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Hearing on Renewable Ocean Energy: Tides, Currents, and Waves
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Introduction

Ocean Renewable Energy Coalition is a trade association founded to promote energy technologies from clean, renewable ocean resources. The coalition is working with industry leaders, academic scholars, and other interested NGO's to encourage ocean renewable technologies and raise awareness of their vast potential to help secure an affordable, reliable, environmentally friendly energy future.

We seek a legislative and regulatory regime in the United States that fosters the development of ocean renewable technologies, their commercial development, and 0 in the race to capture the rich energy potential of our oceans. While other countries have already deployed viable, operating, power generating projects using the emission-free power of ocean waves, currents, and tidal forces, the U.S. is only beginning to acknowledge the importance these technologies.

Ocean energy can play a significant role in our nation's renewable energy portfolio. With the right support, the United States ocean energy industry can be competitive internationally. With the right encouragement, ocean renewable energy technologies can help us reduce our reliance on foreign oil—fossil fuels, in general—and provide clean energy alternatives to conventional power generating systems. And with the right public awareness, our coastline communities can use ocean renewables as a springboard for coastal planning that reflects the principles of marine biodiversity. Today, OREC will address the steps that we must take to realize the promise and potential of ocean renewables.

I. BACKGROUND

A. Types of Technology

Before we describe the benefits that ocean renewables offer, we take a step back and offer a description of the different technologies. Ocean energy refers to a range of technologies that utilize the oceans or ocean resources to generate electricity. Many ocean technologies are also adaptable to non-impoundment uses in other water bodies such as lakes or rivers. These technologies are can be separated into three main categories:

Wave Energy Converters: These systems extract the power of ocean waves and convert it into electricity. Typically, these systems use either a water column or some type of surface or just-below-surface buoy to capture the wave power. In addition to oceans, some lakes may offer sufficient wave activity to support wave energy converter technology.

Tidal/Current: These systems capture the energy of ocean currents below the wave surface and convert them into electricity. Typically, these systems rely on underwater turbines, either horizontal or vertical, which rotate in either the ocean current or changing tide (either one way or bi-directionally), almost like an underwater windmill. These technologies can be sized or adapted for ocean or for use in lakes or non-impounded river sites.

Ocean Thermal Energy Conversion (OTEC): OTEC generates electricity through the temperature differential in warmer surface water and colder deep water. Of ocean technologies, OTEC has the most limited applicability in the United States because it requires a 40-degree temperature differential that is typically available in locations like Hawaii and other more tropical climates.

Offshore Wind: Offshore wind projects take advantage of the vast wind resources available across oceans and large water bodies. Out at sea, winds blow freely, unobstructed by any buildings or other structures. Moreover, winds over oceans are stronger than most onshore, thus allowing for wind projects with capacity factors of as much as 65 percent, in contrast to the 35-40 percent achieved onshore.

Other: Marine biomass to generate fuel from marine plants or other organic materials, hydrogen generated from a variety of ocean renewables and marine geothermal power. There are also opportunities for hybrid projects, such as combination offshore wind and wave or even wind and natural gas.

B. What is the status of US wave, current and tidal projects?

At present, prototype offshore renewable projects are moving forward in the United States. These include the following:

● New Jersey based Ocean Power Technologies has operated a test wave energy buoy off the coast of Hawaii for the U.S. Navy and plans to interconnect to the grid by the end of the year. It has also operated a buoy off the coast of New Jersey funded by Board of Public Utilities since 2005 and in July 2006, filed a preliminary permit for a tidal project at Reedsport, off the coast of Oregon.

● Washington state based Aqua Energy has proposed a 1 MW pilot project for the Makah Bay off the coast of Washington state. The project is currently poised to complete a four-year permitting process at the Federal Energy Regulatory Commission. (FERC)

●New York based Verdant Power is undergoing licensing at FERC and intends to deploy two of six units of a tidal/current project located in the East River in fall, 2006. These units will supply power to customers on Roosevelt Island imminently, once all regulatory clearances have been obtained.

●Australian based Energetech has formed a subsidiary in Rhode Island which has received funding from the Massachusetts Trust Collaborative and has planned a 750 kw project for Port Judith Rhode Island. Permitting has not yet commenced.

● Multiple permits (see attached list) for sites in Maine, California, Oregon, Alaska and Florida have been filed with the Federal Energy Regulatory Commission.

● The Mineral Management Service (MMS) now has authority to lease lands for offshore wind projects on the Outer Continental Shelf. MMS is now conducting environmental review of the proposed 420 MW Cape Wind Farm off the coast of Nantucket, MA and LIPA/FPL 100 MW project off the coast of Long Island, NY.

C. Overseas:

In Europe, projects are moving ahead. Europe has already installed 587 MW of offshore wind in Denmark, Holland, Scotland, England and UK. See http://www.bwea.com/offshore/worldwide.html. Two near shore wave projects, are operating in Scotland and Isle of Azores. Pelamis of OPD in Scotland will deploy three units in Portugal for world's first commercial wind farm and Marine Current Turbines has operated a prototype tidal project for 2 years.

D. Commercial Viability of Ocean Renewables

Offshore wind costs range from 3-8 cents per kWh compared to 2.5-7 cents onshore. (World Renewable Energy Report 2002-2007, Renewable UK). These figures have been derived based on operating experiences in Europe and reflect operating experience. Costs for offshore wind increase as projects move further offshore, necessitating more costly mooring systems and larger turbines.

As for wave and tidal, we have general parameters on cost, but they remain subject to further refinement. The World Renewable Energy Report estimates the cost of wave energy at an average of 9 cents/kWh and tidal and current an average of 8 cents/kWh.

Recent EPRI reports have found that, presently, the cost of power from ocean technologies ranges from 7 cents to 16 cents/kw in a low case scenario. For tidal, the May 2006 EPRI report found that the cost is driven by the resource, a strong resource can yield power at prices as low as 6 cents/kwh. Plus, similarities between tidal and offshore wind bring costs down.

And, the costs of offshore wind or wave are stable. Whereas natural gas and oil have fluctuated over the years (with natural gas now higher than ever), offshore wind and wave energy costs are stable, since the cost of renewable power sources like wind or wave are free.

Also, costs are expected to decline as the industry matures and as economies of scale make ocean projects less costly. To compare, back in 1978 wind energy cost 25 cents/kwh to produce – but now costs between 4.5 and 6 cents/kwh. Wave is already less costly than wind was in its early stages. Moreover, the EPRI report found that if wave had obtained the same government subsidies as wind, it would be a far more advanced technology than at present. Finally, as the offshore wind industry makes advancements on mooring systems, turbine durability and other issues that bear on the cost of marine projects, these advancements will help bring down the cost of ocean energy. In addition, if we can gain a better assessment of our resources, we can target the most powerful sites first and learn from our experience in these locations to bring costs down further.

In addition, ocean renewable energy offers other economic benefits.

Development of a robust offshore renewables industry can:

--Reduce reliance on foreign oil

--Rely upon ocean terrain for power generation as opposed to onshore land resources

--Revitalize shipyards, coastal industrial parks and shuttered naval bases

--Create jobs in coastal communities

--Allow the US to transfer technology to other countries, just as a country like Scotland is exporting its marine renewables know-how

--Provide low cost power for niche or distributed uses like desalination plants, aquaculture, naval and military bases, powering stations for hybrid vehicles and for offshore oil and gas platforms

--Provide use for decommissioned oil platforms through "rigs to reefs program"

--Promote coastal planning that reflects the goals of bio-diversity, that maximizes best comprehensive use of resources and capitalizes on synergy between offshore industries

II. WHAT THE INDUSTRY NEEDS TO ACHIEVE OUR GOALS

What will it take for the ocean renewable industry to move from where it is now to achieve its potential? OREC recommends the following actions:

--More funding for R&D and technology development: Wind energy has benefited from substantial government investment. Thirty years ago, wind cost 30 cents/kWH to generate; today, that cost stands at 3 to 7 cents/kWH. And even today, DOE continues to invest in wind. Just a few months ago, DOE announced a $27 million partnership with GE to develop large-scale turbines and also issued a $750,000 SBIR to Northern Power for offshore wind technology development.

Private developers have borne the costs of bringing the ocean energy technology forward for the past thirty years, but they need government support. Government funding will also give confidence to private investors and help attract private capital.

--Resource Assessment: At present, we do not even know the full potential of offshore renewables, because no agency has ever mapped the resource comprehensively. The Energy Policy Act of 2005 directed the Secretary of DOE to inventory our renewable resources but that work has never been funded. And even as MMS moves forward with a rulemaking for offshore renewables on the OCS, it has not received appropriations to map the resource.

Preliminary studies done by EPRI and private companies show that we have substantial ocean resources. But we will not know the full scope without further mapping and study.

--Incentives for State funding and support: The DOER Act gives states incentive to support and fund offshore renewables and also to benefit from their deployment. The DOER Act lets states share in a larger portion of royalties from all offshore energy development, be it offshore oil drilling or offshore wind. When states benefit directly from activity off their coast, they are more inclined to support these programs.

Also, the DOER Act gives states money from royalties to invest in offshore wave and wind. Thus, the DOER Act provides a pool of funds through which states can move ahead with offshore renewable development.

--Incentives for Private Investment: Offshore renewables are compatible with other large industries in our country, such as oil and maritime industry. These industries, with the right tax incentives, can provide substantial support to offshore renewable development. Incentives could include investment tax credits for investment in offshore renewables and incentive to use abandoned shipyards and decommissioned platforms for prototypes and demonstration projects.

--Incentives for coastal communities: Coastal municipalities stand to gain tremendously from installation of offshore renewables. We want to make them stakeholders in the process by letting them have a voice in development that will take place off their shores. Congress can continue to authorize Clean Energy Bonds and the REPI for coastal projects.

--Reduced regulatory barriers: Until companies get projects in the water, we will not learn about the environmental impacts or true costs of offshore renewables. Unfortunately, developers face onerous barriers to siting small, experimental projects. We should establish streamlined regulation and permitting for offshore renewables, with maximum cooperation between state and federal agencies.

CONCLUSION

Ocean renewables can help diversify our energy portfolio and improve our environment. With the proper support, these resources will become a robust part of a reliable, affordable, clean electric supply infrastructure.