

Floating Offshore Wind Technology

Acknowledgements:

US DOE EERE, WTO, ARPA-E

Senator Collins

Senator King

Congresswoman Pingree

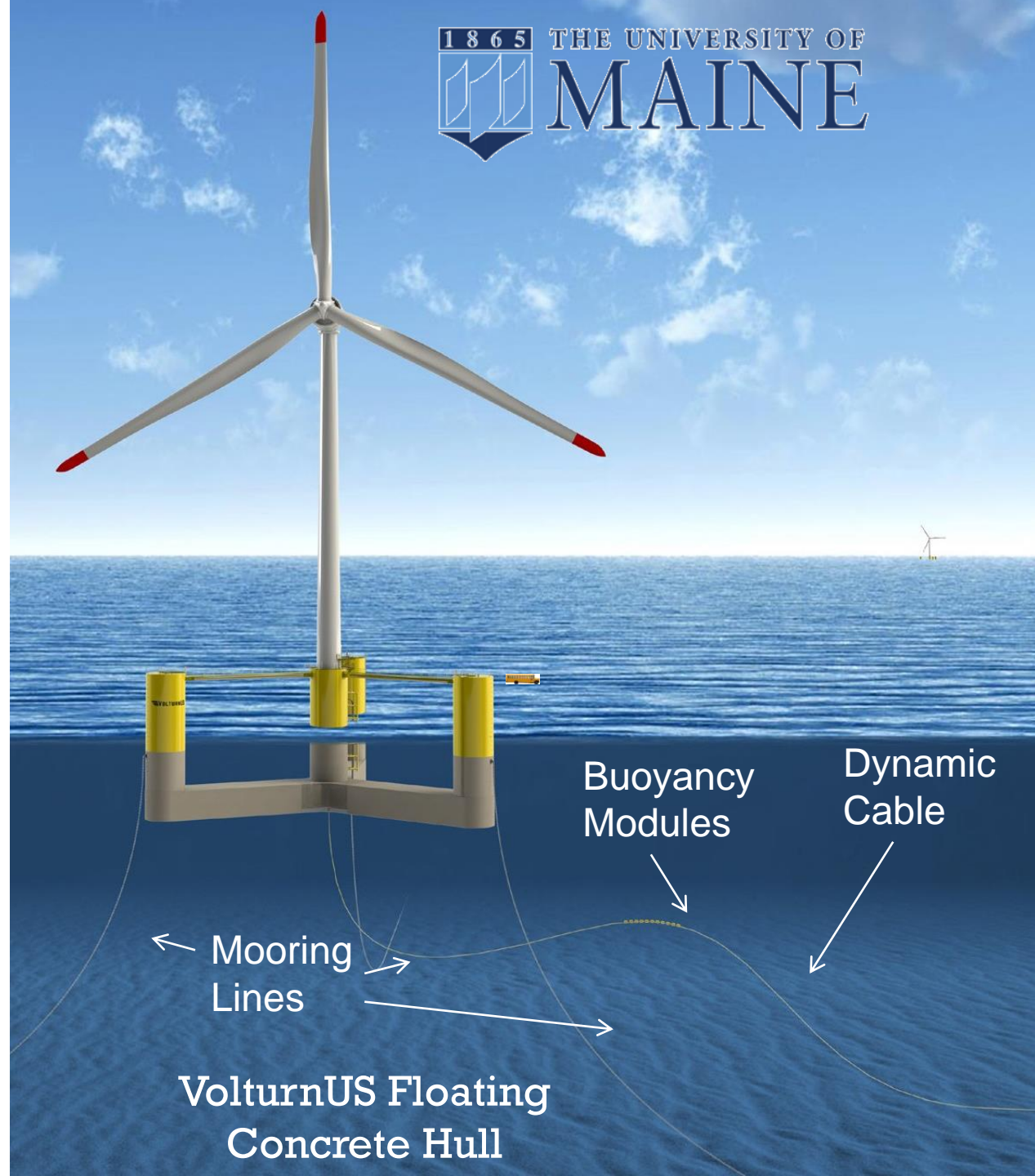
Congressman Golden

EESI Briefing

June 29, 2022

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Buoyancy
Modules

Dynamic
Cable

← Mooring
Lines →

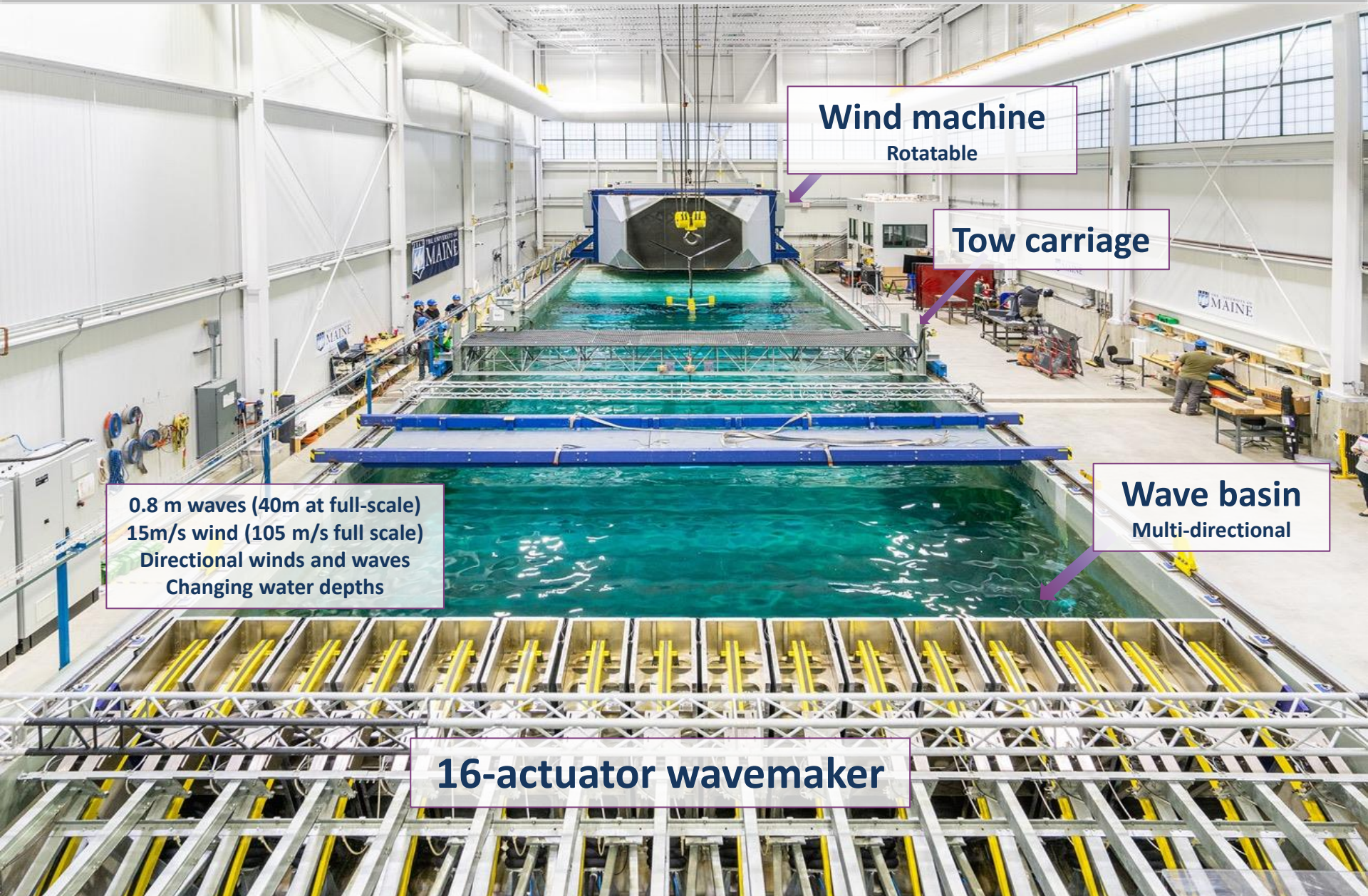
VolturnUS Floating
Concrete Hull

- **11,561 Student Enrollment**
- **866 Faculty**
- **Carnegie R1 Top-Tier Research University (top 4% of US colleges and Universities in research)**
- **16:1 Student to Faculty Ratio**
- **3.35 Avg. First Year Student GPA**
- **\$179.3M in R&D expenditures in FY21**
- **150+ Research Institutes, Centers and Labs**
- **Maine's leading engineering program**
- **Engineering excellence since 1865**

- Largest Univ.-based research Center in Maine
- Founded through the NSF in 1996
- 2,600+ students funded from 35 majors
- 260 faculty, staff, students
- 100,000 ft² lab
- 10+ spinoff companies
- 1,000 publications
- 120 patents
- 30,000 Visitors
- 1500 media stories







Wind machine

Rotatable

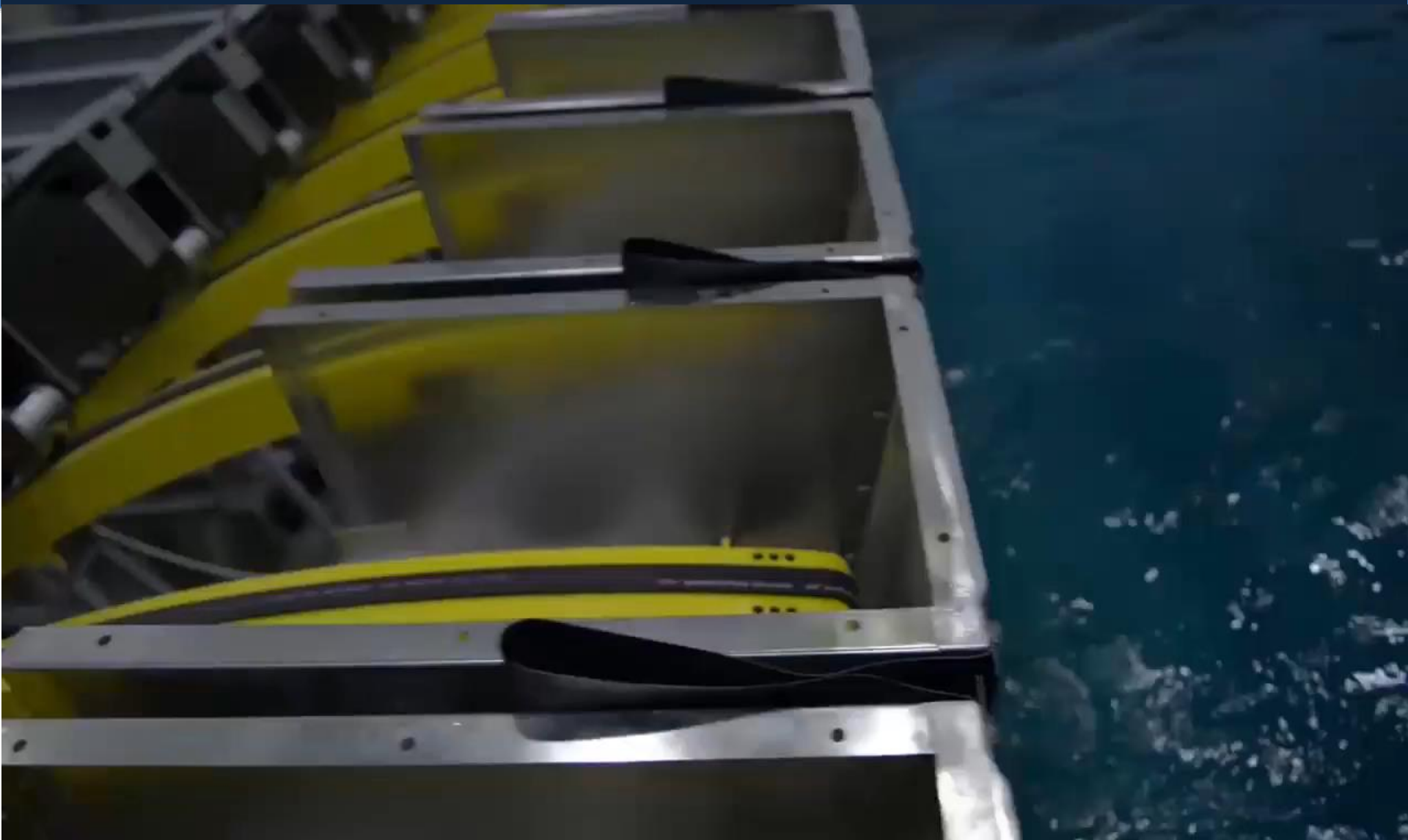
Tow carriage

0.8 m waves (40m at full-scale)
15m/s wind (105 m/s full scale)
Directional winds and waves
Changing water depths

Wave basin

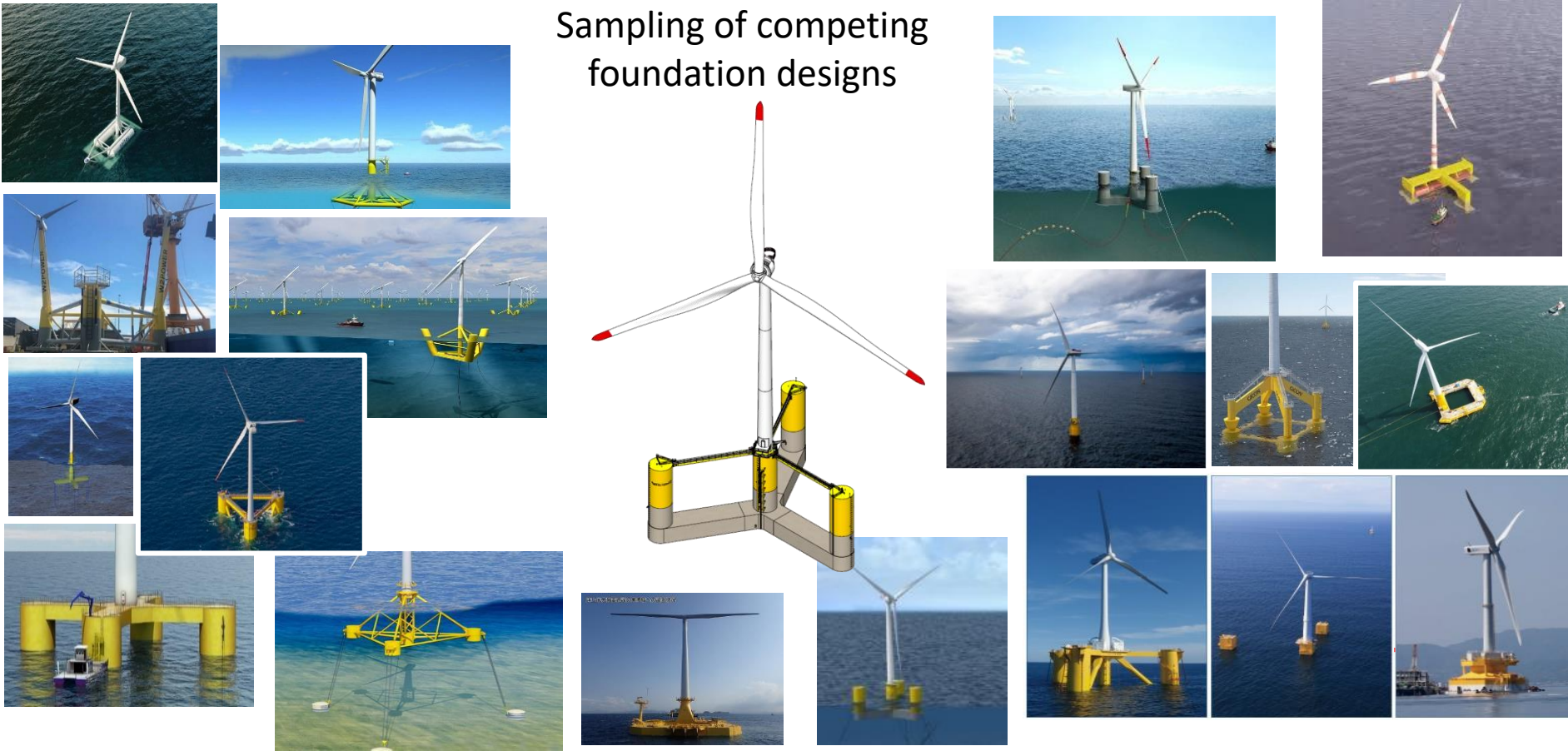
Multi-directional

16-actuator wavemaker

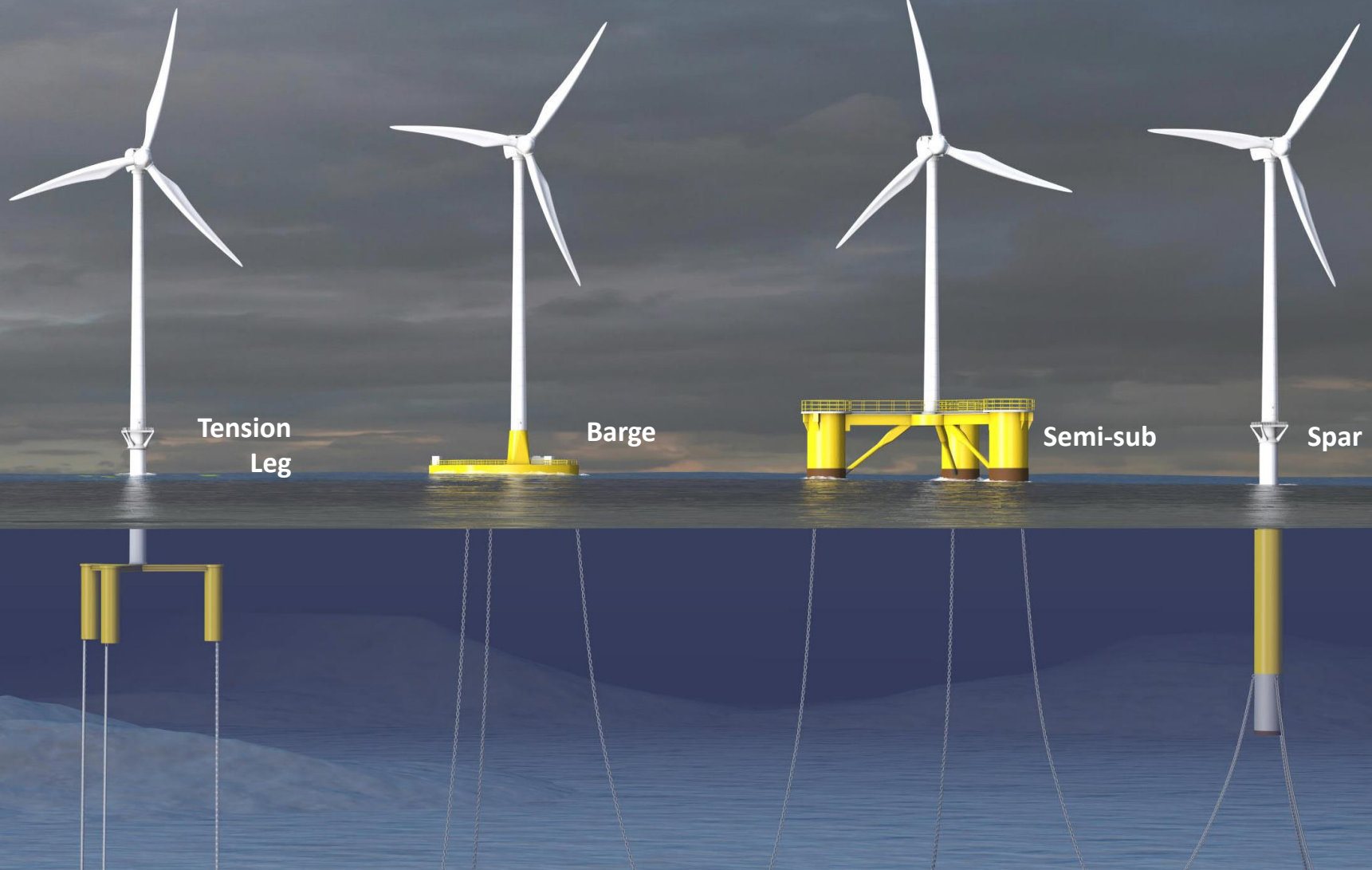


Global Technology Race in Floating Offshore Wind

Sampling of competing
foundation designs



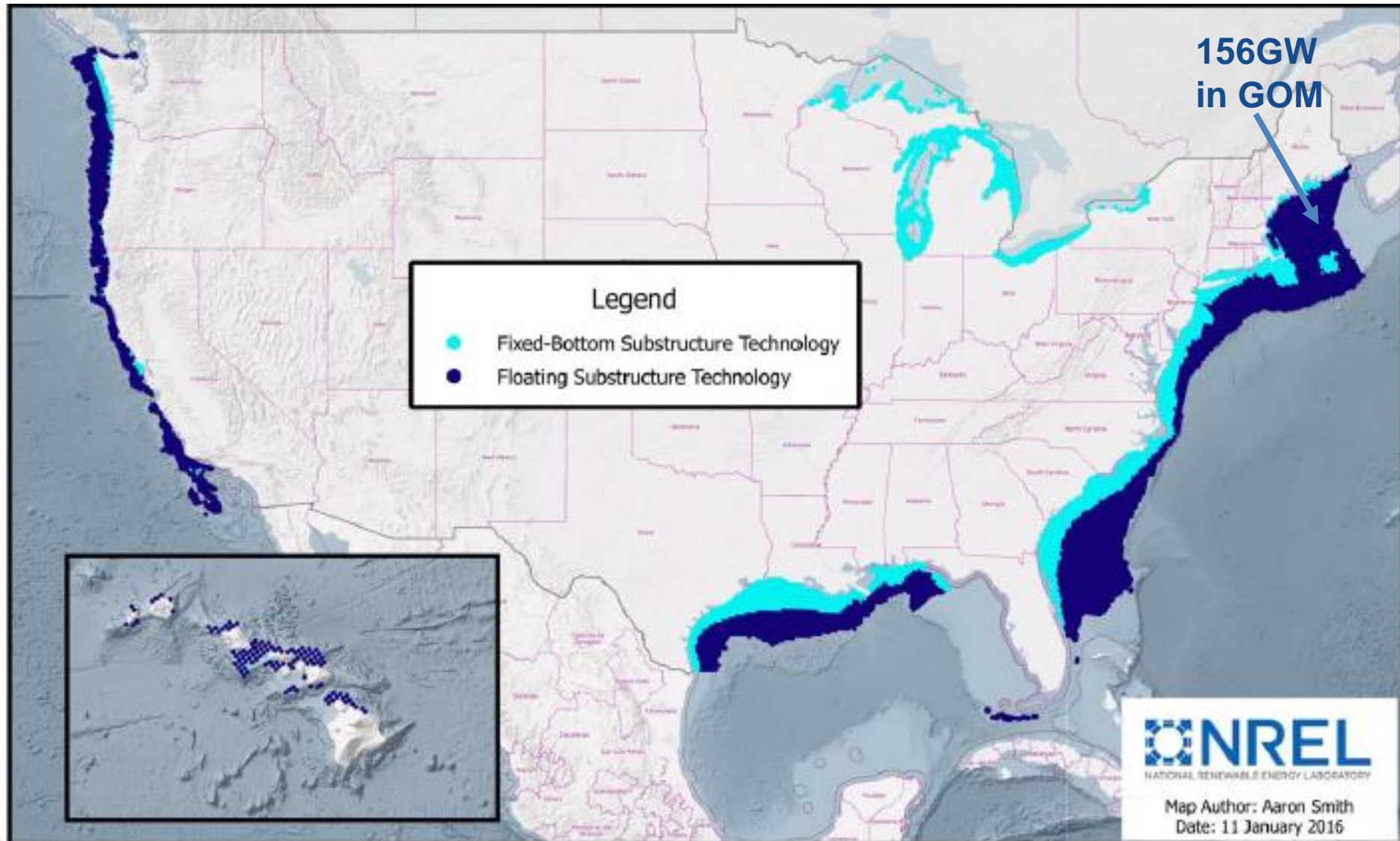
How does a Turbine Float? There are four Designs



US Potential for Floating Wind

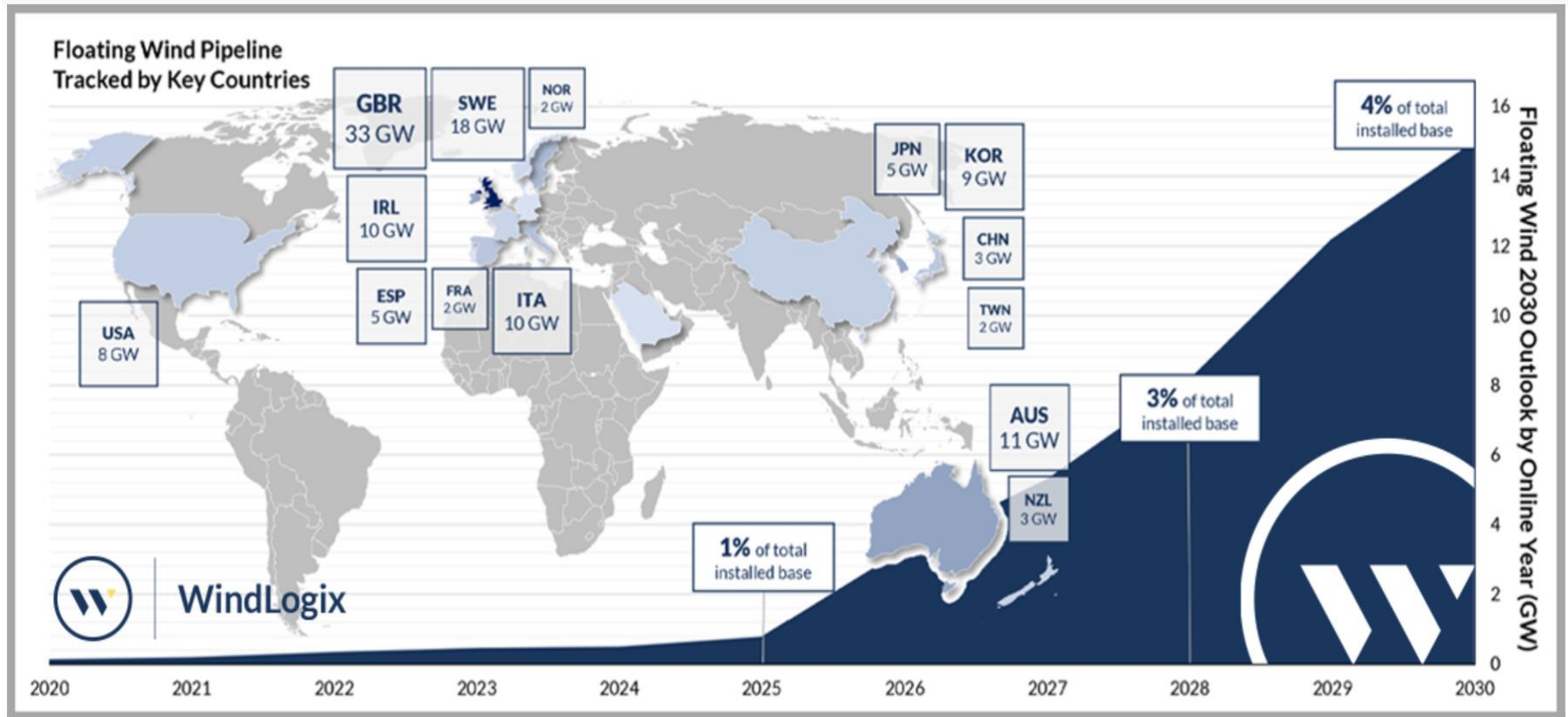
60% of US resource requires floating technology

BOEM to issue three floating leases by 2025: GOM, California & Oregon



Global Pipeline of Floating Wind: 121 GW¹

Nearly ½ trillion dollars investment



Source: WindLogix, Westwood analysis

¹ https://www.offshorewind.biz/2022/06/22/15-gw-of-floating-wind-capacity-to-come-online-by-2030-westwood-analysis/?utm_source=offshorewind&utm_medium=email&utm_campaign=newsletter_2022-06-23

UMaine Floating Technology Roadmap

2013

1/8 Scale Pilot
Project - 1
turbine (Castine –
UMaine, Cianbro,
MMA)



2023/24

11 MW
Demonstration
Project - 1 turbine
(Monhegan –
NEAV LLC, UMaine)



2026-2027

Research Array - 12
turbines or less
(State, UMaine, NEAV LLC)
LD336



2030+

Commercial
Development -
BOEM Leasing
and Permitting

VoltturnUS 1:8 Launch

May 31, 2013



Tow-Out Testing

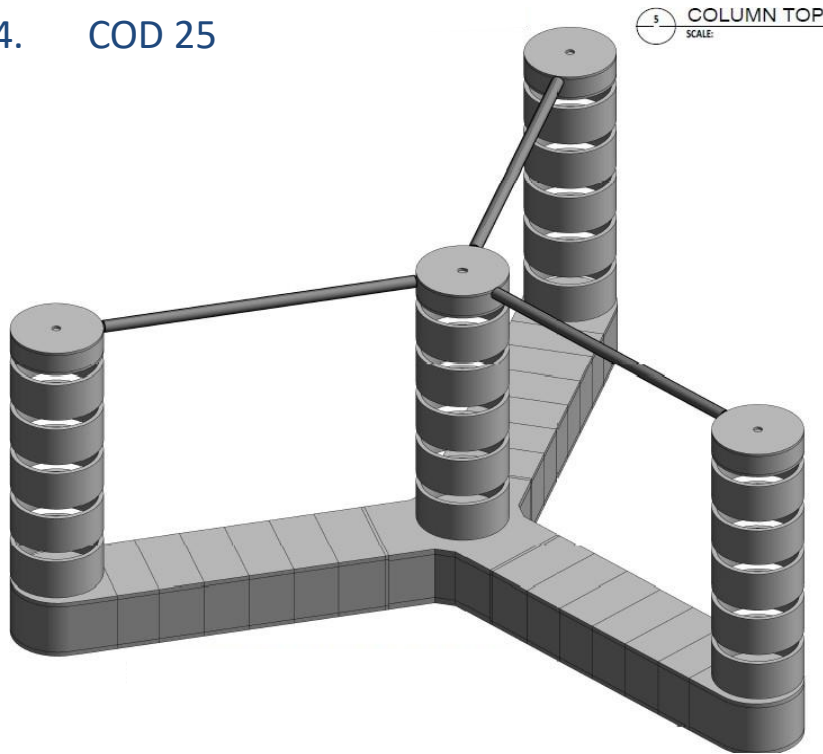


Castine, Maine (2013)

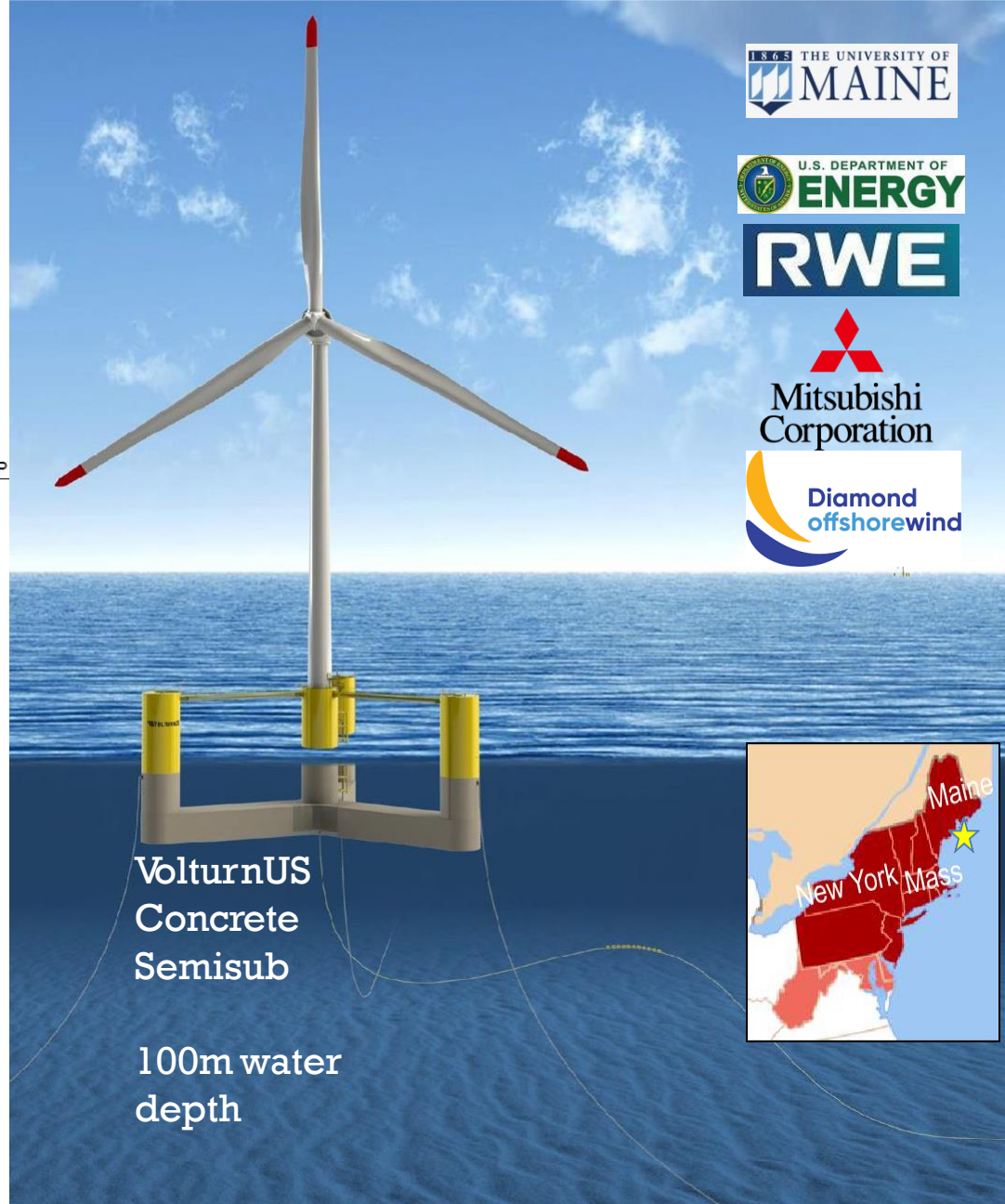


New England Aqua Ventus I

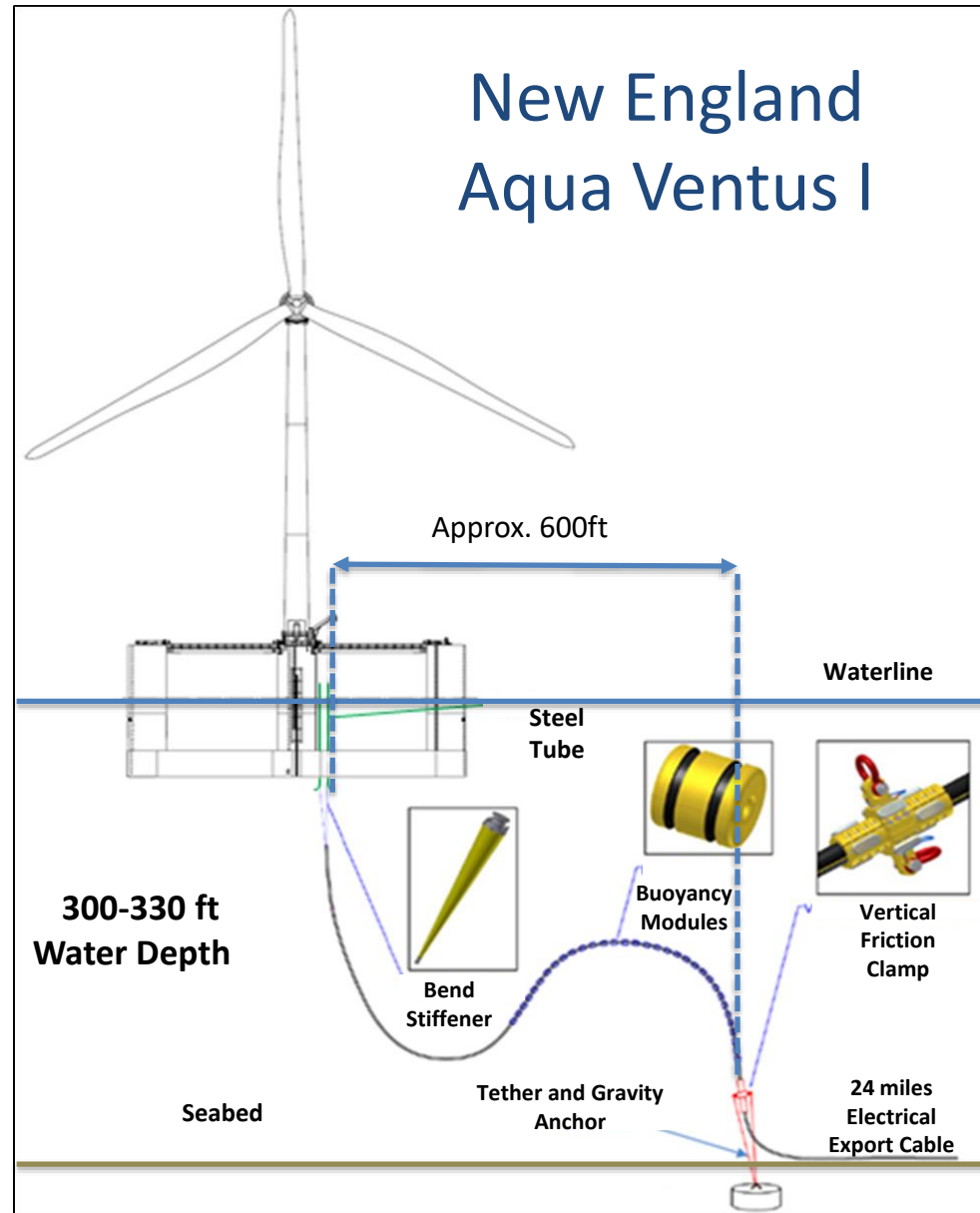
1. UMaine VoltornUS Concrete semisub
2. US DOE Advanced Technology Demonstration Program for Offshore Wind
3. Monhegan Island, Maine
4. COD 25



Locally produced VoltornUS
segmental concrete hull

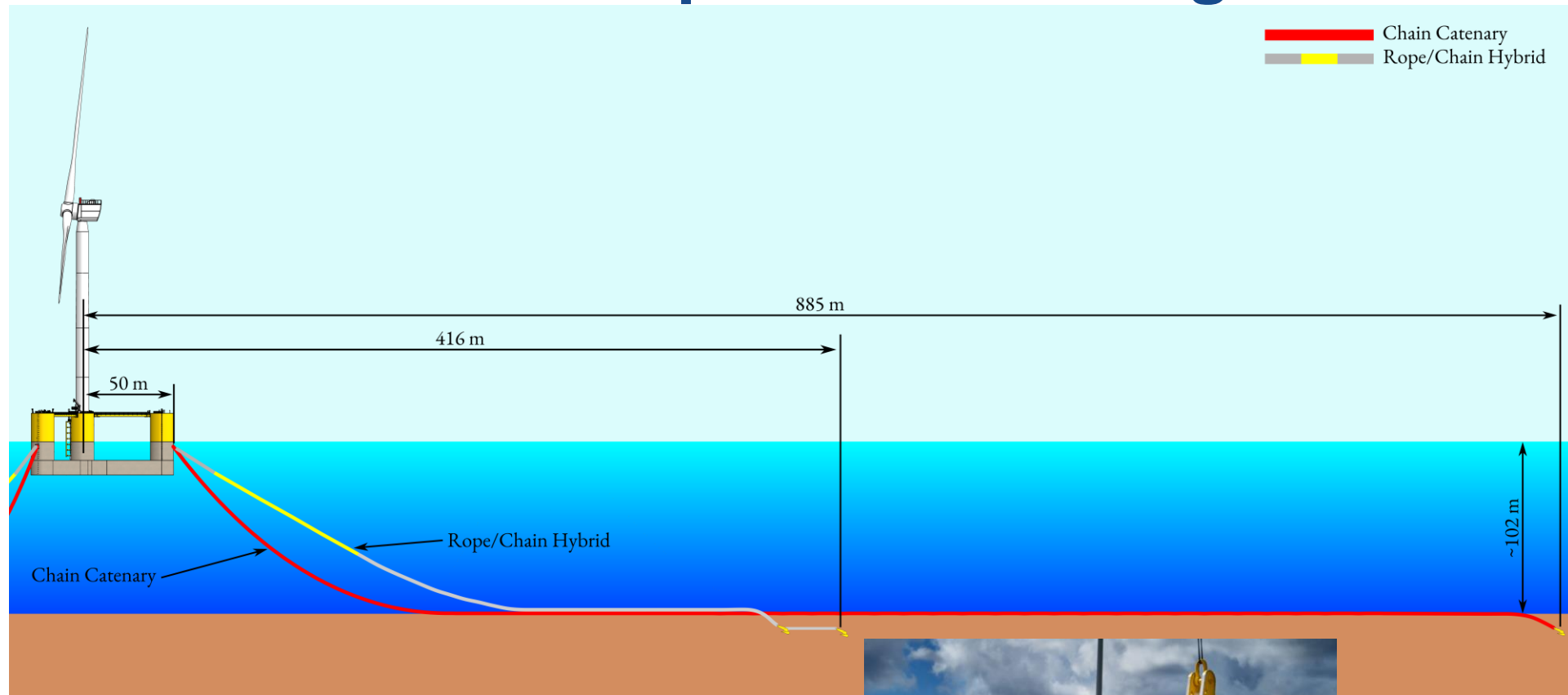


1. Aqua Ventus 1 has relatively shallow water, with 300-330ft water depth. The dynamic cable transitions to a 24-miles export cable.
2. Deeper waters such as off the California coast (>2,400ft) create new challenges.



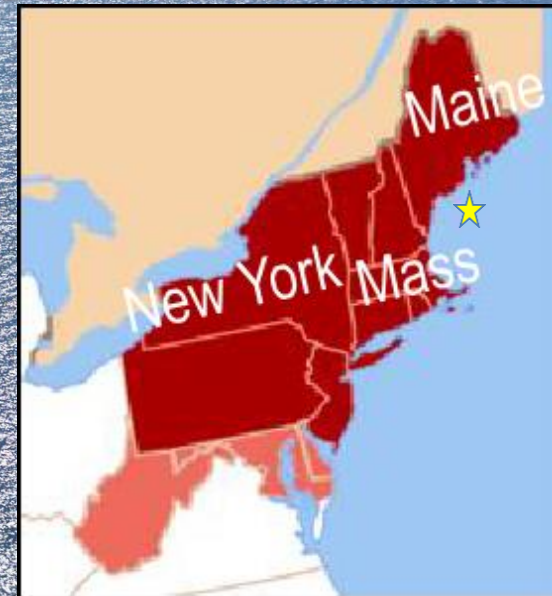
Beyond the Horizon Farms: Reduce Impacts on Fishing/ Visual

Chain Catenary
Rope/Chain Hybrid



MeRA: Maine Research Array (2027)

Up to 12 turbines, 150 MW, 16 square mile



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US Needs East and West Coast Floating Offshore Wind Ports



Vessels are Needed: Can we Print Some of Them?



Needed: US Floating Wind R&D Investments



U.S. DEPARTMENT OF ENERGY

WETO
Wind Energy
Technology
Office



NATIONAL OFFSHORE WIND
RESEARCH & DEVELOPMENT CONSORTIUM



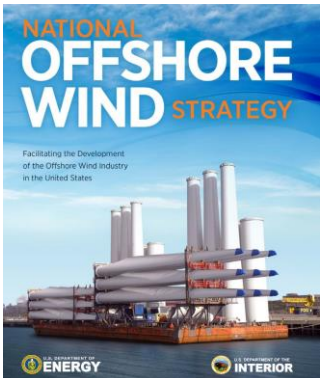
U.S. DEPARTMENT OF ENERGY
Offshore Wind
Energy
Strategies

Regional and national strategies to accelerate and maximize the effectiveness, reliability, and sustainability of U.S. offshore wind energy deployment and operation
January 2022

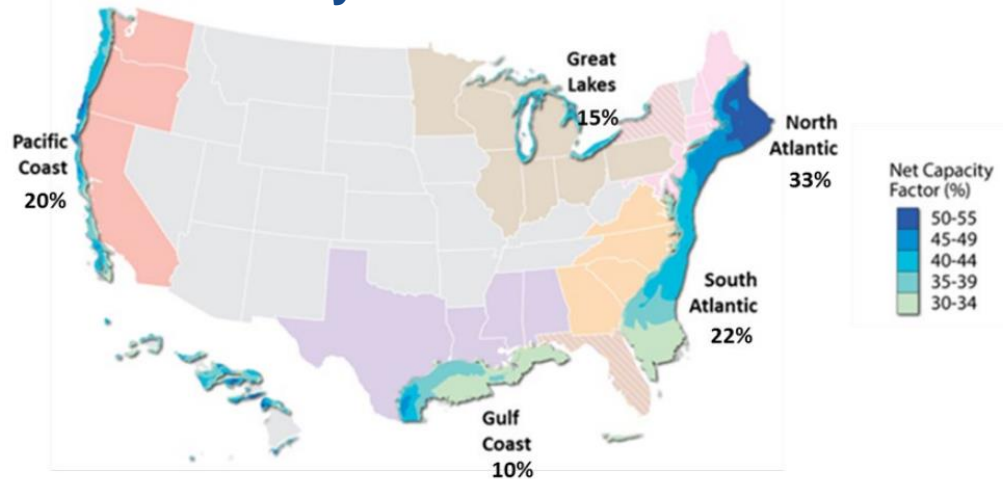


<https://nationaloffshorewind.org/>

<https://www.energy.gov/sites/default/files/2022-01/offshore-wind-energy-strategies-report-january-2022.pdf>



86GW by 2050 Scenario



<https://www.energy.gov/sites/prod/files/2016/09/f33/National-Offshore-Wind-Strategy-report-09082016.pdf>