DOCKETED	
Docket Number:	22-BUSMTG-01
Project Title:	Business Meeting Agendas, Transcripts, Minutes, and Public Comments
TN #:	244045
Document Title:	Presentation - Agenda Item 7- Presented by Elizabeth Huber, Branch Manager Safety and Reliability Office Siting, Transmission,
Description:	Offshore Wind Energy Development Off the California Coast: Maximum Feasible Capacity and Megawatt Planning Goals for 2030 and 2045 Revised Draft Report. Presented by: Elizabeth Huber, Branch Manager Safety and Reliability Office Siting, Transmission, and Environmental Protection Division
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Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	7/12/2022 4:42:33 PM
Docketed Date:	7/12/2022

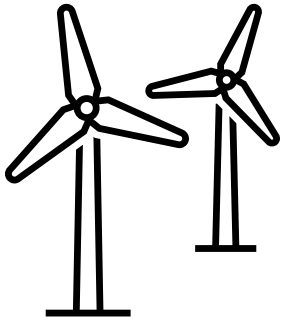
Informational Item 7: Offshore Wind Energy Development Off the California Coast: Maximum Feasible Capacity and Megawatt Planning Goals for 2030 and 2045 Revised Draft Report

July 13, 2022 Business Meeting

Presented by: Elizabeth Huber, Branch Manager
Safety and Reliability Office
Siting, Transmission, and Environmental Protection Division

CEC Historic Work on OSW

- **October 2016** –Intergovernmental Renewable Energy Task Force launches with goal of identifying an offshore area that could be the focus of a call for information and nominations by the U.S. Bureau of Ocean Energy Management (BOEM)
- **July 2017** – CEC establishes a project team to identify opportunities to remove or reduce technological, manufacturing, logistical, and supply chain barriers to lower the development risk of offshore energy projects.
- **December 2017** – CEC and Scotland sign Offshore Wind MOU to share knowledge, experiences, data, and best practices relevant to the development of offshore wind energy
- **April 2018** – CEC and Denmark sign an Offshore Wind MOU
- **September 2018** – Senate Bill 100 “The 100 Percent Clean Energy Act” signed
- **August 2020** – CEC publishes *Research and Development Opportunities for Offshore Wind Energy in California*
- **March 2021** – CEC published *SB 100 Joint Agency Report* includes a preliminary goal of 10 GW of Offshore Wind



Assembly Bill 525 (Chiu) Introduced

Source: BOEM, April 2017

"Offshore wind is a tested, proven technology that can provide huge amounts of renewable energy, with minimal environmental impacts, complementing California's enormous solar fleet by providing power in the evening hours and through the night."

~Former Assemblymember Chiu

Assembly Bill 525 Requirements

June 1, 2022
Evaluate and quantify maximum feasible capacity and establish megawatt planning goals for 2030 and 2045

December 31, 2022
- Submit a report on the preliminary assessment of economic benefits as they relate to seaport investments and workforce development needs
- Submit a report on a permitting roadmap

June 30, 2023
Develop a strategic plan for offshore wind off the California coast in federal waters

Strategic Plan Chapters

1. Identification of sea space
2. Economic and workforce development and identification of port space and infrastructure
3. Transmission planning
4. Permitting
5. Potential impacts on coastal resources, fisheries, Native American and Indigenous peoples, and national defense, and strategies for addressing them

Factors for Establishing Planning Goals

1. **Findings from the Joint Agency 2021 SB100 Report**
2. **Need to initiate long-term transmission and infrastructure planning**
3. **Need for renewable energy to accommodate California's shifting peak load**
4. **Generation profile of offshore wind off the coast of California**
5. **Potential impacts on coastal resources, fisheries, Native American and Indigenous peoples, and national defense and strategies to address them**
6. Potential to attract supply chain manufacturing for components in the Pacific region
7. Need for economies of scale to reduce costs of floating offshore wind
8. NREL finding that California has 200 GW of offshore wind technical power potential
9. Need to develop skilled and trained offshore wind workforce
10. Availability of federal tax incentives
11. Opportunity for California to participate in federal offshore wind megawatt goals
12. Executive actions from the Governor

Study Element	Elements Defined in Key Studies					
	Study 1	**Study 2**	**Study 3**	**Study 4**	**Study 5**	**Study 6**
Power Density (MW/km^2)	3	3				
Power Plant size (MW)		1,000				
Gross OSW Potential (GW)	1,698					
Tech. OSW Potential (GW)	201	21.1	1.7 (by 2032)	21.3 (by 2045)	10 (by 2040)	21.1
Turbine Size (MW)		15 (by 2032)				
Bottom Depth (meters)	1,300	1,300				
Wind Speed (meters/sec)	7 to 12	7 to 12				
Hub Height (meters)	100	150 (by 2032)				
Turbine Diameter (meters)		240 (by 2032)				
Turbine Spacing (Diameters)		7D x 7D				

Public Process for Developing Report

March 3, 2022	• Stakeholders suggest planning goals, starting at 3 GW in 2030 and scaling to between 10-18 GW by 2045 • Several comments emphasized the importance of planning goals need to send market signals necessary to drive investment in ports, infrastructure, and supply chain development and point to how planning goals and procurement targets have driven offshore wind development in the east coast • Planning goals should be robust enough to drive economies of scale which will be essential for reducing costs, delivering competitively priced clean power, and encouraging local industry and job development • Environmental organizations would like to see both state and federal waters analyzed in report
May 18, 2022	• Most comments support larger goals ranging from 3MW to 5MW for 2030 and 20+ MW for 2045 • Large emphasis on the anticipated rate of technology advances supporting larger goals • Reiteration that goals are for planning and not mandates or requirements – also supports going larger on goals. • Identified new reports that have come out since the posting of the draft report that should be considered • Most comments provided came from industry with a handful of comments from environmental organizations, labor, and fisheries
June 27, 2022	• Importance in sending a market signal to spur investment in infrastructure and supply chain development • Scale will be important to drive economies of scale and reduce overall costs to ratepayers • Point to examples in the east coast where larger targets have resulted in attracting investments • Technology will continue to evolve and should not be a limiting factor • These are just planning goals so no downside to going larger • Concerns that larger ecosystem impacts are not being thoroughly addressed • Need for a better understanding of environmental, social, and ocean use conflicts • We should proceed with caution - monitor and learn from this first set of deployments • Need to be sure planning goals are based on full set of requirements outlined in AB 525

Study Element	Elements Defined in Each Study			
	Study 1	**Study 2**	**Study 3**	**Study 4**
Power Density (MW/km^2)	2.8 to 5.7			
Power Plant size (MW)	735 to 2,055		600	
Gross OSW Potential (GW)			200	
Tech. OSW Potential (GW)	4.5 to 8 (within 9 years)	4 (by 2030)	50 (by 2045)	0.1 (by 2035); 3.2 (by 2040); 6.5 (by 2045); 10 (by 2050)
Turbine Size (MW)	15		15	
Bottom Depth (meters)	1,300			
Wind Speed (meters/sec)	9.4 to 10.6			
Hub Height (meters)	100		150	
Turbine Diameter (meters)	220 to 242			
Turbine Spacing (Diameters)	7D to 10 D; 3 D to 7 D			

Next Steps

- Finalize report: *Offshore Wind Energy Development off the California Coast: Maximum Feasible Capacity and Megawatt Planning Goals for 2030 and 2045*
- Present for adoption at August 10, 2022, business meeting.