Wave power site proposed

By HARRY EAGAR, Staff Writer

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HAIKU – The proposed location for Hawaii's first wave energy station is about half a mile offshore from Pauwela Point lighthouse on the east side.

The power cable would come ashore somewhere in Kuiaha Bay, also known as Shark Bay.

The proposed location was announced at Gov. Linda Lingle's office in Honolulu on Monday, but the idea of a wave generator became public last week when a bill to allow the developer, Oceanlinx Ltd. of Australia, to use special purpose revenue bonds was introduced in the Legislature.

Last week, Maui Electric Co. President Ed Reinhardt said that Pauwela is attractive both for the configuration of the seafloor and because it is close to an easement that will allow the 2.7 megawatts of wave energy to flow into MECO's grid.

Lingle touted the wave farm, along with other forms of nonfossil fuel energy, on a visit to Maui on Friday.

At 3 megawatts of rated power, the station with its two or three floating generators would supply about 1 percent of Maui's peak electricity demand.

The bond proposal is for $20 million. Reinhardt says he does not know the total cost of the project, but Oceanlinx Executive Chairman David Weaver said Oceanlinx and its investors would assume the entire cost.

Hawaiian Electric Co.'s alternative energy subsidiary, Renewable Hawaii Inc., may become an investor.

The project's impact on Maui electric rates cannot be determined yet because a purchase power agreement has not been worked out.

But the capital cost for wave power is expected to be far higher than a fossil-fuel-burning plant. Based on the $75 million price tag of MECO's last major power-generating unit at Maalaea, MECO's next 20-megawatt combustion turbine could be developed for perhaps $4 million per megawatt at Waena, MECO's permitted but unbuilt generating station next to the Central Maui Landfill.

Waena has large initial infrastructure costs because it would need to be built on undeveloped sugar cane land. Adding 20 megawatts at an existing generating station could cost as little as $1 million per megawatt, according to Steve Holaday, head of

Alexander & Baldwin's agricultural group, which owns the only existing Maui station that could be expanded, at Puunene.

What the lifetime cost of wave versus diesel would be is also unknown. The higher the price of oil goes, the more favorable for wave energy.

Mauians already pay some of the highest electricity rates in the country.

Reinhardt says there are "hundreds and hundreds" of wave energy designs around, but the Oceanlinx concept looked better than most because all the control mechanisms are located on top of the floating housing.

Considering how much trouble MECO has with salt buildups and corrosion, that's a plus. "We believe it's a workable system," Reinhardt says.

The platforms are basically welded steel boxes, although with a complicated geometry. That should make them harder to sink.

No wave generators are operating in American waters now, and the only prototype, which was set out off the coast of Oregon last year for a two-month test, sank.

That one, of a different design, had an underwater seal that apparently failed, Reinhardt says.

Oceanlinx has had a prototype wave generator in Australia since 2002. The model ticketed for Maui is a much-modified descendant of that design.

Oceanlinx also has plans and/or contracts to install wave generators around the world, including off Rhode Island, but Maui is planned to be the first commercial installation. The target for completion is late 2009.

In the Oceanlinx design, waves push air through a turbine at speeds of about 250 mph. Then, as the wave falls, the air rushes back the other way, generating electricity on both pulses.

It is said to be quiet, about 75 decibels, which is roughly the loudness of a daytime street.

Oceanlinx was not able to say whether the intake of air could bother seabirds, but it will undertake an environmental impact review mandated under state law.

The key to the design is a system of variable pitch blades that switch their orientation instantaneously to drive a turbine, which always revolves in the same direction. That's the only moving part.

Sensors on the seafloor anticipate the direction, timing and magnitude of an approaching swell, priming the driving blades to get ready to change orientation.

The generator is a hollow float with a hole in the bottom where the wave energy enters as the water rises. Parabolic walls of the entry channel concentrate the wave force to accelerate the velocity of the air being pushed ahead.

The 1-megawatt units are about 100 feet long.

Oceanlinx prefers a location partially protected from the biggest swells; Kuiaha is west of Jaws. The bottom configuration is important, as well, and Reinhardt says at Kuiaha the exact site probably will be about half a mile to three-quarters of a mile offshore.

The land cable can be laid directly across the shore, but at Kuiaha it probably will come in underground.

By directional drilling from the top of the cliff (about 40 feet high), a conduit can be created that goes under the reef and emerges farther out.

As far as ocean conformation goes, the northernmost point of Maui might have served as well, but Reinhardt says it would have cost a fortune to bring a transmission line out. The area does not have electrical service now.

At Pauwela, there is an unused easement that used to carry electricity to some Maui Pineapple Co. pumps. The poles still stand, although they will have to be rehabilitated.

The Oceanlinx generators are not capable of working all the time. In very low and very high swells, they must be shut down.

Reinhardt expects that a 3-megawatt array should deliver 2.5 to 2.7 megawatts.

That is much less erratic than wind power, where the 30-megawatt wind farm at Kaheawa delivers an average of around 8 megawatts over the course of a year.

Wave power is still not “firm,” or reliable all the time, the way combustion or steam turbines are.

MECO pays Kaheawa a steeply discounted price because of wind’s unreliability. Oceanlinx probably will be looking for a smaller discount, on the grounds that its output will be more dependable.

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A one-third scale prototype of the 1-megawatt wave generator designed by Oceanlinx Ltd. floats off New South Wales, Australia.

Oceanlinx photo

CLOSE WINDOW