

Geothermal solutions set to become a hot topic

Geothermal research at The University of Western Australia is expanding, and collaborations are expected to open up with one of the biggest independent geothermal energy proponents of the South West and now the Pilbara.

Hot sedimentary aquifers offer a unique opportunity for the Australian geothermal industry, and the Western Australian Geothermal Centre of Excellence (WAGCOE) at UWA is working towards a new era of energy development.

Lieb, with 20 staff, including 10 senior UWA professors and researchers in the areas of structural geology, fracture and rock mechanics, thermodynamics, and applied mathematical geophysics, and other related fields.

More recently Professor Regenauer-Lieb and Sean Webb have been in discussions with John Libby, Managing Director of New World Energy and also a multi-award-winning UWA graduate.

The unlisted Guildford company, already one of the biggest holders of geothermal energy permits in the state's South West, is now also the biggest geothermal energy

both hot rock and hot sedimentary aquifer areas."

Geothermal energy, already in widespread use around the world, is a major potential source of zero-emissions energy.

The process involves tapping into the latent heat contained within rocks buried deep below the earth's surface and using it to generate power. This is typically done by drilling wells into the resource and extracting hot water which can then be used directly as a heat source or to generate electricity.

"Air-conditioning needs at UWA vary from a two megawatt thermal base to a 16 megawatt load at peak times. So it is likely that the geothermal energy we harness will be used for base-load air-conditioning only. But it is a really good reliable source of energy for uses such as supercomputers, which use the same large amount of energy continuously," he said.

The first step will be agreeing on legal contracts and obtaining approvals, then getting an onshore drilling rig onto the

campus and ensuring the safety of people, buildings, and sensitive equipment.

The UWA air-conditioning project is just one aspect of WAGCOE's research, dedicated to providing desalinated water, heating and cooling for cities of the 21st century.

Professor Regenauer-Lieb said: "our aim is to make Perth the first geothermally cooled city."

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The exploration drill rig at UWA

Already exploratory drilling on UWA's Crawley campus has confirmed decent heat flow estimates. Sean Webb, the business manager for WAGCOE, said that all going well, drilling could begin as early as next year.

"The hot aquifers are just asking to be used for our heating ventilation and air conditioning project," Mr Webb said.

"It is a proof of concept project that will almost certainly go ahead. We already co-own the first geothermal permit issued in Western Australia – GP1."

WAGCOE is a collaboration between UWA and CSIRO and Curtin University of Technology. It engages the expertise of the John de Laeter Centre and iVEC (interactive Virtual Environments Centre supercomputer), and works with geothermal institutes in New Zealand, Germany and France.

The Centre is led by Premier's Fellow, Professor Klaus Regenauer-

proponent in the Pilbara after being named the winning applicant for nine permits stretching between Onslow and Canarvon.

Sean Webb believes after early discussions WAGCOE is in a good position to be involved in some of New World Energy's projects in the Pilbara region.

"We could collaborate on research activities where we map specific areas to target the geothermal resources below ground. WAGCOE is focused on continually improving its world class 3-D below ground modelling to extract and exploit geothermal resources.

The Centre has arguably the best capabilities in the world for mapping hot fluid flow convection within 3D strata in hot sedimentary aquifers such as the Perth and Great Artesian Basins. This same capability can be used to map and even forecast patterns of geothermal resource extraction and regeneration in

Tapping our hidden resources

The Centre for Exploration Targeting (CET) based at The University of Western Australia is assembling four dimensional models that will change the way exploration companies operate in the future.

Building on the back of UWA's world recognised economic geology research centre, CET operates at the cutting edge of fundamental scientific research while providing practical solutions to exploration challenges for the exploration industry. CET is a joint venture between UWA, Curtin University of Technology, and the mineral industry, with more than 50 industry partners as corporate members.

Director of CET, Professor Campbell McCuaig, said the idea was to set up a centre that was focused on research to improve exploration.

"If you look back over the last couple of decades data clearly shows that the rate at which we find minerals and metals is declining as a ratio of the rate at which we mine them," he said.

"These metals are vital building blocks of the global economy, so longer term we're facing a wall that we're going to hit if we don't get better at finding them.

This challenge is similar to the concept of 'peak oil' now widely understood in the petroleum industry. We have to innovate to be able to get past this hurdle. Not every company realises this yet but there are enough of them that see the vision and are jumping on board.

"New ore bodies are likely to be found deeper under cover," said Professor McCuaig. "As a result it is getting more expensive to try to explore. One of the major issues is selecting the best ground to start exploring in the first place. If you look at greenfields exploration generally the success rate is much less than one percent. That's less than one economic discovery out of 100 targets – an expensive exercise. If we can make a change to even two percent, that's a big saving and will provide a big productivity boost to the exploration industry."

The State Government's \$80 million Exploration Incentive Scheme to boost mineral and petroleum exploration throughout the State's greenfield and frontier areas during the next five years is providing money to collect data that will attract increased exploration in Western Australia. The CET and Geological Survey of Western Australia (GSWA) are partnering under this funding umbrella to help stimulate more

productive exploration and improve the pool of knowledge available to explorers.

"GSWA is working with CET and contracting the Centre over the next four years to jointly deliver targeting products to enhance and make more accessible the raw data releases generated through regional surveys.

Norilsk Nickel Australia is among the companies getting behind the CET's research.

According to Ian Gregory, Norilsk Nickel Australia's Exploration Manager, it has given them the opportunity to access higher level research science.

"It provides us with predictive four dimensional geological models which allow us to understand our mineralisation system, and in turn generate new targets. There are also obvious commercial benefits, by reducing the risk of exploration and hopefully resulting in the discovery of new ore bodies," he said.

The first of CET-GSWA's integrated Geographic Information System targeting packages is expected to be delivered in 2010.

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CET researchers on a field trip in the Goldfields