

FINANCIAL REVIEW

Silicon will blow lithium batteries out of water, says Adelaide firm.

An Adelaide company has developed a silicon storage device that it claims costs a tenth as much as a lithium ion battery to store the same energy and is eyeing a \$10 million public float.

1414 Degrees had its origins in patented CSIRO research and has built a prototype molten silicon storage device which it is testing at its Tonsley Innovation Precinct site south of Adelaide.

Chairman Kevin Moriarty says 1414 Degrees' process can store 500 kilowatt hours of energy in a 70-centimetre cube of molten silicon – about 36 times as much energy as [Tesla's 14KWh Powerwall 2 lithium ion home storage battery](#) in about the same space



1414 Degrees chairman Kevin Moriarty and executive director and chief technical officer Matthew Johnson with a prototype of their silicon energy storage system

Put another way, he says the company can build a 10MWh storage device for about \$700,000. The 714 Tesla Powerwall 2s that would be needed to store the same amount of energy would cost \$7 million before volume discounts.

No comparison

"There's no comparison. Except for a few specialised circumstances it will make them totally uneconomic frankly," Mr Moriarty said. "I don't think it's dawned on the market yet and it won't until we get them into a real-world situation."

1414 Degrees has raised \$500,000 of a \$2 million seed capital issue that it hopes to complete by the end of next month. It is in talks with a hydroponic herb farm and wind farm suppliers about pilot commercial scale trials of its technology, and is planning a \$10 million public share issue to fund construction of the first two 200 megawatt hour units.



Chief Scientist Alan Finkel has a tough task to find a solution to Australia's energy crisis.

Mr Moriarty is counting on 40 per cent to 50 per cent of the cost of these initial devices being funded by government subsidies because of the unique technology. The device stores electrical energy by using it to heat a block of pure silicon to melting point, 1414 degrees Celsius. It discharges through a heat-exchange device such as a Stirling engine or a turbine, which converts heat back to electrical energy, and recycles waste heat to lift efficiency.

Pure silicon is a shimmering, blue-grey "metalloid" – a substance that exhibits characteristics of metals and non-metals. A byproduct of smelting metal quartz ores, it is abundant and cheap. It is attractive as a storage medium because it is stable at the 1414 degree melting point, and can hold the heat for a week or two with adequate insulation although 1414 Degree's devices are designed to charge and discharge daily.

If the claims stand up at commercial scale the molten silicon storage device could be one of the technological breakthroughs that make it cheaper to store energy from wind and solar farms. This could smooth out their intermittent generation and also help prevent or isolate blackouts from transmission failures during storms such as the one that hit South Australia in September.



Nano-Nouvelle CEO Stephanie Moroz. The Sunshine Coast company has developed a process for making copper coated polymer electrode that could increase the capacity of traditional lithium ion batteries by 50 per cent.

Still, 1414 Degrees is only one of a growing number of companies seeking to push the frontiers of storage technology in Australia and win a role in the the energy grid of the future, which is evolving from one dependent on "baseload".

Storage race.

First Graphite Resources is funding the commercialisation of a graphene "supercapacitor" battery – which Tesla founder Elon Musk says could be the next big breakthrough – developed at Swinburne University. Nano-Nouvelle has developed lightweight copper coated porous current collectors that could add 50 per cent more capacity to lithium batteries.

Reposit Power, Greensync and Redback Technologies develop and sell software that helps households, firms and communities get the most from solar panels and wind turbines. Simon Hackett's Redflow is commercialising zinc bromide flow batteries –

which claim to be longer lasting and less prone to catching fire than lithium batteries. Mr Hackett paid \$730,000 last year to install 660KWh of Reflow's batteries at his business park – similar to the price for which Mr Moriarty says 1414 Degrees can build a 10MWh silicon storage device.

Rather than just sell its storage devices, 1414 Degrees wants to enter into joint ventures with customers – or partners – and share in the benefits. For example, Mr Moriarty said its devices could increase the revenue of a wind farm by 25 per cent, through increased output and exploiting higher wholesale prices when the wind isn't blowing. For a hydroponic farm, it can provide heat as well as electricity.