



Government looks to balance Victoria's energy mix

By Tania Winter

THE FUTURE ENERGY requirements of Victoria will see the sustainable development of the state's petroleum, geothermal and geological carbon storage (GCS) industries.

The most recent initiative, the \$5.2 million Victorian GCS project, is building a 3D model of the onshore and offshore Gippsland Basin to assess its carbon storage potential.

Commitment

The four year project was kicked off in July last year and forms a key part of the government's commitment to reducing greenhouse gas emissions and allow the ongoing development of the state's vast brown coal resources.

"Carbon capture and storage to us is very important because it determines how we are going to continue to use large quantities of brown coal," Victorian Energy Minister Peter Batchelor said.

"If we solve the carbon dioxide problem for electricity generation it then opens up the prospect of using brown coal for other industrial purposes such as turning it into high quality diesel, liquid fuels, ammonia and other fertiliser products.

"There is even work being undertaken to see if it can be used to boost

agricultural efficiency and whether it can be treated and exported to energy hungry markets overseas."

Storage

In essence, GCS is a way of dealing with very large amounts of carbon dioxide by storing it underground rather than in the atmosphere.

The advantage that Victoria has is that it has suitable geological formations, particularly within the Gippsland Basin.

Another initiative in the area of GCS is the government's Energy Technology Innovation Strategy (ETIS).

"We are trying to encourage the deployment at commercial or industrial scale of already developed technology that will help meet the greenhouse gas abatement challenge," the minister said.

"This is our second round, and our first round saw an agreement struck where significant funding was made available for a solar power station and a new integrated gasification and drying technology for brown coal.

"The second round request for proposals is currently underway for a contribution of around \$100 million towards a carbon capture and storage initiative in Victoria.

"Essentially this ETIS program tries to take proposals that have already gone through the R&D stage and take them out of the laboratory and put them on the ground at commercial scale so that people can see that the risks of deployment have been satisfactorily met."

Successful applicants will be announced early next year.

Pioneer

Recently celebrating its 40th year of gas production in the Bass Strait, Victoria was the first Australian state to introduce a standalone act of Parliament governing geosequestration.

According to Batchelor, the government is now going through a consultative process with industry stakeholders and other parties to develop the regulatory codes of practice that will underpin that legislation.

"We are participating in a trial in the Otway Basin which is the first, independent large scale pilot program demonstrating GCS from a depleted hydrocarbon base," he said.

"Whilst we have not got the final details of the emissions trading scheme through, and the price of carbon and its trajectory is yet to be finalised, it's obvious that some time in the future we will have



Gas is vital to Victoria's energy needs



to factor in the price of carbon into the electricity price.
 "So we are getting on with the task of solving a number of issues around carbon capture and storage."

Understanding

GeoScience Victoria's Dr Geoffrey O'Brien said it was very important the government had a good geological understanding of the basin, which he described as the premier location in Australia for GCS.

"The ultimate goal of the project is to have a basin management framework to manage multiple use through time," Dr O'Brien said.

"Ultimately, we would like to see the sustainable use of the water resources in the Gippsland Basin, the further development of the petroleum industry and see the basin emerge as a GCS hub, along with geothermal.

"But the key for GCS in the Gippsland Basin is to make sure it can be contained safely and this is the number one issue for us.

"Some of these are actually potentially in conflict, like geothermal for example which takes the water out and exchanges the heat.

"We have to ensure that the knowledge is sufficiently good on a regional scale so that all of these activities can co-exist

successfully and peacefully.

"We have a multi pronged approach to dealing with carbon dioxide abatement and electricity generation, but GCS is really central if we are talking about how we are going to continue to use our brown coal."

Another positive is the location of the Gippsland Basin close to large sources of carbon dioxide from the electricity generators in the Latrobe Valley.

Over the next two to three years work by the group will focus on understanding the high permeability streaks in the basin that could allow carbon dioxide to migrate faster than expected, and the low permeability streaks.

It is critical to establish whether any injected carbon dioxide will be contained permanently in the subsurface, and also within the formation into which it was injected.

"We are trying to determine where we can inject CO₂ safely, as opposed to those that should be avoided," Dr O'Brien explained.

"Carbon dioxide if it is below 800 metres in the Gippsland Basin is present as a fluid, but shallower than that and it is present as a gas.

"We really need a good geological understanding because where GCS is different is that we are putting something

in, not taking it out, and once you inject it underground it can migrate and move.

"For a whole bunch of reasons, you would much rather it be a fluid because you can put a lot more in and fluids migrate at lower rates.

"We are completing a new 'traffic light' map (where red is bad, orange is uncertain and green is good) of the top seal integrity of the Lakes Entrance Formation, the regional sealing unit in the Gippsland.

"We need to know how much we can inject into the one spot so that it doesn't reach the end of the seal.

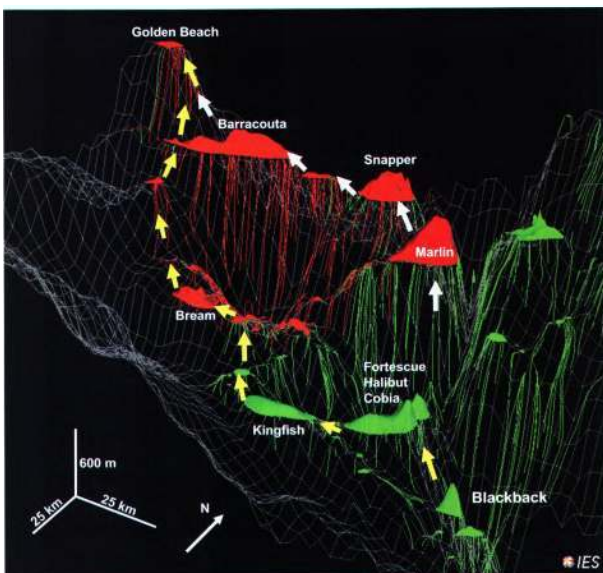
"That is part of the modelling program that we are doing. GeoScience Victoria and our research partners have done scenarios for this.

"The next step, after we have established containment and we know where it can and cannot be undertaken, is to determine how much can be injected and at what rate.

"That is all to do with the quality of the sands and the reservoir quality and how they are connected in 3D.

"If it hits really good sand it could travel at 100m a month but normally it would be 100m a year."

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Geoscience Victoria is compiling a 'traffic light' map of the top seal integrity of the Lakes Entrance Formation to better understand the potential for carbon capture and storage in the offshore Gippsland Basin.



Peter Batchelor



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Robust

At the same time, the group is looking to build a robust understanding of the processes to help facilitate the government's carbon storage acreage process, ongoing acreage assessments, reviews of injection applications, monitoring plans and basin-scale carbon storage regulation.

This management toolkit will provide the framework that will underpin GCS's development.

As for the petroleum industry in the Gippsland Basin, Dr O'Brien believed that as the fields are decommissioned over the coming decades the oil fields in the south could potentially store up to two billion tonnes of carbon dioxide.

However, he stressed that 95% of the state's storage potential in the Gippsland was not in the oil fields, but in areas between the fields.

The southern platform in the Gippsland Basin comprises the oil fields of Cobia, Fortescue and Kingfish, while the northern platform comprises the gas fields of Snapper, Marlin and Barracuda.

The model being used is that carbon dioxide injected south of Kingfish will flow

away to the south west and eventually dissolve and do not affect the field.

Modelling

"We have done some modelling on this with Schlumberger Carbon Services," he said.

"They (the CRC) are putting a tracer signature into the carbon dioxide to see what happens and their plan is to inject up to 100,000 tonnes of carbon dioxide."

As for the Otway Basin, an acreage release is due to be handed down at the upcoming APPEA Conference in Darwin.

"There are four blocks being gazetted in the Otway, two of them are relatively shallow water blocks, one of them transitions between the shallow and deeper water, and one is a deep water block," Dr O'Brien said.

"We have been doing a lot of work trying to understand the petroleum prospectivity of these blocks and the approach we have taken is a little bit different to what they have sometimes done.

"We wanted to understand how the gas fields that are there got there and what the critical factors that determine the location of the gas fields are."

Research has shown that virtually all of the gas fields in the Otway have

been generated or produced from a source rock called Austral 2 and that these occur within 3 km of the thermally mature (for gas) source rock.

"We know that the Otway Basin leaks a little bit as it has leaky faults," Dr O'Brien explained.

"It is unlike the Gippsland Basin where we can demonstrate that some of the hydrocarbons that are trapped in that basin have migrated at least 100 km. In the Otway Basin we are not seeing evidence of significant migration past 3 km.

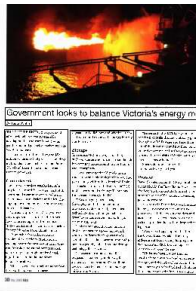
"If you can work out where this source rock unit is that is punching out the hydrocarbons, you can make a map of where it is across the basin.

"That is something we have done and we have extended it to look at some of the fields in the outer area like Geographe and Thylacine."

Geothermal

In terms of the state's emerging geothermal sector, while Bachelor acknowledged it was probably not as developed as its Cooper Basin neighbour in South Australia, it planned to catch up quickly.

With two acreage releases undertaken,



most of Victoria is now covered by exploration licences with the most prospective areas located close to big population centres or existing transmission lines.

The industry has already committed to spend up to \$400 million on exploration as part of the second round land release, in addition to the \$64 million earmarked from the first round.

“We have some interesting locations in the south west, south east and central areas of the state and seven companies have taken up ground,” the Minister said.

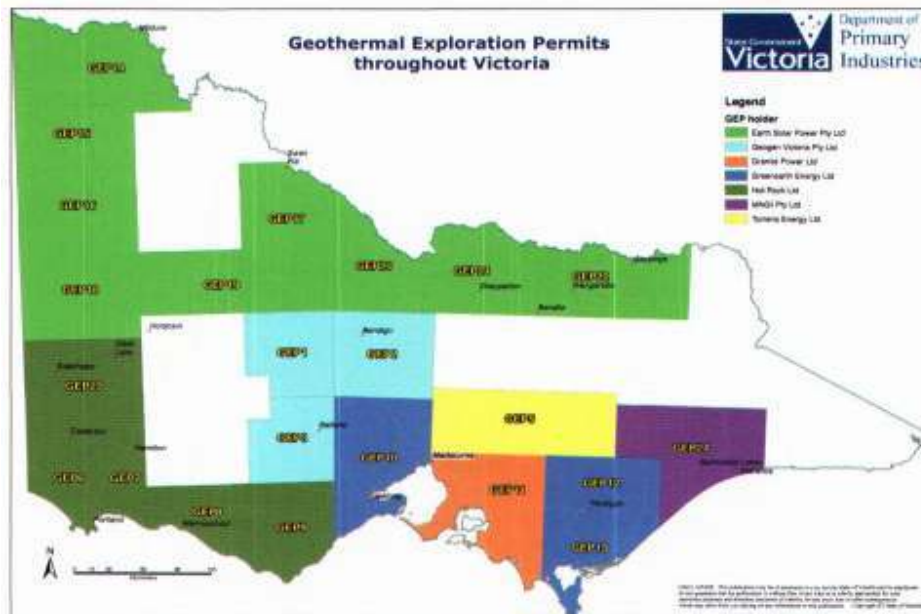
These include Earth Solar Power which has taken up ground in the Murray Basin, Geogen which has taken up acreage in the state’s west, Granite Power which has ground in the Gippsland,

Greenearth Energy which has ground in the Otway Basin, Hot Rocks, also in the Otway Basin, Petrathern and Torrens Energy.

“There are a few areas remaining which haven’t been taken up and we have made no decision as to how or when or if they will be put out onto the market,” Batchelor added.

The key to Victoria’s geothermal sector, according to Dr O’Brien, is that a small resource can be commercialised quickly.

“I know that Greenearth are talking to people in the Latrobe Valley about relatively small scale geothermal being used to dry coal pre combustion so the greenhouse gas emissions from the coal are much less,” he concluded.



Much of Victoria is now gazetted for geothermal exploration