Bombora competes with renewable energy

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Jan Arreza

Bombora Wave Power is confident it will be able to match the electricity costs of renewable energy by 2023 through its mWave offshore device.

The company released the results of its feasibility study of a commercial-scale wave farm last week, highlighting the viability of the mWave offshore device.

Bombora Wave Power CEO Sam Leighton

The Levelised Cost of Energy (LCOE) study was based on a proposed wave farm in Peniche, Portugal and according to Bombora Wave Power CEO Sam Leighton, with further development, testing and refinement, the mWave technology will be deployed within a year.

Bombora engaged industry experts and local suppliers including WorleyParsons, NGI, Trelleborg and WaveEC to ensure both technical viability and costing accuracy.

“Major findings basically show that we’re a commercially viable product, so it means that in the medium or short to medium term, the cost of energy from our device will be competitive with solar and offshore wind,” Leighton said.

“We will have a joint [media] release with ARENA in about three weeks, which will cover more detail on the specifics like the cost breakdown, the total cost of the wave farm, and all these sorts of details.

“By working closely with our suppliers, we’ve defined very clearly the production version of our product and have already started designing for production, albeit at a feasibility level. We haven’t done the detailed engineering yet but all the key criteria have been covered.”

Constructing the plant

The study examined a range of wave energy converter configurations, construction materials, construction processes and deployment and maintenance processes.

In the end, a 1.5MW 60-metre single arm and two-sided concrete structure was selected as the preferred design, which will rest on the sea floor, 10m below the surface.

The combination of high-energy capture with a low cost structure allows the mWave to produce low cost electricity.

“We wanted to get the maximum power produced over the year at the minimum cost of the device and that’s driven us towards a very simple design and construction,” Leighton said.

“It’s a self-contained unit that we could take out and deploy and attach to the seafloor quite simply. The whole thing is centred on trying to make sure we get good efficiency on the conversion of wave energy, while we try to minimise the cost and the complexity of the process, while minimising maintenance costs.”

Enduring the crashing waves

Extracting energy from waves has historically been very challenging due to ocean waves consisting of

a complex mix of short and long waves and the risk of storms damaging most wave energy devices available in the market.

Because the mWave is a concrete structure that rests 10m below the surface on the sea floor, the device is able to survive stormy conditions better. It is also covered with a flexible rubber membrane that pumps air through a turbine, allowing the mWave to work efficiently in all wave conditions.

“We’ve got some very detailed computer models of our device and we’ve modelled storm waves over it, which has given us a loading on the device during storms,” Leighton said.

“We then worked with the Norwegian Geotechnical Institute (NGI) out of Norway and they’ve done the design of the foundation to make sure that under those loading conditions, the device stays on the sea floor and not up in the breaking waves.

“That’s one of the key features of our device; it’s on the seafloor well below the surface so during a big storm, waves aren’t destroying the device. We do get the surge back and forth and that’s what we’re trying to stop. The loads are still significant, but they’re much less than they’ll be on the surface.”

Looking ahead

Bombora is now in stage 1 of the process, which consists of the deployment of the first full-scale 1.5MW mWave converter and this is expected to be complete in early 2017. This first device will help to confirm its power output performance and storm survival, while assessing its environmental impact.

“So we’re in stage one at the moment, which is the rollout of the first full-scale 1.5MW commercial retail device in Portugal. The second stage will involve us expanding deployment with a further three to five more units constructed onto that same site,” Leighton said.

At the moment, Europe is the world leading area for the adoption of renewable energy option, hence the decision to deploy the device in Portugal, as opposed to in Australia.

“They have been quite supportive of the roll-out of all renewable energy options and they’ve put in place schemes for encouraging people to get involved in terms of feed-in tariffs and grant systems,” Leighton said.

“Looking at Portugal specifically, the country has specific sites that are set aside for renewable energy, particularly wave energy and we’re going to one of these sites that’s been pre-approved and set aside.”

That said, deploying the mWave in Australia is part of Bombora's plan.

“At the same time, we’ll be looking for sites around the world to deploy more wave farms. We’ll be looking in Australia, some already pre-approved sites in Scotland, sites in Europe, US, and in Indonesia, so there’s a range of different options for us in terms of further commercial wave farm," Leighton said, adding that Australia can also reach similar levels of adoption if further support from government and industry for renewable energy is offered.

“Australia is not so bad; we have organisations like ARENA supporting these initiatives, plus we already have several schemes in the country that encourage the adoption of renewable energy,” Leighton said.

“The current government has also been making a lot noise lately about innovations and new industries and so on and wave energy can become a major energy market in Australia.

“We have great waves and we have a huge coastline - we are an ideal spot to put in wave energy. We’re keen on seeing it adopted here in Australia, and we’ll continue to work with people in the country to try and encourage the rollout of our product here.”

For now however, Bombora is focussing its efforts on stage one and is undertaking an $8 million private capital raising scheme to help support the roll-out. The initial construction of the first cell of the converter will require around $1 million and each mWave device is expected to cost about $4.75 million to manufacture, deploy and commission.

“Right now, the key focus will be to make sure this first roll-out goes really well. We got to get this first one really right, do it really well, then we can move forward from there.”