

Populærvidenskabeligt abstract

In order to keep offshore wind turbines in production, it is important to continuously focus on maintenance. However, costs related to these activities constitute approximately 30% of the lifetime cost of an offshore wind farm project. Currently, a number of new offshore wind farms are being installed. Previous research have mainly focused mainly on the installation of new wind farms, while maintenance of offshore wind power installations seems to be in an early phase. In this current research a literature study shows that in order to properly manage maintenance of wind turbines, it is important to consider three different perspectives: a short-term operational perspective, where the focus is on day-to-day activities; a medium-term tactical perspective, where planning of maintenance is optimised; and a long-term strategic perspective, where the focus is on the entire lifetime of the wind turbines. However, so far the industry's main focus has been on day-to-day issues, and only a limited focus on more long term thinking. Through three research projects, one on each of the decision-making perspectives, this study focuses on how models and frameworks for short-, medium-, and long-term perspectives can support a reduction of the costs involved in generating electricity from offshore wind turbines.

For the short-term operational perspective, a study on lean and modularisation was conducted. Lean is used to focus at processes that create value and remove processes that do not add value to the customers, while modularisation is used to standardize processes and to remove complexity. The study identifies how lean can be used to reduce the time used on maintenance of an offshore wind farm, as well as to increase the time the wind turbines are available for production. Modularisation is in this study used to re-sequence maintenance tasks so that they can be carried out faster, as well as to remove the complexity in regards to packing tools and other resources before the actual execution of maintenance of an offshore wind farm.

For the medium-term tactical perspective, a maintenance concept named Reliability-Centred Maintenance is in this study tested in maintenance of a small part of a wind turbine in order to investigate how this concept could be used to maintain the wind turbines in a smarter way. The analysis identified how an electrical component could be maintained in another way, which consequently would reduce the maintenance costs for this specific component.

For the long-term strategic perspective, a management concept called Asset Life-Cycle Management is investigated. This method is studied for identifying possible future events in regards to different perspectives of the assets. The Asset Life-Cycle Management is tested on an offshore wind farm where future events were identified to prepare the company for future events and to ensure that the wind turbines can operate for the rest of their lifetime.