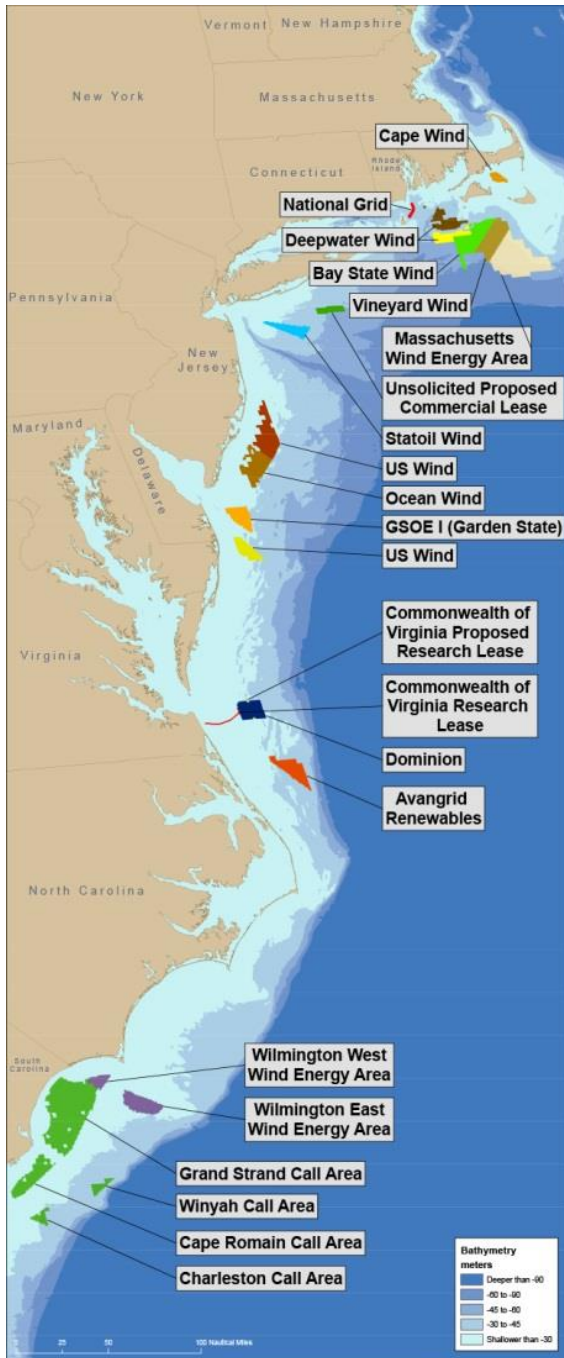


Introduction to offshore wind in the Mid-Atlantic

Bonnie Ram
University of Delaware



stakeholder discussion #3
(zoom)
May 11, 2020

Background

- ❖ **New research grant** from First State Marine Wind, University of DE
 - ❖ Untapped, strong cluster of subject matter experts
- ❖ **Co-Hosts include:**
 - ❖ Kathy Phillips, Assateague Coastal Trust
 - ❖ David Curson, Audubon Chapter (DC-MD)
- ❖ **My Biosketch**

Agenda

- ❖ **Motivations**
- ❖ **Overview of the US offshore wind project activities**
- ❖ **Planning process**
- ❖ **Maryland project commitments**
- ❖ **Economic development package and jobs**
- ❖ **Public concerns**
- ❖ **References**

Motivations for Our Meeting today

- ❖ **Offshore wind is one of the only utility scale low-carbon electricity sources available now**
 - ❖ Near huge coastal electricity loads
 - ❖ Large offshore wind resource
 - ❖ Buildable continental shelf
- ❖ **Renewable energy siting challenges**
 - Any industrial or commercial facility is increasingly controversial and challenging
- ❖ **Local community engagement and knowledge exchanges are needed**

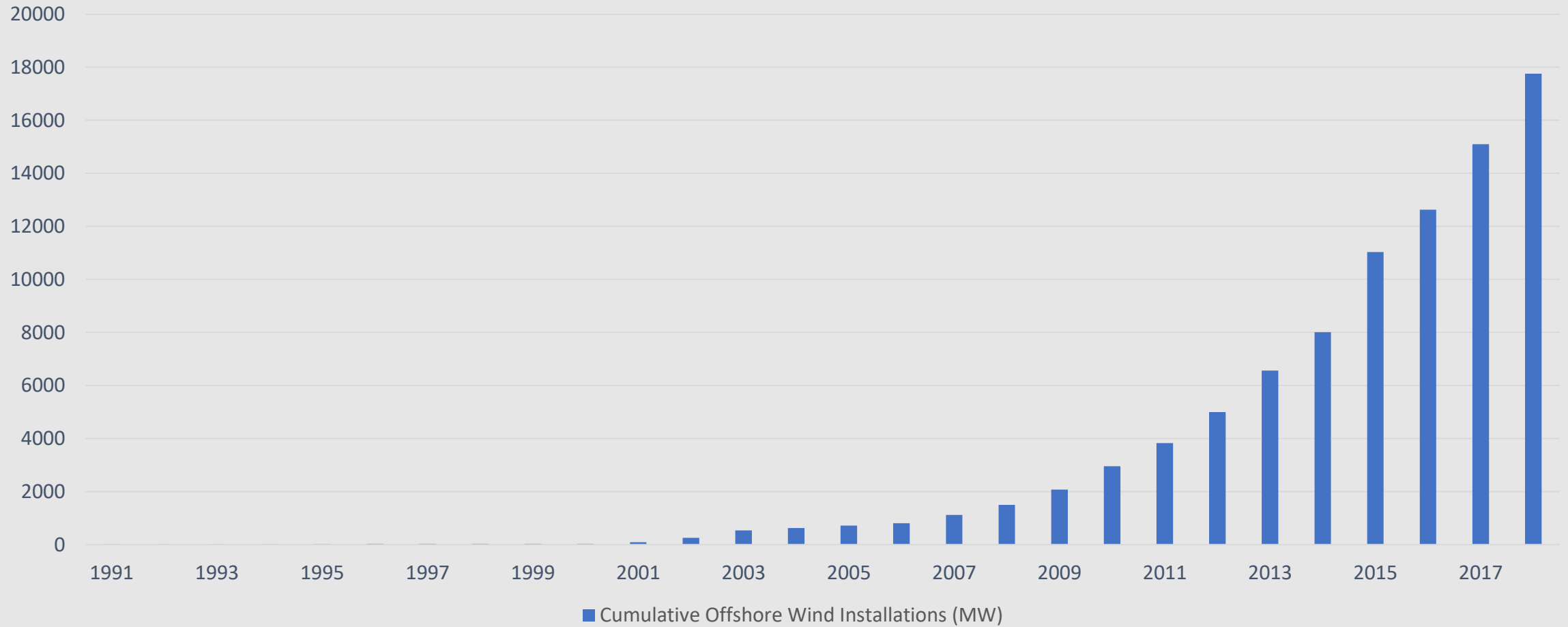
Based on Social science learning

- **Urgency** for actions to address climate change, sea level rise, and reduction of pollutants in air & water
- **Help to develop strategies for effective decision making**
 - More public engagement is needed over the life-cycle of the projects
 - Goes beyond the NEPA process & public hearings
 - Need to **start early** in the decision process



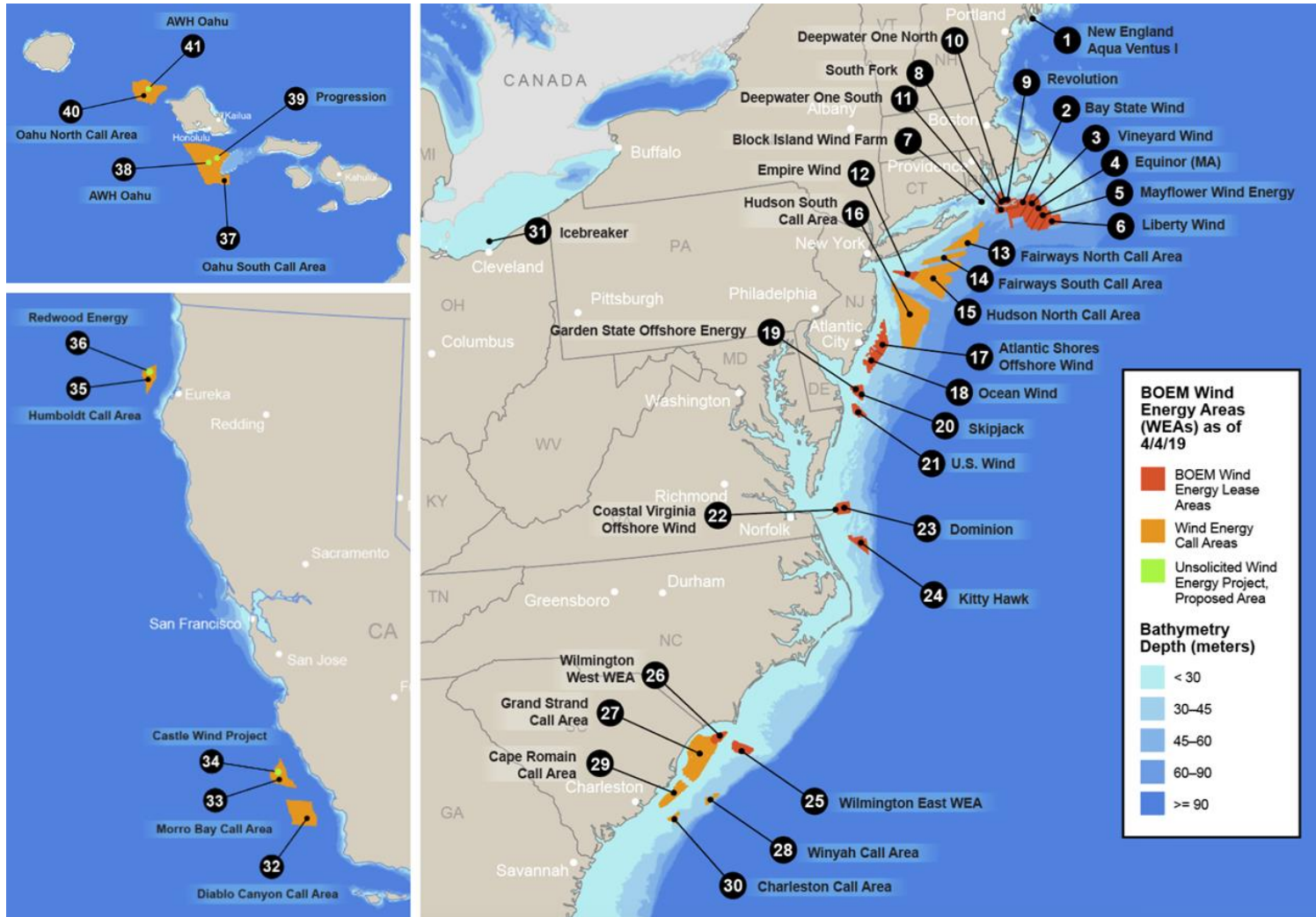
Growth of Offshore Wind Globally

22GW in operation – > 5000 turbines spinning – 3.6 GW added in 2019



U.S. Offshore Wind Industry Regulatory Activity

- Bureau of Ocean Energy Management (BOEM) given authority under EPOA 2005
- 30 CFR 585 released in 2009 provides regulatory framework for federal waters
- Offshore Wind lease sales began in 2011
- BOEM works with state task forces prior to lease area designation
- 16 lease areas have been sold in public auctions (about 21 GW)
- ***Call areas (13)*** are nascent ocean tracts under consideration for possible leasing

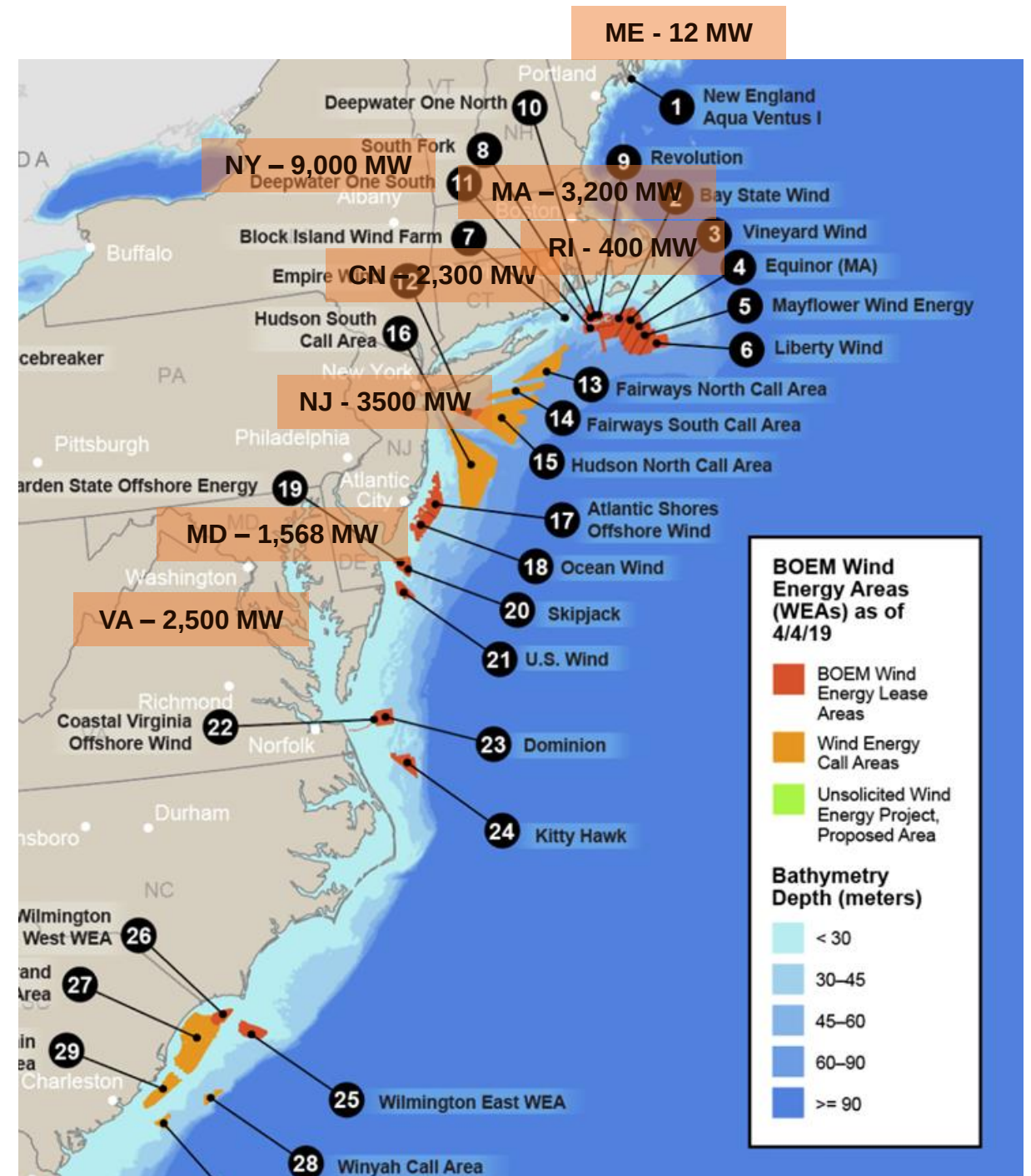


U.S. State Offshore Wind Policy Commitments

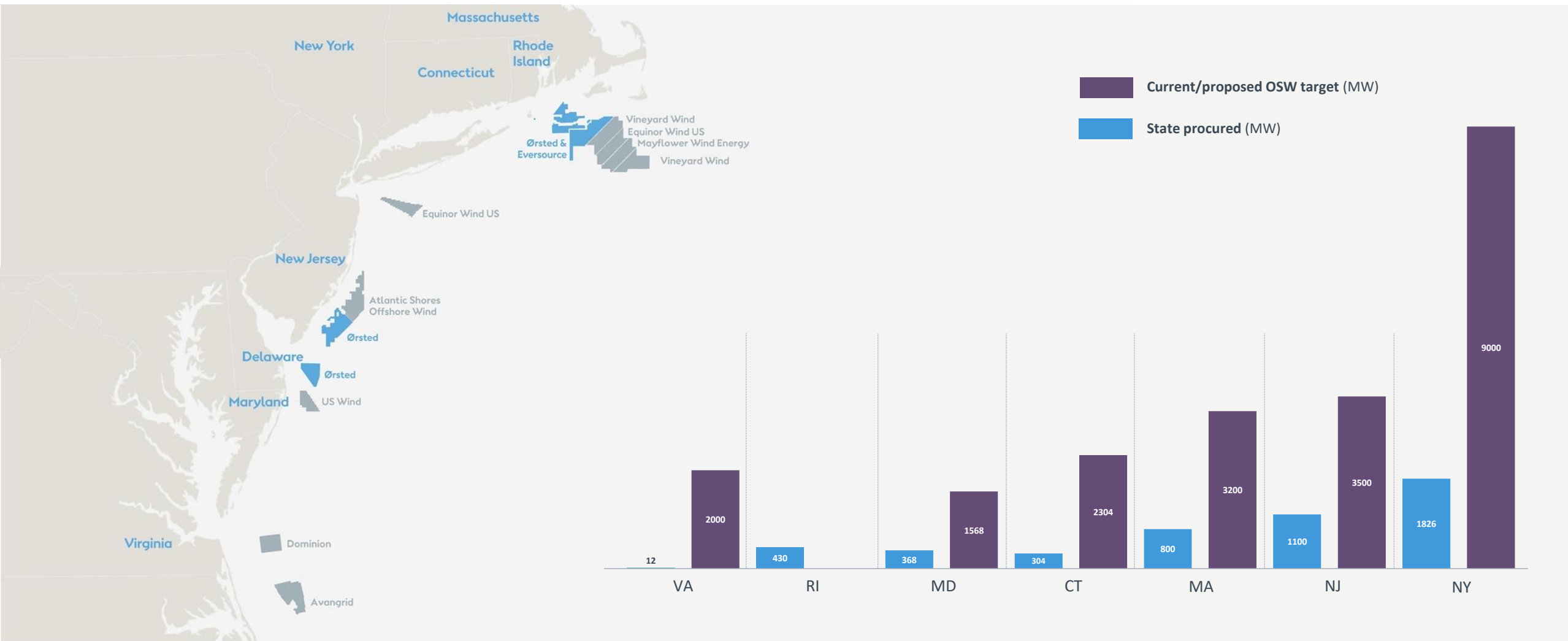
- 22,480 MW* committed by 2035
- 13,956 MW* committed by 2030
- 8 states
- \$80 Billion in gross revenue possible
- Global forecasts predict 154 to 193 GW of Offshore Wind by 2030 and 500 GW by 2050
- Regulatory project pipeline for U.S. is calculated at 25,824 MW.

* increased by 2,500 MW from August market report after VA Gov. Northam's Executive Order in Sept 2019

Slide source courtesy of NREL. Walt Musial.

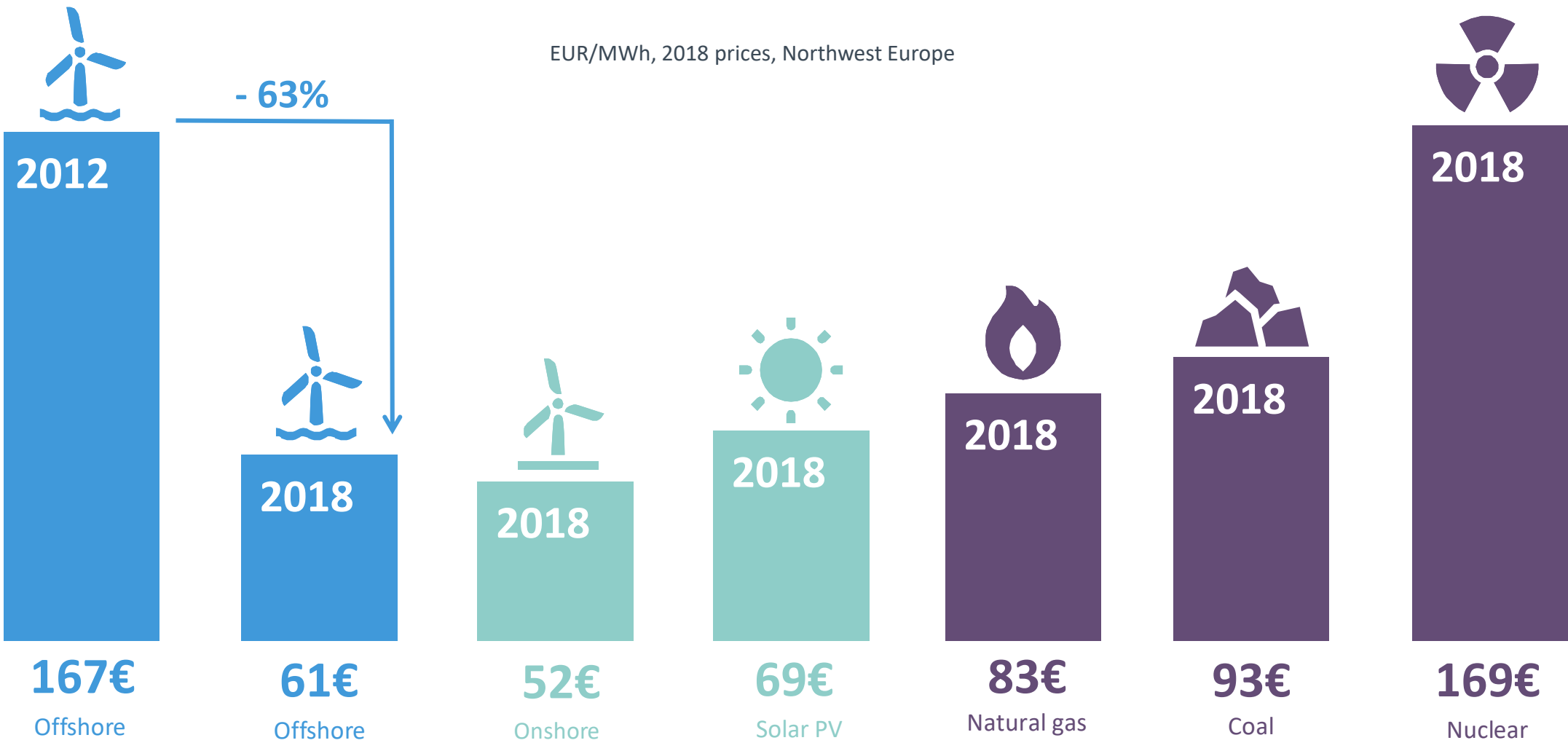


Offshore wind market on the East Coast



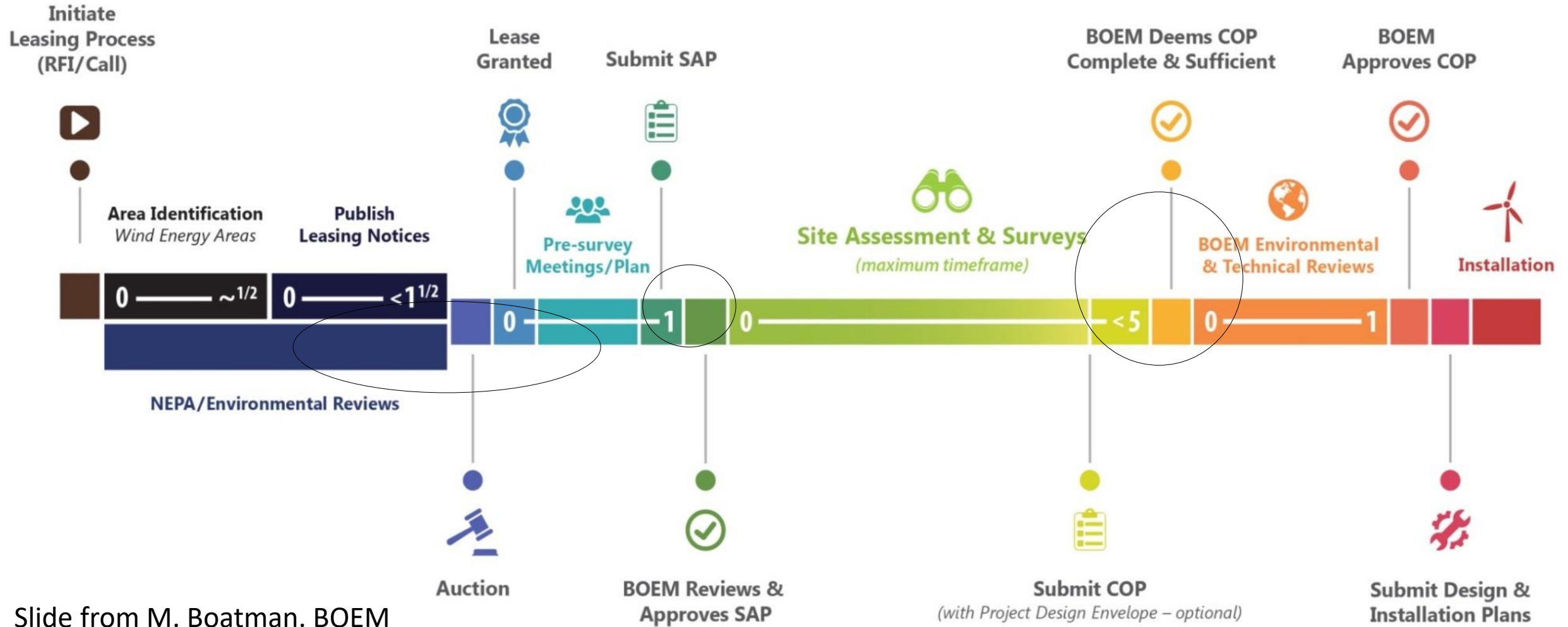
Levelized cost of electricity for different technologies

The rapid cost reductions in the industry, have made offshore wind power competitive relative to conventional power generation based on fossil fuels



Source: Bloomberg New Energy Finance – 2H 2018 LCOE Update, current LCOE.
Onshore wind: average of DE, DK, NL and UK mid-scenarios. Solar PV, Gas: average of DE, UK mid-scenarios. Coal: DE mid-scenario. Nuclear: UK mid-scenario.
Offshore wind: 2012 generic offshore wind, Northwest Europe, FID 2012. In 2012 our goal was to reduce offshore wind costs to EUR 100 per MWh in 2020. 2018: average of relevant projects in NL, UK and DE with COD 2022-2024. NL: Hollandse Kust (zuid) I&II, UK: CfD Round 2, DE: OWP West, BRW I, BRW II. For DE and NL, additional EUR 15 per MWh assumed as transmission cost.
Exchange rate EUR:USD: 0.88, YoY inflation 2017-2018: 1%.

BOEM Lease Selection & Planning Process



Slide from M. Boatman. BOEM

Estimated policy impacts > 30 years



2 years of construction



25 years of operation



2 years of decommissioning

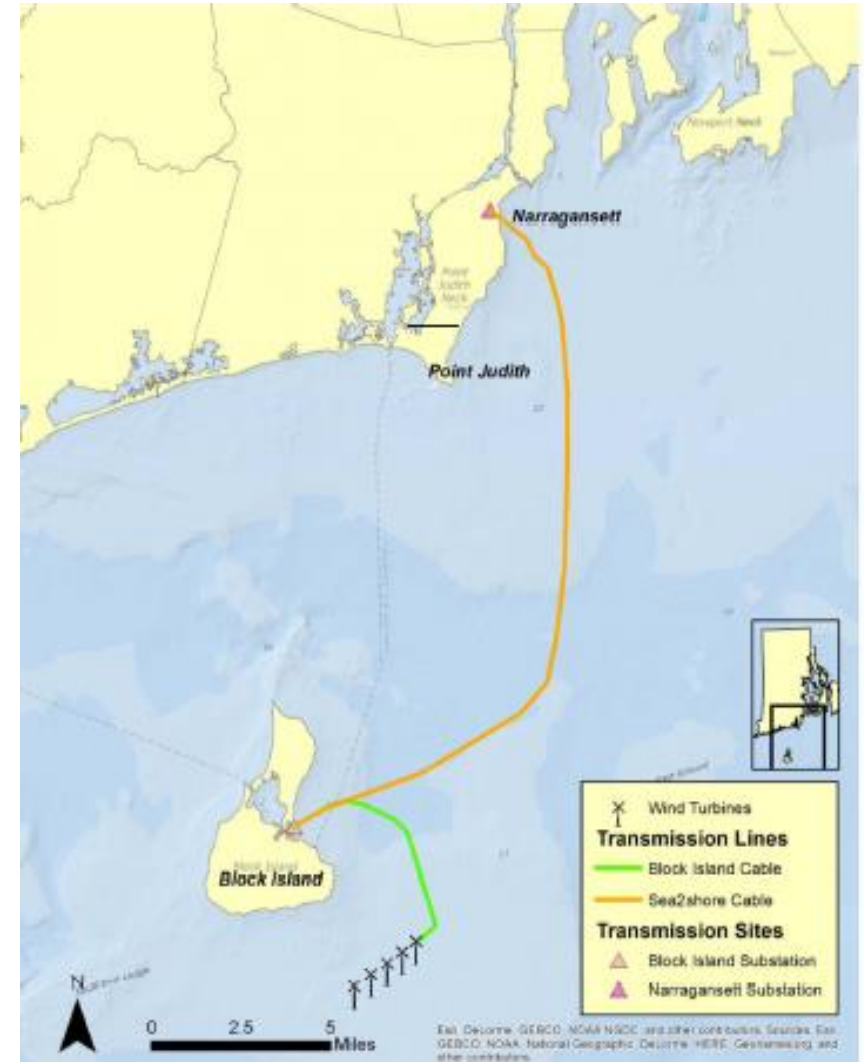
Policy Elements =
*Technology +
Science +
Stakeholders +
Economics +
Ratepayers*

*Slide adapted from
Offshore Wind Energy
Class. University of DE*

Stakeholder Engagement

Our First Offshore Wind Project: Block Island

- Motivation – reduce diesel for electricity
- 30 MW turbine project
 - Five 150-6MW Halidade Turbines Manufactured by GE
- Location in **state waters**
 - Approximately 3 miles off of the southeast coast of Block Island, Rhode Island
 - Approximately 16 miles off of the coast of Point Judith, Rhode Island



What we have learned from Block Island

- There's a big difference between 5 wind turbines and 300+
- Site and species are specific within regional and ecological context
- Comprehensive and inclusive planning process
- Ongoing and robust communication
- Industry mitigation strategies
- Defining community benefits
- Continue the learning and sharing



Slide adapted from Jen McCann presentation. 6/27/18

Maryland PSC Decision – May 2017

Approved two projects

- Maryland offshore wind target 1568 MW
- Procured by the state so far = 368 MW
- Supported by Offshore Renewable Energy Credits (ORECs) bought by utilities
- Delaware & Maryland Wind Energy Areas (leases)

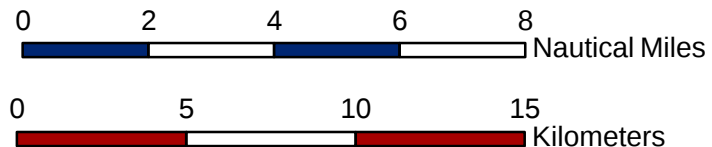
Maryland PSC Decision --- May 2-17

US Wind - Maryland Wind Energy Area

- Off of Ocean City and as far north as Fenwick Island
- Proposed cable to shore proposed at Indian River (TBD)
- 248 MW --- 30 - 8 MW or 20 -- 12 MW (Turbine size TBD)
- Power to an estimated ~ 76,000 homes
- Distance to shore has varied from 12 – 17 miles
- Italian Developer with an office in Baltimore
- Ratepayer Bill increase by 1.4% or \$1.40/month.



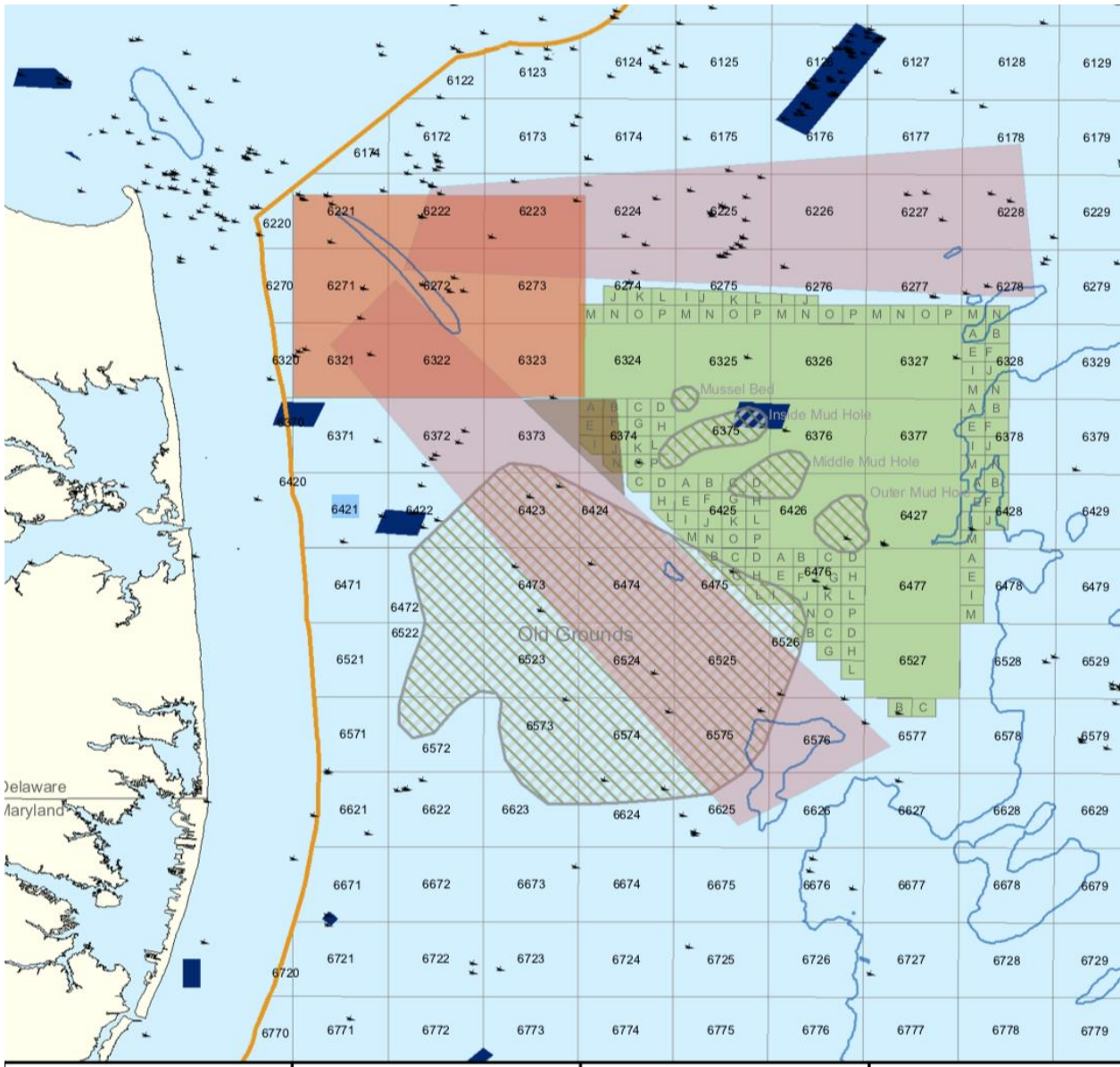
- Fed/State Boundary
- Traffic Separation Scheme
- Maryland Call Area
- OCS Lease Blocks
- Official Protraction Diagram



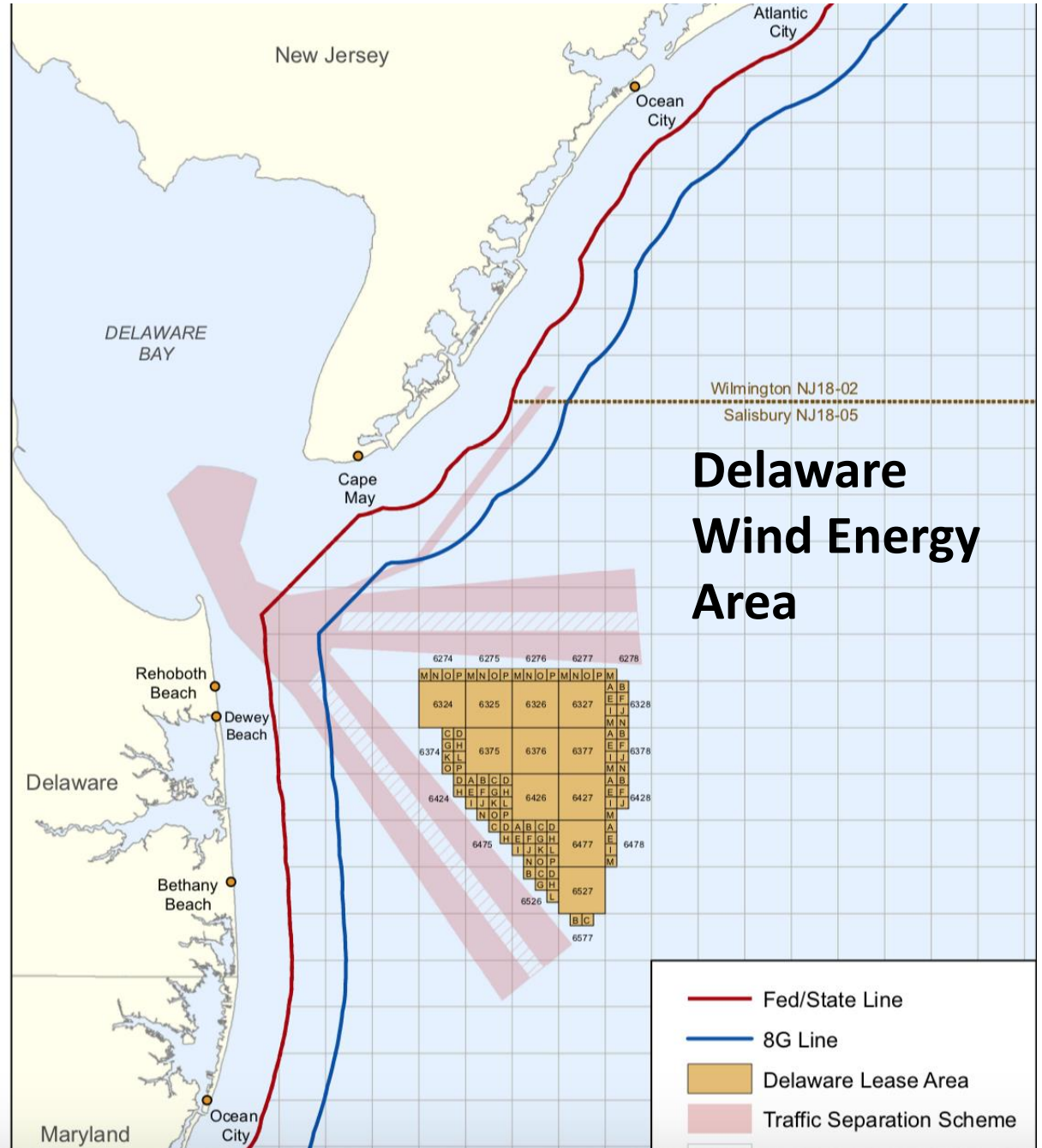
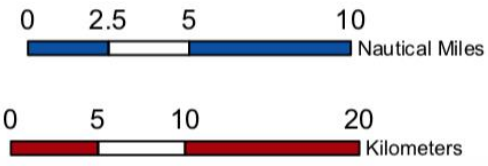
Maryland PSC Decision – May 2017

Delaware Wind Energy Area

- ❑ Developer Ørsted (Skipjack project)
- ❑ Same lease area as Bluewater Wind Delaware, LLC (2012)
- ❑ Closest point to the coast estimated at 19 miles
- ❑ Cable to shore proposed in Fenwick Island State Park
- ❑ 120 MW – Ten -- 12 MW turbines (35,000 homes)
- ❑ 20 year contract @ 2023 Price is \$171.30/MWh rising 1%/year to \$206.95 in 2042.
 - ❑ Levelized cost of \$131.93 in 2012\$
- ❑ Installation & commercial operation projected – 2023



- Wrecks and Obstructions
- 30m Bathymetric Contour
- Fed/State Boundary
- USCG Traffic Separation Scheme
- Fishing Grounds in RF1 Area
- Fish Haven
- USCG Proposed Anchorage Area
- Explosives Dumping Ground
- Delaware Proposed Lease Area
- OCS Lease Blocks



Delaware Wind Energy Area

- Fed/State Line
- 8G Line
- Delaware Lease Area
- Traffic Separation Scheme

https://www.boem.gov/uploadedFiles/BOEM/Renewable_Energy_Program/State_Activities/DEProposedLeaseArea_RF1.pdf

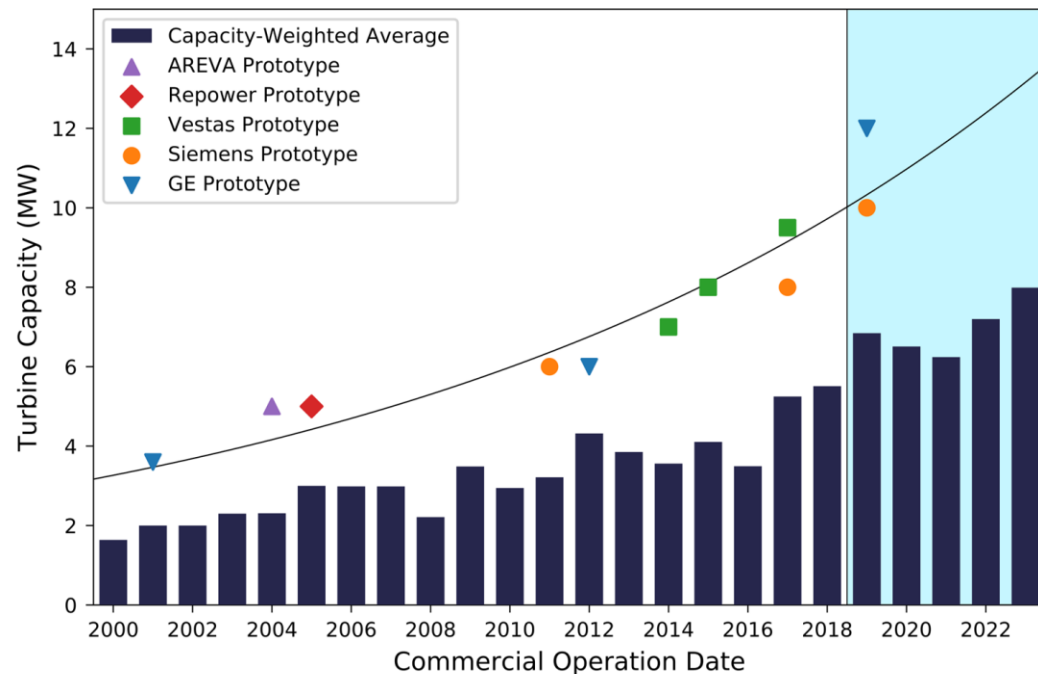
STATUS OF THE TWO PROJECTS

- **Skipjack** --- Developer, Ørsted
 - Submitted COP
 - Negotiated MOU with DNREC for Fenwick Island State Park substation
 - Selected 12 MW turbine
 - Committed \$13.2 million for first piece of overall infrastructure investment

- **US Wind (Marwin)** --- Developer, Toto construction
 - Submitted SAP for MET tower (delayed indefinitely) – now using a FLiDAR
 - Turbine not selected
 - COP not submitted

New Turbine Prototypes Foretell Continued Turbine Growth

- **General Electric announced the 12-MW Haliade-X turbine** prototype now being installed in Rotterdam to be on the market in 2021. The turbine is first in class, with a 12-MW direct-drive generator, 220-m rotor, and 140-m hub height.
- **Siemens Gamesa announced the SG10.0-193 DD turbine**—a 10-MW direct-drive turbine with a 193-m rotor—which is planned to be ready for market in 2022.



**Average Commercial Offshore Turbine Growth With
Prototype Development Leading Further Growth**

Source: DOE 2018 Market Report & Walt Musial Presentation



GE 12-MW Wind Turbine Nacelle – Haliade -X

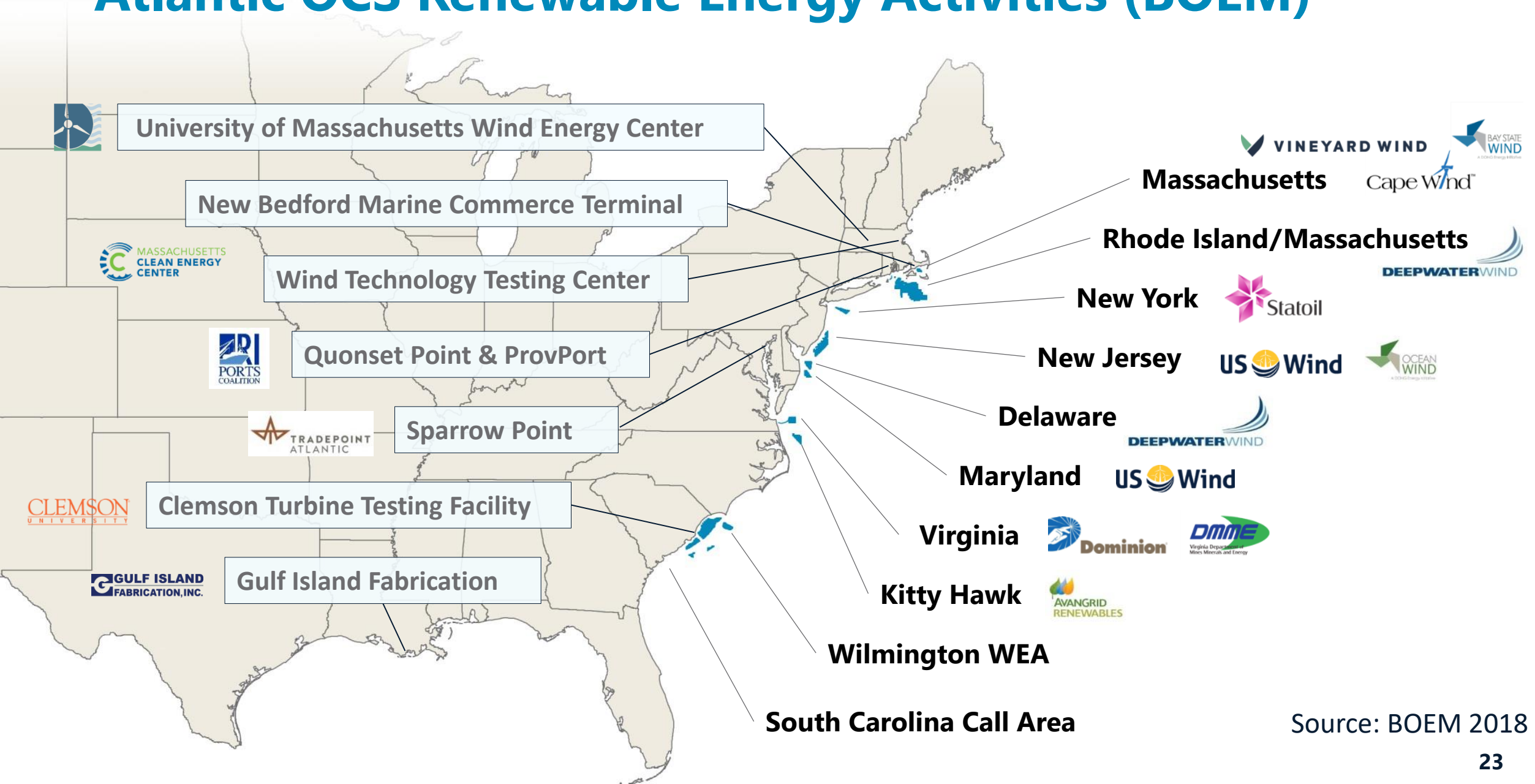
Photo Source: Greentech Media: <https://www.greentechmedia.com/articles/read/ge-finishes-first-nacelle-for-12mw-haliade-x-offshore-wind-turbine#gs.xpxkf6>

How can The Mid-Atlantic reap some of the benefits while addressing the potential challenges?

POTENTIAL BENEFITS

- Reduce greenhouse gas (GHG) emissions & other pollutants
- Reduced water consumption
- Realize economic development commitments
 - Port upgrades
 - New, good paying jobs
- Reduce electricity transmission congestion in Delmarva Peninsula

Atlantic OCS Renewable Energy Activities (BOEM)



Source: BOEM 2018

Fastest growing occupations (2018-28)

OCCUPATION	GROWTH RATE, 2018-28	2018 MEDIAN PAY
Solar photovoltaic installers	63%	\$42,680 per year
Wind turbine service technicians	57%	\$54,370 per year
Home health aides	37%	\$24,200 per year
Personal care aides	36%	\$24,020 per year
Occupational therapy assistants	33%	\$60,220 per year
Information security analysts	32%	\$98,350 per year
Physician assistants	31%	\$108,610 per year
Statisticians	31%	\$87,780 per year
Nurse practitioners	28%	\$107,030 per year
Speech-language pathologists	27%	\$77,510 per year

Reference: OCCUPATIONAL OUTLOOK HANDBOOK. <https://www.bls.gov/ooh/fastest-growing.htm> (accessed May 10, 2020); for wind energy project managers, see, <https://www.onetonline.org/link/summary/11-9199.10>

Maryland PSC Decision – May 2017 ECONOMIC DEVELOPMENT PACKAGE

- Economic development package ~ \$1.4 billion
 - \$39.6 million in port and infrastructure upgrades
 - Tradepoint Atlantic staging area
 - Sparrows point port construction
- 9700 new direct and indirect jobs
- Expected to contribute \$74 million in state revenues over 20 years

How can The Mid-Atlantic reap some of the benefits while addressing the potential challenges?

POTENTIAL NEW JOBS

- Design through operations
 - 914 full time jobs (Ørsted commitment)
- Operations and maintenance facility -
 - 484 jobs during operation
 - Required to build it in Ocean City
 - 20-40 jobs for the facility

How can The Mid-Atlantic reap some of the benefits while addressing the potential challenges?

POTENTIAL UNION JOBS

- Developers are working with several trade unions and councils in NY, CT, NJ, RI, and MD.
 - Rhode Island Buildings & Construction Trade Council (Block Island Wind Farm Project)
- Supply chains, facility construction, maintenance and operation, procurement of infrastructure materials, etc.
- Onshore jobs at the O&M facilities
 - Planners, warehouse coordinators, team supervisors, project managers and site management.

How can The Mid-Atlantic reap some of the benefits while addressing the potential challenges?

94,000 certified GWO technicians working in the wind industry now

+360 certified training providers

- REF: <https://www.globalwindsafety.org/news>

How can The Mid-Atlantic reap some of the benefits while addressing the potential challenges?

EDUCATION AND TRAINING

- Undergraduate and graduate engineering and policy classes (e.g., University of DE, Tufts, Arizona State, UMass)
- Salisbury, MD training center in process – Global Wind Organization
 - Certification and standards
- MA Maritime Academy – first in the nation training

How can the Mid-Atlantic reap some of the benefits while addressing the potential challenges?

POTENTIAL CHALLENGES

- Understanding better the public & political perceptions of renewable energy
- Building the knowledge base quickly but with transparency
 - Commercial fishing areas
 - Navigation and shipping lanes
 - Post-construction monitoring of protected and/or endangered species
- Participating in public engagement opportunities & local social media

QUESTIONS AND DISCUSSION

FUNDER: First
State Marine
Wind



PARTNER:
DE Sea Grant

THANK YOU TO OUR CO-HOSTS

Kathy Phillips -- Assateague Coastal Trust
David Curson -- Audubon Chapter (DC-MD)

FURTHER INFORMATION

- More details on the Maryland projects can be found on the Commission's website (www.psc.state.md.us) in Case No. [9628](#) (US Wind) and Case No. [9629](#) (Skipjack). Original case number was 9413.
- [BOEM links for MD and DE](#) project information
- [BOEM environmental studies](#) (completed and ongoing)
- [Department of Energy – Wind Energy Technologies Office FAQs](#)
- [University of DE --- FAQs](#)
- [MA Maritime Academy](#) – Offshore wind safety certification training
- A Day In The Life Of A Wind Turbine Engineer
<https://www.youtube.com/watch?v=vfUhBKZR4sU>
- [Tradepoint Atlantic Port](#) – Maryland investment
- [Wind Europe statistics](#)
- [Video of floating wind turbine](#) presentation from Walt Musial (NREL)