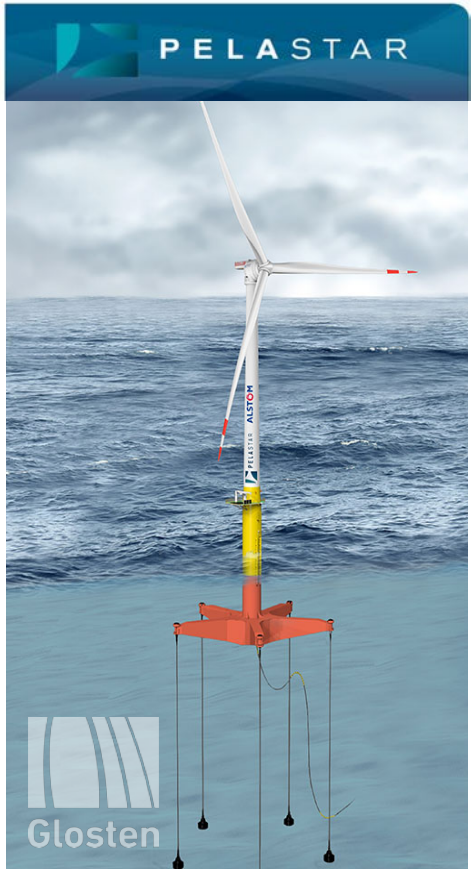


poet
PACIFIC OCEAN ENERGY TRUST

OCEAN RENEWABLE ENERGY CONFERENCE

SEPTEMBER 19, 2018

PELASTAR TLP TECHNOLOGY UPDATE

GLOSTEN INTRODUCTION

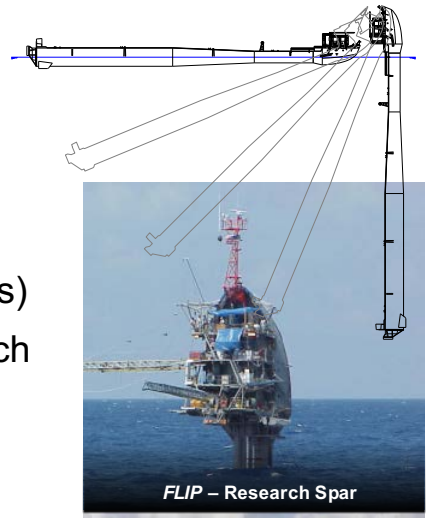
Summary:

- Established 1958
- 100 Employees
- Offices in Seattle, Boston, and New Bedford
- Naval Architecture, Marine Engineering and Ocean Engineering

Complete Vessel and Platform Design: Concept to Production Detailing

Business Sectors:

- Marine Construction
- Marine Energy (Oil & Gas)
- Oceanographic Research Vessels
- Ferries
- Aerospace and Special Projects
- Marine Renewable Energy and ***PelaStar***




MV *Delta Mariner* – Delta IV Transport


Lake Coeur d'Alene - Floating Golf Green


Olmsted Lock Construction – Heavy Lift Platform

PELASTAR TECHNOLOGY OVERVIEW

- PelaStar is the most technically-advanced FOWT TLP
- Centralized buoyancy, 5-arm, synthetic tendon design is optimal, cost-effective, and robust
- Received more 3rd party review than any other TLP concept
- Lowest utility scale cost of energy among all floating solutions
- Full-scale technology demonstration is our next step

Engineered for optimized deep-water commercial cost of energy

ADVANCED TENDON TECHNOLOGY

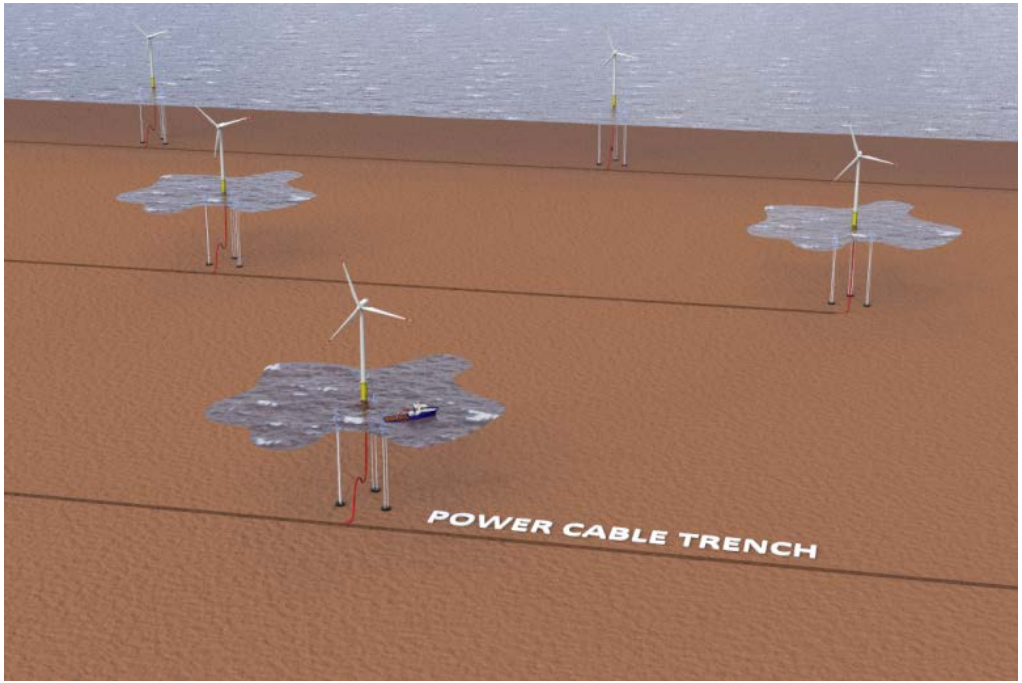
Synthetic Cable Tendons solve many of the traditional TLP mooring and installation challenges

- Minimize need to adjust tendon tensions to balance uneven loads at installation.
- Neutral buoyancy reduces overall system mass
- Tolerate slack-line events in extreme conditions.

MOORING AND ANCHORING

***PelaStar* TLP**

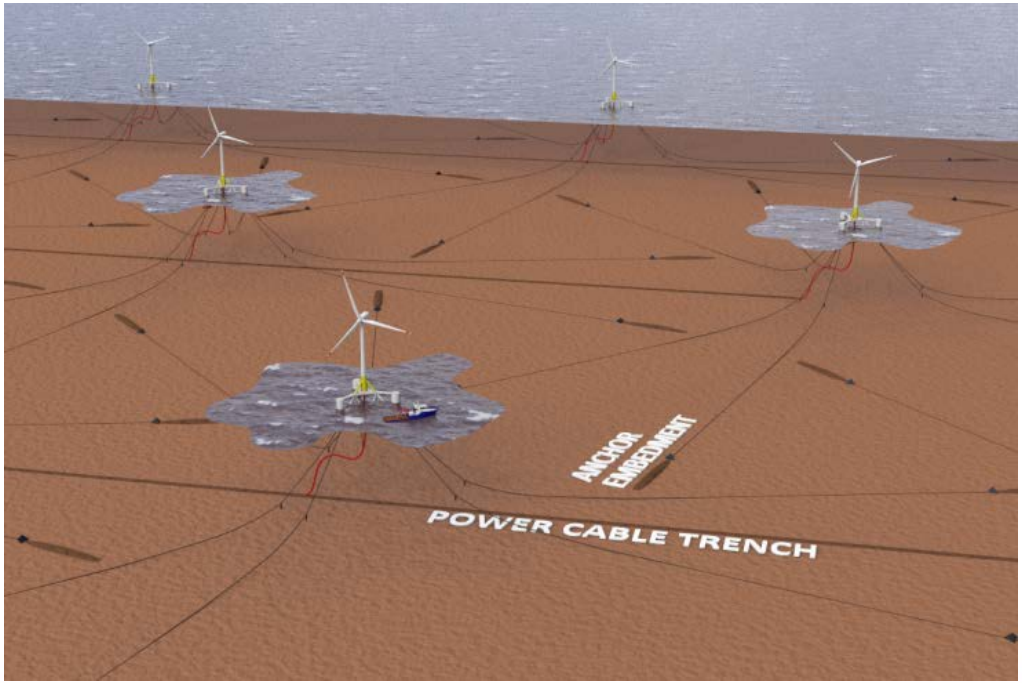
- Vertical Tendons
- Compact footprint
- Minimal impact on benthic ecology
- Minimal impact on fishing



MOORING AND ANCHORING

Catenary Spread Moorings

- Extensive footprint
- Significant seabed impact



ETI DEMO PROJECT FEED STUDY TEAM

Glosten

Engineering, Integration, Cost and Management

ALSTOM

The Alstom Haliade 150, 6MW turbine is the first turbine to be integrated with the PelaStar foundation

res

Operations and Maintenance (O&M)

LBD KML

Anchor Fab and Installation

Shipyard/ Fabricator

Various – to suit supply chain requirements

Tendon Fibre Technology

DSM

Tendon Fabricator

FIBREMax

Turbine Assembly and Platform Installation

GeoSea
Geotechnical & Offshore Solutions

Project Certification

DNV·GL

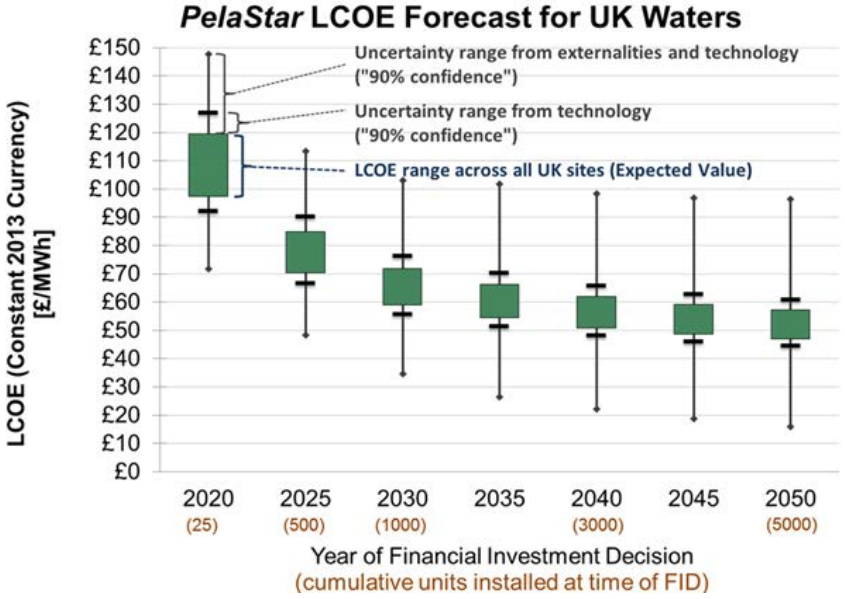
THE TECHNOLOGY SOLUTION

- TRL 5: Engineering-intensive FEED-level design with 6.0 MW turbine
- DNV GL approved Basis of Design and has reviewed the FEED-level design.
- 1:50 scale model tests performed with software validation reviewed and studied by DNV GL. Results co-published with DNV GL.
- Program total of USD 12 mil
  - USD 9 mil in engineering hours.

PELASTAR COST

Optimized for low commercial LCOE: PelaStar has the lowest primary steel weight for material and construction costs.

- Full cost analysis is available
- Recent reductions in bottom-fixed costs will transfer to floating wind and lower the floating wind baseline cost estimates further



2015 forecast – Updates will reflect current industry progress and wind farm development timescales.`

TECHNOLOGY DEVELOPMENT PARTERNS

Turbine Controls

GE

NREL

Tendon Technology

DSM

FIBREMax

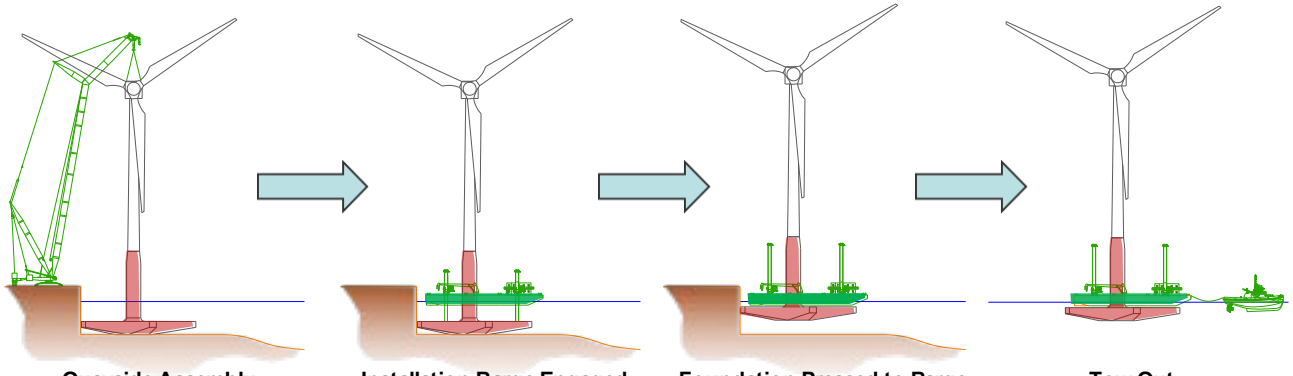
Coupled Analysis

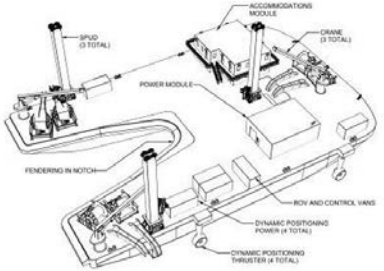
DNV·GL

NREL

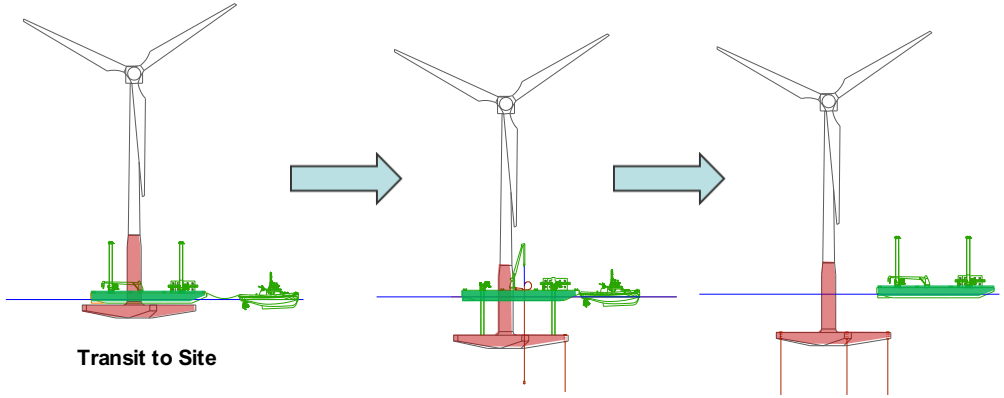
INDUSTRIALIZED INSTALLATION METHOD

UK Patent Awarded – US Patent Imminent





PelaStar Support Barge



Long-term utility-scale installation and deployment method utilizes a dedicated installation barge.

NEW CLASS OF INSTALLATION VESSELS

- DEME/GeoSea *ORION*
  - 3,000mt lift at 50m reach
  - 1,500mt lift on aux hook with 800mt heave compensation and 170m hook height
- Designed to transport and install next gen turbines
- Deep water floating lifts with no jack-up legs

LOADOUT: TURBINE/TOWER AND FOUNDATION

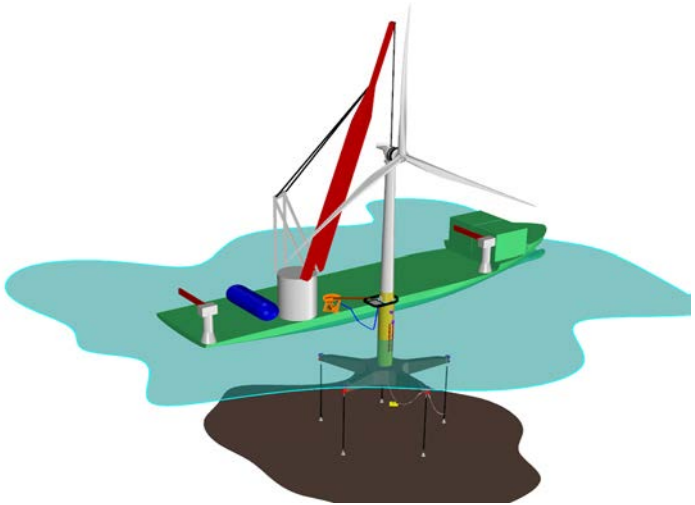
- Tow Foundation from fab yard to assembly site
- Bottom tower segment installed on Foundation with turbine equipment and pre-Commissioned
- Quayside assembly of turbine and blades on upper tower segments
- Orion lifts Turbine Assembly and Foundation onboard
- Transit to Site

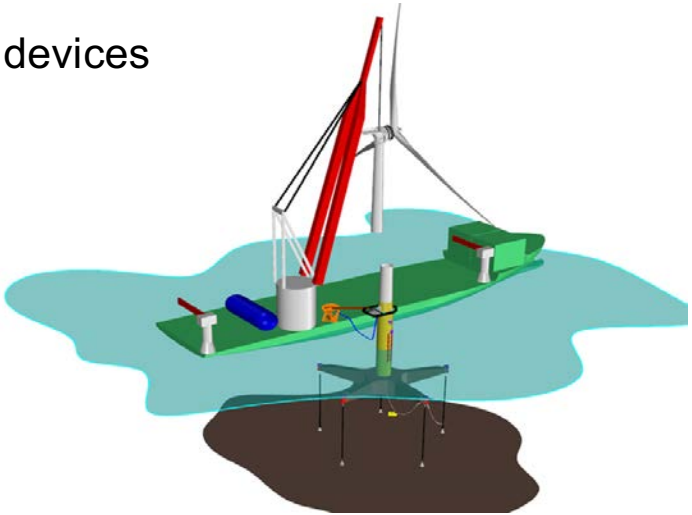
INSTALL FOUNDATION

- Foundation ballasted and lowered to tendon installation draft
- Tendons connected
- De-ballasted After Tendons Connected
- Tendon tensions verified
- Crane hook released
- Cleared Safe for boarding

INSTALL TURBINE / UPPER TOWER

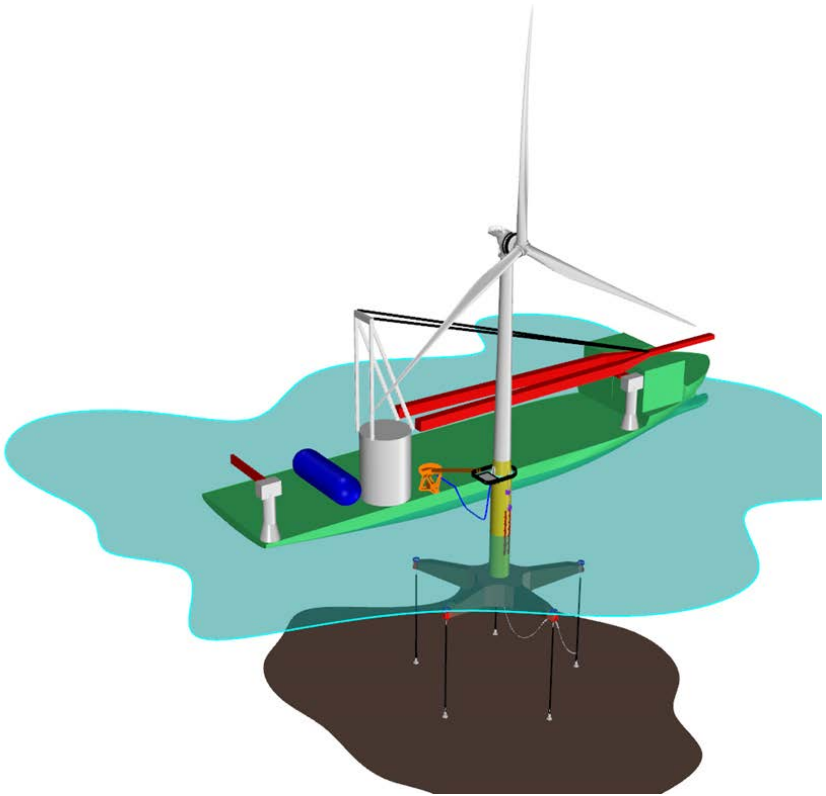
- Pick Weight: 700 MT, with Heave Compensation
- Secure at Connection Joint with temporary latching devices
- Release Crane Hook





COMPLETE INSTALLATION

- Complete permanent connection between the tower and Foundation
- Orion leaves: Estimated time on site: ~24hrs
- Final Commissioning and startup completed by wind farm support vessel



PELASTAR: 6 MW, 12MW

	12MW	6MW
Min Water Depth:	100m	60m
Rotor Dia:	220m	150m
Hub Height abv. LAT:	137m	108m
Tower Wt:	1,350mt	450mt
Column Diameter	10.5m	7m

Glosten

The PelaStar Team:

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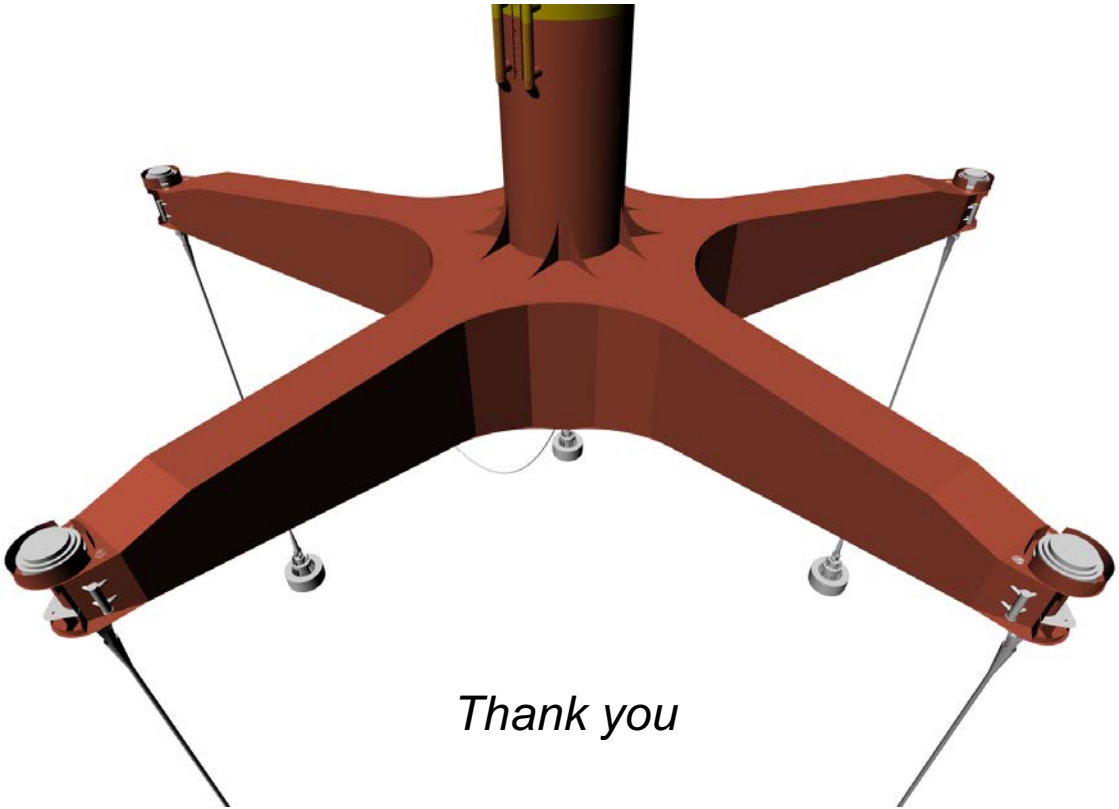

Thank you