



Where science teams
with experience.

DEUTSCHE
WINDGUARD

Deutsche WindGuard: Mission Statement

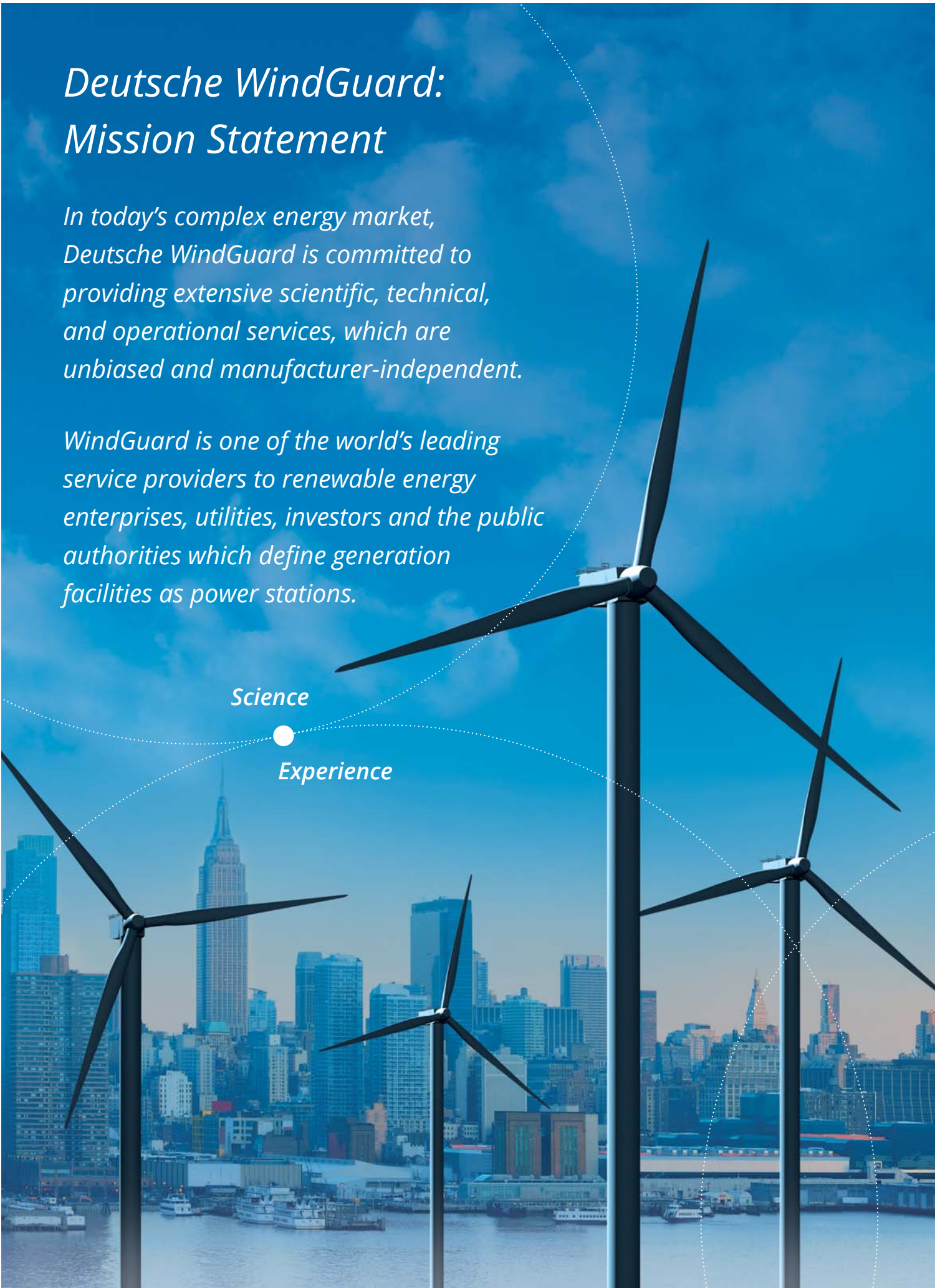
*In today's complex energy market,
Deutsche WindGuard is committed to
providing extensive scientific, technical,
and operational services, which are
unbiased and manufacturer-independent.*

*WindGuard is one of the world's leading
service providers to renewable energy
enterprises, utilities, investors and the public
authorities which define generation
facilities as power stations.*

Science



Experience



We are a holistic network with a scientific-core leadership team and 150 experienced specialists, and the WindGuard Universe is ever-expanding – a fact which justifies our international renown and status as a competent leader of projects of all magnitudes throughout the world.

Our clients' investments are safeguarded by supplying comprehensive expertise regarding revenue opportunities, frame conditions and related risks.

Internationally recognised accreditations and certificates add certainty and objectivity to the assessment of all project-related information.

Our integrated services reliably support the complete project lifecycle and ensure optimum performance from the word go.

*Onshore.
Offshore.
Worldwide.*





Dear Reader,

A quarter of a century ago, we decided to turn the potential of wind power into a viable source of energy. We are convinced that a safe responsible, cost effective, and long-term energy supply lies with renewable energy.

We have successfully overcome many challenges. However, development occurs at a rapid pace and it is an exciting task to come up with convincing solutions to the many new challenges, whether it is regarding research and development, pioneering wind farm projects around the world, and last but not least cooperating with authorities and political institutions.

We invite you to accompany us on this journey. Together, we will establish the energy of the future.

***New
questions
require
convincing
answers.***

Gerhard Gerdes, Axel Albers, Dr. Knud Rehfeldt



Objective Target

Analysis

Strategy

Implementation

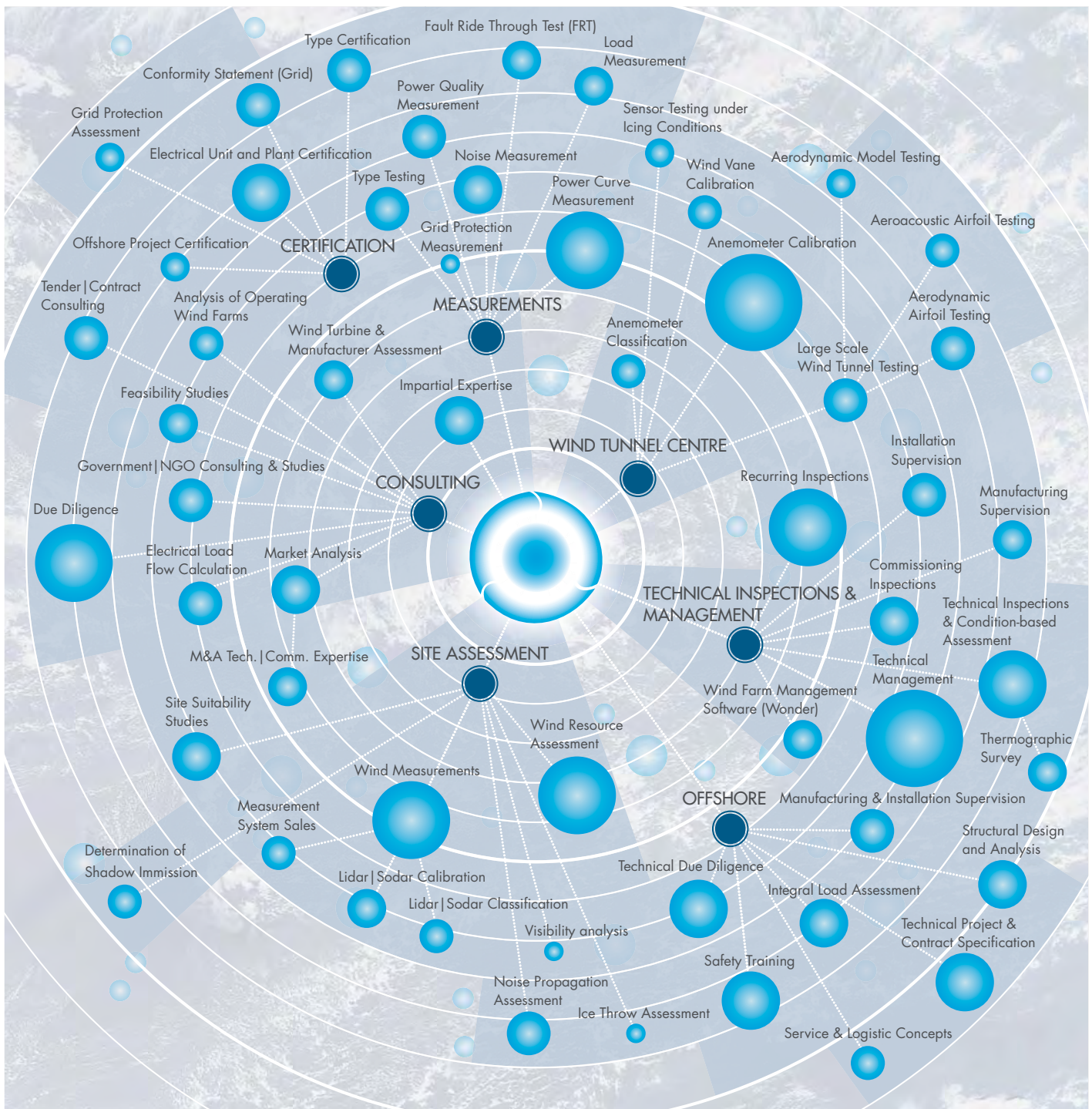
Certainty

Deutsche WindGuard The Wind Professionals

The universe is constantly expanding. This is also true for the wind energy industry, and for the services of Deutsche WindGuard as well. WindGuard has been, and still is, actively involved at every step along the way to replace traditional fossil energy production, thus continually expanding their expertise.

Today, we offer investors and developers, manufacturers, decision makers in governments and businesses worldwide, extensive and independent expertise on all facets of wind energy. We can evaluate the potential of a location and create all the necessary documentation for the approval of your project. We ensure a smooth implementation of your project, from the first draft of the first contract to the hand-over and connection to the grid. We ensure a trouble-free operation and conduct all the necessary testing. Our objectivity is underlined by accreditations by the German accreditation body Deutsche Akkreditierungsstelle GmbH (DAkkS).

Our clients can take advantage of every service in the WindGuard Universe, either as a single item or combined with others. In every instance you will receive the benefit of WindGuard know-how: Our experts constantly exchange ideas, thus their work contains knowledge from all sectors of the wind energy industry.



DISCOVER THE WINDGUARD UNIVERSE



*WindGuard analyses
are accepted by banks as
objective, and form the basis
for a successful project.*

Site Assessment

An open field – a good business opportunity?

This question is not easy to answer when it comes to wind farm projects. Therefore a reliable assessment can determine the long-term return on investment, financing and availability of credit.

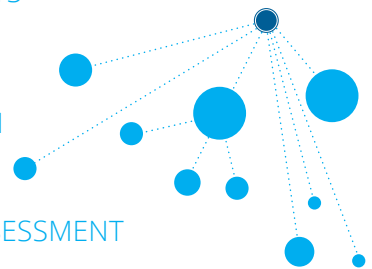
All the factors at a glance

We look at all the relevant influences under a magnifying glass. What average and extreme wind speeds are expected? What is the wind shear? Can another turbine type provide a higher yield? Is the life-span of the turbine guaranteed? Is the wind farm layout optimised? Qualified answers to these questions can maximise your returns.

High level of acceptance of WindGuard's data

The best turbine will not generate any return without official approval. Receive the necessary reports regarding noise, shadows, visibility or ice throw from WindGuard, all of which meet our strictly objective criteria. The high level of acceptance by officials can shorten the approval time for your project, and protects you from subsequent costly requirements.

- WIND MEASUREMENTS
- VISIBILITY ANALYSIS
- NOISE PROPAGATION ASSESSMENT
- WIND RESOURCE ASSESSMENT
- SITE SUITABILITY STUDIES
- ICE THROW ASSESSMENT
- DETERMINATION OF SHADOW IMMISSION





*With WindGuard expertise
you recognise technical risks
in time and move safely in
foreign markets.*

Consulting

A multitude of requirements

An unclear contract clause. Two components that do not fit together. Power fluctuations that can threaten grid stability: In the sensitive interplay of the various factors of a wind farm project, overlooking a detail or an incorrect estimate can result in expensive repairs, lengthy processes, and high additional costs.

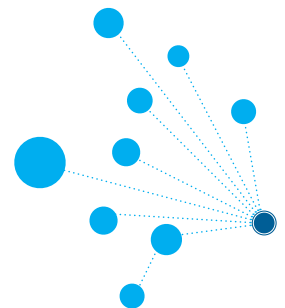
Boost your specialised knowledge

But what should you look for if you don't know the hidden sources of error? How do you become rapidly fluent with all the important technological and technical terminology?

Reduce risks to a minimum

WindGuard offers you know-how gained from our experience with on- and off-shore projects worldwide: whether it is ensuring the technical implementation process runs smoothly – from the tender, the ground-breaking ceremony, all the way through to the turbine start-up – or assisting you with working confidently in the market. Benefit from this source when it comes to the development of new components, discussions with governments and interest groups, or when entering new markets abroad, often with different conditions, guidelines and rules.

- DUE DILIGENCE
- MARKET ANALYSIS
- TENDER | CONTRACT CONSULTING
- GOVERNMENT | NGO CONSULTING & STUDIES
- ELECTRICAL LOAD FLOW CALCULATION
- FEASIBILITY STUDIES
- WIND TURBINE & MANUFACTURER ASSESSMENT
- ANALYSIS OF OPERATING WIND FARMS



*WindGuard actively develops
the technical standards and
ensures the best possible wind
turbine performance.*



Technical Inspections & Management

Only an operating turbine is a profitable turbine

With WindGuard you avoid all the factors that can lead to a deterioration of performance – and in extreme cases to shutdown. For example, errors in the manufacture of components, or during installation, commissioning or operation. WindGuard monitors all the sensitive process steps for you and proves proper system management in case of a claim.

WindGuard expertise for legal standards

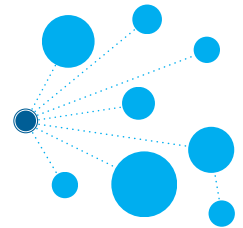
Where the safety of people and the environment is important, the government requires regular monitoring. The specialists at Deutsche WindGuard helped create the standards prescribed by the German Wind Energy Association.


This know-how, teaming with years of experience and brought to perfection through the constant exchange of information by our experts, is reflected in the high standards of our technical inspections.

Secure data – safe yield

For reliable wind farm monitoring, WindGuard has created a software tool: WONDER. This ever-evolving software is used by the specialists at WindGuard, and is available for the management of your wind farm as well.

- TECHNICAL MANAGEMENT
- RECURRING INSPECTIONS
- TECHNICAL INSPECTIONS
- COMMISSIONING INSPECTIONS
- MANUFACTURING SUPERVISION
- INSTALLATION SUPERVISION
- WIND FARM MANAGEMENT SOFTWARE (WONDER)





*WindGuard measurement
methods set new quality
standards and are
accredited by DAkkS*

Measurements

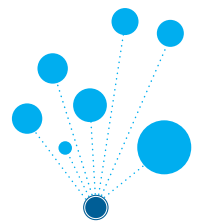
Objective data base

Power curve. Noise. Power Quality. Loads. These four factors play a decisive role in the certification of new systems and components. An objective, reliable data base is crucial, for those as well as for regulated resurveys. But is one measurement like all the others?

Recognised, self-developed measurement methods

WindGuard uses self-developed, very precise measurement techniques and devices. Customers can receive all individual measurements, anemometer calibrations and resurveys from a single source. Because of active participation through the years in the development of applicable standards, our specialists are familiar with not only the current standards, but previous standards on which older contracts are based as well. Our measurement services are accredited by the national German accreditation body, Deutsche Akkreditierungsstelle GmbH (DAkkS).

- POWER CURVE MEASUREMENT
- NOISE MEASUREMENT
- TYPE TESTING
- POWER QUALITY MEASUREMENT
- LOAD MEASUREMENT
- FAULT RIDE THROUGH TEST (FRT)
- GRID PROTECTION MEASUREMENT



In-house research

The technical development of wind turbines always presents new challenges, and WindGuard is constantly researching to improve measurement techniques, in order to offer to manufacturers and operators a qualified data base.



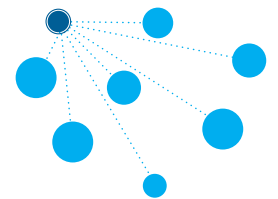
Offshore

Challenges on the high seas

Wind turbines on the high seas benefit not only from high and constant wind speeds, but better acceptance due to the large distance from land and any populated areas. However, they pose special challenges compared to onshore facilities. For example, in terms of the foundation, or transport of components and staff.

Know-how from the field

Our offshore experts come from all areas of the wind industry. From the first draft of a contract to the connection to the grid, they are actively involved in all areas of existing wind farms. Together with their scientific expertise, they ensure the successful implementation of your offshore project.



- TECHNICAL DUE DILIGENCE
- TECHNICAL PROJECT & CONTRACT SPECIFICATION
- INTEGRAL LOAD ASSESSMENT
- STRUCTURAL DESIGN AND ANALYSIS
- MANUFACTURING & INSTALLATION SUPERVISION
- SERVICE & LOGISTIC CONCEPTS
- SAFETY TRAINING

Safety Training

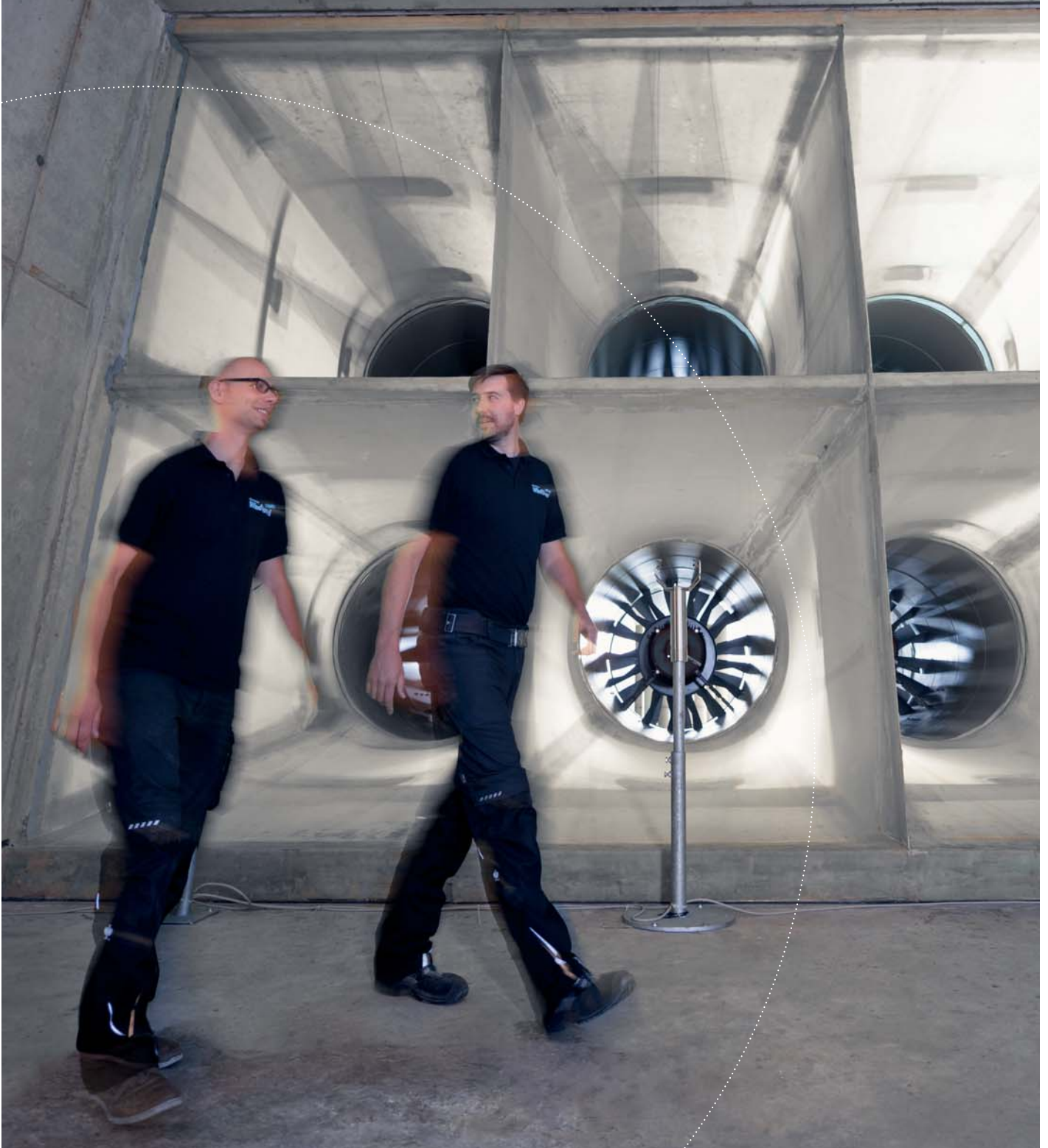
Safety in any situation

Train at one of the most modern locations in Germany. At Maritime Campus Elsfleth, we offer safety training for the operation of wind turbines – both on land and offshore. The realistic conditions and the individual supervision by experienced trainers from the German Navy or professional fire departments ensure the best results. Tailor-made courses are also available.

FACILITY	FEATURES	TRAINING
Climbing tower	18 m in height, descender, emergency descent system, 2 interior ladders	Working at Height
Helicopter simulator	Exit from a capsised and submerged helicopter	HUET (Helicopter Under-water Escape Training)
Fire container	Simulation of different causes of fire, extinguishing with water or dry powder, smoke simulation	Fire Awareness
Indoor swimming pool	4 wave profiles with up to 1.5 m wave height, wind and rain simulation, night simulation, helicopter downwash simulator	Sea Survival



*Optimal research and
measurement conditions in
self-developed calibration
and special wind tunnels.*

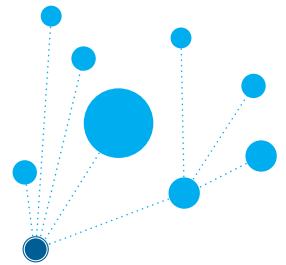


Wind Tunnel Centre

Accredited calibrations

Our position as a recognised expert in all matters relating to wind energy is reinforced with our own research and measuring equipment. Four calibration wind tunnels and two special tunnels (ice and pressure) form the Wind Tunnel Centre at our headquarters in Varel. The calibrations are recognised by the independent institutions Deutsche Akkreditierungsstelle GmbH (DAkkS) and MEASNET. Since 2009 one of the calibration wind tunnels has been used by the Physikalisch-Technische Bundesanstalt (PTB) to define the unit “metres per second” in the area of flow measurements and is therefore the national standard for this physical unit in Germany.

- ANEMOMETER CALIBRATION
- SENSOR TESTING UNDER ICING CONDITIONS
- LARGE SCALE WIND TUNNEL TESTING
- ANEMOMETER CLASSIFICATION
- WIND VANE CALIBRATION



Large wind tunnel in Bremerhaven

In addition, our acoustically-optimised large wind tunnel in Bremerhaven has been operational since 2008. The tunnel offers high wind speeds at low levels of turbulence, together with the most advanced drive and control techniques for ideal conditions for research and development. The aerodynamic and acoustic optimisation of rotor blades benefits from the data obtained in our wind tunnel, as do the marine and automotive industries.



*WindGuard customers benefit from our
good reputation with banks, investors,
regulators and manufacturers.*

Impartial Expertise

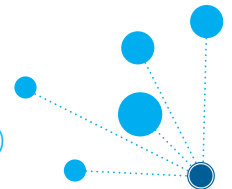
Independent and qualified

With expert advice from WindGuard, you receive qualified, strictly independent assessments of all aspects of wind energy, backed by years of experience, our own research, active participation in the design of the existing directives and the intensive exchange between the individual WindGuard departments.

Expertise in all areas of wind energy

Benefit from our good reputation with banks, investors, authorities and manufacturers. Take advantage of our qualified feasibility studies and energy yield assessments for the financing of your wind farm project. During the approval process of your wind power installation, we can provide all of the documentation for noise, shadows, etc. In legal disputes, we can help with our recognised objective expertise on the possible causes of damage.

- TYPE CERTIFICATION
- OFFSHORE PROJECT CERTIFICATION
- ELECTRICAL UNIT AND PLANT CERTIFICATION
- CONFORMITY STATEMENT (GRID)
- GRID PROTECTION ASSESSMENT



Certified

Our objective data base is the foundation for the certification process. All certifications can be obtained from the stand-alone WindGuard Certification body. These experts examine and certify compliance with the standards of new types of turbines and components, as well as offshore wind farms and power quality at the connection to the grid. Signed and sealed, with our accredited expertise.



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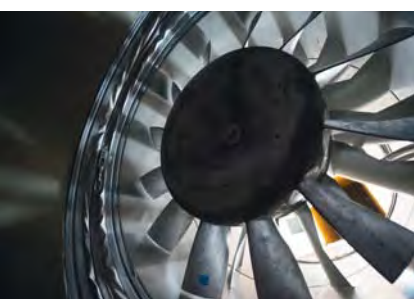
Energy with a future

Energy is the foundation of our modern civilisation. How we live, how we travel, how we act – no area of our lives would be the same without a secure energy supply. But our standard of living has a price: environmental impact and conflict over limited resources are down-sides of our prosperity.

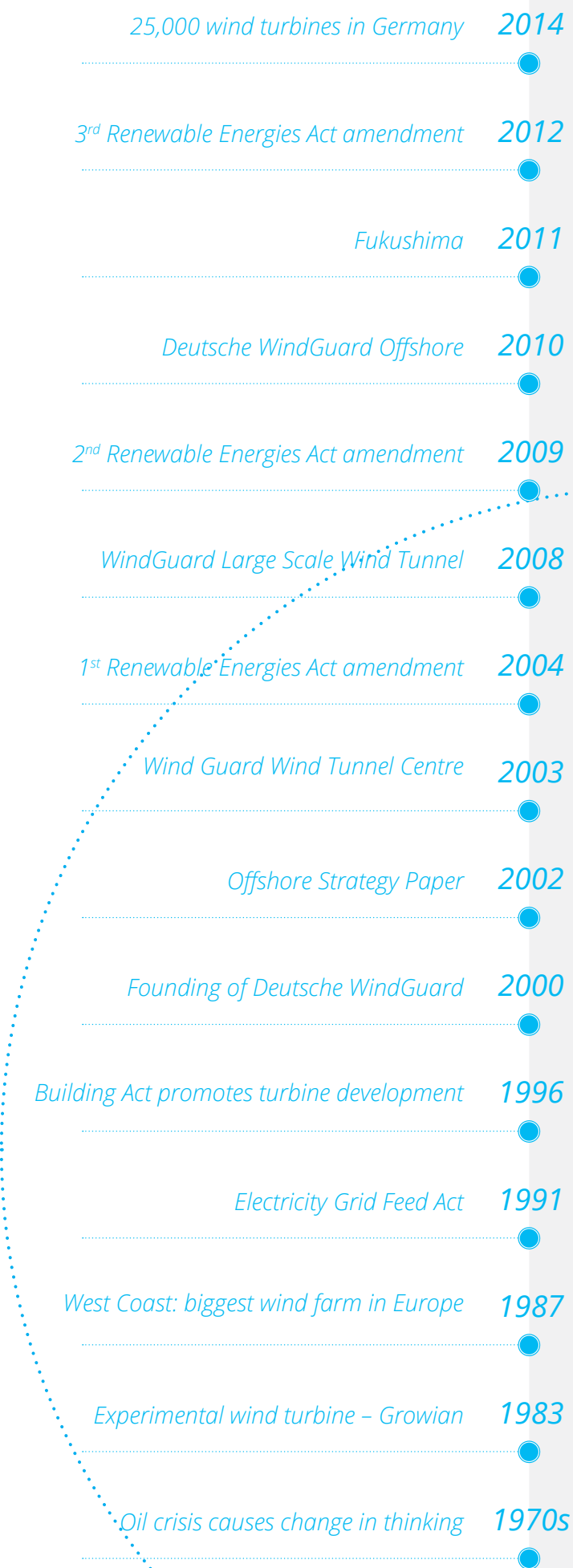
Worldwide, technicians and research groups are working to find answers to questions about the future of our energy supply. Their ideas are visionary, and implementation requires courage, determination and conviction.

All solutions ideally meet three conditions: The energy is obtained where it is used, does not consume irreplaceable resources or raw materials, and is free of charge.

Wind is blowing everywhere, all the time and doesn't provide an invoice. Therefore, wind energy plays a central role in every energy concept of the future. Deutsche WindGuard will actively participate in this process, for safe living conditions – today and tomorrow.







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