Ocean Winds:
Pioneering Floating Offshore Wind

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Organized by FWE Quest Offshore

FWS

The Westin Houston, Memorial City 28-29 June 2021

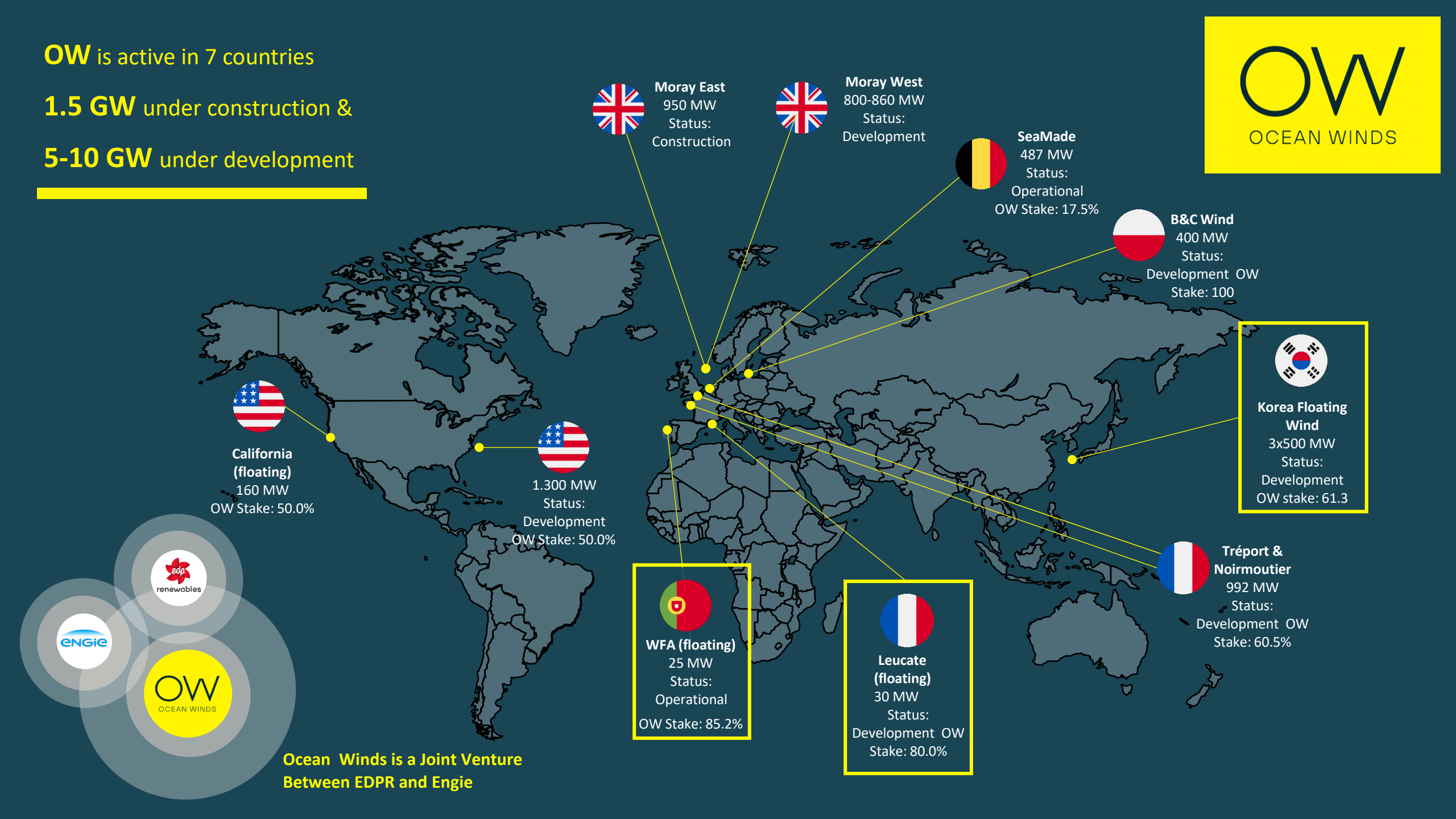
Agenda

1. **OW Ocean Winds Overview**
2. Floating offshore wind outlook
3. OW Ocean Winds Projects

OW is active in 7 countries

1.5 GW under construction &

5-10 GW under development



Ocean Winds is a Joint Venture Between EDPR and Engie

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Floating offshore wind is considered to be a key technology to achieve ambitious renewable targets, and the US is expected to become a key markets

Floating offshore wind will be **essential to achieving ambitious renewable targets and net-zero emissions**

- 58% of the total technical wind resource in the U.S. lies in depths greater than 60m[1]
- allows access to areas with much **higher and more consistent wind speeds**
- presents **lower construction, installation, and decommissioning costs, risks** than traditional bottom fixed

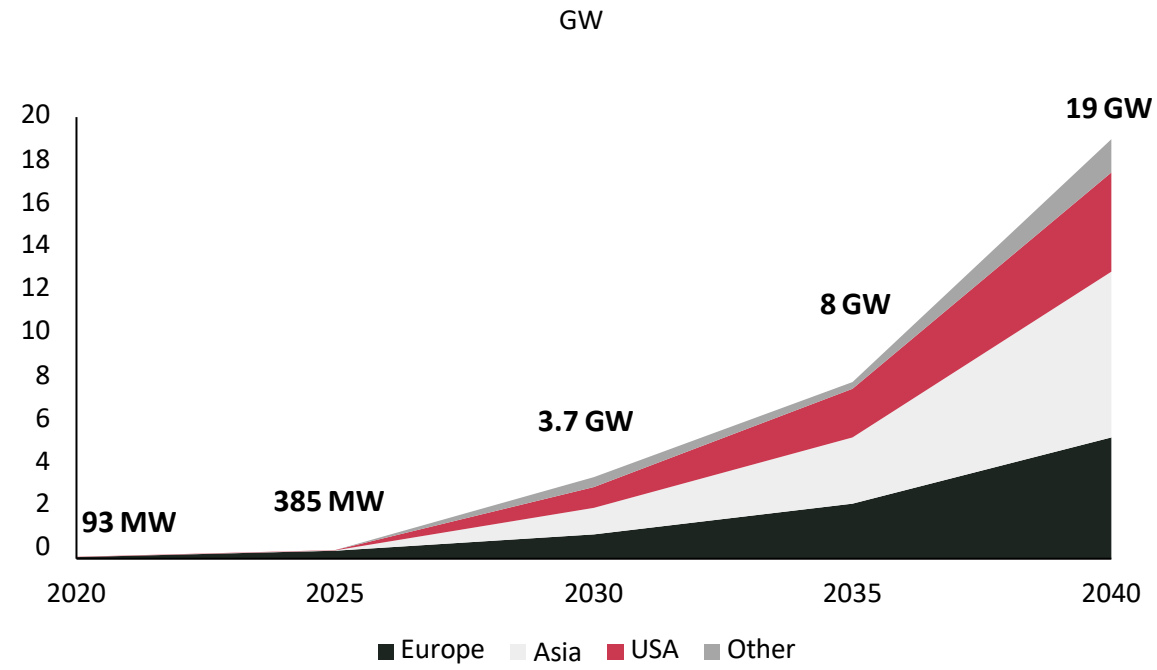
There are **many floating wind concepts**[2] being explored

- According to DNV GL, **WindFloat is among the top 3 in all aspects**[3]
- **Semi-submersible structures are the most versatile** and assumed they will represent significant share of market

The **technology has proven to be technically feasible**

- Current focus is shifting towards demonstration of arrays, reducing costs and scaling up the size of installations

Estimate of cumulative installed capacity of floating offshore wind (DNV GL)



1. U.S. DOE, NREL (2016) 2016 Offshore Wind Energy Resource Assessment for the United States
2. Technologies that have been benchmarked by DNV GL are: WindFloat, Hywind, Ideol, SBM, Naval Energies, TetraSpar, Hexafloat
3. CAPEX, scalability, commerciality, technical design transport and installation, operational aspects, technical maturity and fabrication

Sources: DNV GL, WindEurope, R&M analysis

LCOE is expected to come down in the next decade as floating offshore wind technology matures

Floating offshore wind industry is ready for commercialization…

and utility-scale projects are on their way

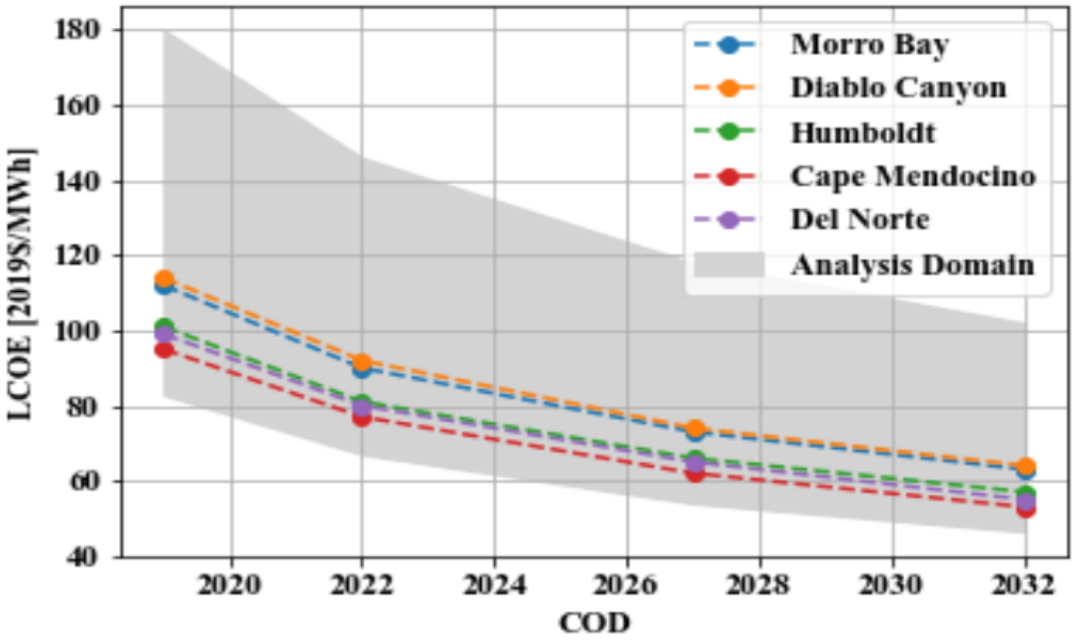
- Several projects already backed by key players in finance and insurance sectors
- Cost improvements and supportive policies are its main challenges to its commercial success

With significant cost reductions already achieved and expected to decrease by 40-50% by 2050 as the result of:

- Economies of scale
- Significant learning effects
- Supply chain scale-up
- Higher capacity factor sites, decreasing LCOE

Expected floating offshore wind LCOE evolution in California

Between 2019 and 2032 the cost of 1 GW of floating offshore wind in CA is estimated to **decline by 44%** on average, reaching levels of $53–$64/MWh by 2032[1]



Source: DNV GL, IEA, WindEurope, R&M analysis

1. Musial, et al (2020) 2019 Offshore Wind Technology Data Update. National Renewable Energy Lab: https://www.nrel.gov/docs/fy21osti/77411.pdf

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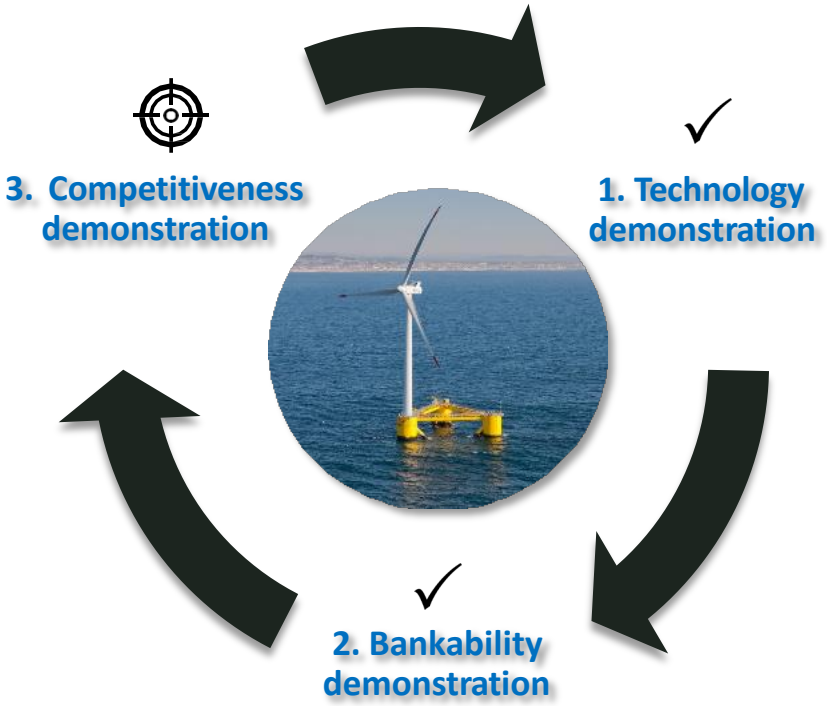
EDPR was an early-mover in floating offshore wind under a risk-controlled approach and now Ocean Winds is ready and well positioned to deliver commercial-scale projects

Bringing down costs to reach cost-competitiveness against other techs

OW is working on bringing down LCOE



Develop a reliable and full-scale tested solution using state of art wind turbines

First prototype under operation for 5 years

Reduce risks to ensure the ability to raise financing for the commercial projects

OW first pre-commercial project started full operation in 2020, proving bankability

Source: OW, R&M analysis

WindFloat 1 prototype was under operation for 5 years and proved the technology worked under real marine conditions

1 platform

Vestas V80 2 MW

Prototype scale: 120m above water, 23m below water

~40 m water depth

5 km offshore

17 m waves & up to 110 km/h wind speeds

5Y operation (2011 – 2016)

17 GW produced, no performance losses

Successful decommissioning (proof of concept for large correctives at port)

Source: OW, R&M analysis

WFA is already operational and has proven bankability, LCOE reduction and multiple improvements in design vs. WF1, and was successfully delivered under a multi-contract strategy

3 platforms

Has structural optimization, leading to smaller platforms than WF1

25.2 MW

Vestas V164 8.4 MW

Pre-commercial scale: 180m above water, 30m below water

95 m water depth

20 km offshore

25 years lifetime

Design life extension x5 vs. WF1

Multi-contracting approach

<u>First (and to date still only)</u> floating project to secure
Project Finance (in October 2018)
EIB: 60 M€
EU FUNDING - **NER300** 18 M€
PT Fundo Ambiental 6 M€

Source: OW, R&M analysis

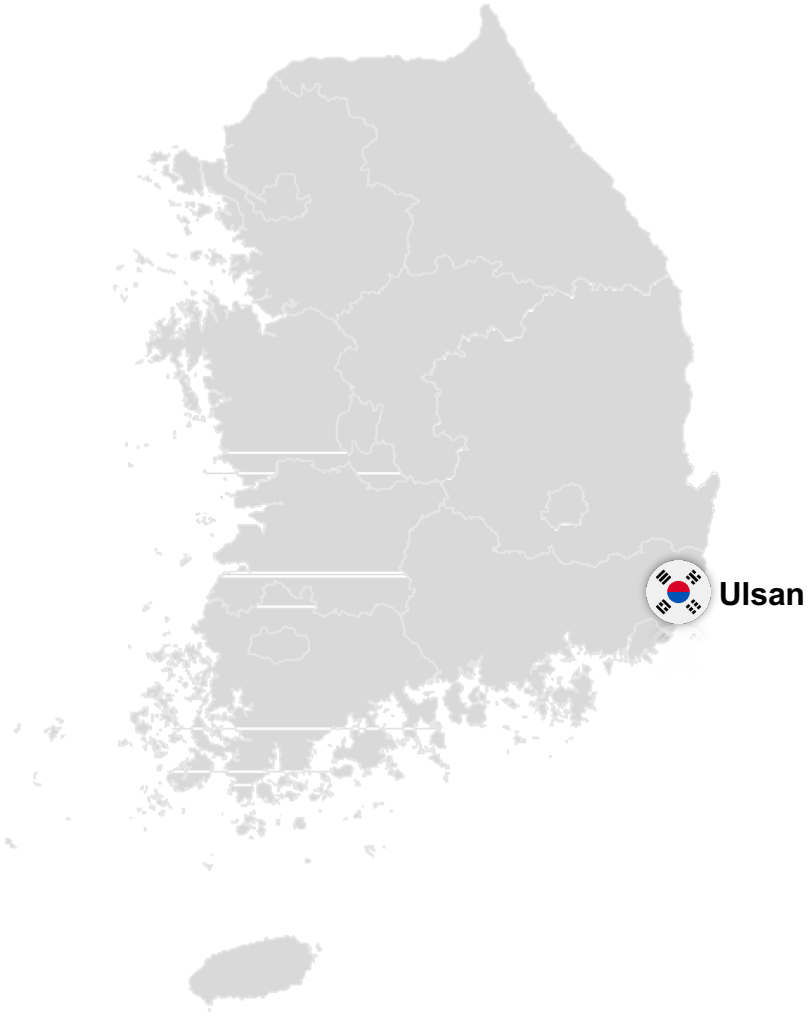
Technical and economical optimizations since the prototype phase have been remarkable and are still expected to continue in the coming projects

- Increase in turbine size (x 4)
- Design life extension (x 5)
- Structural optimization and equipment improvement (i.e smaller platform)
- Accessibility
- Mooring and Installation improvements

- Increasing turbine size (double-digit unitary capacity)
- Savings in steel
- Improvements in design efficiency
- Structural optimizations
- Interface improvements

Source: OW

On the other hand, OW has already started developing commercial-scale offshore wind projects



- OW is the leading shareholder in a JV developing up to 1.5 GW of floating wind projects off the coast of Ulsan (South Korea)
- Each project can accommodate up to 500 MW
- The sites are located 70 km from shore at 225 – 275 meters water depth and with an average wind speed of 8 m/s
- FID expected in 2024/25

Source: OW, R&M analysis

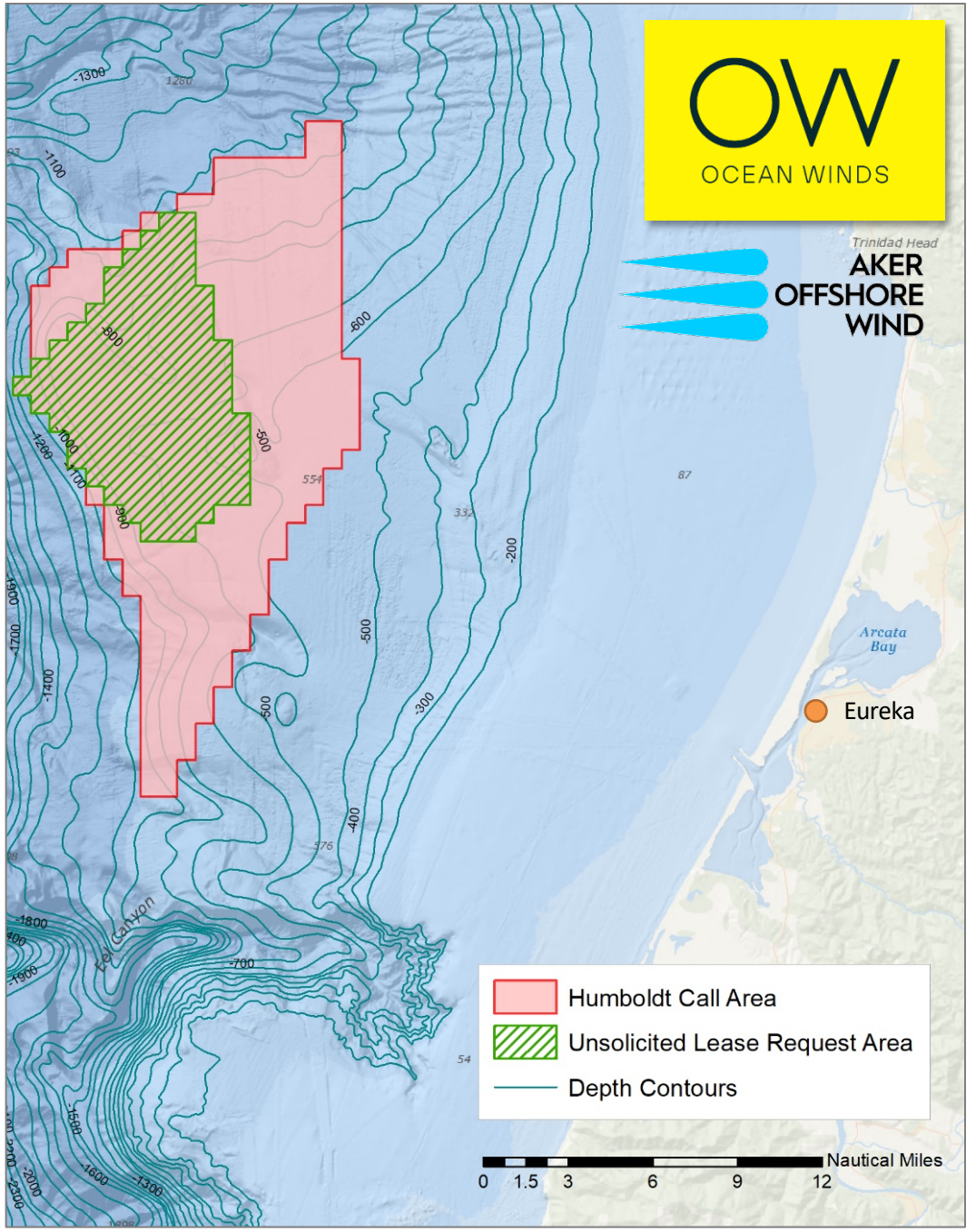
OW has entered a strategic partnership to bring floating offshore wind to California

- **Redwood Coast Offshore Wind** is a 50/50 JV of Ocean Winds and Aker Offshore wind in partnership with Redwood Coast Energy Authority

- **Location**:
  - Humboldt Call Area
  - Approx. 25 miles offshore from Eureka, CA

- **Key Milestones**
  - Feb 2018: Team selected by RCEA in response to RFQ
  - Sept 2018: Submitted BOEM unsolicited Lease Request
  - Nov 2018: Entered Cooperation Agreement
  - Nov 2020: Redwood Coast Offshore Wind LLC formed
  - Mid-2022: BOEM Auction

- **Project Principles**
  - Provide competitively priced renewable energy
  - Prioritize stakeholder engagement and acceptance, and actively identify and address issues of local concern
  - Maximize investment in local infrastructure
  - Maximize the Project's economic viability



Redwood Coast Offshore Wind

Conceptual 10 turbine layout

AkerSolutions

Conceptual Port Design

Redwood Marine Terminal 1
Humboldt Bay, CA

Key Facts: Port facilities are key to floating offshore wind development and will attract supply chain and associated jobs, economic development

Aker Offshore Wind

Closing remarks

- Pure offshore wind player, with strong track-record of delivery and execution
- 10+ years experience in offshore wind through OW sponsors, both bottom fixed and floating
- Wide experience in international JVs with different partners/profiles
- Early mover on floating offshore wind (already operational windfarms- WindFloat Atlantic), with delivery of commercial scale projects as a natural next step, with unique positioning

Source: OW, R&M analysis

OCEAN WINDS

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