



Salem Offshore Wind Terminal

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Seth Lattrell, VHB



Presentation Overview

- Salem's Maritime Tradition
- Power Plant Reconstruction
- Harbor Plan
- Site Overview
- Offshore Wind Overview
- Port Redevelopment

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Salem's Maritime Tradition

- **1626**—Salem was called Naumkeag, “the fishing place” by Native American’s when European settlers first Arrive.
- **Mid 1760’s to around 1812**—Global maritime trade flourished, making Salem 6th largest city in the nation.
- **1790**—Richest city in the nation per capita
- **1805**—250 vessels registered in Salem and over 30 wharves lined the port, including India Wharf, where current port is located
- **1812**—Salem’s maritime preeminence ended by war and embargo
- **1830’s to early 1900’s**—India Wharf rebuilt for expanded coal storage and distributor via Salem & Lowell Railroad, fueling Industrial Revolution
- **1952**—New England Power Company builds coal/oil fired power plant in Salem
- **2018**—Coal-fired plant replaced with new natural gas fired plant



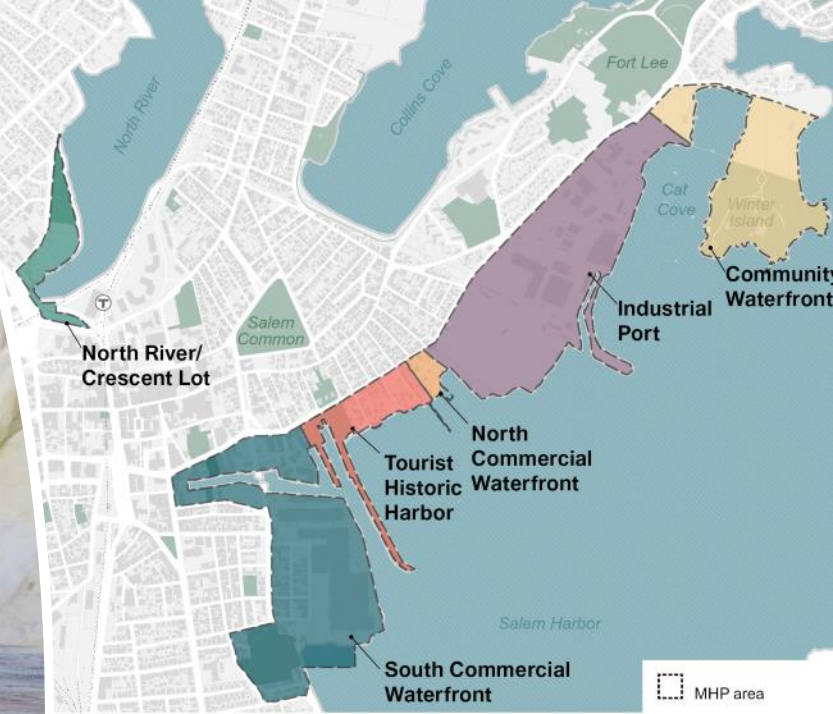
Power Plant Reconstruction

- “Filthy-five” coal/oil plant replaced with quick start gas fired facility
- Quick start will fill the gap as we transition to renewables, and balance intermittent output of wind/solar
- Air-cooled condenser and transition to gas eliminates water-dependency (and port activity)
- Significantly smaller footprint—65 acres to 23
- Operations to cease by 2050



Salem Harbor Plan

- Aug. 2020 Community Kickoff
- Robust community participation:
 - Dozens of meetings
 - 250 map interactions
 - 650 responses on survey
- Key planning takeaways:
 - Market analysis presented limited options other than mixed-use
 - Opposition to high density residential
 - Strong interest in supporting renewable energy wind
 - Market unclear under prior federal administration





Site Reuse Overview

- ### OPPORTUNITIES
- 42-acre remediated upland
 - Deep-water berth with access to Federal Channel
 - No overhead restriction
 - Ideal location for Gulf of Maine OSW

- ### CONSTRAINTS
- Poor road/rail access
 - Proximity to historic neighborhood
 - Designated Port Area
 - 200+ Miles from existing offshore wind lease areas

+/- 42 Acres

Federal Channel
32 ft Depth

South Essex
Sewerage District

Salem Witch Village

Salem
Common

Peabody Essex Museum

The Satanic Temple

South Essex
School

Existing Lease Areas

7 LEASE AREAS

1,418 MILES²

5 DEVELOPER TEAMS

5 PROJECTS W/ PPAS*

5,600 MW*



WIND TECHNOLOGY TESTING CENTER



★ Salem OSW Port

NEW BEDFORD MARINE COMMERCE TERMINAL

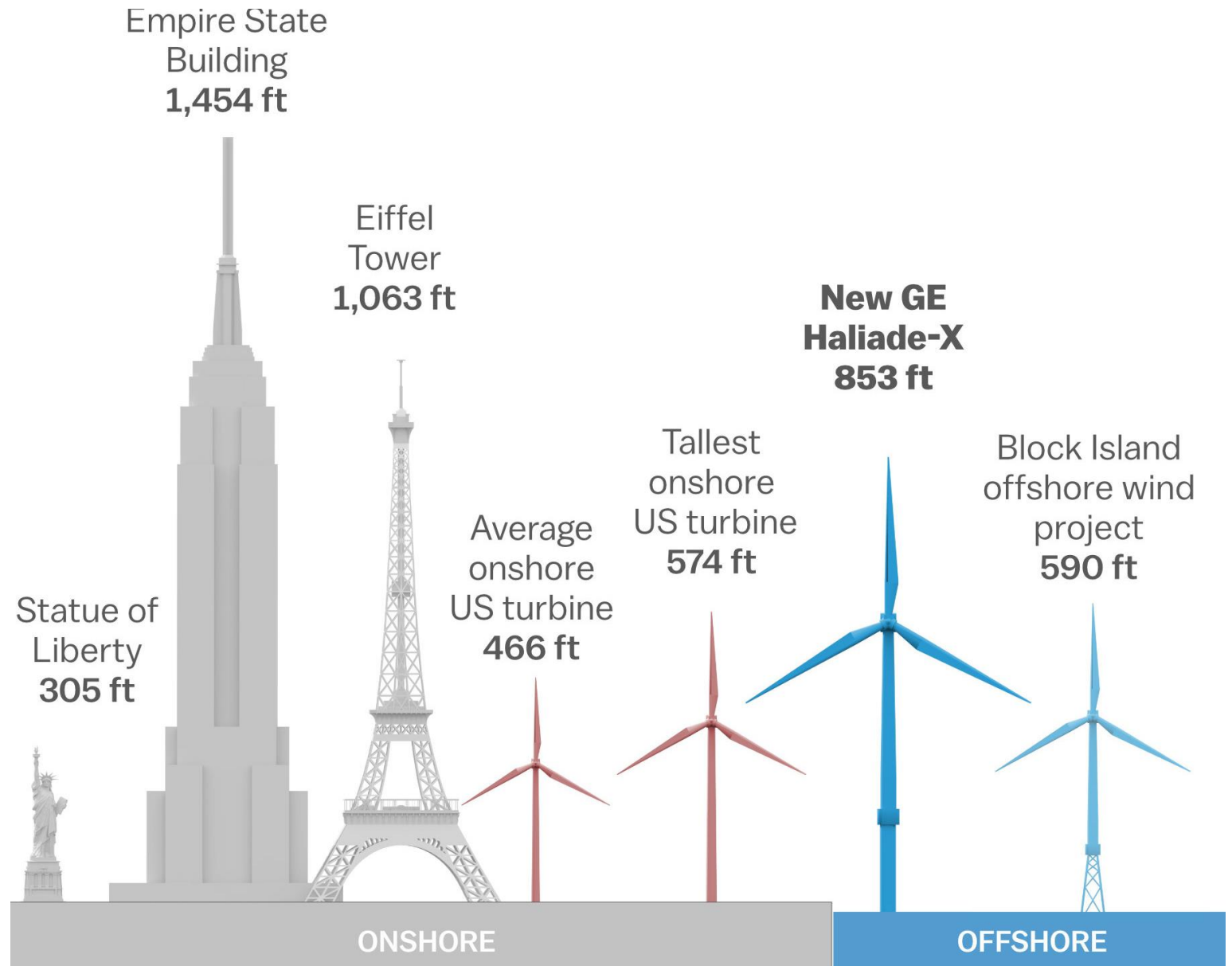


Block Island Wind Farm

- Ørsted
- Vineyard Wind
- Equinor Wind US
- Mayflower Wind Energy

Size and Scale of Components

- GE Haliade X Facts:
 - Blades are longer than football field
 - 853 feet total height
 - Each turn could power home for 2 days
 - Each turbine could power approximately 16,000 homes / year
- Larger onshore turbines have reduced prices from 7 cents to 2 cents per kWh over last decade
- Higher altitude = higher wind speed, so taller/larger blades can be more productive



OSW Installation Requires Ports

Three primary port types:

Marshalling/Construction Base Port

- Pre-assembly, staging, and construction of components, and loading for delivery/install
- Physical attributes are most critical—depth, distance, and height/width restrictions
- Proximity matters regardless of WTIV or feeder barge
- Area requirements = 30-50 acres

Manufacturing

- Manufacturing facilities for main components, i.e. foundations, turbines, cables, etc.
- Proximity less critical
- Area requirements = 30-50 or more acres

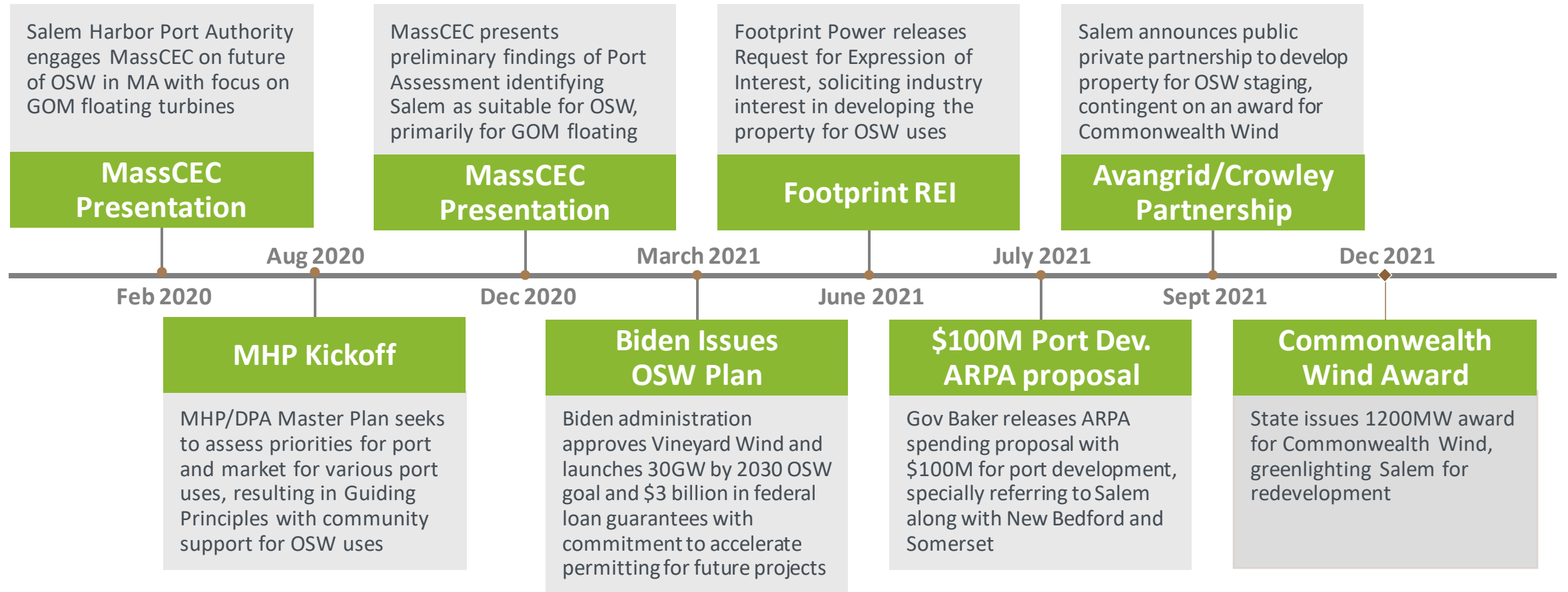
O&M

- Support ongoing operations of wind farm, including; workshops, warehouse, office, facilities for technicians
- Could include service/repair port with storage space for replacement components
- Area requirements = 5-20 acres



TIMELINE


Salem's Role in Offshore Wind

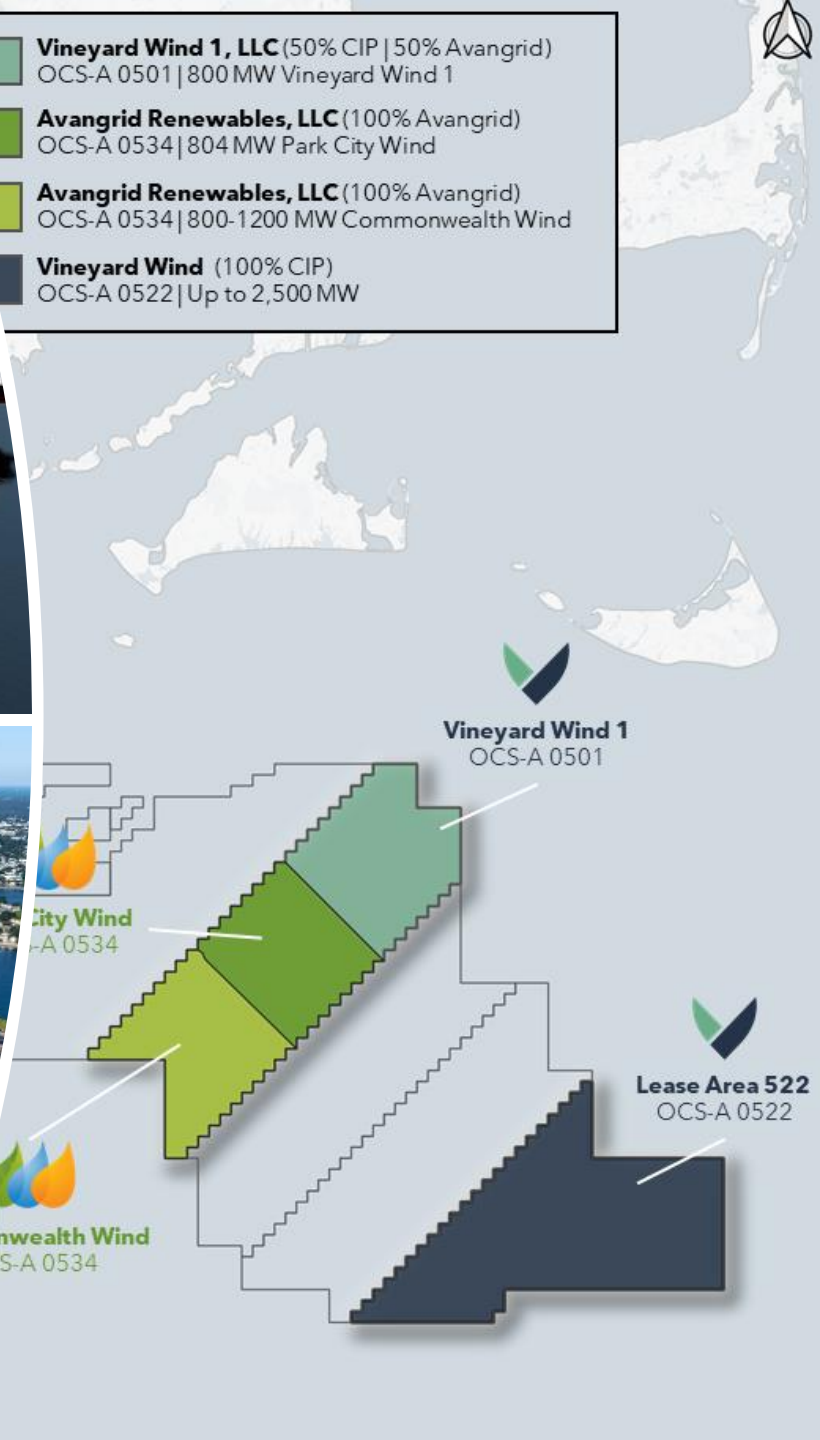


Port Redevelopment Plan

- Salem, Crowley, and the partners of Vineyard Wind (Avangrid and Vineyard Offshore) partner to build MA 2nd offshore wind port
- Crowley will develop/operate the port
 - Leading US Maritime Transportation Co.
 - Founded 1892
 - 6,300 employees
 - Largest civilian employer of US mariners
 - Owns and/or operates over 200 vessels
- Avangrid lease port to marshal 2GW of offshore wind out of Salem in first 5 years—enough power for 1.25 million homes
 - 1200MW Commonwealth Wind/
800MW Park City Wind
 - Future lease option with Vineyard Offshore
- City/MassCEC to share ownership of the port from prior agreements
- Project currently supported by over \$110 million in public funding



	Vineyard Wind 1, LLC (50% CIP 50% Avangrid) OCS-A 0501 800 MW Vineyard Wind 1
	Avangrid Renewables, LLC (100% Avangrid) OCS-A 0534 804 MW Park City Wind
	Avangrid Renewables, LLC (100% Avangrid) OCS-A 0534 800-1200 MW Commonwealth Wind
	Vineyard Wind (100% CIP) OCS-A 0522 Up to 2,500 MW



An aerial view of an offshore wind farm construction site. Several large support vessels, branded with the name 'CROWLEY', are positioned around the site. These vessels are carrying large white cylindrical components, likely nacelles or tower sections, for the wind turbines. In the background, several wind turbines are visible, some fully assembled and others under construction. The water is calm, and the sky is overcast.

QUESTIONS?

Follow the progress at
salemoffshorewind.com

Seth Lattrell
SLattrell@VHB.com
617.607.0093

Job Creation/Economic Impact

- Port Development Direct Economic Benefits (2022-2025):
 - Acquisition and development cost estimated at \$180M
 - Creation of approximately direct 400 FTE job years during site buildout and 600 indirect/induced
- Port Operation Direct Economic Benefits (2025-2039):
 - Enable Construction of 7.2 GW of offshore energy and attract \$1.5 billion of in-state expenditures
 - Support over 14,000 job years of employment (across 17 years of operation)
 - 4,000 job-years direct
 - 5,000 job-years indirect
 - 5,000 job-years induced
- Other localized benefits:
 - Millions in new tax revenues
 - \$150m + infrastructure investment into the Port of Salem (co-owned facility) at no cost to City
 - New Community Benefits Agreement with Crowley will include pathways to provide access for residents to good jobs



Future Lease Areas: Gulf of Maine

- BOEM formation of the Gulf of Maine Renewable Energy Task Force
- Representatives from MA, NH, ME, federal agencies and municipalities
- 1st meeting December 12, 2019
- Biden administration announced timeline to open GOM lease areas by 2025.
- Floating tech required due to depth



Offshore Wind in Massachusetts

- Essential to meeting climate/net-zero goals
- Regional retirements create room for new generation
- Proximity to load + wind resource + shallow water = “Saudi Arabia of Offshore Wind”
- Peak coincidence—greatest wind during highest demand in late afternoons
- First movers:
 - Cape Wind
 - New Bedford Marine Commerce Terminal
 - Vineyard Wind 1—First commercial scale offshore wind project in US



Status: Massachusetts Procurements

- 2018 §83C-1 was awarded to Vineyard Wind for 800MW
- 2020 §83C-2 was awarded to Mayflower Wind for 804MW
- 2021 §83C-3 was awarded to Commonwealth Wind by Avangrid for 1200 MW and Mayflower Wind for 400MW
- 2,400 MW remaining in current authorization
 - 15,000 MW (15GW) forecasted off MA by 2050
 - 30,000 MW (30GW) forecasted off MA by 2050
 - 30,000 MW (30GW) targeted in US by 2030—requires approx. \$57B investment and 44,000 workers employed by 2030*
 - 31,000 development, supply chain, port and installation jobs
 - 13,000 operations and maintenance-related jobs

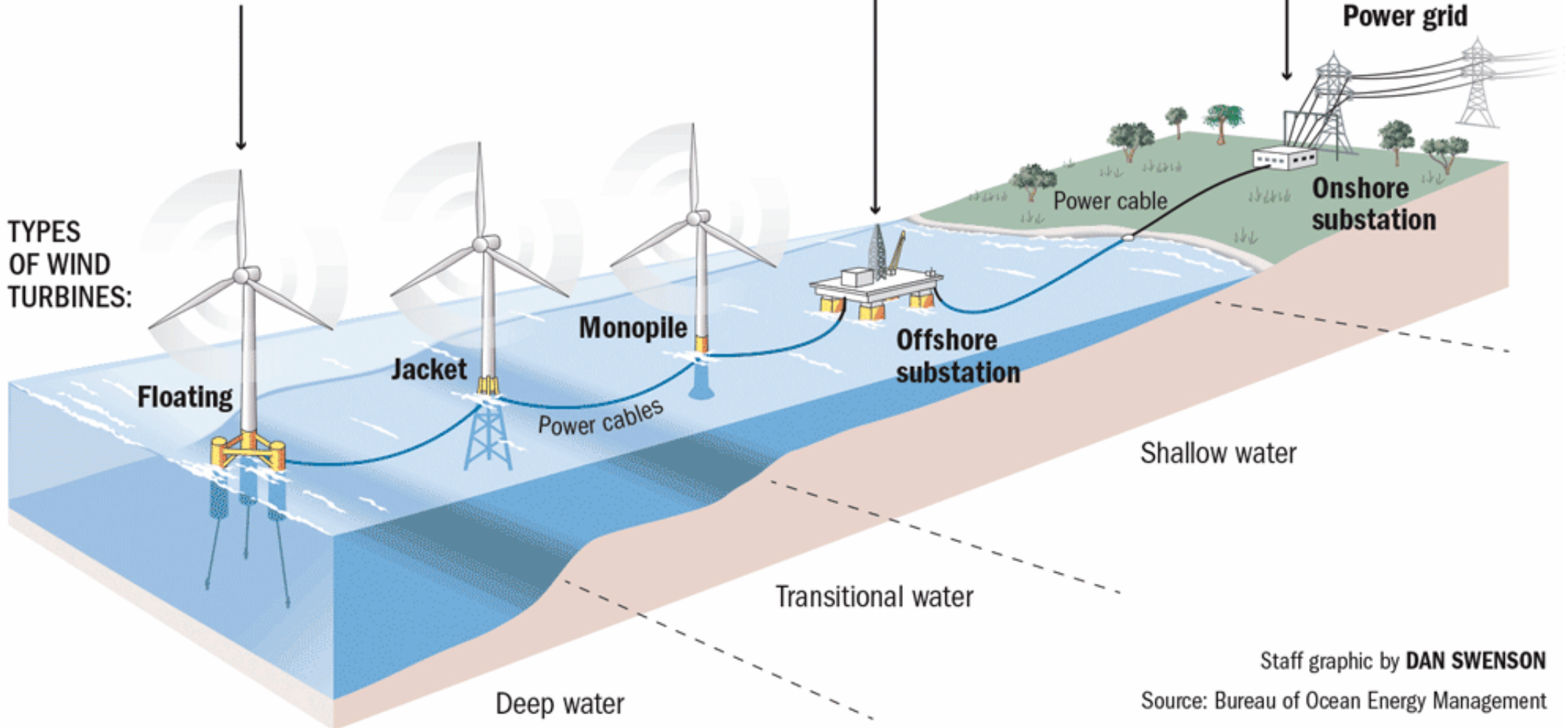


How an offshore wind farm works

Turbines are often placed in groups in areas with optimal wind speeds. Most are stationary or fixed to a location in shallow water, but floating turbines could be used in deep water and hauled into port during hurricanes.

Energy captured by turbines is transmitted by cables to substations. Abandoned oil platforms could be repurposed and outfitted as offshore substations.

Electricity flows to an onshore substation linked to the power grid.



Staff graphic by **DAN SWENSON**

Source: Bureau of Ocean Energy Management