Credits: WindEurope

Key Findings

You can find herewith a summary of the main key findings presented during the event:

Introduction to the event (Jimmy Murphy, University College Cork)

LEANWIND is a project co-funded by the 7th Framework Programme (7FP) of the European Commission. It started in December 2013 and will end in November 2017.

Cost reduction along the full cycle of the offshore wind supply chain and lifecycle is the principle objective of the project. This main objective is sought while trying to remain industry relevant and go hand in hand with the main market developments.

The following are items related to an offshore wind farm life-cycle and supply chain which are analysed in the project: construction, deployment and decommissioning; novel vessels and equipment; operation & maintenance; integrated logistics; system integration; testing & validation of tools & technologies; economic & market assessment.

For more details, please check the presentation.

Models for ports suitability assessments (Negar Akbari, University of Hull)

The ports play a major role in the phases of installation, O&M and decommissioning of an offshore wind farm.

Ports facilities have to adapt following the increasing sizes offshore wind turbines are taking.

This is the background reason for developing a decision support tool to help navigate through the different criteria underlying the selection of the most suitable port.

The first step was the formulation of a set of hierarchy models, composed of different port criteria (i.e. physical characteristics, connectivity, layout). Those models were validated by a series of industry experts and then weighted.

The resulting tool is useful for ports authorities to compare their port attractiveness against other ports'.

Herewith the main highlights from exchanges with the audience:

- So far, the data base has been maintained via public data, but it would be better to directly contact ports, which has proven to be not an easy task.
- The tool does not include data on the infrastructure of a harbor. The reason for that is that the tool's authors look for a higher level and more strategic set of factors. Nevertheless, the point raised is acknowledged as being an interesting factor to possibly include in other models.
- In general terms, it is possible to customise the tool to the necessity of different possible customers. The tool in question, though, was tailor-made to the needs of the LEANWIND project and targeted to a wider public.
- The tool does not include the type of vessels used and the related operational criteria to be applied.
- The tool is not publicly available, although a publicly available report describing it is downloadable from the LEANWIND website.
- It is wished the ports to be responsible feeding the model with updates in the future.

More details on the presentation.

How to reduce maintenance costs by means of innovative lifting solutions (Nicolas Degand and Ole Jacob W. Nielsen,OWA)

Among the main offshore wind challenges and trends lie wind turbines increasing size and weight and an increasing water depth of offshore wind installations.

When it comes to costs, O&M account for 65% of offshore wind OPEX. 90% of those are represented by the logistics. Optimisation of those costs is one of the main tasks OWA are contributing to in the LEANWIND project.

More in particular, those tasks are synergetic with the achievements OWA developed in the HighWind project. This is particularly referred to the "Boom Lock System". Inspired by the automobile industry, the idea of robotize wind turbine installations was further developed and scaled towards the current concept. This allows an offshore crane to install wind turbine generator components in high wind speeds. After successfully finalizing the first project at the Kentish Flat Wind Farm, the focus is now on simulating larger blade sizes in higher wind speeds and developing offshore trails with new blade yoke designs.

Herewith the main highlights from exchanges with the audience:

- The simulator is not incorporating the movement of all the various parts of the wind turbine. Indeed, it is not incorporating how the tower and the nacelle are moving (this is a possibility for improvement). OWA is working on a more general crane simulator.
- The Boom Lock System concept is owned by GeoSea, SBE, Sarens and is supported by the Flemish Government via a participation of PMV (Participatiemaatschappij Vlaanderen)

More details on the presentation.

Credits: REBO

Full logistics model demonstration (Lars Magne Nonas, Marintek)

The development of a holistic set of optimisation based decision support systems for all lifecycle phases and supply chain legs is the innovation presented in this series of LEANWIND activities. This is in contrast with what is currently available, which is mainly simulation based.

The offshore wind sector is particularly affected by: a lack of structured planning processes; complex operations and a lack of advanced tailor-made decision-support tools.

A more thorough application of mathematical models would significantly help in overcoming the current encountered obstacles.

The 9 inter-connected optimisation models developed have been inspired from what has been already implemented in other industries (e.g. aviation), similar to the offshore wind's for the complexity of the problems to be solved. They involve all life cycle phases and supply

chain legs, i.e. installation, O&M and decommissioning for the stages “prior to port”, “at port” and “port to site”.

More details on the presentation.

Simulation of GIS database of manufacturing facilities, transportation links and port locations (Thomas Van Lanschot, *University of Edinburgh*)

As part of the above-mentioned set of models, a Geographical Information System (GIS) tool has been created. Based on the database already developed by UHULL, the tool uses the open source QGIS, which can be publicly downloaded. It allows to display optimised ways of: land routing; shipping; port selection; traffic flow and rapid estimation.

The GIS can be used in combination with the other Full logistics models.

More details on the presentation.

Herewith the main highlights from exchanges with the audience:

- The 9 models are available and owned by the partners who developed them. Now they are being tested and validated and they will be published depending on the confidentiality elements that can be disclosed.
- The mathematical models is built to reflect the description and characteristics of the different planning problems which has been provided by the industry actors consulted. The main focus in the LEANWIND project has been to build realistic models that reflect the most important and relevant aspects of real life decision problems within offshore wind transportation and logistics. The input data for the model describing any logistical or technical concept will be inputted by the user of the decision support models.
- The offshore logistics model will choose the optimal configuration of vessels, ports, technicians and maintenance strategies that minimizes the LCOE.
- Travelling speed has been considered, but not speed restrictions within different zones.
- The Graphical User Interphase (GUI) of the decision support models are Excel based sheets and, hence, relatively easy to use, and will be able to produce solutions in a very short amount of time. This means that the expert planners could spend more time on evaluating a set of promising solutions instead of spending a lot of time on generating a possible solution (without much knowledge on the quality of the generated solution).

Hints to the case-study analysis on Port of Oostende (Jan-Erik Hanssen, 1-tech)

The current analysis on Port of Oostende aims at describing the environmental, societal and economic impacts that offshore wind activities carried out in a port can bring to the local community and environment.

This is done by means of a desk research as well as a more pro-active work (e.g. feedback during dissemination events; interviews to key stakeholders).

More in particular, the study will disclose how the industry grows, what key decisions are made and which impacts/consequences to bring to the local community and their environment.

More details on the presentation.

The construction of the Nobelwind offshore windpark (Koen Marchand,Jan de Nul)

Jan de Nul Group has been contracted the realisation of the Nobelwind offshore windpark, off the Zeebrugge coast. The windpark will be composed by 51 monopile foundations for 50 wind turbines. Jan de Null will also take care of the Offshore High Voltage Substation (OHVS), the supply and installation of scour protection and the installation of 50 wind turbine generators.

The works started in April 2016 and will end in 2017.

Working Group on Models (Assessment of ports suitability and Full logistics model)

- Regarding transport time from the port to the site (O&M), it was highlighted that it is more relevant how long it takes to drive the distance rather than the distance itself.
- The model can be useful at the first stage, but then it should be assessed if a port should be out because of a lack of data.
- Important criteria to include in the Assessment of ports suitability model might be:
    - vessel compatibilities, which are recognised to be of large importance for the choice of port
    - the port's level of experience in hosting offshore wind activities, as this might differ from one case to the other;
    - quantitative information on port characteristic (e.g. selection of a series of ports based on their water depth);
    - prioritisation of traffic and effects on vessel down time – ports where traffic priority can be given to offshore wind installation vessels should also be included as port selection criteria.
- The port selection tool is very dependent on the input data. Thus, it would be a good idea to produce all the input data for all relevant ports in Europe in order to compare them in the model. That would make it a very relevant tool for the industry.
- The model can be used by the same ports to assess their level of competitiveness.
- If ports are willing to disclose their business case, there might be relationships with other ports to be set up via the model.
- If the information is updated, the industry is willing to use the model.

Working Group on case-study analysis on Port of Oostende

- The question whether ports bring temporary or long term benefits to the local community was raised.
- The advantages that ports bring can sometime be short-term, for example employment created during the construction phase of an offshore wind project. While this can create a positive impact at a certain moment in time, it should be investigated how these opportunities could be transformed in permanent benefits for the local people, e.g. by fostering employment in the O&M sector. In the case of port of Oostende it should be explored how the port wants to position itself, either as a hosting port for temporary operations or as a permanent base for hi-tech. In the latter case investment in education and skills is a pre-requisite for a successful development in this direction. Port of Oostende expressed their interest in offering more permanent jobs through the service

chain but is still lacking expertise in some areas of the offshore wind farm chain such as providing good marine services.

- Port of Oostende has a tradition in working with the textile industry and that they are seeking for this type of cooperation.
- The main environmental impacts of ports are linked to the CO_2 emissions and other air pollutants, noise pollution as well as waste handling, treatment and disposal. In Belgium project developers have their own waste handling practices that are sometimes conflicting with EU regulation.
- Curtailment due to birds' migration periods is another possible environmental impact having a consequence on the overall annual production of an offshore wind farm.

Working Group on reduction of the maintenance costs by means of innovative lifting solutions

- The discussion focused on the boom-lock system, a technology that results in reduced costs for installation vessels and crews. It ultimately increases the revenues of the projects owner as it reduces the weather downtime for installation to a minimum. Project developers can benefit from producing wind power earlier than initially scheduled.
- Several clarifications with regards to the technology were emphasized such as:
    - The boom lock system is not about increasing the installation speed but about being able to install at higher wind speeds.
    - Despite the fact that High Wind is a consortium of companies GeoSea, SBE, Sarens and the initiative is equally supported by the Flemish Government, the Boom Lock system is available for all turbine manufacturers, contractors and jack-up owners. It was not developed for one company in particular.
    - It also provides safer working conditions during installation as uncontrolled movements are reduced to a minimum.

About LEANWIND

LEANWIND is a 4-year project that started in December 2013. Its primary objective is to provide cost reductions across the offshore wind farm lifecycle and supply chain through the application of lean principles and the development of state of the art technologies and tools.

The leanwind project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No. 614020.