Magellan Wind Comments on the July 9, 2015
CPUC/CEC/ARB/CAISO Renewables Symposium

Magellan Wind appreciates the opportunity to submit these comments supporting Governor Brown's greenhouse (GHG) reduction goals. Offshore wind can play an important part in achieving those goals. Development of California's high quality offshore wind resource will help the State to diversify its renewable energy portfolio while increasing in-State employment and investment. As the sun goes down and power production from the State's solar cells declines then stops, winds off the California coast pick up. Wind farms off the California coast can complement the State's solar assets by offsetting this evening drop off; furthermore, by feeding power into the grid from the west, offshore wind farms reduce the need for new transmission from the east and potentially expenditures related to reliability and voltage support along the coast. These wind farms will also ensure that the State benefits from the jobs and economic development opportunities that would be created. As California's energy agencies work to identify and implement specific programs and measures needed to achieve the State's GHG reduction goals, it is important that offshore wind's significant contributions be considered.

Introduction

Magellan Wind is an offshore wind development company formed in late 2013. The company's principals work to implement lessons drawn from Europe's 25-year history with offshore wind and a decade of work by US developers. One key lesson emphasizes the need for careful attention to siting from the earliest stage of the development process. Wind farms must be sited far enough from the coast to avoid migratory flyways and protect coastal views, and away from areas with sensitive marine life or a history of other incompatible uses.

Magellan is concentrating on markets where renewable power from offshore wind can be produced at scale. One-off projects, even if built at utility scale, cannot drive the supply chain growth that is needed to reduce costs and secure broad stakeholder support. In contrast, multiple projects, developed under a single state policy framework, have great potential to advance both environmental and economic development goals. Magellan believes that California's large power market, excellent offshore wind resource, and consistent leadership in reducing GHG emissions provides the basis for a sustainable offshore wind industry – an industry in which competition among developers will drive down the costs of designing, building, and, ultimately, operating and maintaining offshore wind farms. The creation of such an industry would help the State to advance climate policies supported by the Governor and embodied in existing and proposed legislation, while simultaneously promoting job growth, economic development, and technological innovation.

Magellan also emphasizes close partnerships with leading engineering and technology firms. Risks associated with the engineering, construction and operation of a utility-scale offshore wind project are an important driver of project costs. These risks can be managed most efficiently if engineering

and technology partners are fully engaged early in the process. Affiliations with best-in-class engineering and technology firms will allow Magellan to effectively address challenging engineering and permitting processes, lower project costs and reduce project risks.

Environmental and economic benefits of offshore wind

Offshore wind can help California diversify its portfolio of renewable energy resources. Diversification can lead to a reduction in the cost of decarbonizing electrical power generation. Specifically, offshore wind's distinctive daily and seasonal profiles increase its value to the grid as well as contribute to reliability improvements with strategic interconnection locations. Offshore wind provides significant benefits including a small environmental footprint when properly sited far from the coast. Federal and state regulations will require offshore wind developers to complete thorough wildlife surveys, covering both avian and marine species, to assess their presence and identify mitigation measures, as appropriate.

One 420 megawatt (MW) offshore wind farm, which would likely be an array of 70 turbines, each with 6 MW capacity if built with current technology, can generate enough electricity to power about 211,000 California households (assuming a moderately windy site and household consumption at the current California average). This 420 MW offshore wind farm also yields impressive GHG reductions — 743,000 tons of CO_2 per year when replacing gas-fired power and 1,570,000 tons of CO_2 per year when replacing coal-fired power. Offshore wind power also provides economic and job creation benefits. A utility-scale wind farm can create up to 500 construction jobs and 40 full-time operations and maintenance jobs for the 20-to-25 year life of the wind farm.

Overview of offshore wind development

European countries have led the development of offshore wind since 1991, when the world's first offshore wind farm was installed in Denmark. By the end of June 2015, offshore wind was supplying power to 11 countries; 3,072 turbines are now operating at 82 wind farms with a total of 10,387 MW of installed capacity. The European Wind Energy Association projects an additional 11,000 to 22,000 MW to be installed by 2020.

Asian countries are working hard to catch up. In Japan, there is 49 MW of installed offshore wind capacity and 504 MW in various stages of construction. In China, there is 657 MW of installed capacity and several thousand MW of additional capacity proposed and under development.

The Obama Administration has been a strong supporter of offshore wind, led by the Secretaries of the Interior and Energy. At Interior, the Bureau of Ocean Energy Management (BOEM) is implementing its "Smart of the Start" regulatory regime for offshore wind. The Department of Energy intends to provide $169M for advanced technology offshore wind demonstration projects.

The US is also seeing significant progress at the state level. Deployment of bottom-fixed foundations has begun for a five-turbine project in state waters off Block Island, RI, marking the first "steel in the water" for a US project with full-scale turbines. The 30 MW Block Island wind farm will be commissioned in 2016, after five, 6-MW Alstom turbines are installed on these foundations. In Maryland, a state law that established a revenue stream for power generated from offshore wind

farms led to an $8.7M bid for two federal leases, and the winning developer is moving forward with a utility-scale wind farm. In Massachusetts, major European developers won two federal leases and state legislation is being considered to create a 2,000 MW revenue stream for offshore wind power. In New Jersey, legislation has been enacted to create a revenue stream for 1,100 MW of offshore wind.

Technological advances strongly support offshore wind for California

Offshore wind is new to California – indeed, to the entire West Coast – because the technology needed to deploy wind turbines in the deep coastal waters is only now being commercialized. In waters off the East Coast, the continental shelf falls off gradually, creating relatively shallow offshore areas where wind turbines can be deployed on bottom-fixed foundations. On the West Coast, where the continental shelf drops off more steeply, floating foundations are needed. While floating foundations for turbines are relatively new, the floating technology itself is well-developed, having been used for decades in the oil and gas industry.

Leading companies in Europe and Asia are investing in floating foundation technology for offshore wind turbines. In 2009, Norway's Statoil deployed the world's first floating offshore wind turbine foundation, installing a 2.3 MW Siemens turbine on its Hywind foundation in 600 feet of water off the Norwegian coast. In 2011, Energias de Portugal (EDP) partnered with US-based Principle Power, developers of the WindFloat foundation technology, to deploy a 2 MW Vestas turbine in 120 feet of water off the coast of Portugal. Two separate coalitions of Japanese companies have developed and deployed a total of four floating foundations, supporting two 2 MW turbines, a 7 MW turbine and a floating substation.

The success of these initial floating foundation deployments has set the stage for the commercialization and construction of arrays of floating turbines. At least three companies have announced plans for such multi-turbine projects.[1] Statoil has secured authorizations and a revenue stream for a five-turbine, 30 MW floating wind project off the Scottish coast near Aberdeen. Principle Power has secured first stage DOE funding in support of a floating wind project off Coos Bay, Oregon and announced plans, in collaboration with EDP, to deploy a 5-turbine array off Portugal. In addition, Alpha Wind has applied to BOEM, the federal leasing authority, to initiate the leasing process for two utility-scale projects, to be based on the WindFloat foundation, in federal waters off Oahu.

Offshore wind for California complements the generation profile of solar energy

California's strong, steady offshore winds will enable wind turbines in the Pacific to operate at a high capacity factor. Federal agencies are nearing completion of a west coast wind modeling effort. These results can also help to inform state agencies as they assess the efficacy of offshore wind for California. In addition, Magellan is working with its own experts to develop more detailed analysis.

[1] Additional information on a number of leading floating foundation projects and technologies is set out in the UK's Offshore Renewable Energy Catapult Project's report, entitled "Floating Wind: Technology Assessment -- Interim Findings" (June 2015), available at: https://ore.catapult.org.uk/documents/10619/110659/Floating+wind+technology+assessment+June+2015/cb73c3f1-6331-4197-98c9-b10ba3d45d2f.

Preliminary data indicate that wind speeds off the California coast tend to pick up late in the afternoon, just as solar power fades. The complementarity of power from offshore wind and solar PV installations can help mitigate the ramping and curtailment challenges highlighted by CAISO's "duck chart." Offshore wind, by adding clean, renewable power to the grid at a time when solar power fades, can help the State meet its GHG reduction goals by reducing the amount of fossil fuel generation needed in the evenings.

* * * *

Magellan appreciates the opportunity to submit these comments and looks forward to participating in future discussions of specific programs and measures to advance California's renewable energy and GHG reduction goals.