

# WindFloat: Ready for Commercial Deployment on the US West Coast.



POET Conference in Portland, OR  
September 2018



# Introduction to Principle Power

Global  
Presence

Founded in 2007  
> 50 employees - Offices in California, FR, and PT

Strong  
Backing

## Shareholders



## Partners



A Proven  
Technology

**Successful 5-year Full Life-Cycle Demonstration**  
2MW Vestas, Identical Performance to Fixed Foundation  
17GWh, Produced in 12m waves; Survived 17m waves

Project  
Pipeline

**3 Precommercial Projects** in Progress  
**Commercial Developments** in Europe, USA, Asia

Our Vision:

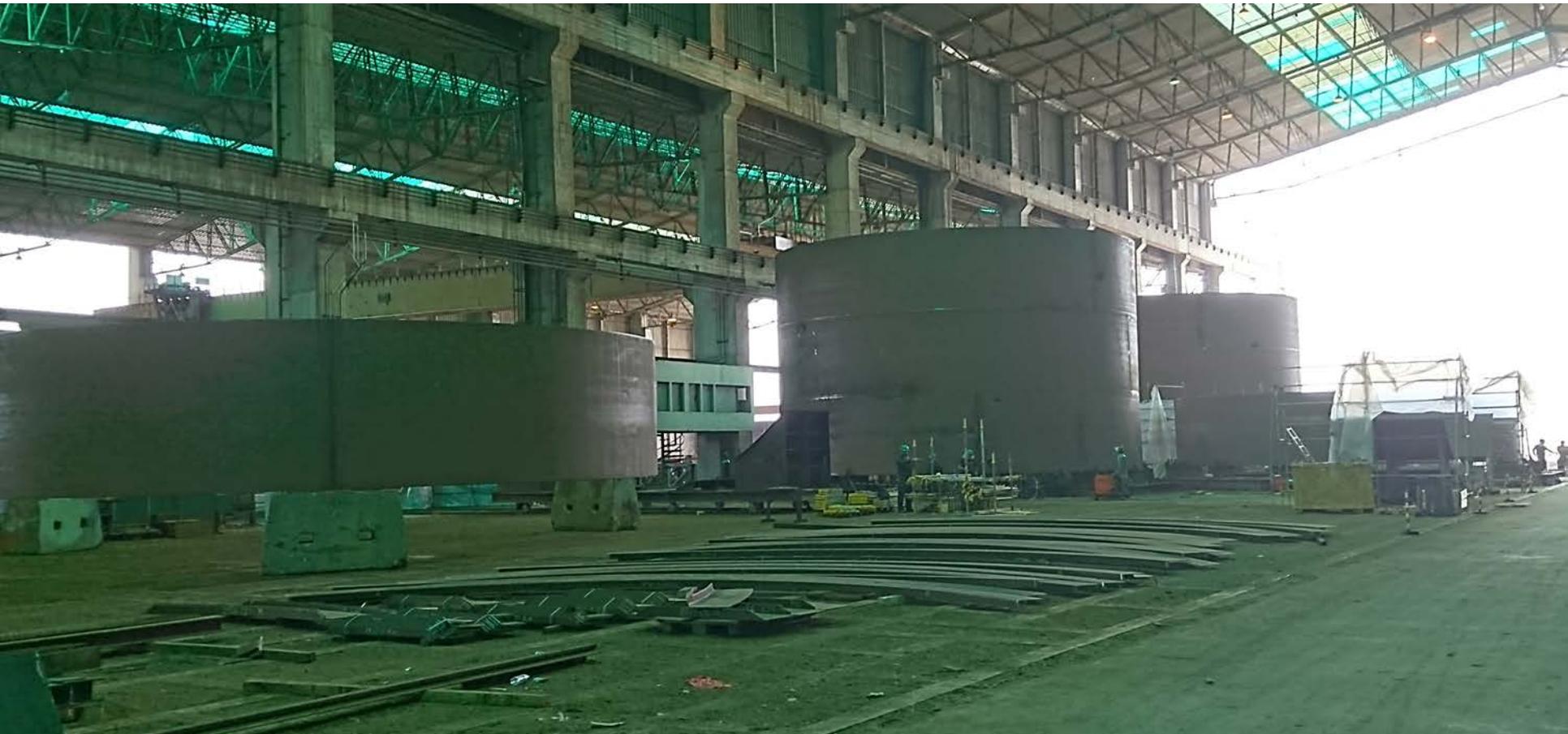
Be the global leader in deep water wind technology

Our Mission:

To make the WindFloat the most competitive, safe, reliable and environmentally friendly floating technology and unlock GWs of global renewable energy potential



# WindFloat Atlantic under construction: fabricating columns for 8MW+ turbine foundation



# First retrofit of a floating wind turbine (WF1) in Scotland



MARITIME &  
OFFSHORE  
COMMUNICATION  
PARTNER

DOCK  
90

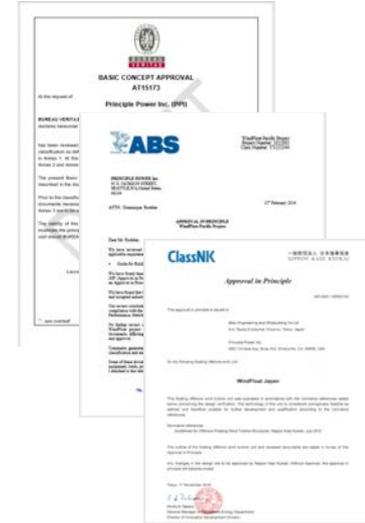
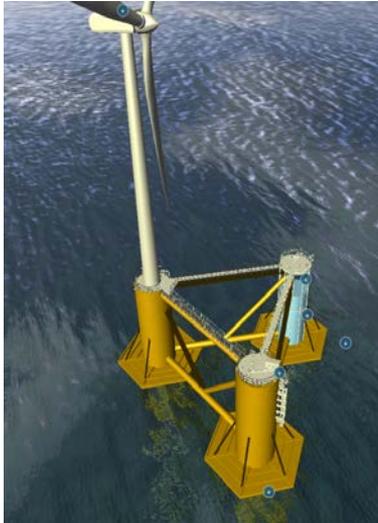


# WindFloat Technology Presentation



- **Relies on Existing Oil&Gas and Wind Energy Expertise**
  - 3 column Semi-Submersible Type
  - Turbine-Agnostic (latest: Vestas V164 8.3MW)
  - Shallow draft / Inherently stable in transit
  - Quayside Final Assembly and Commissioning
  - Low pre-tension conventional mooring system
- **Approval from Class Societies: ABS, BV, Class NK**

Project	Turbine OEM	Turbine Model	Power	Diameter	Status
WF1 prototype	<b>Vestas</b>	V80	2MW	80m	Decommissioned and Sold to another Project
WindFloat Atlantic	<b>MV</b> Mitsubishi Heavy Industries	V164	8.3MW	164m	Approved for Construction (Finalizing)
France / Golfe du Lion	<b>GE</b>	Haliade 150-6MW	6MW	150m	Engineering
France / Golfe du Lion	<b>Adwen</b>	AD 8-180	8MW	180m	preFEED
WindFloat Pacific	<b>SIEMENS</b>	SWT6.0-154	6MW	154m	FEED
WindFloat Pacific	<b>Vestas</b>	V164	8MW	164m	FEED
NEDO project	<b>HITACHI</b>	HTW5.0-126	5MW	126m	FEED
NEDO project	<b>SENVION</b> wind energy solutions	6.2M 152	6.2MW	152m	FEED



# WindFloat Technology Status

## TRL 8

### 5-Year Full Life Cycle Demonstration 2011-2016

- Vestas V80 2MW performed as well as on a Fixed Foundation
- Operation up to 1-year Return Period Storm Conditions
- Endured intense storms: 55' waves, 60 knot winds
- Incorporated lessons to improve next generation of technology

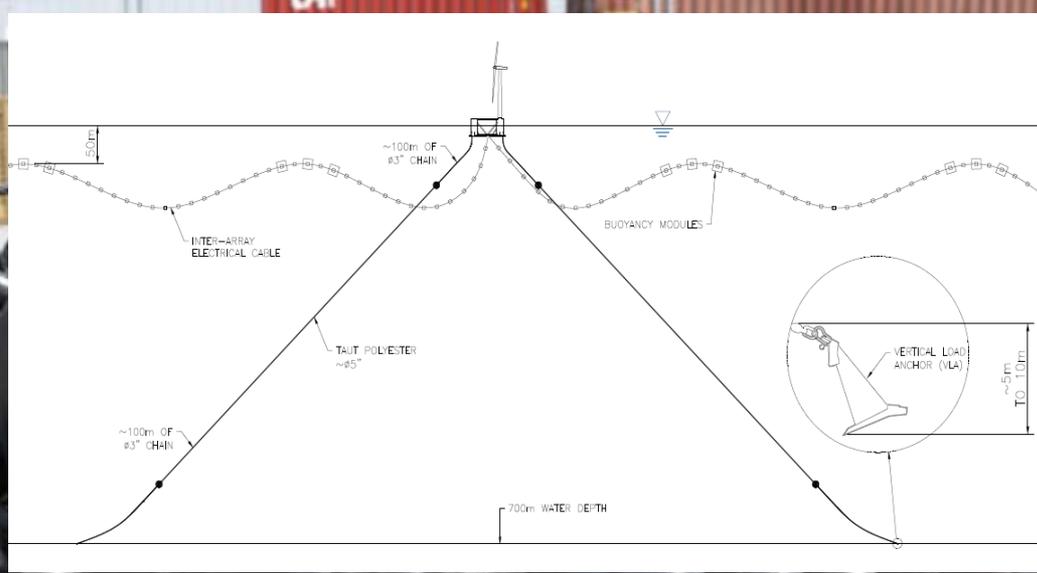
### 3 Precommercial Projects: COD 2019-2021

incl. WindFloat Atlantic (under construction) Non-Recourse Project Finance

### Several Commercial Projects under Development



# Mooring System For Deep Waters



## Conventional Catenary or Taut Mooring System

- Simple and Robust 3-Line Spread Mooring System
- Combination of Chain and Polyester
- Proven mooring technology commonly used in the oil & gas industry
- Design for 25 years, meeting Class requirements

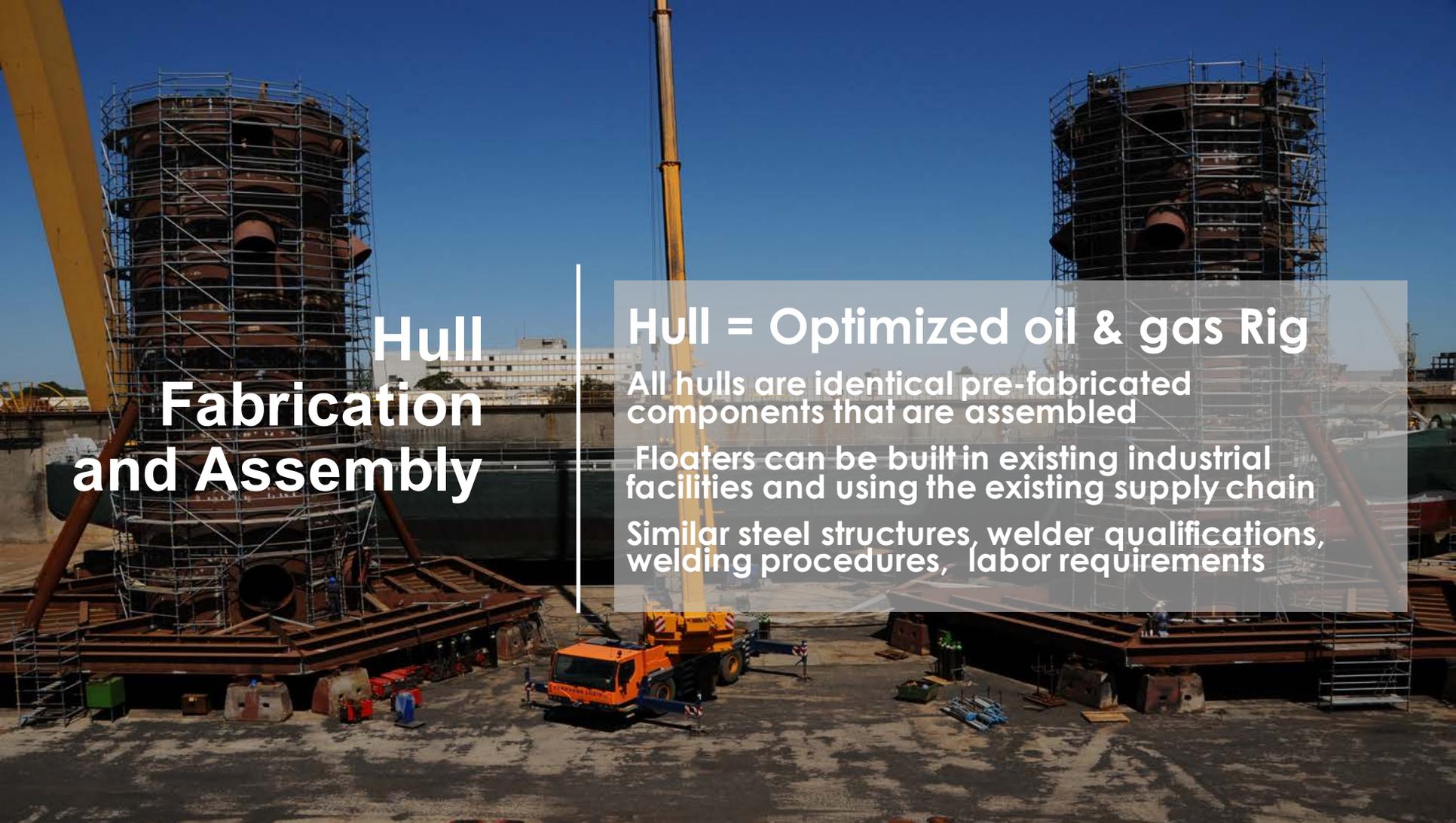


## Mooring System

## Siting Flexibility/ Reduced Geotech. Works

No piling - acoustic disturbances are minimal  
Drag embedment anchors tensioned to 100% design load, NOT driven

Standard anchor handling and towing vessels readily available in most markets including in the US



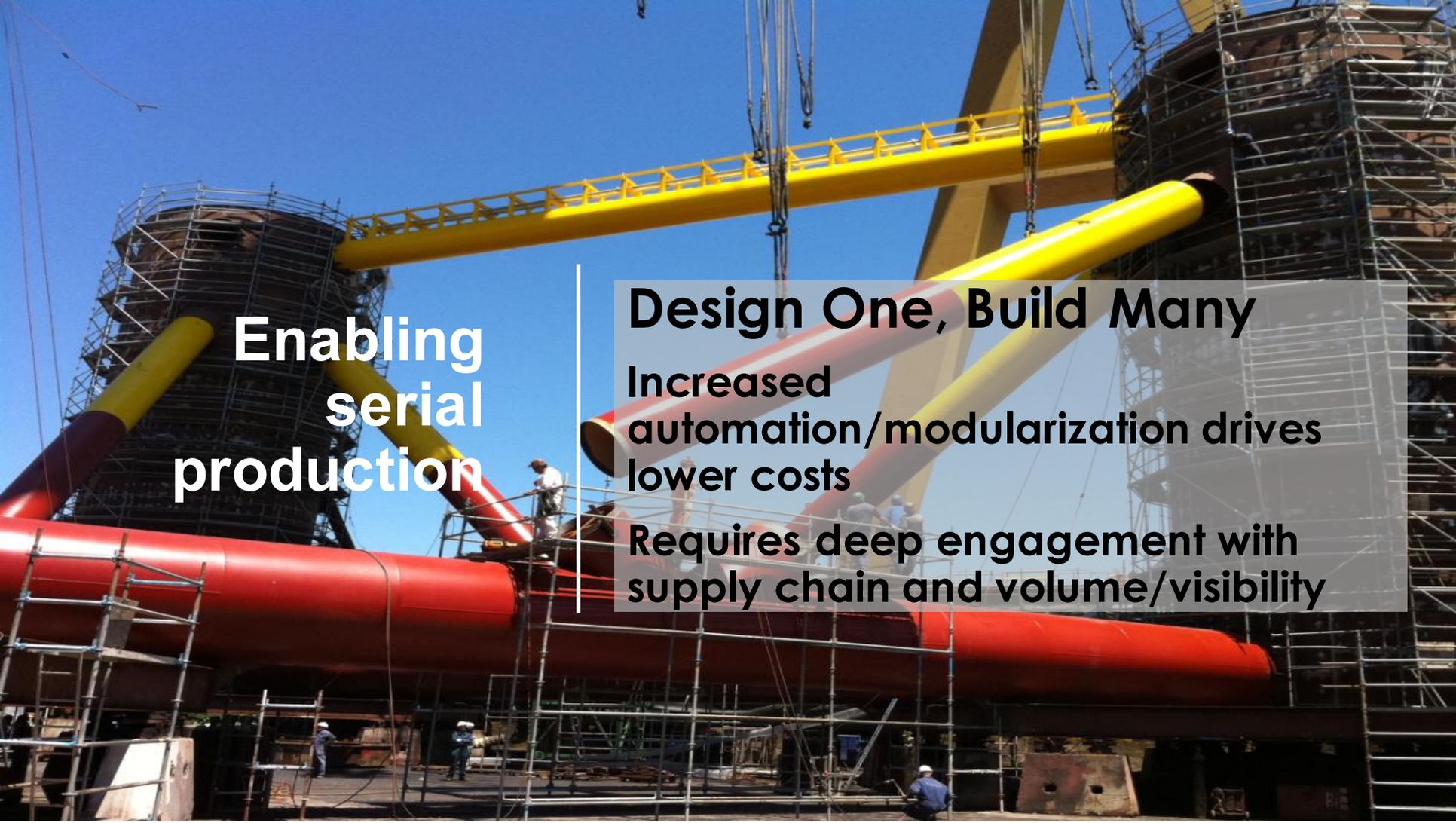
# Hull Fabrication and Assembly

**Hull = Optimized oil & gas Rig**

All hulls are identical pre-fabricated components that are assembled

Floaters can be built in existing industrial facilities and using the existing supply chain

Similar steel structures, welder qualifications, welding procedures, labor requirements



**Enabling  
serial  
production**

**Design One, Build Many**

**Increased  
automation/modularization drives  
lower costs**

**Requires deep engagement with  
supply chain and volume/visibility**



# Finalizing Assembly at Quayside

## Minimum Offshore Operations and NO Offshore Heavy-lift

Assembled and Pre-Commissioned Onshore

Uses Existing Port infrastructure: Quays or Drydocks

Requires only offshore tug Vessels

Foundation acts as Installation Vessel

A large yellow cylindrical float is being lowered into the ocean from a ship's deck. The float has the word "Float" and "by Principle Power" printed on it. Several workers in orange safety gear and white hard hats are visible on the deck, managing the operation. The water is blue with white foam from the ship's wake.

# Offshore Installation

**Minimum Offshore Operations**  
Mooring Pre-lay (1.5 day)  
Pre-Commissioned System Towed  
Final Hook-up (0.5 day)

# Revolutionizing O&M

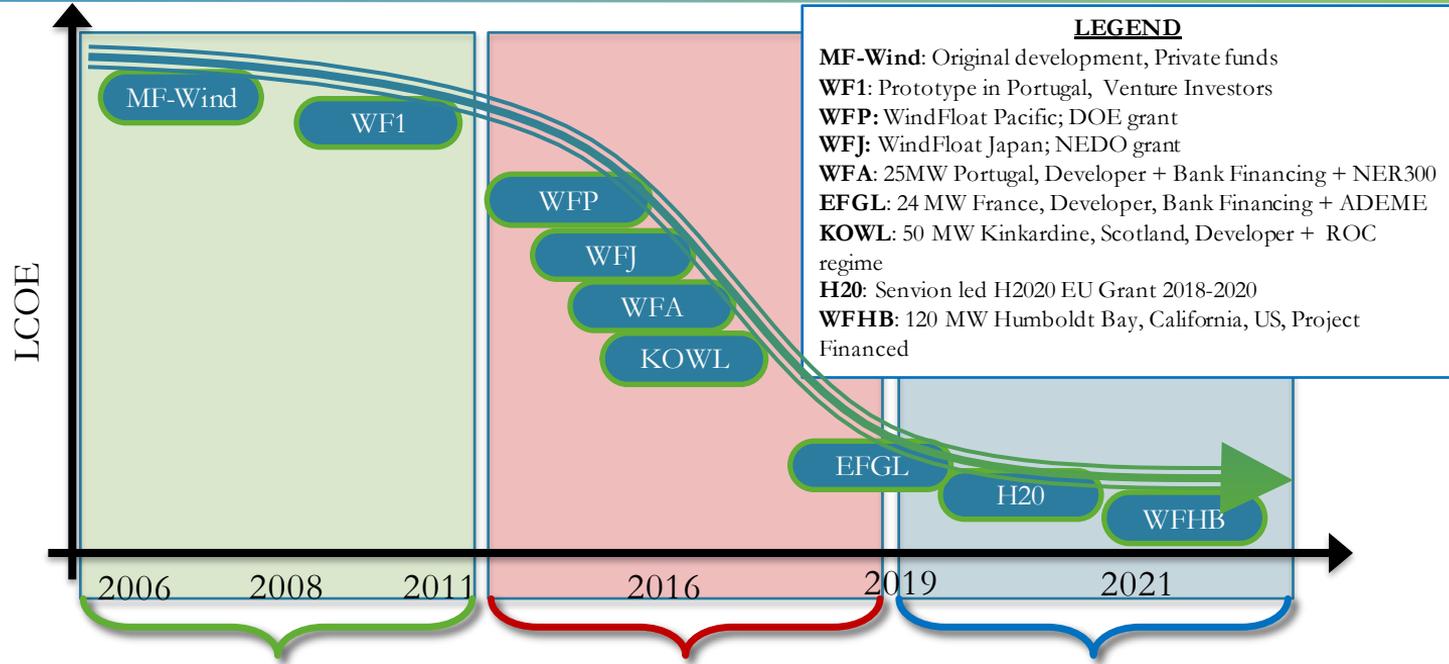
**Large O&M conducted  
“Onshore”**

**Shorter weather windows required  
Fewer and simpler operations to be  
conducted offshore**

**No use of specialized O&M vessels**



# LCOE reduction has been the focus of every project - WindFloat is on its 3<sup>rd</sup> generation design



## WindFloat V1.

- Prototype
- Turbine size .25-2 MW
- V1.0 3x250KW
- V1.1 1 MW
- V1.2 WF1 (2 MW)

## WindFloat V2.

- Pre-commercial
- Turbine size 5-8 MW
- V2.0 WFP
- V2.1 WFJ
- V2.2 WFA

## WindFloat V3.

- Commercial
- Turbine size 6-15 MW
- V3.0 EFGL
- V3.1 H20 10+ MW
- V3.2 RCEA CA, US
- V3.3 500 MW Commercial

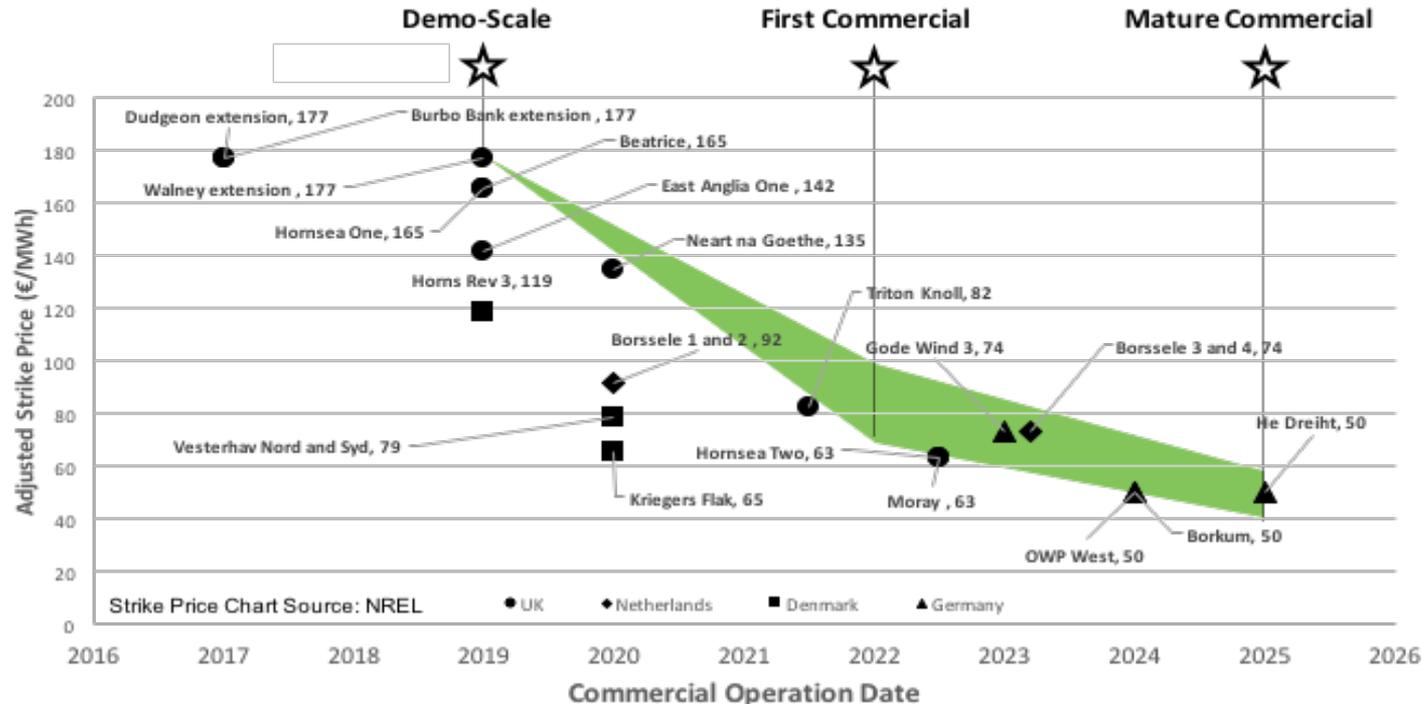
# The WindFloat is on track to compete with conventional power, other renewables, and fixed offshore wind



**Adjusted Strike Price (EUR/MWh)**  
Announced Fixed Projects vs WindFloat

**WINDFLOAT Strike Price Range**

Demo-Scale: 25-30 MW, 8 MW Turbines  
 First Commercial: 300 MW, 9-10 MW Turbines  
 Mature Commercial: 500 MW, >10 MW Turbines





# Thank you!

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