**Condition Monitoring in Wind Turbines – Practical Experiences with a Global Digital Approach**

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**Abstract**

The cost of energy generated from wind power plants is challenging societies in terms of desiring cheaper and more environmentally friendly generated electrical energy. The high cost reduction targets can be aided by broad application of condition monitoring systems, which bear the potential to support plant owners reducing turbine downtime and lowering costs. In order to be competitive EnBW follows a global condition monitoring strategy and developed a platform, to take advantage of the different information sources available to operators. For this purpose latest cloud technologies are used for storage and analysis of data, building the basis for cost efficient monitoring.

One of the most common sources for information about the turbine condition is Supervisory Control And Data Acquisition (SCADA) data, e.g. temperature, current or voltage measurements from different components. Using Adaptive Neuro-Fuzzy Interference System (ANFIS) models, a normal behavior model based approach is taken to extract information from these data, which otherwise are covered by the high signal variance.

Another information source potentially available to operators is vibration measurements from the wind turbine drive train or structural information.

Finally, a global fuzzy expert system is under development giving the possibility of linking all available information in terms of fuzzy logic rules. With this the cost in diagnosis is expected to decrease as diagnosis can be automatized to a certain extent.

The monitoring system is life since several years, and has proven its value in lowering operational costs. It will be given application examples showing the information content within the data and the value generated from them using real world examples.