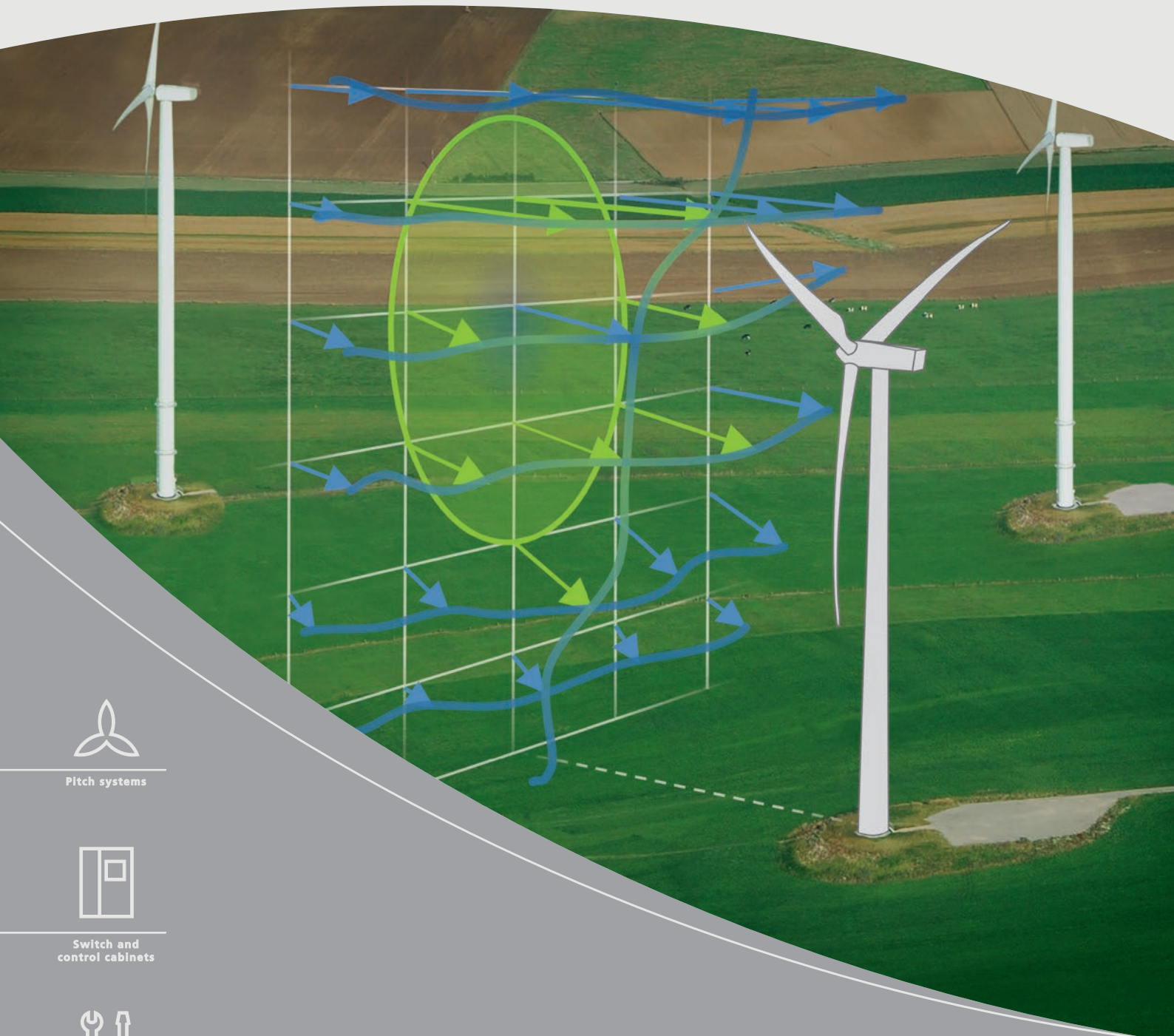


More than a well-rounded solution: BladeVision.



Pitch systems



Switch and control cabinets



Service

Because the wind varies at every wind turbine: BladeVision.

Wind is complex. It doesn't just blow from the front or the side. To describe the wind driving a wind turbine, at least seven quantities are needed: speed, direction, vertical shear, horizontal shear, veer, vertical velocity, and turbulence level. Knowledge of these quantities helps maximize turbine performance, and life. It also helps explain why some neighboring turbines perform differently. Modern sensor systems are rarely capable of meeting this challenge. However, our most advanced sensor has been designed to do exactly that: BladeVision doesn't just measure wind speed and direction: It provides a complete wind-field description over the swept area of the blades. This completeness provides operators with important data about wind factors affecting the performance of different types of WTGs in their wind park.

What's happening outside is best seen from within.

"Every action has an equal and opposite reaction" (Isaac Newton). The solution developed by SSB Wind Systems has been designed to precisely focus on that part of each individual WTG most impacted by the wind: the rotor blade. Which is why the components of BladeVision are

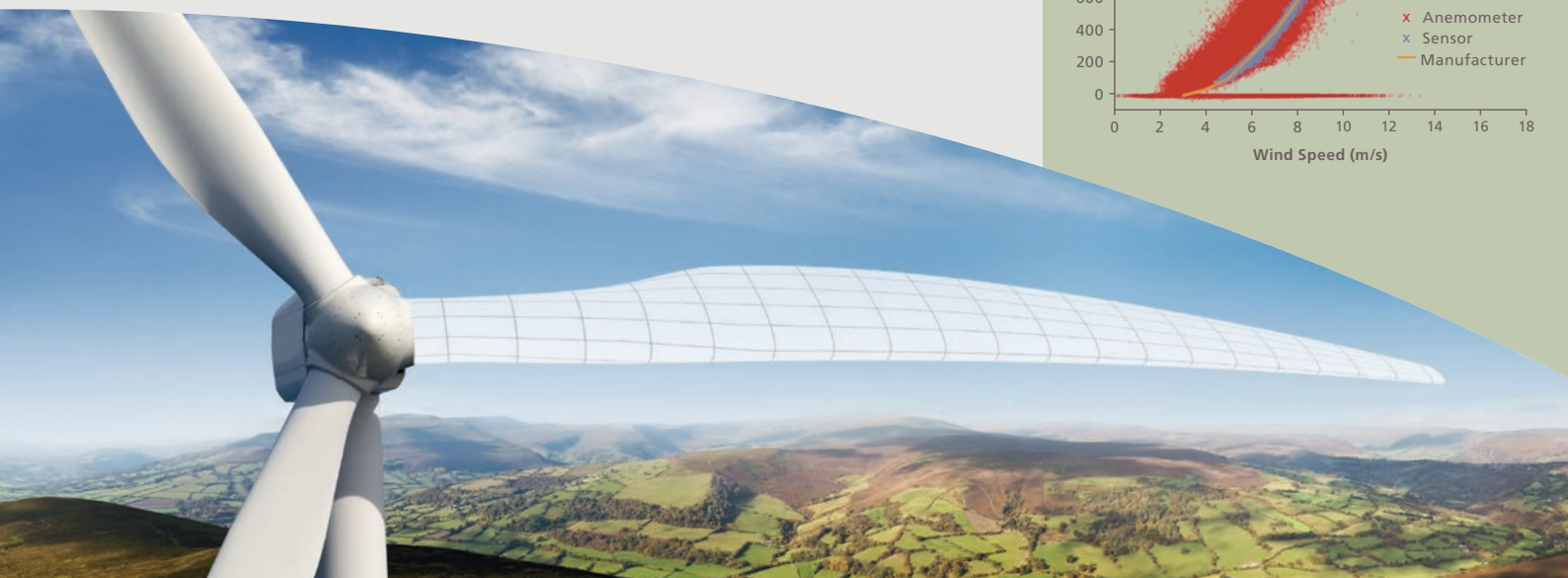
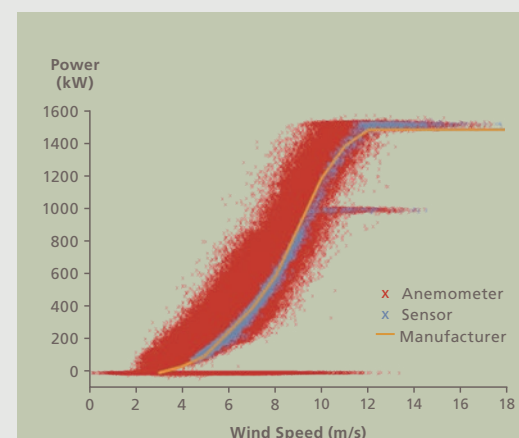
installed within the rotor blade. Not only does BladeVision provide accurate blade load data, it offers detailed measurements of even incremental changes in the seven components of the wind field according to changes in the rotor blade deflection. The conversion from

loads to wind data is performed by a proprietary data analysis tool within the system's main computer to deliver a precise measurement of the wind field ahead of a turbine – a reliable basis for the accurate configuration of each WTG.

Full scale precision.

The measurement of the entire wind field enables unmatched accuracy in the evaluation of the power curve – compensating for the effects of complex terrain and wakes, and using precise near-instantaneous data (15 sec) rather than 10-minute averages –

hence provides an unprecedented accuracy in the assessment of a WTG's performance. This represents a decisive edge in knowledge for turbine manufacturers, operators and service providers (for example, by eliminating under-performance due to wind-turbine "miss-parametrization").



A complete and reliable measurement package.

BladeVision provides more than just wind data. Blade-root bending moments can be delivered with 40 Hz frequency – and not just the usual flapwise and edgewise moments, but also the torsional moment. Additionally, condition-monitoring functionalities are provided, including accurate measurement of the pitch angle, as an absolute measurement without need of calibration, and of the pitch asymmetries, and blade vibrations. Reliability is second to none. BladeVision components are placed entirely within the wind turbine structure. Consequently, they are protected from harsh weather, icing, lightning, and other forces of nature. Cameras, or optionally strain gauges, are placed inside each blade, and can be easily accessed during the wind-turbine’s regular maintenance visits.

i **Consistent measurements and continuous revenue.**

The precision of BladeVision is unrivalled. Moreover, it is considerably cheaper than modern LiDAR system of comparable accuracy. BladeVision comes in two versions: OEM optimized, for installation at the factory, and retrofit optimized, for the installation in existing wind turbines. These two properties make it an ideal product for every WTG.

		Measurement	PC	CL	YE	AS
Anemometer & wind vane	•	Wind speed	•			
	•	Wind direction	•	•	•	
LiDAR (two beam)	•	Wind veer	•	•		
	•	Vertical wind shear	•	•		•
LiDAR (hub mounted)	•	Horizontal wind shear	•	•		
	•	Vertical velocity	•	•		
BladeVision	•	Wind turbulence	•	•	•	
	•					

PC: Power Curve
 CL: Cyclic Loads
 YE: Yaw Error
 AS: Atmos. Stability

Behind the scenes, but with everything in sight: Our system components.

The technology within BladeVision doesn't only sound advanced, it is advanced. In addition, our engineers have spent long hours during development to ensure that it is easy to use. Even the installation of BladeVision is easily managed. Not that there is much to see: Compared to current LiDAR systems, BladeVision is hidden out of view, carefully protected within the blades of your WTG.

Cameras.

- -40°C to +70°C operating range
- Condensation proof (optical)
- Vibration tested & certified
- EMI and lightning protected
- Industrial-grade wireless
- Camera motion compensation
- Plug & Play: self calibrating
- More complete than fiber-optic Bragg gratings



Processing unit.

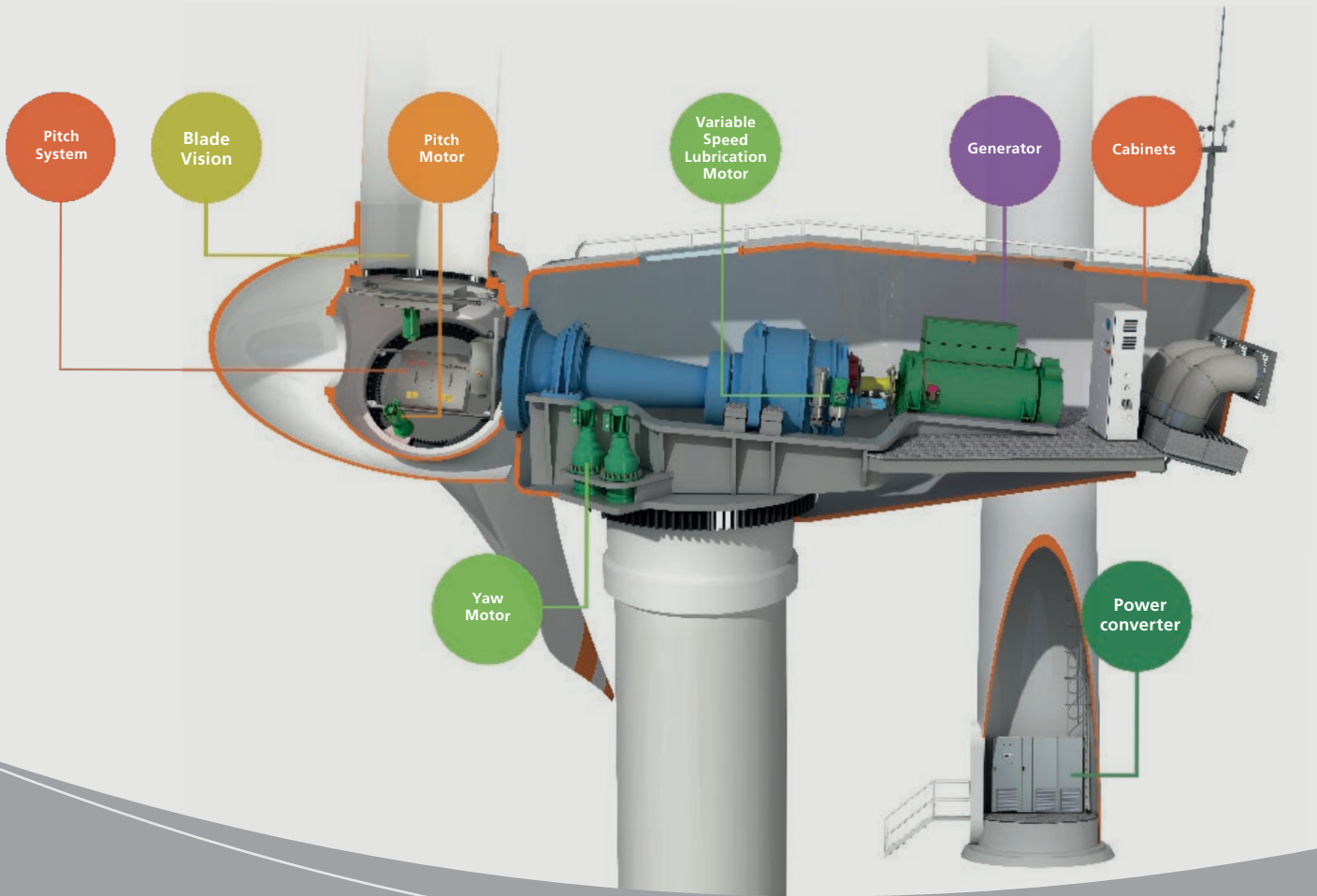
- Vibration & EMI proof
- Temperature & density compensation
- Wireless communication to cameras
- Ethernet to turbine network
- Large data storage/historian
- Flexible and powerful WEB based visualization

Reflectors.

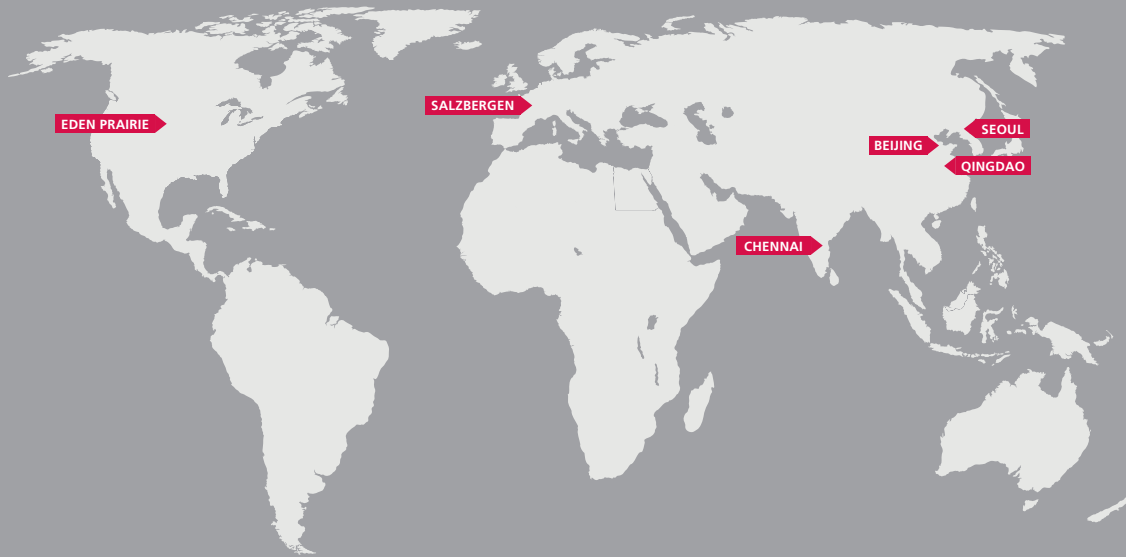
- Self-cleaning option
- Quick & easy mounting



Everything that spins and moves.



Our locations.



SSB Wind Systems in Germany.

Nidec SSB Wind Systems GmbH
Neuenkirchener Straße 13
48499 Salzbergen
Germany
☎ +49 5976 946 0
✉ +49 5976 946 139
info.ssb@mail.nidec.com
www.ssbwindsystems.de

SSB Wind Systems in the USA.

SSB Wind Systems
c/o Nidec Industrial Automation Ltd.
7078 Shady Oak Road
Eden Prairie Minnesota 55344
United States of America
☎ +1952 995 8111
✉ +1952 995 8129
info.ssb@mail.nidec.com
www.ssbwindsystems.com

SSB Wind Systems in China.

SSB Wind Energy Technology
(Qingdao) Co., Ltd
Zhuzhou Road 91
266101 Qingdao
P.R. China
☎ +86 532 8870 2788
✉ +86 532 8870 5788
info.ssb@mail.nidec.com
www.ssbwindsystems.cn