
OPERATION AND MAINTENANCE

Purpose: Identification of areas for cooperation on the operation & maintenance (O&M) level which lead to value chain savings. The operation & maintenance list is a value driver to secure that there is a common understanding where Vestas Wind Systems, Siemens Gamesa Renewable Energy and MHI Vestas see the future cost reduction areas.

The O&M list includes transportation, installation, operation, maintenance and decommissioning on both offshore and onshore.

Hot list:

- Installation / transport: Example: Transport taking place before installation is an important parameter for the industry, where tools are defined as installation tools, transportation tools, standardization of interfaces (for example on blades, staircases etc.), modular transport equipment, approvals and certification of all tools; Back-up and installation power: For example, standard generator set. Sea fastening: nacelle, blades, towers, jackets/ monopiles; Resource competences: standardized training of installation and service technicians; Employer's requirements, HSE, time before ready to work, safety equipment in WTG (for example documentation-project of the differences of HSE responsibilities in the different countries).
- O&M standardisation: Example: Common Access systems
Example: Health Safety Environment (HSE) standardisation:
Example: Common anchor point which is the same for all markets, seen from service and test
Example: Common transport, taking place before installation;
Example: Common training and GWO training;
Example: Common HSE, same as under "WTG list";
Example: Digitalisation
- Health Safety Environment related sourcing: Example: could specifications be the same for HSE, same colours, shoes, hats etc?
- De-commissioning: Example: Lifecycle management De-decommissioning documentation, HSE, disposal, materials, CSR, environmental aspects (for example handling of reefs)
Example: Re-cycling in a safe and cost friendly way e.g. blades, foundations, cables etc.
Example: Re-selling and upcycling (Reuse of "old" components)

Not list:

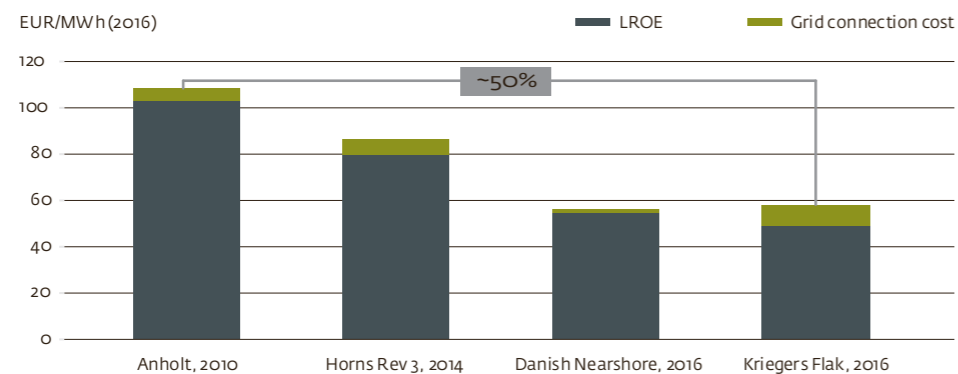
- Scheduled and unscheduled service
- Transport and installation, only when turbines are installed will there be O&M

WHY REDUCE COST IN THE VALUE CHAIN THROUGH STANDARDISATION?



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Estimated LCOE for tendered Danish offshore wind projects



Source: Danish Wind Industry Association

Notes: Projects by auctioning year. LCOE estimated by using LROE as proxy. Levelized revenue of electricity (LROE) = Revenue estimate at final investment decision using winning CfD strike prices, contract duration and a power price assumption. Grid connection cost reflect the levelized cost covered by the TSO outside the scope of the tender

Only one decade ago the wind energy industry saw Levelized Cost of Energy (LCoE) of above 100 EUR/MWh. Since then the cost reduction journey has only been going one way and that is down. Today's LCoE is in an area below 60 EUR/MWh – a drop of approximately 50% (as shown in the figure). The world has also seen its first subsidy free project bids approved in auctions for 2023 and onwards.

The industry needs to find common ground on where the next cost reductions are found and how to get there. This calls for communication, coordination and collaboration between all stakeholders in the industry- utilities, Original Equipment Manufacturers (OEM's), suppliers and research institutions.

Cost reductions are a joined effort and results are found in collaboration.

Vestas Wind Systems, Siemens Gamesa Renewable Energy and MHI Vestas have taken up the challenge to list areas with potential for further cost reduction on components and system level as well as defining the areas which respectfully is “core” and “non-core” within technologies and sourcing.

The cost reduction areas are listed in the following two lists:

- Wind Turbine Generator list
- Operation & Maintenance list

The table provide a “hot” list that should be seen as guidelines for future research, development and/or demonstration (cost reduction) projects both within onshore and offshore. Any such project could be initiated either through Energy Innovation Cluster (EIC)¹, as projects directly between supplier and OEM or between other collaboration consortiums. The “not list” are describing where the OEM's do not see a common area for cooperation.

Megavind invites anyone to challenge the lists with further ideas.

We recommend that companies and knowledge institutions use the LCoE calculator (developed by Megavind) to quantify the saving. Other models will lead to wrong comparisons and different baselines.

1) The previous Offshoreenergy.dk

WIND TURBINE GENERATOR INCLUDING BALANCE OF PLANT

Purpose: Identification of areas for cooperation on Wind Turbine and Balance of Plant-level which lead to value chain savings. Below list on topics withing Wind Turbine Generator and Balance of Plant is a value driver to secure that there is a common understanding where Vestas Wind Systems, Siemens Gamesa Renewable Energy and MHI Vestas see cost reduction potentials.

Hot list:

- Common Foundation interface
- Common Boat Landing system
- Common Local Sourcing: Example: Common local infrastructure/facilities
- Casted Components: Example: Could specifications be the same for casted components and/or service treatments, machining and quality inspection procedures?
- Tower welding: Example: could specifications be the same for weldings?
- Common Steel sourcing and Flange sourcing
- 33/66kV: Example: Common specifications on 66kV cable production
Example: Simplification of 66/72,5kV switchgear for turbine and substation
- Tower diameter
production capability: Example: Common tower diameter
Example: Common view on capability demand requirements for supplier and to the extent short listing of suppliers for investments
Example: Logistic setup at suppliers and common tools for transport
Example: Maximum weight for tower sections seen from a transport point of view (internal as external)
Example: Tower internals - anchor points, lifts, light, latter, HSE interfaces, Communications solutions, Radio communication for installation (boat, turbine and land), Lidar specifications, cables
- Foundation design: Example: Common foundation design
Example: Common Crew Transfer Vessel and boat access
- Array Cable: Example: Common solution for array cable solution
Example: Common test standards
- Substation: Example: Common Substation
Example: Common universal High Voltage DC (HVDC) concept
Example: Electrical infra structure simplification

Not list:

- Blades
- Hub
- Nacelle
- Controls and controller software
- Installation above tower top flange

