Victoria's unique geothermal option

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South Australia's 'hot rocks' make it one of the best prospects for enhanced geothermal energy anywhere in the world but Victoria's heat trapping coals may make it just as good!

Somewhat ironically, the very reason that South Australia hosts one third of the world's nuclear fuel reserve also makes it one of the world's most exciting geothermal prospects. Extracted from the ground, South Australian uranium could easily power the nation for the next century but would produce dangerous waste. Where deeply buried South Australia's uranium provides sufficient natural geothermal heat that could power the nation almost indefinitely without any waste.

Australia's most advanced geothermal project is the Cooper Basin in far northern South Australia. It was developed there because oil explorers had already drilled to great depths and measured extraordinary temperatures. In other parts of South Australia, where there has been no such deep drilling, our understanding of the potential for geothermal came about differently and makes an interesting story that helps us understand Victoria's potential.

By Australian standards, some regions of South Australia are unusually prone to mild earthquakes, and show geological evidence for continuing mild tectonic activity. We know this activity indicates a weakness in the crust and that high temperatures could be one reason that the crust was weak. However, it wasn't until we began to map the natural concentrations of uranium in the crust that we began to make the link.

The results were stunning. Large parts of the South Australian crust have more than twice the average crustal abundance of uranium. Because of its natural radioactive properties uranium is one of the main heat producing elements and helps keep the interior of the earth hot. Where uranium is deeply buried, it makes the crust hotter than normal and also weaker. From an Australian Research Council funded study into young tectonic activity in Australia came an exploration model for a new energy industry. Last year Minister Ferguson announced a $7 MM grant to drill deep geothermal targets in the northern Flinders Ranges in the very region we started our work more than a decade ago.

Southern Victoria also shows ongoing mild tectonic activity, as the recent earthquakes near Korumburra show. Indeed, Boolarra, on the edge of the Latrobe Valley, is one of Australia's tectonic hot spots! Does this activity suggest we have our very own geothermal province here in Victoria?

The answer is emphatically yes and the potential may be better than South Australia. And, like South Australia, Victoria's geothermal potential is not without its own touch of irony, since it comes from the remarkable heat trapping properties of coal!

To appreciate this we need to understand that the type of geothermal prospects that occur in Australia come in two distinct 'flavours'. South Australian geothermal prospects result from elevated concentrations of heat producing elements such as uranium. Victorian prospects are more to do with heat trapping beneath exceptionally insulating rocks such as coal.

Coal is the most insulating rock of all and is almost 10 times more insulating than South Australia's hot rocks! However, more than 250 m of coal is needed to trap the heat equivalent of a South Australian 'hot rock', and coal rarely occurs in such quantity.

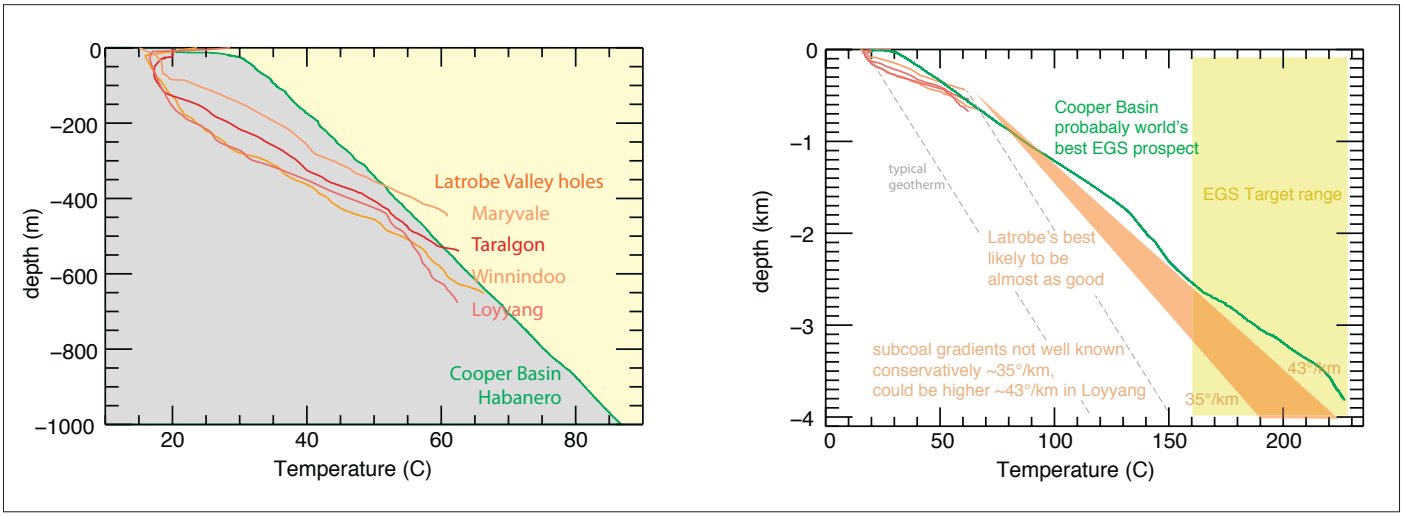
One place that it does is in the Latrobe Valley where the total thickness of coal can reach almost 400 m. This makes the Latrobe Valley amongst the most thermally resistive bits of geology on the planet, and therefore one of the most exciting geothermal prospects! Shallow drill holes already show temperature gradients compare with the hottest parts of the Cooper Basin.

Victoria's geothermal prospects are yet to receive the same publicity as South Australia. One of the problems in understanding Victoria's geothermal potential is that we cannot 'see' through the coals to what lies beneath. Coals have a remarkable ability to absorb energy and so can't be easily probed with seismic waves, as explorers do in the search for oil and gas in our offshore basins. We just don't know what rocks lie down beneath the coals.

The only way to find out is to drill some deep boreholes, but there is a catch. With deep drilling costing around $10 MM few companies can risk drilling 'blind'. Similar 'catch 22's' are precisely why Minister Ferguson has seeded deep geothermal drilling initiatives in South Australia at $7 MM each.

The Latrobe Valley may be the most exciting of Victoria's geothermal prospects, but is not alone, and geothermal is not the only issue for which deep drilling will help. Carefully maintained and monitored, deep drill holes are geological 'endoscopes' that open a tremendous opportunity to learn much about our crust. They will help us understand how much CO_2 we can store in our sedimentary basins, allow us to access deep groundwater resources and better monitor our earthquakes and the hazard they pose. They will provide a research infrastructure that will help us understand how to use our basins for the many crucial services they can provide, both now and into the future. They may even provide us with the laboratory to learn how to turn waste CO_2 into a useful working fluid to deliver geothermal energy from beneath the coals.

Meeting our challenges in providing clean secure energy supply is going to take new ways of thinking backed by inspired investment. Geothermal gives new hope



The case for a deel drilling program [>4 kms] into the Latrobe

that the much-maligned Latrobe Valley coals can contribute a cleaner power supply into the future. But we will not know just how until we start deep drilling.

A deep drilling program across southern Victoria would provide a unique natural laboratory comparable in significance to the astronomers 'square kilometer array'. It would make Victoria a geo-engineering centre leading the way in meeting many of the emerging energy challenges that face the globe. A Southern Victorian Geophysical initiative involving an integrated program involving around 10 deep holes across southern Victoria's sedimentary basins, renovation of some of the abandoned wild-cat holes, backed by a comprehensive research infrastructure may cost around $100 MM.

With the potential to open up a new truly 'clean' supply of baseload power that could prove to be a very wise investment. ■