OCEAN RENEWABLE ENERGY COALITION

The Marine and Hydrokinetic Energy Trade Association

2010 OREC Annual Report

Table of Contents

2010 Government Relations

January 5, 2011 marked the beginning of the 112th Congress, drawing to a close much of the legislative work that OREC and its congressional champions campaigned for over the past two years in the 111th Congress. While bills will have to be reintroduced and new Members of Congress acclimated with OREC and its legislative priorities, OREC looks forward to garnering additional support for the marine and hydrokinetic industry in the coming session.

In sum, no comprehensive energy bills containing a national renewable energy standard or additional financial support for marine renewables were passed. However, water power funding from the American Recovery and Reinvestment Act (ARRA) and Fiscal Year (FY) 2010 Appropriations was awarded to recipients in August and September 2010 – an unprecedented amount of federal funding for MHK. Further, the renewable energy industry received support in the extension of the Treasury Grant Program, also known as Section 1603, through the end of 2011. The program provides a cash grant of up to 30% of equipment costs for renewable energy projects. OREC also secured a legislative victory in the introduction of the Marine and Hydrokinetic Renewable Energy Promotion Act of 2010, which it will aggressively lobby for in the 112th Congress.

Climate and Energy Bills

On July 30, 2010 the House of Representatives narrowly passed an oil and gas reform package with a vote of 209-193. The legislation borrowed heavily from House Natural Resources Committee Chairman Nick Rahall's Consolidated Land, Energy and Aquatic Resources (CLEAR) Act, a bill which OREC reviewed and provided suggested changes at the Committee level. The measure divides the formerly-named Minerals Management Service (MMS), Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) into three separate entities that oversee leasing, enforcement and revenue collection. It also calls for companies to develop more detailed spill-response plans, set stronger offshore worker and environmental safety standards, and impose new ethics standards on federal drilling regulators. Furthermore, H.R.3534 includes an industry-subsidized endowment that funds the Land and Water Conservation Fund, which provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities.

OREC lobbied House Members to include several amendments to protect the offshore renewable energy industry from getting grouped with offshore oil and gas regulations. OREC received support from Rep. Jay Inslee (D-WA), as well as Rep. DeFazio (D-OR) and Rep. Holt (D-NJ). However, the Committee and House leadership opted not to include the amendments in order to facilitate limited floor debate and a quick vote. There was also pushback from the environmental NGO's in OREC's pursuit to streamline permitting and reduce fees associated with offshore renewable energy development. After House passage, the legislation stalled in the Senate.

The House of Representatives passed its version of a climate bill led by Reps. Waxman (D-CA) and Markey (D-MA) in 2009, and left it to the Senate to make the next move in 2010. OREC strongly urged Majority Leader Harry Reid (D-NV) to include Section 474 of the American Clean Energy Leadership Act (S. 1462), approved by the Committee on Energy and Natural Resources in 2009, in his climate and energy package. Section 474 provides additional resources for the Department of Energy's water power program to support research, development and deployment activities. In addition, the Adaptive Management Grant provision in S. 1462 provide a mechanism to develop much needed environmental data that can be used by numerous ocean industries and the MHK community.

[http://www.gpo.gov/fdsys/pkg/BILLS-111s1462pcs/pdf/BILLS-111s1462pcs.pdf - Sec. 474, page 477]

Marine and Hydrokinetic Renewable Energy Promotion Act of 2010 Introduced

Consensus on an energy package that encouraged MHK development could not be reached in the 111th Congress however, OREC plans to support the reintroduction of the Marine and Hydrokinetic Renewable Energy Promotion Act of 2010. In September 2010 Reps. Jay Inslee (D-WA) and Brian Baird (D-WA) introduced the bi-partisan bill after months of lobbying by OREC and its members. The Act, corresponding to the Senate's Marine Renewable Energy Promotion Act of 2009 (S.923) sponsored by Sen. Murkowski (R-AK), would authorize $800 million for marine renewable Research, Development, Demonstration & Deployment (RDD&D), a Device Verification Program, and an Adaptive Management Program to fund environmental studies associated with installed ocean renewable energy projects.

Departments of Energy and Defense sign Memorandum of Understanding

In July 2010 the Departments of Energy and Defense joined forces to push clean energy research through a Memorandum of Understanding (MOU). The MOU calls for both departments to collaborate on science and technology (S&T) projects at research institutions sponsored by either agency, and to synchronize research and development (R&D) of new knowledge and technologies to expand complementary efforts. Further, the MOU establishes a framework to develop joint initiatives for major energy technology research, development and demonstration programs of mutual interest to DOD and DOE, such as pilot or demonstration facilities which address military needs and also may address national security needs that transcend military requirements. The document states the DOD installations may serve as test beds for such technical demonstrations.

[http://www.energy.gov/news/documents/Enhance-Energy-Security-MOU.pdf]

Funding and Appropriations

Fiscal Year 2010 Funding Opportunity Announcement/Solicitation Winners

September 9, 2010 the Department of Energy (DOE) awarded funding from its Marine and Hydrokinetic Technology Readiness Advancement Initiative, which was released for competitive bids in April 2010. The awards, totaling more than $37 million, aim to accelerate the technological and commercial readiness of emerging MHK technologies. 27 projects were selected for funding, with individual awards ranging from $160,000 to up to $10 million.

The unprecedented level of funding covered topic areas including MHK Technologies Concept Development, as well as Technology Readiness Level Advancement. Awards were designated for either "systems" or "components" and covered four funding categories based on technology readiness level.

FY 2010 MHK Technology Readiness Advancement funding winners included OREC members Ocean Power Technologies, Ocean Renewable Power Company, Resolute Marine Energy, Sound & Sea Technology, Dehlsen Associates, Lockheed Martin, Wavebob, and Snohomish Public Utility District.

Fiscal Year 2010 American Recovery and Reinvestment Act & SBIR/STTR Water Power Awards

August 12, 2010 DOE announced winners of the Water Power R&D Small Business Innovation Research (SBIR) and Small Business Technology Transfer Program (STTR) grants with funding from the Recovery Act and Fiscal Year (FY) 2010. Awardees secured Phase II DOE grants to focus on principal water power R&D, with awards of up to $750,000 over a two-year period.

Recovery Act grant awardees included OREC members - Dehlsen Associates in California for its Centripod Wave Energy Converter; Columbia Power Technologies in Oregon and Virginia for its High Torque, Low Cost, Direct-Drive Rotary Generator; Ocean Renewable Power Company in Maine for its Refinement of Cross Flow Turbine Hydrofoils; and, Resolute Marine Energy in Massachusetts for its Viable-Geometry Oscillating Wave Surge Converter for Utility-Scale Electricity Production.

Two additional Recovery Act grants were secured by Natel Energy in California for its Scale-up of Low-head SLH Hydroengine and by Lucid Energy Technologies in Indiana for its In-conduit Hydropower project.

DOE's FY 2010 Water Power R&D program (Non-Recovery Act) grants were awarded to FloDesign in Massachusetts for its Next Generation Hydrokinetic Turbine and Princeton Power Systems in New Jersey for its High-Voltage, Highly-Efficient, Power-Dense Electronic Converter Using Silicon Carbide and AC-link.

Section 1603 Grants Extended

On December 17, 2010 President Obama signed into law the Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010 after it passed the House of Representatives by a vote of 277-148. The Senate had previously approved the bill on December 15 by a vote of 81-19. The measure extends for one year, through 2011, payment of Section 1603 grants in lieu of energy tax credits originating in the Recovery Act. Absent from the measure, which OREC had lobbied for, included the 48C credit for advanced energy manufacturing from the Recovery Act, and the clean renewable energy bonds (CREBS) program.

FY 2011 Appropriations

Congress failed to enact any of the 12 individual spending bills for FY 2011 by the time the new fiscal year began on October 1, 2010. Senate Appropriations Chairman Inouye (HI) and Ranking Member Cochran (MS) worked diligently to craft an omnibus bill, rolling all 12 Appropriations bills into one to avoid having to pass a long-term Continuing Resolution (CR). The omnibus package included $41 million programmatic funding specifically slotted for MHK, which would have been the highest programmatic funding for MHK to date. Unfortunately, the omnibus measure failed to garner enough votes to pass, resulting in passage of a CR that funds the government at FY 2010 levels until March 4, 2011. DOE's Water Power program is funded at $50 million for both MHK and conventional hydropower based on FY 2010 levels. In FY 2010 MHK received $34 million of the $50 million in the Water Power program, which is $4.5 million more than it received in FY 2009 funding. It is unknown at this time whether Congress will extend the CR to cover the remaining fiscal year.

Regulatory Resources

Bureau of Ocean Energy Management, Regulation & Enforcement (BOEMRE)

BOEMRE has listed the status of requests for offshore wind, wave, tide and current leases in federal waters. There work in 2010 included efforts to revise 30 CFR Part 285 [Docket ID: BOEM–2010–0045] RIN 1010–AD71 Renewable Energy Alternate Uses of Existing Facilities on the Outer Continental Shelf—Acquire a Lease Noncompetitively and other cooperative prgrams with NOAA and DOE.

(http://www.boemre.gov/offshore/RenewableEnergy/StateActivitiesProjects.htm)

Department of Energy (DOE)

The US Department of Energy Marine and Hydrokinetic Technology Database is a shared resource for the marine and hydrokinetic industry and government. The Database, developed

by the U.S. Department of Energy, is a central repository of in-depth information and data on marine and hydrokinetic technology, companies, and projects being developed in the United States and abroad. The Database includes information on the location, application, nameplate capacity, stage and status of various companies' technologies and projects. Companies included in this Database were asked to provide information on their respective technologies and projects. The information has been reviewed for consistency and presentation, but in most cases, the details have not been independently verified. The content within the database is updated and reviewed quarterly to ensure accurate details.

(http://www1.eere.energy.gov/windandhydro/hydrokinetic/about.aspx)

Federal Energy Regulatory Commission (FERC)

The Federal Energy Regulatory Commission (FERC) issues permits for inland river and coastal water energy devices. Out of a total of 148 Preliminary permits issued in 2010, 22 were for Marine Hydrokinetic Wave or Tidal installations in US waters in Alaska, California, Oregon, Hawaii, Delaware, New York, New Jersey, Massachusetts, New Hampshire and Maine. The others were for conventional Hydro, Pumps and Storage and Hydrokinetic Inland permits in rivers all across the US. As a measure of further progress, FERC issued 43 Permits for Hydrokinetic projects: 31 for Hydrokinetic Inland projects and 12 for Marine Hydrokinetic Wave or Tidal projects in: Alaska, California, Maine, New Jersey, New York, Delaware, Massachusetts, Oregon.

(http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp)

Member News

Columbia Power Technologies, Inc.

Columbia Power Technologies is developing an offshore, megawatt-scale wave energy device,known as the " Manta", that utilizes two direct drive, rotary permanent-magnet generators (DDR PMG) for electricity production. Columbia's design is differentiated from other technologies at or approaching commercialization by its choice of generator (DDR PMG) , energy capture method (heave and surge) and a fiberglass structure - fiberglass provides for more cost efficient construction, operation and maintenance. Now finalizing its third generation design, CPT originally licensed a linear point absorber technology developed by researchers at Oregon State University. In 2010, CPT tested a scaled 3rd generation device and multi-unit array at Oregon State's O.H. Hinsdale facility (wave flume and tsunami wave basin, respectively) in addition to constructing an intermediate scale device named the SeaRay for a multi-month sea trial. The SeaRay was recently successfully deployed in Puget Sound near Seattle, WA. Columbia has made a number of patent applications covering the full spectrum of its designs and anticipates more deployments in 2011.

(http://www.columbiapwr.com)

Free Flow Power, Inc. (FFP) Boston, MA, Bellingham, WA, New Orleans, LA)

Free Flow Power expanded the number of hydrokinetic permits in the Mississippi River Basin to 88 sites in 2010 from below St. Louis to the Gulf of Mexico. Five of the initial cluster of permitted sites are being licensed through the Integrated Licensing Process (ILP) with the remainder to be licensed through the Traditional Licensing Process (TLP). The Preliminary Application Document (PAD), Study Proposal, and Study Plan Determination (SPD), and the first 3 study reports have all been filed with FERC (see Dockets P-12829, P-12861, P-12921, P-12930, P-12938), and FFP is continuing to develop these sites directly to full-scale 40-year commercial license applications. The fully built out projections in the 88 permit applications are 6.5GW.

A subscale 1.4-meter unit was tested in a water flume in 2008. Electrical generation tests were conducted and the subscale turbine was subsequently deployed on a floating mount in the Mississippi River continuously for approximately 6 months primarily as an operations and maintenance study and removed in Jan 2010. The first full scale 3-meter SmarTurbine(TM) was tested in the USGS Conte (Turner Falls, MA) water flume in February-March 2010 for structural post-test inspections, and then again in November 2010 for steady-state electricity generation. The 3-meter prototype will also be deployed on a floating mount moored in the Mississippi for 6 months continuous operation in 2011.

As part of the FERC ILP SPD, FFP will install 4 pilings with turbines for a 12-month environmental study. Laboratory-based fish passage tests are also required by the FERC SPD, which FFP expects to satisfy and file for its full commercial license in 2013.

(http://free-flow-power.com/home)

Ocean Power Technologies, Inc. (OPT) Pennington, NJ.

OPThas been developing and testing and their Power Buoy technology in US waters in the past few years. In 2010 OPT received funding from the DOE, US DOD and from Japanese Govt. to further refine their power buoy technology and mooring systems. (OPT is traded publicly on NASDAC.)

OPT plans to use the first part of a US DOE $4.8 million award, ($2.4 million), to build and deploy of one of its PB150 PowerBuoys(R) at Reedsport, Oregon. Plans are to complete this phase in 2011.

In September, 2010 OPT completed the first-ever grid connection of a wave energy device in the United States at the Marine Corps Base Hawaii ("MCBH"), in conjunction with the US Navy. The PB40 PowerBuoy is part of OPT's ongoing program with the US Navy to develop and test the Company's PowerBuoy wave energy technology. The PowerBuoy was deployed on December 14, 2009 approximately three-quarters of a mile off the coast of Oahu in water depth of 100 feet. To date, the PowerBuoy has operated and produced power from over 3 million power take-off cycles and 4,400 hours of operation.

In October, 2010 Ocean Power Technologies, Inc. was awarded $2.75 million from the US Navy for a second stage under its existing contract to provide an autonomous PowerBuoy(R) wave energy conversion system for the Navy's near-coast anti-terrorism and maritime surveillance program. The new award follows the successful completion by OPT of the first stage of a four-year $15.0 million project for the US Navy's Littoral Expeditionary Autonomous PowerBuoy (LEAP) program.

To top of 2010, in November 2010, OPT signed a new contract with Mitsui Engineering & Shipbuilding Co. Ltd. ("MES") to develop OPT's PowerBuoy technology for its application in Japanese sea conditions. Under this new contract, the two companies will work together to develop a new mooring system for OPT's PowerBuoy(R), customized for wave power stations off the coast of Japan. The new system will undergo testing at MES's wave tank facilities to verify the results of extensive computer modeling.

(http://www.oceanpowertechnologies.com)

Ocean Renewable Power Company (ORPC) Portland and Eastport, ME/Anchorage, Alaska

During 2010, ORPC grew from 15 to 23 full time employees who work at the company's offices in Portland and Eastport, Maine, and Anchorage, Alaska. In addition, the company employed 6 temporary interns.

The US Department of Energy awarded ORPC seven grants totaling just over $13 million in 2010. In addition, the Maine Technology Institute and the Maine Technology Asset Fund awarded ORPC over $1.4 million in two awards and the Denali Commission in Alaska awarded ORPC a single grant of over $800,000. In all, federal and state funding sources awarded to ORPC on a competitive basis totaled over $15 million.

In 2010, ORPC successfully deployed, operated and monitored its Beta Pre-Commercial TidGen™ Power System (Beta TidGen™ System)—the largest ocean energy device ever deployed in U.S. waters—at ORPC's tidal energy site in Cobscook Bay, adjacent to Eastport and Lubec, Maine. The Beta TidGen™ System was deployed from ORPC's world-class research and testing vessel, the Energy Tide 2, which was launched in early March. Extensive performance testing and monitoring was concluded in mid-December 2010.

The Beta TidGen™ System Project demonstrated that the Beta TidGen™ System reliably generates grid-compatible power from actual tidal currents, unattended and on a sustained basis, with results at, or slightly above design expectations. The Beta TidGen™ Project also provided valuable data to inform the design, installation and operation of ORPC's commercial, grid-connected TidGen™ Power System to be installed in Cobscook Bay in late 2011.

Environmental monitoring and fish studies performed during the Beta TidGen™ System project yielded no evidence of fish or mammal disturbances. These activities, conducted in conjunction with the University of Maine's School of Marine Sciences, were also highly successful and garnered national attention, while giving ORPC a much better understanding of the Beta TidGen™ System's interaction with the marine environment.b

Over a 60-day period during the Beta TidGen™ Project, ORPC also delivered tidal energy to the U.S. Coast Guard station in Eastport by charging battery pods onboard the Energy Tide 2, delivering them to the Coast Guard pier, and discharging them into the Coast Guard's 41-foot emergency response vessel. This constituted the first use of tidal energy by any federal agency.

(http://www.oceanrenewablepower.com)

Resolute Marine Energy (RME) Boston, MA

RME reported two rounds of tank testing in 2010. The first took place in January 2010, where RME spent a week testing one of its point-absorber wave energy converter prototypes at BOEMRE's Ohmsett facility in Leonardo, NJ. The tests were conducted as part of a Phase I SBIR project funded by DOE.

RME's CEO Bill Staby said "We'd like to thank BOEMRE for making Ohmsett available to us at an affordable rate and we'd also like to thank the Ohmsett crew for all their help." "Despite the tough weather conditions, our experiments were very successful."

The second successful tank test occurred during the course of a week in April, 2010. FME tested an OWSC wave energy converter prototype at Alden Labs in Holden. MA pursuant to a different DOE Phase I SBIR grant. Later in the summer, this project was awarded Phase II funding and objectives include two rounds of additional tank tests and at least one ocean trial in 2012.

(http://www.resolutemarine.com/)

Snohomish County PUD (SNO-PUD) Everett, Washington

SNO-PUD is one of the recipients of part ($10 million) of the $37 million awarded by DOE in Sept. 2010. They will deploy, operate, monitor and evaluate two 10 meter diameter Open-Center Turbines, developed and manufactured by OpenHydro Group, Ltd. In Admiralty Inlet of Puget Sound. The project is expected to generate 1 MW of electrical energy during period of peak tidal currents with an average energy output of approximately 100 kW. This full scale, grid connected tidal turbine system will gather technical and cost data for operations in the US market place.

(http://www.snopud.com/PowerSupply/tidal.ashx?p=1155)

Verdant Power, Inc., NY : Verdant Power made significant progress during 2010 on technology and project development, as well as regulatory permitting in preparation for commercial installation in the near term. Based on data gathered through a successful demonstration of the technology, Verdant Power completed designs for the commercial class, 5th Generation (Gen5) of its 'Free Flow' kinetic hydropower system, which utilizes three-bladed axial-flow turbines to generate clean energy from tidal and river currents. The advancements in the Gen5 system are aimed at high reliability, cost-effective manufacturing and environmental compatibility, and feature a custom integrated turbine drivetrain with substantially fewer parts and improved sealing. The Gen5 turbine also includes a new rotor, comprised of composite (FRP) blades and designed for high-strength, long-life and scalability. The development of the Gen5 turbine rotor was conducted through support from the US Department of Energy's Advanced Water Power Program and in partnership with its National Renewable Energy Laboratory and Sandia National Laboratories, as well as the University of Minnesota's St. Anthony Falls Laboratory.

Installation of the Gen5 system is planned to take place at Verdant Power's Roosevelt Island Tidal Energy (RITE) Project, located in the East Channel of the East River in New York, NY. The first installation at RITE will be comprised of two Gen5 turbines deployed on existing monopiles for a grid-connected demonstration of the updated technology during 2011-12. This demonstration will be conducted under modifications to existing project permits. Subsequent installations to develop a full commercial pilot field at RITE will be undertaken upon receipt of necessary licenses and financing. In preparation for this pilot installation, Verdant Power

finalized and submitted an application for a commercial pilot license to the Federal Energy Regulatory Commission (FERC) in December of 2010. This license would allow for the phased installation of up to 30 grid-connected turbines at the RITE Project for 1 MW of power, which could be delivered commercially onto the national grid - a first for the US. Verdant Power's license application, which was submitted under FERC's newly established Hydrokinetic Pilot Project Licensing Procedures, is currently under review by FERC, with a decision expected later in 2011. Verdant Power also plans to install the Gen5 system at its Cornwall Ontario River Energy (CORE) Project, located in the St. Lawrence River near Cornwall, ON, in late 2012.
(www.verdantpower.com)

WaveBob (Annapolis, MD and Maynooth and Belfast, Ireland)

WaveBob secured a grant of $2.4 million from the US Department of Energy to prepare for a commercial-scale wave energy demonstration project planned for US waters in 2013. The US Department of Energy grant will be used specifically to develop and test their advanced power take-off device. Other partners include; Vattenfall, one of Europe's largest utility companies, Chevron and Lockheed Martin in the US.

The United States Secretary of Energy and Nobel Prize laureate, Dr. Steven Chu met with the CEO, Andrew Parish, at Wavebob Ltd.'s headquarters in Maynooth, on Friday 05 November 2010. Secretary Chu is a vocal advocate of research into alternative energy sources and during a tour of the Wavebob facility, Secretary Chu and Mr. Parish discussed the massive potential of the global ocean energy resource and the potential to create a large new industry in the manufacture and supply of wave energy converter technology. Wavebob CEO Andrew Parish believes that the Energy Secretary's interest in Wavebob reflects a firm commitment to developing new sources of renewable energy. "This visit by the US Secretary of Energy is certainly a tremendous boost to our company, and is of course a very great honour. More importantly though, Dr. Chu's visit and his Department's grant allocation of $2.4 million shows that the US government supports our work and is aware of the significant contribution that wave energy devices could make to the US energy market."

Wavebob Ltd. has partnered with some of the most powerful players in the US energy sector and the company has been building up a presence in the US since the establishment of their US head office in Annapolis, Maryland in 2008. The $2.4 million US Department of Energy grant was allocated from a total fund of $37 million in marine and hydrokinetic energy grants.

(http://wavebob.com)

Resources:

FERC Hydrokinetic Projects
http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp

Ocean Energy Systems-Implementing Agreement Bulletin
October 2010
http://www.iea-oceans.org/_fich/6/OES-IA_Bulletin_October_2010.pdf

US Department of Energy Web site devoted to wind and hydro kinetic power advancement.
http://www1.eere.energy.gov/windandhydro/hydrokinetic/about.aspx

US Dept of Interior BOEMRE:
http://www.boemre.gov/offshore/RenewableEnergy/StateActivitiesProjects.htm