



Concepts NREC installed its first wave energy platform off the coast of Australia. The turbine captures air pushed up into it as the waves move underneath and uses the oscillating air column to drive the turbine.

## Wave Hello To New Turbomachinery

Concepts NREC developing wave energy turbomachinery platforms

For as much buzz as there is around green, environmentally friendly energy, only a small percentage of power consumed in the United States comes from renewable, sustainable sources. While the numbers are small, they are increasing, especially with the push and incentives from the United States and local governments to meet carbon and sustainability targets.

Concepts NREC, White River Junction, Vermont, U.S.A., designs, develops and manufactures turbomachinery equipment for the power generation sector and focuses on newer and experimental methods of harnessing renewable energy sources.

Fred Becker, director of sales-engineering services at Concepts NREC, said, “The way turbomachinery fits into [green technology] is that this technology enables you to handle large flow rates through a small, efficient and cost-effective package.

“When you talk about green technology,” said Becker, “you probably need to incorporate such aspects as renewable, environmentally friendly and sus-

tainable in the discussion. If you are not careful, you can have a renewable technology that is not necessarily environmentally friendly,” he said.

“In turbomachinery technology, what we’re trying to do is meet all those needs, so it’s environmentally friendly — it’s not big, you don’t see it, you don’t hear it.”

Turbomachinery has been around for decades and has been steadily evolving

into the power conversion systems used throughout the world today. These include steam turbines, gas turbines, pumps, fans and compressors. Becker said the major changes in power generation started in the 1920s when reciprocating engines were redesigned to use the hot exhaust gases to drive a turbocharger for increased power.

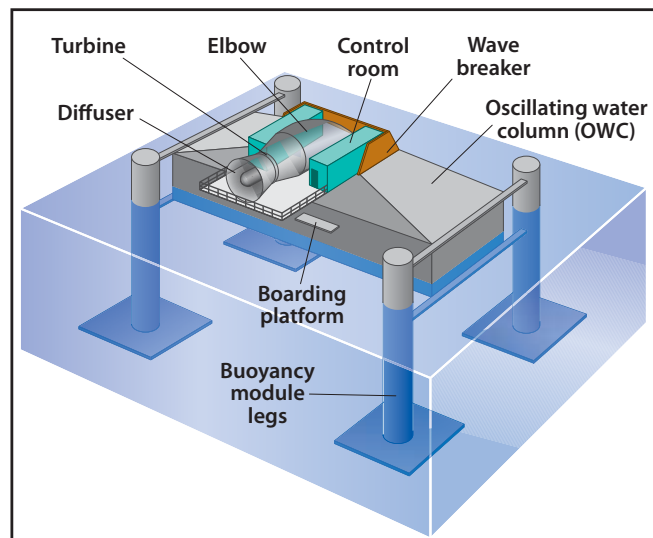
“When customers come to us, usually there’s a range of devices that can be used to convert whatever their energy source is into power. It could be solar; it could be geothermal; it could be wind. And they’re coming to us and saying ‘Do you have a piece of equipment that can work with this technology?’ And they’re really already saying ‘We already know we want turbomachinery,’” Becker explained.

Concepts NREC offers a range of turbomachinery equipment for biomass, biofuel, geothermal, solar, hydro, wind and more recently wave energy.

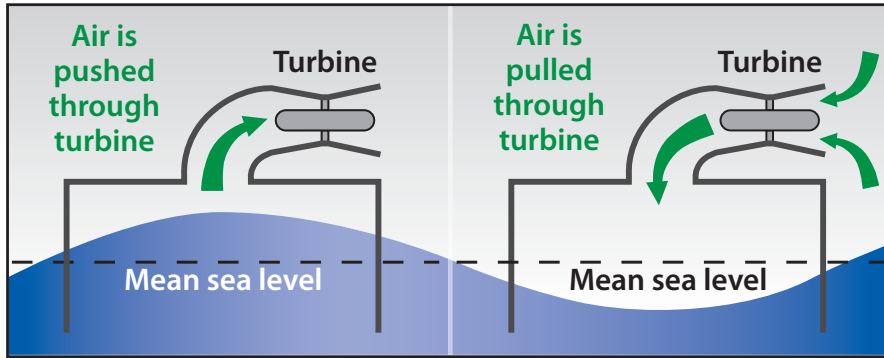
The company is working with Oceanlinx Ltd., an Australian company that installed its first wave energy platform off the coast of Australia. Plans are in motion for a second platform off Maui, Hawaii, U.S.A. According to the company, wave activity in the ocean is more predictable than wind energy and has about 800 times more energy density.

The wave energy platform is designed to capture the rise and fall of waves in the water.

Becker explained, “If you take a funnel or a device that sits on top of the water — as the wave goes up, it pushes



The platform sits on the surface of the water with no moving parts in the water, which decreases any harmful effects on ocean life. The platform is approximately 50 m long by 15 m wide and rises about 15 m out of the water.



In addition to turbomachinery, Concepts NREC designs, analyzes and manufactures equipment incorporating centrifugal, mixed-flow and axial compressors, pumps and fans. In addition, the company offers its CAE/CAM software tools for the design and analysis of turbomachinery compressors, turbines, pumps and fans.

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the air up through the funnel. Then the wave goes down and it will suck the air back in. If you put a turbine in that funnel, you can use that air (an oscillating air column) to drive the turbine.

“The approach with the oscillating air column is that you’re capturing a large area of the wave and you’re converting that to air flow through a turbine,” Becker said.

The platform sits on the surface of the water, similar to how an oil platform looks, and there are no moving parts in the water, which decreases any harmful effects on ocean life. The platform is approximately 50 m long by 15 m wide and rises about 15 m out of the water.

Becker said each unit is expected to produce about 1.5 MW, making the technology a candidate for a “wave farm” concept, in that several platforms would be constructed as a power plant, much like a wind farm.

While wave energy farms and other newer power generation technologies may show positive strides toward environmental sustainability, there’s still the matter of economics in developing and building alternative energy sources.

“As we build more of these devices, they will become less costly and more cost-effective,” said Becker.

“In the near term, it’s expensive electricity. The question is, will it ever be less than some of the fossil fuel-fired plants. I think it may be on par with them,” Becker said.

“And when I say expensive, that means the cost of electricity. Cost of electricity is not just the cost of the fuel; it’s also the cost of putting up the plant,” Becker explained. “So you have these renewables where there is no fuel, but the facility is very expensive.”

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