

Cryogenic Technology **SUPERCOOLER** for Superconducting Wind Turbines



Applications

- Offshore Wind Turbines
- Rotating Electric Machines
- Fault Current Limiters

Benefits

- Lo-Risk Superconducting Wind Turbine Launch
- 25% Cut in Offshore Wind Power Generation Cost

Status

- Concept Phase
- 3-Year Development Plan
- Prototype & Proving
- Production for 'Round 3'

Contact

- John Vandore at Cryox



Incorporating the latest superconductors in wind turbine generators makes them smaller, lighter and more efficient, with an overall reduction of 25% in the cost of offshore wind power generation - provided they are kept cold (at around 35K, approximately -230°C). Cryocooler development has been driven by other applications such as superconducting magnets for laboratories and MRI scanners. Offshore operating environments combined with the lifetime requirements & maintenance regimes of electric utility owners present new technical challenges.

Cryox is in a special position to meet this new demand by virtue of its exclusive access to cryogenic technology from the STFC Research Council - whose Rutherford Appleton Laboratory near Oxford has a world-leading grip on long-life cryocooler technology developed originally for applications in space. Development of the SuperCooler for large superconducting wind turbines is due to commence this year, with a three-year programme of design, prototype manufacture and proving tests to follow the initial concept evaluation. Production availability of the new SuperCooler is planned in time to catch the rapid growth in offshore wind power projected with Round 3 of the Crown Estate developments.

Unlike technology for the hydrocarbons industry, cryogenic engineering is not widely codified, and material properties at cryogenic temperatures are not readily available. Cryox can provide access to data, to test facilities, and to exceptionally high calibre expertise. If engineering code is ever written for cryogenics, the STFC experts could write it - they are a source of sound guidance, backed by experience and testing, on features from thermal links to high performance super-insulation.

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appendix 1

Industry Structure



OFFSHORE WIND TURBINE BUILDERS CONSIDERING UK MANUFACTURE

Clipper

Mitsubishi

Siemens

GE

Darwind

OEM GENERATOR BUILDERS

Converteam
The Switch
Indar Electric

CRYOCOOLER SUPPLIERS

Sumitomo Cryogenics
Brooks Automation
Cryomech
Oxford Instruments Vericold
Qdrive
Stirling Cryogenics
Sunpower
Thales Cryogenics

SUPERCONDUCTOR SUPPLIERS

American Superconductor
Bruker
Chubu Electric
Columbus Superconductor
Fujikura
Furukawa
Metal Oxide Technologies
Nexans
Showa Electric
Sumitomo Electric
SuNam
Superconductor Technologies
SuperPower
Theva
Zenerav

"...this generator, employing HTS technology, will have a 66% reduced size and 75% reduced mass compared to conventional systems of similar production capacity. Other benefits are high productivity, less maintenance expenditure and better cost economy in operation"

Zenerav Power Inc

