Ocean Wave Energy

Oregon State University School of Electrical Engineering and Computer Science
Lead Professors:
Annette von Jouanne, Ph.D., P.E., Ted Brekken, Ph.D.

Northwest National Marine Renewable Energy Center in Newport, Oregon
- Threats Include: building a floating "test bench" system off the Oregon Coast to test wave energy technologies, extensive modeling, fluid environmental model studies, community outreach and other initiatives.
- Main Collaborators for this USDOE funded effort: OSU, ORET, FNEU, Univ. of WA, ASDL, EPRE
- OSU PI’s: Drs. Bob Pash, Annette von Jouanne, Ted Brekken, George Boebel, Solomon Yin, Alex Yokoichi, Merrick Haller, Tuba Ozkan-Haller
- OSU has three key laboratories available to advance wave energy research.

Wallace Energy Systems and Renewables Facility (WESRF)  O. H. Hinsdale Wave Research Laboratory  Hatfield Marine Science Center

Power From the Sea
The full Oregon State University conducted preliminary ocean testing in the summer of 2007. The testing site is a little under 2.5 miles off the Oregon coast. It is 150 feet of water. At this rate of wave the opportunity to generate electricity is maximized. The tests are conducted on a spars wave rectifier assembly located on the ocean floor, the root float has been secured and the wave rectifier assembly is towed there by another vessel. The tests are conducted on a 2 foot diameter spar that remains relatively stationary while the heaving float, 50 feet below, goes through its wave cycle. The overall buoyant height is approximately 23 ft.

Wave power devices have low profiles.

Oregon Coast Wave Power Profile

With only a small percentage of countries on the Oregon coast, up to 2000MW could be provided with little additional transmission requirements (can take advantage of existing infrastructure).

Oregon State University Conceptual Wave Park

Ocean, bay, and linear test bed testing of OSU's 5th prototype in the summer and fall of 2007. The buoy is a 10kW permanent magnet linear generator.

In 2009, the 11th prototype was constructed and tested. OSU, in collaboration with Columbia Power Technologies (CPT) and the U.S. Navy, evaluated 12 different direct-drive technologies, and down-selected to five promising designs. OSU and CPT built each of those prototypes at the 200kW peak level and tested them on the new wave energy linear test bed shown on the right.

OSU and CPT also comprehensively simulated each of the designs, and scaled the simulations up to 100kW, including full 100KW designs with costs, maintenance, operations etc., to give estimates for total costs of energy for each. This has been a tremendous collaboration enabling the engineering in the optimum designs. Based on this work, in the summer of 2008, OSU and CPT completed a series of successful bay and ocean testing (shown on the left) of the latest 10kW device (below).

Model of 10kW 2008 Buoy

Inform the public on ocean wave energy
- Features a transverse flux linear generator prototype
- Two mini-wave flumes with actuators
- Lots of fun education for the kids

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CONTACT INFORMATION

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