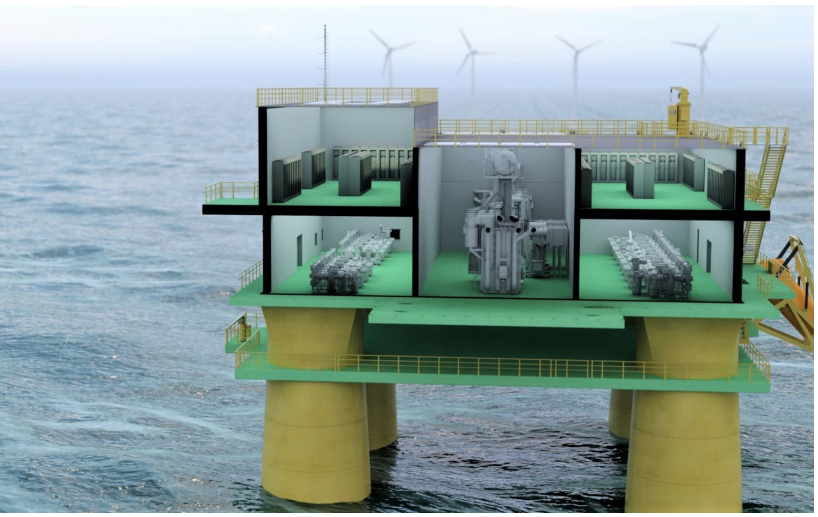
HITACHI
Inspire the Next

TRANSFORMERS

# Transformers for floating applications

## Floating offshore substations and wind turbines



Floating substations and wind turbines are a rapidly emerging solution, for deep waters. Introducing even greater challenges for the already demanding offshore segment.

With a full offshore wind transformer portfolio, now enabled for floating, we are the partner of choice, from the nacelle to the connection point.

**Offshore wind generation**
Since the first commercial projects in the early 1990s, offshore wind electricity generation has grown enormously.

Yet building offshore has great challenges beyond the harsh salt-water environment, and only a small fraction of the full potential has been exploited, as many offshore areas do not have a suitable seabed and beyond 60-meter depths are not feasible for fixed structures.

**The floating solution**
Floating substations and floating wind turbines offer a solution.

These structures can be used in deep waters, vastly increasing the available global capacity for developing offshore wind energy.

Yet floating systems come with their own challenges. Floating structures are constantly in motion, exposed to vibrations and shocks from waves up to 15 meters in height; 365 days a year, for their whole lifetime.

**Enabling power transmission**
Transformers and shunt reactors are key the transmission of electricity generated in offshore windfarms and Hitachi ABB Power Grids now has a complete and qualified range of this equipment for floating applications.

Using our world leading experience and in partnership with the forefront floating offshore developers, these products brings together:

- Deep understanding of grid requirements
- Lightweight and modular design
- Specially designed:
    - Active part
    - Tank
    - Tap changers
    - Accessories
    - External components

Hitachi Energy

**Technical data**

| | Wind turbine transformers (33 kV) | Wind turbine transformers (66 kV) | Collector step-up transformer | Shunt reactor (Variable Shunt / Fixed Shunt) | Earthing transformer |
|---|---|---|---|---|---|
| **High voltage** | 36 kV | 72.5 kV | < 275 kV | < 275 kV | 33 or 66 kV |
| **Low voltage** | > 400 V | > 400 V | 33 or 66 kV | N/A | > 400 V |
| **Rated power** | > 5 MVA | > 8 MVA | > 100 MVA | > 30 MVAar | |
| **Cooling** | KFWF | KFWF | ONAN or KNAN | ONAN or KNAN | ONAN or KNAN |
| **Insulation fluid** | Ester | Ester | | | |
| **Insulation material** | High temp class | High temp class | | | |
| **Tapping range** | +/- 2x2.5% | +/- 2x2.5% | | | |
| **Frequency** | 50 or 60 Hz | 50 or 60 Hz | 50 or 60 Hz | 50 or 60 Hz | 50 or 60 Hz |
| **Standards** | IEC/IEEE or other technical standards | IEC/IEEE or other technical standards | IEC/IEEE or other technical standards | IEC/IEEE or other technical standards | IEC/IEEE or other technical standards |