

Benefits of TCM

TCM Turbine Condition Monitoring is a valuable solution to detect evolving damages in structural or rotating parts in an early state, which can help you to do proactive maintenance, i.e. plan your maintenance and prevent breakdowns and in this way minimize downtime to earn more money. In addition many insurance companies offers a discount rate when applying certified Turbine Condition Monitoring as the TCM System.

Typical Errors and Downtime

Statistics collected and analyzed by the German university ISET under the "250 MW Wind" program WMEP based on reporting from more than 1000 wind turbines placed all over Germany, documents the distribution of errors and their average downtime shown below in figure 1. From this figure the average yearly downtime for the errors (marked with green), which the TCM system can reduce, the average downtime for these errors are nearly 3.8 days per year. The TCM system can reduce this downtime by 90% giving a saving in lost production about 3.4 days per year. In e.g. Germany this would give an average increase in production for a 1.4 MW machine, with 2.200 full load hours per year (25% of nominal production), around 28.562 kWh @ 9 Cent per kWh which is 2.607 € per year.

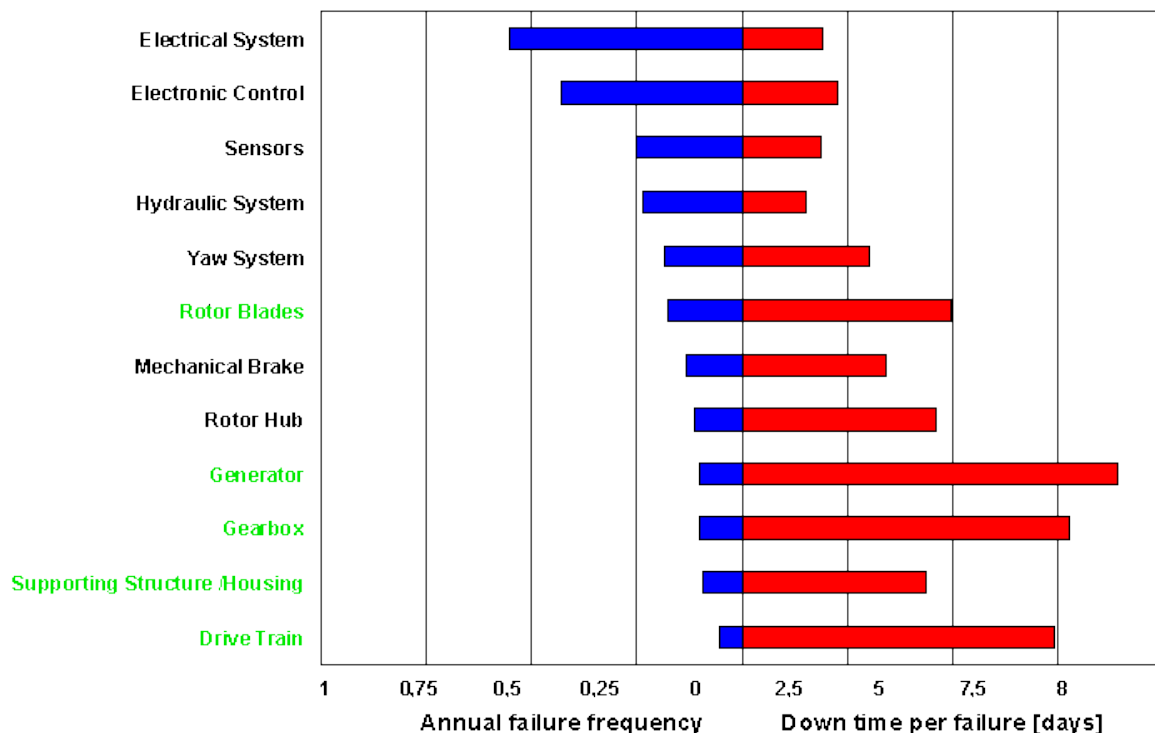


Figure 1 – Source ISET, Kassel

ROI - Return On Investment

The return on investment, i.e. money saved over the lifetime of the wind turbine by investing in a TCM Solution including installation and subscription to the TCM Data Center Service for the whole lifetime, is made up of different contributions

- a) Money saved by reducing the down-time
- b) Money saved on repairs due to the fact that the errors are detected in an early stage
- c) Money saved on insurance policy, a figure you can have from your insurance company
- d) Money saved when certain actions otherwise required by your insurance company, as changing all bearings every 5 years, can be avoided. Ask your insurance company.

The first contribution can be calculated rather precise based on the statistics from ISET mentioned above. The second contribution is not possible to calculate exactly but when it comes to catastrophic failures is an essential saving. The remaining contribution depends on the insurance company used. Regarding savings related to reduced downtime the total saving over 20 years, i.e. the lifetime of a wind turbine, for the 1.4 MW turbine used in the example above compared to the financed initial investment (6%pa.) and including TCM Data Center Services is better than 20%. The larger the turbine - the better ROI. Please see the graphs below for ROI versus turbine size at 10 and 20 years lifetime.

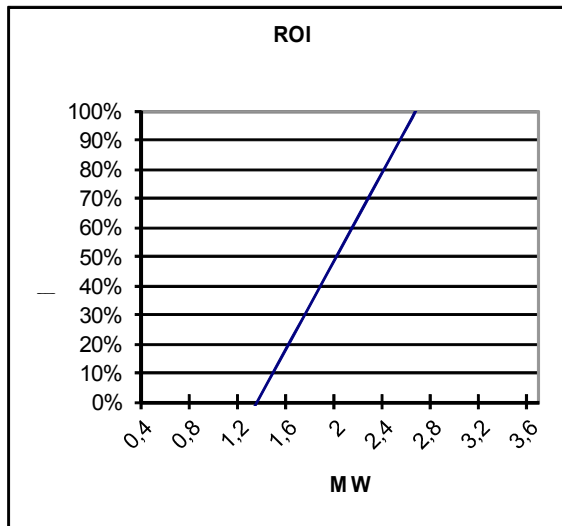


Figure 2 - 20 years lifetime

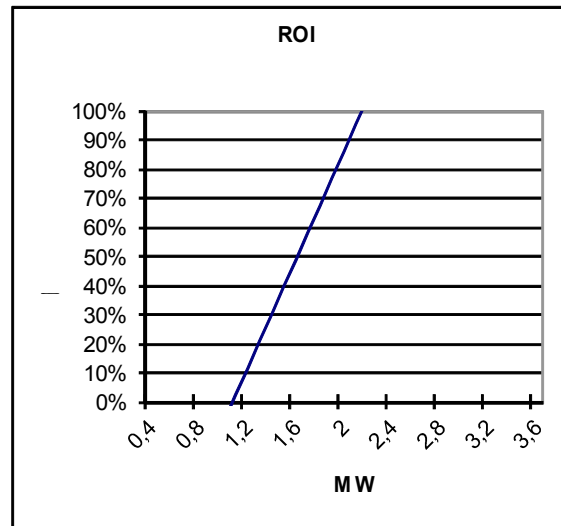


Figure 2 - 10 years lifetime

Summary

Investing in a TCM solution will save you money for turbines in size from 1.4 MW. This is only based on the savings related to reduced downtime, although other savings are very likely to make it even better. Definitely larger wind turbines (>2MW) can benefit substantial from the TCM solution. You can use our online ROI calculator to calculate the ROI on your wind turbine(s) at our home page <http://www.gramjuhl.dk>.

Related Information

- [M-System Product Description.pdf](#)
- [DAM-XY01 Product Description.pdf](#)
- [TCM Server Product Description.pdf](#)
- [TCM Data Center Services.pdf](#)
- [TCM System Product Description.pdf](#)