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CONGRESSIONAL BRIEFING
Offshore Wind Energy
Briefing Series: Scaling Up Innovation to Drive Down Emissions

Wednesday, June 29, 2022

About EESI

EESI
Environmental and Energy Study Institute

Non-partisan Educational Resources for Policymakers

A bipartisan Congressional caucus founded EESI in 1984 to provide non-partisan information on environmental, energy, and climate policies

Direct Assistance for Equitable and Inclusive Financing Program

In addition to a full portfolio of federal policy work, EESI provides direct assistance to utilities to develop “on-bill financing” programs

Commitment to Diversity, Equity, Inclusion, and Justice

We recognize that systemic barriers impede fair environmental, energy, and climate policies and limit the full participation of Black, Indigenous, people of color, and legacy and frontline communities in decision-making

Sustainable Solutions

Our mission is to advance science-based solutions for climate change, energy, and environmental challenges in order to achieve ***our vision of a sustainable, resilient, and equitable world***.

Policymaker Education

EESI
Environmental and Energy Study Institute

Briefings and Webcasts

Live, in-person and online public briefings, archived webcasts, and written summaries

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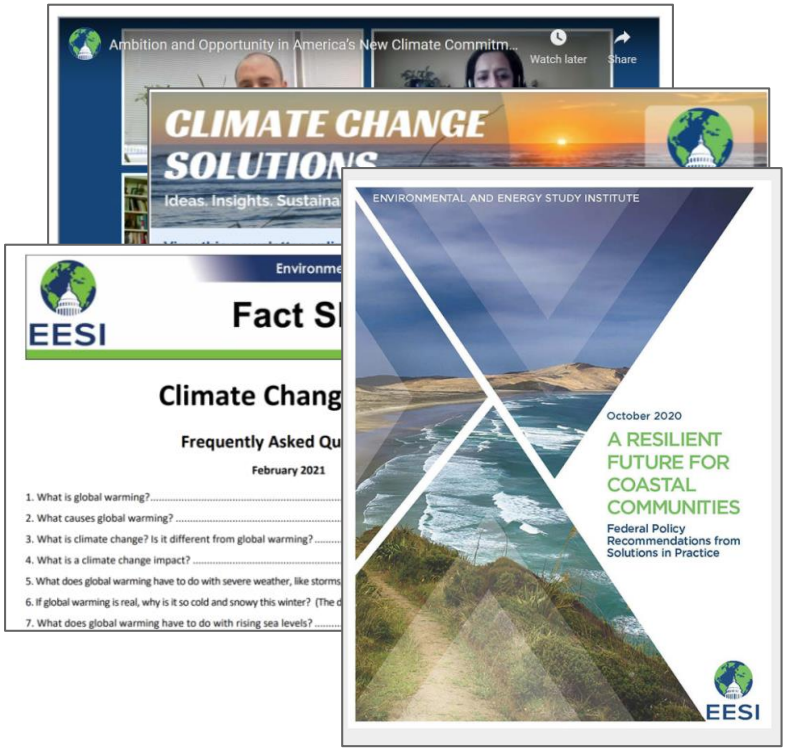
Bi-weekly newsletter with everything policymakers and concerned citizens need to know, including a legislation and hearings tracker

Fact Sheets and Issue Briefs

Timely, objective coverage of environmental, clean energy, and climate change topics

Social Media (@EESIOnline)

Active engagement on Twitter, Facebook, LinkedIn, and YouTube



Upcoming Briefings & Series

EESI Environmental and Energy Study Institute

Living with Climate Change

Polar Vortex – April 13

Sea Level Rise – May 18

Wildfires – June 13

Extreme Heat – June 24

Scaling Up Innovation to Drive Down Emissions

Green Hydrogen – April 27

Direct Air Capture – May 25

Electric Vehicle Charging – June 02

Offshore Wind Energy – June 29

BOEM
Bureau of Ocean Energy Management

Outer Continental Shelf (OCS) Renewable Energy

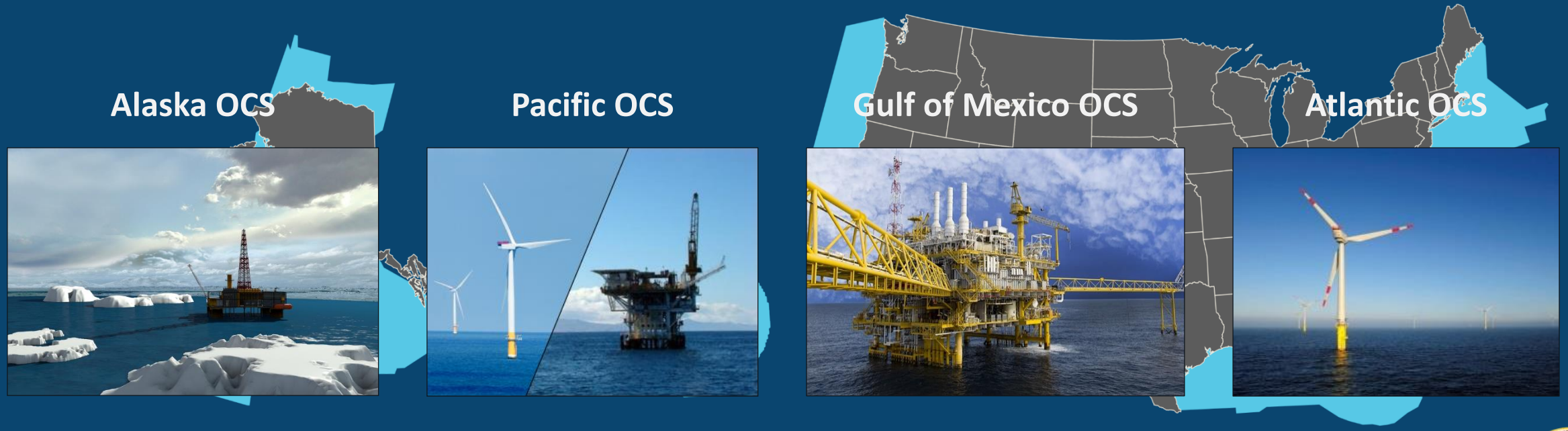
Wright Frank
Office of Renewable Energy Programs

Environmental and Energy Study Institute
June 29, 2022

Outer Continental Shelf (OCS) Energy

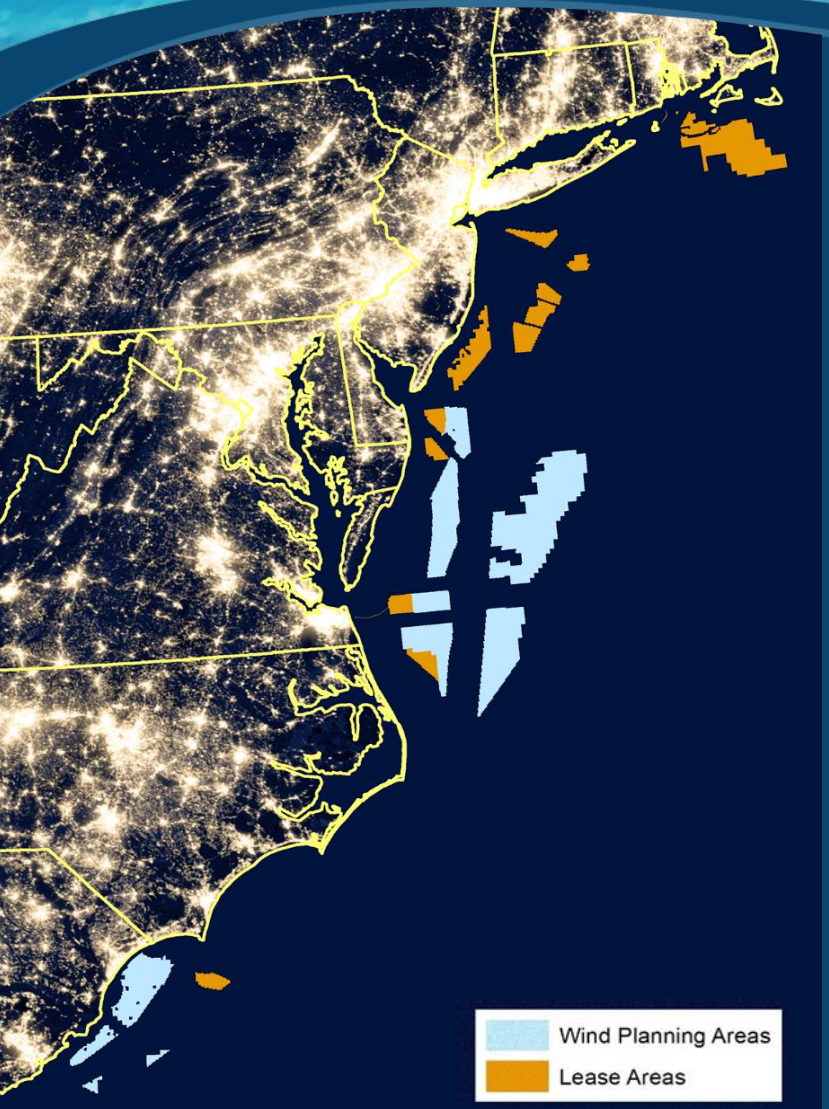
OCS Lands Act: "… vital national resource … expeditious and orderly development … environmental safeguards"

Energy Policy Act of 2005: "… energy from sources other than oil and gas …"



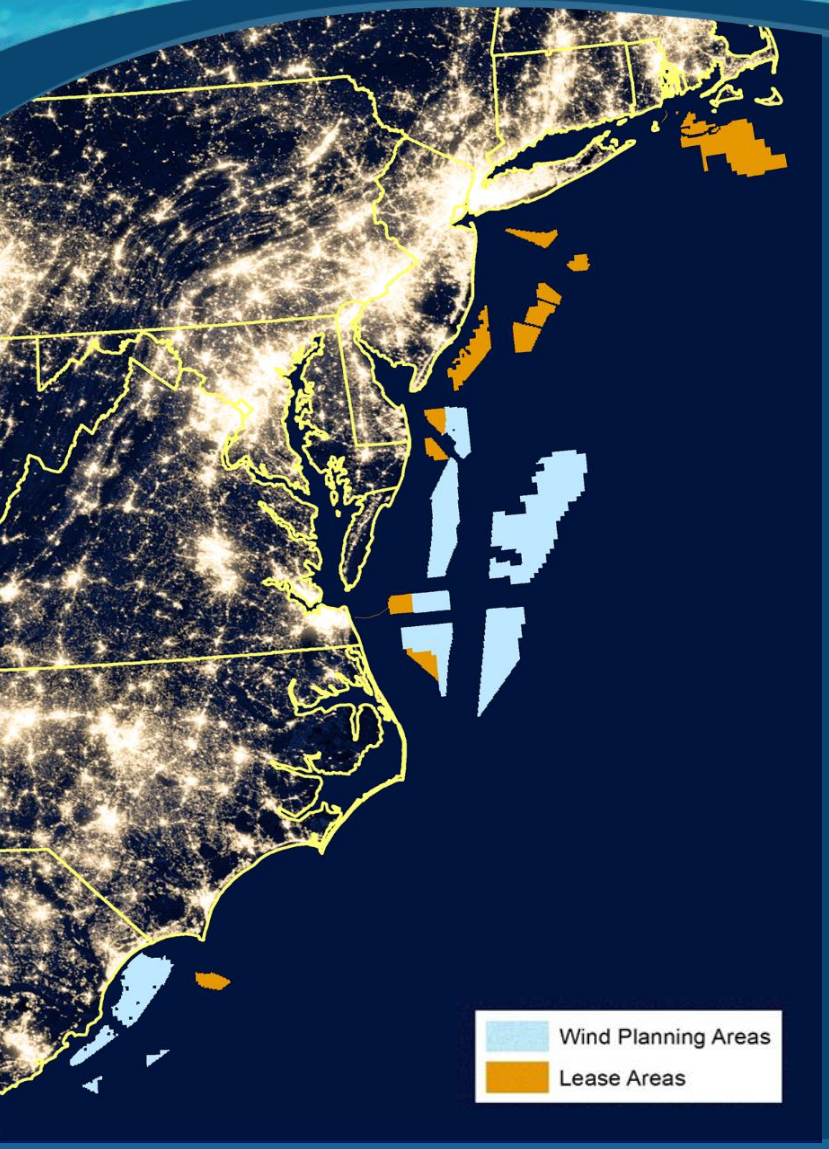
Atlantic OCS Renewable Energy: State Leadership

Atlantic OCS Renewable Energy: State Leadership (cont.)



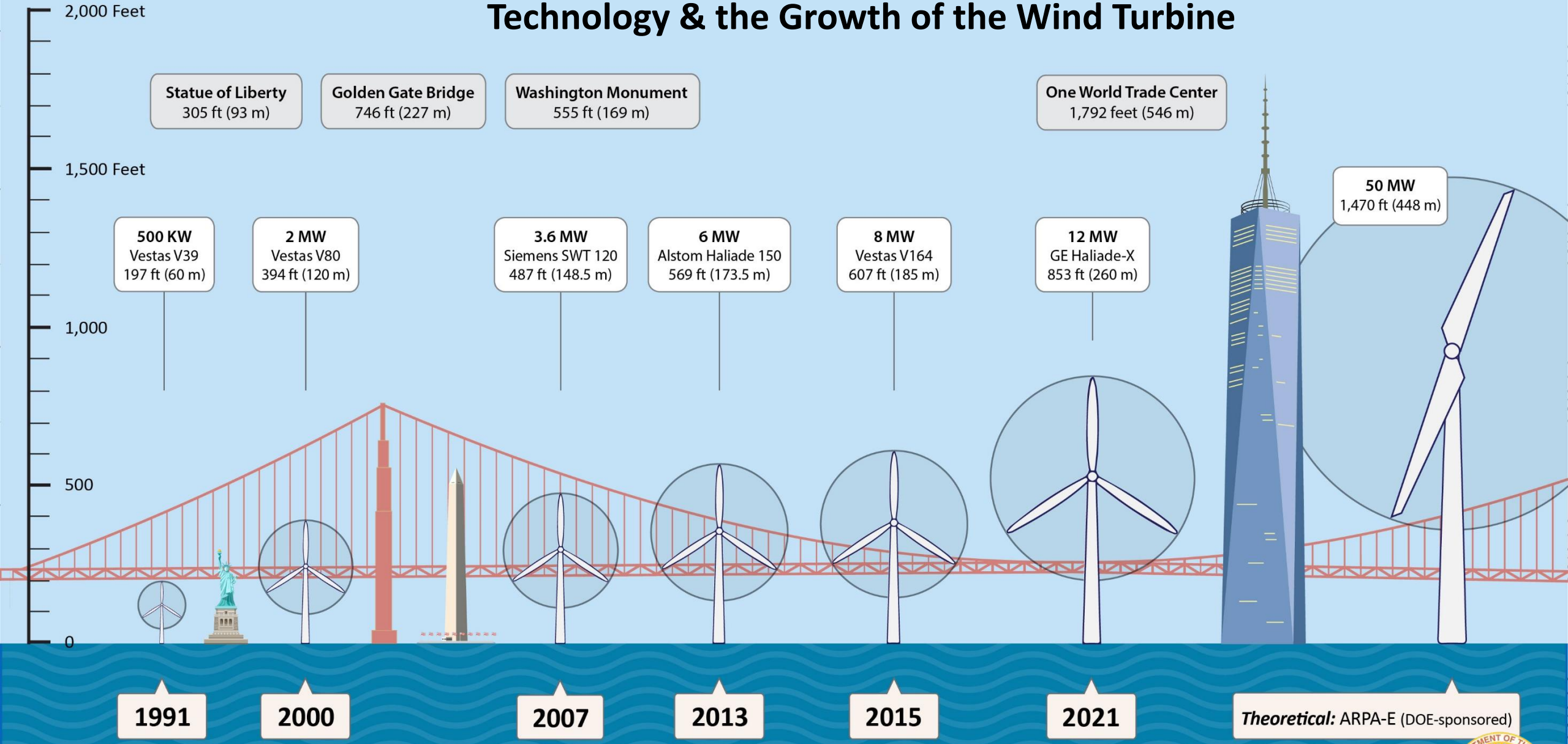
	Renewable Goals	Offshore Wind Goals (MW)	Offshore Wind: "Offtake" Awarded (MW) + Scheduled (MW)
Maine	80% by 2030	144	0 + 0
Massachusetts	35% by 2030	5,600	1,600 + 1,600
Rhode Island	100% by 2030	unspecified	430 + 600
Connecticut	48% by 2030	2,300	1,108 + 0
New York	70% by 2030	9,000	4,316 + 0
New Jersey	50% by 2030	7,500	1,100 + 6,400
Maryland	50% by 2030	1,568	368 + 1,200
Virginia	30% by 2030	5,212	2,652 + 0
North Carolina	unspecified	2,800	0 + 0

Atlantic OCS Renewable Energy: State Leadership (cont.)

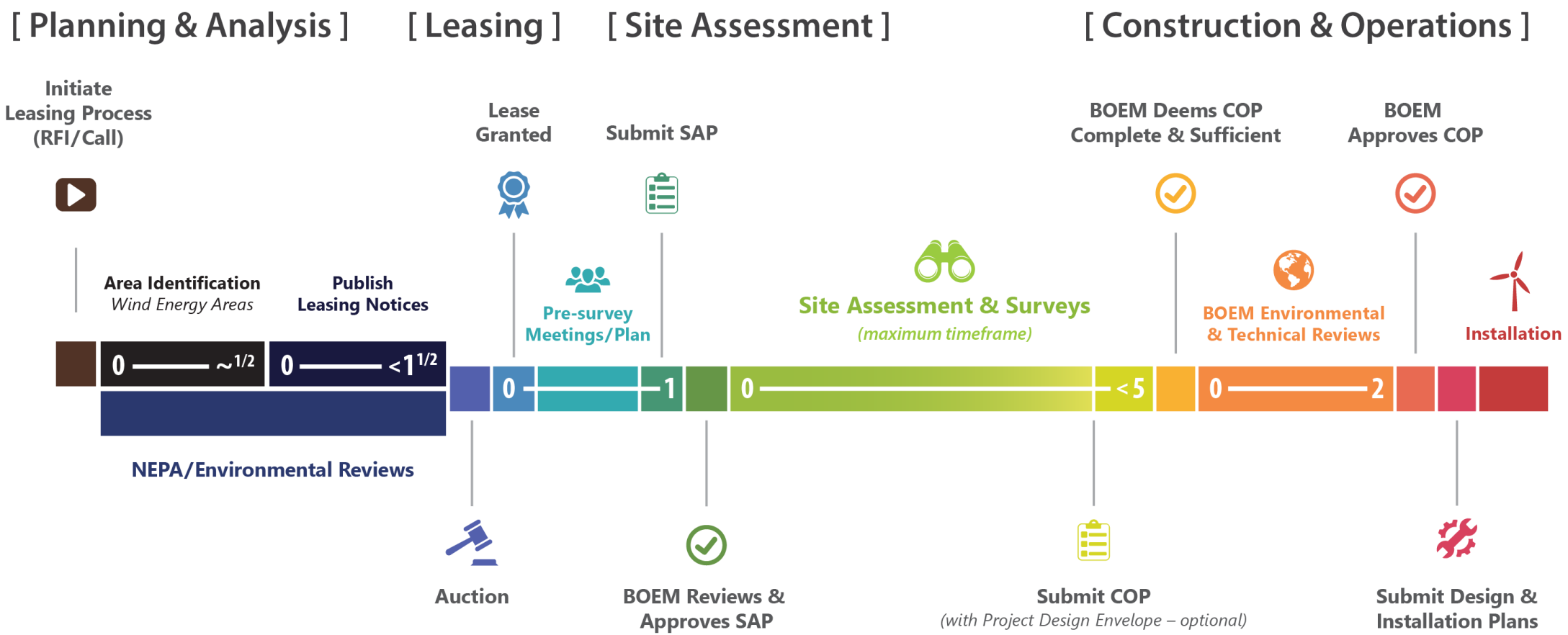


	Renewable Goals	Offshore Wind Goals (MW)	Offshore Wind: "Offtake" Awarded (MW) + Scheduled (MW)
California	100% by 2045	3,000	unspecified
Hawaii	100% by 2045	unspecified	unspecified
Oregon	50% by 2040	unspecified	unspecified
Louisiana	80% by 2050	5,000	unspecified
TOTAL	--	**42,124** MW	**21,374** MW

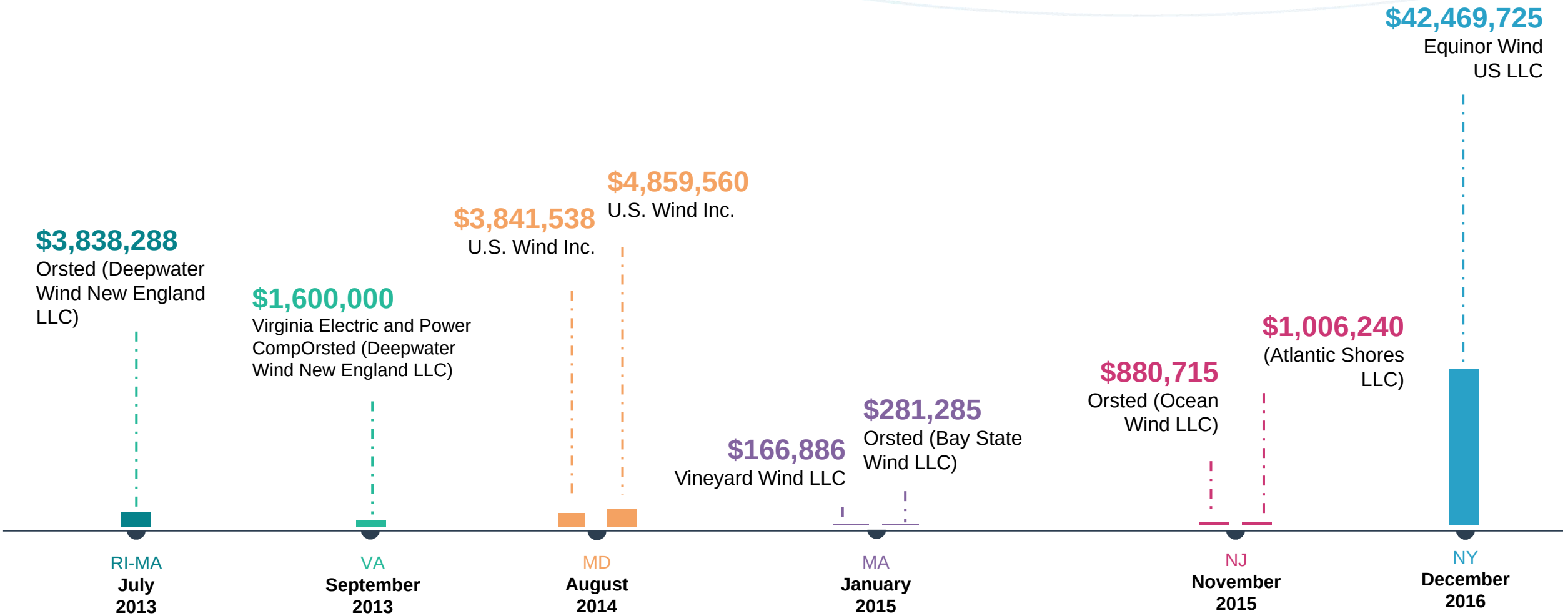
Technology & the Growth of the Wind Turbine



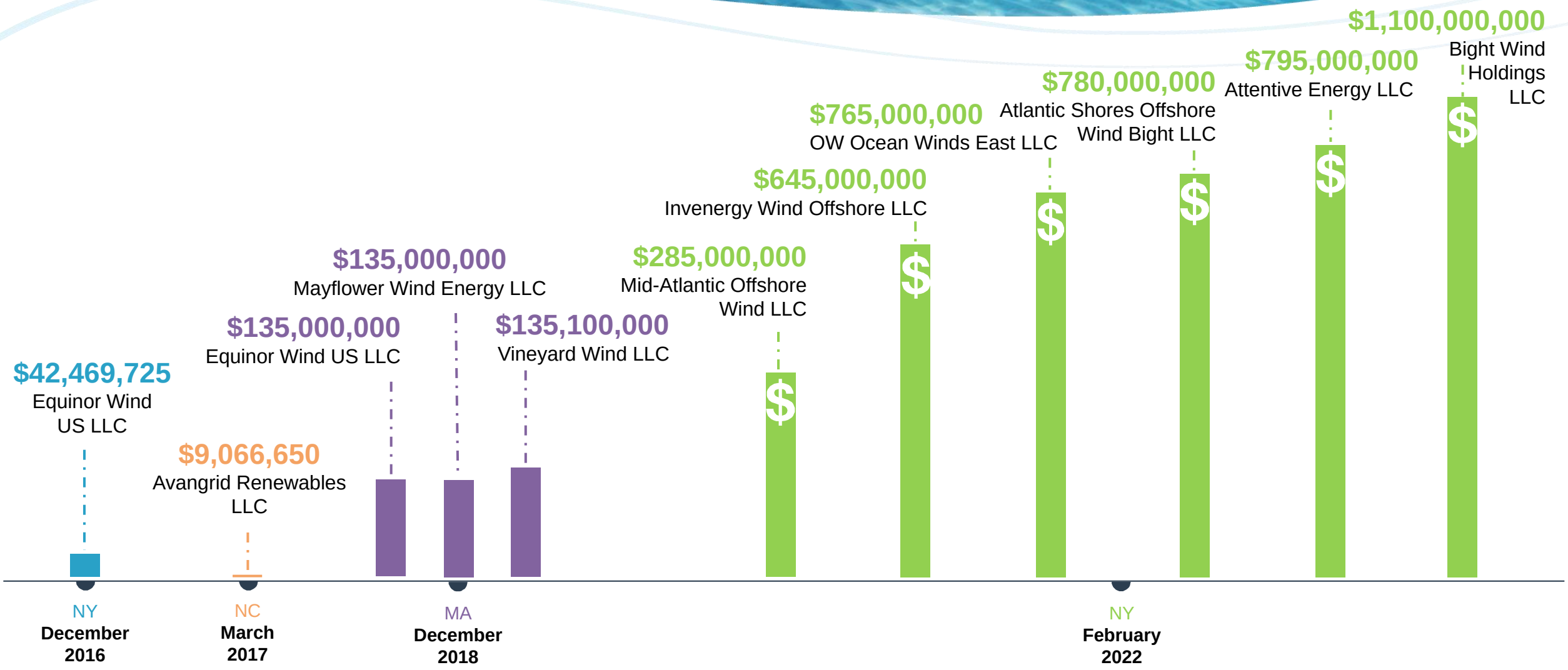
Renewable Energy Leasing Process: From RFI/Call to Operation



Atlantic OCS Renewable Energy Lease Sales (2013 – 2016)



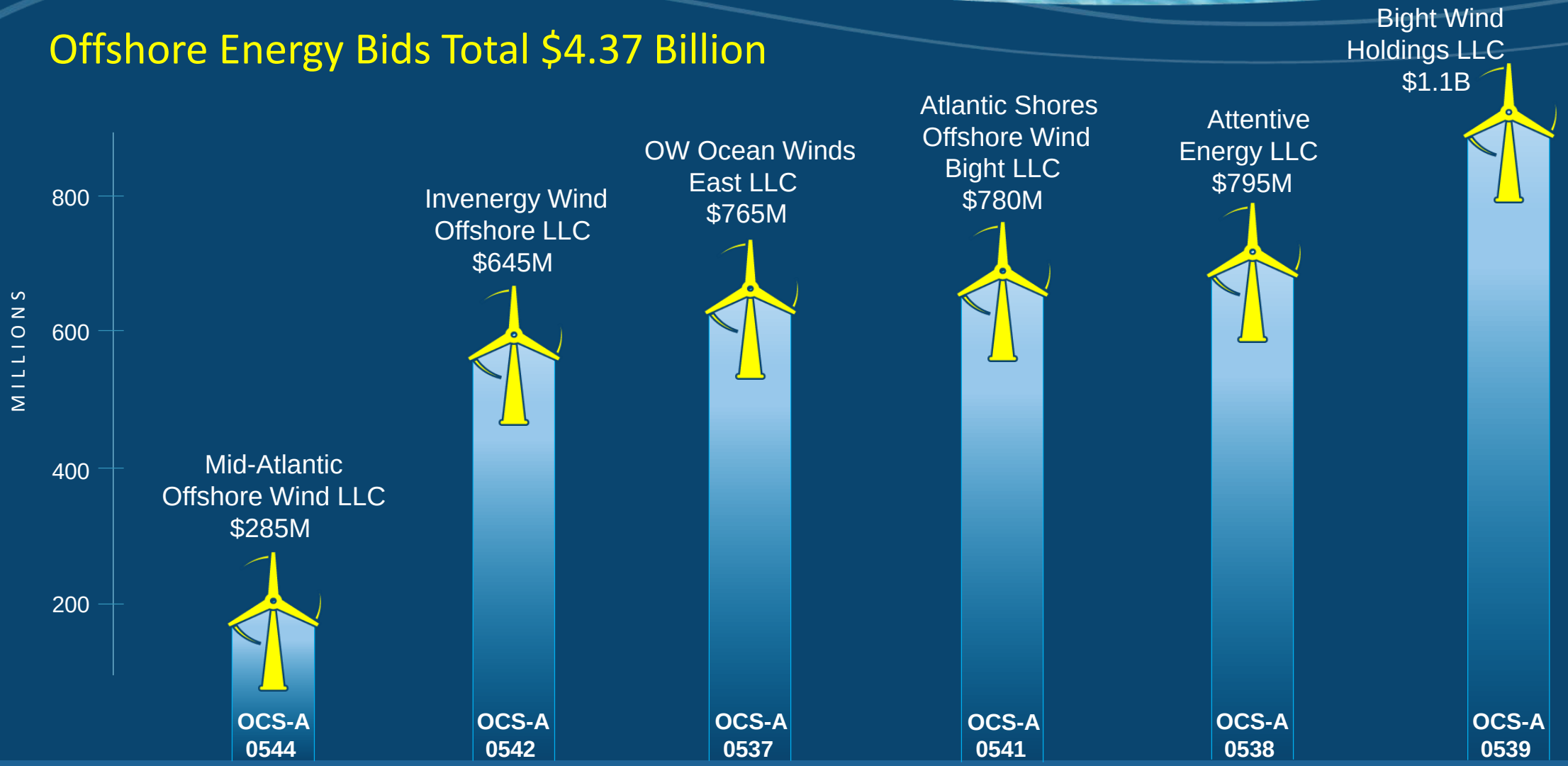
Atlantic OCS Renewable Energy Lease Sales (2016 – 2022)



$ = Recent Sales

Atlantic OCS Renewable Energy Lease Record Sales

Offshore Energy Bids Total $4.37 Billion

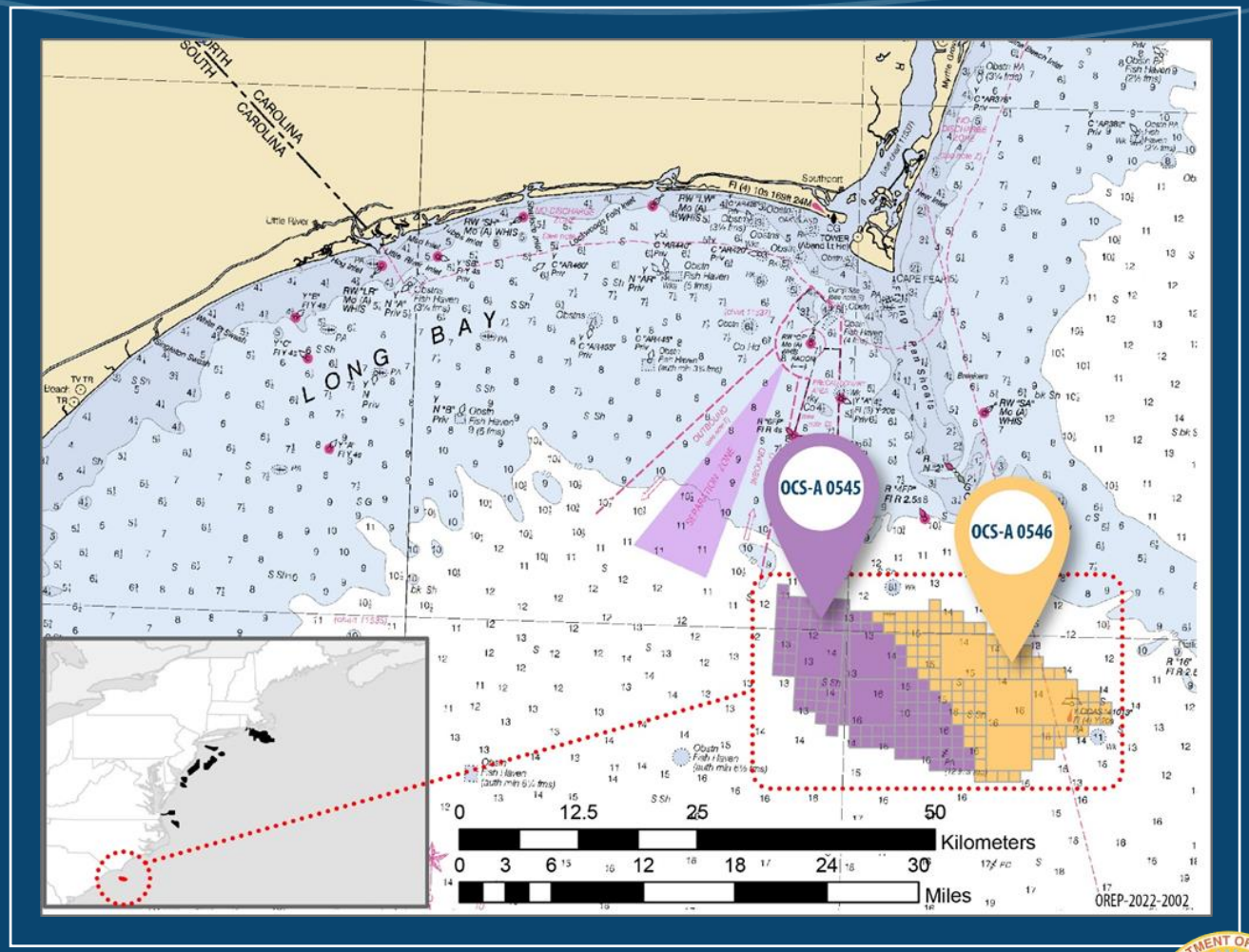


Renewable Energy Leasing: Carolina Long Bay

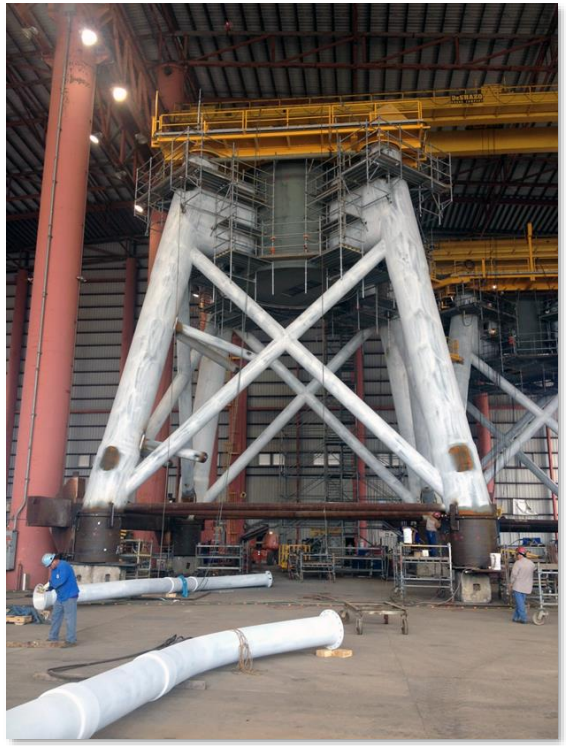
Provisional Winners of the Carolina Long Bay Lease Areas, $315M in High Bids

OCS-A 0545
TotalEnergies Renewables USA, LLC
$[illegible]M

OCS-A 0546
Duke Energy Renewables Wind, LLC
$[illegible]M



Atlantic OCS Renewable Energy: Onshore Supply Chain Activities



MANUFACTURING

Atlantic OCS Renewable Energy: Onshore Supply Chain Activities (cont.)

VESSELS

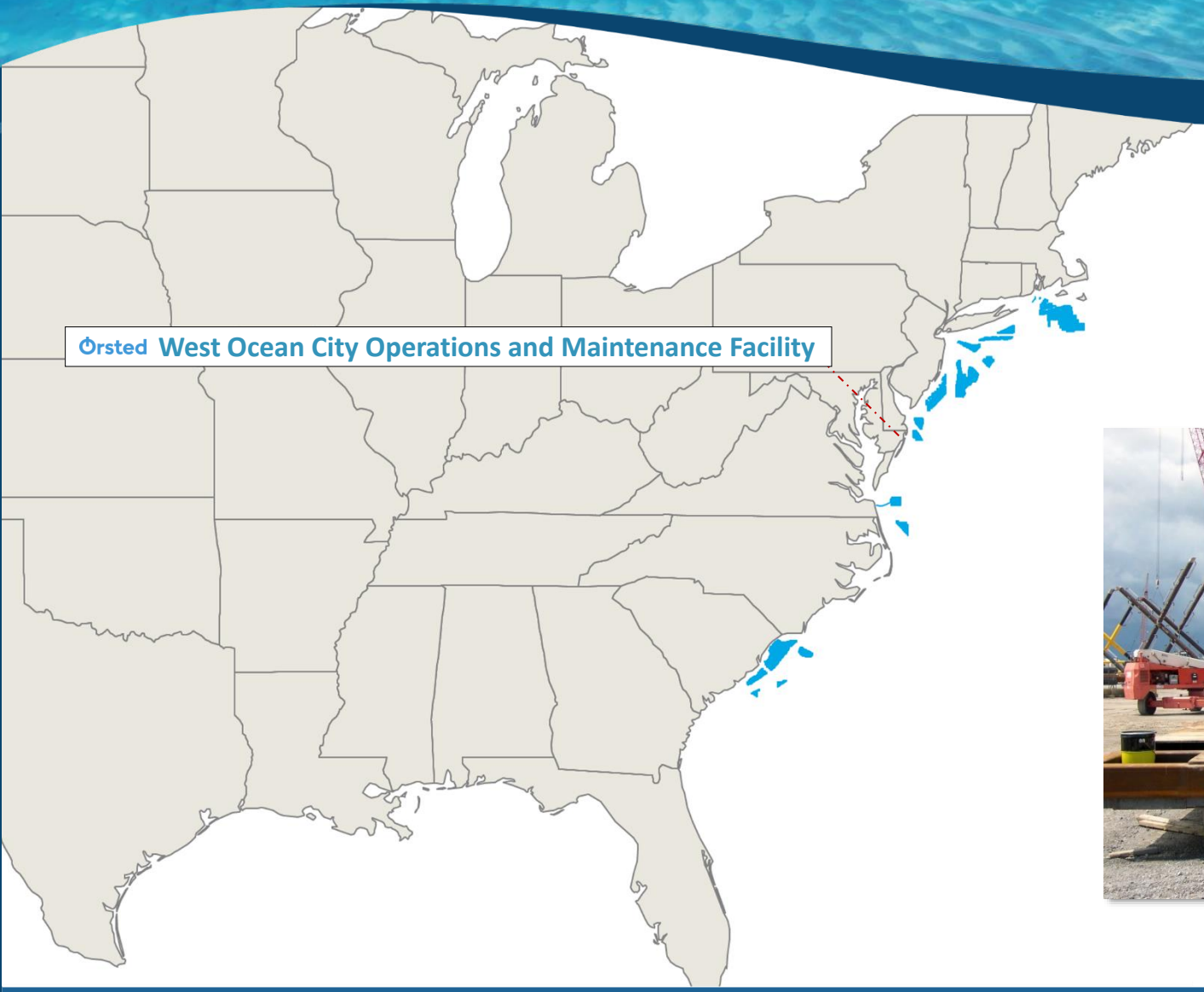
Atlantic OCS Renewable Energy: Onshore Supply Chain Activities (cont.)

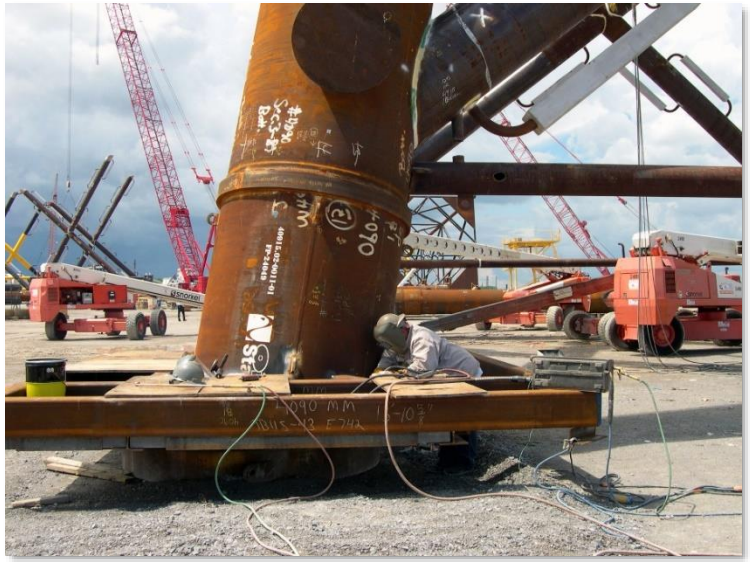
PORTS

Atlantic OCS Renewable Energy: Onshore Supply Chain Activities (cont.)

ACADEMIA

Atlantic OCS Renewable Energy: Onshore Supply Chain Activities (cont.)

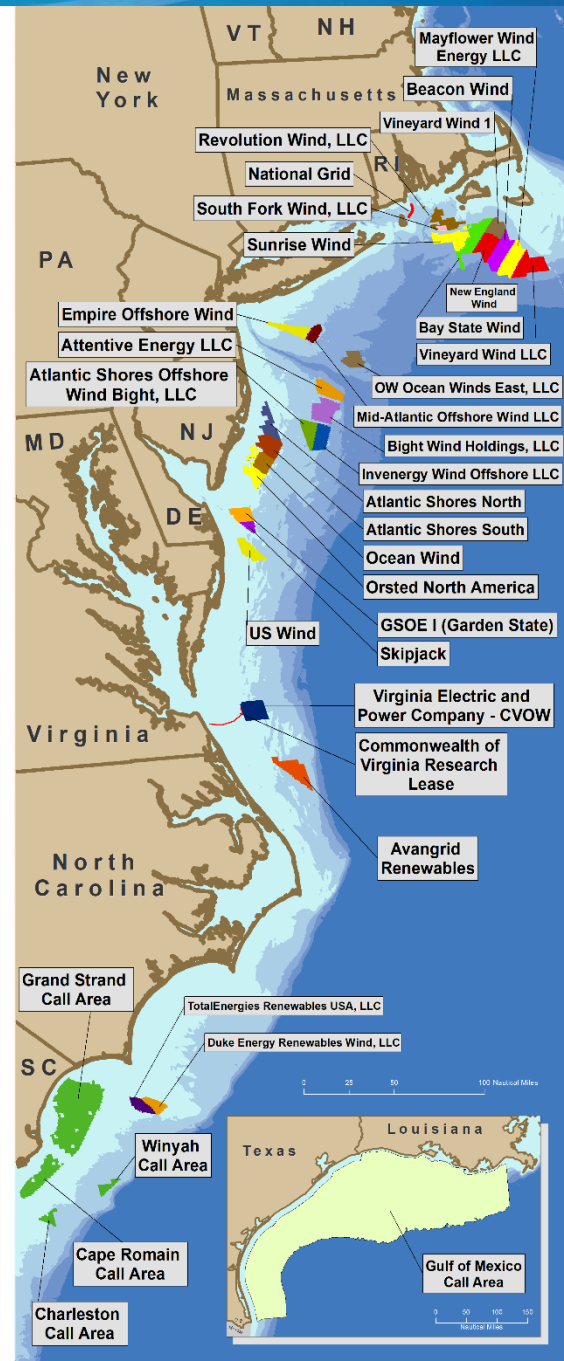




OPERATIONS & MAINTENANCE

Renewable Energy Program by the Numbers

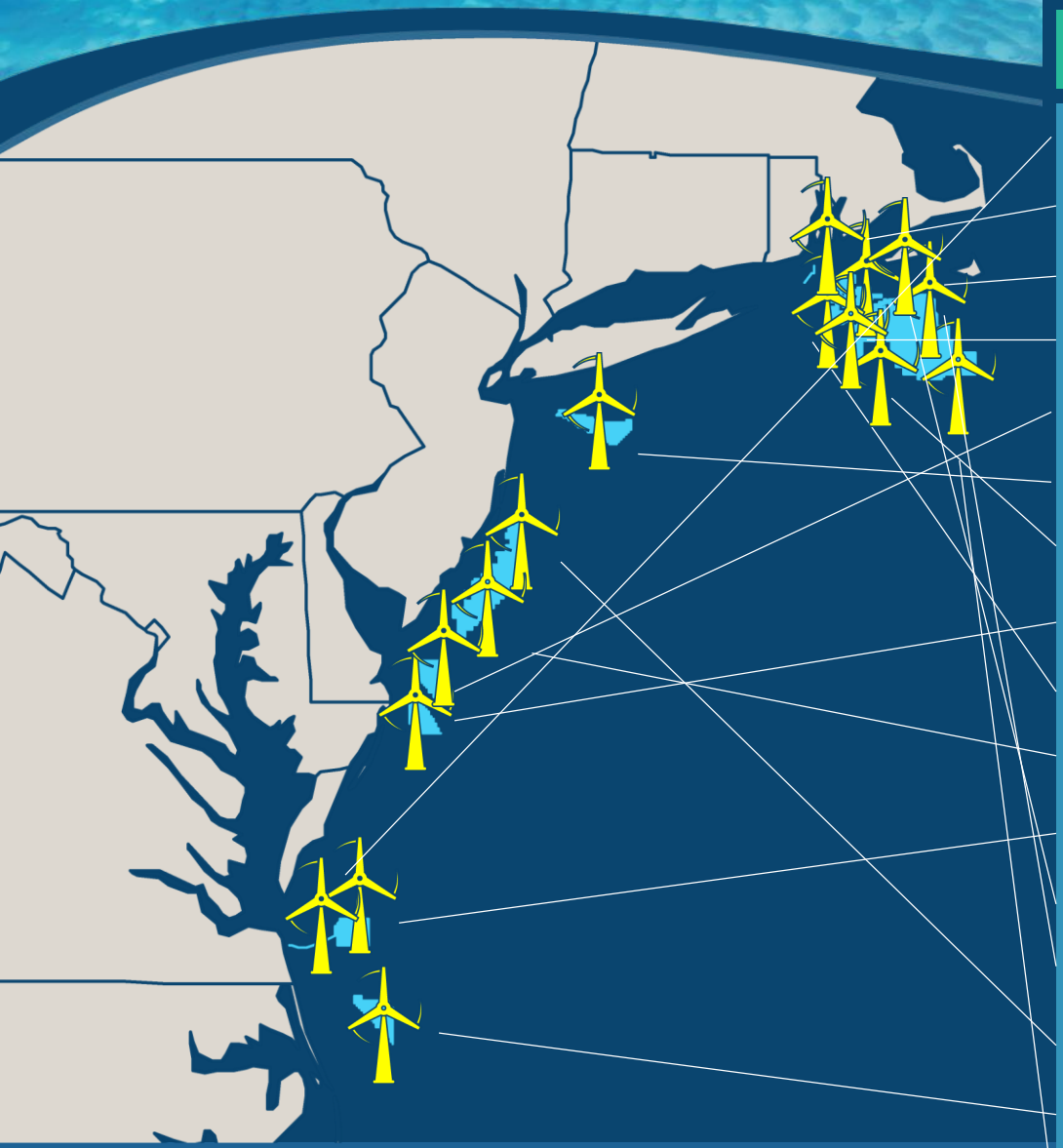
Competitive Lease Sales Completed:	10
Active Commercial Offshore Leases Issued:	27
Active Research Offshore Leases Issued:	2
Site Assessment Plans (SAPs) Approved:	14
General Activities Plans Approved:	1
Construction and Operations Plans (COPs):	
• Approved Since 2021	2
• NEPA Process Underway	10
• Other COPs Submitted	5
• Anticipated Within Next 12 Months	2
Guidance:	11
Leasing Under Consideration:	5
Steel in the Federal Waters:	2020



STEEL IN THE WATER! Coastal Virginia Offshore Wind Project (CVOW)

- Lessee: Virginia DMME
- Operator: Dominion Energy
- Engineering Contractor: Orsted
  - Construction (May/June 2020)
  - Two 6-MW turbines
  - Staging: Halifax, Hampton Roads, Camp Pendleton
  - Commissioning: 2020

Atlantic OCS Renewable Energy: "Projects in the Pipeline"



	Project	Company
2020	Coastal Virginia Offshore Wind Pilot	Dominion Energy, DMME, Ørsted
	South Fork	Deepwater Wind
	Vineyard Wind I	Vineyard Wind
	Revolution Wind	Deepwater Wind
	Skipjack Windfarm	Garden State Offshore Energy, Deepwater Wind
	Empire Wind	equinor
	Bay State Wind	Bay State Wind
	U.S. Wind	US Wind
	Sunrise Wind	Ørsted, Eversource
	Ocean Wind	Ørsted
	Coastal Virginia Offshore Wind Commercial	Dominion Energy
	Park City Wind	Park City Wind
	Mayflower Wind	Mayflower Wind
	Atlantic Shores	Atlantic Shores offshore wind
	Kitty Hawk	Avangrid
2030	OCS-A 0522	Vineyard Wind

BOEM Bureau of Ocean Energy Management

Renewable Energy Project: Rhode Island / Massachusetts

South Fork (OCS-A 0517)

- Lease Issued: Oct 1, 2013
- Current Stage: **Installation**
- Next Milestone: Facility Design Report (FDR)
  Fabrication & Installation Report (FIR) Review
- Max # of WTG Locations: Up to 15
- Interconnection State: New York
- Power Purchase Agreement: NY, 133 MW
- Commissioning Date: 2023
- Lessee: South Fork Wind, LLC

Renewable Energy Project: Massachusetts

Vineyard Wind I (OCS-A 0501)

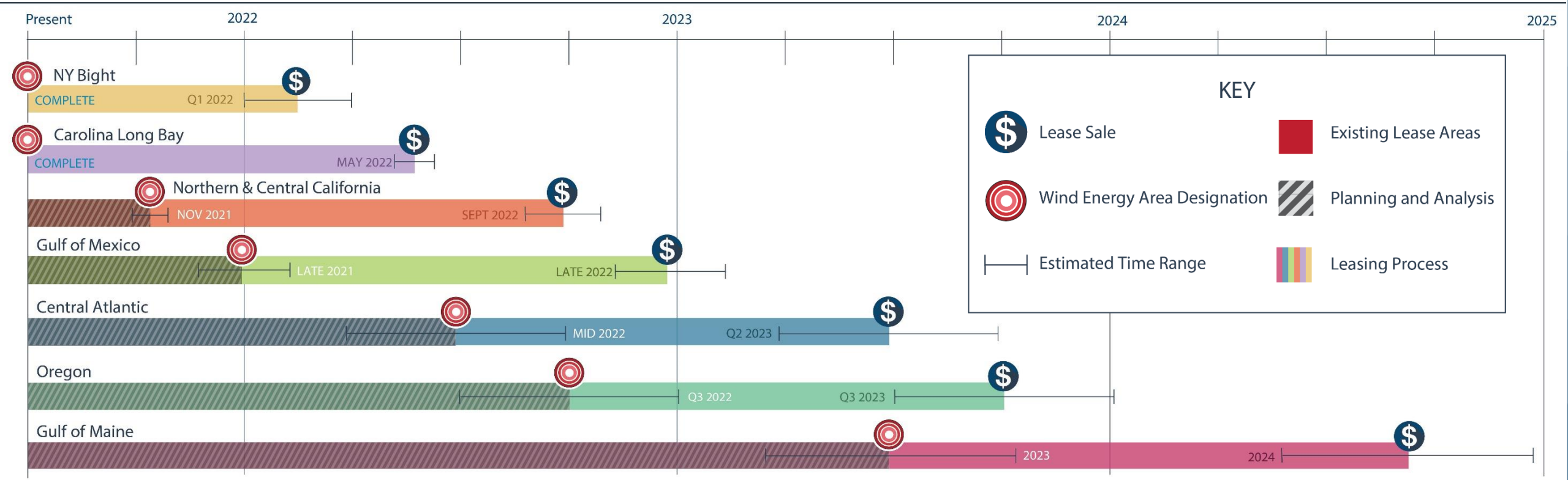
- Lease Issued: April 1, 2015
- Current Stage: **Installation**
- Next Milestone Facility Design Report (FDR)
  Fabrication & Installation Report (FIR) Review
- Max # of WTG Locations: 62
- Interconnection State: MA
- Power Purchase Agreement: MA, 800 MW
- Commissioning Date: 2024
- Lessee: Vineyard Wind 1, LLC

Administration Goals

- President Biden issued **Executive Order 14008** that called for the Interior Department to identify steps to increase responsible renewable energy development on public lands and waters

- First-ever **national offshore wind goal** to deploy **30 gigawatts of offshore wind by 2030**, which would create nearly **80,000 jobs** .

BOEM Offshore Wind Leasing Path Forward 2021-2025



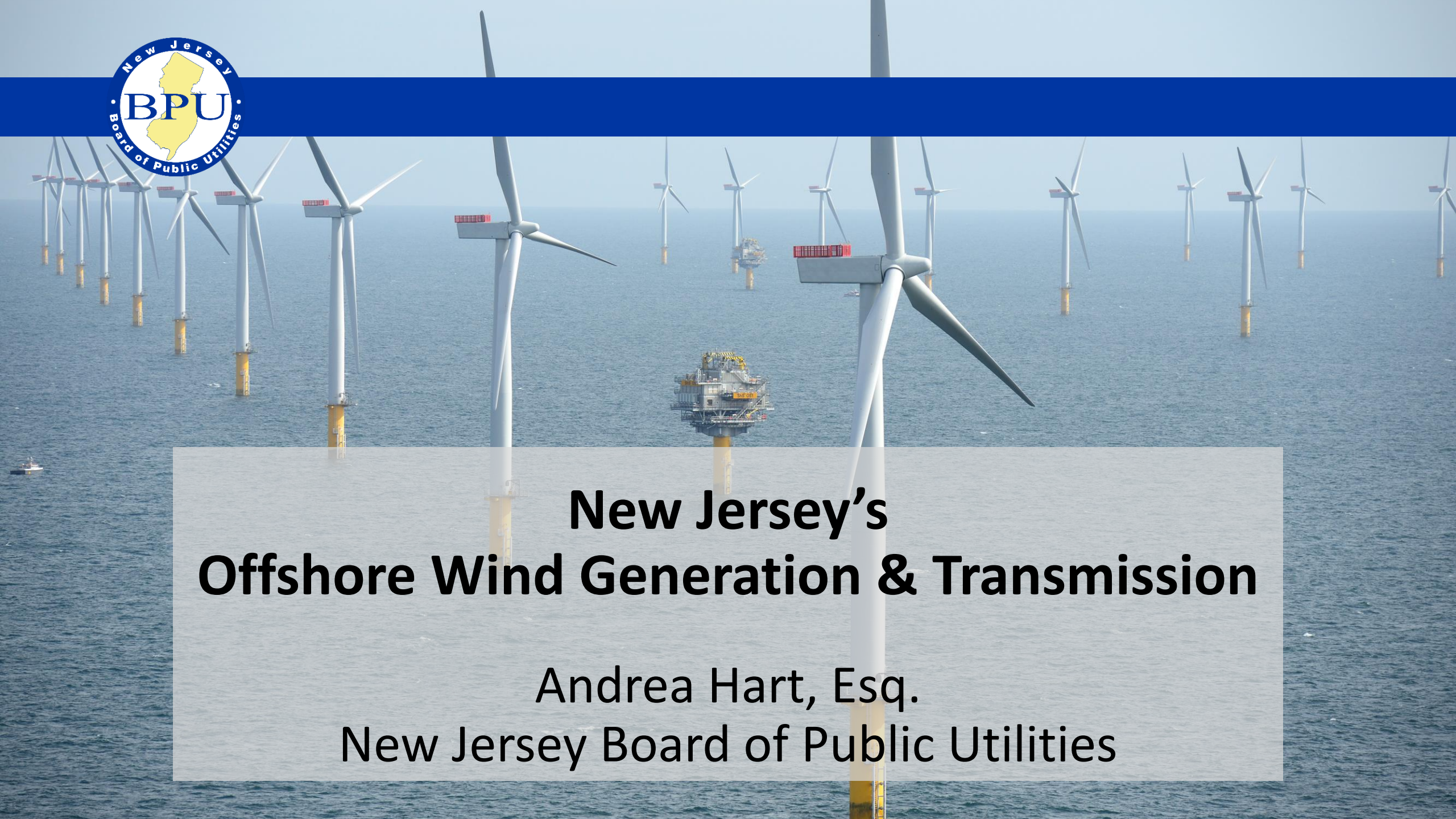
Our path forward will help achieve the first-ever **national offshore wind goal** to deploy **30 gigawatts of offshore wind by 2030,** which would create nearly **80,000 jobs**

Bureau of Ocean Energy Management

U.S. Department of the Interior

BOEM.gov

Wright Frank, wright.frank@boem.gov



New Jersey's Offshore Wind Generation & Transmission

Andrea Hart, Esq.
New Jersey Board of Public Utilities

NJ Offshore Wind Generation Solicitation Schedule

Solicitation	Capability Target (MW)	Capability Awarded	Issue Date	Estimated Commercial Operation Date
1	1,100[(1)]	1,100	Q3 2018	2024-25
2	1,200-2400[(2)]	2,658	Q3 2020	2027-29
3	1,200	N/A	Q1 2023[(3)]	2030
4	1,200	N/A	Q2 2024	2031
5	1,342	N/A	Q2 2026	2033

NJ Offshore Wind Transmission

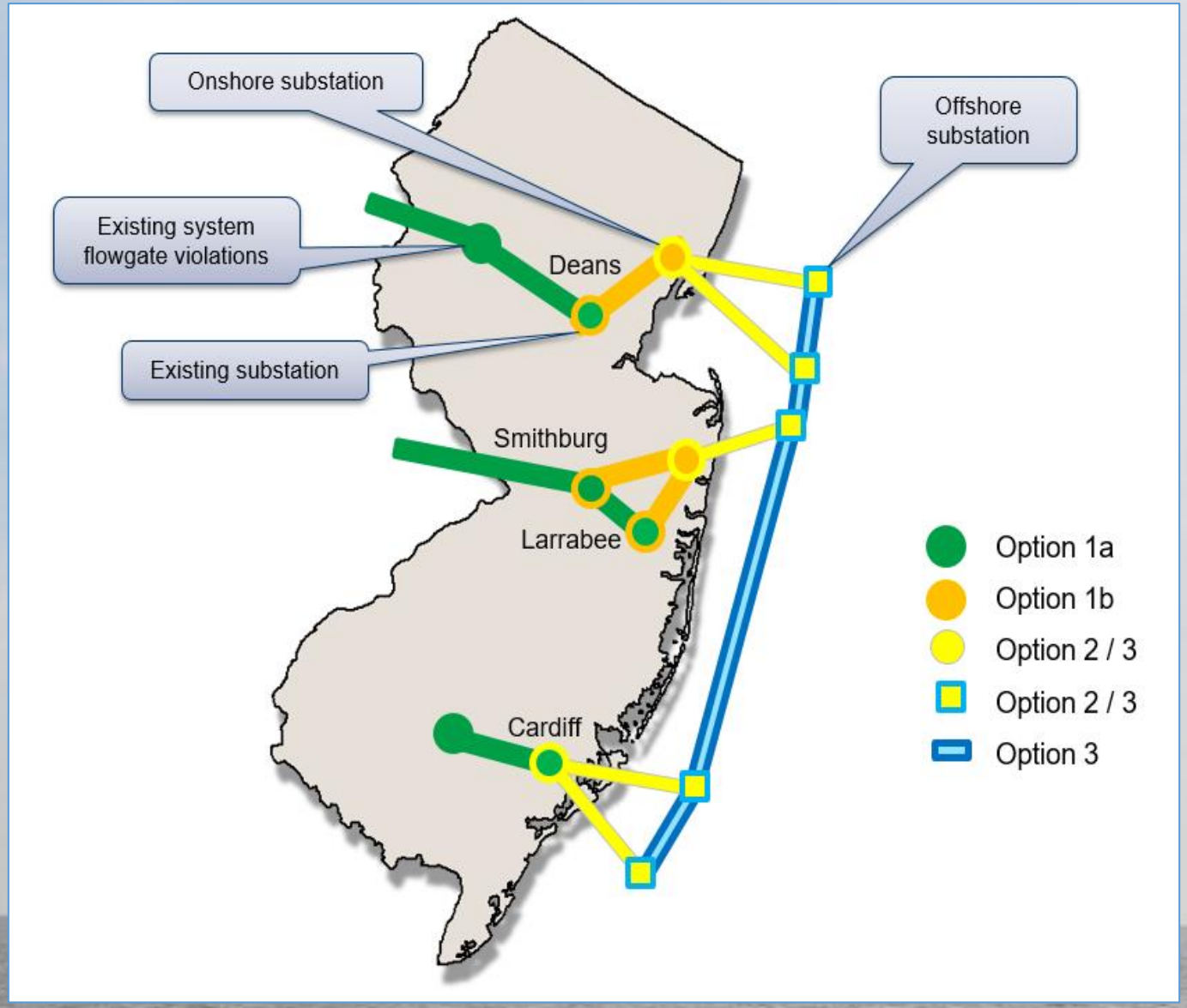
- PJM Interconnection is New Jersey's regional grid operator
- BPU identified the potential benefits of soliciting coordinated market-based options for building out the transmission facilities necessary to achieve the offshore wind goal
- November 2020, BPU requested PJM to solicit competitive transmission proposals to support New Jersey's offshore wind via the State Agreement Approach (SAA)

State Agreement Approach (SAA)

- The SAA is a tool offered by PJM—transmission development, based on policy
- New Jersey is the first state to utilize the SAA
- The SAA is a competitive solicitation for transmission projects from a broad pool of regional developers
- Proposals—lower costs, greater innovation resulting in efficiencies, decreased environmental impacts and increased ratepayer savings.

New Jersey's 2021 SAA

- PJM with BPU Staff developed a solicitation for transmission project applications under the SAA to meet New Jersey's public policy of developing 7,500 MW of offshore wind
  - Window Opened: April 15, 2021
  - Window Closed: September 17, 2021
- The solicitation requested Applications for four distinct options shown on the next slide, with each entity having the choice to propose more than one option
- Received Applications from 13 entities proposing a total of 80 projects


Onshore substation
Offshore substation
Existing system flowgate violations
Deans
Existing substation
Smithburg
Larrabee
Cardiff
Option 1a
Option 1b
Option 2 / 3
Option 2 / 3
Option 3

SAA Evaluation Process

- BPU Staff is currently working with PJM to evaluate the SAA proposals
- PJM and BPU Staff are also evaluating project costs, constructability, risk mitigation, environmental impacts, permitting plan, quality of proposal and developer experience, flexibility, modularity, and option value, and additional New Jersey benefits
- On April 15, 2022 FERC approved the SAA order (ER22-920)

How does SAA fit into the federal government's larger goals?

The SAA is one tool states may use to expand the grid to accommodate the expansion of renewables

Congressional Considerations:

- **Availability of federal funding**
- **Regional coordination**
- **Timing**

Thank you

Andrea Hart, Esq.
Andrea.Hart@bpu.nj.gov

THE BUSINESS NETWORK FOR OFFSHORE WIND
offshorewindus.org
Business Network for Offshore Wind
@offshorewindus

U.S. Market Overview & Insights

Business Network for Offshore Wind

BUSINESS NETWORK for OFFSHORE WIND

UPDATED: 2022/03/31

Business Network for Offshore Wind

1. Focus on developing US offshore wind industry and its supply chain

2. Not-for-Profit, Membership-Based

3. Provide: *Information, Education, Introductions*

U.S. OSW Structure

BUSINESS NETWORK FOR
OFFSHORE WIND

STATES

Request call areas, enact policy that drives the market, enforce state and local regulations

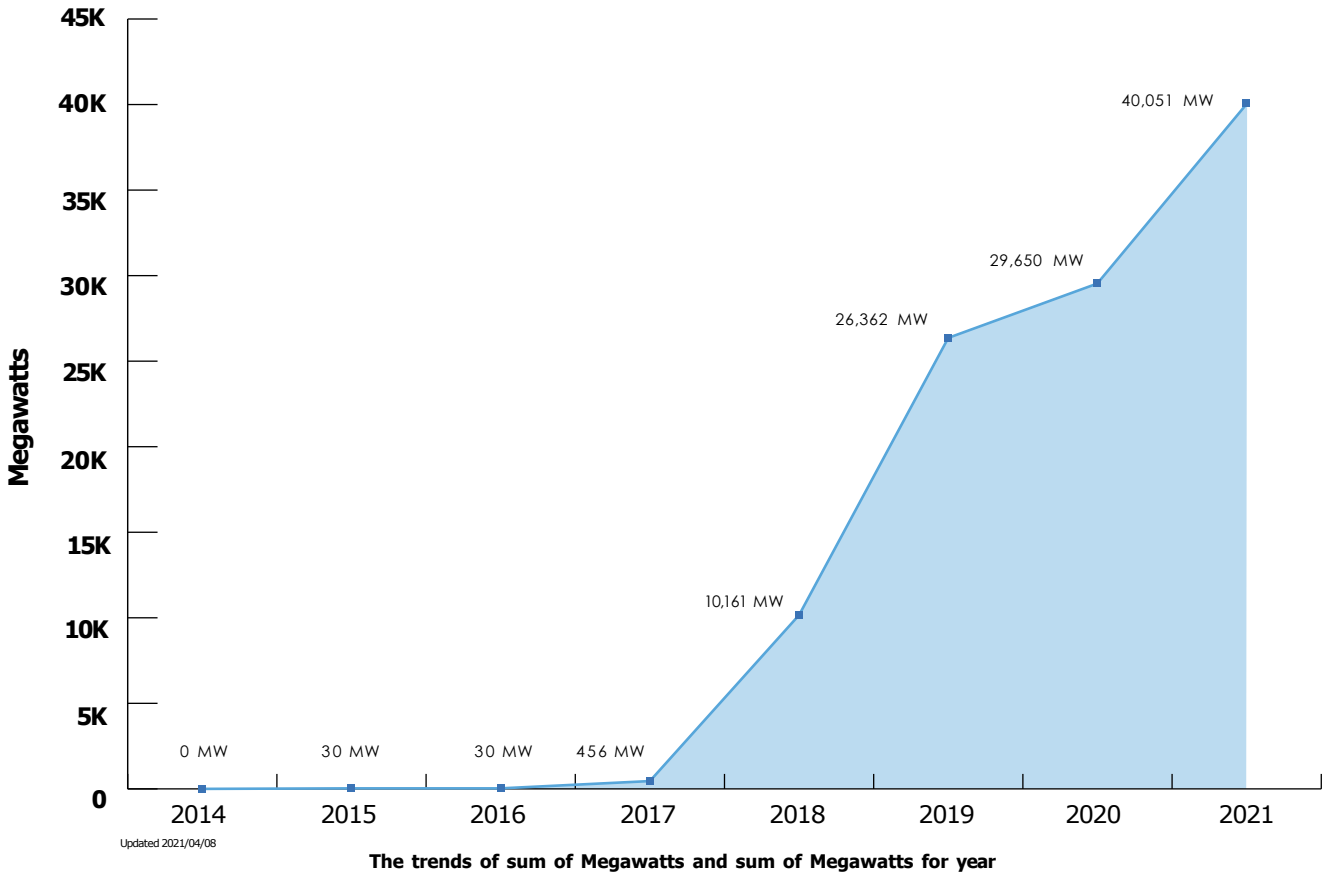
U.S. BOEM / U.S. BSEE

Siting, leasing, permitting and approval of plans, regulate OSW projects

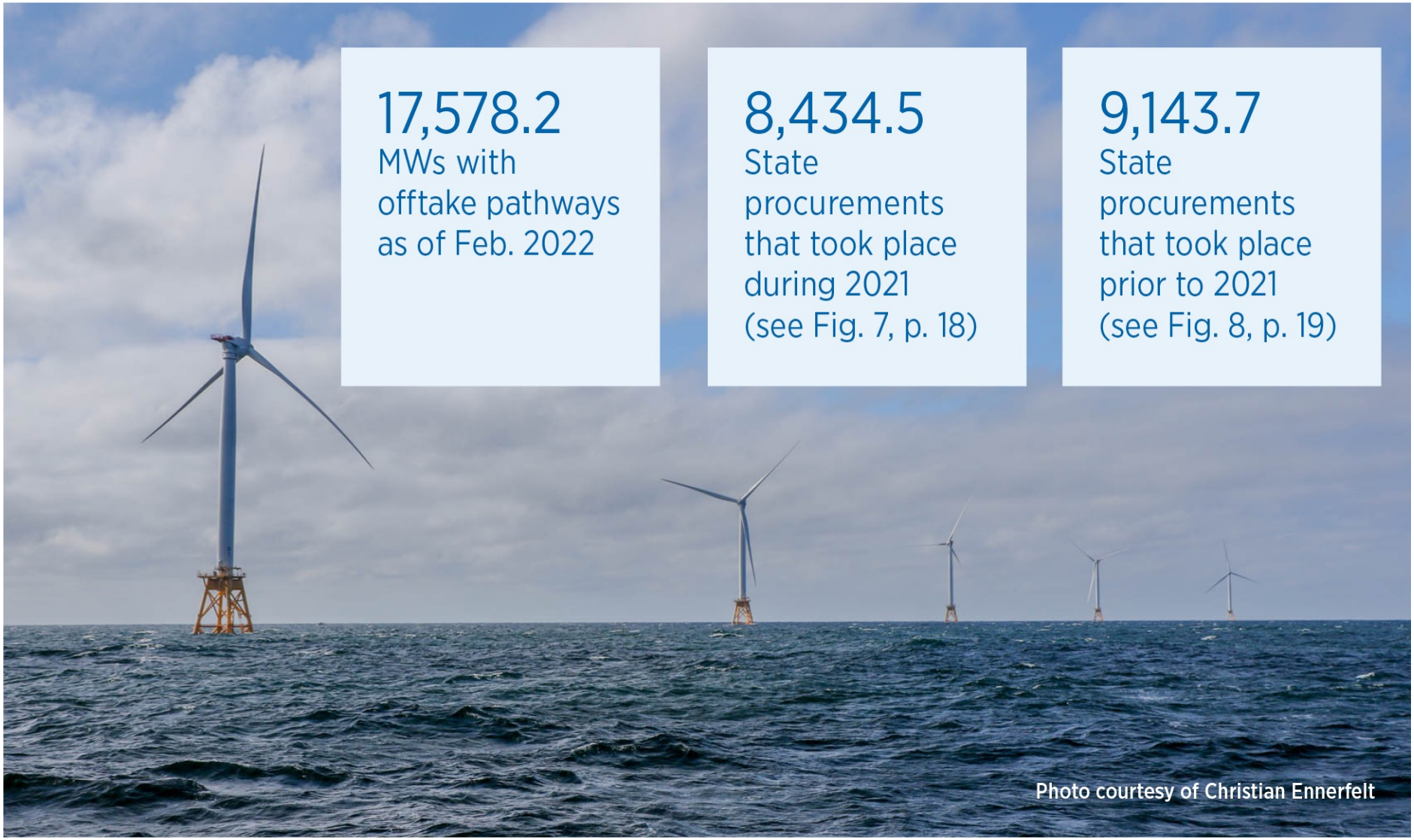
PRIVATE DEVELOPERS / LEASEES

Acquire lease rights and develop projects

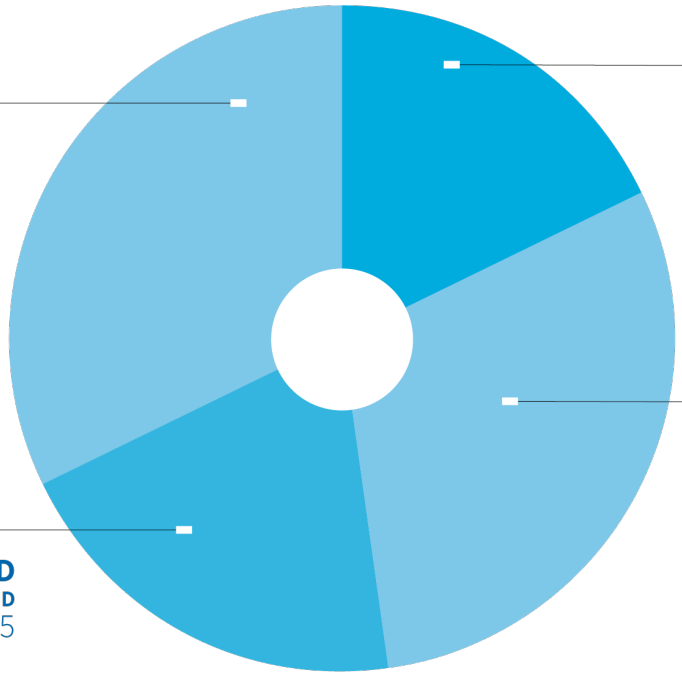
State Commitments to OSW



Offtake Pathways



State Procurements During 2021



NEW JERSEY
2021 **ATLANTIC SHORES OFFSHORE WIND**
1,510
2021 **OCEAN WIND 11**
1,148

MASSACHUSETTS
2021 **COMMONWEALTH WIND**
1,232
2021 **MAYFLOWER WIND 11**
400

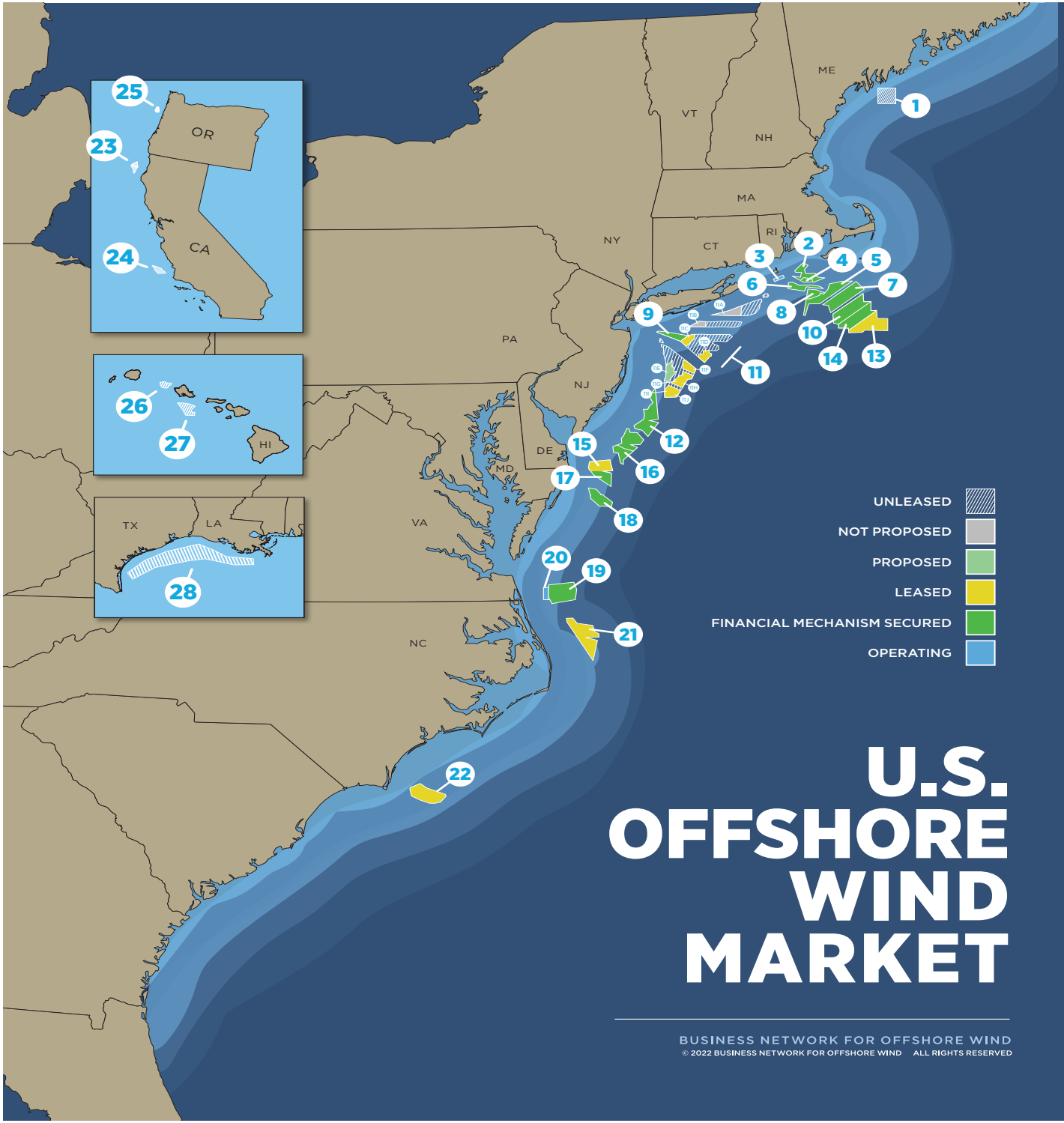
NEW YORK
2021 **BEACON WIND**
1,230

2021 **EMPIRE WIND II**
1,260

MARYLAND
2021 **MOMENTUM WIND**
808.5

2021 **SKIPJACK WIND 11**
846

TOTAL
8,434.5



U.S. OFFSHORE WIND MARKET

U.S. OSW LEASE AREAS

1. **Maine Aqua Ventus I** (New England Aqua Ventus) [11 MW]
2. **Revolution Wind** (Ørsted / Eversource) [704 MW]
3. **Block Island Wind Farm** (Ørsted) [30 MW]
4. **South Fork Wind Farm** (Ørsted / Eversource) [132 MW]
5. **Bay State Wind**
6. **OCS-A 0486**
7. **Vineyard W. / Park City W. / Commonwealth W.** (CIP / Avangrid) [800/804/1,232 MW]
8. **Sunrise Wind** (Ørsted / Eversource) [880 MW]
9. **Empire Wind 1 & 2** (Equinor / bp) [816/1,260 MW]
10. **Beacon Wind** (Equinor / bp) [1,230 MW]
11. **NY Bight Call Area**
    - **A** (Fairways N) • **B** (Fairways S) • **C** (OCS-A 544) • **D** (OCS-A 537)
    - **E** (OCS-A 543) • **F** (OCS-A 538) • **G** (OCS-A 540) • **H** (OCS-A 539)
    - **I** (OCS-A 541) • **J** (OCS-A 542)
12. **Atlantic Shores Offshore Wind** (EDF / Shell) [1,510 MW]
13. **Liberty Wind** (CIP / Avangrid)
14. **Mayflower Wind** (EDPR / Shell) [1,204 MW]
15. **Garden State offshore Energy** (Ørsted)
16. **Ocean Wind 1 & 2** (Ørsted / PSEG) [1,100/1,148 MW]
17. **Skipjack I / II Wind Farm** (Ørsted) [120/846 MW]
18. **MarWin / Momentum Wind** (US Wind) [270/808.5 MW]
19. **Coastal Virginia OSW - Commercial** (Dominion Energy) [2,640 MW]
20. **Coastal Virginia OSW - Pilot** (Dominion Energy) [12 MW]
21. **Kitty Hawk Offshore Wind** (Avangrid)
22. **Carolina Long Bay**
23. **Humboldt Wind Energy Area**
24. **Morro Bay**
25. **PacWave South**
26. **Oahu North Call Area**
27. **Oahu South Call Area**
28. **Gulf of Mexico OCS**

BUSINESS NETWORK FOR OFFSHORE WIND

BUSINESS NETWORK for OFFSHORE WIND

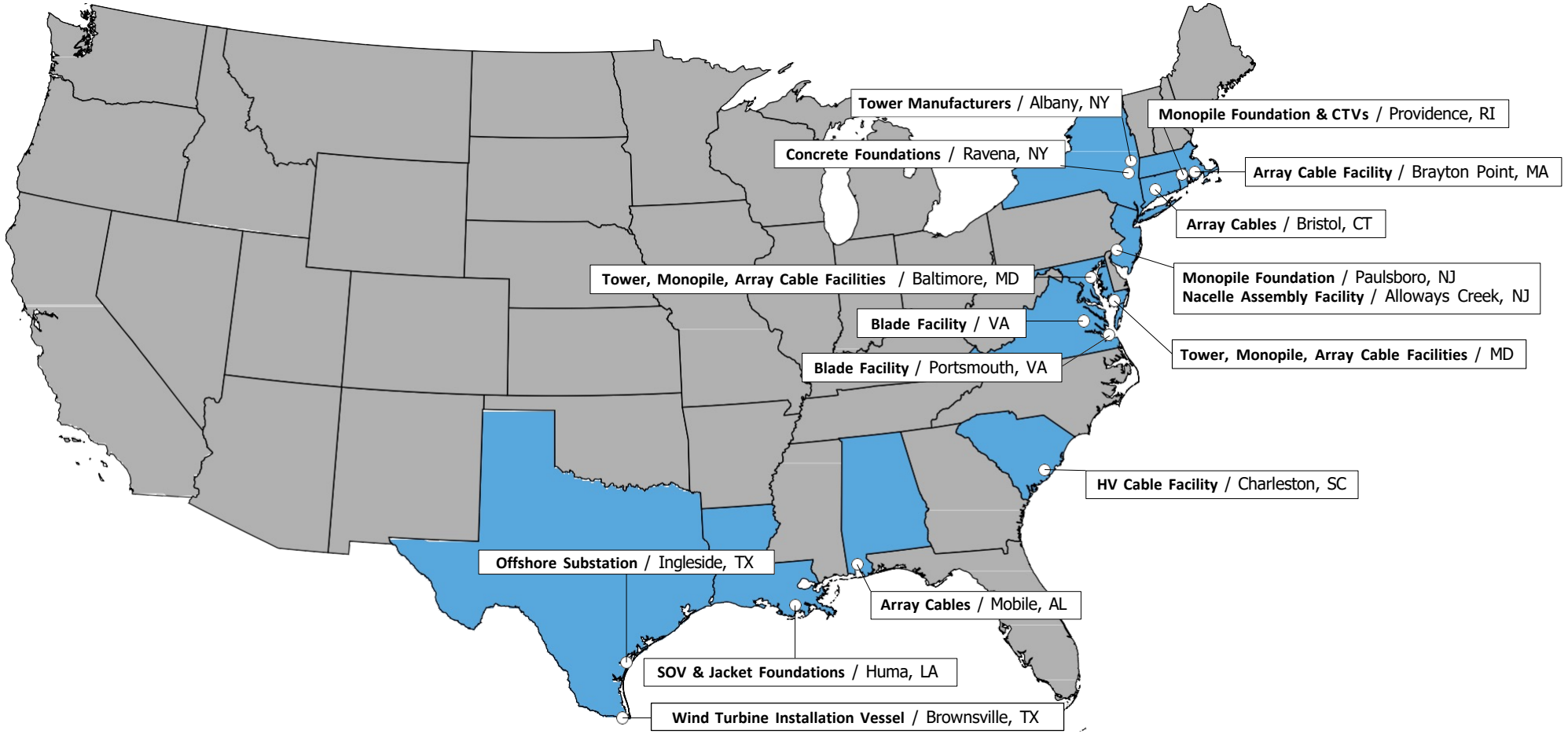
OSW Leasing Path Forward 2021–2025

BUSINESS NETWORK for OFFSHORE WIND

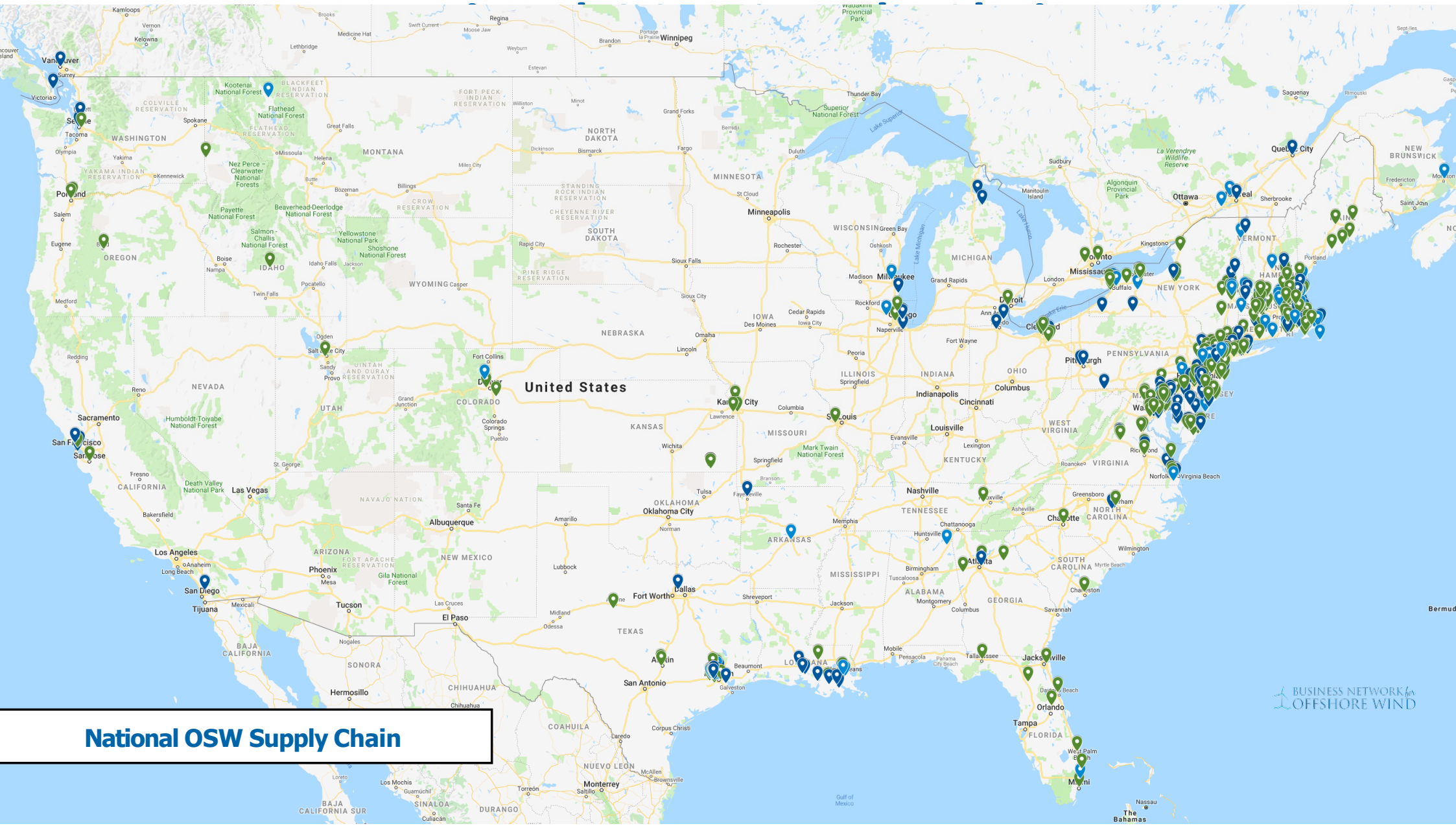
Biden Administration 2025 Goals: A Global Perspective

- 16 COPs approved by 2025, representing at least 19GW of OSW
- Currently, ~50GW deployed globally
- UK + Germany combined = 20GW

Supply Chain Development:
Major Component Manufacturing



Supply Chain Development: National Opportunities




Lake Erie
PENNSYLVANIA
Pittsburgh
MASSACHUSETTS
Boston
Providence
CONNECTICUT
RI
New York
Philadelphia
MARYLAND
Baltimore
Washington
NEW JERSEY
DELAWARE
WEST VIRGINIA
George Washington
Richmond
Norfolk
Virginia Beach
Charleston
Savannah
Greensboro
Durham
S
OSW ACTIVITY DECIDED
UNDER CONSIDERATION
OSW LEASE AREAS
1 COEYMANS (Manufacturing)
2 PORT OF PROVIDENCE (Construction, Manufacturing)
3 BRAYTON POINT (Staging & Manufacturing)
4 NEW BEDFORD (Staging)
5 QUONSET POINT (Construction)
6 NEW LONDON STATE PIER (Staging/Pre-Assembly & Construction/Installation)
7 BRIDGEPORT (Fabrication, Staging, O&M)
8 PORT JEFFERSON (O&M)
9 SOUTH BROOKLYN MARINE TERMINAL (O&M)
10 HOMEPORT PIER (Staging)
11 PAULSBORO (Manufacturing)
12 ATLANTIC CITY (O&M)
13 NEW JERSEY WIND PORT (Staging & Manufacturing)
14 TRADEPOINT ATLANTIC (Staging & Manufacturing)
15 HAMPTON ROADS (Manufacturing)
16 PORTSMOUTH (Staging)
17 CHARLESTON, SC (Cables)
18 TISBURY (O&M)
19 PORT OF ALBANY (Manufacturing)
20 SALEM (Assembly & Staging)
21 OCEAN CITY (O&M)
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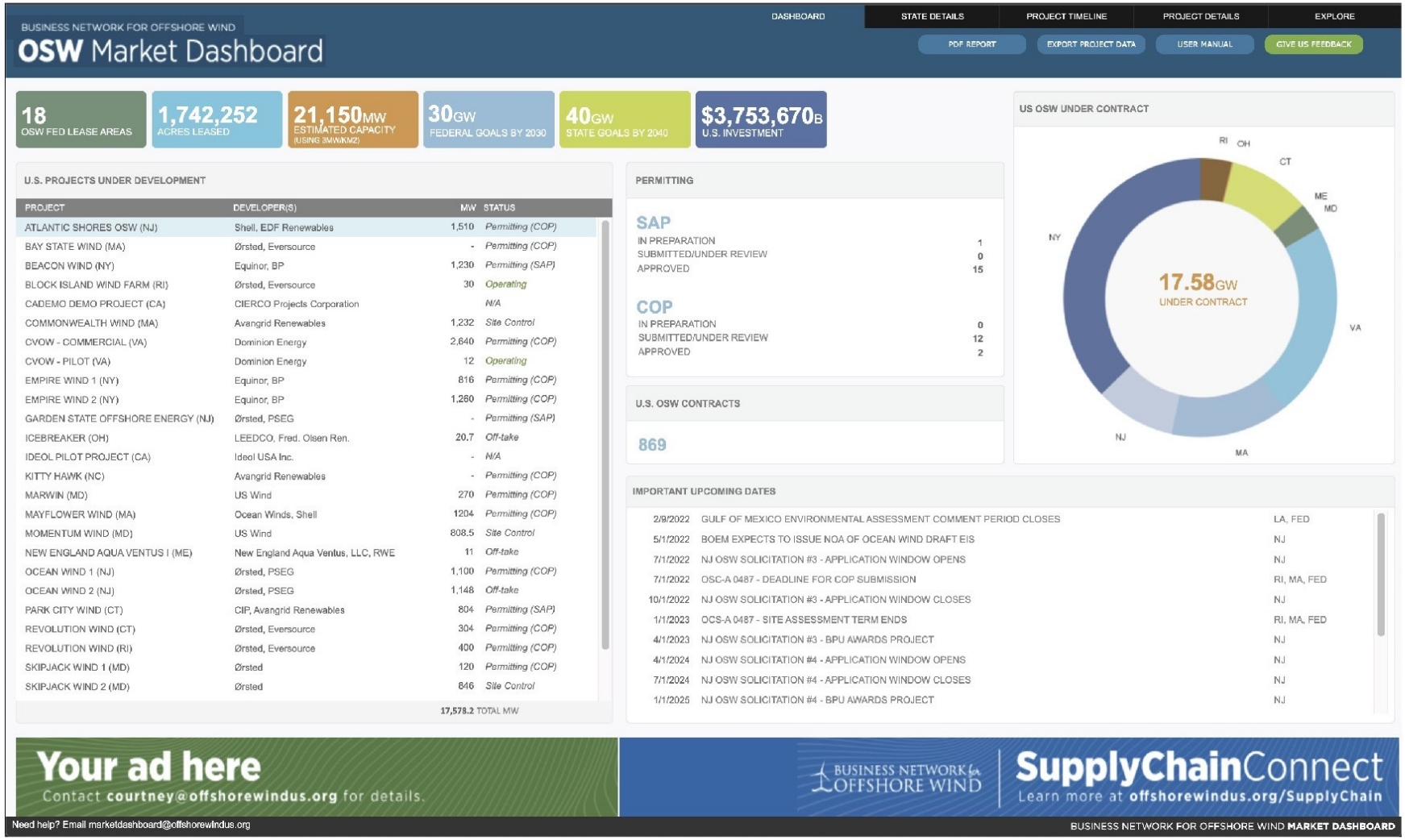
2022/01/11

Port Name	State	Laydown Area (acres)	Quayside Length (m)	Number of berths	Berth Depth (m)	Channel Depth (m)	Bearing Capacity (t/m^2)	Air Draft Limit (m)	Readiness Level (WTIV)	Readiness Level (Feeders)
New Bedford[8]	MA	29	366	3	9.1	9.1	20 t/m^2	None	Berth/channel depth, and quayside length	Quayside length
New London State Pier[9]	CT	30	1244	4	12.2	10	Assume > 15	None	Channel depth	
South Brooklyn Marine Terminal	NY	88	417	2	10.7	12.2	30	60	Berth depth, quayside length and air draft	Quayside length
New Jersey Wind Port[10]	NJ	70	854	4	11.5	9.88	29.8	None		
Tradepoint Atlantic[11]	MD	3,300	1,021	2	10.97	10.97		None	Berth/channel depth, bearing capacity	Bearing capacity
Portsmouth Marine Terminal	VA	287	1,079	3	13.11	13.11	Assume >15 t/m^2	None		
Other ports (1)	-	-	-	-	-	-	-	-		
Other ports (4)	-	-	-	-	-	-	-	-		
Other ports (9)	-	-	-	-	-	-	-	-		

Table 11. West Coast Ports Marshalling Capabilities and Assessment

Port Name	State		Laydown Area (acres)	Quayside Length (m)	Number of berths	Berth Depth (m)	Channel Depth (m)	Bearing Capacity (t/m^2)	Air-Draft Limit (m)	Readiness Level (Floating Substructure)
Port of Seattle	WA		1,541.9	2,400	20	23.2	>30		None	High congestion and bearing capacity
Astoria	OR		20.55	1551	5	12.2	14		None	Laydown and bearing capacity
Port at Coos Bay[13]	OR		1,335	80	7	11.28	11.28		Select areas limited	Bearing capacity and quayside length
Humboldt Marine Terminal	CA		150	703	2	11.6	10.67	Assume > 15	None	Channel depth
Morro Bay	CA			80	1	5.5	5.5		None	Laydown area, quayside length, berth/channel depth, and bearing capacity
San Francisco	CA			870		15.2	15		67	Laydown area, bearing capacity, and air draft
Oakland	CA		1,300	7,800	185	15	15		67	Bearing capacity and air draft
Richmond	CA		195	2,350	7	11.5	11.5		67	Bearing capacity and air draft
Benicia	CA		645	1,550	4	11.5	11.5		67	Bearing capacity and air draft
Hueneme[14]	CA		120	800	5	10.5	11		None	Berth depth

OSW Market Dashboard



BUSINESS NETWORK for OFFSHORE WIND

OSW Supply Chain Connect

BUSINESS NETWORK FOR OFFSHORE WIND

SupplyChainConnect

The **Business Network for Offshore Wind Supply Chain Connect** allows companies to publicly indicate their interest and ability to supply components and services for U.S. offshore wind projects. It is used as a source for identifying potential recipients of Requests for Proposals (RFPs) as well as identifying local, small, minority-owned, women-owned, and/or veteran-owned businesses for partnership with developers and/or Tier 1 suppliers. Please be sure to complete all fields and regularly update and maintain your organization's profile.

To register, first gather the information requested to identify the products and services you can provide for offshore wind projects. You'll have 30 minutes to fill out the form before the system logs you out. Your information will be saved.

COMPANY NAME

EMAIL ADDRESS

☑ I agree to have my information shared with developers and other companies looking for partners. (Required)

Supply Chain Categories - SERVICES

SERVICES | PRODUCTS/MATERIALS

Select either SERVICES or PRODUCTS/MATERIALS above, then click on a category below to see company info.

TURNKEY PROJECT (DESIGN / PROCUREMENT / CONSTRUCTION / INSTALLATION)	
Wind Power Plants	6 companies
Marine & Underground Cable Systems	6 companies
Fiber Cable Systems	1 company
Other Modules / Units	1 company
BUILDING & CONSTRUCTION WORKS	
Reservoir Construction Works	6 companies
Pier / Port Construction Works	12 companies
Road / Bridge Construction Works	9 companies
Piling / Boring	27 companies
Tunnelling Construction Works	5 companies
General Buildings / Offices	3 companies
Utility Construction	35 companies
Embankments / Earth Banks Construction Works	7 companies
Ground Work / Levelling Works	4 companies
Cable & Pipeline Trenches Construction Works	24 companies
Other Building & Construction Works	4 companies
WATER / SEWAGE CONSTRUCTION WORKS	
Pipe Rehabilitation	4 companies
Pipe Lining (Trenchless Sewer Repairs)	2 companies
Guided Drilling	1 company
Internal Pipe Coating	1 company
Water & Sewage Pumping Stations	6 companies
Metering Manholes	2 companies
Marine Pipe (Water / Sewage)	1 company
Other Water / Sewage Construction Works	4 companies

BUSINESS NETWORK for OFFSHORE WIND

John Begala

Vice President, Federal & State Policy

Business Network for Offshore Wind

john@offshorewindus.org

THE BUSINESS NETWORK FOR OFFSHORE WIND
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@offshorewindus

BUSINESS NETWORK for OFFSHORE WIND

MASSACHUSETTS CLEAN ENERGY CENTER®

June 29, 2022

OFFSHORE WIND WORKS –

RESPONSIBLE DEVELOPMENT OF A CLEAN ENERGY WORKFORCE

EESI BRIEFING: SCALING UP INNOVATION TO DRIVE DOWN EMISSIONS

Presented By
Lauren Farnsworth , Senior Program Manager – Offshore Wind

OUR MISSION

Grow the economy and help meet the state's clean energy and climate goals.

Offshore Wind Workforce Opportunities

Planning and development

- Activities that precede construction, including site characterization, research, engineering, and permitting

Construction and installation

- Pre-assembly, installation, and commissioning, with a large roles for skilled trades, organized labor, engineers, project managers, and individuals with maritime and water transportation expertise

Operations and maintenance

- Regular inspection of turbines, foundations, cables, and substations, and process of making necessary repairs or replacements

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OSW Workforce Development Strategy

- Conduct targeted **research and analysis** to inform workforce development initiatives
- **Engage** directly with OSW industry to ensure programs and efforts align with their needs
- **Invest** in and leverage resources for essential, high-need programs to meet needs and fill gaps
- Proactively **support** programs and initiatives that build an OSW workforce that is diverse, equitable, inclusive, and just
- **Convene**, support, and facilitate practitioners and stakeholders to share information, ideas, challenges, and best practices

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Research and Analysis

2018 Massachusetts Offshore Wind Workforce Assessment

Construction and Installation Jobs
- 2,200-3,000 direct job-years
- 6,800-9,800 total job-years

Operations and Maintenance Jobs
- 140-250 direct annual job-years
- 960-1,700 total annual job-years

Economic Impact
- $600-800M in direct economic benefit
- $1.4-2.1B in total economic benefit

Priority Needs
- Skills and safety training programs
- Partnerships w/industry, schools, trades

2021 Offshore Wind Workforce Training & Development in Massachusetts Report

- Deeper examination of capabilities and opportunities, building on 2018 Assessment.
- Quantifies offshore wind occupational demands on an annual basis
- Maps local labor supply for these occupations to further identify more specific areas of strength and potential gaps in local labor supply.
- Identifies and catalogs 119 distinct occupations across phases of offshore wind development

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Offshore Wind Works

OSWW Community of Practice Projects:

- Introductory offshore wind courses and programs;
- Health and safety training programs;
- Trades programs;
- Technical training programs;
- Undergraduate and Graduate programs;
- Diversity, Equity, Inclusion and Justice

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Offshore Wind Works Spotlight: Browning the Greenspace and Xodus Group

- Targeted community engagement campaign that will deliver an overview of the offshore wind industry directed towards high schools and community colleges in underserved communities;
- Paid experiential learning opportunities in the offshore wind industry for BIPOC, unemployed, and low-income individuals

xodus GROUP

MASSACHUSETTS CLEAN ENERGY CENTER®

Offshore Wind Works Spotlight: Massachusetts Maritime Academy

- The first facility in the U.S. to offer all five modules of Global Wind Organisation (GWO) Basic Safety Training for offshore wind
- Plans to develop and offer a 40-hour Basic Seamanship course for the Pile Drivers and Divers Local Union 56, and expand upon existing GWO-certified course offerings.

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Offshore Wind Works Spotlight: ACE MV

- Adult Continuing Education Martha's Vineyard (ACE MV) offers a Wind Power Technician Certificate program specifically for local island workers who will help build and operate Vineyard Wind's 800MW project.
- Outreach campaign to increase enrollment of women into the industry.

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Offshore Wind Works – Investments to Date

Over $7.8M invested in grants to support 20 organizations and institutions since 2017

Thank you

Visit us at www.MassCEC.com/offshore-wind

lfarnsworth@MassCEC.com | 617.315.9388

Sign up for our Offshore Wind Newsletter, Daily News Digest, and more!
masscec.com/email-updates

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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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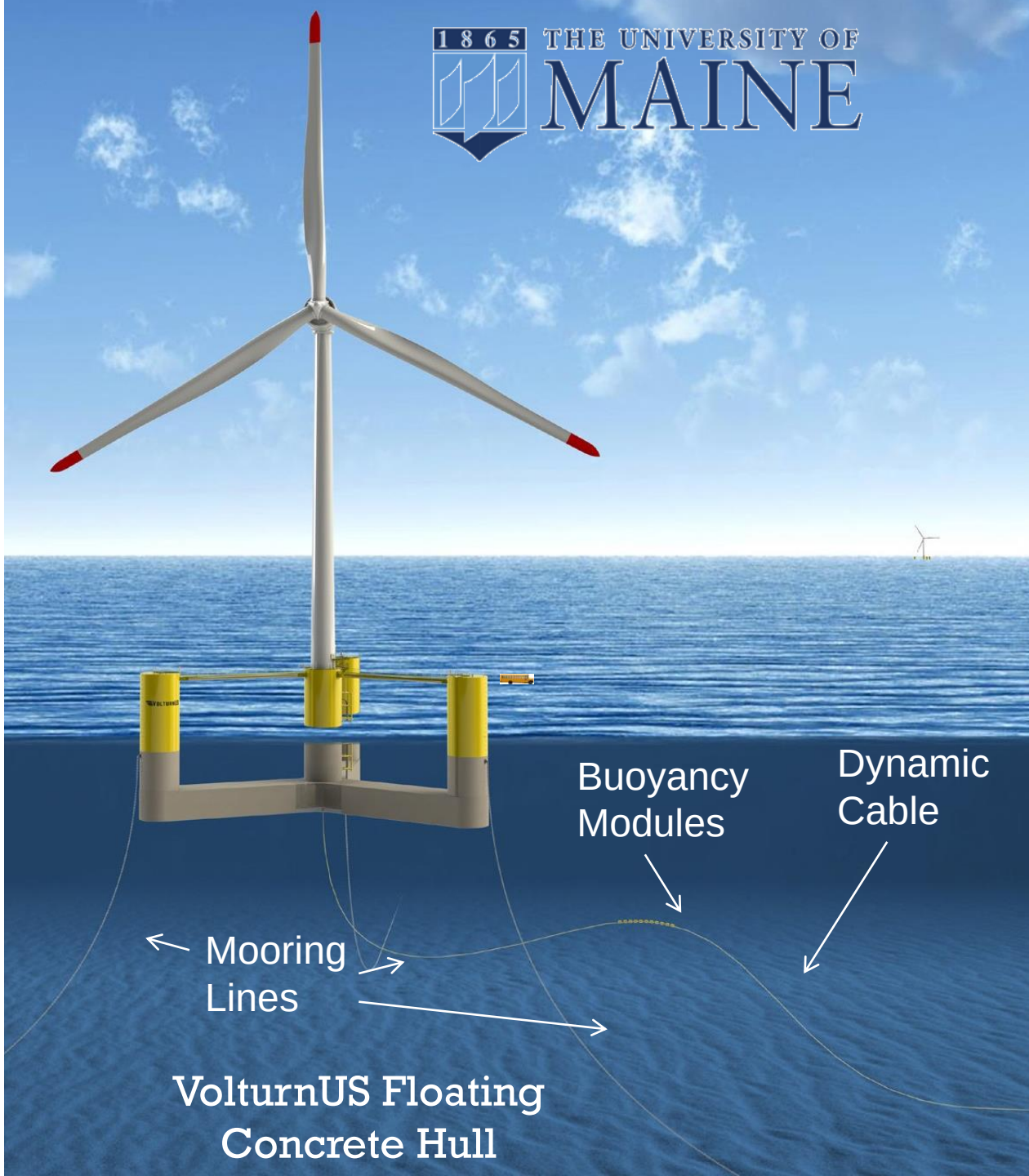
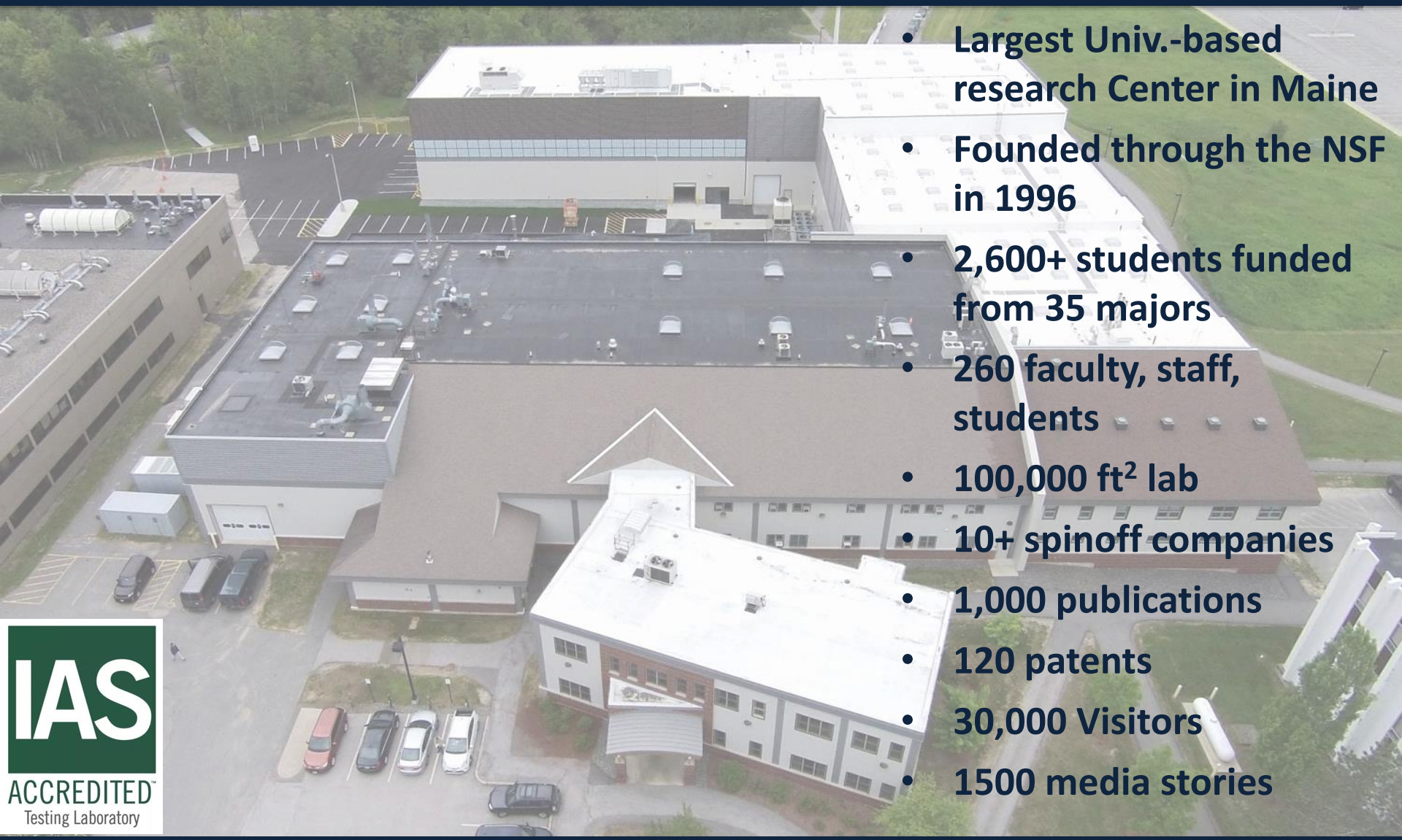


The University of Maine

- 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

R1 DEFINES TOMORROW

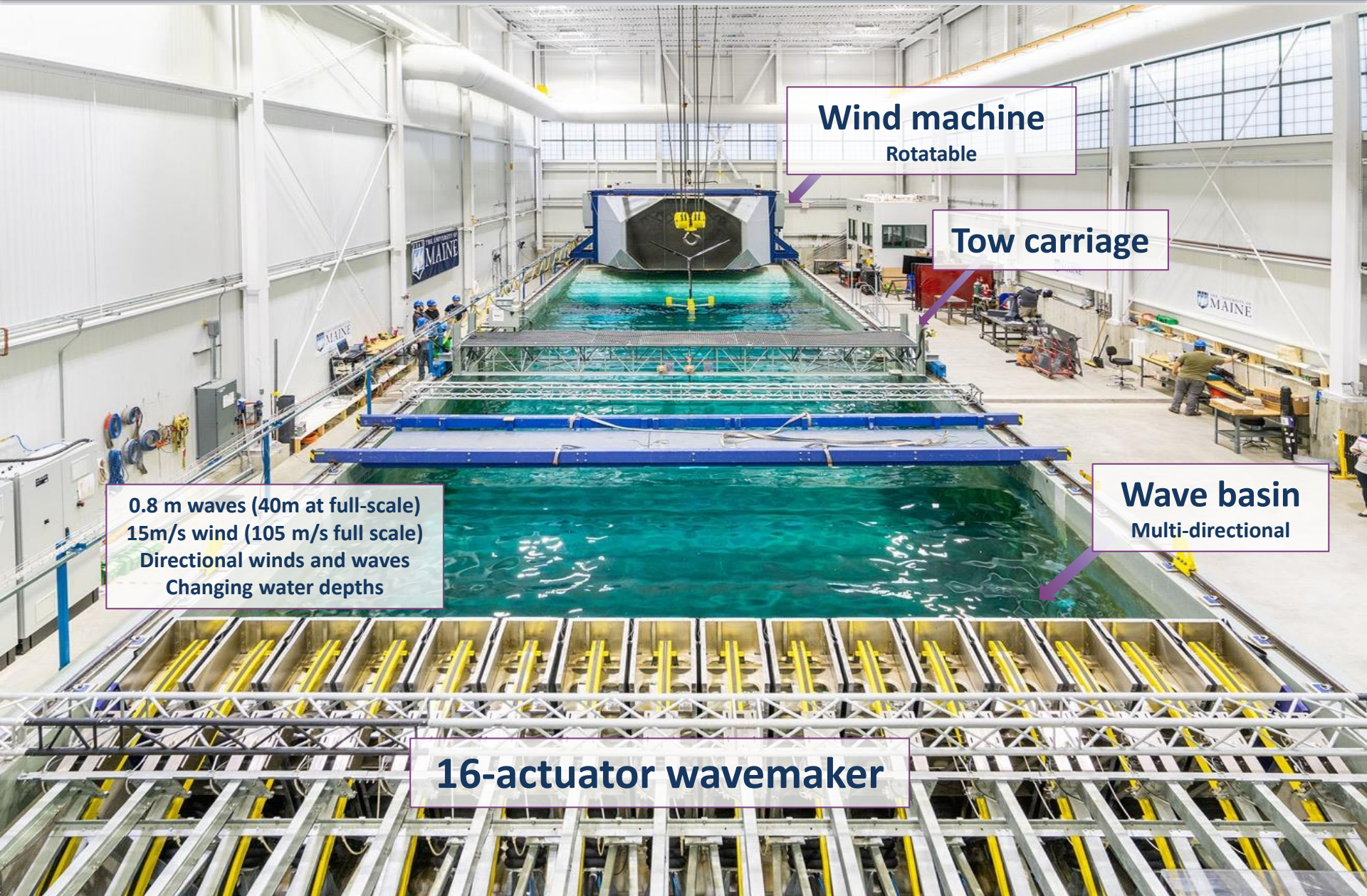


- Largest Univ.-based research Center in Maine
- Founded through the NSF in 1996
- 2,600+ students funded from 35 majors
- 260 faculty, staff, students
- 100,000 ft^2 lab
- 10+ spinoff companies
- 1,000 publications
- 120 patents
- 30,000 Visitors
- 1500 media stories

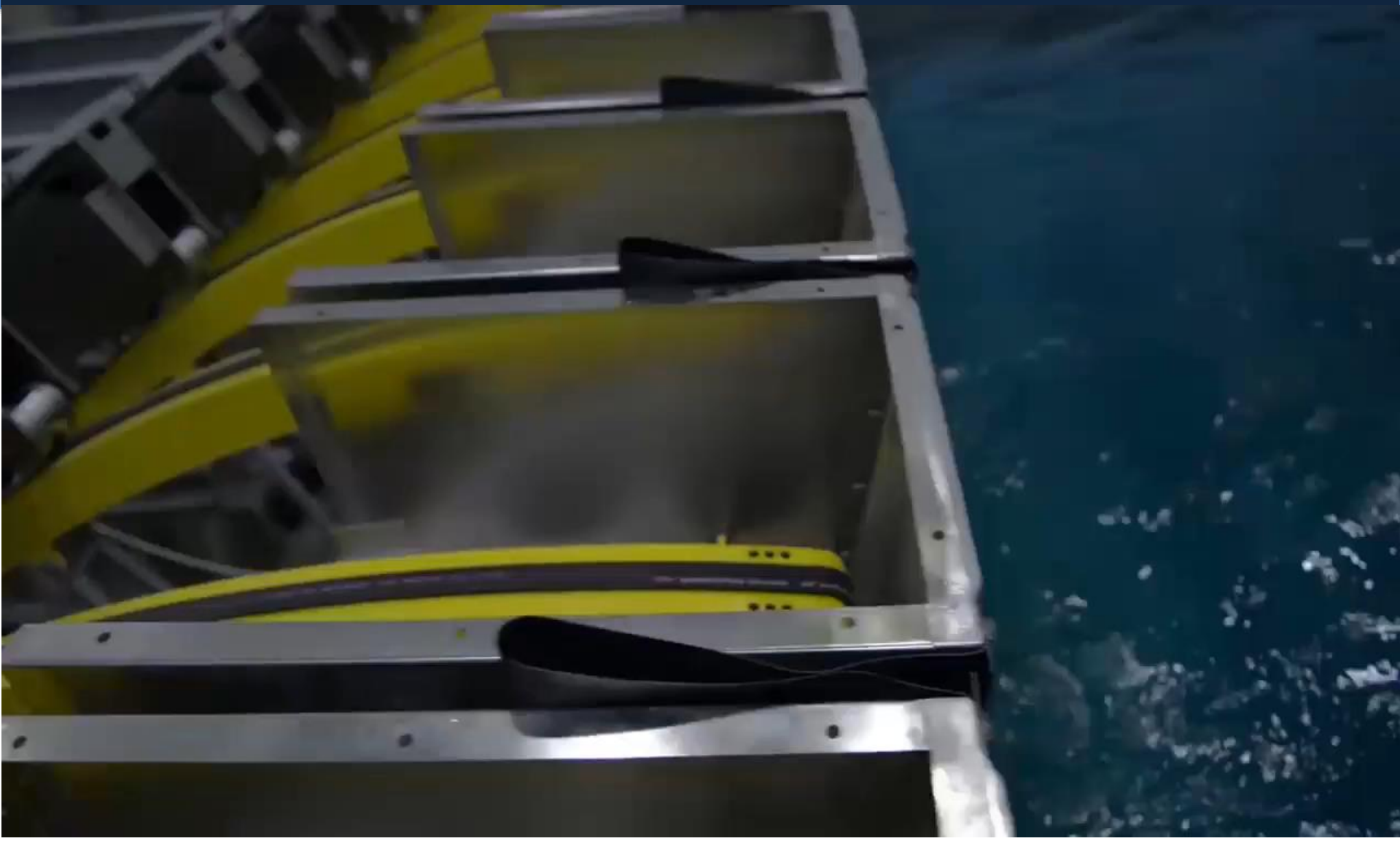
IAS ACCREDITED Testing Laboratory

Structural and Material Testing

Alfond W2 Wave-Wind Basin

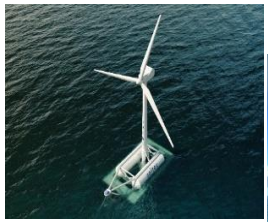


Alfond W^2 Ocean Engineering Lab

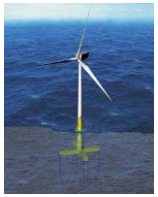


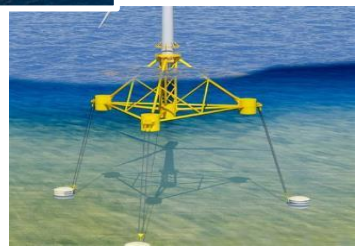
Global Technology Race in Floating Offshore Wind

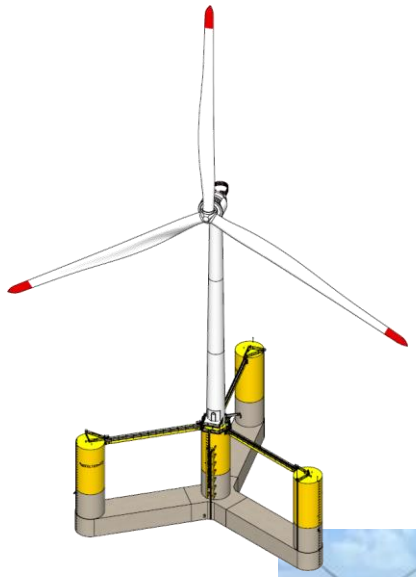
Sampling of competing foundation designs





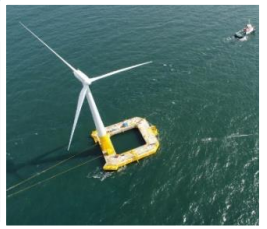


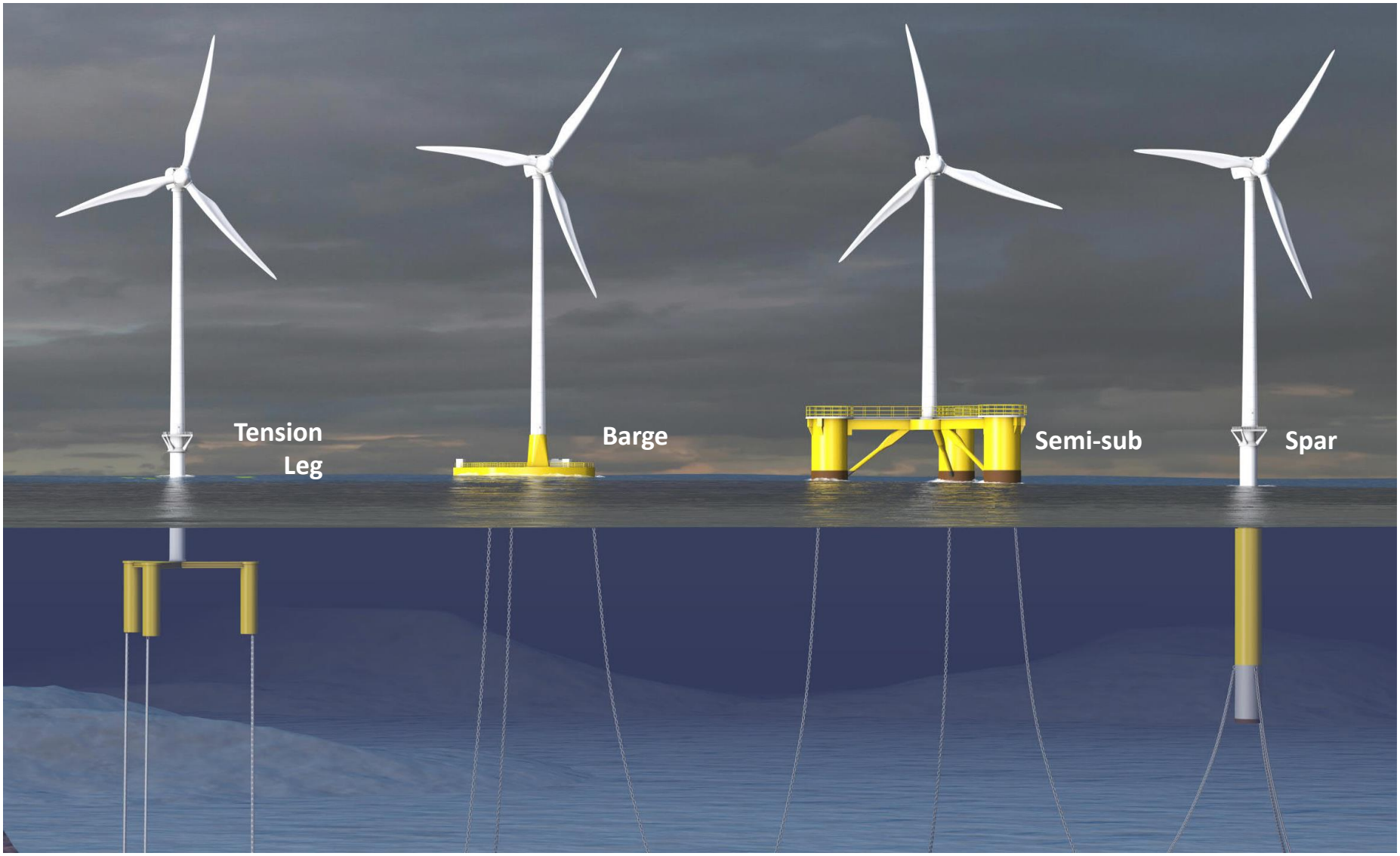








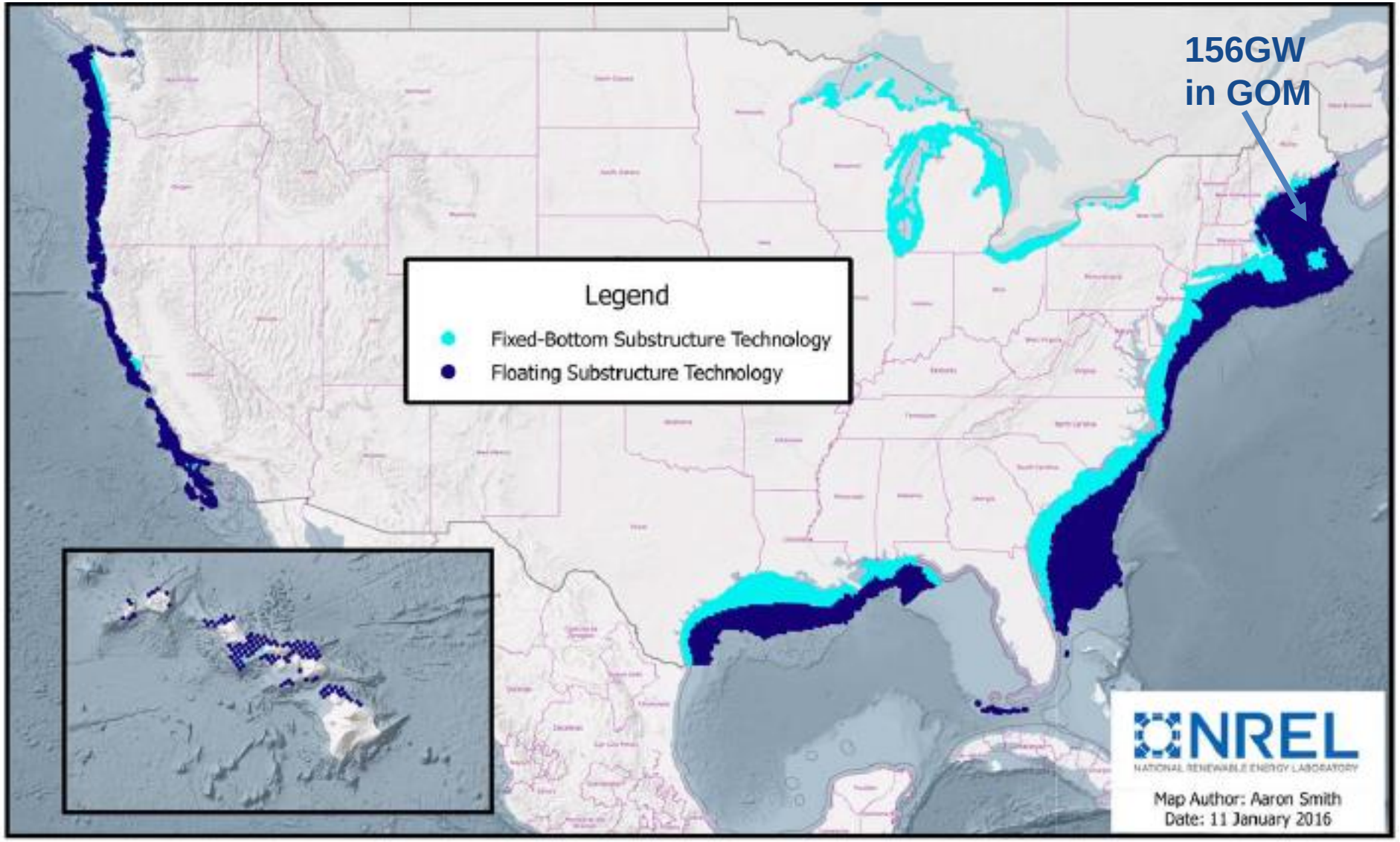

How does a Turbine Float? There are four Designs



US Potential for Floating Wind

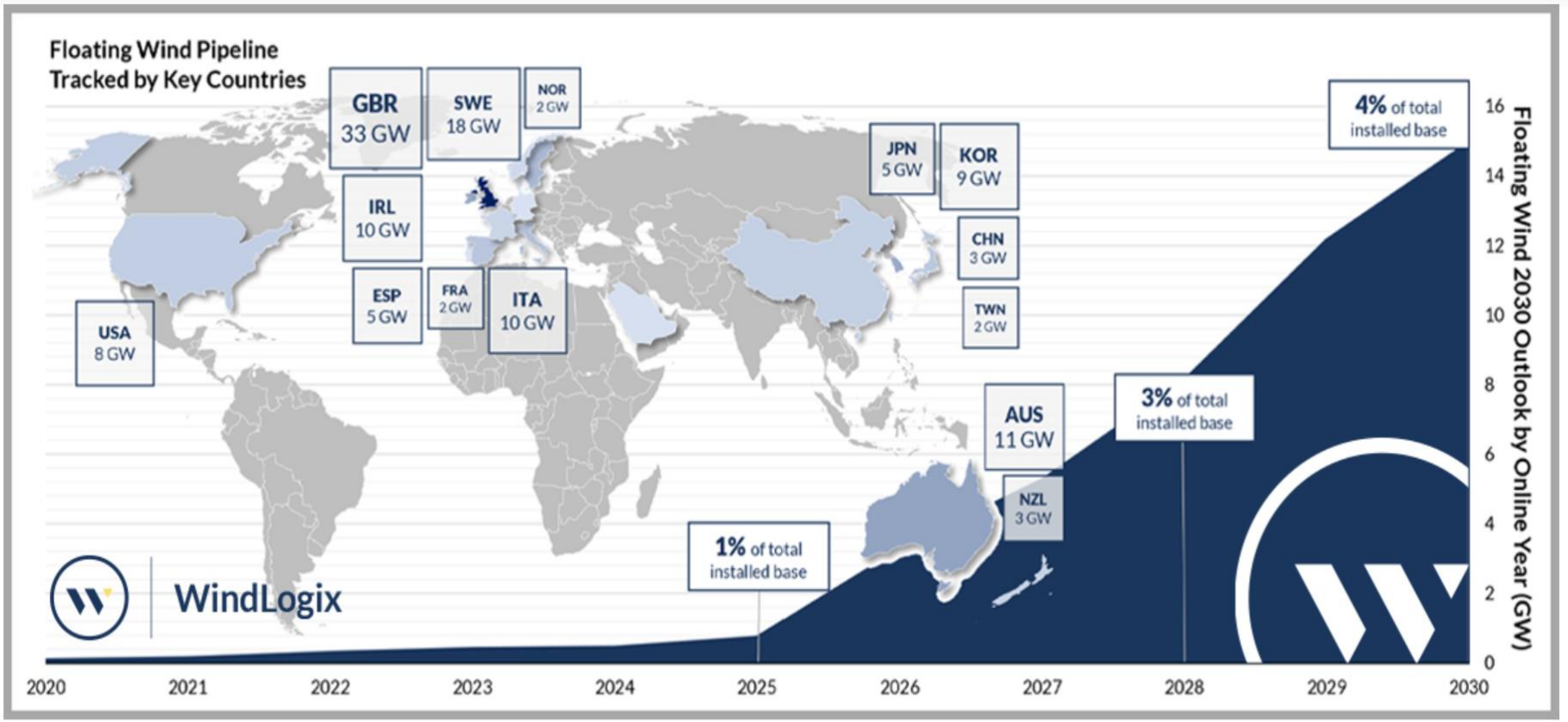
60% of US resource requires floating technology

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



Global Pipeline of Floating Wind: 121 GW[1]

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

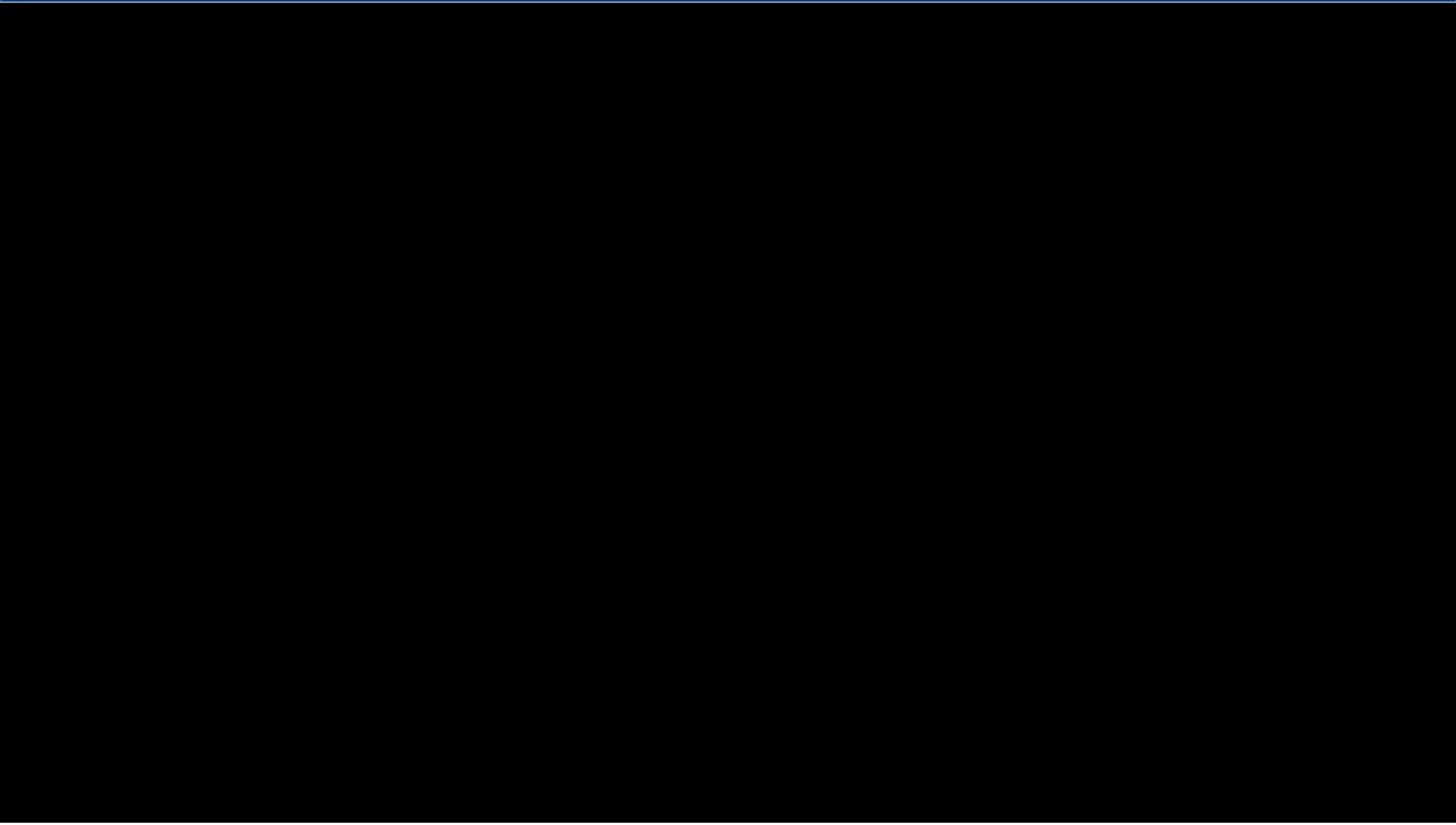
VolturnUS 1:8 Launch

May 31, 2013

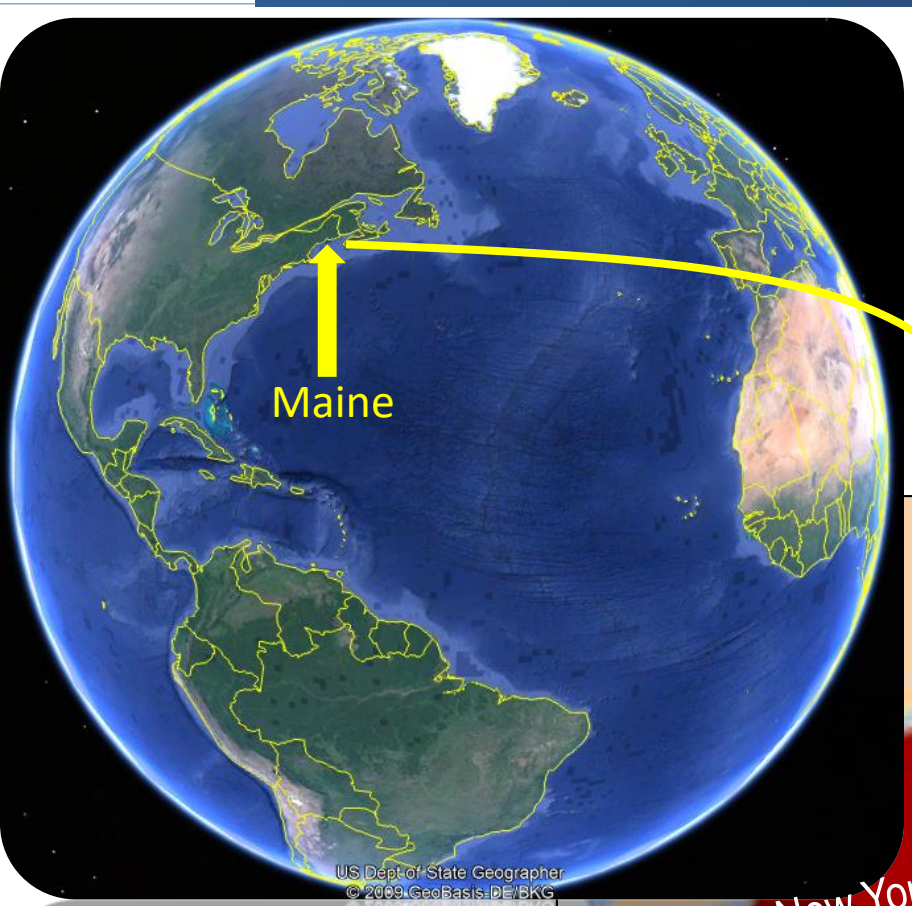
Tow-Out Testing

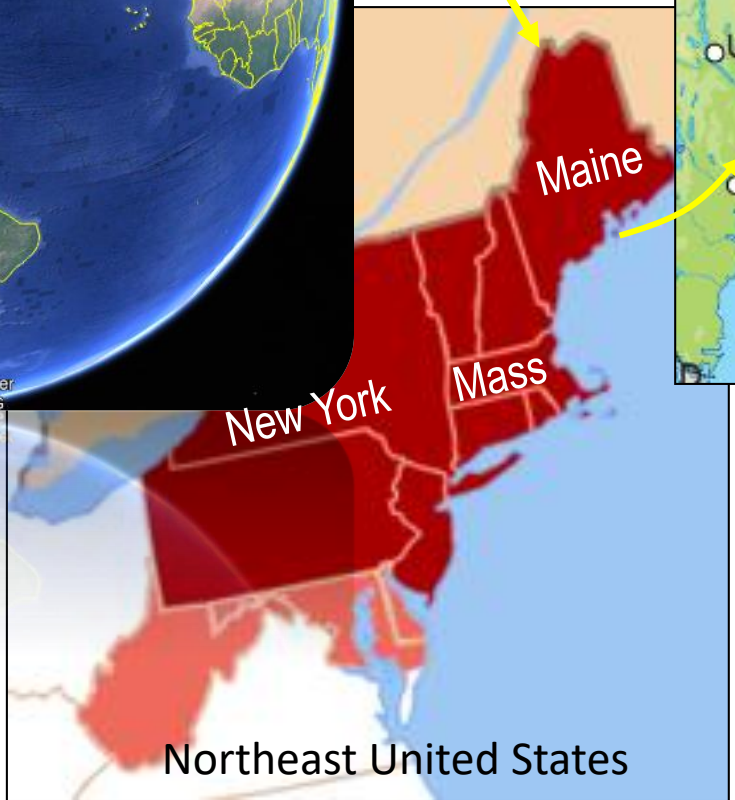
Castine, Maine (2013)

50-Year Return Period Storm



New England Aqua Ventus and MeRA Project Sites

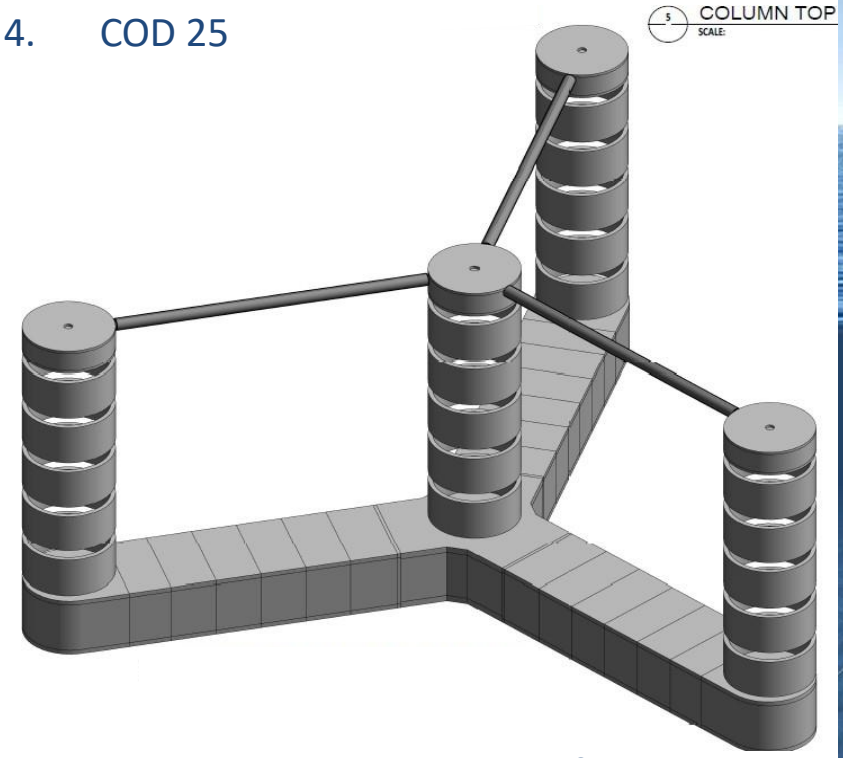




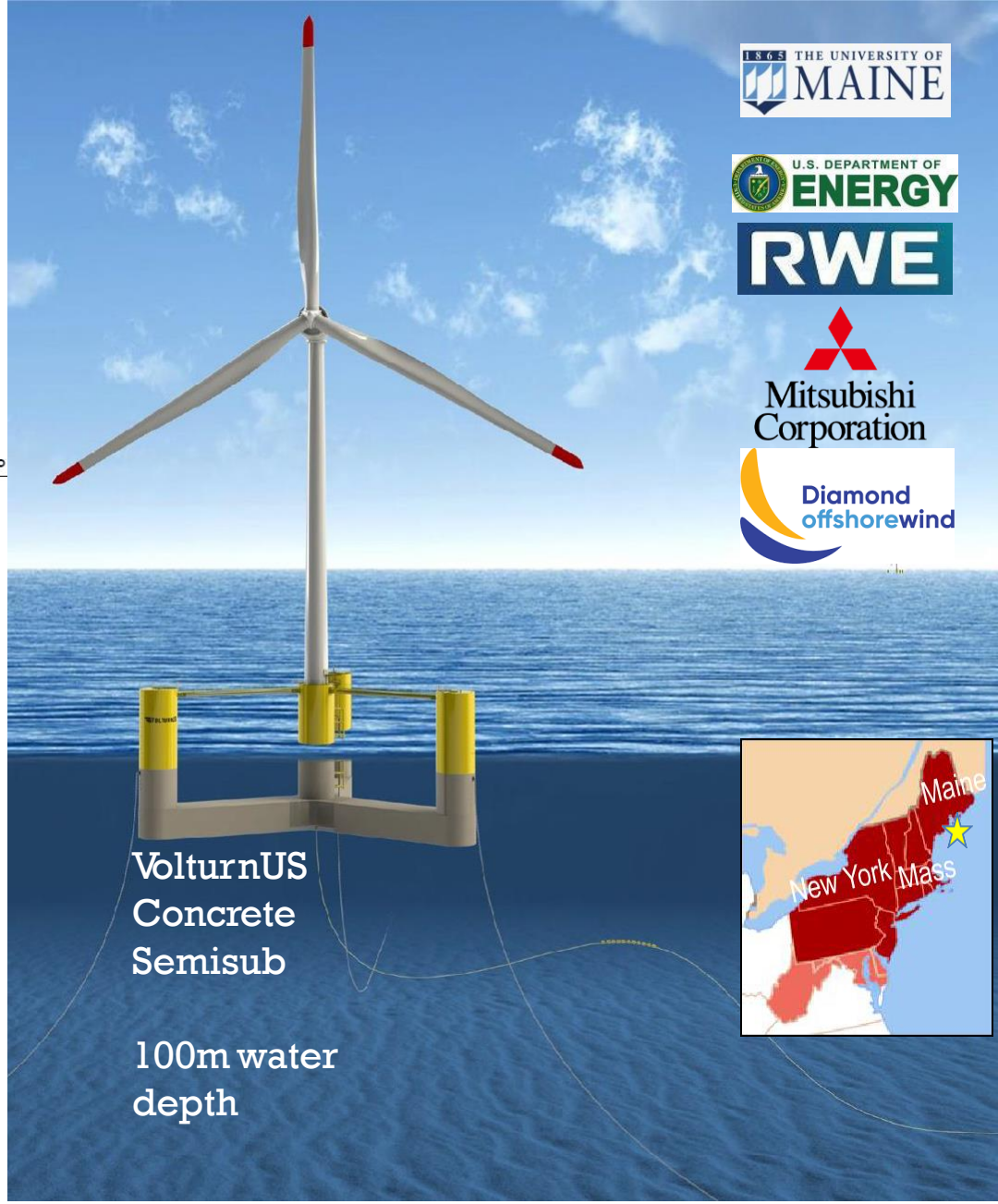
Northeast United States

New England Aqua Ventus I

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

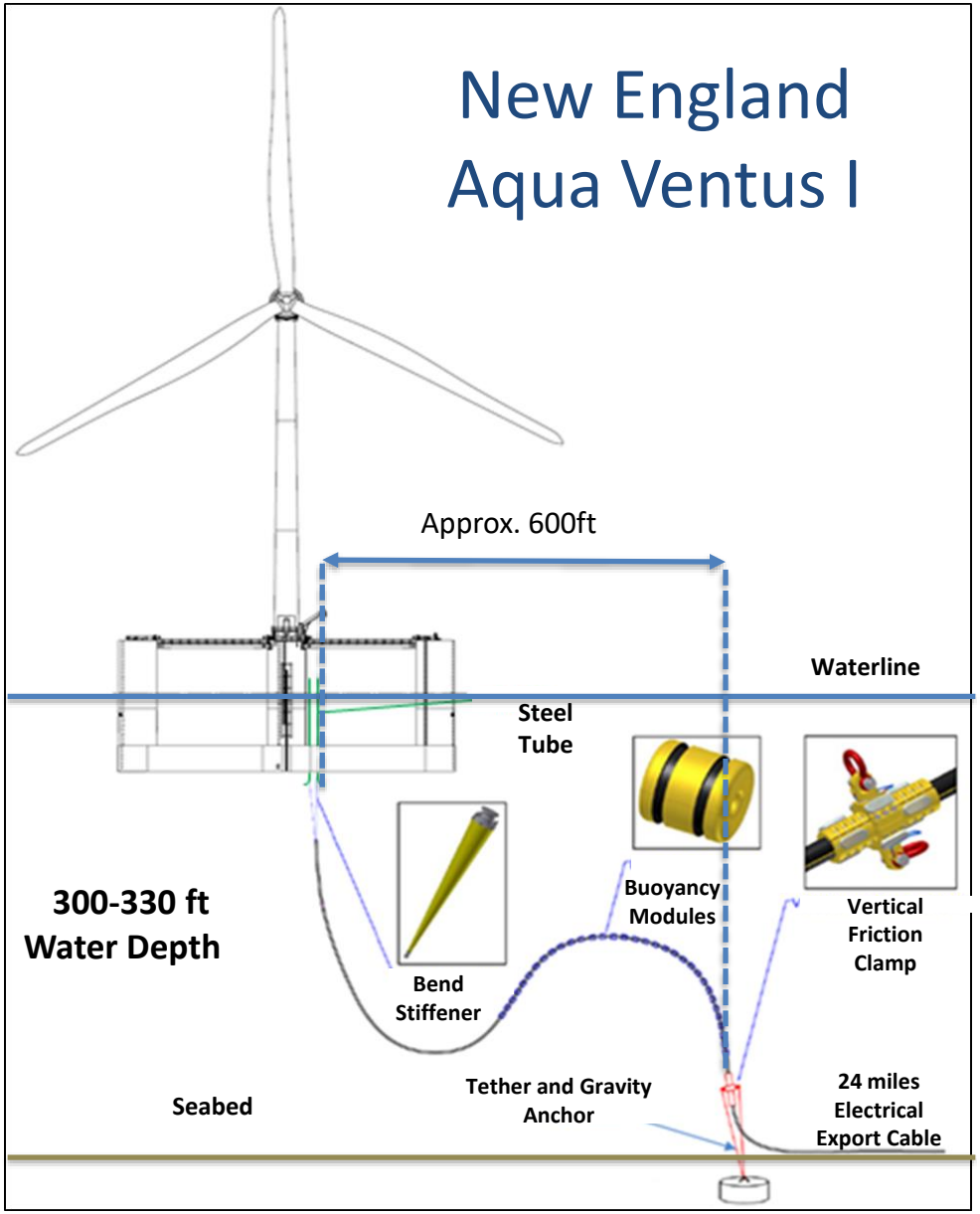


Locally produced VolturnUS segmental concrete hull

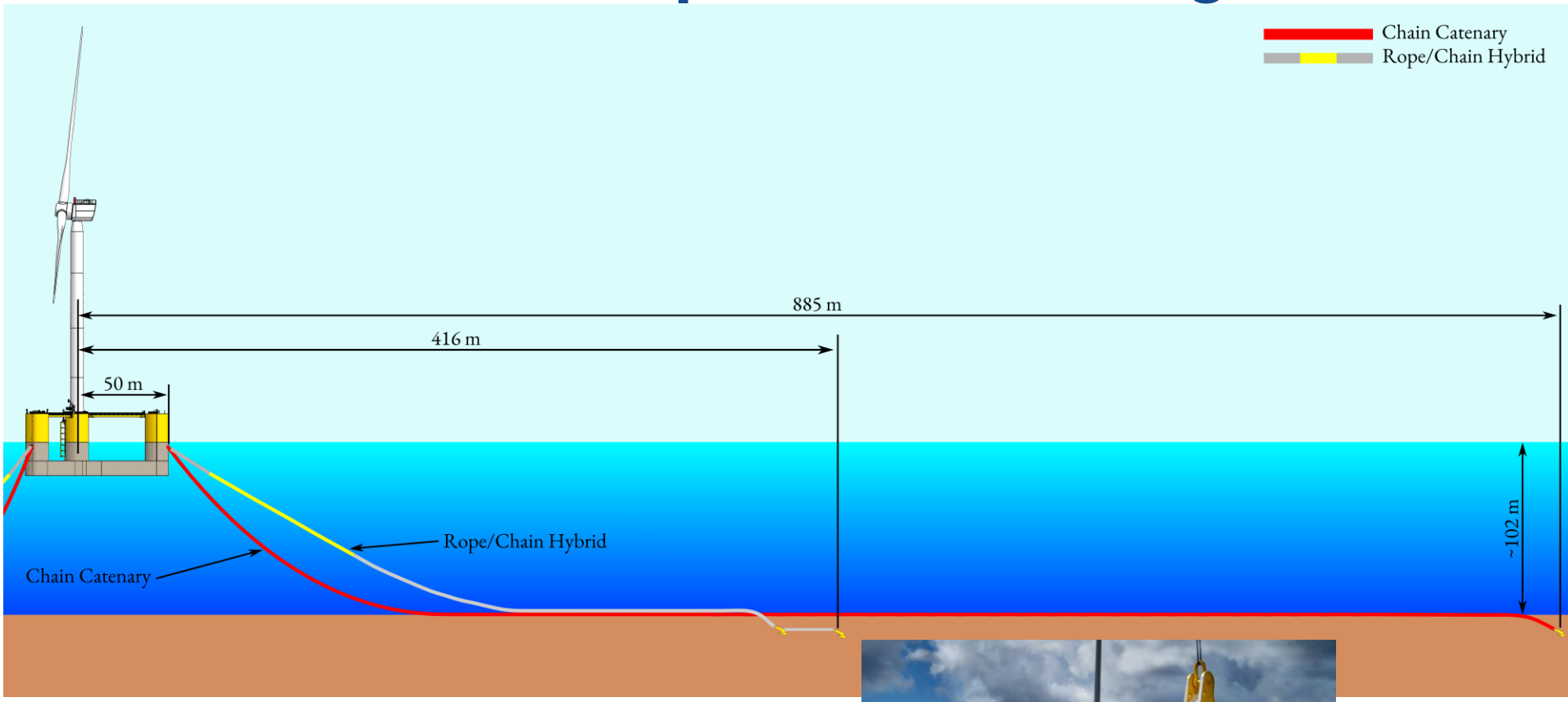


Electrical and Dynamic Cables

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.



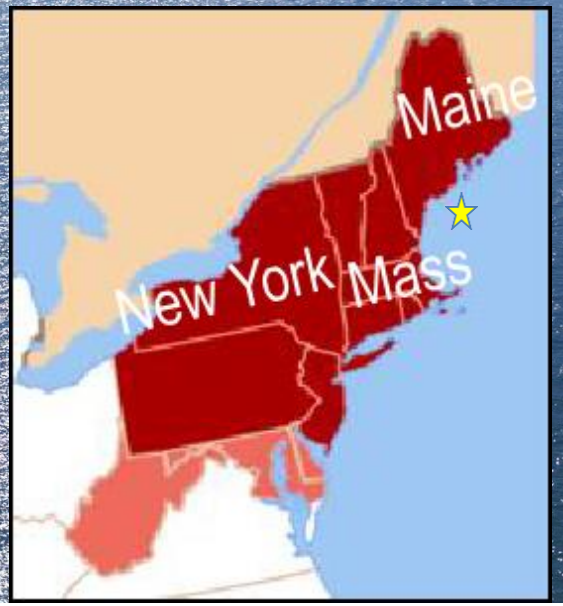
Beyond the Horizon Farms: Reduce Impacts on Fishing/ Visual



MeRA: Maine Research Array (2027)

Up to 12 turbines, 150 MW, 16 square mile

~ one mile



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US Needs East and West Coast Floating Offshore Wind Ports

- Floating-Wind Ports essential
- Likely more than a $250 million investment for one port project
- If 10 GW of floating wind are built in on the East Coast, that's a $30-$40 billion investment.

Vessels are Needed:
Can we Print Some of Them?

Needed: US Floating Wind R&D Investments

WETO
Wind Energy Technology Office

U.S. DEPARTMENT OF ENERGY

NATIONAL OFFSHORE WIND RESEARCH & DEVELOPMENT CONSORTIUM

https://nationaloffshorewind.org/

U.S. DEPARTMENT OF ENERGY

Offshore Wind Energy Strategies

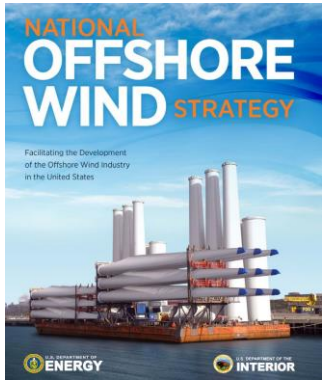
Regional and national strategies to accelerate and maximize the effectiveness, reliability, and sustainability of U.S. offshore wind energy deployment and operation

January 2022

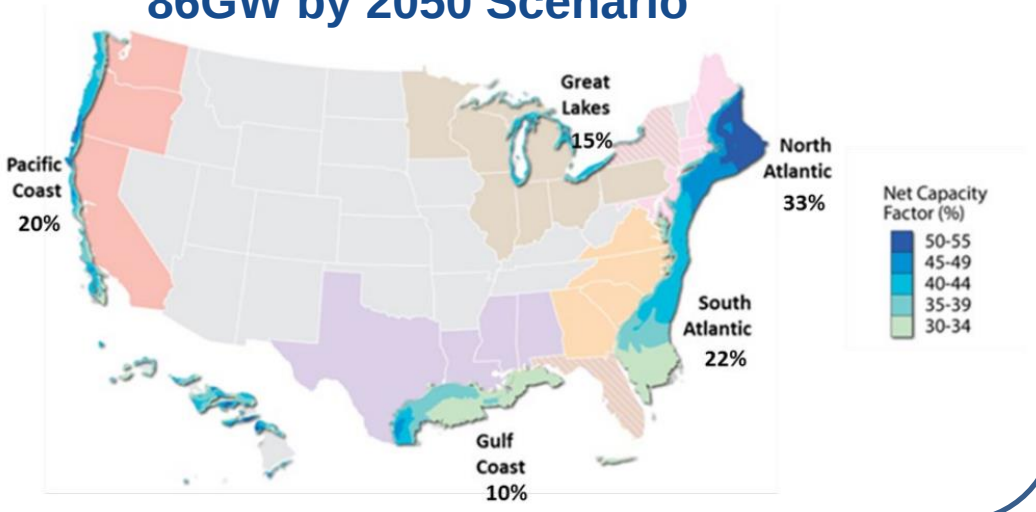
https://www.energy.gov/sites/default/files/2022-01/offshore-wind-energy-strategies-report-january-2022.pdf

arpa·e

86GW by 2050 Scenario



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



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Environmental and Energy Study Institute

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www.eesi.org/survey

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Wednesday, June 29, 2022