

California Offshore Wind Energy Potential

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Abstract: An initial analysis was performed for areas suitable for offshore wind farm development near the California coast. Based on the analysis, California's offshore wind resource was divided up into three areas; Northern California, San Francisco Bay Area, and Southern California. The siting of an offshore wind farm is limited by water depth, with shallow water being the most preferable economically. Acceptable depths for offshore wind farms were broken up into three categories, based on current and future wind turbine tower support technology; ≤ 20 meters depth for monopile towers, ≤ 50 meters for water jacket tripods/quadrupods, and ≤ 200 meters depth for deep water floating tower technology which is likely to be developed in the next 15 years. Using the Penn State/National Center for Atmospheric Research Mesoscale Model version 5 (MM5) to predict winds aloft at high resolution (1.67 and 5 km) near the locations of interest, annual 80 meter wind speeds were found for each area. Annual 80 meter wind speeds were based on the average of January, April, July, and October's 2005 MM5 model data. Using the REpower 5M 5.0 MW, 126 meter diameter offshore wind turbine, a preliminary overall resource assessment was made for coastal California. Initial estimates show that 2-10 TWh, 9-27 TWh, and 67-293 TWh of energy could be harnessed annually using monopile, state of the art, and future turbine support technology in Northern California, the Bay Area, and Southern California respectively.