# THE GERMAN WIND TURBINE RELIABILITY DATABASE

WMEP

Wind Power R&D seminar – Deep sea offshore wind power 20-21 January 2011, Trondheim, Norway

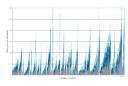
<u>J. Bard</u>, S. Faulstich, P. Lyding Fraunhofer Institute for Wind Energy and Energy System Technology (IWES)



# THE GERMAN WIND TURBINE RELIABILITY DATABASE

- Introduction
- WMEP
- Reliability of wind turbines
- Offshore~WMEP
- Conclusions









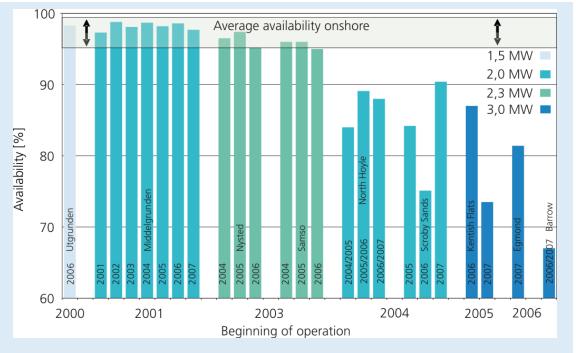
## Introduction

#### Starting Point:

Modern wind turbines achieve high availability

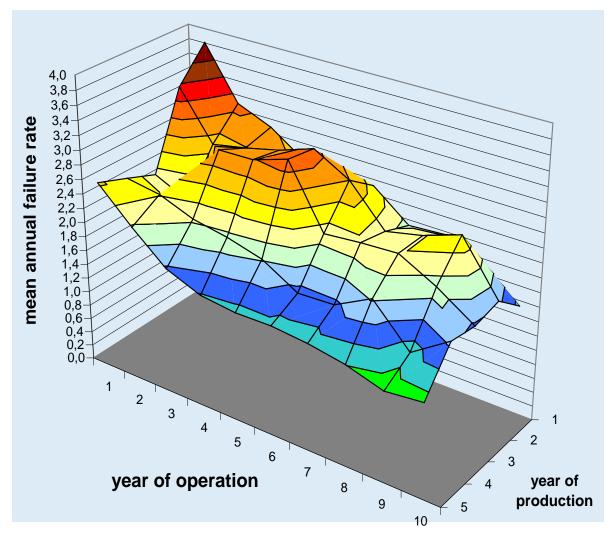
Number of faults cause unplanned downtimes → high maintenance efforts and costs

Offshore: drop of availability expected





#### Introduction







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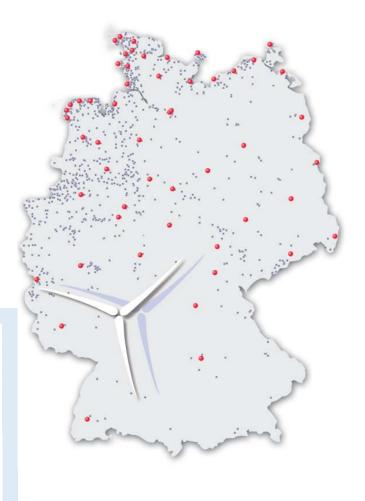
# Scientific Measurement and Evaluation programme WMEP

"250 MW Wind" (1989-2006)

193.000 monthly operation reports64.000 Incident reports1.500 wind turbines

Maintenance and Repair Report WMEP 250 MW-Wind		Wissenschaftliches Mess- und Ex Getedunten von Danassenatelen forderett Jahresbericht für Windenergiean	National and Real-to-determine (SNU)
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#### WMEP

Dissemination:

 Wind Energy Report (yearly published, 2010 coming soon)

Internetportal

www.windmonitor.de

Project Homepage <u>www.offshore-wmep.de</u>

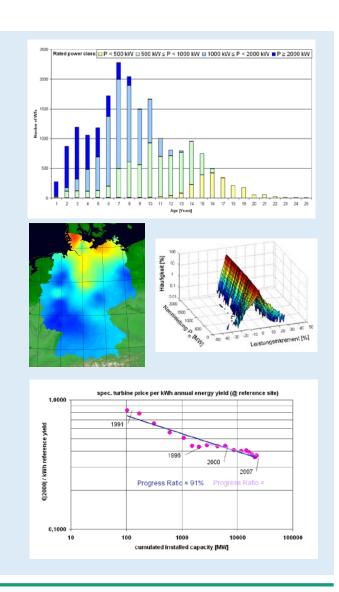






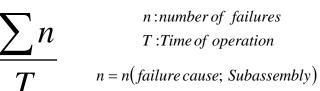
#### Research topics:

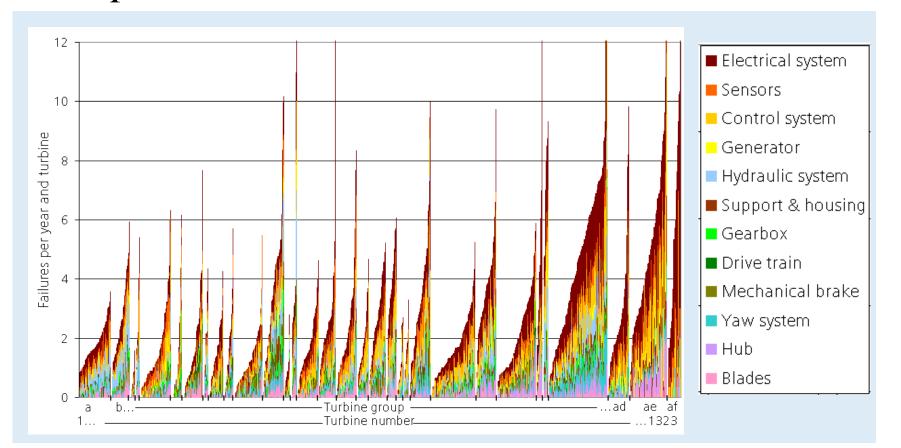
- Development and state of wind energy use
- Site & Turbine development
- External conditions
- Grid Integration
- Economics
- Reliability and availability





## Reliability of wind turbines

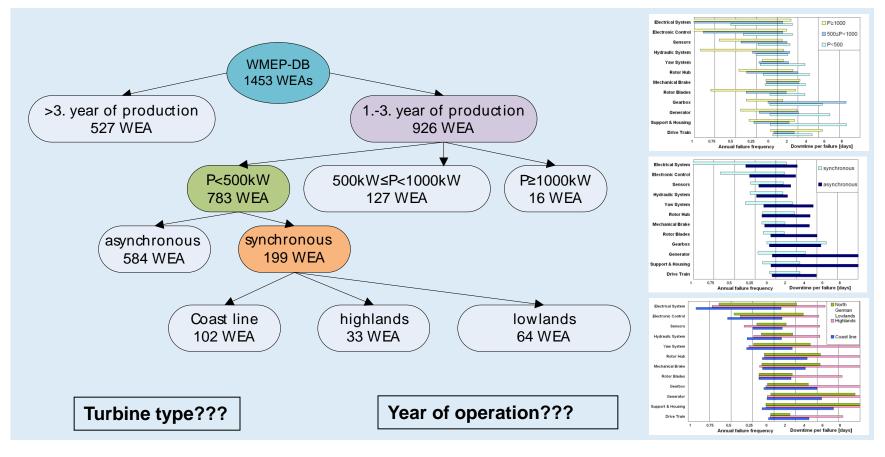






### **Appropriate Failure Statistics**

For differential analysis distinctions regarding size, technical concepts, site conditions, etc. must be made





### Reliability based maintenance

#### Increasing availability:

→ extending uptime

 $\rightarrow$  increasing reliability of turbine and sub-assemblies

➔ reducing downtime

→ qualified maintenance
→ efficient strategies for spar parts

 $\rightarrow$  additional preventive measures

#### Basis for reliability based maintenance is

- structured reliability characteristics
- validated maintenance costs

in consideration of operating conditions (reference values)

➔ Accurate and detailed documentation, consistent labelling of subassemblies, and unified description of events are needed

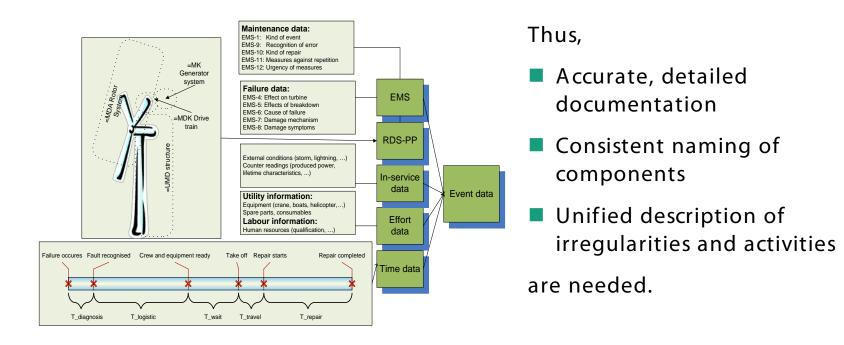


## **Appropriate Failure Statistics**

For reliability based maintenance it is essential to know

- structured reliability characteristics
- validated maintenance costs

taking into account the operating conditions (reference values).





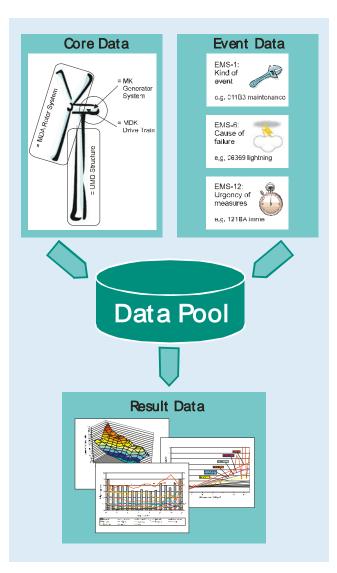
### Offshore~WM₽



The generation of a common database -aims to help in answering essential questions concerning offshore wind energy -contribute to political decision-making processes and facilitate further technological progress

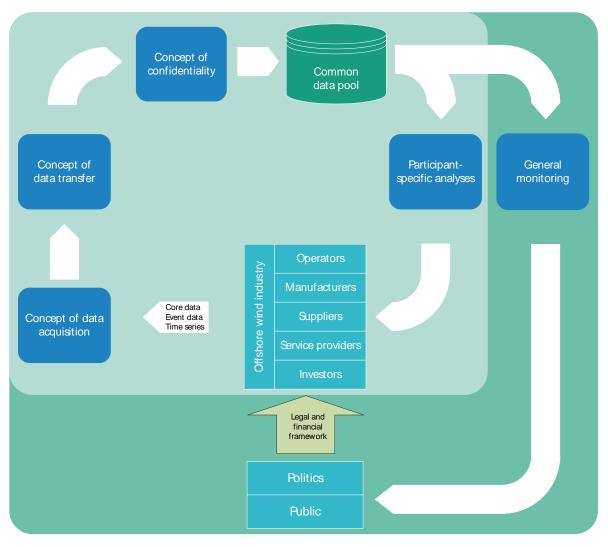
-allows anonymous benchmarking and weak-point analyses

-gives the possibility to test and, if necessary, optimize the performance of offshore wind farms





#### Offshore~WM₽





#### Conclusions

- Reliability and availability needs to get improved
- Experience is of great value for reliability and maintenance optimisation
- Already information available
  - level of detail needs to get improved
  - Statistic mass needs to be increased
    - ➔ Common database is proposed
      - Concepts (e.g. data base structure) established
      - Sharing of information has begun



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# Thank you for your attention



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