

Waves of Power

May 17 2005



New buoys convert the ocean's energy into electricity

Whether witnessed as destructive waves, gently rolling swells or mesmerizing rhythms along the shoreline, the sea's energy is immense. In fact, experts estimate that just 0.2 percent of it - in the form of waves, tides, salinity and more - could power the entire world. Although the technology is 15-20 years behind that of wind energy, ocean power is a promising, clean energy source that is more predictable, available and energy-dense than wind is.

Image: Ocean-buoy generators, like the one illustrated, promise to convert the movement of waves into energy. Voltage is induced when waves cause coils located inside the buoy to move relative to the magnetic field of the

anchored shaft. This process generates electricity. Credit: Nicolle Rager Fuller, National Science Foundation

Led by Annette von Jouanne and Alan Wallace, engineers at Oregon State University (OSU) are tapping into the ocean's vast potential by developing ways to harness its energy to produce electricity: buoy systems that can generate power just by floating in the ocean's undulating swells. One such system, located one to two miles offshore, is called the permanent magnet linear generator buoy. An electric coil surrounds a magnetic shaft inside the buoy, and while coil is secured directly to the buoy (see illustration), the magnetic shaft is anchored to the sea floor. When waves cause the coil to move up and down relative to the fixed magnetic shaft, voltage is induced and electricity is generated. Each buoy could potentially produce 250 kilowatts of power, and the technology can be scaled up or down to suit a variety of energy needs. A fleet of about 200 such buoys could power the business district of downtown Portland.

OSU's proximity to the Pacific coast combined with strategic research facilities in the OSU Motor Systems Resource Facility and the O.H. Hinsdale Wave Research Laboratory make it a leader in this new technology. The researchers are planning a demonstration facility to test this developing technology in conjunction with the Electric Power Research Institute and others.

Source: NSF

Citation: Waves of Power (2005, May 17) retrieved 28 April 2024 from <https://phys.org/news/2005-05-power.html>

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