

Search for Solutions

Keeping our energy reliable and affordable



Power From Waves

Wave energy is renewable and clean, but in its infancy

Relentless and powerful ocean waves intrigue scientists as a potential source of electricity. As we search for clean ways to produce power, wave energy is being explored as a renewable option.

A hot bed for wave energy potential is the Pacific Northwest. The drive to harness ocean energy is gaining momentum, with plans to deploy massive buoys off the central Oregon Coast.

Ocean Power Technologies plans to deploy the first test buoy this year. With nine others, it will form the nation's first commercial wave energy park.

During the test, scientists will study the effect on marine life around the giant buoy, which is 140 feet tall, weighs 200 tons and has a 30-foot float rising out of the water. The doughnut-like float will move up and down, generating electricity that travels through an underwater substation and then to the shore via a cable.

Project partner PNGC Power is hopeful the demonstration will show wave energy technology has come of age. Although it is taking a wait-and-see position, PNGC Power sees wave power as promising.

"We are very supportive," says PNGC spokeswoman Kathi VanderZanden. "This holds great potential for the future. We have learned to take our time when technology is generally not there yet. We want to collect data from all parties and see how it performs under ocean conditions.

"We think it's entirely likely that waves hold promise of a higher capacity factor than wind and more constant power than wind."

Wave systems typically channel the

movement of ocean waves through a turbine generator. Technology has not settled on a single best way to harness energy. The World Energy Council says harnessing waves probably won't be done with a few, very large generators. Instead, large-scale use would involve thousands of small generators of 1 megawatt or less.

Although more dense in energy potential than wind, wave power is variable, too. National Renewable Energy Laboratory data shows even wave energy dense areas, such as the Northwest, can expect electricity production rates of about 1.5 megawatts (MW) for every 100 feet of shore occupied by generators. By comparison, a fossil fuel plant of 1,000 MW capacity would occupy about 200 acres. Installing a similar capacity wave generator would occupy more than 12½ miles of shoreline.

While wave power generation is pollution free, there are still impacts that have prompted some resistance. Buoys would occupy miles of some of the world's best wave locations, also home to highly desirable residential areas or pristine wilderness.

The World Energy Council estimates wave energy eventually could compete with fossil fuel generation—possibly costing less than 5 cents per kilowatt-hour.

"Wave energy technologies are still in the preliminary stages of development, where wind turbines were approximately 15 to 20 years ago," says Annette von Jouanne, a researcher from Oregon State University. She predicts the catch-up time for wave energy will accelerate with available advanced technology.

Wave Power Taking Off

In bits and pieces, fits and starts, demonstration test sites are working or proposed to explore the future of wave generation technology.

So far, little electricity is being produced and technical difficulties have slowed development. The next three years will be critical in determining whether it is cost effective, with about 30 wave energy projects expected to start operations, according to Emerging Energy Research, an alternative energy firm.

Although more than 1,000 wave energy patents exist, four basic technologies are commonly mentioned:

- ▶ An oscillating water column device of partially submerged boxes with an opening toward the shore at the top.
- ▶ A pendulum or flap device—a box with an opening on the seaward side, driving a hydraulic generator.
- ▶ A tapered channel device with walls that are progressively higher as the water travels through a narrowing channel.
- ▶ Giant buoys with doughnut-shaped floats, such as those to be deployed off the central Oregon Coast near Reedsport.

Oregon State University is designing an ocean energy project at a Northwest National Marine Renewable Energy Center in Newport, Oregon, to begin operation next year.

ENERGY TIP: Summer is a good time to buy inexpensive energy-saving tools and equipment, such as new air conditioner filters. In hot weather climates, you can save up to 2 percent off your energy bill just by replacing air conditioner filters monthly. For more summer energy-saving tips, go to www.consumerenergycenter.org/tips/summer.