

Renewables





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Hybrid Tower – Highest performance

The tower is the mainstay of every wind turbine, forming a steady link between the massive turbine and the force of nature that is wind. We at Max Bögl Wind AG continuously strive to improve our Hybrid Tower to ensure the highest efficiency. With our Hybrid Towers, hub heights of up to 190 meters can be achieved cost-effectively. Each additional

meter of hub height increases the annual energy yield of a wind turbine up to 1 percent, thus ensuring a faster return on investment for the entire project. As a turnkey company we are able to provide all construction services from a single source - from infrastructure work to complete turbine installation.



Efficient combination of steel and concrete

One of the primary goals of wind farm operators is to generate the greatest possible amount of energy. Wind turbines with high hub heights and large rotor diameters offer the ideal solution.

By combining prefabricated, CNC-milled concrete elements with standard steel tube sections, our modular designed Hybrid Towers can reach hub heights of up to 190 meters. The conical shaped concrete elements are series-produced in our precast plants at our headquarters in Sengenthal and in Osterrönnfeld in Schleswig-Holstein. These locations offer ideal access to waterways, which means the Hybrid Towers can be transported quickly and safely to any location in Europe. Prefabrication guarantees continuous quality assurance of the production process and allows us to produce up to 500 towers a year at both facilities. For international projects we deploy a mobile manufacturing plant in which concrete elements are produced using local materials and labor. This innovative construction method is a product of our long-standing

experience and expertise in designing and manufacturing high-precision concrete and steel components. As a result, the world's most modern and efficient wind turbines are able to exploit their full potential while turbine operators can take advantage of new opportunities in terms of productivity and yield security.

Advantages of the Hybrid Tower

- Proven and reliable technology
- Economical system of concrete and steel
- Maintenance-free concrete tower
- Transport on standard trailers
- Short leadtime and installation
- Local production with mobile fabrication
- Long service life of concrete tower
- Easy dismantling and reuse of concrete tower segments



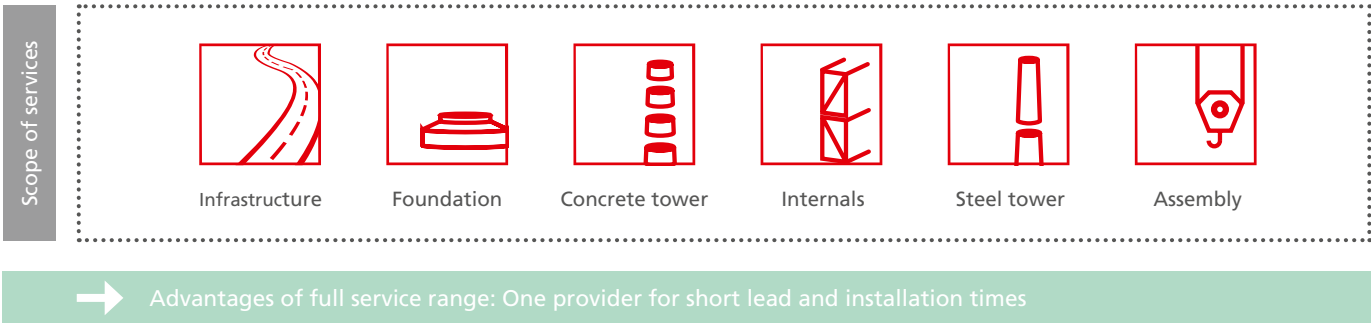


Turnkey construction for more efficiency

From infrastructure works and foundation engineering to the complete construction of wind energy plants, we offer a comprehensive package that minimizes costly and time-consuming interfaces between various technical personnel or construction phases. Projects can be implemented in a faster and more cost-effective manner. We are an experienced turnkey partner who supports our customers in all project processes including the construction of entire wind farms that are ready for immediate use. The Hybrid Tower can easily be adjusted to any projectspecific hub height to ensure optimal and cost-effective project implementation. In addition we also perform all technical tasks such as infrastructure works, excavation along

with any necessary special foundations, implementation of soil replacement measures with subsequent backfilling and foundation construction. Also included are cable installation works, preparation of assembly areas for heavy-duty cranes, logistics of transporting finished parts to the respective project site, completeturbine assembly as well as greening and landscapingduring completion of the wind power project.

Customer satisfaction is our highest priority. That is why the most important aim of our team is to win over customers on the basis of our long-standing experience and premium quality products.



Overview

Infrastructure

Transporting wind turbine components requires a suitable infrastructure before construction can begin. We offer all the services required for this from a single source, including our own technicians, machinery and equipment. Thanks to our years of experience as a construction company, we can guarantee a high level of added value.

Logistics

All project logistics as well as the secure transport of all wind turbine components is managed by one of our own long-standing company divisions, which helps ensure precise, punctual and cost-effective services over great distances. Due to our large transport fleet of over 300 vehicles, we can transport components flexibly and independently. In addition, we use waterways such as the Rhine-Main-Danube Canal at our headquarters in Sengenthal and the Kiel Canal at our second factory in Osterrönnfeld.

Foundation engineering

To safely disperse the loads from the wind and the turbine's own weight into the ground, the Hybrid Tower is built on a standard foundation made of in-situ concrete. Our experienced foundation engineering team takes care of the

entire construction process, from creating the subbase and installing reinforcements to concreting the foundation with follow-up treatment and adding special foundations when necessary.

Assembly

We make sure that tower and turbine component installation runs smoothly at the construction site. The segments produced in the plant are joined at the construction site to form whole rings using specially developed assembly devices. The precast CNC-machined elements are then quickly and precisely placed on top of each other in a "dry joint". This method of construction can be used to erect towers in almost any kind of weather.

Complete turbine assembly

We install all turbine components and prepare them for operation. Using qualified installation teams and cutting-edge technology, we erect the steel tube sections as well as the nacelle, hub and rotor blades. The complete mechanical and electrical installation of the turbine from a single source eliminates the need for subcontractors and saves on costs.

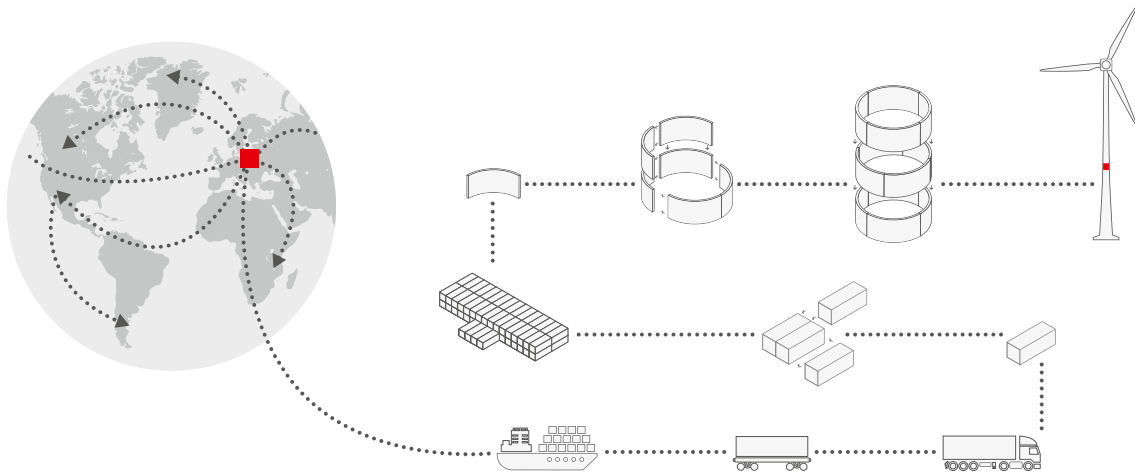




Mobile fabrication

To provide our international customers with higher flexibility in the construction of wind farms, we developed a mobile fabrication concept and adapted our German manufacturing plants for a serial production of our modular concrete segments worldwide. This allows us to achieve the same high level of quality at any location in the world and a production output of up to 300 towers a year.

The modular assembly and disassembly of the mobile fabrication offers the highest flexibility in servicing different project sites across the globe. It also increases the added value in the respective country of manufacturing. On-site production avoids expensive long-distance and heavy-load transports and supports the regional economy through targeted investment.





A photograph of a wind turbine in a field under a cloudy sky. The turbine is on the left side of the frame, with its blades blurred from motion. The sky is a mix of blue and white clouds. The foreground is a green field. A semi-transparent green box covers the lower half of the image, containing text. A red vertical bar is on the right side of the image.

Energy – Expertise

Qualified employees advise and support our customers with efficient concepts for all service offerings. We are a competent partner - from the initial idea to financing, planning

and execution to turbine operation. Our services also include technical as well as commercial operations management and the development of customised energy concepts.



Operations management

Our technicians and engineers are capable of getting the maximum out of any wind turbine. To do so they use software solutions that are specifically designed for optimizing turbine behaviour. We also place great value on work safety. All employees are familiar with the highest current safety standards and train for evacuation and rescue on the world's highest turbines. When necessary, qualified employees also make expert assessments during the turbine inspection. This saves on time, travel costs and minimizes turbine downtimes. Even in the early phase of project planning for a turbine, the overall grid connection - from registration and infrastructure to final declaration of conformity - and communications interface are taken into account.

Project management

- Project planning for grid connection
- Project planning for communications interface

Technical operations management

- Wind energy, photovoltaics, substations, etc.
- Technicians and engineers with medium voltage switching authorization
- 24 h monitoring and readiness
- Expert assessments and regular inspections
- Yield loss and availability management
- Requirements, insurance, contract and direct marketing management
- Optimization management and vulnerability analysis
- Support in repowering

Commercial operations management

- Billing, accounting and organization management
- Contract, liquidity and cash management
- Full-service customer support
- Processing of offers and orders necessary for operation





Direct marketing from max.power

max.power has outstanding expertise in direct marketing and is able to place the generated power on the electricity market at the most efficient time. Our customers make use of this expertise and benefit at the same time from our experience in marketing: our service ranges from the registration process and securing the remote control connection of your wind turbine to energy data management.

Customer-oriented marketing models

Together with our clients, we develop an optimal marketing model adapted to their needs. max.power determines the feed-in quantities on the basis of reliable forecasting models and minimizes balance energy. This results in higher yields from the wind turbine generators. Of course, we also support our business partners in supplying their clients directly.

Big advantage: our network

We guarantee the best conditions in direct marketing. Customers of max.power GmbH benefit from our network of different electricity producers. We bundle the energy of all producers in a virtual power plant and balance power fluctuations.

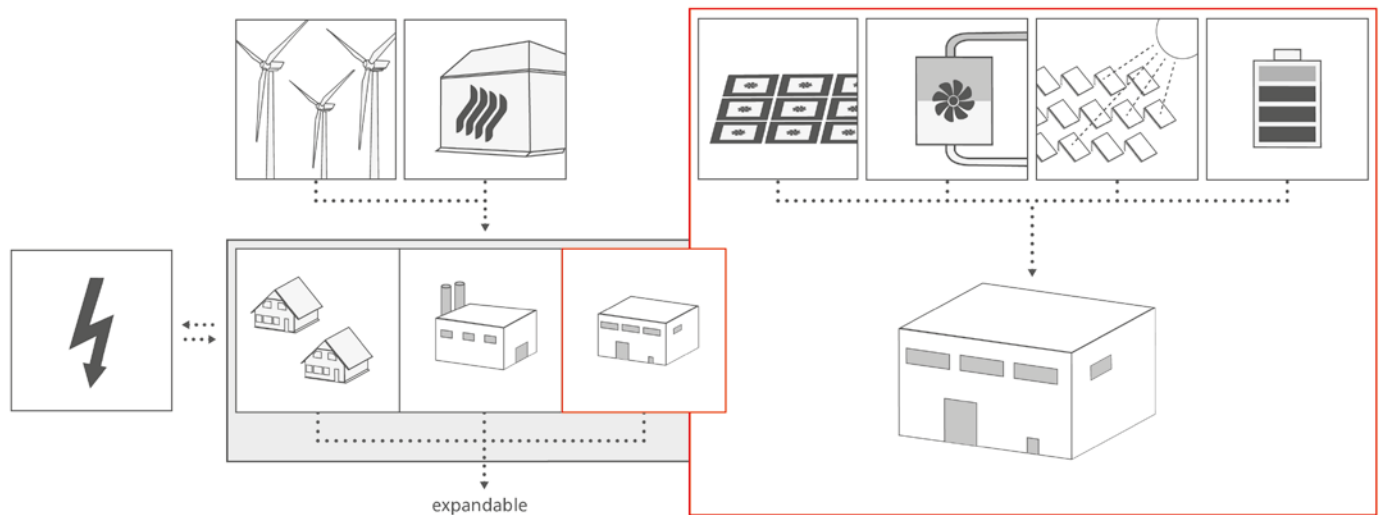
Overview of our service plus

- Customer portal for viewing all generated data, including documentation and archiving
- Ensuring remote control capability, measurements and mediation of metering station operators
- Management: Support for all commercial and technical aspects of operating wind turbines

Energy solutions

Energy concepts are also a key component of the green energy transition and climate protection. The central idea behind such concepts is to always produce as much energy as possible on your own and to use that energy in the most efficient way. At the same time all technical, commercial and regulatory requirements and opportunities should be considered. Together with our customers we develop

energy solutions that ensure optimal use and efficiency. Our expertise covers a wide spectrum of conceptual experience, ranging from building energy concepts to operating and marketing concepts for power generation plants. When developing all of our customized energy solutions, we combine our long-standing knowledge in renewable energy, direct marketing and the construction industry.







Water Battery – Storage power

Making green electricity easily accessible is one of the major challenges of the green energy transition. Our Water Battery is the answer. The innovative combination of renewable energy

sources and a pumped-storage power plant creates a powerful storage system for flexible power supply. The Water Battery acts as a short-term storage facility and helps maintain grid stability.



Cost-effective energy storage

The Water Battery is a totally new kind of storage system for renewables that can store surplus electricity and release it on demand. As a powerful short-term storage system, the Water Battery is ideal to compensate for fluctuations in the grid.

Thanks to peak shaving, load peaks can be reduced and consumption-based grid fees saved. When needed, the pumped-storage power plant can provide energy for grid feed-in within 30 seconds or store surplus energy from the grid.

Advantages of the Water Battery

- Saving of investment costs due to economies of scale and standardized solutions
- Standardized power plant concept
- Suitable for fresh and salt water
- Small visual and environmental impact
- Short construction period and easy approval process
- Long service lifetime and cycle proof technology (~50 years)
- Combinable with all forms of renewables



The components of the Water Battery

Storage basin

The newly developed storage basin replaces the traditional upper reservoir of the pumped-storage hydropower plant. Because of its prefabricated modular design, the water basin concept minimizes the impact on the landscape.

Pumped-storage hydropower plant

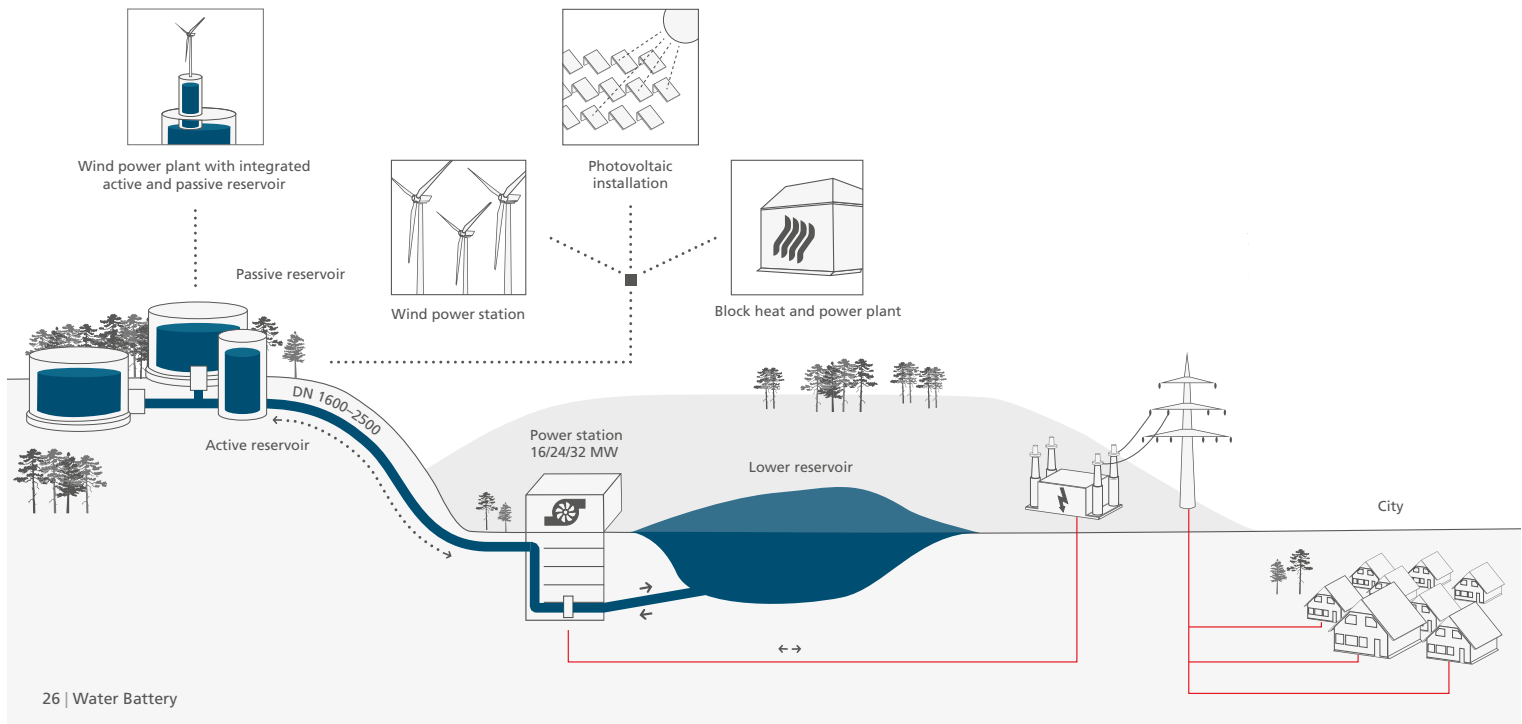
The modular power plant is completely standardized and available in various power classes (16/24/32 MW). Reversible high performance turbines are the centerpiece of the electronically controlled power plant.

Penstock

A specially developed penstock made of polyethylene connects the upper reservoirs with the lower reservoir. The pipes are installed piece by piece with a special installation platform, saving resources while using existing routes. This reduces environmental impact to a minimum.

Lower reservoir

Due to its natural design, the lower reservoir blends in with the landscape.





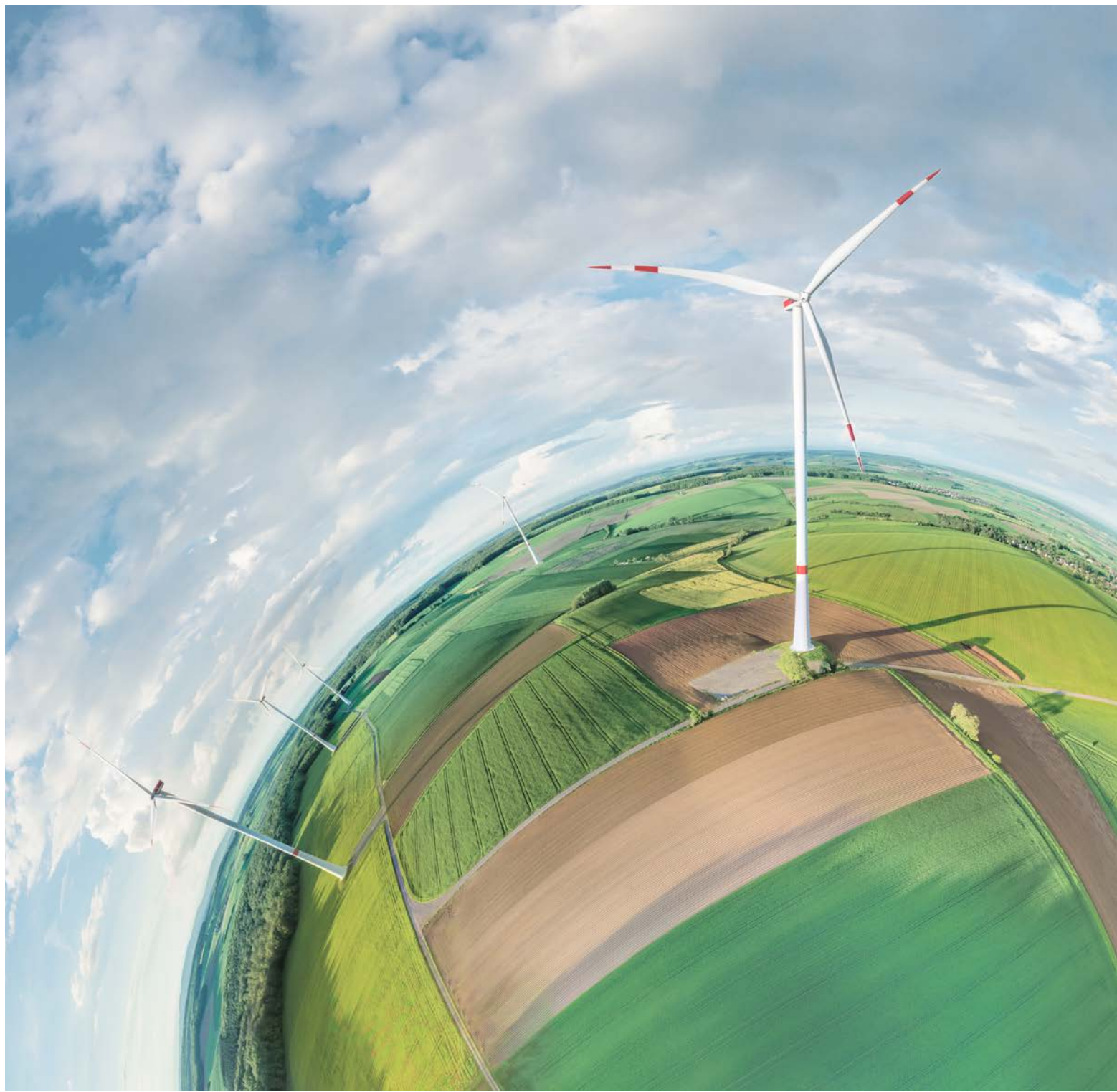
Pilot project Gaildorf

The pilot project in Gaildorf near Stuttgart, Germany, demonstrates how the Water Battery will work in the future. In this project, the foundations of the wind turbines are used as upper reservoirs.

They are connected via an underground penstock to a pumped-storage power station in the valley that can provide up to 16 megawatts in power. The electrical storage capacity of the power plant is designed for a total of 70 megawatt hours.

Facts and figures

Wind turbine capacity:	4 x 3.4 MW
Rotor diameter:	137 m
Annual electricity generation from wind power:	42 GWh
Turbine hub height above ground:	up to 178 m HH
Pumped-storage power plant capacity:	16 MW
Electrical storage capacity:	70 MWh
Water fall height:	200 m
Water volume:	160,000 m ³
Active reservoir:	up to 40 m
Passive reservoir:	8–13 m



Max Bögl Wind AG – Vision

Innovate, initiate, push forward: The shift from conventional fuels to renewable energies is essential to protecting our planet and its inhabitants from the effects of climate change. This requires a long-term and worldwide understanding of sustainability, the environment and energy

efficiency. Our mission is to create, develop and market future-oriented solutions for the renewable energy market. We contribute to a green future with our custom concepts and innovative ideas – regionally, nationally and internationally.





Innovations are making history

Our products combine premium quality, proven expertise and visionary ideas – shape the energy future together with us. We have invented two innovative and worldwide unique products: the Hybrid Tower and the Water Battery. A wide range of services – including direct marketing and project management completes our portfolio. With our long-standing experience and know-how in the renewable energy

market, we support our clients based on their individual requirements. The Max Bögl Group is one of the biggest family owned construction companies in Germany. With over 6,500 professionals at 40 locations worldwide, an annual turnover of over 2 billion Euros and over 90 years of experience in the construction industry, we are optimally positioned for the future.

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MAX BÖGL

Progress is built on ideas.