

Ensuring Bankable Wind Measurement Campaigns respecting IEC 61400-12-1 Ed.2 (03-2017) & MEASNET

ProfEC Ventus GmbH

The value of bankable wind measurement sensors, certified wind measurement systems and accredited expert opinions do yield improved loan and financing conditions

THE PROCUREMENT of bankable wind measurement sensors, accredited measurement systems, wind measurement masts, RSD (like SODAR and LIDAR) and the transparent data retrieval, analysis and supervision (respectively the entire data quality management) warranting authenticity and integrity during the wind measurement campaign in accordance to MEASNET recommendations „Evaluation of site-specific wind conditions“ is a challenging endeavour with numerous details to be considered and specifications to be respected.

Much care needs to be taken to warrant so-called BANKABILITY and to obtain best insights and results of the wind measurement campaign at lowest uncertainty possible.

Facts about Bankability and Certified Wind Measurement Campaigns

Due to the current absence of a sole, international standard exclusively focussing on wind measurements meant for energy yield prognoses only, in reality the Best Practices for wind resource assessments do refer to several standards accepted by banks that each touch part of the requirements to be respected:

- IEC 61400-12-1; Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines, December 2005

- IEC 61400-12-1 Ed.2; Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines; March 2017
- IEC 61400-12-2: Wind turbines - Part 12-2: Power performance of electricity producing wind turbines based on nacelle anemometry, March 2013
- FGW Technical Guideline for Wind Turbines, Part 6 Rev. 10: Determination of Wind Potential and Energy Production, October 2017
- MEASNET Power Performance Measurement Procedure Version 5, December 2009
- MEASNET Evaluation of Site-Specific Wind Conditions Version 2, April 2016
- MEASNET Cup Anemometer Calibration Procedure Version 2, October 2009

Each of these standards intrinsically contains relevant and important information to be complied with in order to warrant that a wind measurement campaign is fully bankable and in accordance to best practices, reflected by consideration of these most recent and by banks accepted standards. This is well understood by banks' engineers and accredited measurement institutes like ProfEC Ventus GmbH. However, often project developers, banks or investors are not always fully aware about all the details to be necessarily taken into account in order to reach a such high quality level of a wind

measurement campaign that is acceptable to virtually any bank, and hence in order to warrant the honour "BANKABILITY".

Thus, the quality level reflected by the title BANKABILITY yet is not defined by a single, exclusive standard, but BANKABILITY is conditioning compliance to several standards, each of them with relevance to some important aspects addressing the utmost quality level of wind measurement campaigns to be archived. Banks, as well as venture capital providers or funds that are firm on wind project financing, by default demand maximal compliance of any wind measurement campaign with these standards in order to reduce any risks and uncertainties attached to the measurement results, relying on a best practices. That leads to acceptance among the capital providers and hence is honoured "BANKABILITY".

Moreover: considering best sensors, procedures and an accredited documentation and reporting for any wind measurement campaign yields more precise and more certain results, meaning higher likeliness at reduced uncertainties, and hence a narrower distribution of P70, P90 and P95 values around the P50 expectation value. This again is in favour to all: in case of a classical project financing, the capital providers do offer better load and financing conditions expressed by lower interest rates, less equity capital, less contingencies



Shed some light into the dark

Detection and mitigation of risks & reduction of uncertainties to a bankable level



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- MEASNET-Anemometer and Wind Vane Calibrations
- Accredited Assessments of Wind Resource, Energy Yields and Site Classification
- SoDAR, LiDAR & Mast Wind Resource Measurements
- Virtual Measurement Mast Analytics (mesoscale CFD), Wind and Solar Resource Maps

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and less guarantees demanded to hedge the capital offered as part of the overall project financing strategy.

The chain of accredited services should not be interrupted

If carrying out a wind measurement campaign with subsequent wind resource assessment and energy yield forecasting of a wind farm planned, the ilac-MRA accredited processes have to go hand in hand. For example: the accredited installation reports for wind measurement technology from ProfEC Ventus, acting as Measurement Institute, often include more than 120 pages, in order to address and consider all questions and points regarding compliance with relevant national and international standards and guidelines in a most comprehensive and precise manner. „If the chain of the accredited works executed by accredited Testing Laboratories and Measurement Institutes breaks within the overall process of an expert opinion assessment, then in the worst case work steps have to be repeated,“ warns Jansen, CEO at ProfEC Ventus. „This can involve substantial costs, e.g. for new site visits, data validation and verification with respect to data integrity and authenticity, a new or extended measurement campaign etc. and therefore slows down the process of generating expert opinions reports that the investors want to evaluate before taking an investment decision. Such requirement are obsolete on the basis of our installation reports and individual “CERTIFICATE OF BANKABILITY” highlighting the compliance with all relevant standards, norms and guidelines, since every accredited Testing Laboratory in the world can blindly rely on our accredited appraisals, certificates and (installation) reports“, adds Jansen.

Rumours around “Bankability” and “Certified” wind measurements and necessary equipment compliance

ProfEC Ventus warrants bankability by issuance of a CERTIFICATE OF BANKABILITY. In first instance BANKABILITY in qualitative terms can be derived from the likeliness that capital providers accept the quality of an expert opinion, based on which project appraisal can be granted. Subsequently, in quantitative terms, BANKABILITY can be expressed by the attractiveness of the loan and financing conditions offered. Wind measurements surely constitute one of the key factors in deciding whether a

wind farm will be built or not. By calibrating sensors for wind measurements, the risks for investors can be reduced considerably, as they deliver reproducible results, and any uncertainties of measuring instruments are accurately assessed and reported. As the second company in the world, ProfEC Ventus GmbH got accredited by the German Accreditation Body (DAkkS, ilac-MRA compliant) for calibration of wind vanes, and by that is also recognized in context of the international organisation for accreditation bodies: ilac-MRA.

ilac-MRA accredited Measurement Institutes and Laboratories in accordance to IEC 17025 are obliged to comply to a maximum extend with the following norms and standards that are well accepted among capital service providers. ProfEC Ventus, as accredited Measurement Institute in accordance to ilac-MRA rules, complies as Testing Laboratory and Calibration Laboratory following ISO 17025 with all these standards.

A measurement system from suchlike accredited institutes can be certified as “being bankable”, based upon the accreditations and trustworthiness gained.

Therefore in case of ProfEC Ventus and based on our ilac-MRA accreditations and MEASNET membership: any measurement system as well as LiDAR and SODAR RSD that leave the Laboratory are tested, calibrated and form as such an accredited product itself, which is bankable in terms of IEC, MEASNET and FGW. This compliance ProfEC Ventus certifies by an accredited CERTIFICATE OF BANKABILITY, which has global validity and is accepted by virtually any banks, investors and turbine manufacturers all over the world, firm on the underlying norms and standards.

Beyond the procurement of measurement sensors and systems, also the measurement campaign, data supervision and evaluation can be executed as bankable, accredited service in order to warrant authenticity and integrity of the measurement and its results. ProfEC Ventus also hooks up here: data loggers come with a customer friendly data management and analysis service V.Mac (Virtual Measurement Access), offering quick data analyses, real time data access, resource evaluations and data sharing by individual user rights that our Clients can assign to the stakeholders to whom they grant a sub-account. V.Mac (Internet browser based or mobile App based) is flexible and can incorporate any data

a Client wants to incorporate, also from measurements not performed by us. V.Mac moreover warrants data authenticity and integrity in compliance with pertinent requirements from banks and investors. V.Mac services are free and save our Clients alternatively hiring an external, additional data management service worth more than several thousand USD per year per measurement station, if compared to business as default offers from appreciated competitors.

„One Stop Wind Shop“ offers comfortable compliance with bankability requirements

Anticipating entirely on the need to warrant bankability starting with the sensor selection already, ProfEC Ventus recently has launched „ONE STOP WIND SHOP“ (<https://shop.profec-ventus.com/>) for certified wind measurement systems, wind measurement towers and diverse accredited expert opinion services.

At ONE STOP WIND SHOP customers can find an immense selection of proven, calibrated and by banks accepted measurement technology at <https://shop.profec-ventus.com/>

Declared objective is the optimisation of professional procurement for high-quality, bankable wind measurement equipment as well as complete, accredited wind measurement campaigns, and to facilitate the choice of products.

In addition to individual, bankable sensors, the offer ranges from fully calibrated, certified and bankable wind measurement systems with or without wind measurement towers to the complete, accredited setup and data management support of entire wind measuring campaigns, using measurement masts, SODAR or LIDAR technologies involved. But also a worldwide assembly and installation services, an accredited calibration service and various, accredited expert services are offered at a glance: anytime and everywhere.

ProfEC Ventus also provides intensive advice and assistance for the appropriate selection of measurement technology and services.

ProfEC Ventus, as ISO/IEC 17025 Measurement Institute, acts as accredited Testing Laboratory as well as accredited MEASNET Calibration Laboratory with main focus on bankable energy yield assessments and long-term prognoses, wind maps (meso- & micro scale), wind forecasts & CFD-calculations. ProfEC Ventus' premise as accredi-


ted, independent Wind Energy Consulting Experts is to increase success of projects, to assess and identify associated risks that our clients are facing, to minimize risks and to qualify and quantify remaining uncertainties at bankable level as well as to most precisely determine any potentially energy losses involved. This expertise yet was proven in more than 40 countries worldwide.

Unique Features of the „ONE STOP WIND SHOP“


ONE STOP WIND SHOP is the only of its kind, which is operated by an ISO-17025 accredited Measuring Institute and Test Laboratory with an own, accredited (MEASNET) Calibration Laboratory.

The ONE STOP WIND SHOP enables the client a convenient and efficient ordering process and a directly apparent price offered. „The customer can immediately and at any time check our huge range of sensors with or without a cable and connector-plug, with or without calibration, and he can compare all the features of different sensors in order to find the most suitable sensor for his measurement system and his measurement campaign. And the client also can order any sensor or complete measurement systems right away“, says Mathias Hölzer, CEO at ProfEC Ventus GmbH. This reduces the time and administrative effort as well as the delivery time.

„As an accredited Testing Laboratory and Calibration Laboratory, we offer wind measurement systems with an individual CERTIFICATE OF BANKABILITY, which verifies adherence to relevant standards and norms and thus is accepted by almost all banks worldwide,“ says Managing Director Mathias Hölzer. In order to entirely comply with the requirements of the upcoming IEC Site Assessment standard (IEC 61400-15) likely being published in 2020, only wind measurement stations and wind measurement campaigns have to be used as base for wind resource assessments and energy yield prognoses, which previously have been assessed and evaluated by an accredited Testing Laboratory. These expert opinion reports in turn are the prerequisite for banks and investors to finance a wind farm project, especially in Germany. „Measuring systems from ONE STOP WIND SHOP meet all the requirements of banks and investors around the world and are certified to comply with relevant and most recent standards of FGW, IEC and MEASNET“ Hölzer adds.




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Performance TR2

- Power Performance Measurements & Verifications (IEC 61400-12-1 Ed.2:2017)
- Accredited Assessments of Wind Resource, Energy Yields and Site Classification
- SoDAR, LIDAR & Mast Wind Resource Measurements

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In addition, ProfEC Ventus offers wind measurement masts in the ONE STOP WIND SHOP under observance of various building code regulations and static requirements. „We supply our customers worldwide with wind measurement towers that meet the prevailing national or local structural requirements, avoiding any problems during appraisal of the building permit or during the operating period „, says Hölzer.

At the same time, clients at the ONE STOP WIND SHOP can also access and investigate numerous accredited consulting services. „Here, however, we offer a more detailed consultation and advice already during the quotation phase, in order to first of all precisely assess the individual requirements and database existing, based on which we then can provide a tailor-made, cost-efficient offer to our Client, meeting his needs and in most cases exceeding his expectations“, says Andreas Jansen, CEO at ProfEC Ventus GmbH.

ProfEC Ventus at a glance

ProfEC Ventus' procedures and techniques do comply with relevant and recent international industry standards for wind energy. Its accreditation as Testing and as Calibration Laboratory following ISO/IEC 17025 proves accepted bankability of the offered services. Work and expert opinions are hence performed in compliance with pertinent norms as:

- IEC 61400-12-1 Ed.1:2005
- IEC 61400-12-1 Ed.2:2017
- IEC 61400-12-2
- IEC 61400-1
- IEC 61400-2
- FGW TR6 Rev.10
- FGW TR2 Rev.16
- MEASNET Power Performance Measurement Procedure V.5
- MEASNET Evaluation of Site-Specific Wind Conditions V.2
- MEASNET Cup Anemometer Calibration Procedure – V.2

ProfEC Ventus is accredited following ISO/IEC 17025 for following services:

- Anemometer and Wind Vane Calibration
- Measurement of Wind Turbine Power Performance
- Wind Resource and Energy Yield Assessment of Wind Turbines incl. Assessment of Losses
- Installation and Evaluation of Wind Measurements
- Site Classification of Wind Turbines

Typically with its top-class services ProfEC Ventus entirely serves the needs and satisfy the expectations of project developers, banks or investors, governments, wind turbine manufacturers as well as international organizations worldwide.

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ProfEC Ventus is engaged in several national and internationally expert bodies focusing on streamlining quality of work, service and results within the global wind energy market. Development of standards, norms and guidelines yield harmonized results, necessary for globally acting wind energy stakeholders as banks, investors, wind turbine manufacturers, project developers, O&M companies etc.

ProfEC Ventus naturally not only applies such standards, but also contributes during the development and acceptance of such, by injecting valuable knowledge and experience to the working groups and boards developing, respectively approving, said standards.

Among others ProfEC Ventus is engaged with reference to the following work committees:

NATIONAL COMMITTEE WORK:

BWE – German Wind Energy Association

- Expert Advisory Board
- Experts' Forum

FGW – Federation of German Wind Power and other Renewable Energies:

- Technical Committee – Power Curves
- Technical Committee – Wind Potential

INTERNATIONAL COMMITTEE WORK:

IEC – International Electro-Technical Commission (mirror committee)

- IEC 61400-12-1 (Power Curve)
- IEC 61400-15 (Site Assessment)

MEASNET – International Measuring Network of Wind Energy Institutes

- Working Group Anemometer Calibration
- Working Group Wind Vane Calibration