start up

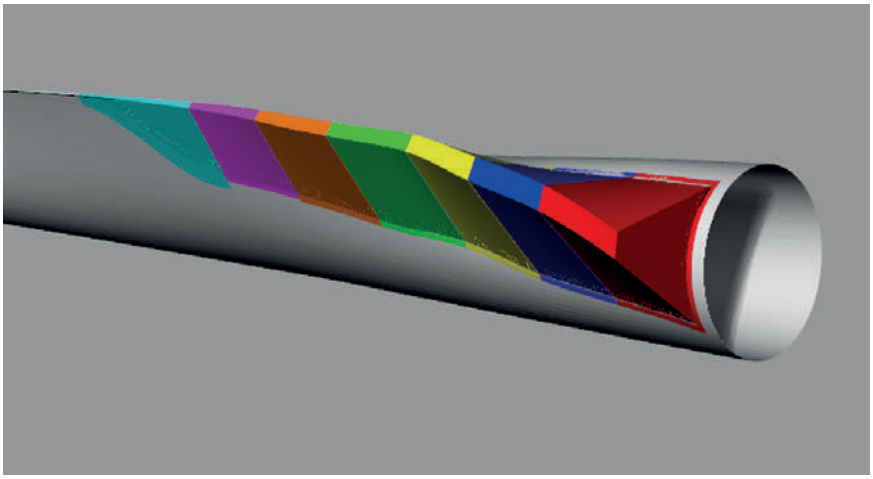
Start-ups are entering the market with new ideas.
A selection is presented on the following pages.
Be inspired by their innovative power.

An excerpt of the BWE Industry Report **‚Wind Industry in Germany 2022'**

Rendering: NRGSync

Evoblade – We change the way you think about wind!

Evoblade is a North German start-up that spun off from the Institute of Aerospace Technology at the City University of Applied Sciences in Bremen in 2016. We develop aerodynamic retrofits for rotor blade optimisation as well as innovative small wind turbines.



EvoFlap trailing edge spoiler divided into seven segments

The spoiler can be fitted or retrofitted on all wind turbines with a slim blade root profile. We adapt the flow element individually for the respective blade type.

Evoblade is currently developing other retrofittable performance-enhancing aerodynamic components including:

- An aeroelastic flap for the trailing edge of the central rotor blade profile
- A wing fence with an integrated flow channel to reduce radial flow at the blade root
- A simple trailing edge spoiler for the blade root area
- A 5-hole probe for measuring wind speed and direction by drone

Our retrofittable "EvoFlap" spoiler, which we developed in a joint project with Deutsche Windtechnik, improves the aerodynamic flow around the root of the blade, which improves efficiency and ensures maximum performance of the wind turbine. The startup Evoblade emerged from the project which was supported by Wirtschaftsförderung Bremen GmbH. Another project partner was the Institute of Aerospace Technology (IAT)'s Wind Turbines Department at the City University of Applied Sciences in Bremen.

The technical and economic performance of a wind turbine is determined by the rotor blades. With the development and optimisation of the retrofittable flow element, we have achieved a significant improvement in the properties of both new and existing systems.

The results of a side-by-side comparison show an increase (annual increment) in the Annual Energy Production (AEP) of 6 % at a reference wind speed of 7 m/s. The "EvoFlap" trailing edge spoiler has significantly improved the performance of the pilot wind turbine (NEG Micon NM 82).

Installing the EvoFlap

evoblade
experts in aerodynamics

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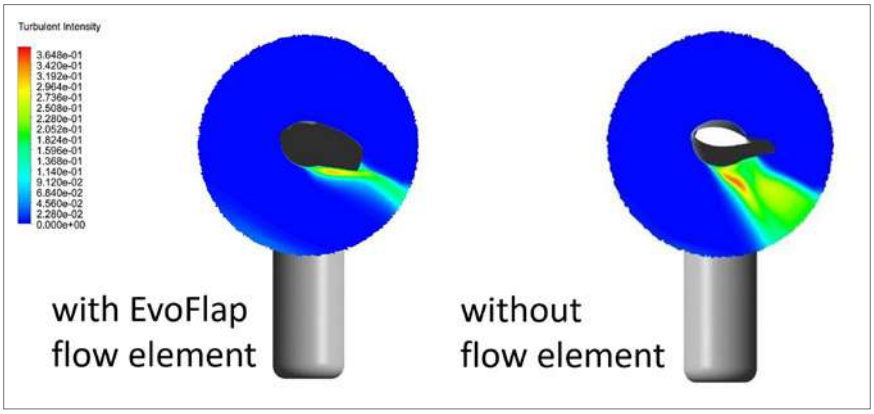
Founding year	**2016**
Focus	**Aerodynamics, flow simulation, renewable energy systems / wind energy**
We offer	**Flow elements for aerodynamic rotor blade optimisation, scalable small wind turbines for decentralised & supportive energy supply, technical expertise in flow simulations**
We are looking for	**Pilot wind turbine for a project currently being funded by ESA BIC Northern Germany and wind turbine operators for aerodynamic optimisation, investors, wind turbine and rotor blade OEM's, collaboration partners and licensees**



Reduced turbulence at the rotor blade root with EvoFlap

Our development focus for all of the above is on passive flow elements that do not require actuators and are therefore cost-effective and maintenance-free. All aerodynamic retrofits are mounted on the installed rotor blade.

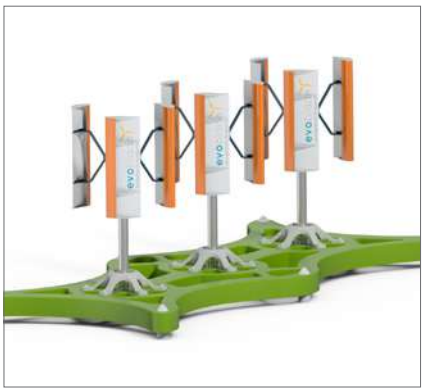
Our engineering team takes the energy transition and sustainability very seriously, which is why we are also focusing on small wind turbines.

We are currently developing an innovative rotor for small wind turbines with a vertical axis as the basis for a wind energy module. The rotor utilises resistance and buoyancy and is planned for use on new and existing buildings.

We have kept the system design as simple as possible so as to minimise potential fault sources and to ensure a long and low cost service life. The vertical axis system makes the rotor independent of the wind direction. Due to the modular design, the number of rotors can be adapted to the local energy demand and available space. We plan to use different rotor sizes to cover a comprehensive range of bespoke requirements.

„Depending on the service life of our spoiler, the service life of the rotor blade can be extended by up to two and a half years."

Dr.-Ing. Frank Kortenstedde, Founder and CEO of Evoblade



Small wind turbines arranged as a wind energy module

Small wind turbine with stacked rotor

Conclusion

Evoblade's core expertise is in aerodynamics and flow simulation as well as the development of flow elements for optimising and increasing the performance of wind turbines. We also focus on the development of a decentralised and complementary energy supply using small wind turbines based on reliable technology.

JenaBatteries: Sustainable storage for clean electricity

The energy transition needs sustainable power storage systems. **JenaBatteries** is the technology leader in the field of metal-free redox flow batteries. We offer resource-efficient and flexible solutions for stationary power storage applications.

The future belongs to CO_2-neutral society. Industry, power grid operators and the energy sector are increasingly searching for sustainable and efficient storage solutions for green electricity to make it independent of weather-related, seasonal, and diurnal fluctuations. JenaBatteries has developed a revolutionary storage system that differs fundamentally from conventional rechargeable batteries in that it uses metal-free storage molecules. Rather than being stored in solid electrodes, energy is stored in a scalable system consisting of tanks and electrochemical cells. To achieve this, the metal-free storage molecules are dissolved in water and poured into the tanks, making the battery incombustible and therefore safer.

One important feature of our batteries is that their production does not rely on the use of critical raw materials from unsafe countries of origin. Obtaining such materials is often linked to overexploiting nature and inhuman working conditions. Lithium mining for example lowers the ground water table near South American saltwater lakes, while cobalt extraction in the Congo involves child labour. The metal-free redox flow battery, in contrast, can be produced entirely in Europe.

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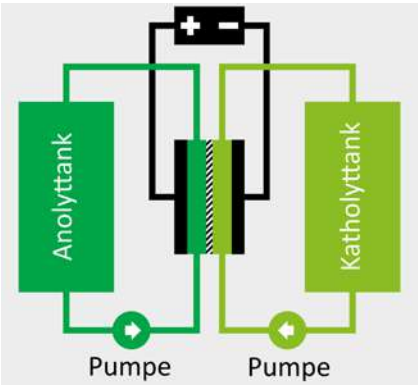
Founding year	**2013**
Employees	**35**
Focus	**Stationary power storage systems starting at 400 kWh for combination with renewable energies, peak load management, etc.**
We offer	**Metal-free redox flow batteries for sustainable, safer, and cost-effective power storage**

As a supplier of storage materials, BASF is an important regional partner with a global presence. Our battery therefore makes a significant contribution towards the achievement of the UN's global Sustainable Development Goals.

JenaBatteries has developed large battery modules the size of an overseas container, with a storage capacity of 400 kWh. They can provide interim storage space for electricity from solar and wind parks for example. In the future it will be possible to connect several such modules to form power storage stations. A major feature of our battery modules is their planned service life of 20 years. They are delivered as a turnkey solution with all necessary operational components included. Other exciting applications include peak load management in energy-intensive companies and internal consumption optimisation. As a low-cost alternative to the expansion of grid capacity for the rapidly developing e-mobility charging infrastructure, our batteries can enable the installation of additional charging stations.



The functionality of the metal-free redox flow battery was demonstrated on a large scale for the first time in a smart grid in the Netherlands in 2019. The field test, in which a 100-kWh battery was built and connected to renewable power sources, was an important milestone. JenaBatteries has further developed the technology based on the test results so that the first pilot facilities can now be installed in collaboration with selected partners and customers. Production will gradually be expanded over the next few years and in the future, units in the higher MWh range will also be capable of storing "green" electricity in a sustainable manner.

Conclusion

You too can rely on a forward-oriented technology that provides the solution to what the global renewable energy market needs most urgently – high-performance, sustainable storage solutions for the flexible, efficient energy systems of tomorrow.
www.jenabatteries.de

Decentralised energy generation 2.0

NRGSync's primary objective is to ensure independent energy production for the benefit of everyone. We combine decentralised energy production technology with versatile applications for everything from domestic residences through to municipalities.

EMIWA Anjo

NRGSync develops small and large wind turbines which combine all the benefits of decentralised energy generation. Equipped with our PV foil and coupled with our patented technical wind solutions, we have developed unique systems over the years that stand out in terms of yield, cost-benefit and flexibility.

Whether it be a municipality, an industrial site, or the creation of entire infrastructure solutions through a suitable charging infrastructure, we make it all possible from a single source and 100 percent "Made in Germany".

Anjo:
Energy supply for domestic residences
For our EMIWA "Anjo", all CE, EMC/EMC tests and all necessary DIN standards were complied with and certified. We have also complied with the legal requirement pertaining to noise emissions in residential areas, whereby a value of just 31db at full load was certified. All safety-relevant components have also been integrated, from overvoltage protection through to the non-combustible storage cell used for our own storage batteries.

As a contracting solution, including the coupling of PV systems for public and non-public buildings, tenant electricity models represent unique solutions for cities, municipalities, cooperatives, and management companies.

Liko:
Street light and charging station in one
The huge potential of our EMIWA "Liko" lies in its simplicity: the system produces approximately 700 KwH of energy per annum, but only requires around 70 KwH per year for its own (dimmable) lighting.

Among other things, it can be used as a motion detector, a monitoring system and as a replacement for existing lighting points. We use the installed cables to bring together and store the excess energy. This excess energy can be used directly at the Liko for charging e-vehicles or made available at strategically important collective locations.

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Founding year	**2021**
Employees	**7**
Focus	**Manufacturer of innovative wind systems for infrastructure, private, commercial and industrial contexts for decentralised independent energy generation.**
We offer	**Holistic system solutions for private and commercial sites, industry and heavy industry, energy parks, housing developments, decentralised H2 production, charging infrastructure**

EMIWA Liko

Hiroki:
The wind turbine for the city centre
Like all our products, the EMIWA "Hiroki" – which means "big tree" in English – is a global first in the field of decentralised energy generation. The Hiroki can be installed in any built-up area and combines modern design with high performance at a height of between 40–50 metres. It can produce between 780,000 and 1.23 million KwH of energy at ports, industrial sites, city-centre locations etc. The installed capacity is 3 MW. Totally new potential applications include integration in major charging stations or directly at filling stations for the production of green hydrogen.

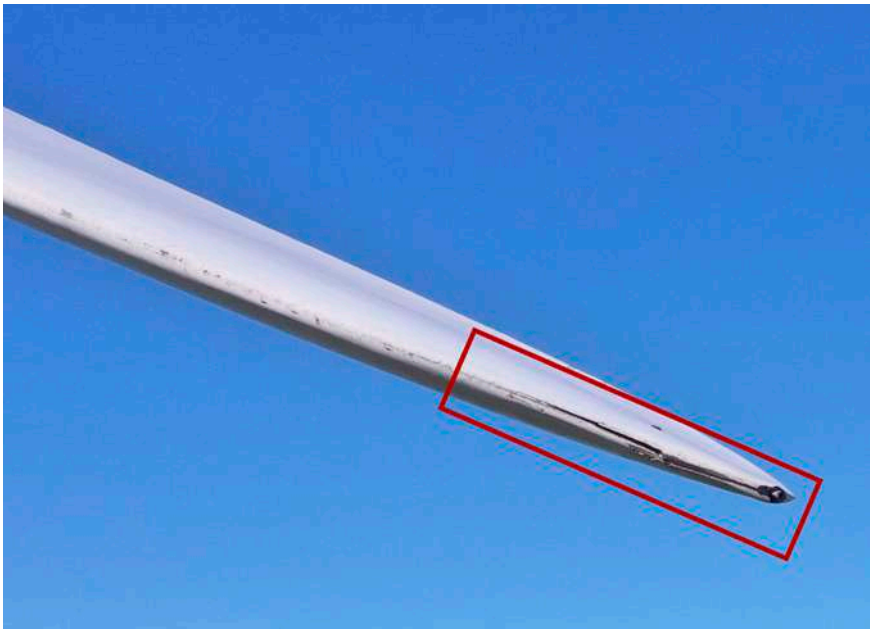
EMIWA Hiroki

Conclusion

NRGSync advocates a 100 percent energy transition and provides decentralised solutions for everything from domestic residences to industrial sites and municipalities. We welcome collaboration with other companies to help achieve this goal with our products. Our requirements are modest, but our values are all the more important. Which is why we are happy to work with partners who are also keen to advance modern energy production.

SkyVisor: Ever thought of inspecting blades yourself?

SkyVisor enables wind farm operators to fully capitalize on their renewable energy assets by empowering their technicians to independently inspect their assets thanks to fully automated drone-based data collection.



A lightning strike impact on the tip of a GE 1,5SL , detected during a SkyVisor inspection

The SkyVisor drone taking off to start the automatic inspection

Nowadays, 22 percent of total O&M costs are related to blade maintenance, making wind turbine rotor blades a key component to inspect in order to reduce O&M costs . Yet, current inspection methods for rotor blades are complex and time-consuming and hence do not allow for comprehensive and timely identification of required maintenance measures, leading to more than 76,000 blade services each year.

These days, camera-based and rope access techniques constitute the two most prevalent methods for blade inspection. While the former does not provide high-quality results, the latter is rather expensive. Significantly, neither one of these techniques provides a digitalized and comprehensive set of data about the rotor blades' condition. This impedes a thorough understanding of their lifecycle and the reaching of critical maintenance decisions.

To resolve this issue, we at SkyVisor contrived a software solution which enables IPPs to inspect their assets in-house and reduce their inspection costs. With already 10 percent of French and Belgian wind turbines monitored by our SkyVisor solution, amounting to more than a thousand inspections per year, we are a well-established solution provider in Western Europe and have successfully empowered many wind farm technicians to independently inspect rotor blades.

SkyVisor
Industrial inspection by drone

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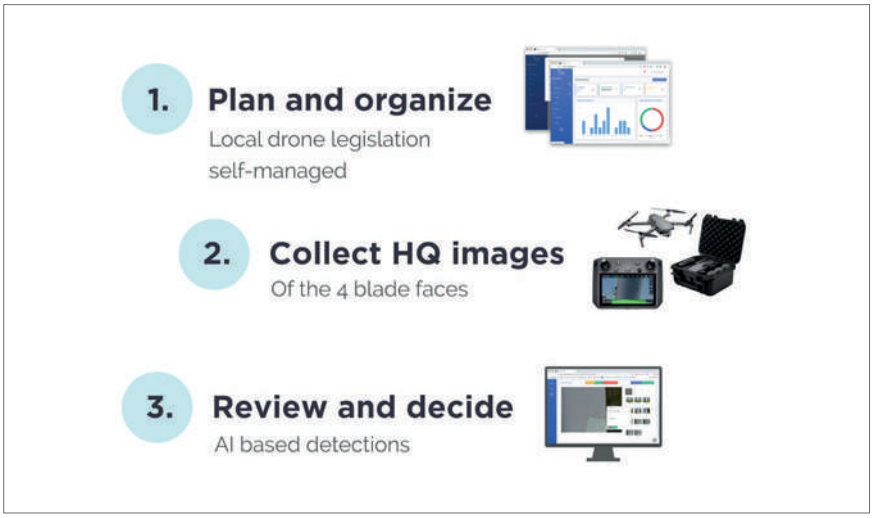
Founding year	**2018**
Employees	**6**
Focus	**Fully automated, drone-based, in-house inspection of rotor blades with AI based data-processing and automatic report generation**
We offer	• **Internalization of blades and tower inspection processes** • **Fully automated, drone-based inspection of rotor blades – Anyone can fly it!** • **Acquisition of high-quality, comprehensive, and uniform data** • **AI based data-acquisition and processing**
We are looking for	• **IPP's O&M Managers** • **ISP's with a blade focus,** • **EU sales partners** • **investors for growth within the EU**

SkyVisor Wind is our precise, easily deployable, and fast inspection solution for rotor blades: It requires one rotor stop only and takes no more than 25 minutes to inspect all three blades while collecting comprehensive, high-quality, and standardized data in sub-centrimetric resolution. With SkyVisor Wind, IPPs can take control over the inspection of their assets' rotor blades by empowering their technical team to independently and flexibly inspect the assets with our fully automated, drone-based inspection solution.



The SkyVisor Wind solution deployment process

Notably, our SkyVisor Wind application is designed to be straightforward and easy-to-use: It features AI based data processing, the possibility to compare the data with past inspection results, as well as an automated report generation, simplifying and expediting the analysis of the inspection for a better predictive maintenance planning.

Founded in 2018 by Paul Fontaine, a passionate drone-specialist, and Fabien Sauvage, our experienced software engineer, we are constantly endeavoring to ameliorate and expand the scope of our products according to our clients' needs. That is why we naturally included tower inspection in our SkyVisor Wind product and launched our SkyVisor Solar solution.

At SkyVisor, we strive to become the predictive maintenance reference tool for renewable energy assets in Europe within the next five years. Therefore, we are excited about launching our product on the German market throughout the next months and are looking forward to enabling wind farm operators in Germany to fully capitalize on their assets and technical teams.

Enertrag's technicians deploying our SkyVisor Wind drone-based solution

Conclusion

At SkyVisor we value technicians and provide them with top-notch digital tools, to empower them to fully draw on their expertise in order to enable easy and fast rotor blade digitalization. After having successfully launched our product on the French and Belgian market, we are now excited to establish ourselves in Germany. Empower your technicians by including our SkyVisor drone and software solution in your wind farms' operational toolbox.

Vortex Bladeless: Wind turbines without rotation

Vortex wind turbines are a disruptive wind turbine that, instead of rotating, oscillates. Its first objective is to become the perfect tool for harnessing wind energy in urban and residential environments.

Vortex Bladeless S.L. is a Spanish company that is developing what could be considered the "simplest wind machine in the world". It is a technology without shafts, mechanisms, gears, bearings and does not need lubricants. Compared to other traditional solutions, it aims to fill gaps in the market that are not being successfully exploited by other traditional solutions, such as distributed energy with small-sized devices.

This solution is based on an aerodynamic resonance phenomenon known as "aeroelasticity". This is a great way to transmit the kinetic energy of the wind to a structure. To avoid having to orient the device depending on the wind direction, it is a circular section structure.

Inside is the alternator, which also has complete radial symmetry and, in addition to converting motion into electricity, modulates the stiffness of the machine to adapt to different wind speeds and thus maintains resonance.

One of the most attractive features of solar panels is their very low maintenance requirements. No one wants to climb on a roof to change parts or add lubricants. This could also be one of the strengths of this new type of wind machines. In addition, they could work on their own, but they can also be combined with solar panels. Statistically, the wind resource is strongest at night, when solar panels cannot work. The hybridization of photovoltaic and wind systems are strongly synergistic and allow a more stable energy production.

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Founding year	**2013**
Employees	**7**
Focus	**Radically new kind of wind power devices not based on rotation or blades but on aeroelastic phenomena, solving many problems of current wind turbines like maintenance cost, noise, wildlife casualties, safety systems and more.**
We are looking for	**Industrial partners who can enter the project with investment, industrial resources and industrial knowledge so we can start mass production and first definitive installations for private and public sector.**

The major benefits of the Vortex Bladeless technology are its low cost, minimal environmental impact and integrability in populated environments.

Vortex is formed by a small team of three engineers and other two workers and their current headquarters are a little space in Ávila, a town in Spain. As a small startup in a country which is not top in industry or economy, every help has been very appreciated. The real development started with a succesfull corwdfunding back in 2015 and the company hasn't stop since, working slow but steady as scientific development requires.

In 2018 the company was awarded with the Seal of Excellence on the Horzion 2020 programme of the European Commision for technology and innovation in Europe.

In 2020 Vortex participated alongside with Equinor for an acceleration programme, being awarded one of the 10 most promising tech and innovation startups of the decade. In 2021 the company was awarded by the European International Bank as one of the top 15 most promising energy and sustainability projects in Europe.

All of these help has given fruit in form of prototypes and pilots that are currently being produced, a first pre-series of 100 units of the very small device model, called "Vortex Nano". These units are being installed worldwide in universities and research centers for study and data gathering. With this, the company intends to accumulate enough experience and technological maturity to start introducing its product in the market. Over time, its size will be scaled up to larger devices with a wider scope of application.

Conclusion

Vortex Bladeless is a Spanish startup developing a radically alternative and innovative way to harness energy from wind, working with oscillation and with no need for blades, shafts, gearbox, big foundations or lubrication. It aims for even greener wind power, being completely harmless to birds or any wildlife, completely silent, easy to install and operate, cheap and with almost zero maintenance costs. By now the tech is under development with pilots being installed in universities around the world for study and data gathering.