



Tapping into circuit breakers

There are hurdles ahead but the ocean offers energy opportunities aplenty

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IF Australia's vast coastline and great waves have enabled the country to dominate the sport of surfing, it probably makes sense that Australian companies should number among the foremost wave-energy developers.

The potential of wave energy is estimated by the World Energy Council at 2 million megawatts, or double the current world electricity production.

It is estimated that enough wave energy hits Australian shores each year to power the country several times over.

In practice, however, the amount of wave energy that could reasonably be generated is much smaller than that, taking into account appropriate locations and availability of infrastructure. But it could still provide a quarter of the nation's needs, if it could be proved to work on a commercial scale.

Much is expected to be learned from pilot projects over the next few years. Industry participants realise that until a technology can be proven to operate in the ocean, its ability to function does not go beyond the theoretical. There have already been several instances where promising wave technologies have failed, or even sunk, soon after being tested in the ocean.

The competing technologies can be broadly separated into two groups — submerged technologies that are likely to operate near to shore, some of which can also provide desalinated water; and floating technologies that will likely be situated further offshore but will generate energy in situ and transfer the energy to land via cables.

Australia's flagship project will be built at Portland in Victoria by Ocean Power Technologies, a US-based firm founded by Australian-born former surfer George Taylor.

Earlier this month it won a \$66.5 million grant to build a 19MW plant that will feature its PowerBuoy technology, which generates energy from a piston-style movement caused by waves.

Carnegie Corporation, considered the most advanced of the local wave energy providers, has been operating a pilot plant near Fremantle and is to begin construction next year on a 5MW installation near Garden Island in Perth. It is also talking to the Department of Defence about a facility to power a naval station near Exmouth. It hopes to be able to build a 50MW plant in Australia, subject to government funding support, but is also looking at sites in Europe and the US.

BioPower will next year begin a pilot project of its submerged technology on King Island in the Bass Strait. Last month it announced it had been selected as the preferred technology provider by the City of San Francisco for a wave farm installation of up to 100MW, and it has also signed an MOU with Spanish renewable giant Elecnor to build a demonstration project in Spain and pursue other opportunities in Europe and South America.

Of those technologies proposing to operate on the surface, Oceanlinx is expected to unveil a demonstration-sized unit of its latest model at its Port Kembla facility soon. Chief executive Ali Baghaei expects that within 10 years the company could develop a 200MW project with costs competitive with the best renewable energy.

BioPower chief executive Tim Finnigan says although most technologies are in their pilot stage, he is confident they will prove to be cost-competitive and rapidly emerge as a viable source of predictable baseload energy.

"I think we will see large-scale wave utilities over the next 10

years. In Australia I don't know, but in the world yes," Dr Finnigan says.

Michael Ottaviano, the chief executive of Carnegie, agrees. His company estimates wave will produce energy at about \$120 per MW/h, in line with geothermal but cheaper than wind and solar.

He says that it is this prospect that has attracted the interest of large utilities and industrial groups such as EDF, General Electric, Stakkraft and Elecnor. "There's no doubt that there is investor demand. We are backed by EDF, the world's largest power company, and there is a massive amount of interest in this space."

However, much of the early large-scale development will likely take place in Europe. England and Scotland are offering huge incentives to develop wave-energy installations because they have few other renewable energy alternatives in the absence of significant solar and geothermal resources. Should Australia implement its emissions trading scheme, and wave energy projects are able to access renewable energy certificates offered by the 20 per cent Renewable Energy Target, the potential tariff for wave energy in Australia would be about \$150MW/h.

However, in England incentives push that tariff up to \$250MW/h, Ireland and Portugal to \$300MW/h, while in Scotland it has soared to \$600MW/h.

Scotland, England and Ireland are also seeking to attract wave energy technologies by investing large amounts of money in communal test sites. Tidal power is also being developed, although it is thought its application in Australia is more limited than wave, with a potential of 1000MW. BioPower is developing its own tidal-power system, with a pilot plant to begin operation off Flinders Island next year, while



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Atlantic Resources Corporation, an Australian company based in Singapore, is looking to construct a IMW installation to help power an iron ore operation at Koolan Island off WA.



Michael Ottaviano, the chief executive of Carnegie, views the ocean with hope