Australian geothermal Industry working with Investors - Defining the key parameters contributing to the long run marginal cost of geothermal and providing a comparison benchmark on the key unknowns

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Abstract
The development of the Australian geothermal industry is unique as, especially in the early exploratory phases, the industry is driven by capital investment raised via equity markets. This equity is supported in some instances by grants provided by the Commonwealth Government through its Geothermal Drilling Program (GDP) and, in the case of the commercial demonstration of the technology, via the Renewable Energy Development program (REDP).

The costs involved in the deep exploration phase are significant, as are those involved in the commercial demonstration of the technology. It is understood by the industry that until it has been able to prove the commercial reality of its projects, all funding is required to come from equity markets or government grants.

Australian geothermal companies are therefore, in essence, competing for a limited pool of risk capital from the equity markets and grant monies from the Commonwealth government. This money will be provided to those projects and companies which are expected to deliver a commercial project and this provide the best returns.

A number of reviews by Equity brokerage firms have been provided recently (Morgan Stanley, RBS Morgans and Goldman Sachs JB Were) reviewing the prospects of the industry and commenting on each of the companies within the sector. It is not the purpose of this paper to review individual companies' prospects, however these papers have provided a summary of the key parameters for company attractiveness:

- Experience of the board and management;
- Presence of project partners, and the experience and size of such;
- Development options of the company (effectively the breadth of the project portfolio to diversify risk);
- Funding capability through access to government grants and large partners at either the project or equity level;
- Project quality assessed in respect of location, quality and risk

The ability to attract the capital (human as well as financial) to develop a project is ultimately a function of the project quality. The project quality in turn is a function of a number of competing factors which will be discussed in more detail below, but is ultimately determined by the expected cost of production of geothermal energy arising from the project.

Australian geothermal companies therefore are competing for limited capital allocations on the basis of their project's forecast cost of production. This cost of production is typically evidenced by a calculated Levelized Cost of Electricity (LCoE) or Long Run Marginal Cost (LRMC).

Recognizing the importance of this figure in the allocation of capital within the industry, the Australian Geothermal Energy Association (AGEA) formed an Economics Committee to develop a framework for the reporting of Economic parameters to the public to ensure consistency across releases.

This paper represents that framework which defines the key parameters in the economic assessment of the project, and thus which assumptions need to be released to support any economic releases. Further, it also provides data sets where available of what has been achievable in respect of these assumptions elsewhere in the world to give interested parties an independent benchmark of what has been previously achieved and prompting explanations from companies as to where their assumptions sit on this frequency distribution curve and why.

The paper highlights the close cooperation that exists between the investment community and the geothermal industry and is an example of how the informational needs of investors can be met by a cooperative industry approach. It is an excellent guide to how companies can work with investors in other emerging technology markets.

$$u = u^{\theta} + u^{*} = \left[4\alpha\Theta(x,t)\right] + \left[\frac{\bar{u}_l^{*}}{l}x + \bar{u}_0^{*}\right]$$