AGEA NEM Policy Committee

Concept Paper No. 1
Far North South Australian Region

18 February 2009

Draft for Discussion

Purpose

The purpose of this paper is to outline briefly a number of NEM policy issues facing the Australian Geothermal Energy Industry and to propose potential solutions and further issues for discussion.

This paper is the first in a series of papers and focuses on the far north region of South Australia. It is proposed that additional concept papers be developed to facilitate the connection and development of renewable generation technology in other regions of Australia.

Concept Paper 2 will focus on the Victorian region and the broader issue of transmission congestion.

Concurrently, AGEA will continue to provide its views on the AEMC review of Australian Energy Markets in light of Climate change Policies through its membership of the AEMC Stakeholder Committee.

Background

It is widely recognized by AGEA members that future NEM policy issues will be critical to the success of the geothermal energy industry. In particular, where geothermal energy developments are either distant from the NEM transmission system and/or in close proximity to large-scale intermittent sources of generation (e.g. wind farms and solar energy), and/or where the NEM transmission system is otherwise constrained (within regions or between regions).

The Ministerial Council for Energy (MCE) has recognized the need to address how the Commonwealth's Carbon Pollution Reduction Scheme (CPRS) and Renewable Energy Target (RET) policy aims can be accommodated (or not) by the existing Australian Energy Market frameworks (gas and electricity).

The MCE has requested that the AEMC undertake a review of the issue and involve key stakeholders. AGEA is represented on the stakeholder review committee of the AEMC.

AGEA's NEM Policy Committee will aim to contribute to the AEMC process over the next twelve months.

This Concept Paper No.1 focuses on the Far North South Australian regions where proximity to market and lack of major electricity infrastructure is a significant issue. A key issue relating to the development of significant electricity transmission capacity relates to the appropriate sizing of the transmission line and the need to balance prohibitive costs for large development versus potential underutilization in the shorter term. Such an issue can be further compounded by the need to prove technology (as is the case for EGS based geothermal). The costs of transmission capacity connecting the Far North area to Port Augusta or Olympic Dam for 250 MW capacity or more is substantial and is in the order of several hundred millions of dollars. In addition the timing of increments of generation (envisaged to be typically 30MW to 50 MW stages) will present an issue for coordination and utilization – over time – of the transmission capacity.

Accordingly, this concept paper seeks to identify potential solutions that involve several parties (governments, developers, generators/retailers, transmission owners and customers) in a cooperative effort to establish a sensible staged approach to providing the backbone infrastructure necessary to facilitate the entry of large scale renewable energy into the NEM.

Issues

A number of issues arise when considering potential solutions to the problems faced in getting large-scale geothermal energy generation into the NEM.

Firstly, there are significantly different approaches amongst developers which at the most extreme ends are "finding the hottest spot" vs "finding a spot closest to the wires". Ultimately, this is an overall economic and risk trade off to be made by each developer.

The common matter here though is that, irrespective of proximity to the "wires", there remains the issue of large-scale connection into the NEM due to matters of congestion – caused by the already limited transmission capacity and/or large-scale intermittent generation (wind or solar) that may have had preferential treatment in terms of dispatch (and use of the limited transmission capacity).

Currently, most activity in the Australian geothermal energy sector is centered in two locations:

a) The north eastern part of South Australia with several geothermal players focused on the development of "hot rock" or "engineered geothermal systems" (EGS). Arguably the north eastern part of South Australia also represents the best known "hot spots" with the existence of the South Australian Heat Flow Anomaly (that covers most of the geothermal exploration licenses taken out in SA –Cooper and Arrowie basins). EGS resources, once proven in a commercial context offer huge potential to provide large scale, base load, renewable energy solutions ; and

b) The large sedimentary basins along the south coast of Victoria and stretching into south-eastern South Australia and southern Victoria. The Otway and Gippsalnd basins lie in those areas have well defined sedimentary style "hot aquifer" geothermal resources, a type which is currently being exploited

commercially in Europe and USA, with the support of favourable regulatory and market environments.

Discussion must address the issue of proximity to market. The lack of transmission infrastructure is most stark in the north eastern part of SA, but is less of an issue for the sedimentary resources which generally have better established transmission infrastructure.

AGEA's NEM Policy Committee has provided feedback to the AEMC's Scoping Paper that outlines a number of key relevant and related issues including, but not limited to:

- Issue 1 – Convergence of gas and electricity markets
- Issue 2 – Generation capacity in the short term
- Issue 3 – Investing to meet reliability standards with increased use of renewable energy
- Issue 4 – Operating the system with increased intermittent generation
- Issue 5 – Connecting new generators to energy networks
- Issue 6 – Augmenting networks and managing congestion
- Issue 7 – Retailing
- Issue 9 – Financing new energy investment.

AGEA's NEM Policy Committee has added a further issue for consideration being:

- Issue 0 – Interrelationship of NEM review objectives and other relevant policy objectives (i.e. CPRS, RET, capital fund in programs).

AGEA has provided a formal submission to the AEMC commenting on all of the above issues with a particular focus on Network Connection and Congestion.

Potential Solutions

The rationale behind the two potential solutions outlined below includes recognition of:

- The range of issues identified in the AEMC Scoping Paper.
- The specific proximity and congestion issues faced by geothermal energy generation connecting large-scale plant to the NEM.
- The need for solutions to the benefit of a broad constituency and preferably the Australian community.
- The ability to demonstration either a market failure (utilizing existing frameworks) or the non selection of the lowest cost solution to the economy.

Utilizing the above four points as a guide to frame potential solutions, two solutions for the northern part of SA (for discussion) have been developed as follows:

<u>Solution 1 – Cooperative Development of a Northern SA Transmission & Power System</u>

The concept here is to have a number of generation developers (geothermal, solar, wind, gas, etc) cooperate with large mining companies, electricity generators/retailers and ElectraNet to develop a staged approach to large-scale transmission in the northern part of the state. The concept would be to have a variety of parties commit and part-contribute to a staged level of transmission development.

It is proposed that, where possible, connecting transmission lines are routed via areas of mineralisation to support mining development.

Importantly, all development would be staged to support future expansion and economic operation of infrastructure. It is proposed that all works are designed for extensibility to readily support expansion and connection of new infrastructure.

One potential staged approach could be to develop the network as follows:

- A 250MW 275 kV transmission line from the Cooper Basin to Port Augusta (but capable of being expanded to 500MW).
- A further 250MW 275 kV transmission line from the Cooper Basin to Olympic Dam (also capable of being expanded to 500MW).
- Expansion of the above lines to deliver a total 500MW to Port Augusta and then a total of 500MW to Olympic Dam.
- The network could be further expanded to deliver a further 500MW from the Cooper Basin to Port Augusta with an additional double circuit 275kV line.
- Beyond that level of capacity (i.e. 1500MW) additional new and large-scale transmission lines would be required that transport power to interstate markets.

It is proposed that other transmission lines will be established to connect generation developments in proximity to these lines. A potential network development scenario is shown in Diagram 1. (Refer also to network concept diagrams in Appendix attached).

The timing of these augmentations could be coordinated with demand increases associated with mining loads.

It is proposed that upgrading of transmission interconnections with other states be coordinated with these power system developments to support the management power system reliability and economic development outcomes.

It is likely, that the sequence of network development activity undertaken will depend on maturity of individual generation projects. The extensible design concepts will readily support the connection of new generation capacity as this comes on line.

It is proposed that the connection technology deployed will provide for the connection of a wide range of generation development (geothermal, wind, solar etc) and will anticipate key network limitations.

The funding approach would still require commitment from the Government to facilitate the various stages. Support would be sought from the SA Government and funds would be requested from the Commonwealth Government under an appropriate Fund (Infrastructure Australia Fund). A cooperative approach from various energy technology developers, retailers and customers, together with ElectraNet (the local transmission network service provider TNSP) would enable an efficient and effective staged approach to development of the network.

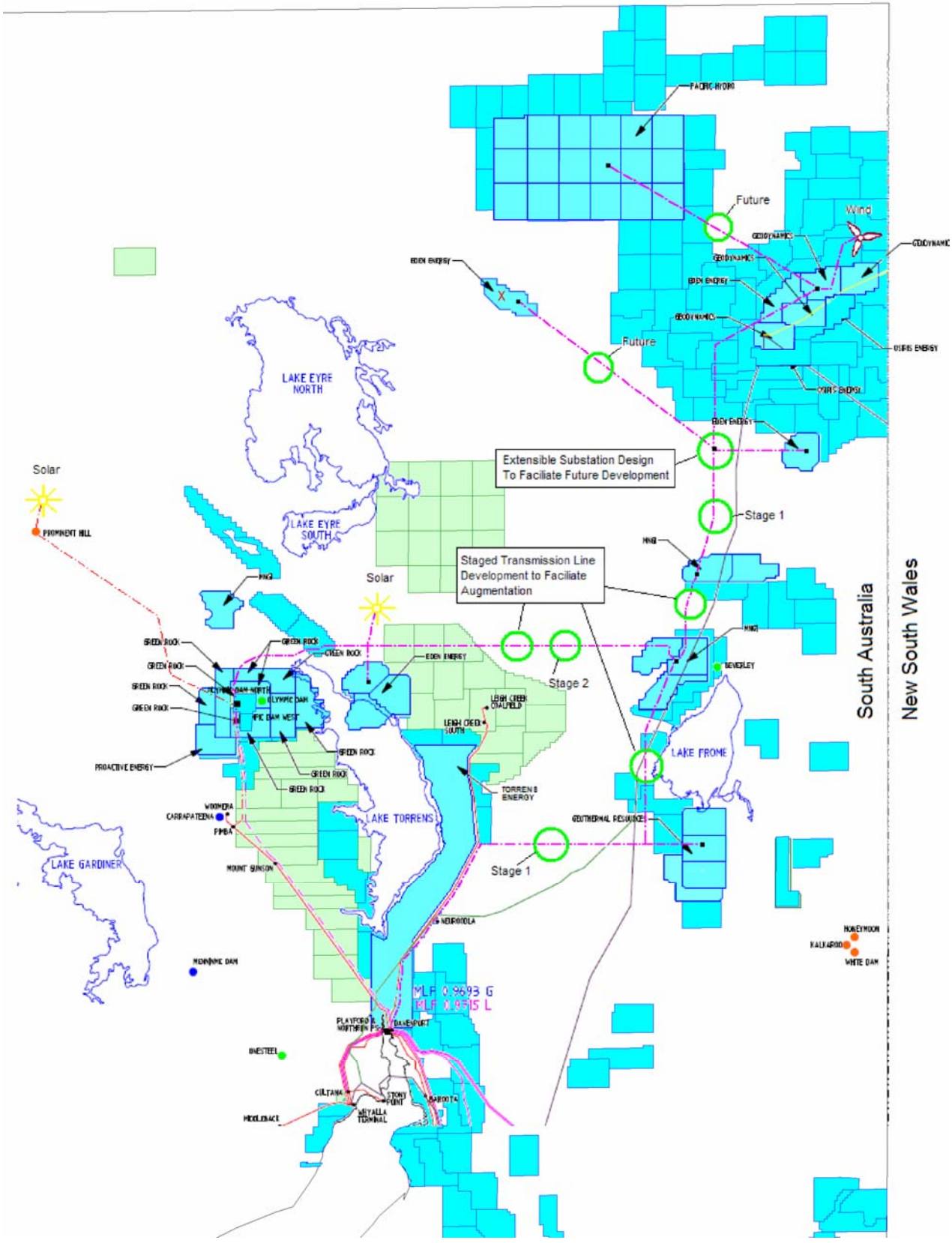


Diagram 1 – Network Concept
Potential Staged Network Development Scenario in the Far North of South Australia – refer Appendix for schematic for Petratherm/Industry Solutions
(Note 1: The above is not meant to represent an exhaustive list of tenement areas – reference should be made to the PIRSA website (refer Appendix).

(Note 2: Dotted purple lines on diagram represent potential 275 kV transmission lines and solid purple lines represent existing 275 kV transmission lines)

Solution 2 – Development of a New Northern SA Region in the NEM

The concept here would be similar to Solution 1 except that a new "Region" of the NEM would also be created to cover the northern part of SA – as a special case where large-scale renewable energy (geothermal, solar and wind) are encouraged to be located. It is appropriate that consideration be given to other measures that will produce more efficient outcomes where potential exists to connect a number of generator proponents.

The benefit here would be that the special region could have specific rules under the NEM arrangements that apply to it but do not apply to other NEM regions such that transmission development is funded by "spreading" or allocating costs across other NEM regions. The rules would also need to address the issue of interstate transmission use of system charges such that customers in SA are not overly burdened with the cost of interstate charges.

It is proposed that these transmission extensions be treated as traditional regulated assets, so that the risk of future generation development is shared across all customers in the same way as traditional network augmentations. This treatment would allow Network Service Providers to plan and construct assets efficiently and would provide for future connection options where generation capacity can reasonably be expected to occur.

The above outcomes could be achieved by developing a clear and practical economic test involving changes to the existing Regulatory Test (cost/benefit) that is currently used by Network Service Providers to assess the viability of regulated augmentations.

These outcomes could also be facilitated by appropriate inclusions in the existing "Contingent Projects" regime that provides for large and uncertain capital investments in electricity infrastructure. The inclusion of appropriate capital provisions for "Contingent Projects" is important and would facilitate the development of emerging projects that were not identified prior to the start of a Network Service Providers revenue assessment period.

In the case of interconnection augmentations, significant works may be required in one jurisdiction, but the benefits may accrue in a different jurisdiction. For the jurisdiction required to undertake the augmentations, customers will potentially incur increased TUOS charges but not be the direct beneficiaries of these capital works.

It is likely that CPRS policy will stimulate the need for interconnection augmentations. In order to produce an environment for efficient augmentation outcomes, existing regulatory arrangements will need to be changed to facilitate equitable cost recovery mechanisms between regions. This could be accomplished by the allocation of TUOS charges based on inter-regional transmission flows.

There is strong interest across all Australian governments in the potential of the Australian geothermal energy industry to assist in meeting future emissions reduction targets in recognition that geothermal energy is emission free, base-load and makes an important contribution to long term energy security goals.

In summary, appropriate consideration should be given to supporting the development of renewable energy sources that are able to provide for low cost, large scale base load generation capacity by modifying the existing Regulatory Test and making inclusions in the existing "Contingent Projects" regime.

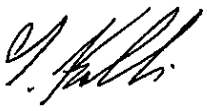
Supporting approach and argument – Recognition of the Value of Base-Load Competitive Power in the NEM and to the broader Economy

The concept here is not a specific solution per se, but rather a critical element of what needs to be included in Solutions 1 and 2.

The promise held by geothermal energy generation is base-load, emission free, competitive and lowest cost renewable form of energy in the Australian market excluding connection. In order to ensure this promised is not blocked out by early decisions during the CPRS and RET (in the period from now to 2020) then the industry needs to be able to demonstrate that the lowest cost to the economy will come from large-scale geothermal entering the market, after including the cost of transmission. Hence, there will be a need to undertake some comparative generation costing, together with appropriate economic modeling. It should also be noted that to do in a credible fashion will require independent analyses together with agreement from the industry about where, when and what cost such generation will eventuate.

Further work is required in the area of congestion and market operation to allow large scale geothermal to enter the market. The SA and soon the Victorian power system will suffer major constraints and will need to be addressed.

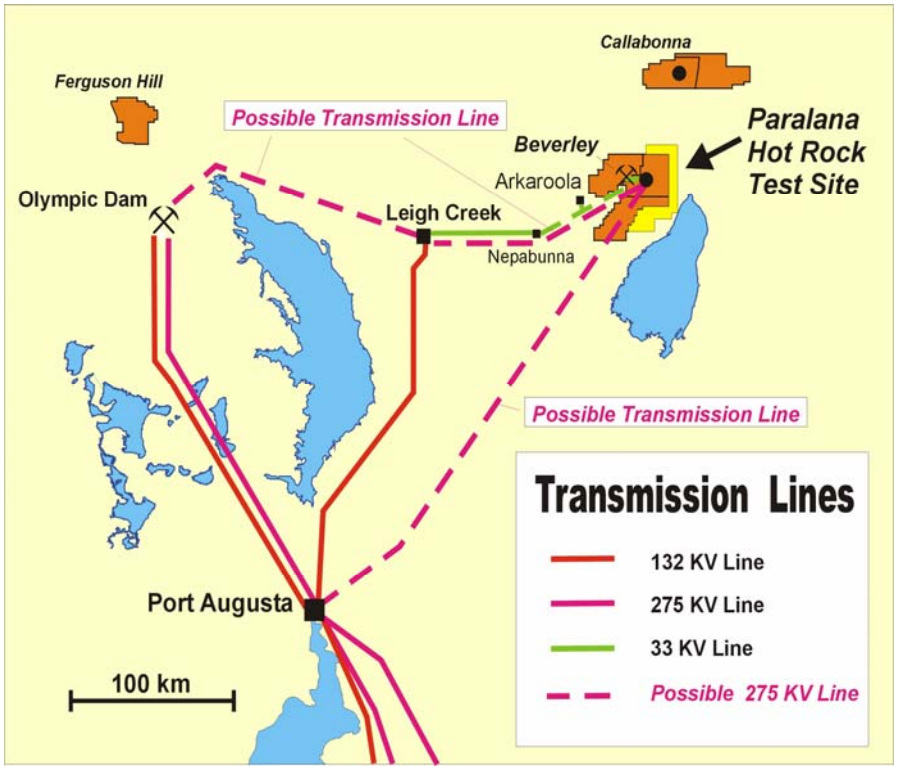
Solutions relating this issue are under development.



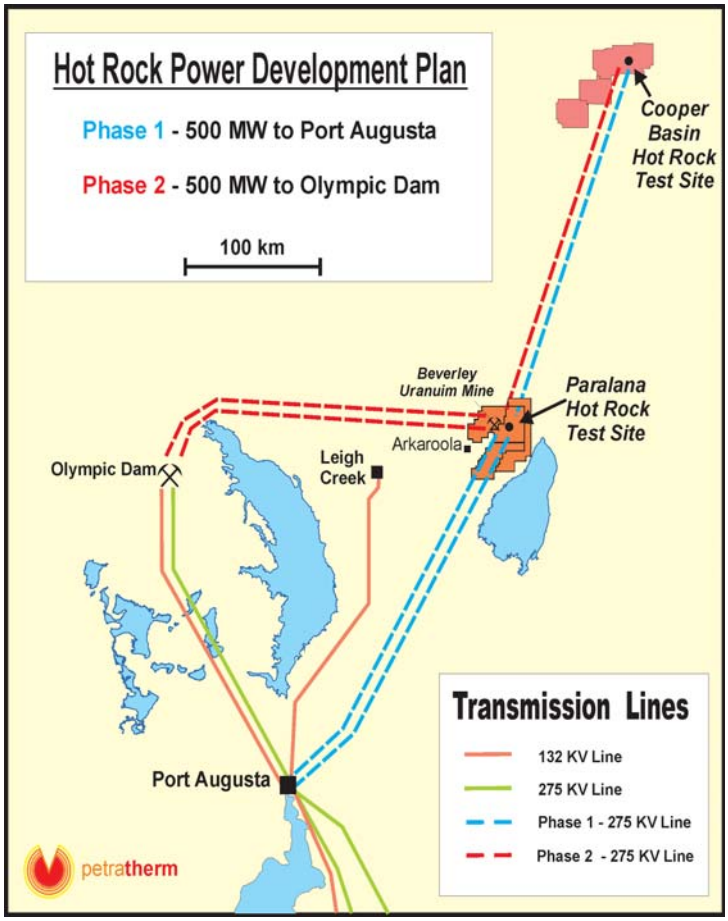
Terry Kallis

MD Petratherm Limited
Chairman AGEA NEM Policy Committee
Chairman-elect AGEA

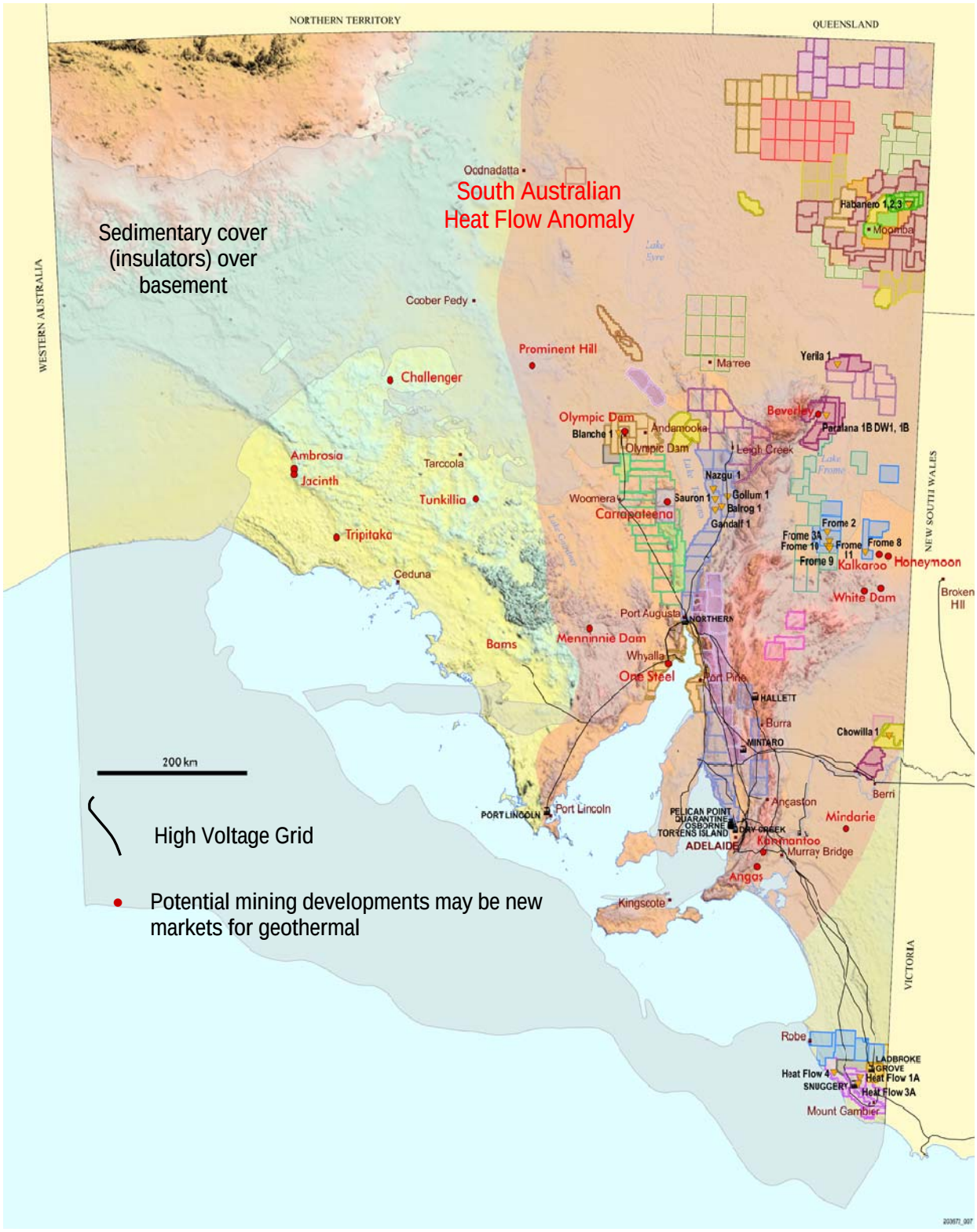
APPENDIX - Network Concepts & Geothermal Exploration Licenses



Planned Petratherm Network Solution



Potential Industry Network Solution



Hot Rock Projects in SA – 31 Dec 2008 – refer PIRSA website for latest information on actual geothermal energy exploration licenses and applications www.pirsa.sa.gov.au