy ecosystem. At the heart of it all remain our high-performance wind turbines – now complemented by smart services and innovative technologies that deliver real added value for our customers. The clean design, modern typography, and fresh visual language express our mindset: open, forward-looking, and closely aligned with the needs of our partners and customers. Because our goal is clear – to support you in realising your projects as effectively as possible, today and into the future.

ENERCON customer event in Magdeburg: **shaping the future together**

At this year's customer event in Magdeburg, ENERCON made a bold statement about its transformation from a turbine manufacturer to a solutions provider within the green energy ecosystem. Even in the early stages of the programme, it became clear just how much the company is realigning its strategy. This new direction is also reflected in the refreshed brand identity – a visible expression of an open, connected, and forward-looking corporate culture.

Impetus, exchange and prospects: at its customer event at the Festung Mark, ENERCON gave a strong indication of its transformation into a solutions provider in the green energy ecosystem.

For two days, the focus was on how wind, storage, and grid solutions can be more intelligently integrated in the future. At the Festung Mark, ENERCON offered guests practical insights, interactive breakout sessions for co-creation, and an exclusive evening event with plenty of opportunity for personal exchange in a unique setting.

On the second day, the generator centre of excellence opened its doors, providing fascinating insights into production and development. It was evident how ENERCON is supporting its customers in unlocking the full potential of green energy solutions – both today and with an eye to tomorrow's requirements. The event was characterised by genuine exchange, collaborative dialogue, and a clear focus on the future.

ENERCON´s climate targets validated by SBTi

ENERCON has taken another significant step towards a sustainable future: our targets for reducing greenhouse gas emissions have been officially validated by the renowned Science Based Targets initiative (SBTi). This means our climate strategy is grounded in the latest scientific findings and is aligned with the 1.5 °C target of the Paris Agreement.

SBTi supports companies worldwide in setting and implementing science-based emissions reduction targets. By joining the initiative at the beginning of 2025, ENERCON has once again reaffirmed its commitment to climate action. ENERCON CEO Udo Bauer explains: 'Climate and environmental protection are firmly embedded in our values. That's why we are proud to lead the way with credible climate targets.'

ENERCON's sustainability strategy pursues a comprehensive approach to reducing greenhouse gas emissions across the entire value chain. Initial measures have already been implemented – including the electrification of our vehicle fleet and an increased use of electricity from renewable sources.

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Find out more about our sustainability goals

Making an impact through responsibility – ENERCON Sustainability Report 2024

Did you know that ENERCON wind turbines installed in 2024 helped to avoid around 82 million tonnes of CO_2 emissions? To put that into perspective: that's one and a half times more than the total annual greenhouse gas emissions of a country like Ireland – achieved solely through clean energy.

82 million tonnes of CO_2 were avoided by ENERCON wind turbines in 2024.

The recently published ENERCON Sustainability Report for 2024 offers more than just figures. It provides insights into our commitment to climate protection, the circular economy, occupational health and safety, equal opportunities and diversity, as well as responsible supply chain management. Since 2021, ENERCON has been reporting voluntarily and transparently in line with GRI standards. From 2025, we will take the next step: reporting will then be carried out in accordance with the Corporate Sustainability Reporting Directive (CSRD) – for even greater transparency, comparability, and clarity.

To download the report, please scan the QR Code.

Strategic partnership for the energy transition: enercity und ENERCON join forces

Cooperation includes delivery, installation, and servicing of 100 wind turbines for the German onshore market.

The developer and wind farm operator enercity Erneuerbare and ENERCON have entered into a two-year partnership for the German onshore wind market. The agreement covers the delivery, installation, and servicing of around 100 wind turbines of various types, with a project volume of up to €800 million. An extension of the partnership is possible.

The collaboration is based on a framework agreement tendered by enercity, which already fostered close cooperation between the Lower Saxony-based wind energy players during the negotiation phase. The first projects are already underway – more than 30 wind turbines are scheduled to be called off this year.

'Ambitious growth and expansion targets can be achieved even more efficiently with strong partners. By working with ENERCON, we are securing reliable access to high-quality technology within a contractually defined timeframe. Both sides also benefit from transparent pricing – this combination of volume, timing, and price provides planning security for both parties,' emphasise Ralf Nietiet and Daniel Müller, Managing Directors of enercity Erneuerbare, a wholly owned subsidiary of the energy company enercity.

ENERCON also sees the partnership as a strong signal: 'The wind energy market in Germany has gained momentum. The transfer of building permits into project realisation is increasing. The contract negotiations in recent months, as well as the first projects now being implemented, show that we have established a very constructive relationship between the two companies. We are delighted to be supplying enercity's projects and to be shaping the energy transition together and sustainably,' says Benjamin Seifert, Regional Head of Central & Northern Europe at ENERCON.

The partnership not only strengthens the energy transition, but also benefits the northern German economy – a win for the entire region.

Signing the partnership agreement (from left to right): Daniel Müller (enercity), Benjamin Seifert (ENERCON), Ralf Nietiet (enercity) and Lennard von Dollen (ENERCON).

ENERCON supplies 15 x E-175 EP5 E2 turbines for major project in Bavaria

An important milestone was reached with the delivery and construction of 15 x E-175 EP5 E2 in Upper Franconia.

A strong signal for the energy transition: ENERCON and CPC Germania GmbH & Co. KG have signed a contract for the delivery and installation of 15 E-175 EP5 E2 wind turbines. The wind farm will be built along the Rennsteig in Upper Franconia and will be one of the largest in the region.

With a total capacity of 105 MW and an expected annual yield of around 300,000 MWh, the site will supply green electricity to approximately 75,000 four-person households. The turbines, each with a hub height of 162 metres, will be installed across an area of roughly 940 hectares.

A particular highlight is the close involvement of the local municipalities of Ludwigsstadt, Markt Tettau, and Steinbach am Wald. Not only are they host communities, but they are also directly participating in the project: four of the turbines will be operated by the municipalities themselves. A public survey showed an impressive approval rate of 85 per cent – a clear sign of strong local support.

Construction is scheduled to begin in spring 2026, with commissioning planned for later in 2027. The project will make a significant contribution to the Free State of Bavaria's climate strategy. A symbolic moment marked the contract signing: Melanie Niemann and Johannes Schnabel presented a 2.5-metre model of the E-175 EP5 E2 – a gesture of strong partnership and a shared commitment to a sustainable energy future.

Contract signing in Upper Franconia (from left to right):
Tobias Vogel, ENERCON After Sales Manager | Dennis Edelbrock, CFO CPC Germania
Melina Tacke, CEO CPC Germania | Melanie Niemann, ENERCON Sales Director Germany
Joachim Binotsch, CTO CPC Germania | Gunnar Schwender, CPC Germania Legal Counsel
Johannes Schnabel, ENERCON Deputy Head of Sales and After Sales Germany South-East.

VISIT US!

Colloque National Eolien Paris
Paris | France
15 – 16 October 2025
www.colloque-national-eolien.fr/fr/cnfr2025

Recharge Wind Power Summit powered by WindEnergy Hamburg
Hamburg | Germany
27 November 2025
www.futureenergy.events/website/15013/

Key - The Energy Transition Expo
Rimini | Italy
4 – 6 March 2026
https://en.key-expo.com/

WindEurope Madrid
Madrid | Spain
21 – 23 April 2026
www.windeurope.org/annual2026/

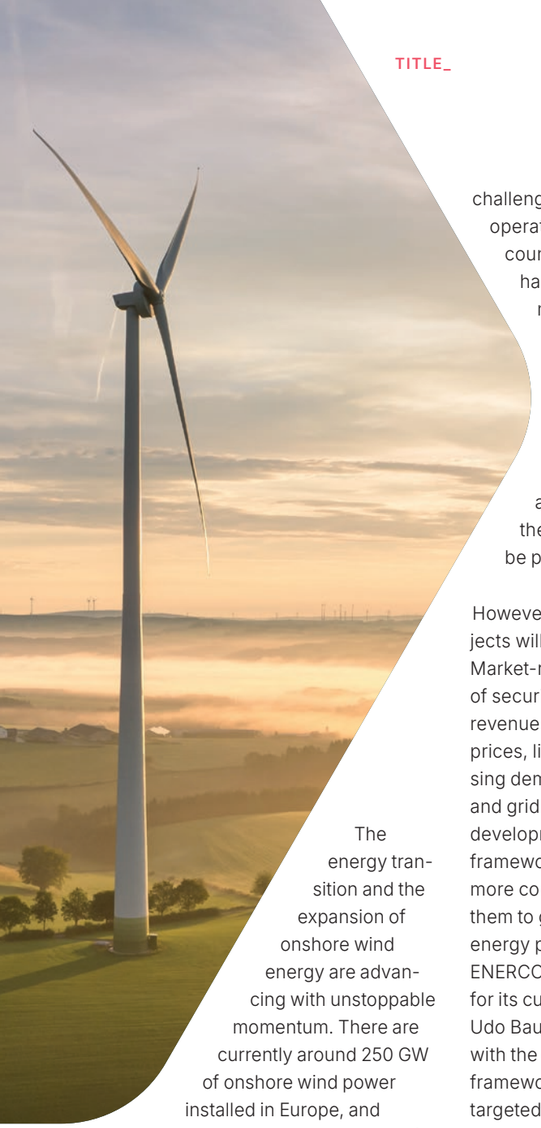
End-to-End Project Engineering

Smart Optimisation

Connected Operation

New position for the next phase of the energy transition

Against a backdrop of changing market conditions and more complex energy policy requirements, ENERCON is expanding its range for partners and customers. As a solutions provider for the interconnected ‘green energy ecosystem’, the company is offering an extensive portfolio of products and services associated with the ENERCON wind turbine. The customer benefit of ‘maximum added value’ from renewables projects is the key objective.



The energy transition and the expansion of onshore wind energy are advancing with unstoppable momentum. There are currently around 250 GW of onshore wind power installed in Europe, and 70 GW in Germany. Almost half of the energy produced in Europe already comes from renewable sources (share of onshore wind: approx. 16 per cent). In Germany, the proportion of renewables is as high as around 60 per cent (share of onshore wind: approx. 26 per cent). And the record number of approvals that have been granted recently means we can expect further large quantities of onshore wind turbines to be installed in the coming years.

Changes to market and framework conditions

While the progression of the energy transition is greatly welcomed from a climate protection perspective, it also brings with it far-reaching changes and challenges for project planners, operators and manufacturers. Many countries with regulated markets have now reached a high level of market maturity and are saturated with renewable energies. Governments are withdrawing from remuneration systems with guaranteed feed-in tariffs. The green kilowatt-hour produced is becoming a commodity that is traded on the energy market and has to be profitable.

However, in future the individual projects will have to guarantee profitability. Market-related price fluctuations, a lack of securities for financing projects, new revenue models, fluctuating electricity prices, limited grid capacities, increasing demands with regard to flexibility and grid stability, rapid technological developments and volatile political framework conditions are making it both more complex and more challenging for them to generate and market green energy profitably. ‘In this context, ENERCON is offering holistic solutions for its customers’, says ENERCON CEO Udo Bauer. ‘We have engaged deeply with the changes and analysed the new framework conditions in order to provide targeted support for our customers.’

‘The “Produce & Forget” motto from the first phase of the energy transition, under which as much wind energy as possible is produced and every one of these kilowatt-hours is fed into the grid and remunerated at a rate guaranteed by the government – irrespective of whether it can actually be used – is currently being replaced by a new market model’, explains Udo Bauer. ‘In future, generating and consuming power needs to be cheaper overall, as well as grid-friendly, smart, connected and climate-friendly. This means further onshore expansion is no longer just about generating more kilowatt-hours. The main goal is to feed, store and use the green energy produced from wind turbines efficiently and smartly.’

New position as solutions provider

‘Instead of “Produce & Forget”, our motto in the future will be “Produce & Refine”’, explains Udo Bauer. ‘This new motto stands for customer-specific, value-based and holistic solutions which aim to achieve the best possible value for the green kilowatt-hour produced. At the same time, this is our new promise to our customers: with ENERCON, every green energy project unfolds added value.’

In order to fulfil this promise to its customers, the company is repositioning itself. ‘This presents us with a huge opportunity to help our customers to actively shape this next phase of the energy transition too, and to enable the establishment of an integrated, connected renewable energy system’, says Udo Bauer.

In repositioning itself, ENERCON is transforming from a wind turbine manufacturer that offers services to an active provider of solutions and an enabler in the green energy ecosystem. ‘By “green energy ecosystem” we mean the whole energy system that is undergoing transformation, including renewable power generating units, energy storage systems, transmission and distribution networks, high-voltage substations, industrial consumers and residential electricity customers. Our solutions incorporate this entire ecosystem in order to meet the needs of our customers and offer them a specific added value’, says the ENERCON CEO.

ENERCON wind turbines at heart of solutions portfolio

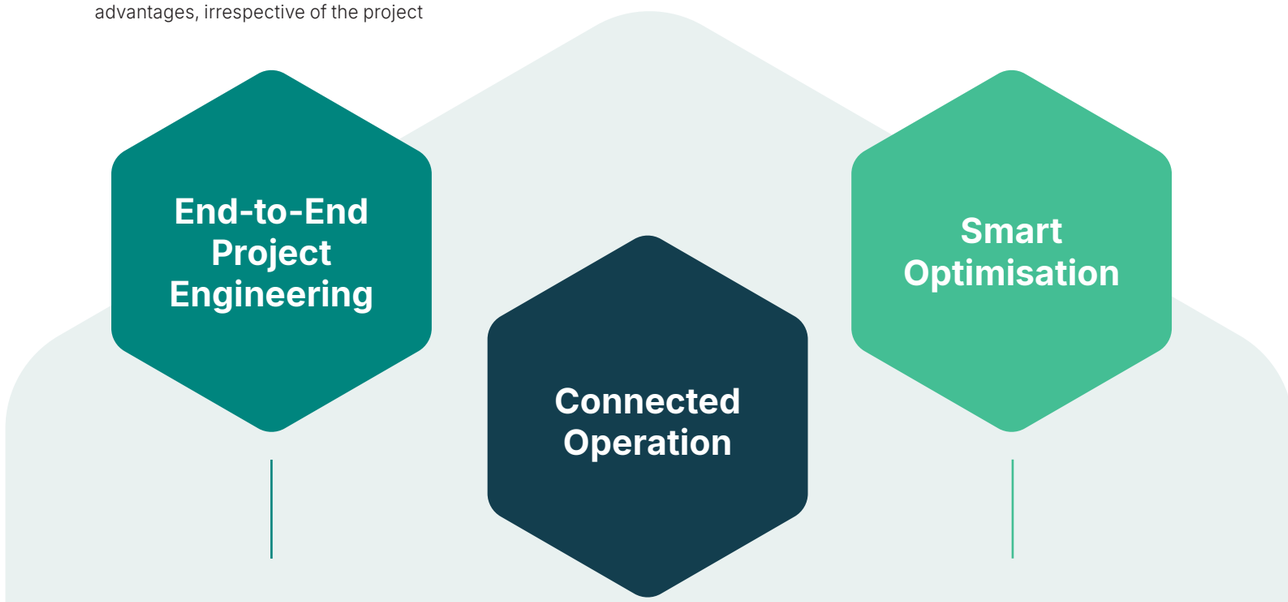
The focus of the new market strategy is on the individual value that customers want to achieve with their projects. As a way to increase this value for customers, ENERCON is developing holistic solutions in the areas of ‘End-to-End Project Engineering’, ‘Connected Operations’ and ‘Smart Optimisation’.

Customers can make choices in these areas to suit their objectives. In each case, the ENERCON wind turbine forms the basis of the portfolio from which the customers select their solution modules.

The new E-175 EP5 top model is a prime example: its excellent performance and yield properties, reliable technology, high quality standards and versatility for combination with other innovative solution modules offer the best conditions for optimum customer benefits and diverse added value advantages, irrespective of the project profile and the customer’s individual configuration of the solutions portfolio.

Reliable partner and new avenues

‘We are a reliable partner for our customers in all phases and make sure the full potential of their green energy project is unlocked’, says Udo Bauer. As a pioneer of green power generation, ENERCON has extensive experience and expertise and has always thought beyond the boundaries of wind energy. ‘Together with our customers and partners, we are now embarking on new ways of combining the diverse elements of the green energy ecosystem into intelligently networked solutions – from power generation through to storage and feeding into the public grid or industrial plant network. In doing so, we are open to partnerships, collaboration and new solutions. We are reinforcing this transformation by relaunching our brand to reflect our new culture of openness, networking and a holistic outlook for the future with a modern new corporate image.’



End-to-End Project Engineering

Starting with the smart wind turbine, ENERCON accompanies the planning and implementation of customer projects – from component selection and financing, site assessment, approval, scheduled delivery of the components to the construction site and installation to project handover and commissioning. If required by the particular project, planning and construction of high-voltage substations and complex grid connections can also be incorporated. Hybrid projects made up of wind farm and battery storage system can also be realised depending on the customers’ needs (also see p. 22).

Connected Operations

ENERCON also offers connected options for management and control of the implemented project solutions. The services available range from turbine monitoring, proactive maintenance, repair and spare parts management to optional cyber security protection packages, documentation and reporting.

Smart Optimisation

In addition to this, ENERCON takes care of the continuous optimisation of operations reaching all the way to support with dismantling the turbines. The performance upgrades on offer allow operators to maintain an efficient and competitive level of performance for their wind turbines at all times and benefit from significant added value from their projects, even in advanced operating phases. Optional yield-optimised modes, for example, are available for a number of turbine types. This also includes models that have already been discontinued and are no longer part of the current product portfolio.

Change as opportunity: more value for wind energy

In an interview with wb, ENERCON CEO Udo Bauer explains what is behind ENERCON's repositioning – and why now is the right time.

wb: ENERCON has the wind in its sails again, the new turbine types are going down well on the market. Why is ENERCON changing its market strategy in this situation?

Udo Bauer: Because now is the right time to do so! Market changes and more complex framework conditions are posing new challenges for our customers, and we listen to them to provide the right solutions. We are undergoing a transformation and expanding our portfolio of products and services to give them the best possible support and assist them as a reliable partner.

Now is also the right time when it comes to our company. We have successfully come out of the other side of a crisis and a restructuring process. Our customers continue to trust in us and our products, our incoming orders are continuously on the rise. But we want to be successful in the future too. We want to continue to grow as a company and actively help to shape the next phase of the energy transition. The new market strategy is setting the course for this.

wb: What exactly is changing?

Udo Bauer: We are diversifying and transforming from simply being a supplier of hardware and services to become a provider of flexible and holistic solutions for the 'green energy ecosystem'. By this, we mean the whole energy system that is undergoing transformation, including renewable power generating units, storage systems, grids, high-voltage substations, industrial consumers and residential electricity customers. Our solutions incorporate this entire ecosystem to meet the varying requirements of our customers in the best way possible.

We are also setting ourselves apart from the competition by becoming an active trailblazer in the green energy ecosystem and by enabling our customers to exploit the full potential of their green energy projects. Our wind turbines always remain our main focus in all of the possible integrated solutions. They are the nucleus from which our solutions portfolio unfolds individually for each customer.

wb: What are the benefits for ENERCON customers?

Udo Bauer: The approach we are taking will result in new growth prospects both for our customers and for us. We therefore see the changed framework conditions as an opportunity. Now we have the chance to use our approach to unlock the full potential of the green energy ecosystem and add value to wind energy!

Our aim is to provide our customers with the best possible support for their plans and offer them the maximum added value when implementing their renewables projects. As a pioneer of green energy generation, we probably understand the changes in the markets, the challenges our customers face and the opportunities that come with them better than any other company. We have more than 40 years of market experience. And it has always been part of our DNA to deal with issues that go further than just generating energy with wind turbines.

Our customers will benefit from this holistic approach too: by becoming a partner for planning and implementation in the green energy ecosystem, we are unlocking more and more of the huge added value potential of green energies and enabling the intelligent and networked development, realisation and operation of green energy solutions for our customers. This allows these solutions to unfold their full potential and their whole value – both today and in the markets of the future.

wb: ENERCON was active in system solutions years ago but then decided to withdraw from the business segment. What has changed today?

Udo Bauer: It is true that we have dealt with aspects of the connected, integrated renewable energy system in the past. However, at the time the framework conditions were not advanced enough to allow marketable series products and services to be derived from our initiatives.

Today the conditions for our integrated approach are much more promising: the market requirements and political framework conditions have changed. There is a real need for intelligent, networked solutions. Our solutions portfolio not only supplies good answers to the demands placed on the power industry by policymakers. It also helps our customers to market their green kilowatt-hours successfully and profitably. Our solutions can be described as a win-win situation from the perspective of the market and regulators, for our customers and for us.

A second difference with our new approach is that we will no longer be doing everything ourselves, but are open to cooperation, partnership and change. This openness and the networking with strong, competent partners are also important prerequisites for us to be able to implement our new customer promise: with ENERCON their green energy project can unfold its full potential.

Onshore wind energy as backbone of energy transition

How the German government wants to clear the way for smart system solutions.

The German federal government, made up of the Union parties and the SPD, has made a clear commitment to the continuation of the energy transition in its coalition agreement. At the same time, the coalition partners have left no doubt as to the energy policy issues they aim to focus on: better security of supply, improved cost efficiency and a more stable energy system will be the key concerns in future. In the past, these requirements were often brought up in arguments against wind energy expansion. However, the technical and systemic maturation process is now so advanced that wind energy can offer up compelling solutions in these areas – and indeed must, since it already provides almost a third of the energy supply in Germany, with figures rising.

As a cost-effective, domestic and climate-friendly source of energy, onshore wind will take on a key role in the energy system of the future. However, unlike the practice to date, in future the aim will not just be to produce as many green kilowatt-hours as possible. The energy generated from the around 30,000 wind turbines installed in Germany must increasingly be made available when

1. **the grids are able to handle it,**
2. **the market offers an adequate price for the kilowatt-hour fed in, and**
3. **there are buyers for the energy produced.**

However, often these three parameters do not align at the same time. For this reason, over ten years ago ENERCON was already developing concepts for storing wind energy flexibly or using it locally in other sectors: battery-supported regional grids were created in this way, as well as electric-operated pumping stations for draining agricultural land, seawater desalination plants and charging parks for electric vehicles. One thing all these projects had in common was the fact that an ENERCON wind farm was never far away, and the local energy consumers were able to benefit from a stable supply at affordable prices.

Strengthening the security of supply with wind energy

These potentials of wind energy can now be tapped if politicians rightly emphasise the importance of ensuring the security of supply in a growing renewable energy system. For this, the federal government plans to remove obstacles in order to improve the intelligent use of renewable energies across sectors. Flexible storage and the regional use of energy that would otherwise have been curtailed is to be made much easier, and large battery storage systems are to be granted privileged status under building law in conjunction with renewable power generating systems. In particular, the in-demand direct supply of regionally produced wind energy to industrial customers is set to be simplified and expanded.

Guaranteeing and increasing cost efficiency

Onshore wind energy is one of the cheapest ways to generate electricity today. Despite this, project costs are increasing, for instance due to approval hurdles and grid connection problems. The coalition agreement puts forward several measures to counteract this: for example, the duration and scope of approval procedures are to be significantly reduced through means such as digital processing, binding deadlines and standardised environmental assessments. At existing wind turbine sites, repowering with more modern and more efficient wind turbines is to be made easier. Administrative instruments such as deemed approval and extended grandfathering ensure speed and cost savings. In addition, direct marketing and power offtake contracts (Power Purchase Agreements – PPAs) with companies are to be strengthened in order to safeguard investments and facilitate the integration of renewable energies on the market.

Consistently integrating into the system

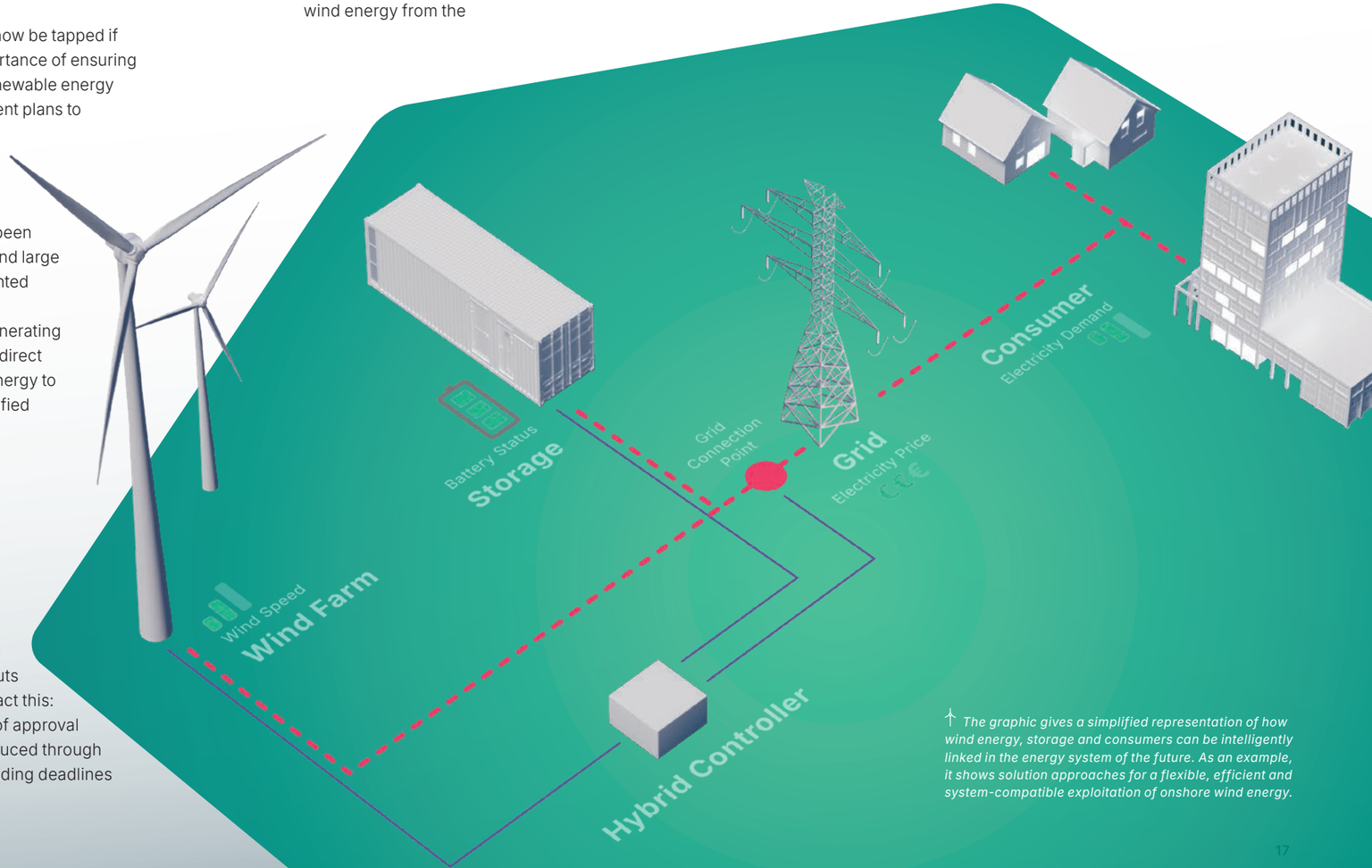
Integrating volatile wind energy into the energy system is one of the biggest challenges of the energy transition. To tackle this issue, the federal government plans to continue its accelerated expansion of the grid – not only with the electricity superhighways designed to transport wind energy from the coast to the consumption centres, but also by strengthening the distribution network to keep up with the regional expansion of renewables. On top of this, hybrid power plants that are equipped with flexible storage systems and integrated between the power generating system (wind, photovoltaics) and the point of common coupling can relieve the load on the grids as well as making it easier to harness the full potential of renewables locally.

Taking action now – with foresight and resolve

The federal government has the chance – and the duty – to make onshore wind energy the backbone of a climate-neutral energy supply. Security of supply, cost efficiency and system integration are no longer showstoppers for the expansion of renewables. Instead, they are mutually reinforcing goals.

By steering a clear political course, making bold and future-proof investments and removing regulatory hurdles, Germany can live up to its role as a pioneer of the energy transition – while also promoting economic opportunities, technological innovations and social cohesion.

Companies like ENERCON and many of its customers are taking active steps to shape the energy system of the future, with hybrid renewable power plants, smart storage solutions and the integrated energy concept. The question of their contribution to the security of supply, cost efficiency and system integration has now become one for others to answer: namely the fossil fuel power plants that use ever more expensive imported energy sources, and are increasingly blocking renewable system solutions.



The graphic gives a simplified representation of how wind energy, storage and consumers can be intelligently linked in the energy system of the future. As an example, it shows solution approaches for a flexible, efficient and system-compatible exploitation of onshore wind energy.

E-175 EP5 in series production ramp-up

While more and more customer projects involving the new top model are entering their realisation phase, ENERCON is steadily increasing production output in its centres of excellence for mechatronics, generators and rotor blades. The industrial ramp-up of series production is in full swing in the production network.

As ENERCON presents its new market strategy, the launch of its new E-175 EP5 top model on the market is also picking up pace. This turbine type featuring the biggest rotor, the highest nominal power and the largest energy yield has a crucial role to play in ENERCON's new positioning. 'Our wind turbines are at the centre of our solution portfolio', says ENERCON COO Heiko Juritz. 'They are the foundation our customers start from to configure their projects. The E-175 EP5 is our most important product – the majority of our ongoing and planned projects are being executed with this type of turbine. This makes a smooth ramp-up of E-175 EP5 series production our top priority.'

ENERCON's Production organisation plays a pivotal role in the market launch. 'It ensures that the main components of the E-175 EP5 are manufactured at top ENERCON quality and that the required quantities are available for delivery to the construction sites at the scheduled time', says Heiko Juritz. 'One of the key demands we make of ourselves is to provide our customers with high-performance, efficient, high-quality and cost-effective products that can be combined with other elements of our solution portfolio to enable maximum added value for their projects. In order to achieve this, we must be able to rely on an excellent and efficient industrial production to guarantee our demands are already met in the main components of our core products – thus making an important contribution to ensuring a competitive solution portfolio.'

The heart of the wind turbine

At the generator centre of excellence in Magdeburg-Rothensee (Saxony-Anhalt), the start of E-175 EP5 E1 generator production is progressing full steam ahead. The aim is to double the rate of production to five generators a week by the end of the year. The generator is one of the most important main components and could be described as the 'heart' of the new turbine. The production steps of stator construction, pole shoe construction, rotor construction, rotor bearing unit production, insulation coating and final assembly are completed in Magdeburg to meet the requirements of the various generator types. The plant also contains an update and repair area.

The centre of excellence began setting up the new production line during the prototype phase of the E-175 EP5 E1. As a partner for ENERCON R&D generator development, the Production experts work together with the Development engineers to create efficient and scalable production processes for the new products. A cross-functional team came together for several weeks in Magdeburg-Rothensee to achieve this.

Objective: streamlined manufacturing

The EP5 stator is made up of over 60,000 segment plates and 192 coils in which 6 MW of power are generated for the E-175 EP5 E1. 'Commissioning the machinery together with two impregnation facilities and two furnaces within a very short time frame was a challenge when we started production', Tobias Möller, Head of the Stator Construction Department tells us. 'The move into our own upgraded factory bay is set to take place by the end of August. The manufacturing process will be reorganised there taking lean management aspects into account.' Special attention will be given to ensuring an optimum supply of materials for the components and an efficient frequency.

From next year, the aim is to manufacture five E-175 EP5 E1 generators every week in Magdeburg.

The rotor's highlight is its 10,032 powerful permanent magnets. 'A modern production line has been created together with the local Lean Team which is already achieving a faster production throughput today than was originally anticipated', says Kjell Tietböhl, Head of the Rotor Construction Department. 'One of the challenges we face is that the rotor currently has to be custom-built for every stator in order to achieve the optimum air gap between rotor and stator. Right now, the aim in development is to stabilise the manufacturing processes so that manufacturing of the rotor and stator in parallel is possible, with the intention of reducing the throughput time in generator manufacturing.'

'In final assembly, the first phase of the production start-up was highly complex', Head of Department Andreas Meißner explains. Both E-160 EP5 and E-175 EP5 E1 generators were assembled in parallel. 'The ramp-up is now entering a new phase: the employees have completed all of the E-160 EP5 turbines to be manufactured in Magdeburg and can now concentrate on the series production of the E-175 EP5 E1', says Andreas Meißner. Final assembly will therefore also be redesigned for the new phase with the lean aspects taken into account.

From next year, the aim is to produce five E-175 EP5 E1 generators every week in Magdeburg. While the series production of E1 generators is being set up for higher quantities, the creation of the production line for the even more powerful E2 generators still lies ahead. The preparations for this are underway in a separate production area in the centre of excellence. Pre-series production of the E2 components is set to start at the end of 2025, and the start of series production is planned for Q1/2026.

New 'lean line' for hubs

The mechatronics centre of excellence in Aurich is also seeing progress in its optimisation of main component series production for the E-175 EP5. Important milestones have been reached in the establishment of modern flow production facilities for hub and E-nacelle production. At the Aurich site too, the measures aim to increase efficiency and reduce throughput times.

A lean 'flow production' system has been set up on the hub production line.

Industrial robots carry out the time-consuming bolting of the bearings automatically.

'In defined stages, we are organising our series production in the centre of excellence to cater for a production volume of up to 1,000 turbines per year', says Stefan Schilling, SE Team Member of Production. The Simultaneous Engineering (SE) division deals with topics related to the overarching product development process. As project manager, Stefan Schilling worked at the interface between R&D and Production to coordinate the ramp-up of the modularised and harmonised hubs and machine houses. 'In order to be able to produce this quantity, we are harmonising the components and assemblies across different turbine types to reduce complexity. At the same time, the focus is on establishing lean and efficient processes. Our measures will make it easier, faster and cheaper to produce our main components in the future.'

In the hub manufacturing process, the components are lined up on a newly created production line. This moves continuously and transports the components from one station to the next. 'We have literally set up a "flow manufacturing" process that is designed to be lean', says Frederik Ungereit, Head of Hub Production. The necessary material is delivered and provided in prepared sets in accordance with the respective cycle time. The time-consuming production steps are carried out in the pre-assembly areas.

Industrial robot takes over bolting

A special area has been set up for bolting the blade flange bearings in which industrial robots carry out the time-consuming task in a fully automated production step. The robots cut the lengthy manual process of setting and bolting the 381 studs from eight down to just three hours. 'This was the biggest bottleneck during the production ramp-up', says Frederik Ungereit.

Both EP3 and EP5 components will be manufactured on the new hub flow production line. 'We have implemented a mixed-model line – manufacturing of various hub types on one line – to significantly reduce the complexity of production', says Ungereit. Both hub types are also tested in the same test bay, which is integrated in the line.

Design changes a must

Setting up a mixed-model line required certain changes to be made to the design. R&D worked closely together with Production to implement these. One example is the standardised cast components now used for all EP5 hubs. The manufacturing process steps are identical; only the blade flange bearings vary due to the different rotor blades.

R&D followed a similar approach to lay the foundations for a more efficient flow production of the E-nacelles in the adjacent factory bay. The new modular design of the machine house is fundamental here. It provides the basis for harmonising the production of EP5 and EP3 components, increases the number of carry-over parts and opens up more advantages in terms of efficiency. Put simply, all EP5 and EP3 turbines – E-160 EP5, E-175 EP5 E1, E-175 EP5 E2 and E-138 EP3 – will have the same E-nacelle in future. Here too, production will be consolidated into a 'mixed line' with EP3 and EP5 machine houses in the further ramp-up stages.

Daniel Wienekamp, Head of E-Nacelle Production, identifies the 'assembly production' method as another huge benefit of the modular design: partial components that are time consuming to manufacture are outsourced to the pre-assembly areas. The pre-produced modules are brought to the main line in a complete state and installed in the corresponding cycle time. 'This makes the process quicker, since we can shorten the throughput time for the line and increase the throughput across the same area.'

E-nacelle flow production with self-driving vehicles

The project team has also simplified the process of transporting the E-nacelle from one station to the next: where two overhead cranes were once used to move each E-nacelle in a complex process, self-driving low-floor vehicles now take care of transportation. Fully automated, they drive underneath the component using a QR marker on the floor for orientation. The E-nacelle is then hydraulically lifted and moved to the next station, where it is set down again.

The next task for Daniel Wienekamp's team is to stabilise the number of units at five EP5 and three EP3 machine houses per week. Q4 is set to bring another increase in capacity, with prospects of manufacturing seven to eight EP5 machine houses every week, Wienekamp explains.

Two more moulds for rotor blade production

At ENERCON's centre of excellence for rotor blades in Viana do Castelo/Portugal, production capacity has been expanded to include two new blade moulds as part of the ramp-up, bringing the total to three. The plant is now preparing to increase the units per mould to four per week, meaning a total of twelve E-175 EP5 rotor blades will leave the plant every seven days.

Various other projects have also been initiated in Viana with the aim of making production more efficient, reducing throughput times and increasing output. As well as training the workforce to work with the new blade type, investments have also been made in automation. One example is the use of lasers as part of E-175 EP5 rotor blade production to mark manufacturing layers and inserts. Machines now support the insertion of long glass-fibre non-woven fabric, while more efficient infusion machines have also been procured for the infusion process.

Support across different sites

The Portuguese team emphasises that it was only possible to overcome all the challenges they faced thanks to the close coordination between all the ENERCON departments and the great dedication shown by everyone: 'This cooperation is an impressive example of how we can overcome challenges together, no matter how big they are', says Hugo Meira, Assistant to the Plant Manager.

Thomas Makuschewitz, Head of Production at the generator centre of excellence, also praises how the various sites and functional areas are mastering the challenges of the ramp-up: 'The team spirit within ENERCON Production is very special. We communicate well and support one another. The ENERCON Production team is thus making an important operational contribution to the successful ramp-up of the E-175 EP5 E1.'

Self-driving low-floor vehicles provide onward transport for the E-nacelles.

Production capacity in Portugal has been expanded by two to three blade moulds as part of the ramp-up.

From wind farm to hybrid power plant

ENERCON is providing an attractive end-to-end approach combining wind farm with battery energy storage system for the next phase of the German energy transition.

The launch of Wind+Storage, beginning with the German market, marks a further expansion of ENERCON's supplementary solution portfolio for wind turbines. The turnkey integration of battery energy storage system and hybrid controller in new or existing wind farms enables operators to access future-proof revenue opportunities and is the key to a regulated energy system based on renewable generation technologies.

'Economical costs of batteries and changes to regulations in the Renewable Energy Sources Act are creating very good framework conditions for the use of battery energy storage systems in combination with wind energy. Nevertheless, the implementation of hybrid projects is challenging in terms of the technology, regulations and commercial aspects', says ENERCON Product Manager Karen Hernandez. 'With ENERCON Wind+Storage, integration is tailored, secure and compliant with the grid. Upon request, we offer support to our customers throughout the entire project process – from the sizing of the hybrid power plant, its financing, project implementation and commissioning to the long-term maintenance.'

ENERCON draws on more than 15 years of experience in the field of hybrid projects as well as its extensive in-house expertise, and also supplies the necessary hardware and software components. These include a powerful hybrid controller that optimally coordinates the wind turbines, battery energy storage system, grid and further controllable units for seamless grid integration and smart operation, or substations for direct feed-in to the public high-voltage grid.

Wind+Storage

This is what the modular complete solution for the implementation of hybrid power plants offers:

System Consulting
Optimal project layout and early contact with relevant stakeholders for efficient implementation

Substation
Feeding energy generated directly into the high-voltage grid thanks to the project's own substation

Hybrid Controller
Optimally coordinating the system for smooth grid integration and smart operation

Battery storage systems
Scalable storage capacities and optimal availability of the stored energy from the wind farm and grid

Service Contract
Maintenance of battery storage system and hybrid controller for smooth operation and high availability

Integrating a battery storage system into a new or existing wind farm enables flexible storage of energy from the wind farm or the grid and its strategic reinjection.

Find out more:
ENERCON **Wind+Storage**

New revenue opportunities for wind farm operators

Battery energy storage systems integrated with intelligent hybrid controllers ensure that wind energy becomes more predictable and reliable, making its integration into the energy grid easier and opening up revenue options for hybrid power plant operators to complement the Renewable Energy Sources Act. 'In addition to the fact that intermediate storage allows more energy to be monetised – energy that would otherwise be curtailed – other remuneration opportunities arise from providing system services for grid regulation or through optimised energy marketing', explains ENERCON CCO Uli Schulze Südhoff.

From a technical perspective, the battery storage systems make it possible to intermediately store both green energy from onshore wind and energy from the grid. However, from a legal approval perspective, the operator has to make a decision according to current regulations. 'The main benefits of storing green energy from the wind farm are the accelerated approval procedure for battery storage systems as well as the opportunity to avoid wind farm curtailments', says Benjamin Seifert, Regional Head of the Central Northern Europe region. 'The "overbuilding provision" also enables more efficient use of the available infrastructure and feed-in of energy from the wind farm and battery storage system via the same grid connection point.

Innovative solutions as a contribution to an affordable energy supply

Wind+Storage is an excellent example of how we are using the diverse products and services of our wind turbine solution portfolio to tap the full potential of green energies, even under new conditions', says ENERCON CEO Udo Bauer. 'As a company we are taking on the responsibility that comes with the next phase of the energy transition and continuing to work on contributing to a clean, secure and affordable supply of energy in Germany with innovative solutions.'

Customer advantages thanks to continuous improvement

‘Smart optimisation’ is an important element of ENERCON’s reorientation as a solutions provider for the green energy ecosystem. Customers benefit from substantial added value, as the example of dynamic performance upgrades demonstrates. Moritz Rodenhausen, Head of ENERCON Product Management, explains how customers profit from optional performance upgrades in this interview for wb.

wb: What exactly is meant by the dynamic performance upgrades that ENERCON is offering in terms of ‘smart optimisation’ for its wind turbines?

Moritz Rodenhausen: Dynamic performance upgrades are improvements to performance and other operating parameters that we offer our customers by means of optimised operating modes. With our dynamic performance upgrades we ensure optimum operation of the wind turbines throughout their service life, enabling significant added value for our customers in all phases of operation. This makes ‘smart optimisation’ an important aspect of our integrated solutions concept for achieving the full value of our customers’ green energy projects.

wb: How do the performance upgrades actually work?

Moritz Rodenhausen: We realise the performance upgrades by making adjustments to the hardware and software of the control system. When these optional ‘yield optimised modes’ are activated, the turbine operates with a better power curve than in basic mode and generates a higher yield. Other available operating modes are designed to reduce noise or loads under particular site conditions.

No changes to the structural design of the wind turbines are necessary for the performance upgrades to be activated. The only requirement is that customers purchase the upgrades from us. They are products that we are actively marketing. Customers do not automatically receive them ready-installed.

wb: Do the performance upgrades affect service life?

Moritz Rodenhausen: No. The new modes do not alter the contractually guaranteed operating service life. And operating modes already supplied to the customer remain valid if they purchase new upgrades and use them for operating their turbines.

Likewise, wind turbines continue to operate with their previous performance characteristics if customers decide not to activate new modes. In this case, however, they will not profit from the yield and revenue increases that they would gain with the new modes. Ultimately the decision rests with our customers.

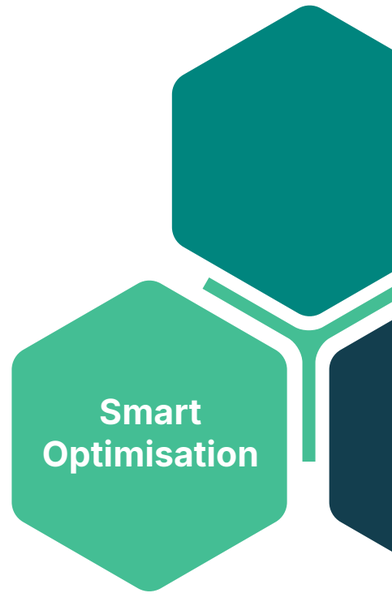
wb: How are the performance upgrades classified in ENERCON’ s new solutions portfolio?

Moritz Rodenhausen: The upgrades are part of our market strategy of enabling our customers to realise the highest added value from their project. All our ‘smart optimisation’ solution elements are designed to open up the highest possible returns for our customers during the operational phase, even under dynamic market conditions – in line with our new performance promise: ‘With ENERCON, our customers can unfold the full value of their green energy solutions’. These performance upgrades aid our customers in optimising their turbines for project-specific conditions and keeping them at an efficient performance level in the long term – even in advanced stages of operation.

wb: Why are operating modes not offered until later in the product life cycle?

Moritz Rodenhausen: New operating modes are typically introduced after our systems or subcomponents (e.g. generator, rotor blade) or prototypes have been successfully validated. The better we understand the physical properties and technical interrelationships of the system, the more precisely we can provide optimisations by means of software updates.

At the start of the product life cycle – particularly around the market launch – we use somewhat restrained data in order to minimise risks and ensure operating safety. Once the validation phase is completed, though, we can develop the turbines in specific ways, thereby enabling significant increases in yields. These optimisations are of high economic value both to ENERCON and to our customers.



ENERCON strengthens local identity and sustainable energy in Taiwan

Culture meets technology: how ENERCON's wind energy project in Changhua County delivers more than electricity – a customer-focused solution within the green energy ecosystem.

ENERCON, in partnership with Shinfox Energy, has implemented a new wind energy project in Taiwan that goes far beyond power generation. Three state-of-the-art E-115 EP3 E3 turbines with a hub height of 92 metres have been installed, with two additional E-82 turbines to follow. These installations are part of a comprehensive solution approach that reflects ENERCON's evolving role as a partner for integrated energy concepts.

Precision technology for maximum efficiency

The turbines are tailored to meet the specific requirements of the site and the customer. Despite challenging conditions, the project was executed smoothly – thanks to ENERCON's proven technology, precise project management, and close collaboration with Shinfox Energy. The result: a reliable contribution to Taiwan's climate goals and a stable local energy supply.

Cultural integration as part of the solution

A standout feature of the project is the artistic design of one turbine, painted with traditional motifs from the Dacheng Township community. Dragon and lion dances, temples, and regional agriculture – including cabbage, peanuts, and ducks – are depicted, symbolising the region's heritage and identity. This element not only fosters local acceptance but also demonstrates how renewable energy can be embedded into existing social structures.

Partnership-based, sustainable, locally rooted

This project exemplifies ENERCON's strategic repositioning – from a turbine manufacturer to a solution provider within the green energy ecosystem. The collaboration with Shinfox Energy shows how tailored solutions can create not only technological but also societal value through strong partnerships.

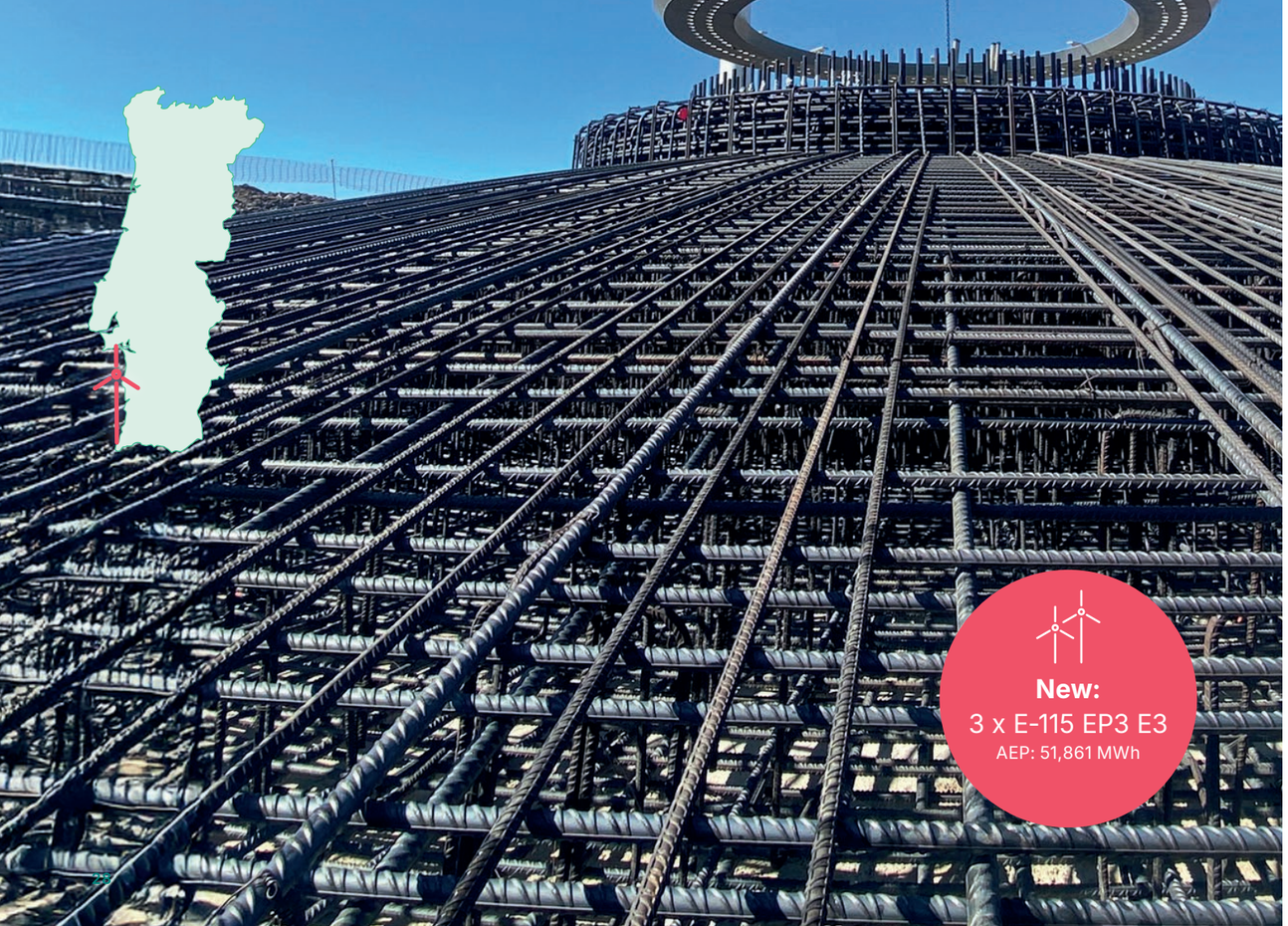
20 years of ENERCON in Taiwan – with a clear vision ahead

As ENERCON celebrates 20 years in Taiwan, the company reaffirms its commitment to innovation, service, and sustainable partnerships. The Changhua County project marks a milestone on the path toward a decentralised, culturally integrated, and customer-oriented energy transition.

Cultural identity meets wind turbine: an artistically designed ENERCON wind energy converter in Changhua County links local tradition with sustainable technology.

Vila do Bispo: A repowering project built on vision and trust

Located in the Algarve, Portugal's premier tourist region, the Vila do Bispo project showcases ENERCON's integrated BoP offering and long-term customer trust.



As the global energy transition accelerates, repowering aging wind farms has become a strategic imperative. For many asset owners, the opportunity to replace older turbines with modern and more efficient models is not only a matter of increasing output, but also an investment in the future.

ENERCON is strengthening its ongoing partnership with its long-standing business partner UNIT ENERGY – Energias Renováveis, S.A. through a new repowering project at the Vila do Bispo Wind Farm, located in the heart of the Algarve, one of Portugal's most iconic and environmentally sensitive tourist destinations.

Originally commissioned in 2003 with seven wind turbines and a total installed capacity of 10.5 MW, the site is now undergoing a significant upgrade: it will be equipped with three E-115 EP3 E3 turbines, increasing capacity to 12.6 MW and delivering an estimated annual production of 51.861 MWh, equivalent to 4.116 full-load hours per year.

BoP reimagined: efficiency, trust and partnership

One of the most critical and often underestimated phases of a repowering project is the civil works stage. This is where the groundwork – literally and figuratively – is laid for long-term success. In the Vila do Bispo Wind Farm repowering project, ENERCON offered the Balance of Plant (BoP)[1] scope for Civil Works as an optional commercial component, a strategic choice that leveraged the proven expertise of our Project Management Team in Portugal. This flexibility played a key role in reducing risks during the civil works phase and boosting customer confidence.

By choosing this hybrid model, UNIT ENERGY benefits from technical oversight and integration support, fostering collaboration, transparency and shared accountability, all essential to a successful repowering effort.

As Nuno Ribeiro, Project Management Director for Southern Europe/Latin America (SELA), explains: 'Offering BoP as part of our scope allows us to simplify complexity for our customers. It gives them a single point of accountability, streamlines coordination and ensures technical alignment from day one. This not only accelerates project delivery but also builds trust because UNIT ENERGY – and many other customers – knows we're managing every detail with precision and care.'

A solid base for new energy: the completed foundation works mark an important milestone in the Vila do Bispo repowering project.

Through this model ENERCON's customer gained access to its expertise in sub-supplier tendering, on-site coordination and civil works oversight, ensuring technical consistency and reducing the risk of interface issues. With a single, streamlined point of contact, ENERCON's business partner was empowered to make informed decisions and without the burden of managing multiple supplier contracts.

Repowering with trust: a returning customer's confidence

This project is not just a technical upgrade – it's a testament to a strong and enduring partnership. UNIT ENERGY's decision to choose ENERCON again for this repowering effort reflects their deep satisfaction with the previous collaboration. Their continued trust underscores ENERCON's reputation for reliability, performance, and customer-centric service.

Foundation works of all three turbines have been successfully completed, reaching a key milestone. Installation is scheduled for Q4, with logistics and equipment readiness already underway, supported by ENERCON's well-trained Installation Teams.

Sustainability beyond energy

While the Vila do Bispo Wind Farm is a milestone in renewable energy and repowering, it also reflects ENERCON's broader mission: sustainability that respects both nature and culture. From the earliest planning stages, ENERCON integrated the Environmental Impact Assessment (EIA) recommendations into the project's execution. Environmental technicians are on site daily, monitoring and guiding operations.

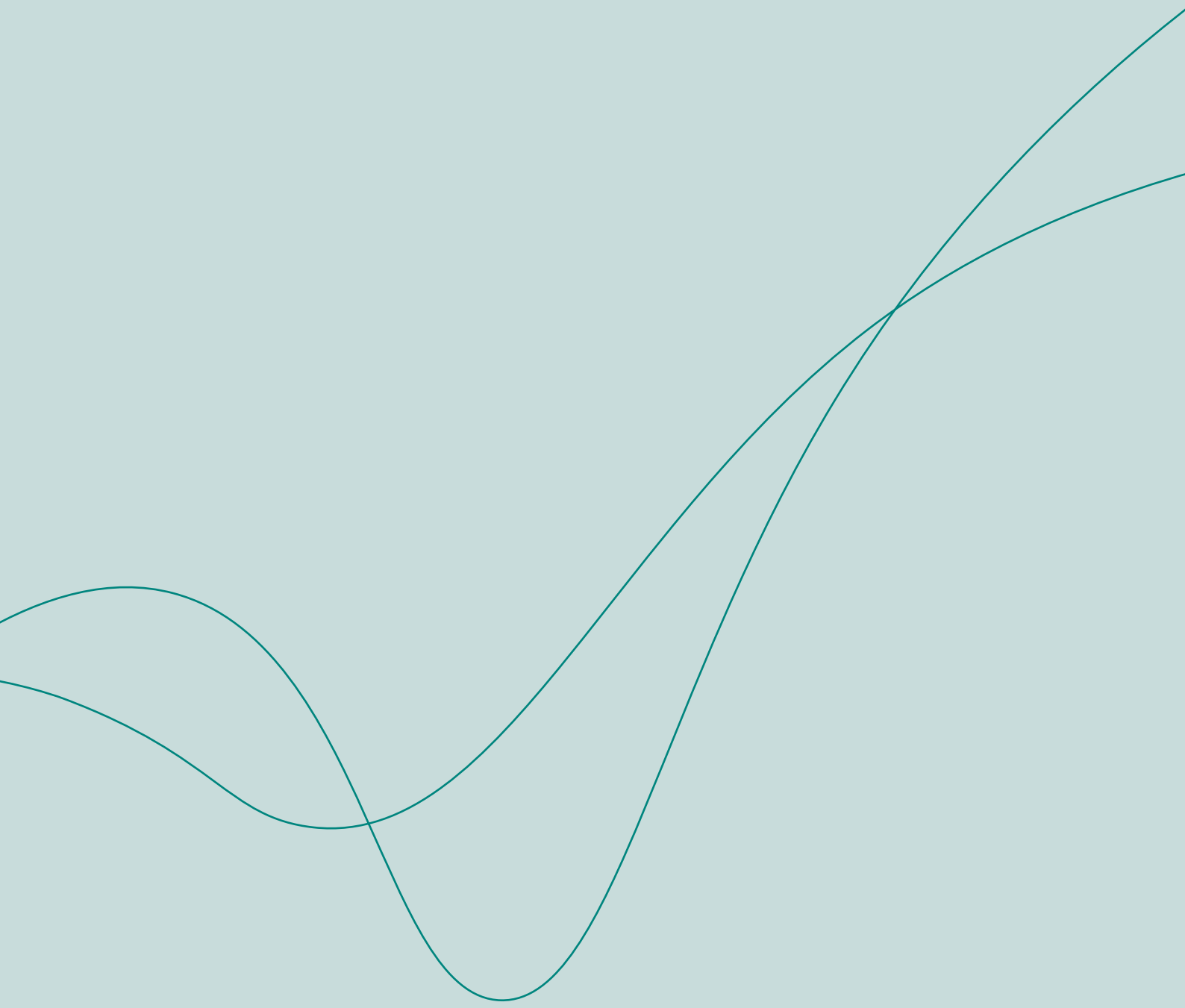
This hands-on approach reflects ENERCON's belief that preservation is a responsibility, not a constraint. By protecting biodiversity and safeguarding historical landmarks, the company shows renewable energy can be developed in harmony with nature and history.

Outlook: repowering as a strategic model for the future

As many wind farms across Europe approach the end of their design life, repowering will become increasingly common. The Vila do Bispo project offers insights into how strategic BoP integration and long-term customer relationships can drive technical excellence and sustainable development.

BoP as an optional scope reflects a shift toward flexible and customer-focused project delivery. In a sector where trust and performance are essential, enabling customers to delegate complex sub-supplier management is not just a service, it's a key enabler of real progress in the clean energy transition.

[1] In the context of wind energy, 'Balance of Plant' (BoP) refers to all supporting components and infrastructure of a wind farm that are not part of the wind turbine itself. This includes foundations, cabling, substations, access roads, grid connections, and control systems. BoP is essential for the safe and efficient operation of a wind farm.



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