Ice-going SOV concept for offshore wind farms completed

Featuring a combination of open-water capabilities and ice strengthening, the ice-going service operation vessel is designed to reliably reach turbines in all prevailing weather conditions, ensuring safe service throughout the year.

Aker Arctic's design team has finalised the concept for the first year-round service operation vessel (SOV) for seasonally freezing seas. The concept design can be tailored to a specific operational area and facilitates wind farms' investment calculations.

The ice-going SOV is designed to reliably reach turbines in all prevailing weather conditions, ensuring safe service throughout the year. Estimating maintenance and investment costs for wind farms in seasonally freezing seas is now easier.

Aker Arctic's proven Double Acting Ship (DAS™) principle combines operational capability in both open water and ice in an efficient design that minimises both construction and operational costs of the vessel. Clarksons Offshore & Renewables Ltd has supported the design work in areas specific to SOVs.

Energy-efficient design

The primary objective was to develop a vessel concept that is as close as possible to an open-water service vessel, but also capable of safe, independent, year-round operations without incurring high additional costs or increased fuel consumption.

According to Chief Designer Lars Lönnberg, employing the DAS™ principle – where the vessel advances bow-first in open water and light ice, and stern-first in heavy ice – has been crucial in creating an energy-efficient design.

"With our experience in designing efficient ice-going hulls, we have developed a stern form that breaks ice without using unnecessary power, thus avoiding excessive fuel usage," adds Project Manager Juuso Lindroos.

The vessel's ice strengthening and ice class are suitable for operations across the entire Baltic Sea, including the Bay of Bothnia, where winter conditions are the most severe. The final ice-going capability will be determined based on the operational conditions in the target area, with the design tailored accordingly.

Maintaining position ensures safety

Dynamic Positioning (DP) and seakeeping have been special focal points, as the vessel must remain stationary when servicing the turbines. A motion-compensated gangway is the safest means of accessing the turbines, and features such as midship location and winterisation have been included.

A passive roll damping system will ensure calm vessel movements in waves, enhancing safety and comfort for the crew.

Internal logistics and material handling on the vessel were thoroughly assessed. To minimise exposure to harsh environmental conditions, such as wind, rain, and the cold, indoor areas are utilised for movement and material transfer as much as possible.

Stepless logistics is part of the solution, allowing forklifts to carry and move service tools and spare parts without obstruction. There is also a lift for gangway access, with stairs as a back-up for safety.

Innovative options

Choices in propulsion and fuel significantly affect energy costs, but also crew well-being. Using a battery-operated electric system reduces noise and engine resonance. A plug-in hybrid system with charging capabilities at the wind farm allows for operations to be powered by batteries day or night.

For longer transfers, engines running on either marine diesel or alternative fuels, such as methanol or ammonia, are essential. Optional space has been allocated for the larger fuel tanks necessary for alternative fuels.

A retractable thruster, quieter than fixed tunnel thrusters, is also part of the low-noise solution. Furthermore, cabins are located high in the superstructure to reduce noise from ice interaction.

Estimates of costs

Maintaining reasonable construction costs has been a significant focus.

"The vessel is not an icebreaker, but tailored for independent operations and optimised for the area it will serve, ensuring that both construction and operational costs remain controlled," Lönnberg highlights.

Lindroos adds that preliminary estimates suggest the construction cost is about 5–10 % higher than a similar-sized open-water vessel. This increase accounts for additional steel weight, propulsion power, and winterisation.

"The hull form, the DAS™ principle, and other innovative solutions play a significant role in keeping the price down," says Lindroos.

Prioritising staff well-being

An SOV can remain at the wind farm up to a month before returning to shore for supplies. The crew works in multiple shifts and is rotated back to the mainland every two weeks using smaller vessels. In winter, the frequency of harbour

calls may increase due to the ice conditions.

"The vessel is essentially a second home for the staff and should be comfortable both during their shifts and their downtime," explains Lindroos.

In addition to other amenities, a sauna and gym area with unobstructed sea views have been included on the top deck, along with an outdoor terrace furnished with an optional hot tub.

Support for investments

Aker Arctic's expertise in ice operations and dynamic ice fields, combined with the specialised requirements of service operation vessels has resulted in a highly successful concept design. This design has been showcased at trade fairs and has attracted considerable interest.

"Wind turbines out of service can lead to financial losses of up to tens of thousands of euros and power grid imbalances," emphasises Lönnberg.

"Therefore, a service operation vessel capable of operating in all weather conditions and throughout all seasons is essential to support investments in wind energy in seasonally freezing regions," he adds.

Technical details

Length:	84.4 m
Beam:	19.2 m
Draft:	5.2 m
Warehouse:	400 m^2
Working Deck:	300 m^2
Gangway:	16–22 m LAT (height about 25 m)
Boat landing:	yes
Daughter craft:	yes
Cabins:	70
Sauna:	with sea view