HR Geothermal Exploration

Go To South Australia

↓
Drill a Deep Well

↓
Bingo

↓
Sorted

I can't help feeling you may have over simplified our objectives somewhat...
Petratherm’s Geothermal Exploration

Australian Earth Sciences Convention, July 2006, Melbourne

Richard Hillis
Peter Reid
Martin Hand
Petratherm’s Geothermal Exploration

• South Australia’s geothermal boom
• Petratherm’s exploration philosophy
• Petratherm’s targets
• Petratherm’s drilling results to-date
• conclusions

Australian Earth Sciences Convention, July 2006, Melbourne
- 78 GELs and GELAs
- 35,633km²

- Eden
- Geodynamics
- Geothermal Resources
- Green Rock
- Origin Energy
- Osiris
- Pacific Hydro
- Petratherm
- Proactive Energy
- Scopenergy
- Torrens Energy

Image Courtesy of PIRSA
South Australian Geothermal Sector

Number of Licences & Cumulative Expenditure

- Forecast expenditures exclude demonstration trials & upscaling towards commercial operations.
- At least two significant geothermal energy production plants are anticipated within the term to 2009/10.
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Hot Rock Exploration Philosophy: Underpinned by Hot Rock Electricity Cost Pillars

- temperature
- drilling depth
- network connection
- flow rate
- generation plant

exploration for highest geothermal gradient, closest to grid

fractures & in situ stress
ENTs & HEWIs
partnerships

Australian Earth Sciences Convention, July 2006, Melbourne
**Hot Rock Exploration Philosophy**

\[ Q = -k \frac{dT}{dz} \]

- high heat flow (heat production)
- insulating cover sediments (low thermal conductivity)

In order to obtain high geothermal gradient
SEEK high Q and low k

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Hot Rock Exploration Philosophy

Temperature at 5km map is aliased over much of Australia because of variation in Q and k
Use geological principles to SEEK high Q and low k

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Petratherm’s Targets

modified from Neumann et al. (2000)
Petratherm’s Targets

- thermally anomalous granites (TAGs)
- radiogenic iron oxides (RIOs)
- enhanced natural thermal systems (ENTs)
Resources Triangles: Petroleum & Geothermal

Small volumes that are technologically easy to develop

Conventional Reservoirs

Improved Technology

Unconventional

Petroleum

Geothermal

Natural resources

Petroleum & Geothermal
Paralana: Potential Grid Development

Transmission Lines

- 132 KV Line
- 275 KV Line
- 33 KV Line
- Possible 275 KV Line
Board & Management

Derek Carter
Chairman

Simon O’Loughlin
Director

Prof. Richard Hillis
Director

Dr Lloyd Taylor
Director

Richard Bonython
Director

Terry Kallis
Managing Director

Donald Stephens
Company Secretary

Peter Reid
Manager Operations

petra therm
Thermally Anomalous Granites

‘Typical’ granite heat production: $2.65 \, \mu \text{Wm}^{-3}$

UK HHP (High Heat Production) Granites:
- Cornubian granites: $3.7\text{--}5.3 \, \mu \text{Wm}^{-3}$
- Grampians granites: $4.7\text{--}7.8 \, \mu \text{Wm}^{-3}$
- Lake District granites: $3.5\text{--}4.9 \, \mu \text{Wm}^{-3}$

Big Lake Suite
Cooper Basin
Carboniferous
$11 \, \mu \text{Wm}^{-3}$

Box Bore Granite
Mt Painter Area
Mesoproterozoic
$22 \, \mu \text{Wm}^{-3}$

Yerila Granite
Mt Painter Area
Mesoproterozoic
$62 \, \mu \text{Wm}^{-3}$
Thermally Anomalous Granites: Callabonna & Paralana

Yerila Granite
Mesoproterozoic
62 $\mu$Wm$^{-3}$

Box Bore Granite
Mesoproterozoic
22 $\mu$Wm$^{-3}$

Palaeozoic granite background radioactivity
Thermally Anomalous Granites: Modelling Callabonna Gravity
Rift Basin Over Hot Basement
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Petratherm’s Staged Risk Reduction Programme

Stage I: Target Definition
- geophysics (gravity, MT and seismic)
- temperature data in old wells
- heat production and conductivity data (core)

Stage II: Shallow Test Wells (~750 m)

Stage III: Thermal Reservoir Evaluation Well (~3.5 km)

Stage IV: Resource Circulation Test
September 2005 Drilling Campaign

Callabonna & Paralana
Callabonna: 64°C at 675 m (68°C/km)
Paralana: 58°C at 485 m (81°C/km)
target temperatures in the Adelaidean cover overlying basement
Paralana: Potential Heat Exchanger Within Insulator (HEWI)
HQ and cased to 1440 m  
NQ to TD 1807 m  
  top Cambrian 475 m  
  top Adelaidean 1550 m 

watch for market announcement in  
~two weeks
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Conclusions

- high heat flow and insulating cover
- enhanced as opposed to engineered circulation
- grid access
- SAHFA: TAGs, RIOs & ENTs under sedimentary cover
- minerals exploration-style exploration geology and geophysics plus thermal modelling
- staged risk drilling program
- Callabonna: 64°C at 675 m  (68°C/km)
- Paralana: 58°C at 485 m  (81°C/km)
- currently deepening Paralana with diamond drilling rig
Acknowledgements

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