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Reality beckons for geothermal energy dream

- **GREENCHIP:** Giles Parkinson
- From: **The Australian**
- December 21, 2009 12:00AM

EVERY time Resources Minister Martin Ferguson makes an announcement regarding geothermal energy he likes to quote the statistic that just 1 per cent of Australia's geothermal resources could power Australia for 26,000 years.

But does he really believe it can even power Australia one time over? The pace and quantum of the government funding for geothermal suggests he is not entirely convinced.

He wouldn't be the only one.

But a report in the latest issue of Scientific American by Mark Jacobsen, a professor of civil and environmental engineering at Stanford University, and Mark Delucchi, a research scientist at the Institute of Transportation Studies at the University of California, outline how wind, water (which includes geothermal) and solar technologies could power the world by 2030. No more need for fossil fuels.

It seems a fanciful idea, but the authors build a strong case for its realisation. The first is that the resources undoubtedly exist.

According to US Energy Information Administration estimates, the current global demand for energy is 12.5 terawatts (12.5 trillion watts).

By 2030, this is expected to be 16.9TW, although efficiency measures such as switching vehicles to electric power from fuel combustion could save more than 5TW of demand. (Less than 20 per cent of the energy used in fuel engines is used to move the vehicle, something that has occupied the minds of managers at Toll and Linfox, for instance, while the rest is wasted as heat. Up to 85 per cent of the energy delivered to electric vehicles goes into the motion, the authors say).

The energy sources are readily available. Potential water power is estimated at 2TW, wind power at between 40TW and 85TW, and solar at 580TW. Currently, we use just 0.02TW of wind power and 0.008TW of solar.

The authors suggest water sources could provide 1.1TW of the 2030 demand with 490,000 tidal convertors, 5350 geothermal plants of 100MW, and 900 hydroelectric plants (more than 70 per cent is already in place). Wind could provide 5.8TW with 3.8 million wind turbines of 5MW and 720,000 wave convertors. Solar would provide 4.6TW, with 1.7 billion rooftop solar PV systems, 49,000 solar thermal plants of 300MW and 40,000 large scale solar PV plants of 300MW.

If that sounds a lot, the authors note that massive transformations have occurred before -- in World War II, when the US and other countries retooled car plants to make aircraft, and in the 1950s, when the US began to roll out its interstate highway system. In any case, if the world kept to fossil fuels, it would still need a further 13,000 coal plants. And the world

makes 73 million cars and trucks every year. The cost? Well, about \$100 trillion over 20 years, as opposed to the \$10 trillion needed if we stuck to fossil fuels and the "tens of trillions" needed in health, environmental and security costs.

The operating costs are seen as cheap as coal, and that is certainly the case with EV batteries vs fuel, hence the interest of the likes of Better Place and some of the more advanced car manufacturers.

The authors recognise that there are some hurdles regarding raw materials, especially those for EV motors, fuel cells and photovoltaic cells, but recycling and tapping vast untapped resources in China and South America will help. Reliability is also the most commonly cited issue, but the authors say that geothermal (it has been used in the US and elsewhere for more than 20 years) could provide the baseload, hydro acting for peak capacity and the remainder by interconnecting wind and solar, and using smart meters to tap into energy stored in EVs and buildings.

All that is lacking is political will, the same problem that hamstrung the Copenhagen talks.

"The obstacles are primarily political, not technical," the authors say. "With extremely aggressive policies, all existing fossil-fuel capacity could theoretically be retired and replaced in (20 to 30 years) the same period, but with more modest and likely policies full replacement may take 40-50 years." Even if you didn't want to impose a tax on the use of fossil fuels, they say eliminating the existing subsidies for fossil energy should be enough to level the playing field. Without a CPRS, the Australian government might have no other option.

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