Fraunhofer
IWES

FRAUNHOFER INSTITUTE FOR WINDENERGY AND ENERGY SYSTEM TECHNOLOGY IWES

# WIND FARM MAINTENANCE
## FOUR STEPS TO REDUCE YOUR COSTS

# WIND FARM MAINTAINCE

## COMPLEX SYSTEMS REQUIRE NEW STRATEGIES AND METHODS

The installation of wind turbines (WT) is booming. However, even larger and more complex systems require new strategies and methods for maintenance. The maintenance of wind turbines has a significant impact on the operating profit.

Besides accurate service and regular maintenance, repair works are an essential element for the successful operation of a Wind turbine. Optimized maintenance strategies increases the reliability of the wind turbine and reduces thereby the risk of unplanned downtime.

The cooperation from different actors in the wind industry by exchanging relevant data is necessary. This is the only way to attain sufficient knowledge about the failure behavior of wind turbines and to reduce the number, the extent and the cost of failures both today and in future.

### Need for action in your company

- Improve ratio of corrective to preventive maintenance
- Implement maintenance as a part of quality management
- Create a decision basis for retrofitting and improvements

### Our services

Fraunhofer IWES in cooperation with relevant companies in the wind industry has developed, a four step process model for long-term reduction of maintenance costs.

### The four steps include:

1. Data acquisition with industry standards
2. Utilization of the Windenergy Information Data Pool (WInD-Pool)
3. Data analysis
4. Adaption of the maintenance strategy

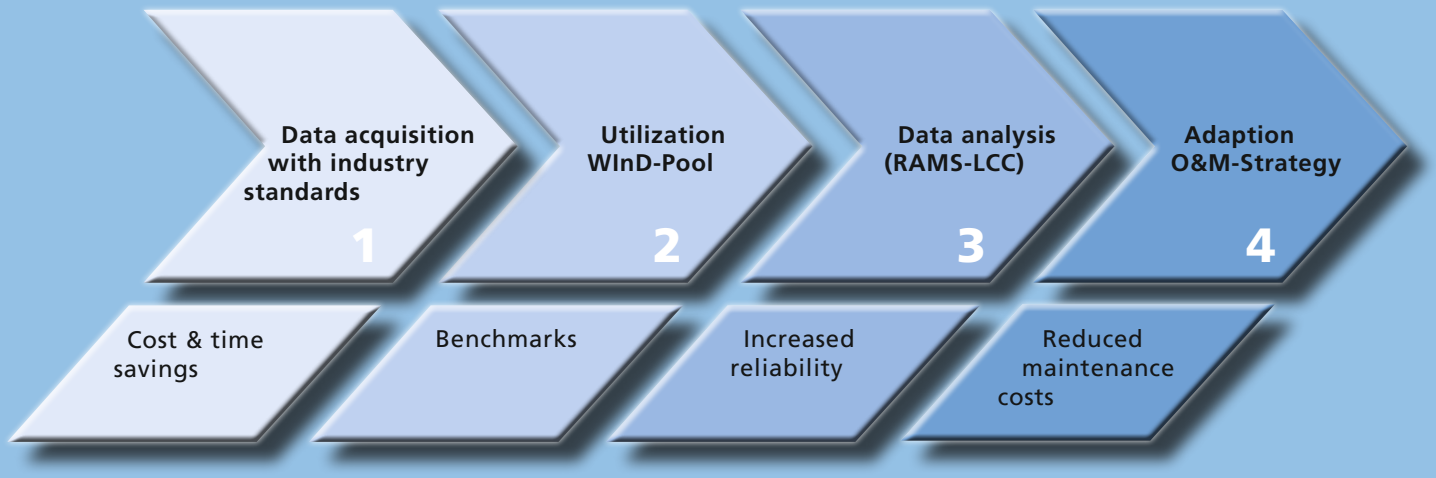
**The benefits for you:**

- Partly automated data management
- Performance benchmarks
- Reliability characteristics library
- Early warning system for damage prevention

**Target group**

- Wind farm operators
- Service providers
- Turbines manufacturers

Join us! Informations on how to participate and benefit please continue on the next page.




# FOUR STEPS TO REDUCE YOUR COSTS

### 1. Data acquisition with industry standards

Structured acquisition of core, operational and event data according to industry standards (e.g. RDS-PP®, ZEUS, GSP), systematic collection of data, uniform description of sub-assemblies, operating conditions, malfunctions and failures as well as introduction of electronic aids (e.g. tablet, barcode-scanner).
**Benefits for you:** Shorter service times by electronic support for service staff with a pre-selection of affected components and standardized error codes. Supplemented by a partly automated reporting system using a quick and simple transfer of all maintenance data.

### 2. Utilization of the WInD-Pool

Establishment of a common knowledge base by joining forces of several wind farm operators. The conclusions are made on the basis of a statistically robust data base.
**Benefits for you:** Benchmark with other wind farm operators as well as early detection of weak spots and cost drivers.

### 3. Data analysis

Description of the reliability behavior of wind turbines by different analytical methods (e.g. RAMS-LCC) and generation of reliability characteristics.
**Benefits for you:** Forecast the reliability behavior and the availability of your wind turbine. Turn unplanned failures into planned repair works.

### 4. Adaption of the maintenance strategy

Clustering of maintenance measures. Prioritizing and shifting measures in times of low winds.
**Benefits for you:** Less non-operation periods. Reduction of failures, maintenance effort and production downtime.

### Reduced maintenance costs?

Yes! Based on a sensitivity analyses and under conservative assumptions, the benefit of participation in the WInD-Pool has been quantified. The expenditures have been taken into account and reduced maintenance costs of up to 1 % has been calculated (detailed analyses and further information: http://www.windmonitor.de/wind-pool).

### Why not?

**»Data about incidences are not available!«**
In your own interest you should collect and evaluate this data.

**»Other operators are aware of the success or failure of my wind farm!«**
Direct conclusions leading to individual operators are not possible. The publication of results and evaluation within the WInD-Pool is governed by a non-disclosure agreement.

**»The effort for the implementation of new standards is too great!«**
The effort is required once only. We will gladly support you in the implementation. However, in the long term the advantage of simplified and faster data acquisition will convince you.

**»There are too many requests for data from similar projects. We cannot participate everywhere!«**
We will manage the data on a fiduciary basis and make them available for further initiatives according to your wishes.
For example, there is cooperation between The Crown Estate, ORE Catapult and the Fraunhofer IWES. Thus you can benefit from various initiatives without additional effort.

## **WInD-Pool** Windenergy-Information-Data-Pool

The WInD-Pool is a data base, still being established, that collects operating and maintenance data of wind turbines across several companies. Currently the WInD-Pool is being developed in collaboration with several wind farm operators within the projects:

- EVW
  Increasing the availability of wind energy turbines
- Offshore~WMEP
  Offshore-scientific measurement and evaluation programme

For the development and international standardization of the necessary industry standards, Fraunhofer IWES participates in national and international committee work.

Important standards are

- RDS-PP® (Reference Designation System for Power Plants)
- ZEUS (State-Event-Causes-Key)
- GSP (Global-Service-Protocol)

## Industries view

»By supporting this project, E.ON recognizes the growing need for a common view among all operators of current offshore wind technology capabilities as well as insights into future sustainable development of offshore wind engineering. We hope to benefit from valuable results in technology development to continue to build on our leading position in offshore wind energy.«

E.ON Climate & Renewables GmbH

»We consider the Offshore~WMEP as a unique opportunity to exchange our experiences via a neutral platform and to establish a good, neutral reliability database.«

RWE Innogy GmbH

»In our database we collect comprehensive wind turbine data from more than 50 wind farms. Despite our extensive assets, a common data pool would lead to more meaningful analyses and improved turbine availability in everyone´s interest. Therefore, we have decided to participate in the WinD-Pool.«

GEO Gesellschaft für Energie und Oekologie mbH

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