

ASX Release

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PETRATHERM LIMITED
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MD presentation to SA Resources and Energy Investment Conference - "SA Geothermal Energy Industry Update"

Petratherm's Managing Director, Mr. Terry Kallis will present later today to the SA Resources and Energy Investment Conference on "SA Geothermal Update" – the status of geothermal energy in South Australia.

Key points from the presentation attached are:

- Geothermal energy has the potential to provide large scale, base load and low cost renewable energy – and there a variety of geothermal technologies and applications.
- Australia has the key ingredients for developing successful engineered geothermal systems (EGS) projects – high heat producing granites, continent under compression, strong commitment from government and financial markets.
- SA has the best known EGS (hot rock) geothermal resources in Australia with approximately 90% of Australia's activity focused in South Australia.
- Geothermal projects face a number of challenges, including but not limited to – drilling, achieving adequate flow rates, power conversion efficiency, cost of delivery to market (proximity) and water issues.
- There is strong government support for geothermal and renewable energy. Capital funding through the \$50M geothermal drilling program and the \$435M renewable energy demonstration program, with the recent COAG decision to increase the renewable energy certificate shortfall penalty by \$25/MWh to \$65/MWh, enable greater investment in geothermal energy.
- More can be achieved with increased capital funding coupled with increased industry cooperation (R&D, drilling and network connection).

Yours faithfully

Terry Kallis
Managing Director

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5 May 2009

SA Resources and Energy Investment Conference

“SA Geothermal Energy Industry Update”

Presented by:
Terry Kallis - Managing Director
PetraTherm Limited
and Chairman,
Australian Geothermal Energy Association

Explorer and Developer of Geothermal Energy

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All amounts in Australian dollars (AUD) unless stated otherwise.

Presentation Outline

- Key Messages
- Geothermal Energy – technology and costs
- Australian Geothermal Energy potential
- SA geothermal exploration and development
- Challenges for geothermal energy projects
- Industry Network Connection solution for SA
- Renewable Energy Policy & Geothermal
- Conclusion
- *Additional supporting slides*

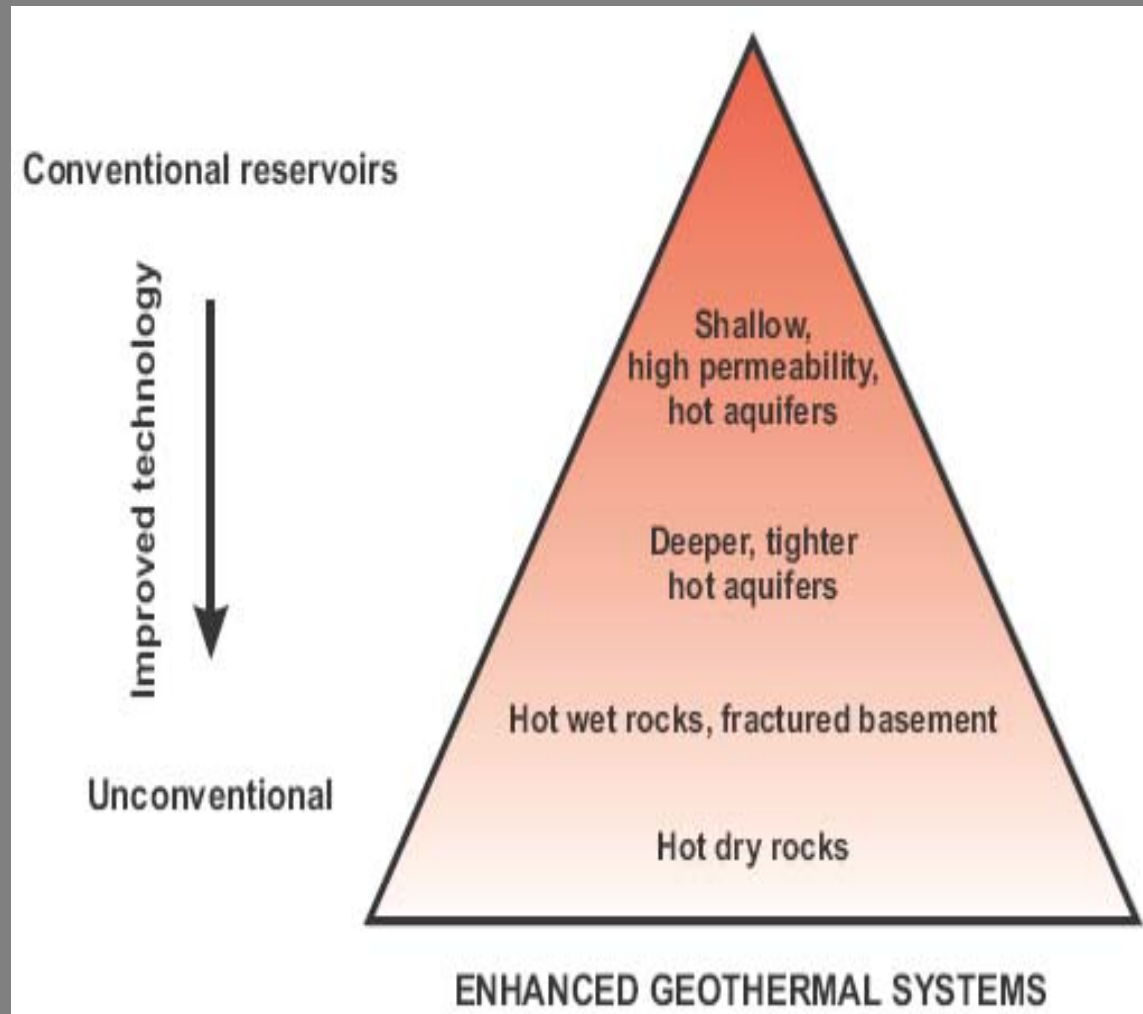
Key Messages

- Geothermal energy has the potential to provide large scale, base load and low cost renewable energy - variety of technologies and applications
- Australia has the key ingredients for developing successful engineered geothermal systems (EGS) projects – high heat producing granites, continent under compression, strong commitment from government and financial markets.
- SA has the best known EGS (hot rock) geothermal resources in Australia with approximately 90% of Australia's activity focused in South Australia.
- Geothermal projects face a number of challenges, including but not limited to – drilling, achieving adequate flow rates, power conversion efficiency, cost of delivery to market (proximity) and water issues.
- Strong government support for geothermal and renewable energy with capital funding and price of carbon – more can be achieved needed with increased capital funding coupled with increased industry cooperation (R&D, drilling and network connection).

Geothermal Industry - Technologies

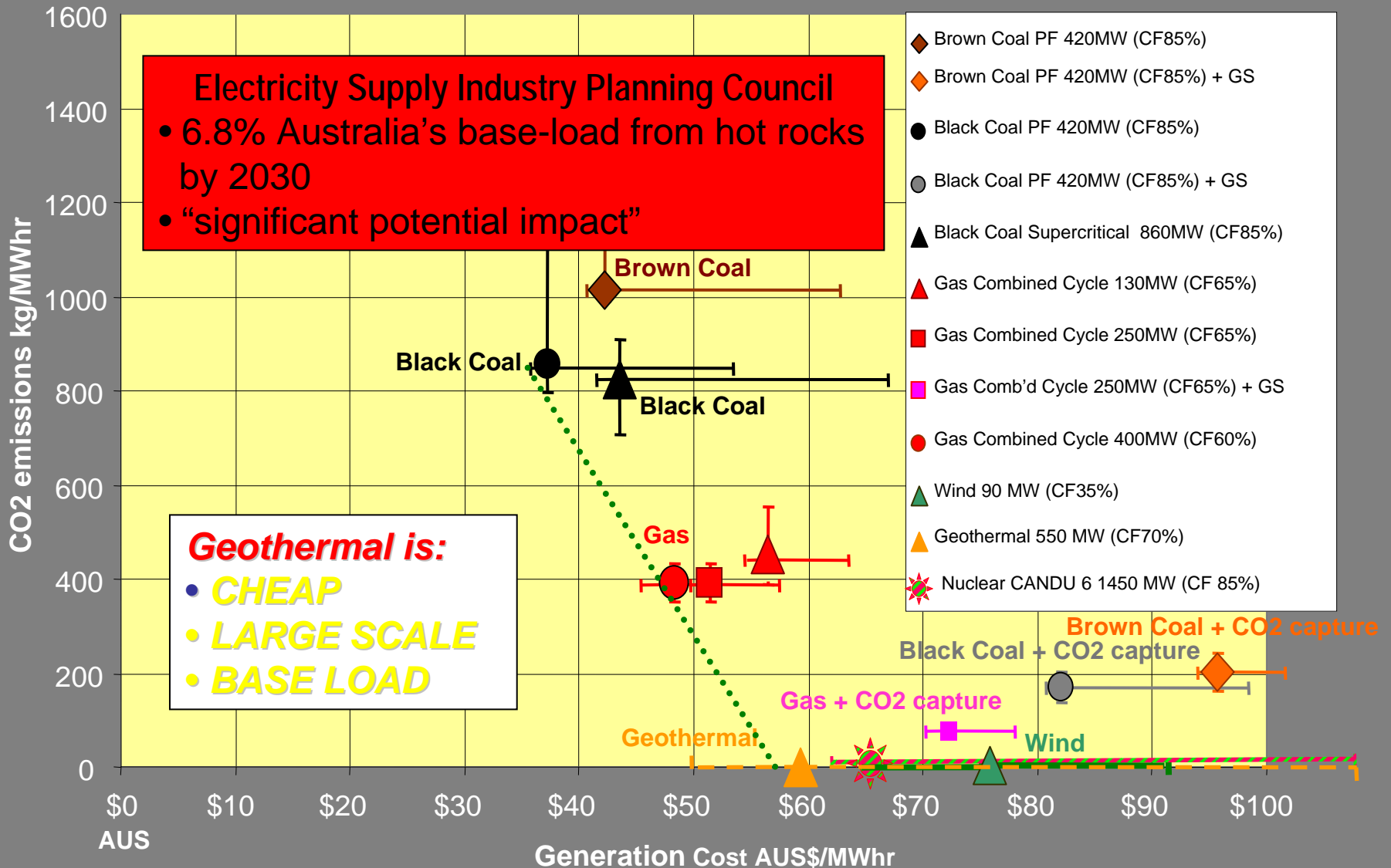
Cost Drivers

- Temperature
- Drilling Depth
- Flow Rate
- Network Connection
- Generation Plant



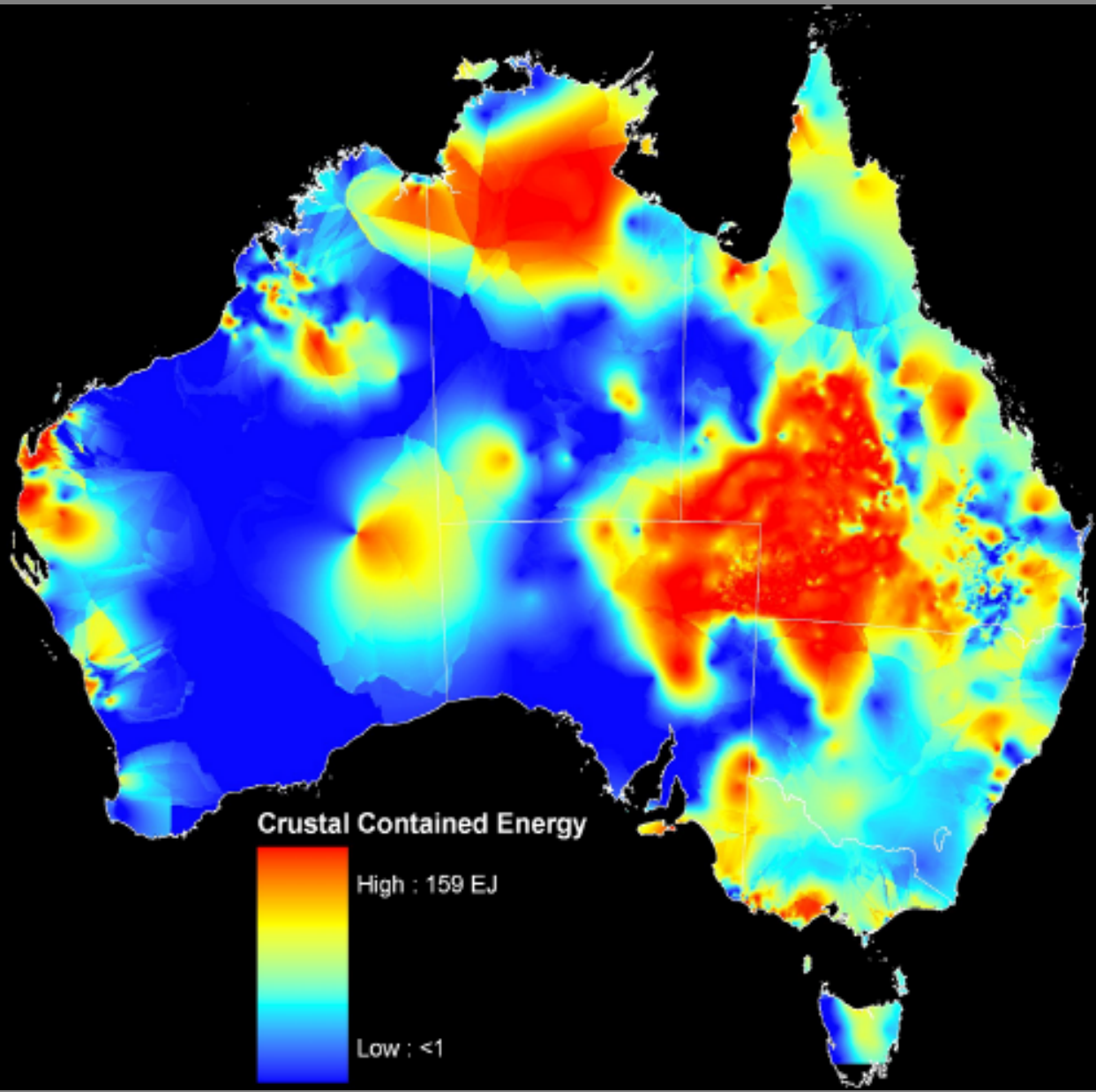
High up front costs – drilling, fracture stimulation, connection, plant (low O/M + no fuel costs)

Geothermal Energy Cost Comparison



COMBUSTION CO2 EMISSIONS vs LONG RUN COST
 (Source: PIRSA Compilation of ESIPC data 2006-07)

Drivers - The Promise of Geothermal



Indicative Resource Map

**Australia's hot
rock energy 150°C
to 5km ~ 1.2
billion PJ**

**~20,000 X annual
primary energy
use in Australia**

Source: Geoscience Australia (2007)

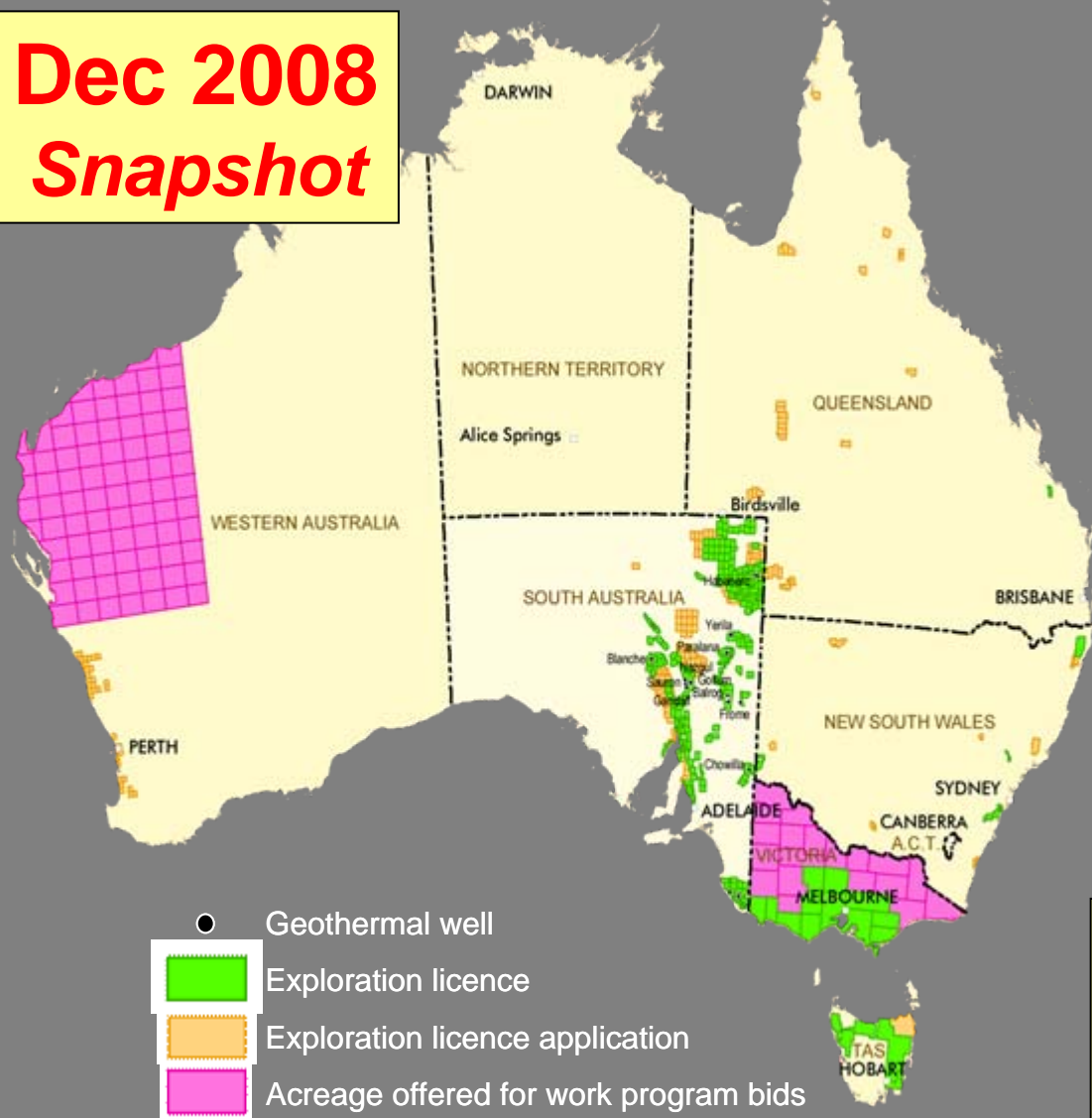
MMA Report on Geothermal - Findings

- Geothermal energy expected to build up to **2,200 MWs of base-load capacity by 2020**;
- An estimated **\$12 billion would be invested** to develop that capacity;
- Represents up to **40% of the Federal Government's 2020 Renewable Energy Target of 45,000 GWh** - the equivalent of the output of around 6,000 MW of wind farms;
- Generation costs are expected to move rapidly down the cost curve from around **\$120/MWh** at small scale (10 MW to 50 MW) and decreasing to around **\$80/MWh** at large scale (300 MW or greater) by 2020; and
- **MMA Treasury modeling report shows most of the capacity is expected to come from developments in SA** - other states increasing their contribution toward by 2020



Growth of Australian EGS Industry

Dec 2008
Snapshot



GELS / GELAS

Aust. 367

S.A. 273

Expenditure

Aust. > \$1000 Mill

S.A. ~ \$ 700 Mill

- **48 Companies**
- **10 ASX listed**

Hot Rock Projects in South Australia – 31 Dec 08

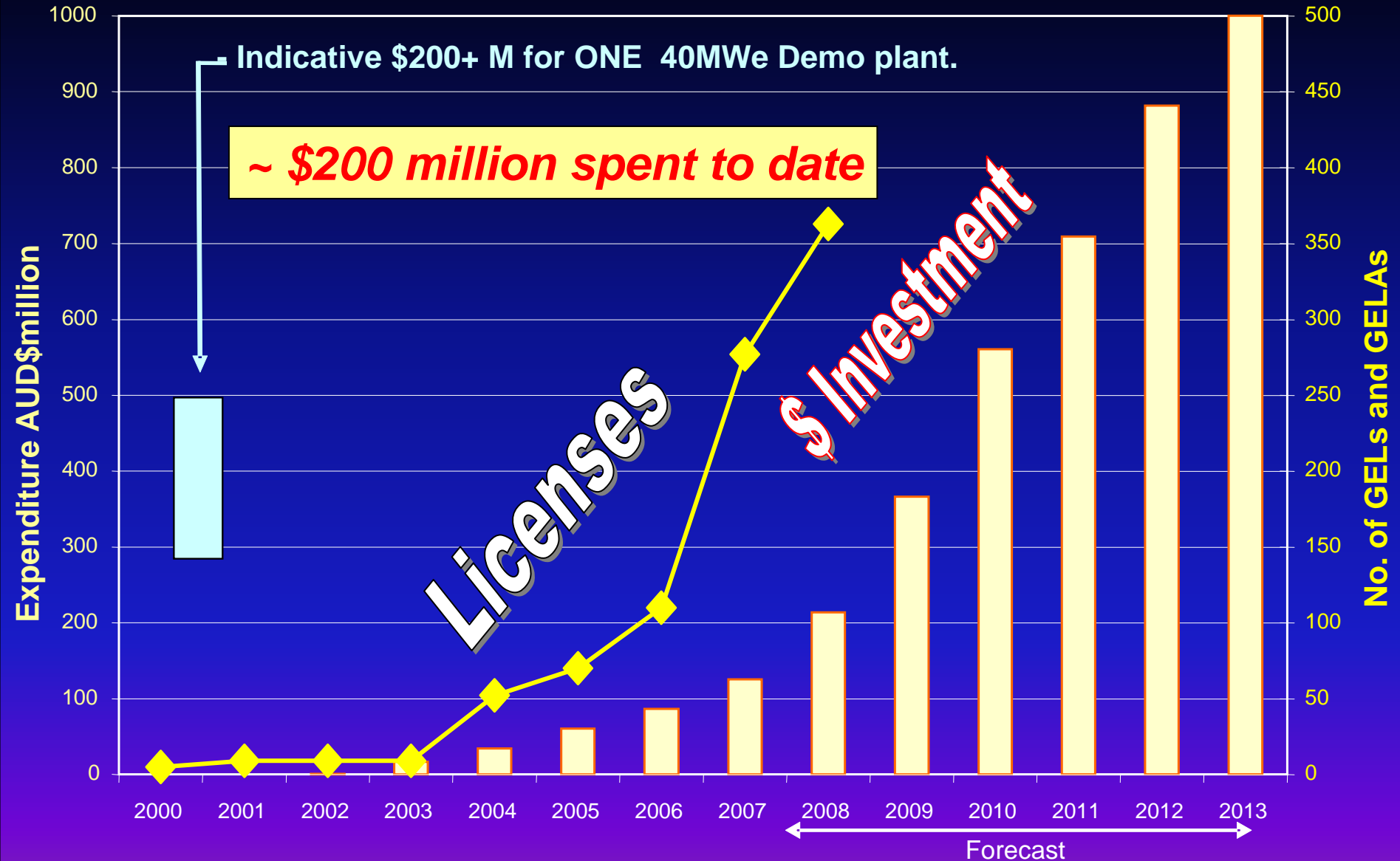
- 28 companies in the hunt in 273 licences on variety of plays covering >125,683 km²

- | | |
|---------------------------------|-----------------------------|
| ✓ Geodynamics ✨ | ✓ Tri-Star Energy |
| ✓ Petratherm ✨ | ✓ Clean Energy Australasia |
| ✓ Geothermal Resources ✨ | ✓ Osiris Energy |
| ✓ Green Rock ✨ | ✓ Origin Energy ✨ |
| ✓ Torrens Energy ✨ | ✓ Callabonna |
| ✓ Eden Energy/Terratherma ✨ | ✓ Deep Energy |
| ✓ Panax ✨ | ✓ Inferus (Southern Gold ✨) |
| ✓ Pacific Hydro | ✓ A-B-L-R Joint Venture |
| ✓ Teck Cominco ✨ | ✓ AAA Energy |
| ✓ Granite Power | ✓ Earth Heat |
| ✓ Gradient Energy | ✓ New World Energy |
| ✓ AGL ✨ (w/Torrens Energy) | ✓ Near Surface Geothermal |
| ✓ TRUenergy ✨ (w/ Petratherm) | ✓ Stuart Petroleum ✨ |
| ✓ Tata Power ✨ (w/ Geodynamics) | ✓ Beach Petroleum ✨ |
| ✨ ASX Listed | ✨ International SX Listed |

- > A\$730 million in work programs (excludes demo & up-scaling for deployment)
- Generalised play ingredients: Amagmatic conductive heat source, geothermal reservoir and insulating cover – combining to enable economic flow rates of sufficient heat energy to meet markets



Growth in Australian Hot Rock Projects



SA Geothermal Project - Snapshot

Geodynamics/Origin (Tata Power/Sentient-SunSuper)

- 2003-5: Proved flow of geothermal energy with Habanero 1 & 2
- 2007-9: Habanero3, Jolokia1, Savina1; Origin JV; Proof of Concept
- Next: 1 MW pilot and Commercial Demonstration Plant

Petratherm/Beach Petroleum/TRUenergy

- 2005-7: Drilled Yerila and Paralana, deepened Paralana & recorded MT + seismic
- 2009 added TRUenergy \$57m JV and \$7m GDP
- Next: Petratherm JV to drill deep Paralana well starting in 2Q/09

Green Rock Energy

- Drilled and Mini-Frac'd – Blanche 1 to 1935m
- Next: Farm-out and drill two deep wells

Geothermal Resources

- 2007-8: drilled 6 Frome area wells up to 500m depth
- Currently drilling deeper test well

Torrens Energy/AGL

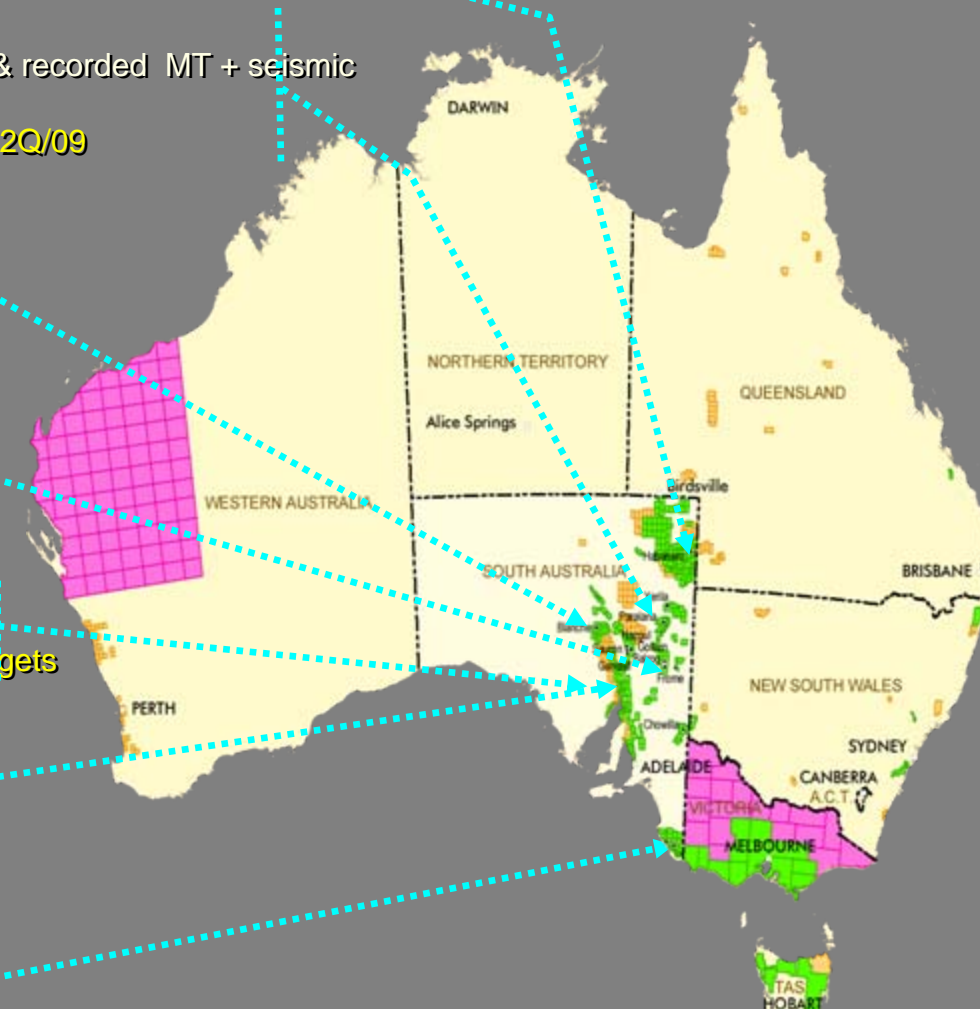
- 2007-9: 14 wells Pt Augusta, Parachilna, Adelaide Plains
- 2008: Geothermal Alliance Agreement with AGL Energy
- Next: Shallow Exploration Pt Pirie, Adelaide; deep well targets

Southern Gold Ltd (Inferus Resources)

- 2008: Drilled two 1km wells north of Pt Augusta
- 2009: Processed seismic acquired by GA
- Next: Geothermal Resource

Panax Geothermal

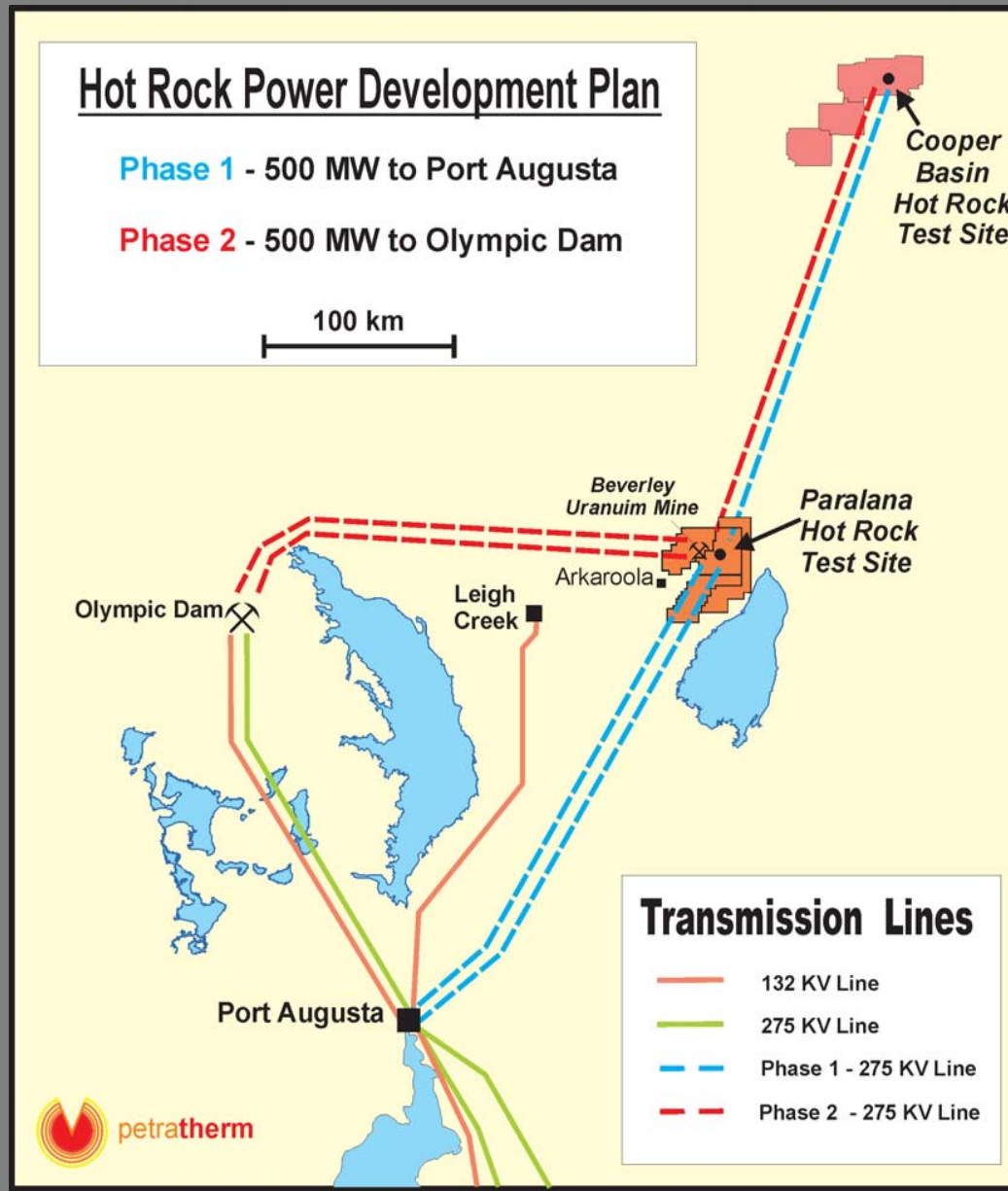
- 2006 – 3 wells to 500m depth & MT survey in SE SA
- 2008-9 Merger with Osiris; Measured Resource (11,000 PJ) confirmed in place; Pre-Feas completed; \$7m GDP Grant
- Next – Salamander 1 (deep well) spudding in Sept 09, WDI rig spot confirmed



Challenges for Geothermal Projects

- Securing a quality site – the three locations - resource, market, permits/approvals – optimizing economics in a competitive market.
- Confirming the quality of the potential resource – temperature differential, stress regime / permeability.
- Deep drilling of wells – well design, drilling rig availability and costs.
- Establishing long-term circulation between injection and production wells -permeability, fracturing, flow rate.
- Integration of above-ground generation plant with below-ground thermal resource, achieving reliable power plant output – then followed by up scaling of generation capacity.
- Electrical connection (transmission) to the National Electricity Market.
- Water quality, usage, net losses, rights, obligations, accessibility, environmental impacts – short and long term – small and large scale.

Industry Network Connection solution - simplified



Renewable Energy Policy & Geothermal

- Strong Federal and SA State Government Support - Federal Government Policy Frameworks
 - \$50M Geothermal Drilling Program -\$7M max/project
 - Geothermal Energy Industry Development Framework
 - \$435M Renewable Energy Demonstration Program
 - AEMC review of Electricity and Gas Networks to facilitate climate change policies
 - Carbon Pollution Reduction - Emission Trading Scheme
 - Renewable Energy Target - 45,000 GWh by 2020 - *an increase in the REC penalty price from \$40/MWh to \$65/MWh and extending to 2030 – enabling greater certainty and improved NPV for geothermal projects*
- Australian Geothermal Energy Association (AGEA) and the Australian Geothermal Energy Group (AGEG) – led by PIRSA and adds to SA Government PACE initiative

World's First Commercial EGS Plant Landau Germany

- Opened Oct. 2008
- 155°C, 60 l/s
- 3 MWe + heat
- Expanding to 8 MWe
- ORC Cycle
- Cost \$20 M Euro



Conclusion

- Geothermal energy has the potential to provide large scale, base load and low cost renewable energy – variety of technologies and applications.
- Australia has the key ingredients for developing successful EGS projects – high heat producing granites, continent under compression, strong commitment from government and financial markets.
- SA has the best known EGS (hot rock) geothermal resources in Australia with approximately 90% of Australia's activity focused in South Australia.
- Geothermal projects face a number of challenges, including but not limited to – drilling, achieving adequate flow rates, power conversion efficiency, cost of delivery to market (proximity) and water issues.
- Strong government support for geothermal and renewable energy with capital funding and price of carbon – more can be achieved with increased capital funding coupled with increased industry cooperation (R&D, drilling and network connection).

Thank You



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www.agea.org.au



www.pir.sa.gov.au



Australian Geothermal Energy Association



The national industry association for the Australian Geothermal Energy Industry

AGEA's Vision. Geothermal energy providing the lowest cost emissions-free renewable base load energy to Australian homes and businesses for centuries to come.

AGEA's Mission. foster and accelerate the development and commercialisation of Australia's geothermal energy resources by:

- Clearly and accurately articulating the advantages of geothermal energy and the progress of the industry;
- Cooperating across the industry to develop, collect, improve and disseminate information about geothermal energy; and
- Developing good and constructive relationships with government, the investment community and the broader Australian community.

AGEA's Work. Increasingly provide both:

- a low cost, emissions free, baseload, reliable and secure supply of energy into the national market over the next decade; and
- a reliable, low cost source of heat to drive energy efficiency and industrial applications.

AGEA works with all Australian Governments, the academic community, relevant scientific organisations and the media to promote information about the progress of the industry and its capabilities.

AGEA seeks to assist government develop prudent policy mechanisms that enable all forms of emissions free energy to increasingly penetrate the national energy market in line with climate change and energy security policy goals that are in the national interest.

AGEA's membership comprises the major geothermal energy project developers, direct heat equipment suppliers and service providers to the industry.

Australian Geothermal Energy Group (AGEG)

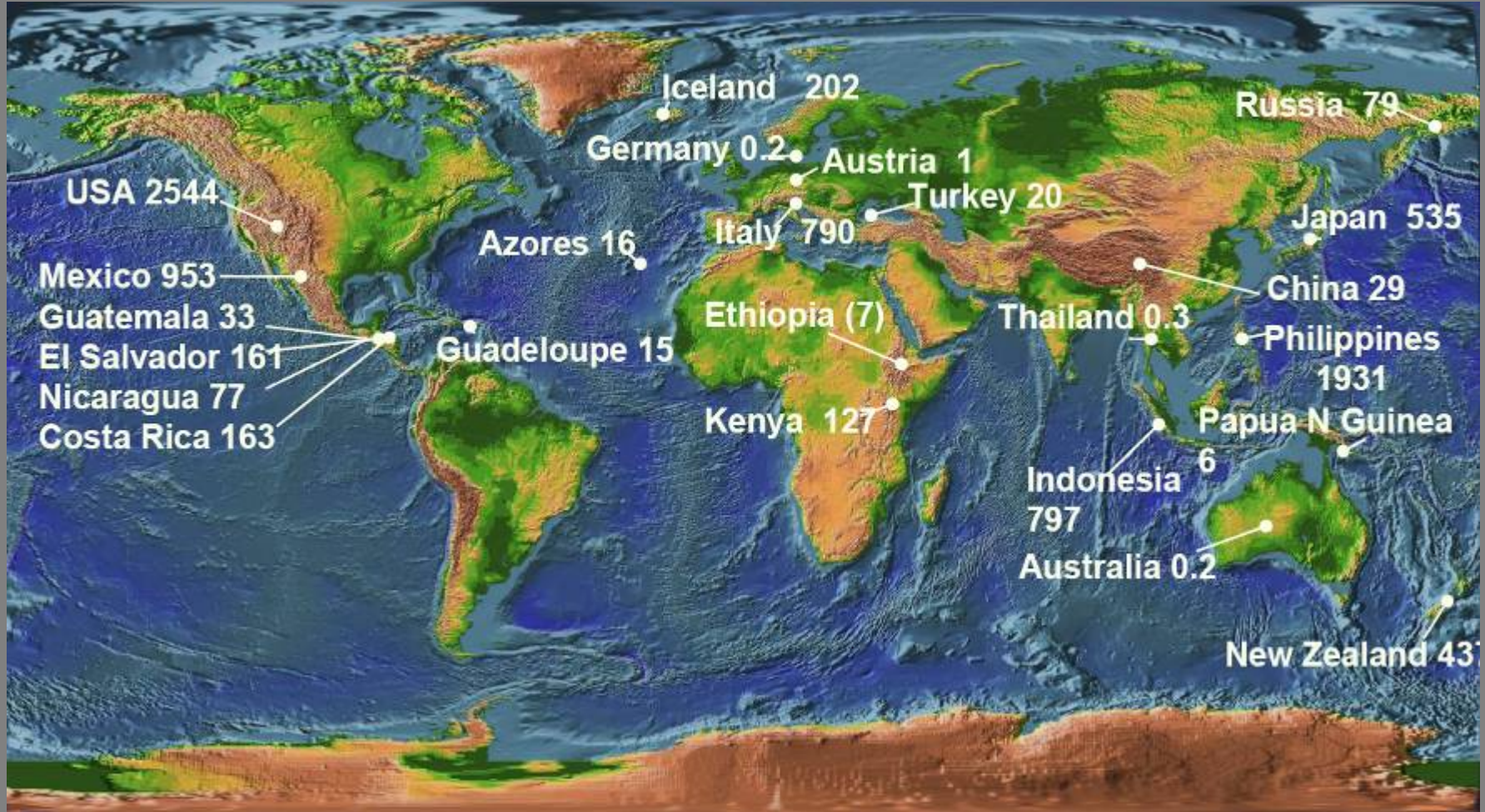
AGEG'S VISION: *Geothermal resources to provide the lowest cost emissions-free renewable base load and direct use energy for centuries to come.*

- Currently 88 members and growing
- Includes all companies with geothermal licences, all Federal, State and NT government agencies with a role in upstream energy policy and investment attraction and 10 Australian universities



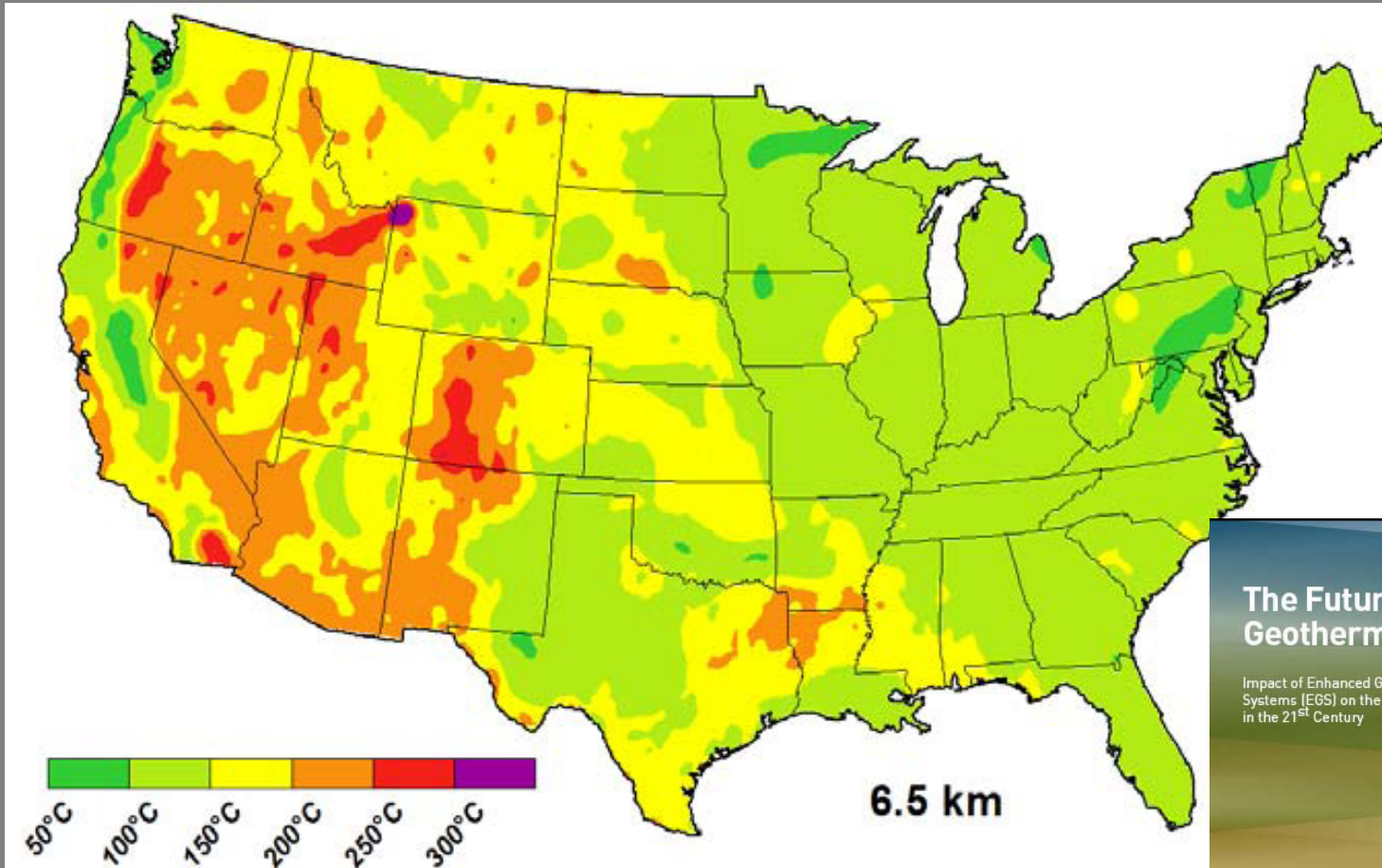
<http://www.pir.sa.gov.au/geothermal/ageg>

Global Geothermal Energy Installed Capacity in MW



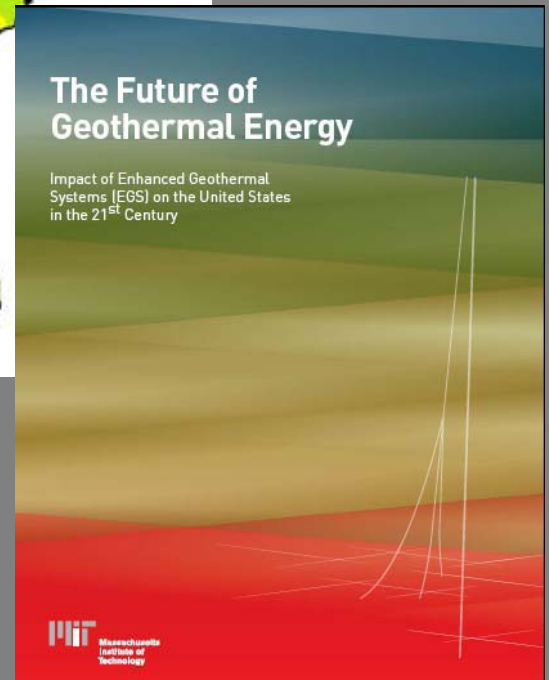
Total 10,000 MW (2006)

Drivers - The Promise of Geothermal



MIT (Tester, et al 2006)

- 100 GWe hot rock power in the USA by 2050
- ~13.7 billion PJ resource to 10 km.
- 130,000 X annual primary energy use in the USA



SA Geothermal Projects

- Many players – 28 Companies, 10 ASX listed
- 277 GELs mostly in SA – PACE grants
- Very large resources
- Exploiting different geothermal resources mainly Hot Rock but also “Hot Water”



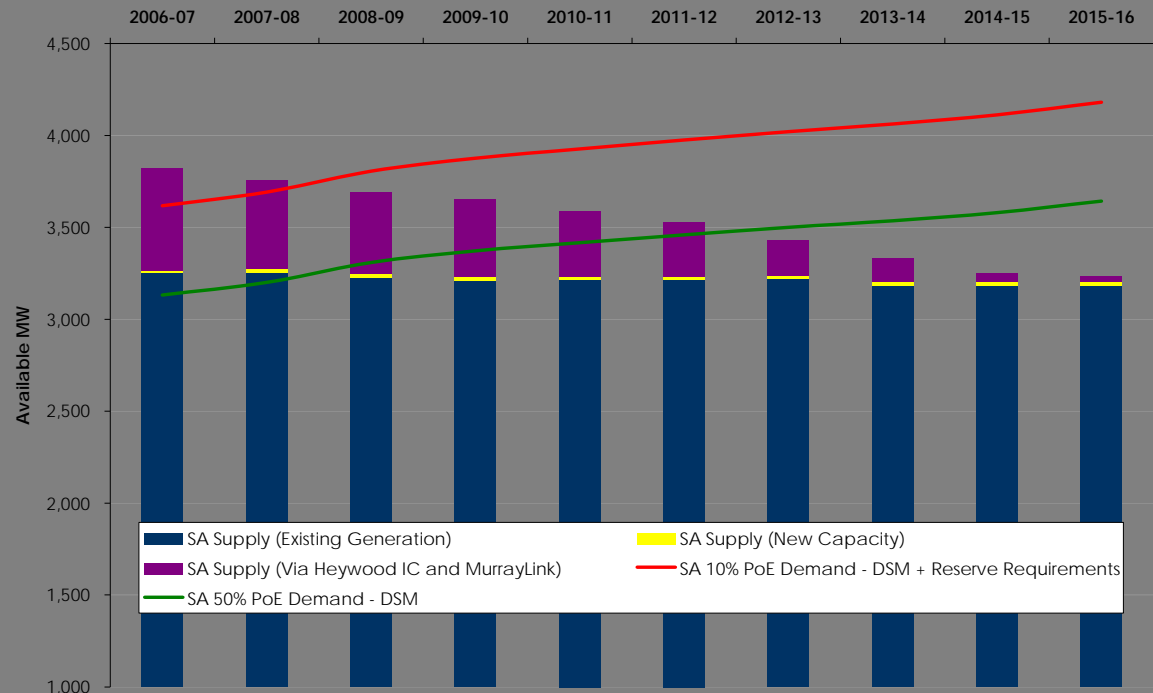
Drivers - Govt. Legislation and Support

1. Geothermal Tenure - SA, Vic, Tas, NSW, QLD, WA (and NT soon)
2. RECS, NGACS, VRECS, Carbon Schemes
3. State and Federal Govt. grants ~ \$100 Million since 2000
4. Geothermal Industry Development Framework – COAG Initiative
5. Australian Geothermal Energy Group (AGEG)
Australian Geothermal Energy Association (AGEA)

SA Electricity Market

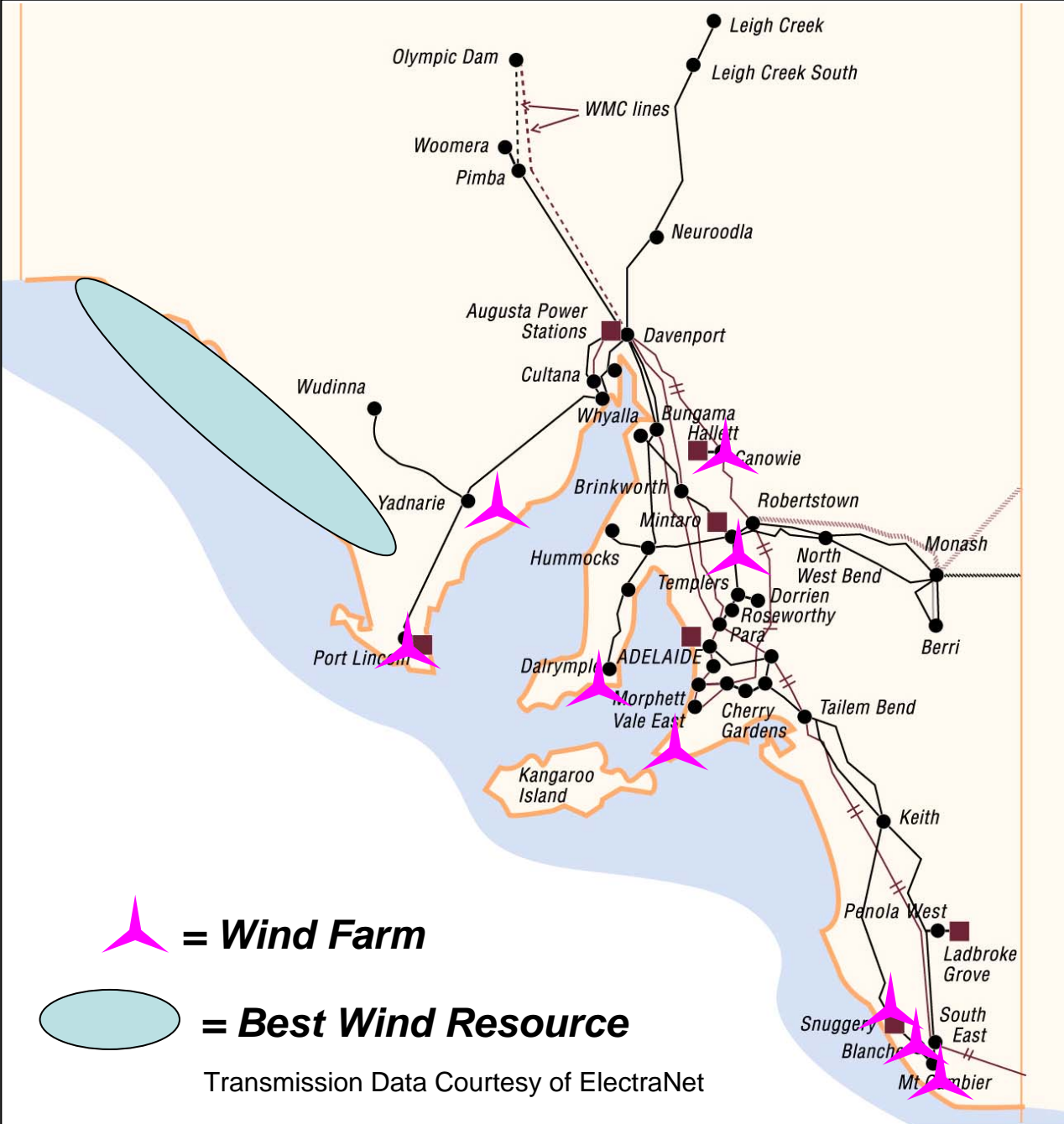
- SA NEM region electricity demand to require at least 600MW of new capacity
- Does not include potential increase of over 400MW from Olympic Dam.
- Nor the effect of depleting Leigh Creek coal.
- Demand requirements will be between 600 – 1,500MW.

Forecast Supply
Demand Balance for
South Australia (source
SA ESIPC APR 2007)

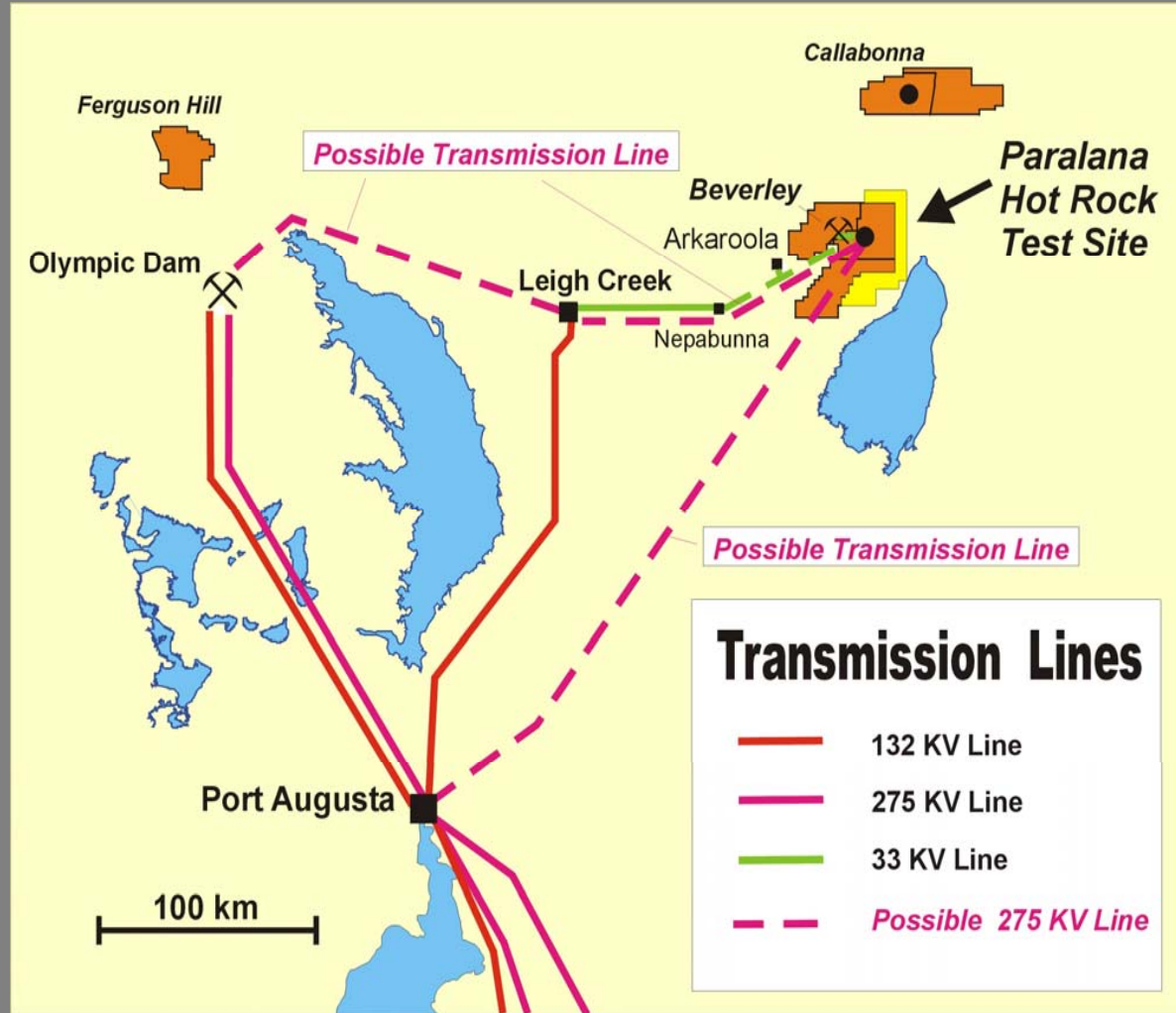


Network Access & Connection

- Transmission Costs
- Transportation losses
- Margin Loss Factor
- System Stability
- Development Approvals, Licensing, Easements and Permits
- Network Capacity at connection point



Transmission Connection - Meshed



Industry Network Connection solution - simplified

