It's Time to Capture Power of Ocean Waves

By Dr Reese Halter

Imagine that 15 percent of the world's energy is just waiting to be harnessed from the constant ebb and flow of the ocean.

Entrepreneurs, engineers, physicists, oceanographers and now eager investors are getting behind some truly innovative technologies that are powering homes, factories, universities and hospitals.

Fathom this: wave technology is reducing greenhouse gases and moving society beyond deleterious and expensive fossil fuels.

Over 50 wave technology companies around the globe are using almost 60 years of experience with deep-sea oil platforms as they hurry to deploy wave farms. There are currently more than a half a dozen wave farms generating electricity in Europe and Australia. And at least another dozen – much larger farms - will be operational within 24 months.

As any mariner, deep-sea oil driller, rig-worker or boat enthusiast knows – the ocean and its environment are rugged and unforgiving.

Wave farms are being located between one and a half and five kilometers from the shoreline. Utility companies are examining the sea floor, looking for strong wave climates or big consistent waves, packed with power.

B.C., Washington, Oregon and California have hundreds of such strong wave climates. Already, Pacific Gas & Electric – the largest utility company in the U.S. – has two wave farms in Fort Bragg and Eureka, California under construction.

By 2010 all utility companies in California must source at least 20 percent of their energy from non-fossil fuel technology, and by 2020 they must increase that stake to 30 percent.

Europe has farms positioned off Portugal and Spain with British and Scottish farms under construction. European Union laws require greenhouse gas reductions by 25 percent, beneath the 1990 levels, by 2020.

In Europe, a number of governments have provided substantial

funding for wave technologies; as a result, Britain will be the first nation to have a large-scale wave farm operational within 12 months.

Canada has the longest coastline on the planet.

So far, Canadian and U.S. Departments for Energy have not spend a dime on ocean wave technologies; yet over a billion dollars has funded nuclear fusion and space-based power with no tangible results.

Wave machines must be resilient enough to survive monster waves and gale force winds at sea.

Farms are either anchored to the ocean floor with heavy chains or locked in place with huge concrete and steel piles.

Human ingenuity has created at least four marvelous variations of machines outfitted with turbines and pistons all with a common goal of capturing the energy of ocean waves and turning it into clean, green electricity.

A Scottish engineer and avid seaman Dr. Richard Yemm designed the Pelamis attenuator. It resembles red floating missiles – but this 150 metre-long-tube of hollow steel is hinged in three places.

Unlike all the other wave technologies, seawater never comes into direct contact with its turbines (which spin to create electricity), the attenuator mechanics are housed in a sealed joint. As the attenuator bobs in the sea its hydraulic pistons compress, creating energy.

The Wave Dragon is the brainchild of Dane Erik Friis-Madsen. His inspiration came from observing ocean water as it passed through openings in Pacific atolls – extinct volcanoes just beneath the ocean surface.

This 100 metre-long floating barge has two outstretched concrete and steel wings, which contains damming reservoirs. The Wave Dragon mimics an underwater volcano, as waves are pushed up and over a ramp into a man-made lagoon or reservoir. Captured water drains out, passing through about 18 openings outfitted with turbines that create electricity.

The yellow Aquabuoy point absorber was created by a Swedish team lead by Gunnar Fredrikson. The point absorber is a four metres-diameter cylinder that occupies a series of pumps that push seawater

up the tube and through the turbine mounted at the top. As the seawater retreats the turbine continues to spin.

The Oscillating water column was invented the Australian Tom Denniss, and at first glance it appears like a device from a Dr Seuss book.

Denniss built this wave farm to mimic the Klama Blowhole a 30 metre-tall New South Wales geyser that shoots from an opening in the ceiling of a sea cave. As waves enter his man-made steel blowhole through a narrow opening at its submerged base, air is pushed through a hole outfitted with a turbine, which spins under pressure. As the waves recede out of the blowhole air is sucked back in the hole also causing the turbine to spin.

The race is well underway for each of these designs and many others to generate jobs and clean, green electricity. There are no problems that the fertile human mind cannot overcome.