The PelaStar™ Tension Leg Platform (TLP) deep-water wind turbine foundation represents the next generation of offshore wind technology. In the innovative PelaStar system, mature technologies such as tension-leg platforms (TLPs), offshore utility-scale wind turbines, and high-vertical-load anchors form an integrated, lowest-cost solution to deep water offshore wind farm developments.

PelaStar Offers:

- A stable platform with minimal motions for a foundation that is ideal for existing and future wind turbines.

- A wind turbine foundation that enables economical wind farm developments in deep offshore sites with high wind speeds, previously thought to be “un-developable”.

- Quayside turbine assembly with no offshore lifting which reduces risk and cost.

- Cost-competition with bottom-fixed turbine foundations in water depths 60 meters and greater.

- Steel structure designed for typical shipyard fabrication methods.

- Certified design with a 25-year design and fatigue life.

- Basic design that adapts to a wide range of turbine sizes, water depths, and environmental conditions.

- Tendon system using synthetic fiber cables and high vertical load anchors.

- High production assembly design with a minimum-cost installation methodology.

Each PelaStar turbine foundation will have a fully-erected and pre-commissioned wind turbine installed while floating at its staging site. The assembled unit will be towed to the site and installed, using an installation barge, eliminating costly jack-up crane vessels.
The *PelaStar* foundation system is comprised of several main components:

- **Upper Column.** Rolled steel with internal decks and upper flange for mating to the turbine tower.
- **Lower Hull.** Steel, subdivided with watertight bulkheads.
- **Arms.** Flat plate with internal stiffeners. Five (5) arms provide redundancy avoiding any single-point failure.
- **Tendons.** Fiber rope tendons are easily deployed, and connect the hull to the anchors.
- ** Anchors.** Standard high-vertical-load anchors are set in the seabed.

**Supported by Glosten Engineering Expertise and in-house Tools:**

- Optimization software can minimize cost for a given water depth and metocean conditions.
- Fully coupled, 6-DOF, non-linear, time domain analysis for parked conditions.
- Aero-hydro-servo-elastic, 6-DOF time domain for operating conditions.

**Acknowledgement**

The *PelaStar* TLP was conceived by The Glosten Associates, Inc., as the Tension Leg Turbine Platform (TLTP) in 2006. In July 2009, the TLTP was selected for fully-funded feasibility development by the Carbon Trust Offshore Wind Accelerator Program. In 2011, Glosten was awarded a grant by the US Department of Energy to advance *PelaStar* technical development with focus on reducing the cost of offshore wind energy. In 2012, the UK’s Energy Technologies Institute (ETI) awarded funding for Glosten to perform a FEED study for a full-scale 6MW *PelaStar* demonstration turbine. The design is now “demonstrator ready”.

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