



Morro Bay Offshore 1,000 MW floating offshore wind farm

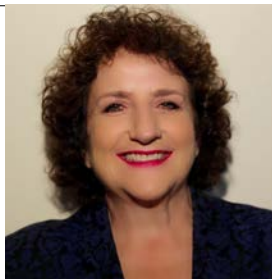


September 19, 2018
Alla Weinstein, JV CEO



Who are we?

Joint Venture Partners – Trident Winds & EnBW

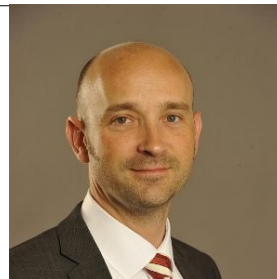


Alla Weinstein (Trident Winds Inc.)
Joint Venture CEO

Trident Winds Inc. is based in Seattle, WA.

The company focuses on offshore wind development in deep waters. Trident Winds' founder and CEO, Alla Weinstein, brings extensive experience:

- Successful multijurisdictional permitting of a wave energy project in Makah Bay, WA;
- Developing a commercially viable floating offshore wind technology while serving as a CEO of Principle Power Inc., and
- Being the first to submit an unsolicited lease request on behalf of Trident Winds for the MBO Project in Morro Bay, CA



Holger Grubel (EnBW GMBH)
Joint Venture COO

EnBW is the second largest utility in Germany and is one of the leading developers and operators of offshore wind farms in Europe.

- It operates 336 MW of capacity, is constructing 609 MW and has a secured pipeline for additional 900MW.
- EnBW's activities range from project development and management; construction and operation of offshore wind projects.
- EnBW constructs, operates and makes investments in grid expansions.
- EnBW's Grids Segment encompasses the transmission and distribution of electricity and gas, the provision of grid-related services, the supply of water, the security of supply and system stability.



Events Timeline



Jan 14, 2016

- Trident Winds submits an Unsolicited Lease Request to BOEM;

May 12, 2016

- Gov. Brown requests BOEM to form an Intergovernmental Task Force;

Aug 20, 2016

- BOEM publishes Request For Interest (RFI) in the Federal Register, soliciting expressions of interest and comments;

Sep 19, 2016

- BOEM receives 13 comments from various stakeholders and an Expression of a Competitive interest from Equinore

Oct 13, 2016

- BOEM & CEC hold Task Force meeting # 1
- BOEM announces a competitive leasing process with an auction after Wind Energy Areas (WEA) have been identified
- BOEM & CEC initiate data collection and identification of WEAs

May 2017

- Navy publishes map that shows all of Central California having conflicts with DoD missions

2018

- Mar 30 – Trident Wind formed a JV with EnBW for the development and operation of the project;
- April 15 – JV submits Grid Interconnection Request to CAISO;
- Mar – Jun - JV partners work closely with the DoD on resolving military conflicts;
- Sep 17 – BOEM holds Task Force meeting #2.



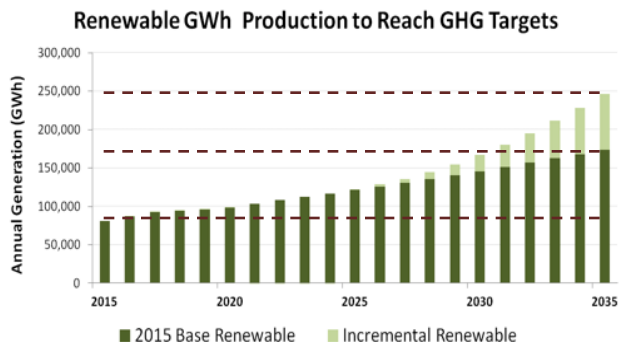
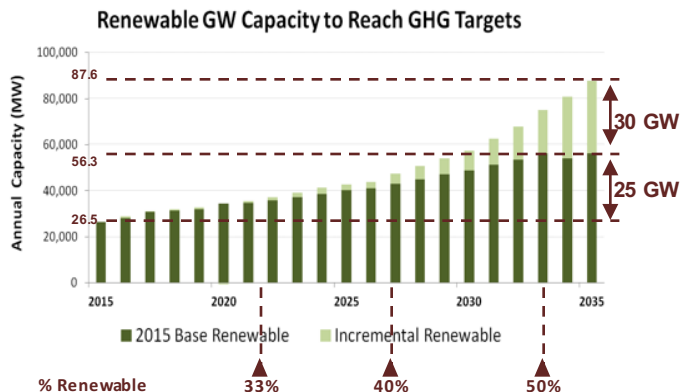
Agenda

1. **Market**
2. **Offshore Wind Project Site Selection Process**
3. **Present Status**



CA Market Demand for Renewables and Dynamics:

GHG = significant demand for renewable energy

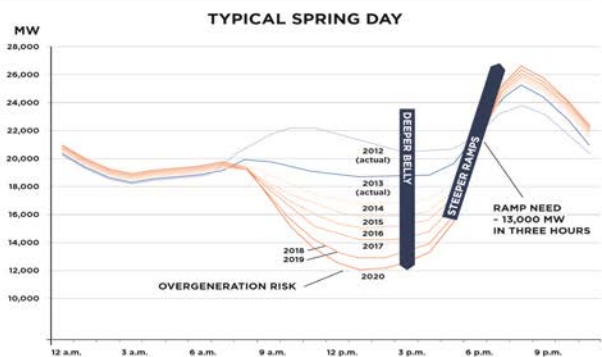
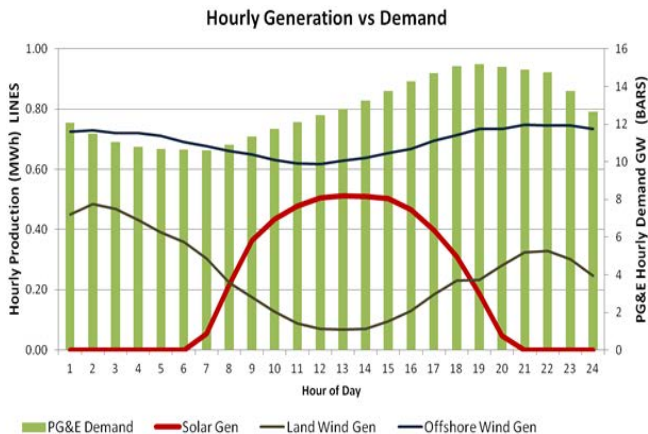


- Existing law in California (AB32) will require approximately 25 GW of new renewable capacity to be built by 2030 or ~2.5 GW/year
 - ~25 GW to transition the existing generation portfolio to renewables assuming zero load growth
 - ~30 GW for new renewable capacity to meet any load growth (economic growth, Electric Vehicles or other)
- SB100 was enacted into law on Aug 31, 2018, calling for 60% renewables by 2045, plus 40% of clean energy
- Market dynamics:
 - Market share is shifting from Utilities to Community Choice Aggregators (CCAs) and End Users (E-U)
 - CCAs and EUs are demanding renewable energy



Market Needs:

The “Duck Curve” / Offshore Wind (OSW) Characteristics



Source: California ISO, presentation by Mark Rothleder at May 12, 2017, IEPH workshop

Generation profile of OSW can offset the impact of high solar PV penetration

- During most months, the difference in the generation profile from peak to trough is minor - approximately 15% on average
- Production falls during the 24-hour period, it generates less during the mid-day period when over-generation risk is greatest, helping to offset operational problems
- Contribution to solve the duck curve is greatest in the late spring months when the operational challenges are the greatest for CAISO

A generic 1 GW OSW farm could offset CAISO's operational challenges of a 1 GW solar PV facility

- Over-generation risk is reduced, since production does not scale up as the sun rises (“the belly of the duck does not get deeper”)
- The afternoon ramp is reduced, since production is not affected by the setting of the sun (“the neck is not as steep”)

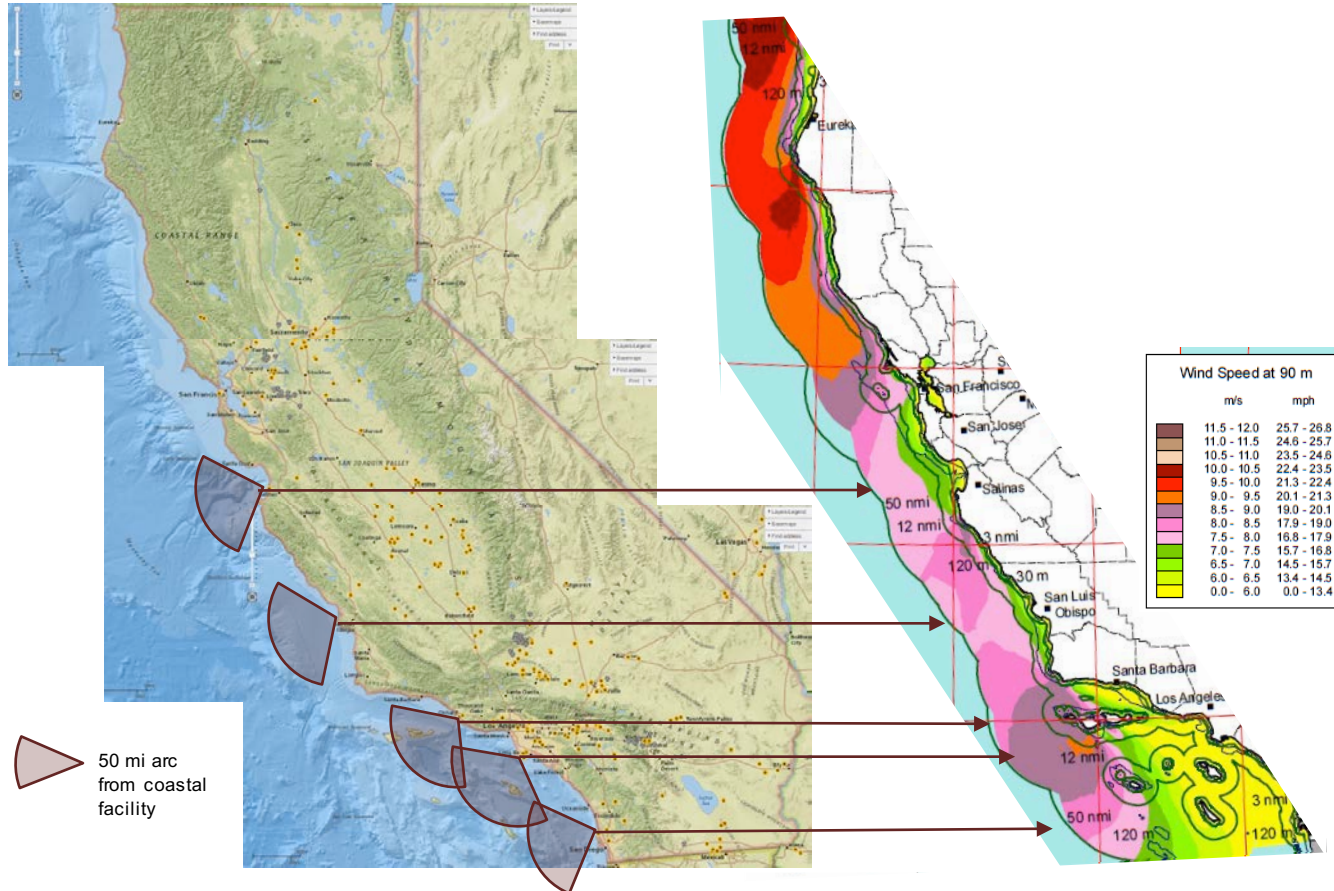


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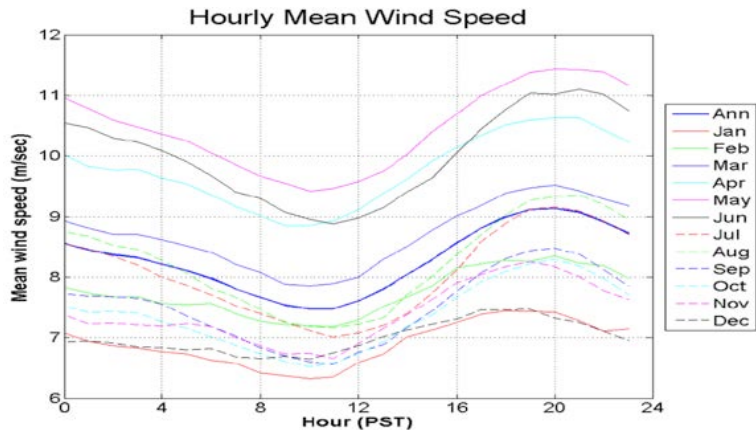


Site Selection: CA Wind Resource / Interconnection Points

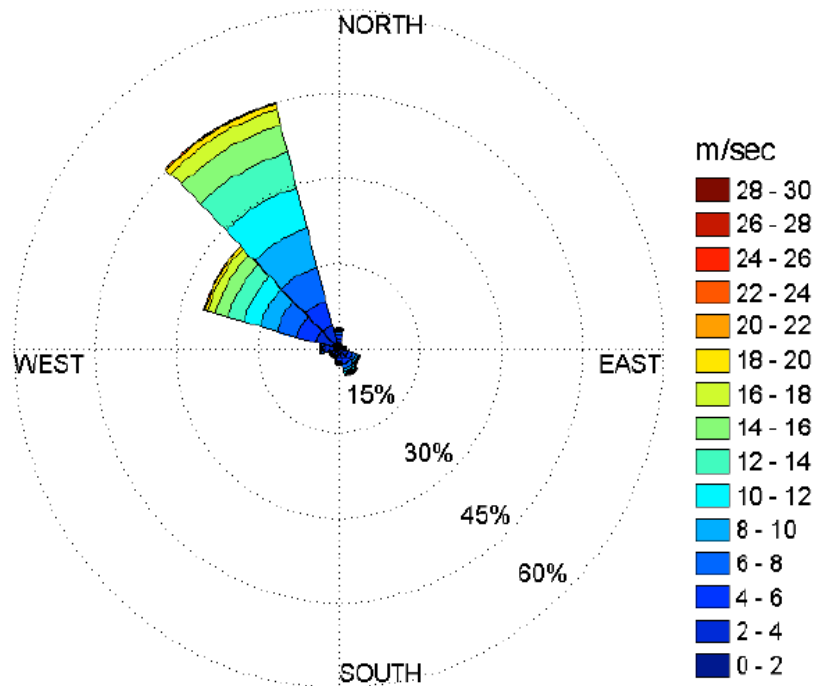




Site Selection: Morro Bay Wind Resource



Time Period	Mean Wind Speed (m/s)
Annual	8.29
Jan	6.91
Feb	7.74
Mar	8.69
Apr	9.76
May	10.45
Jun	10.01
Jul	8.06
Aug	8.24
Sep	7.51
Oct	7.37
Nov	7.41
Dec	7.00





Height of a Floating Offshore Wind System

- Turbine hub height – 120 m (394 feet) for 9 MW, or 150 m (492 feet) for 12 MW

US Coast Guard Geographic Range table indicates

GEOGRAPHIC RANGE TABLE

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer at sea level. It is necessary to add to the distance for the height of any object the distance corresponding to the height of the observer's eye above sea level.

Height Feet / Meters	Distance Nautical Miles (NM)	Height Feet / Meters	Distance Nautical Miles (NM)	Height Feet / Meters	Distance Nautical Miles (NM)
5/1.5	2.6	70/21.3	9.8	250/76.2	18.5
10/3.1	3.7	75/22.9	10.1	300/91.4	20.3
15/4.6	4.5	80/24.4	10.5	350/106.7	21.9
20/6.1	5.2	85/25.9	10.8	400/121.9	23.4
25/7.6	5.9	90/27.4	11.1	450/137.2	24.8
30/9.1	6.4	95/29.0	11.4	500/152.4	26.2
35/10.7	6.9	100/30.5	11.7	550/167.6	27.4
40/12.2	7.4	110/33.5	12.3	600/182.9	28.7
45/13.7	7.8	120/36.6	12.8	650/198.1	29.8
50/15.2	8.3	130/39.6	13.3	700/213.4	31.0
55/16.8	8.7	140/42.7	13.8	800/243.8	33.1
60/18.3	9.1	150/45.7	14.3	900/274.3	35.1
65/19.8	9.4	200/61.0	16.5	1000/304.8	37.0



Site Selection Objectives

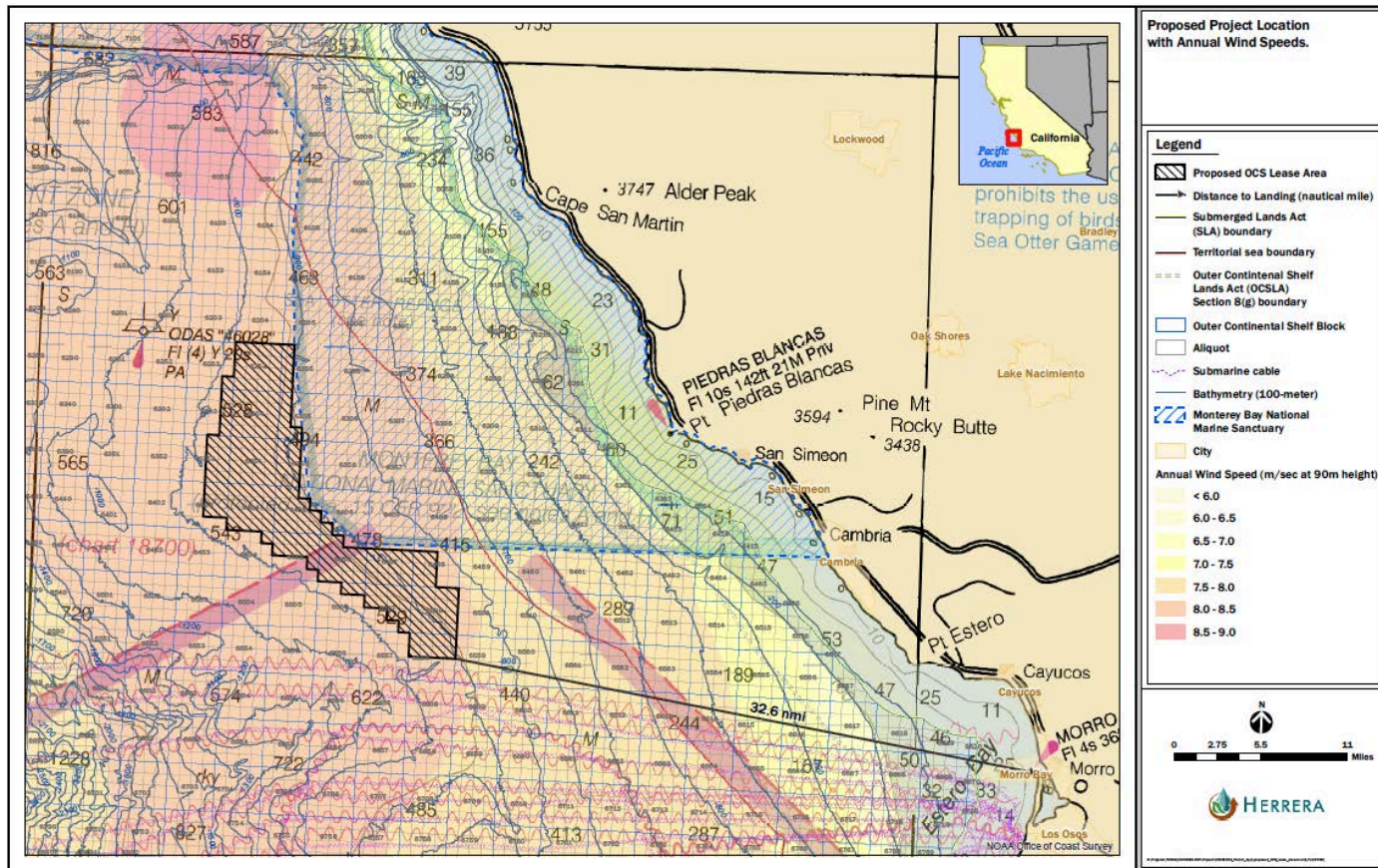
- Wind resource > 8.5 m/sec
- Distance to Shore from the closest turbine
 - Cambria – 26.9 nmi
 - San Simeon shoreline – 25.8 nmi
 - San Simeon Pier – 23.9 nmi
 - Pedras Blancas Lighthouse – 23.9 nmi
 - Morro Bay – 34 nmi to the water outflow tunnel entrance

Reduced Impacts on:

- Visibility from land
- Fishing grounds and habitats
- Offshore birds and marine mammals
- Shipping lanes



Morro Bay Offshore: Original Site Location (to be adjusted per DoD inputs)





Permitting and Agency Stakeholders:

It's a jackpot - 33 permits and licenses

Federal Agencies	Jurisdiction	CA State Agencies	Jurisdiction
Bureau of Ocean Energy Management	Leasing, lead agency for NEPA	CA Department of Fish and Wildlife	Listed species, managed species
U.S. Fish and Wildlife Service	ESA, MBTA	CA Coastal Commission	CZMA, Coastal Development Permit
NOAA Fisheries	ESA, MMPA, MSFCA, CZMA	CA State Historic Preservation Office	Cultural/Archeology
U.S. Army Corp of Engineers	CWA 404; Rivers and Harbors Act	Regional Water Quality Control Board	CWA: WQ & Sediment transport
U.S. Coast Guard	Navigation	CA State Parks and Recreation	Parks and Recreation
Federal Aviation Administration	Aviation, Flight paths	CA Lands Commission	Jurisdiction for cable route and crossing through state waters
DOD	Military operations	CAISO/CPUC	Grid interconnection and transmission upgrades
		CA Ocean Protection Council	Management of CA ocean resources
		CPUC	PPA approval
		PG&E	Substation connection



Permitting: City, Tribes and Stakeholders

City/Tribes	Interests	Stakeholder Groups	Interests
NCTC	Sanctuary nomination	MBCFO	Fishing interests
City of Morro Bay	Community Benefits Agreement	The Sierra Club	Clean Air Act, Clean Water Act, and Endangered Species Act
City of Morro Bay	Local permits	The Audubon Society	Birds
City of Morro Bay	Outflow tunnel lease	Surfrider Foundation	Surfing
		The Nature Conservancy	Wildlife
		The Environmental Defense Fund	Smart economics, practical partnerships & rigorous science, clean energy, climate solutions
		Natural Resources Defense Council	Wildlife and wild places, clean energy, climate solutions



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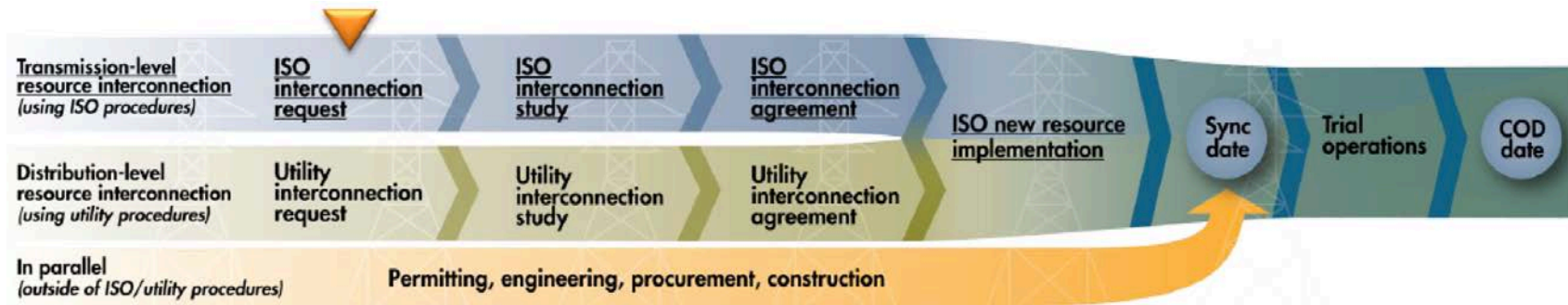
Interconnection: On Shore Infrastructure





CAISO Interconnection Requests

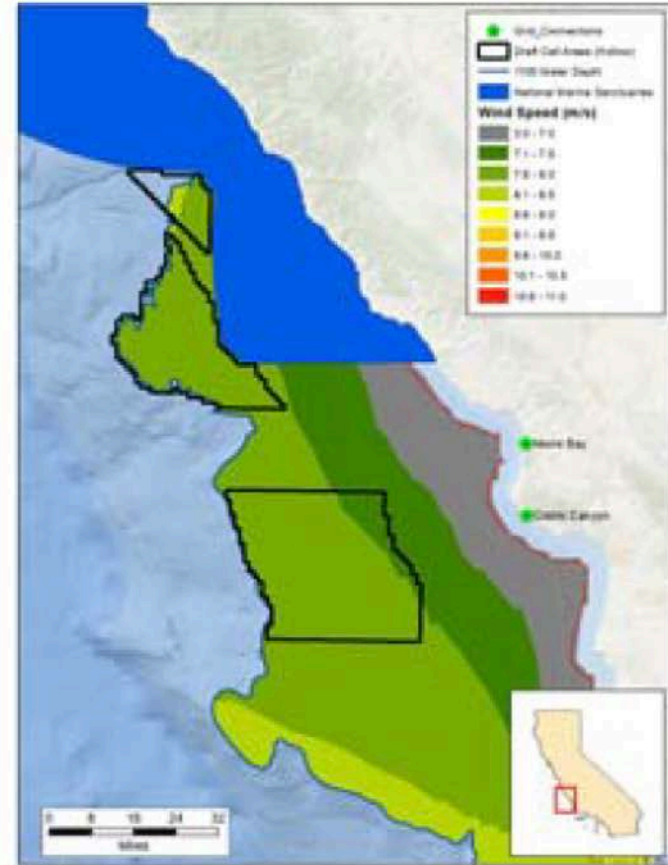
- Submitted interconnection request to CAISO for Cluster 12
- Cluster Study (2 years)
- Project is now in the queue
- No other applicants for the Morro Bay substation connection





California Offshore Wind

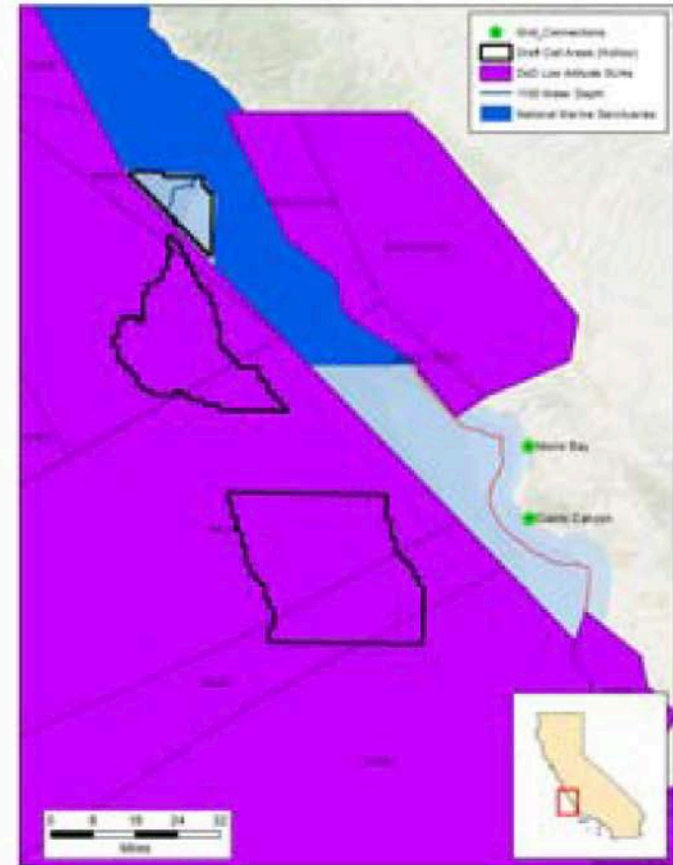
- Central Coast Draft Call Areas
 - Morro Bay North
 - Morro Bay
 - Diablo Canyon
- Grid connections
 - Morro Bay
 - Diablo Canyon





California Offshore Wind

- Department of Defense Warning Areas





Trident Project in W532/W285A



EnBW

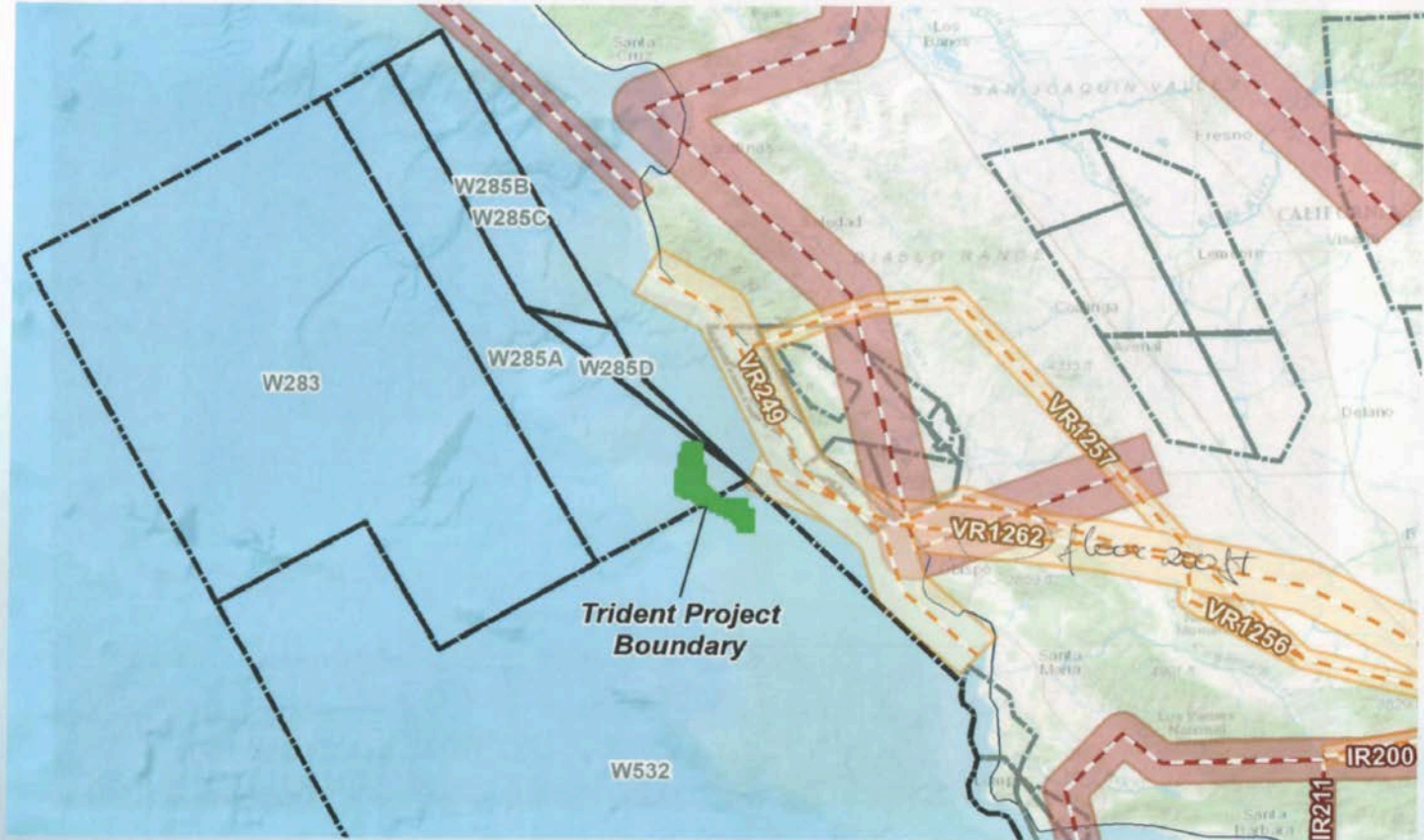
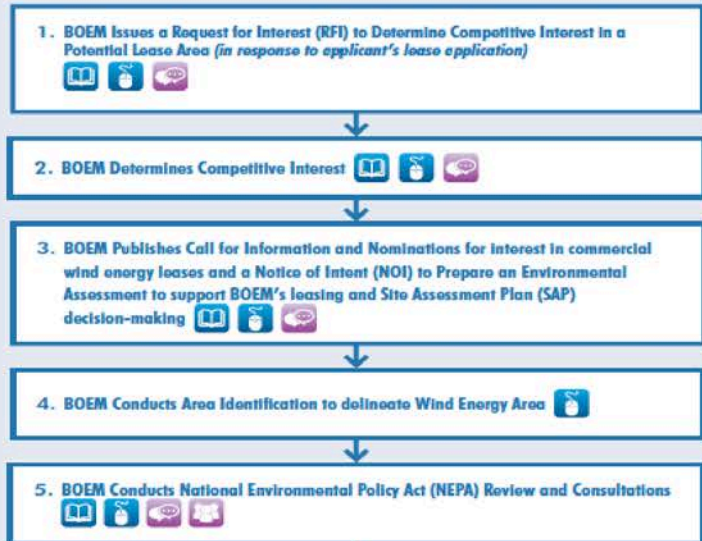


Chart 1

BOEM TYPICAL AUTHORIZATION PROCESS FOR COMMERCIAL WIND ENERGY PROJECTS ON THE OUTER CONTINENTAL SHELF: COMPETITIVE

Note: for illustrative purposes only



Footnote: there can be some variances to this process (e.g., BOEM may issue a call and forgo the RFI stage).

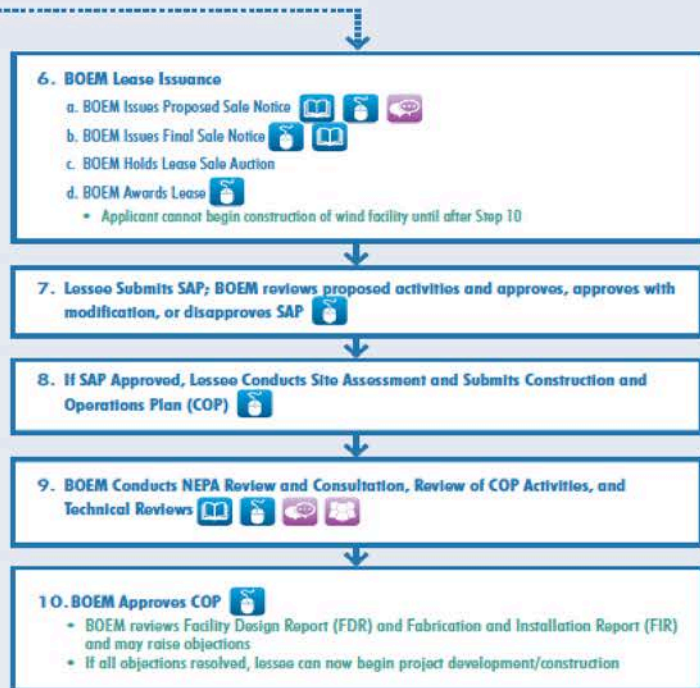
PUBLIC INVOLVEMENT OPPORTUNITIES:

Published in the
Federal Register
www.federalregister.gov

Posted on
BOEM's Website
www.boem.gov

Public Comment
Period

Public Meetings





What is the Call?



- Notice published in the *Federal Register* for formal public comment
- Requests information on focused areas for BOEM to consider in the planning, analysis and decision making process
- Requests nominations of interest for leasing from project developers
- Not a decision to lease

Planning & Analysis

- Intergovernmental Task Force
- **Call for Information & Nominations (Call)**
- Area Identification
- Environmental reviews



What is the next step after a Call?

- BOEM considers comments received during the Call and any nominations of interest
- BOEM may identify Wind Energy Area(s) (WEA) for environmental review: Area Identification (Area ID) Phase
- May include all or portions of the Call Areas
- WEAs would be analyzed under NEPA in an environmental analysis document

Planning & Analysis

- Intergovernmental Task Force
- Call for Information & Nominations (Call)
- **Area Identification**
- Environmental reviews



Upcoming Activities



Future Activities:

- Draft Call to Task Force members early/mid October
- Publication of the Call in the *Federal Register* (60 day comment period due to holiday season)
- Area Identification
 - Review comments received during Call
 - Refine Area(s) based on input
 - Identify Wind Energy Areas (WEAs)
- Conduct NEPA on WEA(s)
- Publish Proposed Sale Notice (60 day comment period)
- Publish Final Sale Notice (at least 30 days before sale date)
- Hold Auction



“The Future for Offshore Wind is Bright..... and it will also be FLOATING”