New England Aqua Ventus I:

First Floating Offshore Wind Demonstration Project in the US

Dr. H. J. Dagher, P.E.

E2Tech Expo
Portland, Maine

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DOE: UMaine, Cianbro, Emera, DCNS
HDR, Kleinshcmidt, SGC, NREL

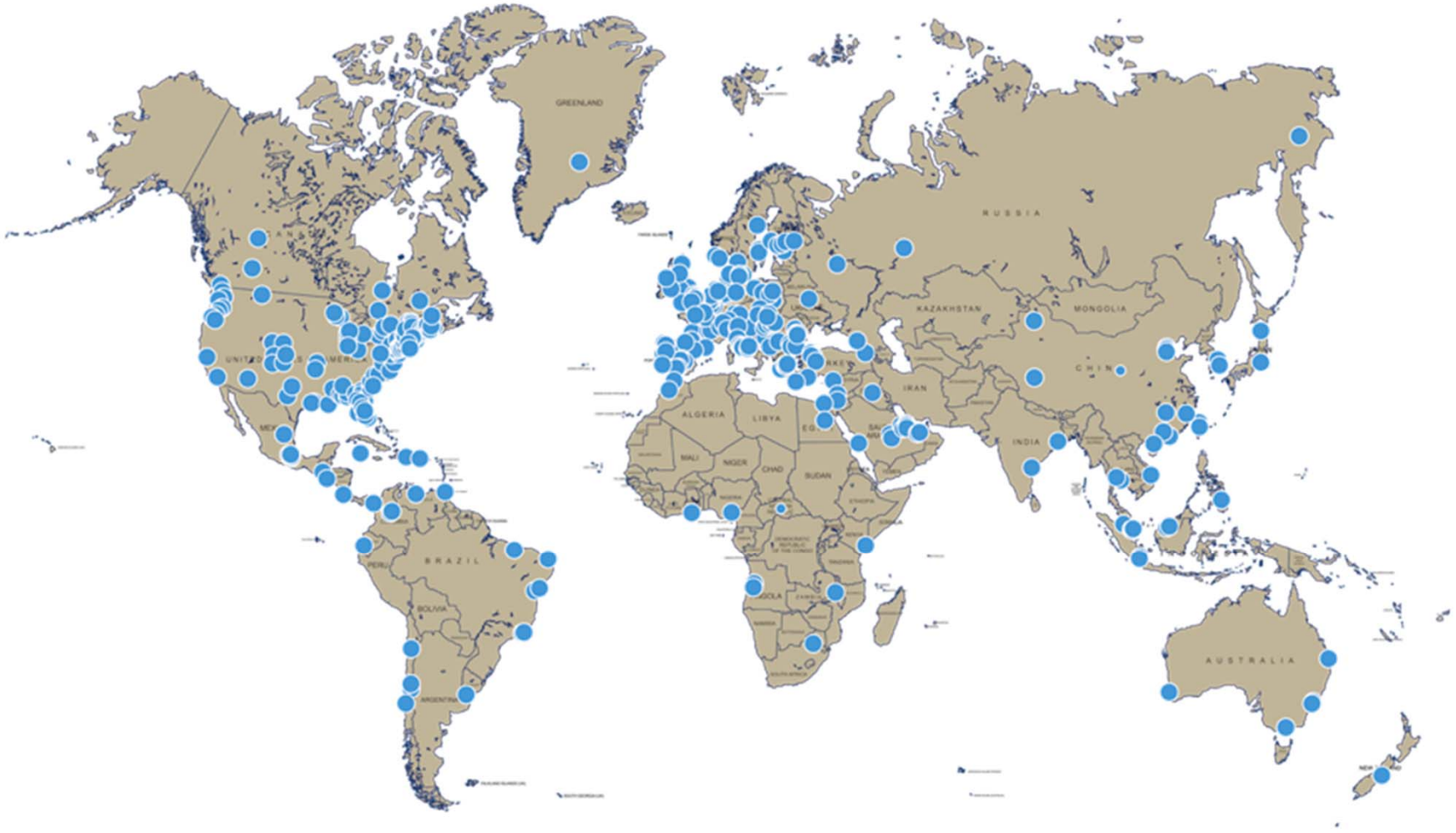
Outline

- About us
- Where do Maine energy dollars go?
- How big is the offshore wind opportunity?
- Why fixed and floating wind turbines?
- **Goal: Offshore wind that competes on the grid with no subsidy**
  - VolturnUS 1:50, 1:8 and full scale
- A vision for offshore wind in Maine

Bringing Advanced Materials into Construction

- Founded though the NSF in 1996
- 180 staff
- 100,000 ft^2 lab
- 2,000+ students funded from 35+ majors at UMaine
- 14 spinoff companies

Our Partners and Clients:



THE UNIVERSITY OF MAINE

ADVANCED STRUCTURES & composites center

183 ft Blade

How much does a Maine family spend on energy?

At $4/gallon

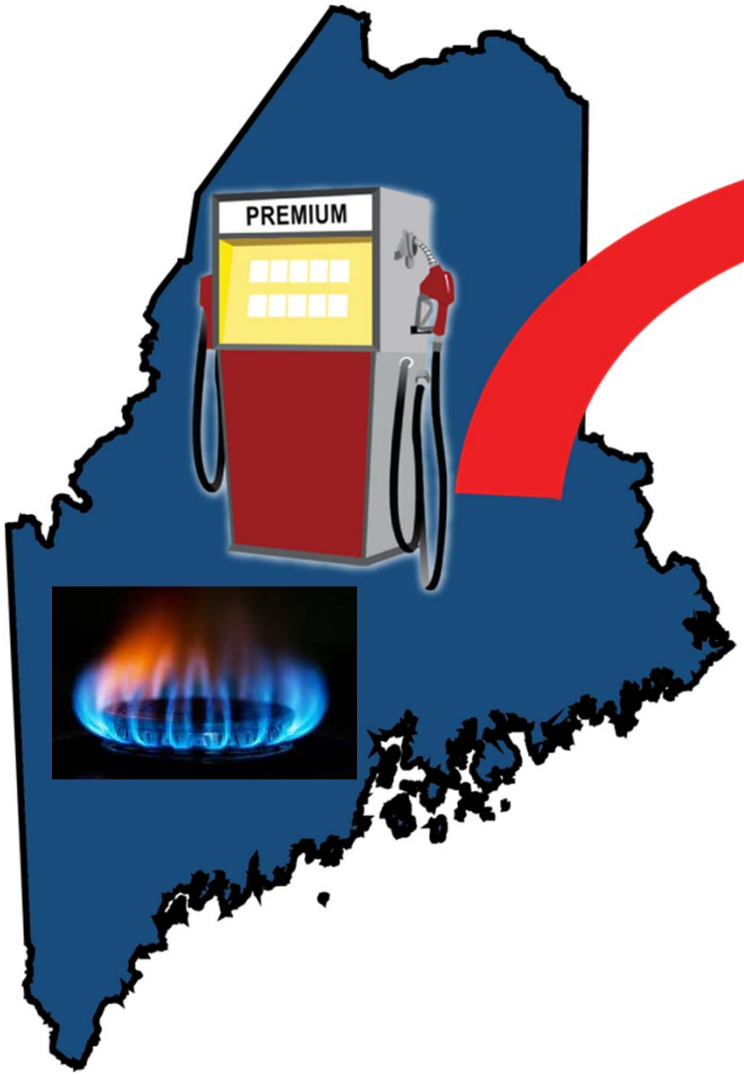
$1,000 electricity

$4,000 heating

$5,000 gas

$10,000 total

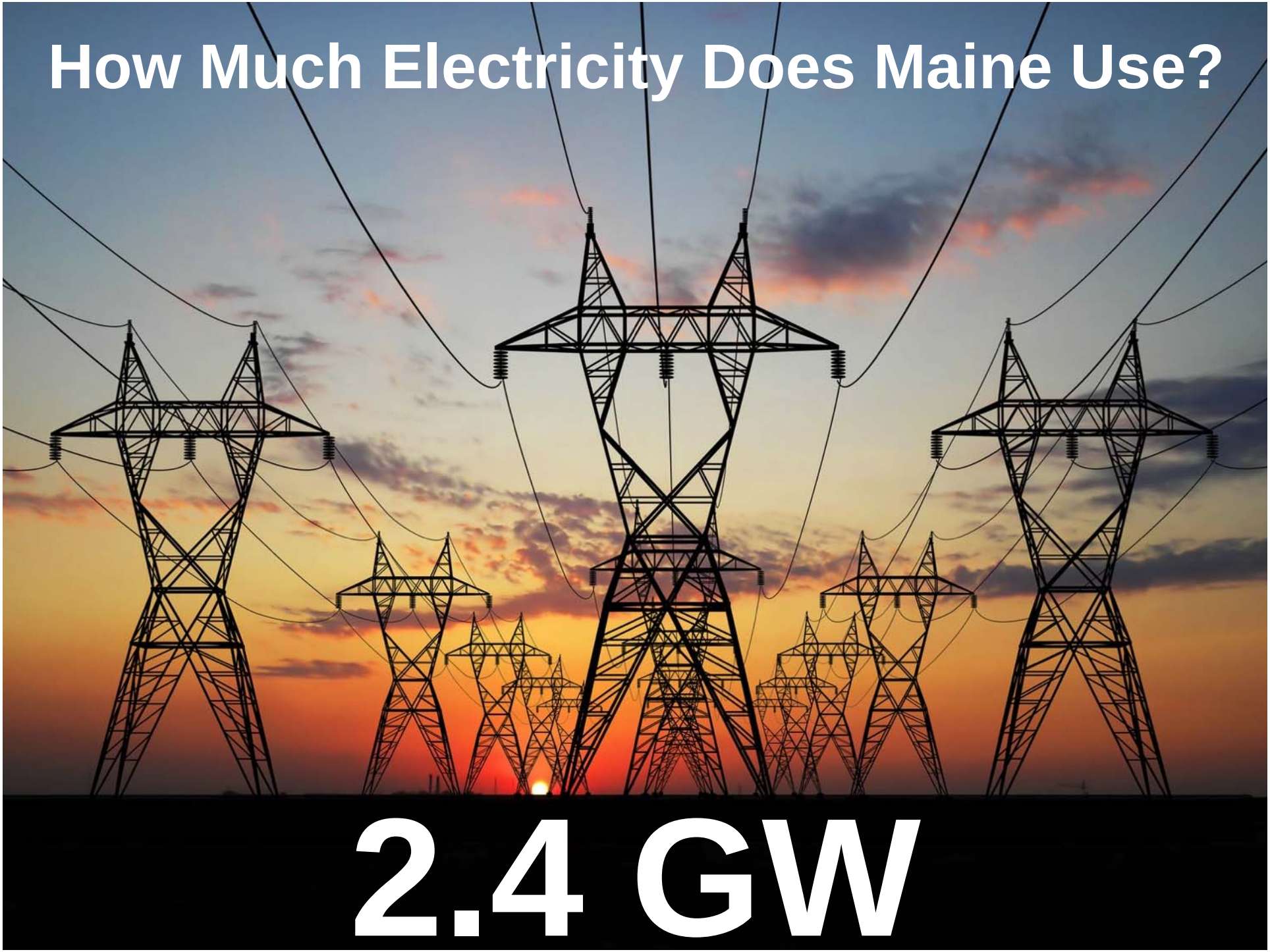
How Much Fuel Money Leaves Maine Each Year?



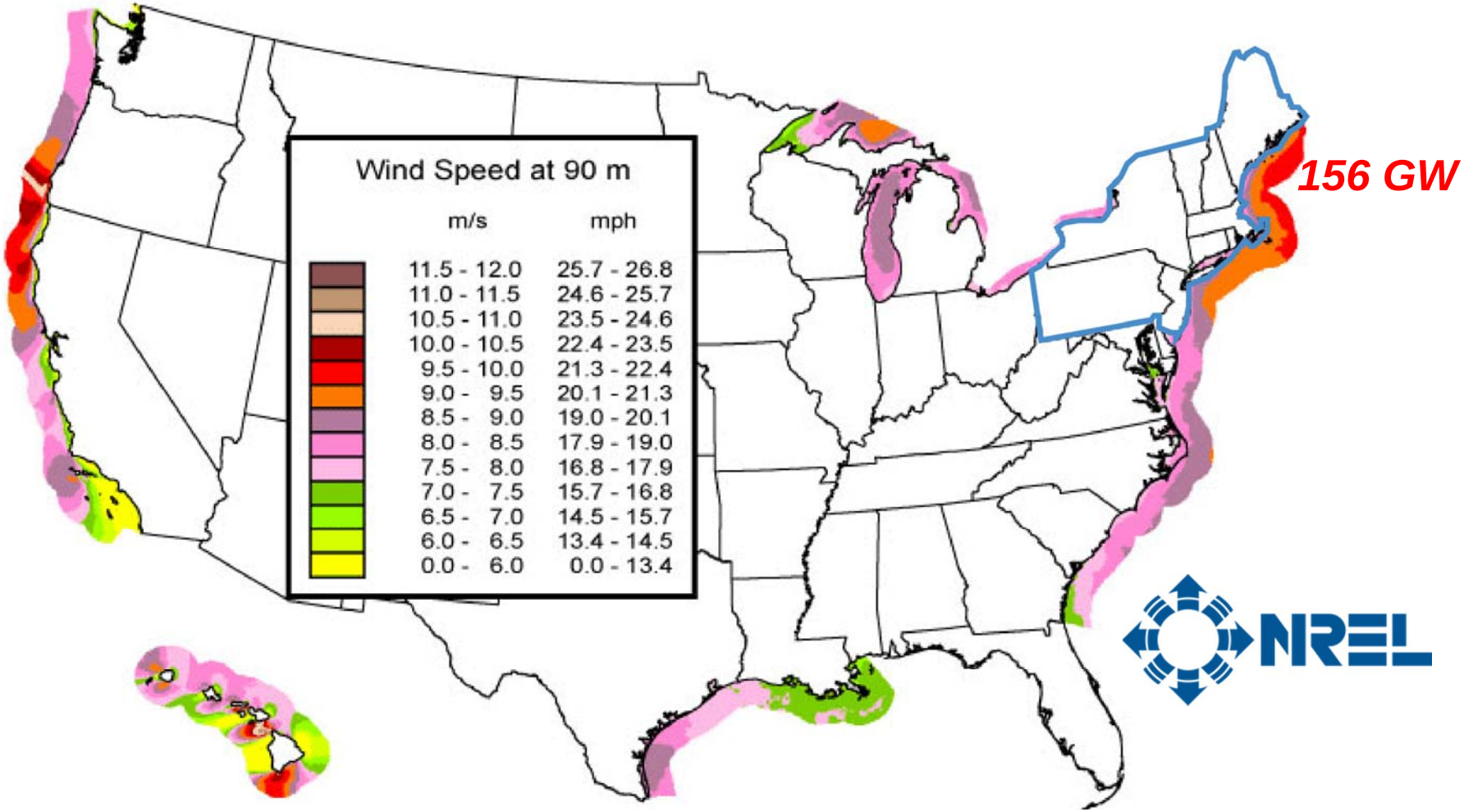
$6B

Amount Maine *spends* each year on petroleum and natural gas.

Data from U.S. Energy Information Administration, "Maine State Profile and Energy Estimates – Expenditures 2013"

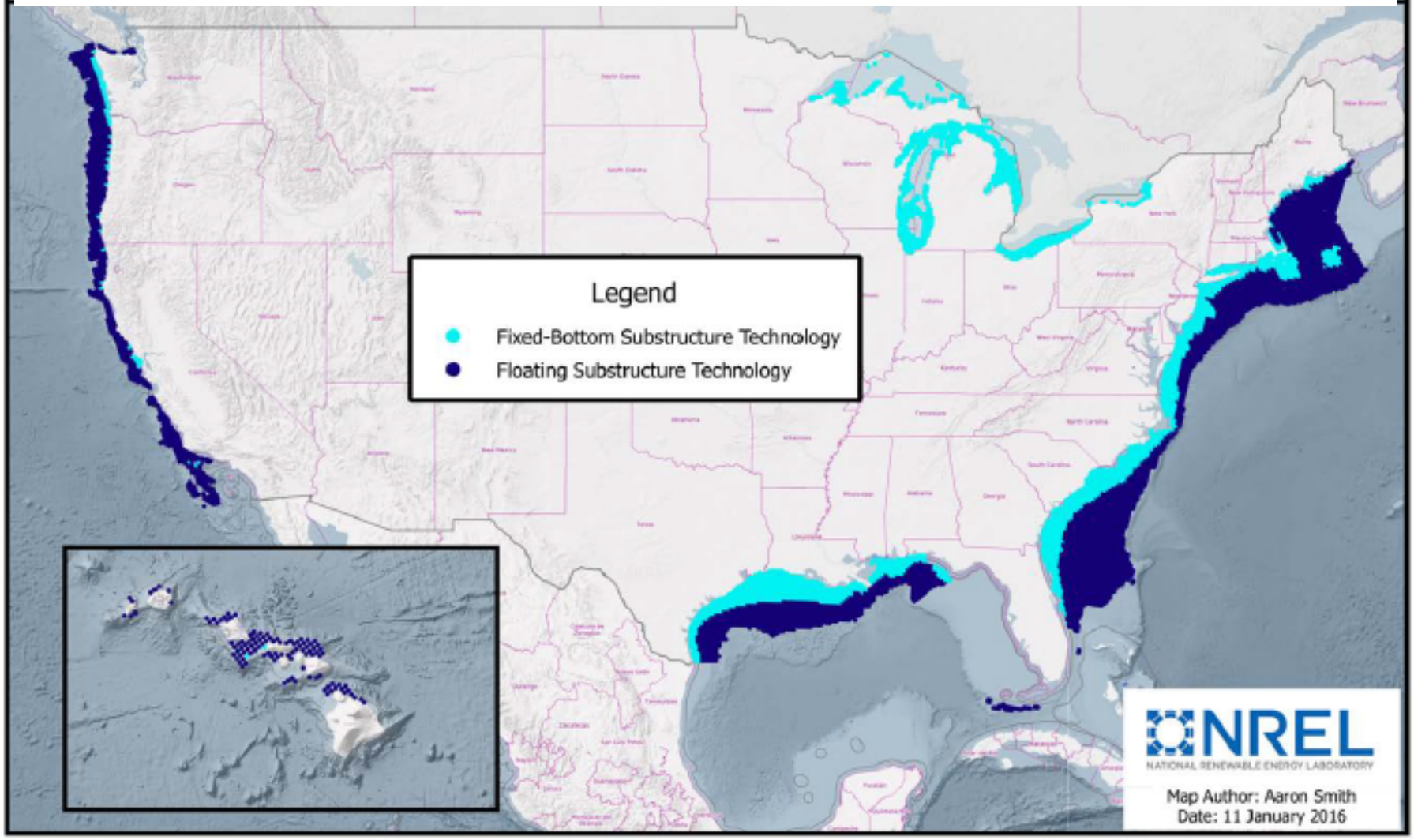

How Much Electricity Does Maine Use?
2.4 GW

How Much Offshore Wind Capacity Does Maine Have?



Europe Leads In Offshore Wind
>13,000 MW Installed – Fixed Bottom
Our Goal: Can floating offshore wind compete with no subsidy?

> 60% of the US offshore wind resource can be harnessed using floating technology.



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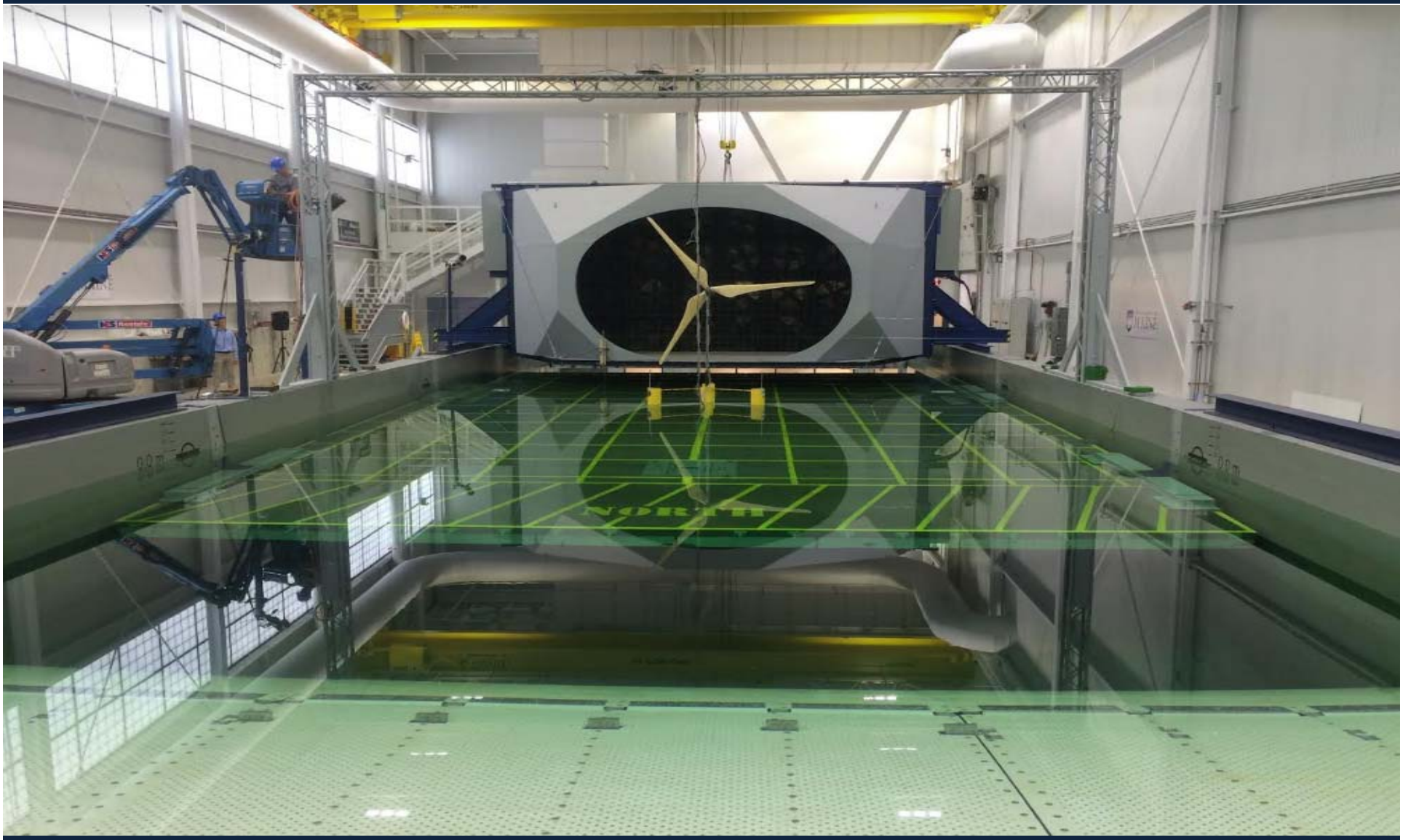
CONFIDENTIAL

Floating Turbines
1:50 Scale Testing



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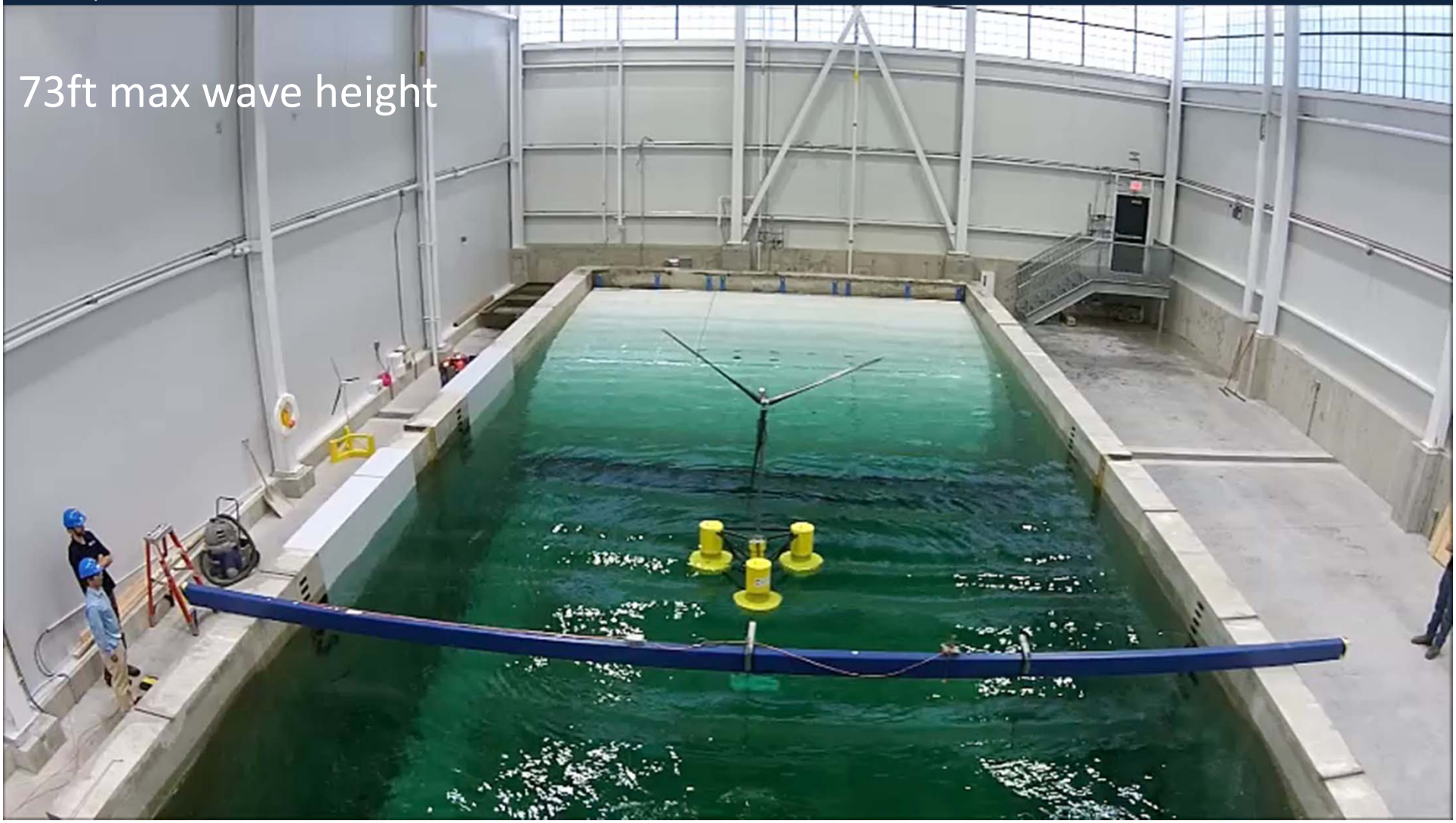
W2 Unique Facility

500-year Survival Waves - Rotor Idling



VolturnUS 1:8 Launch

May 31, 2013

First grid connected offshore wind turbine in US

First in World using concrete hull and composite tower

Goal is < 10 cents/kWh

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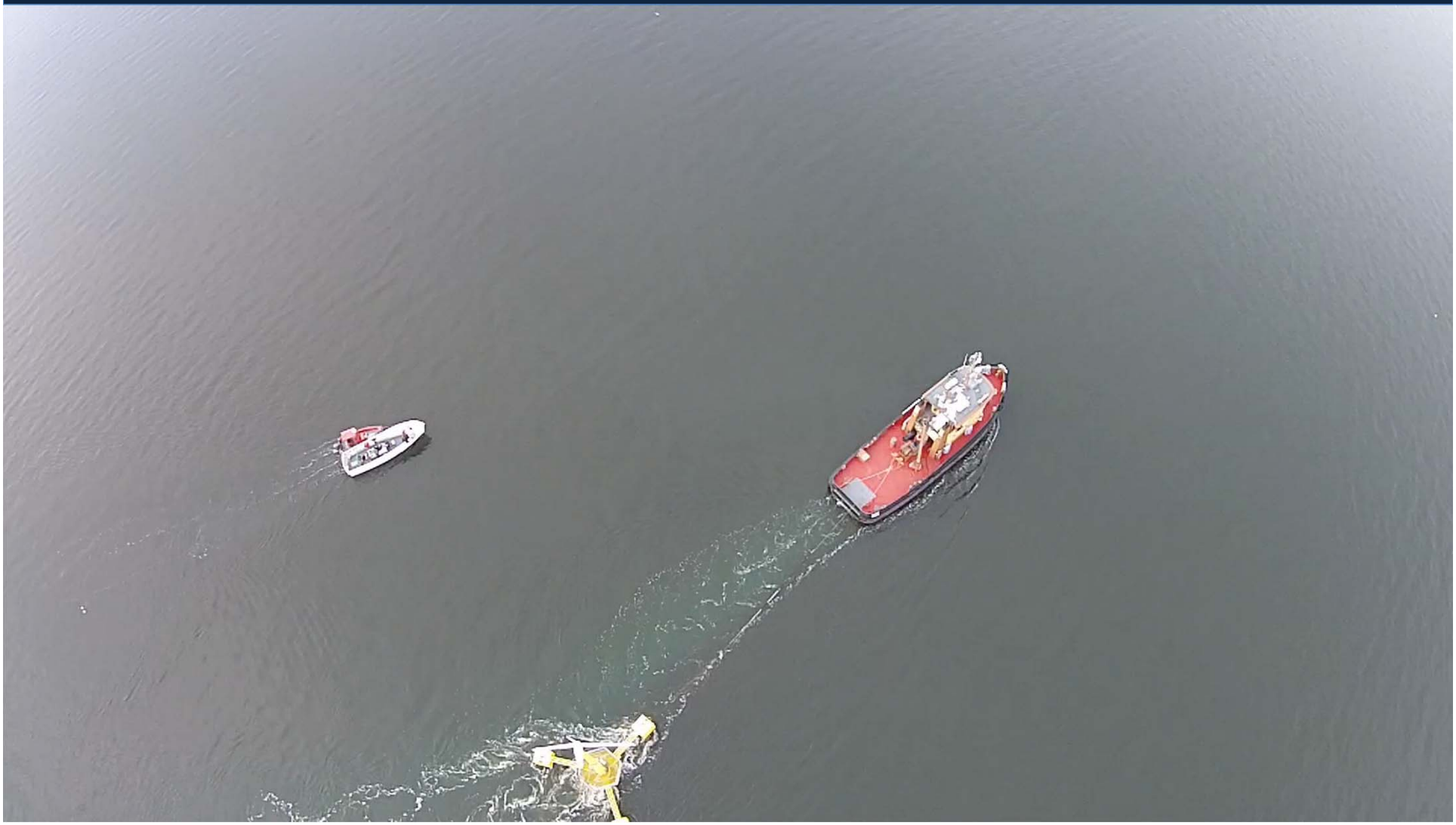
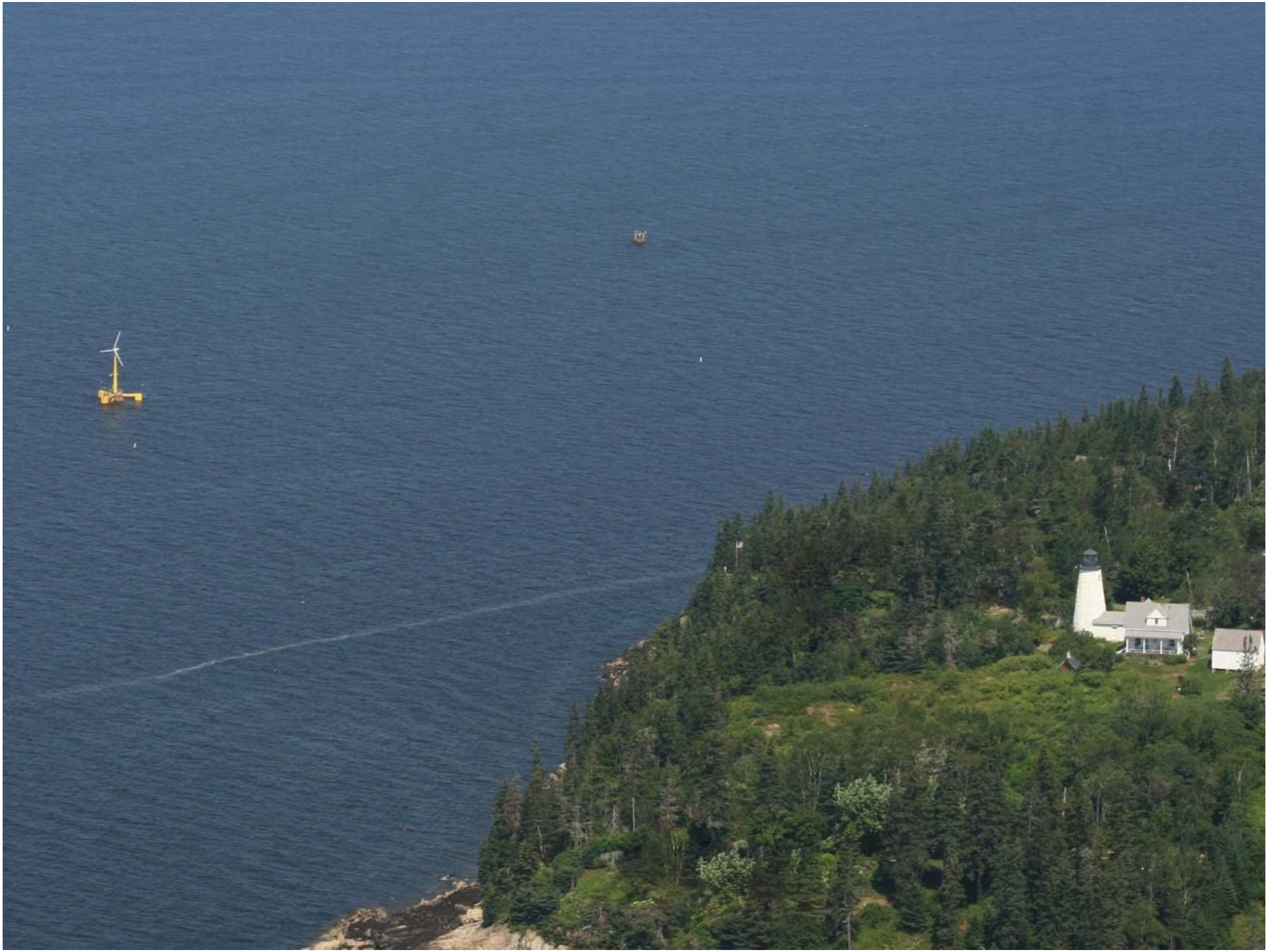
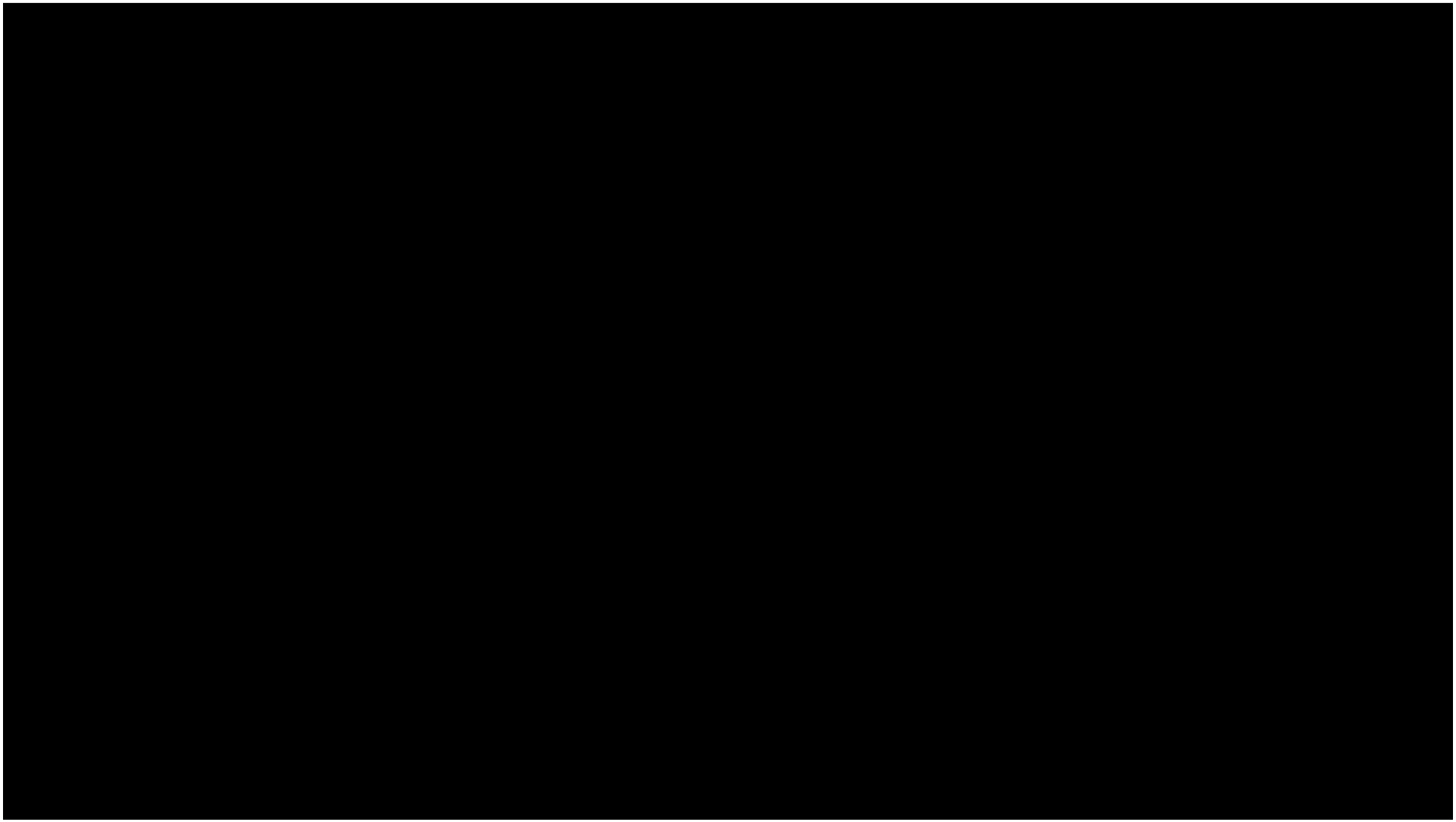




50-Year Storm



Success of VolturnUS 1:8 Pilot Deployment

Validated Technology Performance

Experienced forty scaled 50 to 500-year return period storms. In all cases:

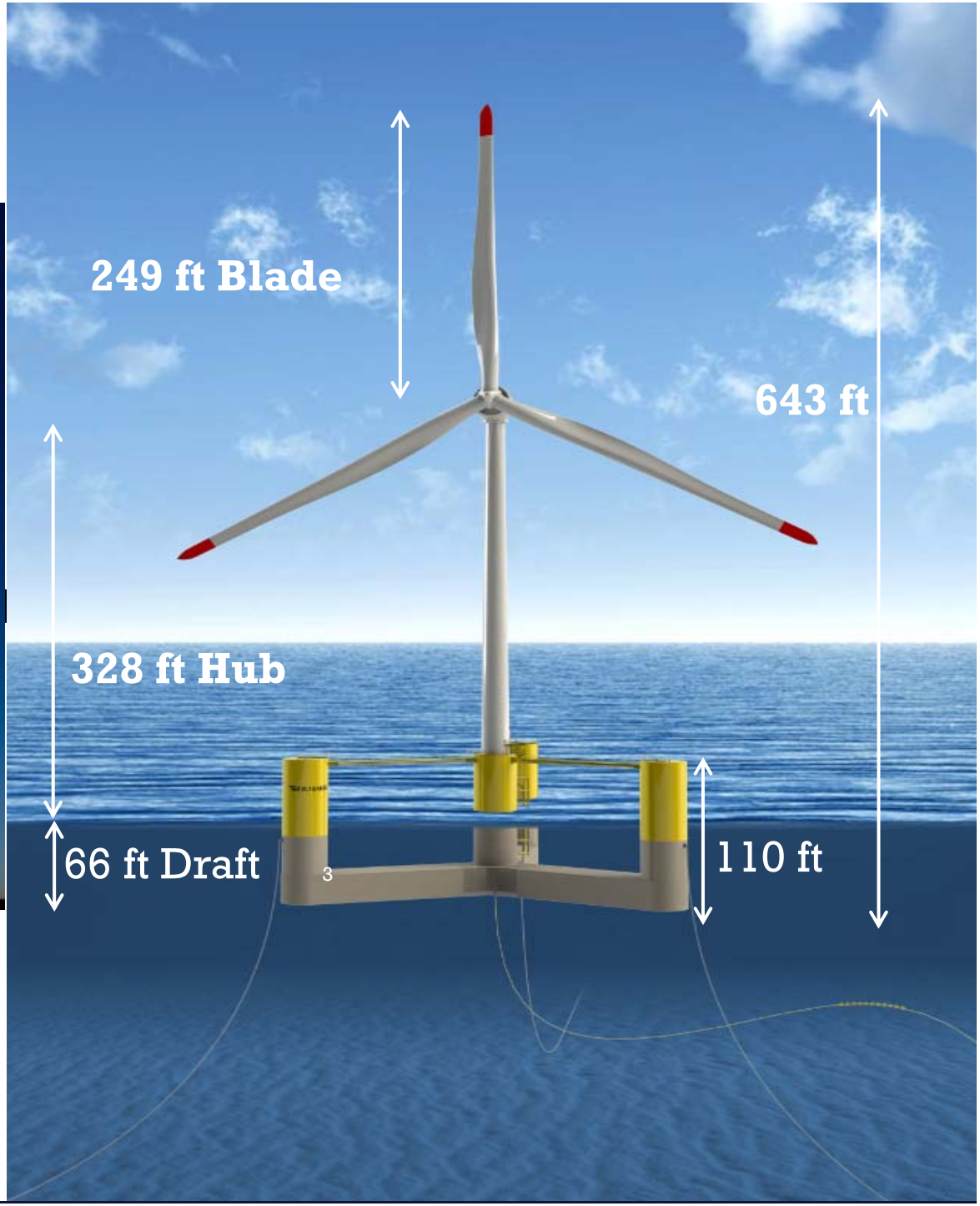
- ✓Max nacelle acceleration < 0.2g
- ✓Max heel angle < 7 degrees

Extreme Event: Nov. 1, 2013

May 2016: DOE Awarded $39.9 M to Cost-Share Construction of Demonstration project

- 2 x 6 MW turbines
- 2.5 miles S. Monhegan Island
- Site control in place
- 20-year PPA term sheet
- Construction 2018-2019
- COD 2019

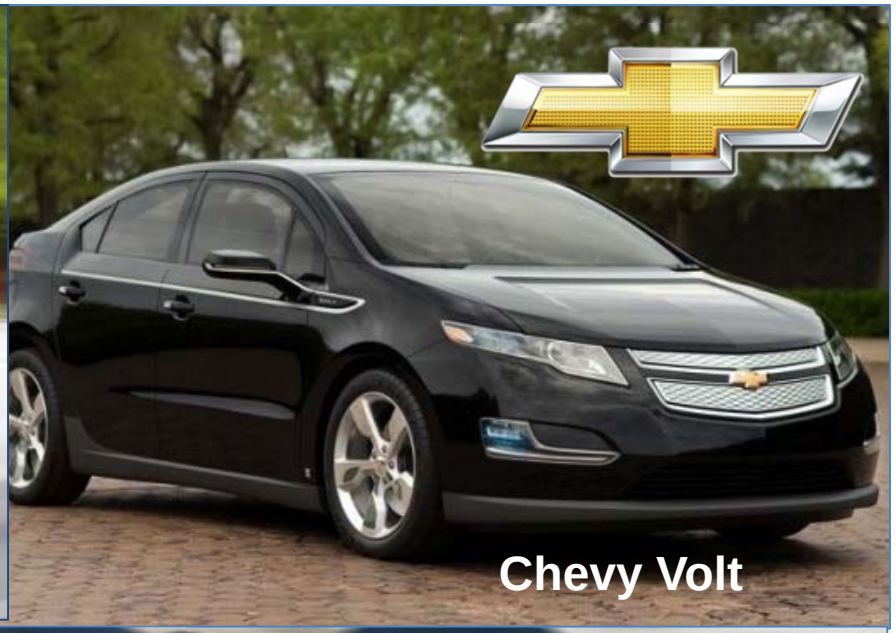
554 ft


249 ft Blade
643 ft
328 ft Hub
66 ft Draft
110 ft
3

Assembly at Searsport, Maine
2018-2019
> 300 Jobs during construction

Storage:
How Many Electric Vehicles in the Next 30 Years?

Ford Focus Electric


Chevy Volt

Nissan Leaf

Audi Electric SUV

How Many Heat Pumps in the Next 30 Years?

2020's-2040's: Offshore Wind for transportation and home heating

HOME HEATING

Heat Pumps

Weatherization

Smart grid

Maine

Export to New England

TRANSPORTATION

Plug-in Electric Vehicles

Summary

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QUESTIONS?

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VolturnUS 1:8
74ft max wave height
turbine operating at rated wind speed
Jan 25th, 2014 1:38pm