Department for Energy Security & Net Zero

NET ZERO INNOVATION PORTFOLIO

SENSEWind Ltd

Innovative technologies to reduce the cost of floating offshore wind

CARBON TRUST

OFFSHORE WIND

Project Lead: SENSEWind Ltd

Partners: Glosten, Houlder, CREADIS, Geodis, ORE Catapult, Xodus, Green Marine, GMC, Reflex Marine

NZIP Grant:

8,100,000

SENSEwind

GREEN MARINE

Glosten PELASTAR

HOULDER

GEODIS

XODUS

GMC

CATAPULT Offshore Renewable Energy

CREADIS

reflexmarine

Innovation overview

The SENSE wind turbine installation and service system is being designed as a series of tools to install and service large onshore and offshore wind turbines using existing cranes and crane vessels. A project using SENSE will have no need for advanced contracting of rare installation equipment, instead will have access to suitable cranes which are readily available at competitive prices.

At the heart of the system is SENSE Lift which engages with rails on the base section of a SENSE Tower to enable subsequent tower sections and then the Rotor Nacelle Assembly to be installed under automated control (to any hub height). When major components need to be replaced, SENSE Lift can be used in reverse to lower the RNA and undertake the work or exchange the complete RNA.

O&M platforms can be attached to the SENSE Tower rails for smaller component replacement, close manual inspections and repairs of blades and tower corrosion protection.

Early in the project, Glosten Pelastar designed versions of their TLP floater with SENSE integrated at 2MW and 12MW scale. Once it became clear the test site location at Kincardine Windfarm could not be made available, the SENSE demonstration was moved to an onshore test site. SENSEWind remains in discussion with floating foundation developers to collaborate in a future SENSE integrated floating foundation, now considered a viable alternative to 'tow back to shore' for turbine major component replacement on floating wind.

Potential benefit to the industry

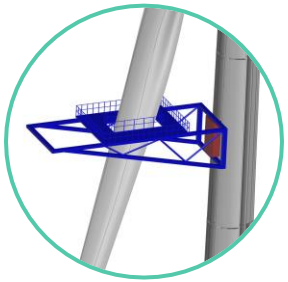
Integration of the SENSE system with floating foundations and novel anchoring systems facilitates the efficient construction and deployment of floating wind projects from UK ports. It also provides the means to undertake major maintenance offshore without the need for 'tow back to port'. SENSE delivers significant cost reductions at all stages of a project, helping to improve the commercial viability of floating wind for the UK and global markets.

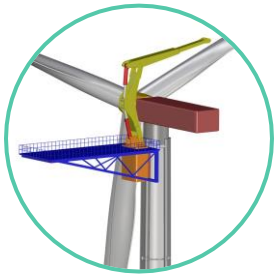
For floating wind, SENSE delivers a 9% reduction in LCoE as well as significant reductions in project risk.

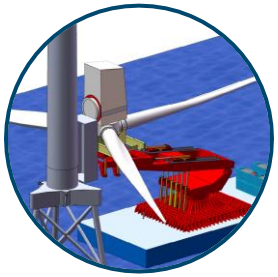
"The problem of how to install and service ever larger, and increasingly remote wind turbines has been looming for some while and is now firmly with us. SENSEWind anticipated this situation over 10 years ago and is now ready to show how the SENSE System solves this problem, significantly reducing project risk and costs, transforming the way large turbines are installed and maintained, regardless of size, hub height or how far offshore. "

Patrick Geraets

CEO at SENSEWind







Results

SENSE demonstrator to install a Vestas V80 turbine

All design work for the SENSE 2 MW scale system has been completed (except for some secondary items) and manufacturing is in progress.

The lower carriage of SENSE Lift has been completed and has been Proof Load tested to demonstrate its safe function. One section of the tower is complete and ready for painting. The V80 turbine has been fully inspected; modifications required are minimal, and work will commence to suit the installation programme.

SENSEWind has a test site at Tormywheel wind farm in Scotland with two locations to install and operate the 2 MW and later a 6-8 MW commercial SENSE System (the follow on project). Because of the grid connection cost and a delay to 2026 on this site, an alternative test site in Denmark has been identified for the 2MW SENSE System test. This will allow completion of the project in 2025 (the Tormywheel test site remains available for the follow on 6-8 MW project in 2027/28).

What happens next?

Following completion of the 2MW SENSE demonstrator, SENSEWind plans to scale the technology, first to a 6-8MW scale commercial onshore product, next prove the design at 15 MW scale for fixed bottom offshore (using similar concepts developed for onshore) and then to 20 MW+ scale for floating offshore wind projects.

SENSE is turbine technology agnostic and can, in principle be used to install turbines from all manufacturers, both geared and direct drive. Involvement of a wind turbine OEM is essential as the system is scaled up.

Components for the V80 demonstrator

Completed Tower: *Midsection*

V80 RNA: *Undergoing modifications*

RNA carriage lower clamp assembly: *Function and load testing*

Development programme to an offshore floating SENSE System

2MW onshore demonstrator

Design, manufacture, install and operate a turbine using SENSE.

Location: Tormywheel Wind Farm, Scotland

Timing: Q4 2025

6-8MW onshore commercial platform

Commercial prototype ready for onshore market entry.

Location: Tormywheel Wind Farm, Scotland

Timing: Q1 2027

10-15MW fixed bottom commercial platform

Adapt SENSE and scale up for offshore use.

Location: TBD

Timing: Q1 2029

20MW+ offshore floating design

Design a SENSE system for full integration with a floating foundation.

Location: TBD

Timing: 2030

The Floating Offshore Wind (FOW) Demonstration Programme is a competitive funding initiative supporting the development of floating offshore wind technologies. Through the scheme, the government awarded £31.6 million in grants to 11 projects across five challenge areas: dynamic cables, anchorings and moorings, floaters and foundations, industry-defined innovation, and integrated demonstration of multiple technologies. These projects aim to showcase innovative technologies to reduce costs and accelerate the deployment of floating offshore wind turbines.

Contact information

Name: Patrick Geraets

Email: PGeraets@sensewind.com

www.sensewind.com

Funded by:

Department for Energy Security & Net Zero

Supported by:

CARBON TRUST | OFFSHORE WIND