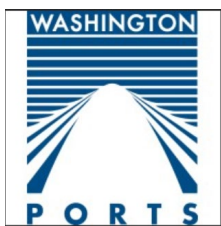


# West Coast Offshore Wind Industry Briefing

WPPA Annual Meeting

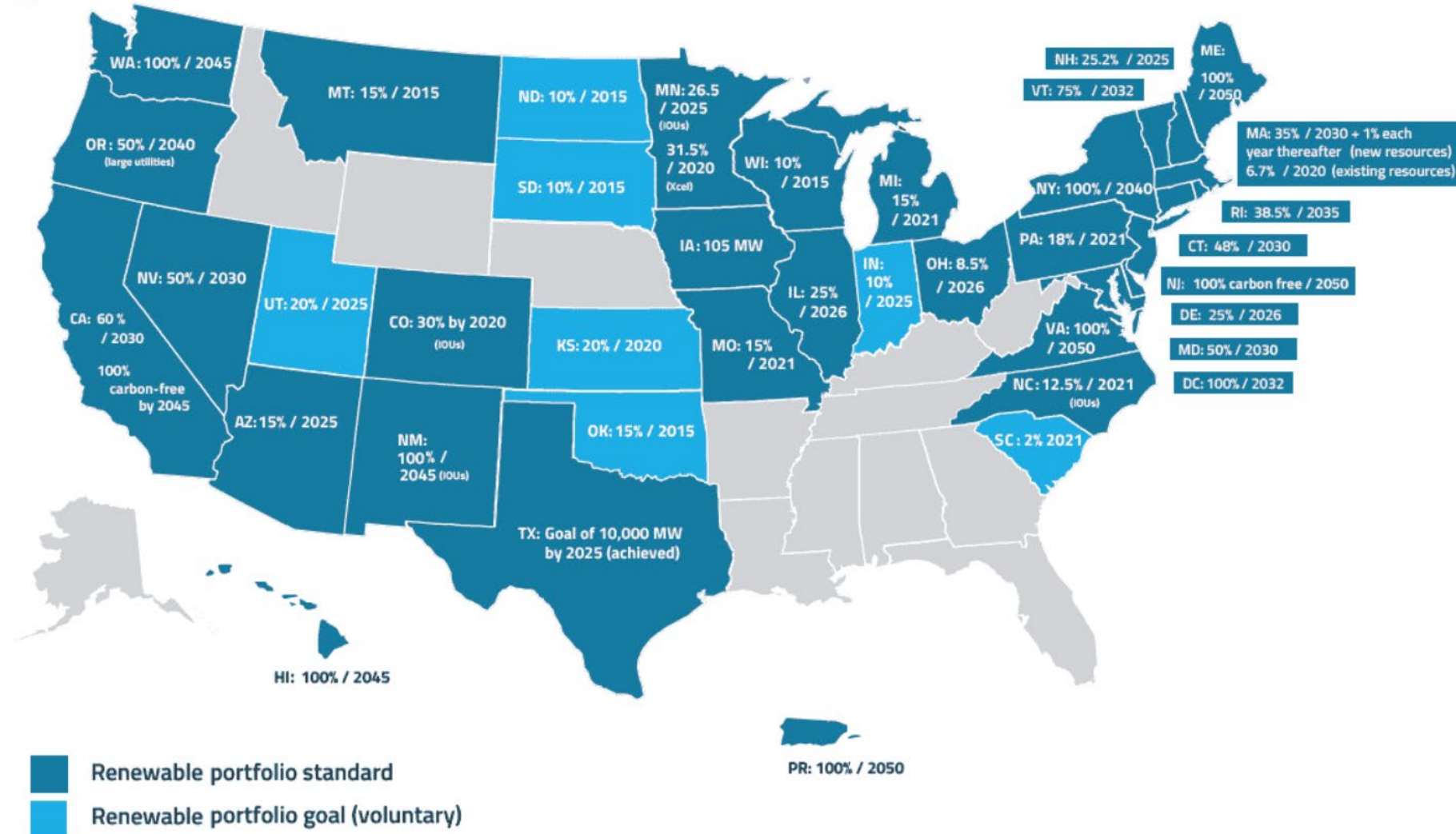


December 7, 2022  
Shane Phillips, P.E.

# Why Offshore Wind Renewables?

Thirty states, Puerto Rico and DC have a renewable portfolio standard, while seven states have voluntary renewable portfolio goals.

- State & Federal Policy
- GHG Reduction as part of addressing climate change
- Workforce Development
- Social Justice
- Energy Resiliency
- Diversified Energy Portfolio
- CA is a large energy market; consumer and importer



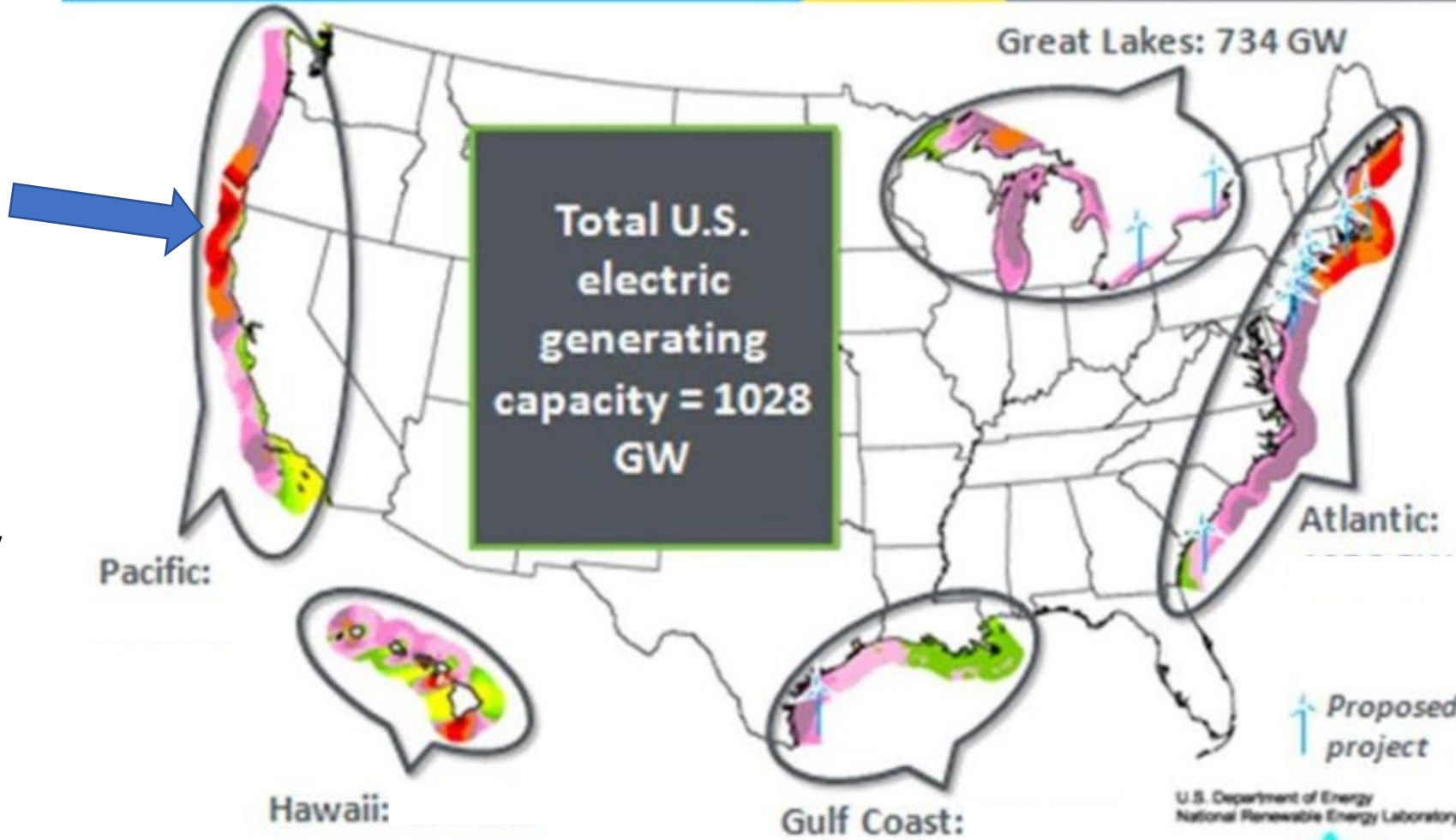
*Note: Each state varies on their purpose, need, goals and motivations*

# National Offshore Wind Opportunity

## Offshore Wind Resource Potential

U.S. DEPARTMENT OF  
**ENERGY** | Energy Efficiency &  
Renewable Energy

Highest  
Energy  
Density for  
power  
production



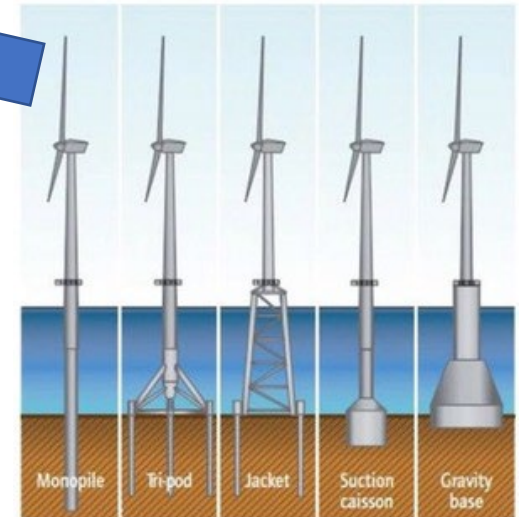
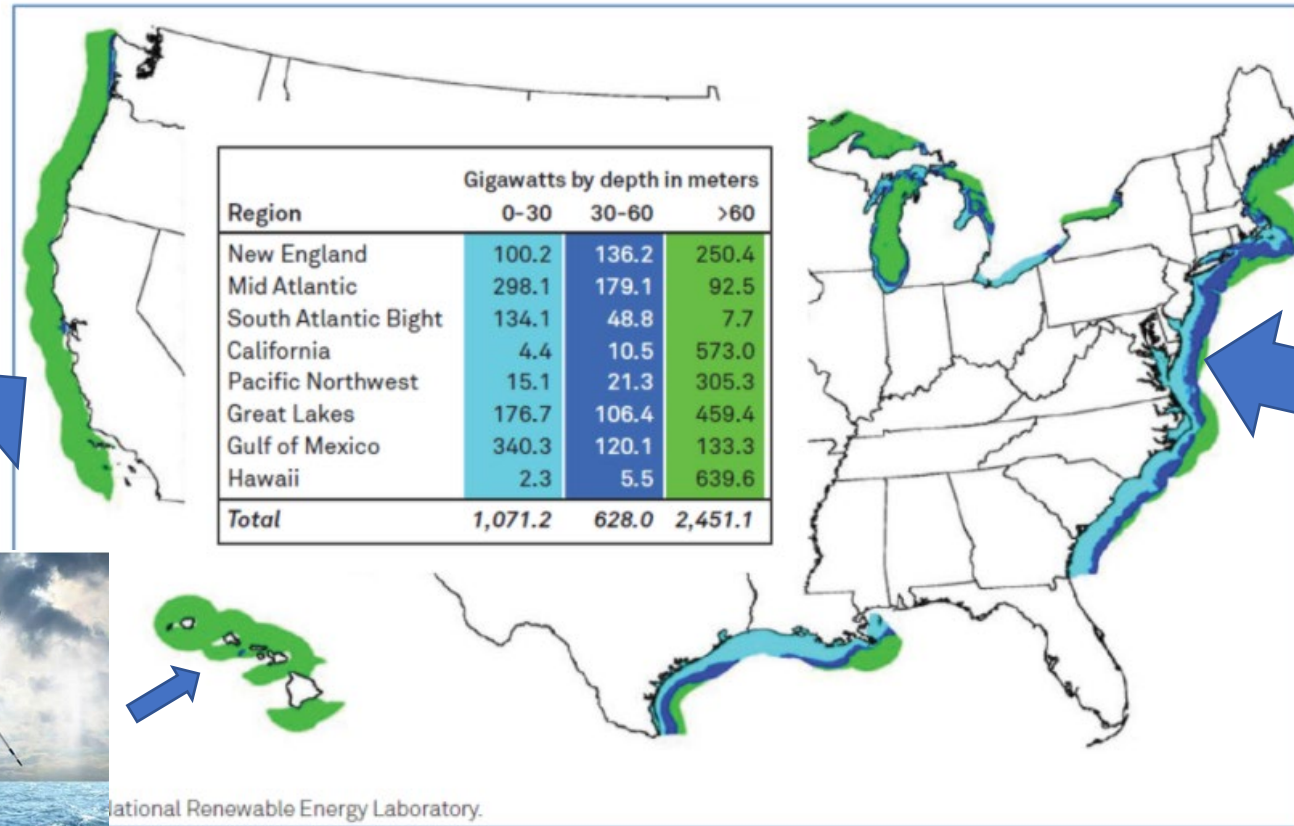
U.S. Department of Energy  
National Renewable Energy Laboratory



*Total gross resource potential does not consider exclusion zones or siting concerns*

# Offshore Wind – West/East Coast

Deep Water On Pacific Coast



OFW = Offshore Floating Wind



National Renewable Energy Laboratory.

West Coast Offshore Wind located in Federal Waters – BOEM (3 to 200 miles)  
Deep Water = Floating Structures

Floating Structure Technology adapted from Oil/Gas Industry

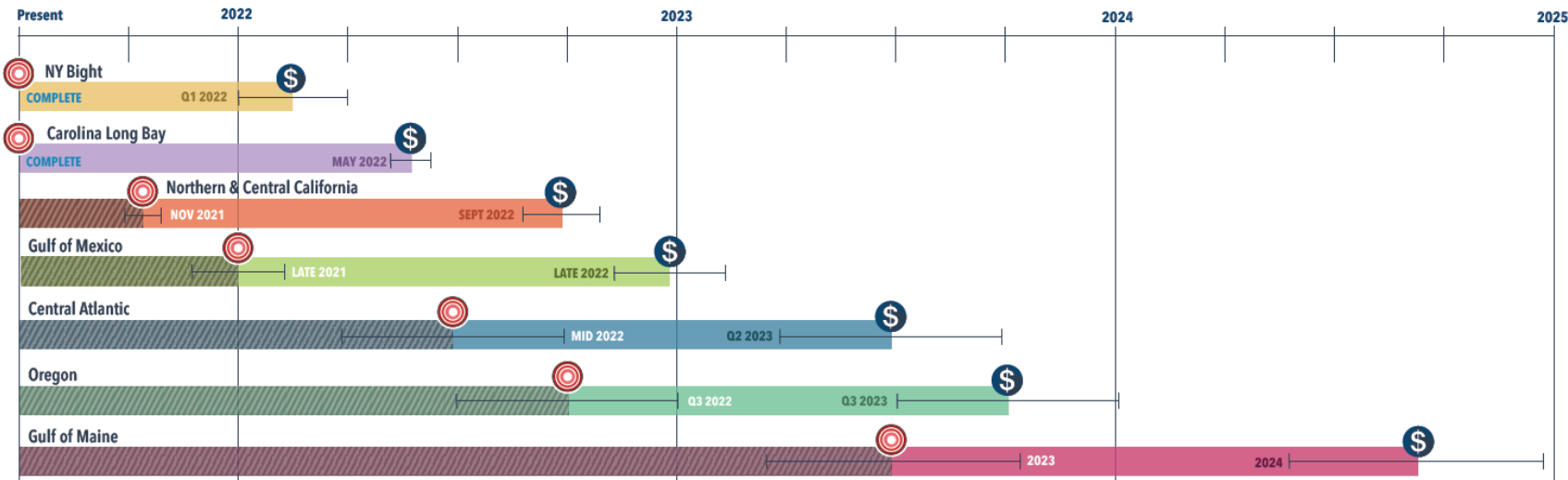
# Federal Plans for Leasing

## East Coast

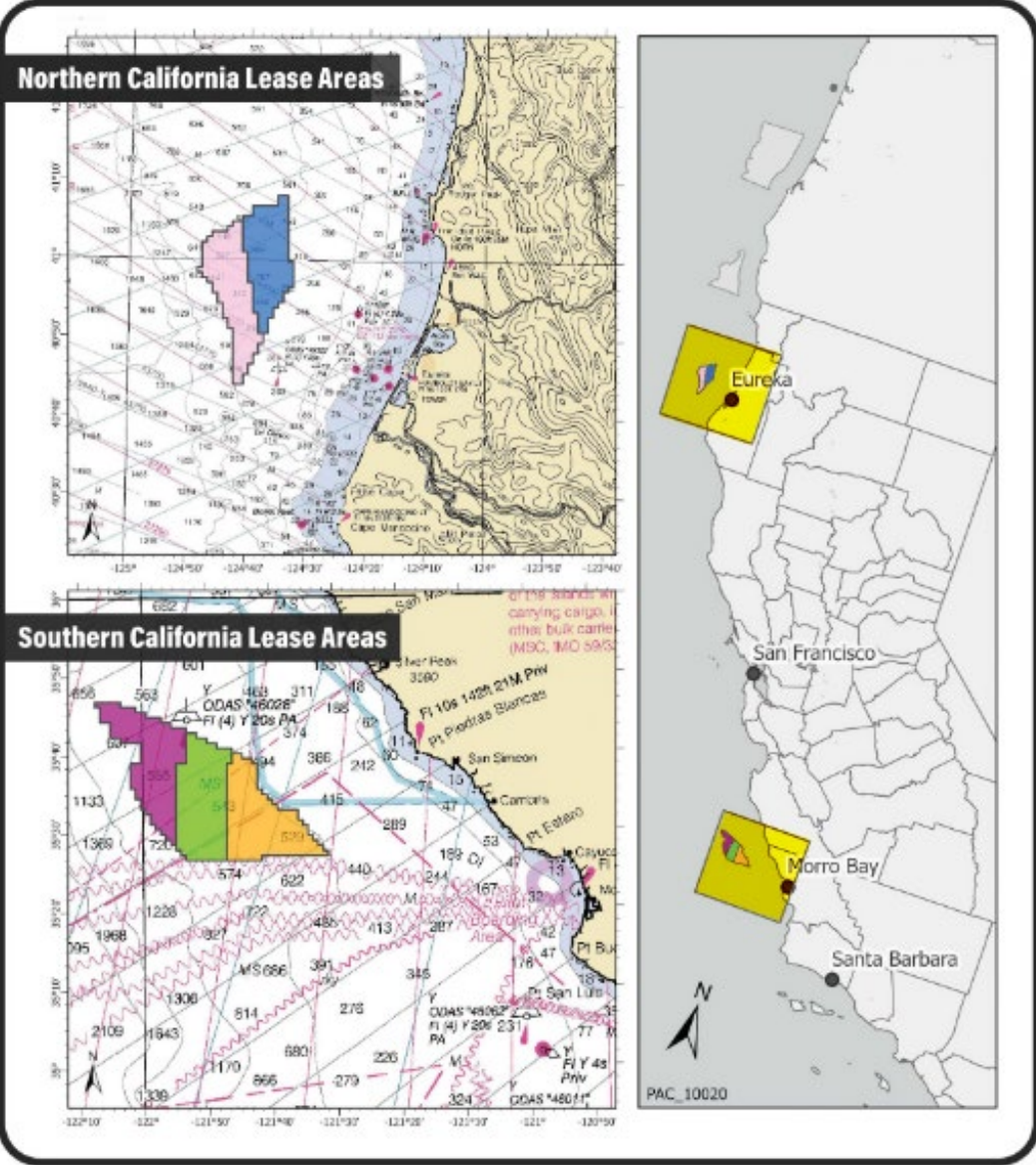
- Legislation for 30 GW by 2035
- Lease auctions occurring over past 5 years
- Continued expansion of call and lease areas in 2021 to 2025
- Biggest challenge facing east coast was finding locations to manufacture and assemble OSW components

## West Coast

- Goals of 4.6 to 25 GW
- 1<sup>st</sup> lease auctions occurring now in December



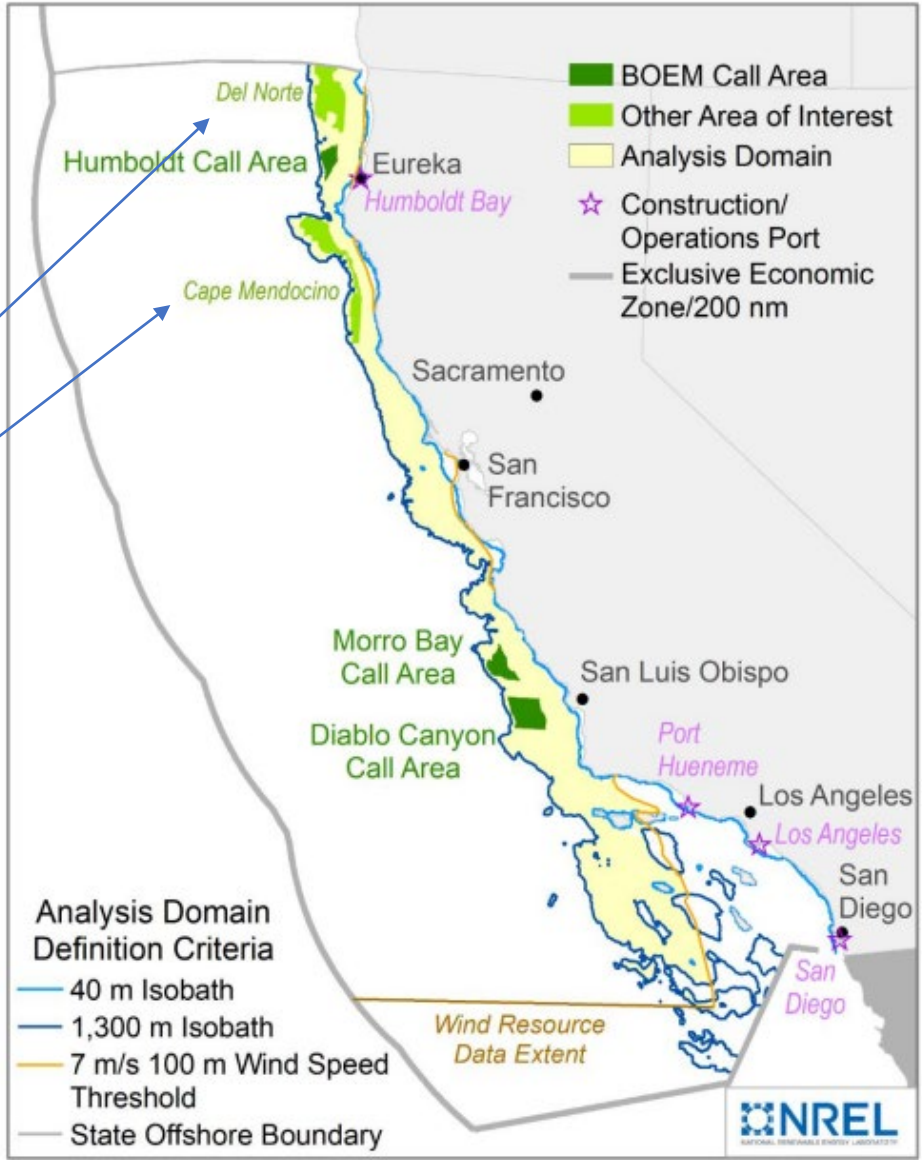
# California BOEM Lease & Call Areas



- 5 Lease Areas –  
Humboldt (2), Morro Bay & Diablo Canyon
- ~4.6 GW
  - Live Lease Auction

- 2 Potential Areas –  
Del Norte & Cape Mendocino
- Potential another 10+ GW – Lease TBD

- Live Lease Auction Dec 6 to ?? - >\$60 million each

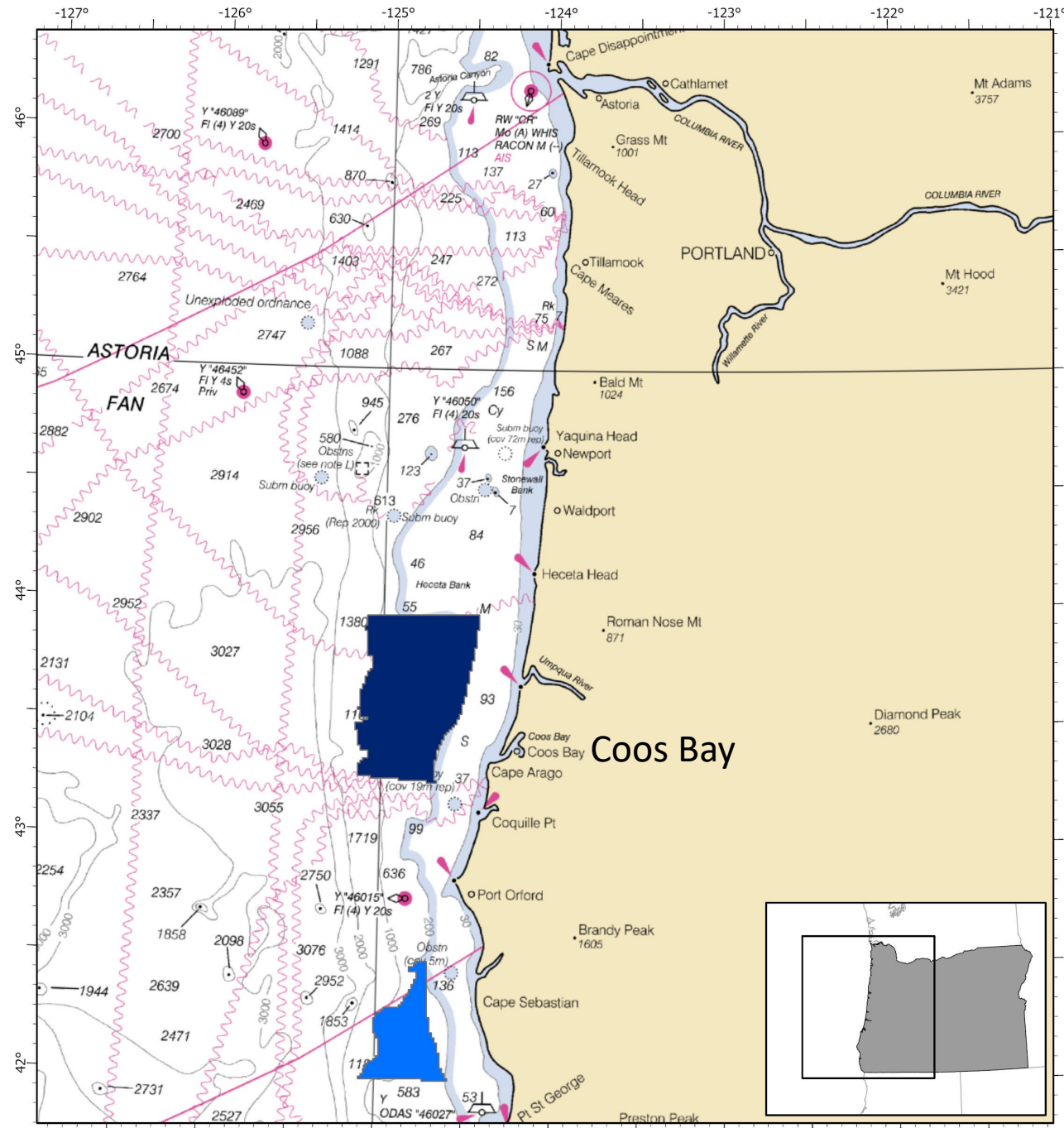


Dec 2022 Lease Areas

Areas of Future Interest

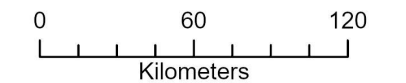
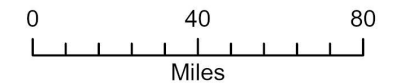
# Oregon Call Areas

- 2 Areas being considered
  - Brookings & Coos Bay
  - Potential Development? 14GW
- State goal is 3 GW by 2030; not a commitment
- Report to legislature late 2022 by OR DOE
- Lease Auction? Q3 2023 ~ 1 year after CA lease auction



## Oregon Call Areas

- Coos Bay Call Area
- Brookings Call Area



Map Date: 04/22/2022

**BOEM**  
Bureau of Ocean Energy  
Management

PAC\_10018

# OFW Device Components

- Turbine Nacelle
- Turbine Blades
- Steel Tower
- Floating Platform/Foundation – Steel Fabrication Shown
- Mooring System – Anchors & Mooring Line
- Power Transmission Cable

Very Large Scale – Requires Purpose Built Facilities to manufacture & assemble



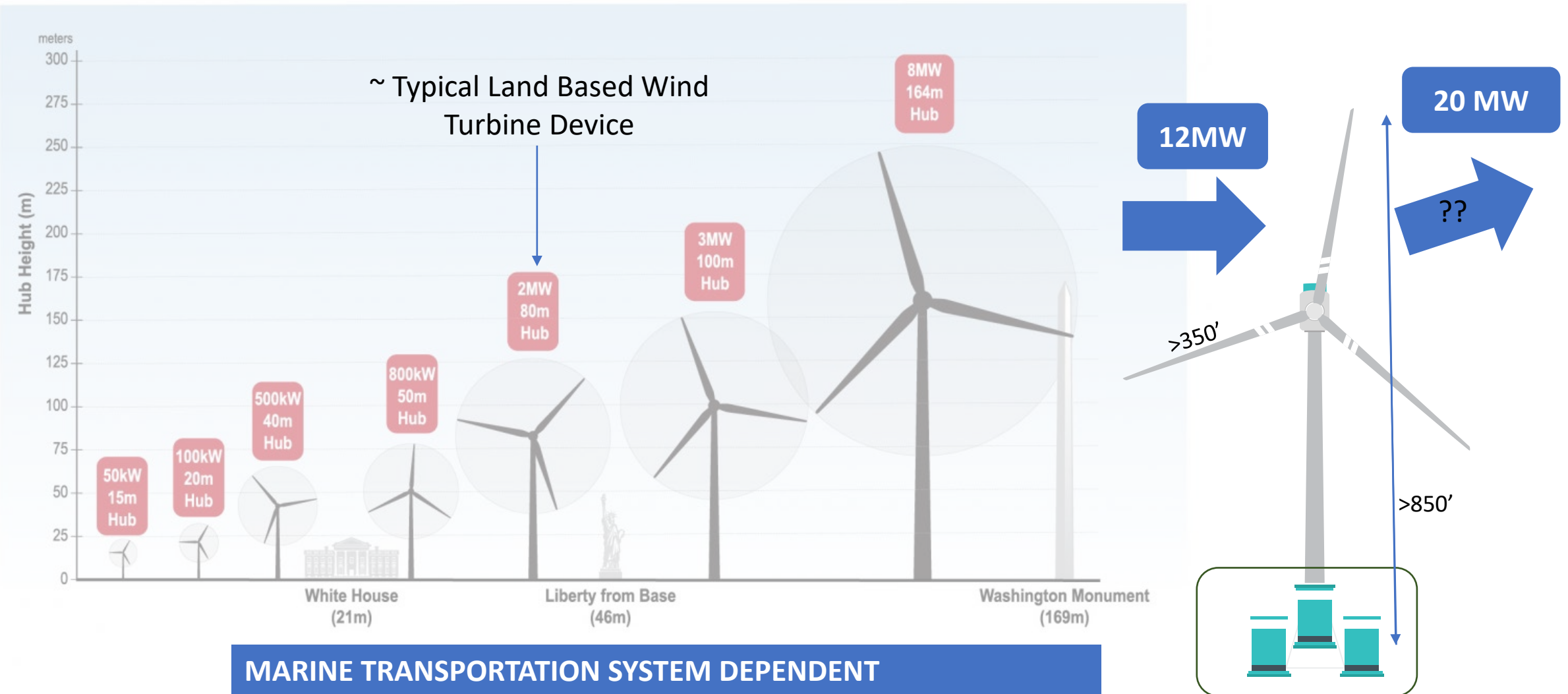
Source: Principal Power



# Component Scale – Requires Marine Based Industry

Component Sourcing/Fabrication, Final Assembly, & O&M

Source: Josh Bauer, NREL



# OFW Port Needs by Classification

**Staging & Integration** – A site to receive, stage, store components; assemble and tow-out offshore wind turbine devices; Protected harbor requirements & preferably near wind farm; purpose built wharf w/ 5,000psf capacity



**Staging and Integration Port**

WA Ports



**Manufacturing/Fabrication** – receives raw materials via road, rail or waterborne transport and creates larger components in OSW supply chain; located at marine port for water transport; purpose built



**Manufacturing/Fabrication Port (Towers shown)**



**Operations & Maintenance**

**Operations & Maintenance Facility** – A home port site for O&M vessels and supporting warehouse and offices during operation period of wind farm

# What is Needed - West Coast Ports Studies



State Lands Commission - CA  
AB525 Seaport Strategic Plan to  
be completed by June 2023

West Coast Ports Strategy  
By NREL reporting to DOE to be  
completed by June 2023

# Determining Required Number of West Coast Ports

## California OSW Deployment Targets

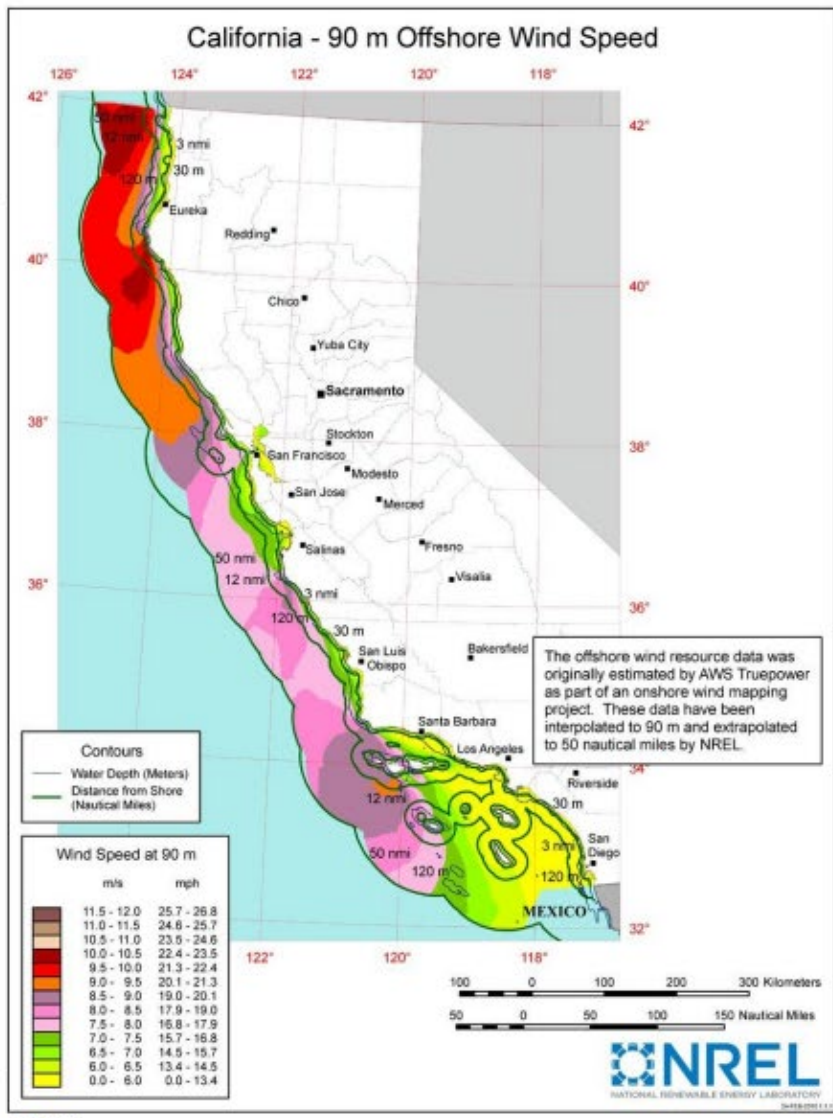
- › **Governor Newsom’s Letter to CARB (July 2022):**
  - 20 GW by 2045
- › **CEC Updated AB 525 Report (August 2022):**
  - 2–5 GW by 2030
  - 25 GW by 2045

↓

25 GW = ~1,250 x 20 MW WTGs  
 ~1,600 x 15 MW WTGs



Principle Power



NREL

CEC = CA Energy Commission  
 CARB = CA Air Resources Board  
 AB525 = Assembly Bill – 100% Clean Energy by 2045

# Determining Required Number of West Coast Ports

## › How many Port sites are required?

- California will potentially require >10 port terminal sites for full OSW supply chain for 25 GW by 2045
- This requires a multi-port strategy
- Sites vary in use and size (5 acres to >100 acres)
  - Staging & Integration
  - Manufacturing: Blades, Towers, Nacelles, Floating Foundations
  - Operations & Maintenance
- Multi-state strategy needs to be studied (NREL West Coast Ports Strategy)



*If 1<sup>st</sup> Turbine placed in 2030, will require > 2 turbines per week for 15 years to meet 25GW Goal*

Medium to Large deployment targets likely require ports from outside of CA

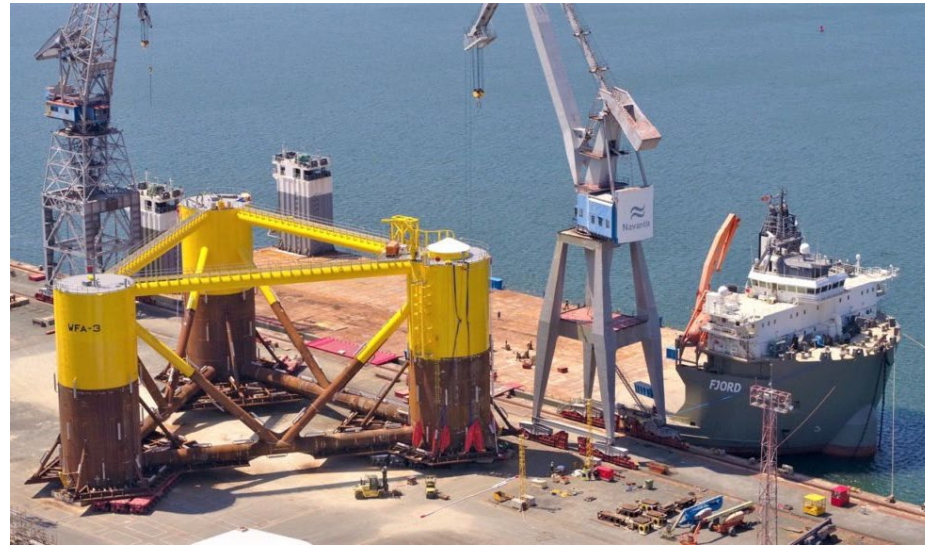
Year	Target Deployment				
	Low		Medium	High	
Rate	0.5 GW/yr	1 GW/yr	1.5 GW/yr	2 GW/yr	2.5 GW/yr
<b>2030</b>	1 GW	2 GW	<b>3 GW</b>	4 GW	5 GW
2035	3.5 GW	7 GW	10.5 GW	14 GW	17.5 GW
2038	5 GW	10 GW	15 GW	20 GW	25 GW
<b>2045</b>	8.5 GW	17 GW	<b>25 GW</b>	34 GW	42.5 GW
2048	10 GW	20 GW	30 GW	40 GW	50 GW
2050	11 GW	23 GW	33 GW	44 GW	55 GW

# Supply Chain Examples



Tower Components (shown)  
Blades

Regional Port Network – Ex:  
Albany NY 250 miles inland



Steel Foundation  
Fabrication

Roll-On/Float Off with  
Semi Submersible

Ocean Transport to  
Integration Port

# Supply Chain Examples

- May not need to be co-located with integration port
- Regional Port Network
- Workforce Development



Mooring Line



Steel Plate & Shape Fabrication



Anchor



Anchor Chain



Power Cable

# Summary - What does this all mean?

- Govt Policy is driving the Industry
  - State & Federal
- Regional Perspective
  - BOEM is state jurisdiction indifferent for their requirements for leases; CA lease auction doesn't require supply chain in same state but has domestic procurement goals.
  - Regional Port Network (CA, OR, WA) is needed to meet the larger offshore wind goals discussed as potential deployment by 2045.
- Centers of Excellence
  - Workforce & Access to specialty materials (Aerospace, Technology) could attract investment in supply chain development beyond immediate wind farm area.
- Lease Auctions
  - Now (CA), next year (OR), and potential additional call areas in future (CA, OR) will spur growth and broader interest in ports for supply chain development over next 5 to 10 years.

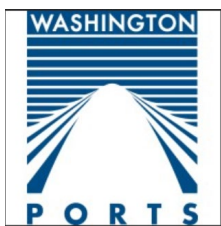


# Leave Behind Thoughts

- WA Ports can participate in west coast OFW buildout without any OFW development on WA coast. They are not related to one another at this point in industry buildout.
- Think Supply Chain - OFW is an opportunity and represents workforce development.
- 1<sup>st</sup> comer status is important – be aware, ready and informed.
- Planning Documents – ensure comprehensive plan, strategic plan and local jurisdiction SMP allow for potential use. If not, update.
- Scale & Size – large components require marine ports and significant size and quantities of construction materials; think big but even bigger!

# West Coast Offshore Wind Industry Briefing

WPPA Annual Meeting



December 7, 2022  
Shane Phillips, P.E.



moffatt & nichol

Creative People, Practical Solutions.®

- Port Infrastructure Consultant
- Since 1945, Port Facility Development
- Experts where land meets water
- East Coast Offshore Wind Port Development
- West Coast Offshore Wind Port Planning
- Maritime Business Lines
  - Offshore Wind, container, bulk cargo, cruise, marinas

**Shane Phillips, PE**  
Moffatt & Nichol

- 30 years ports, harbors & coastal engineering consulting experience
- Pacific NW Operations Manager
- Specialty work in Offshore Wind Ports West Coast
  - *BOEM Port Infrastructure Assessment (2015)*
  - *Schatz Energy Center Humboldt Harbor Offshore Wind Port Assessment (2020)*
  - *Port of Humboldt OSW Terminal Design (ongoing)*
  - *BOEM US Pacific OCS OSW Infrastructure Needs – OR & CA (ongoing)*

# Humboldt Harbor Offshore Wind Port

Harbor Wide Planning for range of port needs; vertical integration, fabrication, O&M, Construction Support



**Vertical Integration Port Planning, Design & Permitting is underway**



**HUMBOLDT BAY OFFSHORE WIND AND HEAVY LIFT MARINE TERMINAL MASTER PLAN**

