Fred. Olsen Windbase®

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Background for Fred. Olsen Windbase

- Offshore wind must increase health and safety
- The offshore wind market must reduce operational costs
- Focus on minimising lost income caused by turbine downtime requires higher accessibility of the turbines and more working hours per year per wind farm
- Focus on reduced OPEX
- HeliPort complement SOVs and Fred. Olsen Windbase operations
- Phased Fred. Olsen Windbase rollout
- Project scope of supply can vary to reduce CAPEX costs

Flexible Solutions – Easy to Install and Removable – Utilising Well Known Technology
Projects Greater than 90 minutes from shore

- 64 (47%) of the projects that are suitable for Universal Foundation are located more than 90 minutes from shore (at speeds between 23 – 30 knots).
- 84% of these projects are located in Germany.
- Of the 7 countries included in the research, only 3 have wind farms that are further than 90 minutes from shore.
- 12 of the 64 projects have been granted consent.
  - 8 in Germany
  - 3 in the United Kingdom
  - 1 in the Netherlands

Projects with Suitable Travel Time by Country
Discuss the Competition and Trends

Dan Tysk

Horns Rev

Global Tech I

Gemini

Race Bank

Bard 1
Fred. Olsen Windbase Concept

Question: If your project is under 90 mins from shore what vessels would you use?

We bring the project to the O&M base!

New projects over 90 mins from the O&M base have limited vessel options today

Or we bring the O&M base to the project!

Now Fred. Olsen Windbase allows proven access systems to be used far from shore
Fred. Olsen Windbase…creates opportunity

SOVs or converted PSVs with a walk to work system (W2W)

- Pros – Sea keeping and accessibility to WTG using W2W
- Cons – Distribution of failures over a large area and teams waiting to disembark

Helicopters

- Pros – Fast to outlying failures with great weather windows
- Cons – Expensive to operate and requires offshore refuelling

Large CTVs

- Pros – Proven, fast, affordable, can stay offshore, distributed teams
- Cons – Sea keeping, accommodation, transferring

Today wind farms use CTVs to transfer thousands of technicians. CTVs have been discounted due to the distance from shore. Fred. Olsen Windbase reopens there use today providing a place to work from offshore and to provide accommodation.
Fred. Olsen HeliPort

HeliPort is a standalone facility targeting projects where an SOV decision has been taken and can be the first phase of a long term plan to introduce a full Fred. Olsen Windbase

Fred. Olsen Windbase to support SOV = Heliport

HeliPort
- Refuelling helicopter inside wind farm
- Delivery of personnel and ad hoc spares to an offshore Fred. Olsen Windbase or SOV
- Supports SOV operations in poor weather
- SOV landing platforms for W2W
- Powered by the wind farm with back up generators
- Boat landings for CTV access
Flexible and Scaleable

Step 1: Fred. Olsen HeliPort

Step 2: Fred. Olsen Windbase

Step 2: Fred. Olsen Windbase with OSS
<table>
<thead>
<tr>
<th>Item</th>
<th>Info</th>
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<tbody>
<tr>
<td>Scope of supply (base case)</td>
<td>Fred. Olsen Windbase includes a service base, large crane and Heliport. Fred. Olsen Windbase crew, employer provides power from substation, fuel for CTV and generators, WTG manpower and PPE, hard wired data connection, resupply vessel, helicopter and spares/tools required for WTG</td>
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<tr>
<td>Service strategy</td>
<td>Year round unscheduled maintenance with ramp up in summer with the addition of manpower and additional vessels</td>
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<tr>
<td>Vessel launches from service base</td>
<td>8 per day</td>
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<tr>
<td>Working hours per day (technicians)</td>
<td>15 hours staggered through day</td>
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<tr>
<td>Helicopter hours per year</td>
<td>600hrs per year approx. EC135 type</td>
</tr>
<tr>
<td>Tech rotation method</td>
<td>Manpower S92 helicopter, CTVs work 24/7 and resupply Fred. Olsen Windbase from shore</td>
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<tr>
<td>Onshore operations</td>
<td>Reporting, material management, accounting and HR</td>
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<tr>
<td>Offshore operations conducted 24hr per day</td>
<td>30 x WTG technicians</td>
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<td></td>
<td>30 x WTG technicians in summer</td>
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<tr>
<td></td>
<td>15 x Fred. Olsen Windbase Crew (Including management team)</td>
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<td></td>
<td>8 x client management team</td>
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<tr>
<td></td>
<td>90 PAX total</td>
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<tr>
<td>Number of Fred. Olsen Windbase CTV’s</td>
<td>Site specific 3 x 12 PAX (1.8m swh)</td>
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<td>Fred. Olsen Windbase technical availability</td>
<td>Fred. Olsen Windbase will target 99% (no outages)</td>
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Time based availability

5 interventions per year/per WTG

Time based availability

10 interventions per year/per WTG
Summary

- When planning offshore wind farm O&M, the site and logistics must be thoroughly modelled and simulated.
- The number of WTG, the area of the wind farm and the distance from shore are critical to the logistical setup.
- Failures occur randomly across a site. The time to deploy and recover manpower is a key factor in the logistic setup.
- Fred. Olsen Windbase provides localised support to wind farm activities.
- Fred. Olsen Windbase means that CTVs can now be modelled as a solution.
- Logistics will improve and evolve over time, no long term fixed charters.
- Fred. Olsen Windbase reduces the risk of logistics volatility from Oil and Gas.
- Fred. Olsen Windbase is provided on a ‘lease and operate’ model for 15 to 25 years.