



It's the mix that matters

All sources will be needed to achieve national targets for renewable energy

JAMES DUNN

THE passing by the Senate of the national renewable energy target (NRET) legislation in August means 20 per cent of Australia's electricity supply — about 60,000 gigawatt hours — will be generated from renewable energy inputs by 2020.

According to Macquarie Bank, about \$34 billion will be invested in the installation of new capacity to meet the target.

Ross Paul, chief investment officer of specialist cleantech research and corporate finance firm Bakers Investment Group, says wind will be the main contributor to meeting the RET. Australia is home to 50 wind farms with a total installed capacity reaching 1306 megawatts, but this capacity will "grow substantially" over the next decade.

"The main reason for that is that of all the renewable technologies, except hydro, wind is the most mature. If we're going to have any renewable technology that's mature enough to be deployed on any meaningful scale over the next decade, it's wind. Hydro is the only other technology that we could see delivering the kind of megawatts we're talking about... but the problem there is that hydro is very big capital cost and also political cost — opposition to dams can be mobilised very quickly."

But there is one major problem with wind power — it is intermittent. Sometimes the wind does not blow, meaning wind farms do not provide baseload (reliable) supply. In fact, they need to be backed up at all times by the coal- or gas-fired power they are supposed to replace. "Wind can provide baseload if it is blended with storage technologies," says Paul. "Redflow Technologies is doing some interesting work here in Queensland,

testing zinc bromine batteries with Energex, effectively doing utility-scale testing of batteries capable of storing baseload power."

Solar power is the next most mature technology, says Paul, but while small-scale, distributed use of solar power is proven, big baseload use is not, although many companies are working on it.

Several other potential renewable energy technologies are under development in Australia. The "hot rock" geothermal energy companies aim to use hot dry rocks technology, which pumps water deep into the earth to form super-heated vapour, which drives turbines. The first flows of geothermal steam have been achieved by Geodynamics and there are four other players in this field: Petratherm, Torrens Energy, Green Rock and Wasabi Energy.

"Geothermal energy could potentially provide baseload, but it's a long way from being proven as viable," says Paul. "The technology is a lot more advanced than it was even a few years ago, but it is still not connected to the grid, we don't know what its generating capacity will be and we don't know how reliably that capacity can be delivered over time. It has a lot of promise, but its baseload potential is unknown."

Wave energy is a possibility being explored by Carnegie Wave Energy, which is commercialising its CETO wave energy technology. This is capable of producing zero-emission power, with the bonus by-product of desalinated water. CETO has been proven at pilot scale and is now in its commercial demonstration phase.

Carnegie chief executive Mike Ottaviano says wave energy can provide baseload, but we have to understand what baseload means.

"In the best places around the world, and Australia is one, the wave energy resource for the southern part of the continent is available 100 per cent of the time. So, therefore, if you have wave energy technology operating with a resource that is available 100 per cent of the time, you're going to be generating power 100 per cent of the time. That is baseload.

"When the waves are bigger or smaller, you produce more or you produce less: it will vary over time, like any natural resource, but it will be very predictable. You will know two or three days in advance how much it is going to vary, and therefore be able to manage your dispatch."

Ottaviano says there is an "obsession" with baseload energy. "The reality is that we've actually got too much baseload energy. We've got too much large coal-fired generation in Australia, which is very poor at dealing with quick changes in energy demand. We have very rapid changes. In summer, at 5pm, when we all get home and turn our air-conditioners on, the power demand spikes. Baseload generation is absolutely useless for us under those circumstances."

What Australia needs, he says, is a mix of energy supply to be able to deal with a modern energy demand scenario. "You need baseload, you need peak capacity and you need demand-following-generation that can ramp up and ramp down quickly. That's clearly where gas, for example, has a major role to play at the moment. We can have part of our power going out as baseload, churning out all the time, and then we have this other part which can be managed two or three days in advance, depending on what the wave resource is doing two or three days in advance."



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What mix is contributing to the RET in 10 years' time can't be predicted, he says. "There will be fossil-fuel energy and there will be a range of renewable energy

sources. There will be wind power, geothermal and wave, and other things that we possibly haven't yet thought about, all contributing." Paul says the viability of renew-

able energy technologies will depend on the carbon price. "We need to identify a carbon-equivalent price for each of the renewable technologies."



Wind power will lead the way as the nation moves forward on renewable energy