GEODYNAMICS
LIMITED

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The Secretary
Select Committee on Fuel and Energy
PO Box 6100
Parliament House
CANBERRA ACT 2600
By email: fuelenergy.sen@aph.gov.au

22 July 2009

Dear Secretary

Re: Submission to the Senate Select Committee on Fuel and Energy

Geodynamics welcomes the opportunity to provide input regarding the Senate Select Committee on Fuel and Energy's Inquiry into Fuel and Energy.

Geodynamics is the largest ASX-listed company in Australia whose sole focus is on developing hot fractured rock geothermal energy. The company has been developing its geothermal resource position in the Cooper Basin in South Australia for the past 7 years. The company is focusing on a technique known as Enhanced Geothermal Systems ('EGS') to tap into and extract the heat contained within granites buried 4 to 5 km below the surface of the earth.

Geodynamics believes there is in the order of 10,000 MW of long term, emission free, base load generation capacity that can be economically extracted from the company's tenements in the Cooper Basin. Further explanation of the technology and its potential can be provided if required.

The attached submission focuses on paragraph (g) of the Committee's Terms of Reference and relates to the role that geothermal can play in assisting to secure Australia's energy security. Given geothermal can supply electricity at zero emissions and zero fuel cost it is able to effectively hedge against a range of Australia's biggest long term threats to energy security including fuel price volatility and expected volatility of emission prices.

Geodynamics has also made some remarks regarding paragraph (e) in relation to the importance of consistency across the Australian jurisdictions regarding royalty policy for geothermal energy as well as ensuring that royalties are not imposed in such a way that they impose too great a burden on the industry during its development and growth phases.

Regards

GF Grove-White

Gerry Grove White
Managing Director

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Submission to the Senate Select Committee on Fuel and Energy

Geodynamics (GDY) supports the Australian Government developing a wide range of policy measures aimed at ensuring the development and deployment of a wide range of renewable energy technologies, to ensure that the country meets its ambitious long term emission reduction targets. Access to a broad portfolio of renewable and non-renewable energy types will enable the Australian community to minimise a range of energy security risks including availability and supply, price, cost of emission abatement and technology risks. Given geothermal can supply electricity at zero emissions and zero fuel cost it is able to effectively hedge against a range of Australia's biggest long term threats to energy security including fuel price volatility and expected volatility of emission prices.

GDY therefore supports the Australian Government's policy behind instituting a renewable energy target, aimed as it is at ensuring a significantly increased supply of renewable energy as part of Australia's energy mix as well as measures to establish an emissions trading scheme which will further encourage the development of zero-emission generation.

The long timeframes involved in technology development and deployment mean that some technologies will be more advanced and consequently more price competitive at a given point in time. However technology development in any sector is highly dynamic such that single discoveries can massively alter the economics of a technology type. To this end GDY believes that the Government should be deploying a variety of policy measures aimed at allowing all available technologies to develop to a point where meaningful comparisons on long term competitiveness can be assessed.

Through the Carbon Pollution Reduction Scheme (CPRS) and the Renewable Energy Target (RET) the Australian Government is seeking to both lower emissions and to enhance renewable energy generation capacity. In GDY's view these complementary actions are best achieved by encouraging a wide range of electricity supply options without specifically picking or locking out any technologies. By ensuring a wide array of technologies in the Australian electricity market the risk of picking the wrong technology is reduced.

The following diagram illustrates this point. While each of the energy types may have a place in Australia's energy supply mix, there are a wide array of risks associated with each, including technology, price and economic risks. A diverse and broad array of energy generation methods, both from renewable and non-renewable sources, will reduce the cumulative impacts of these energy security risks to the Australian community.

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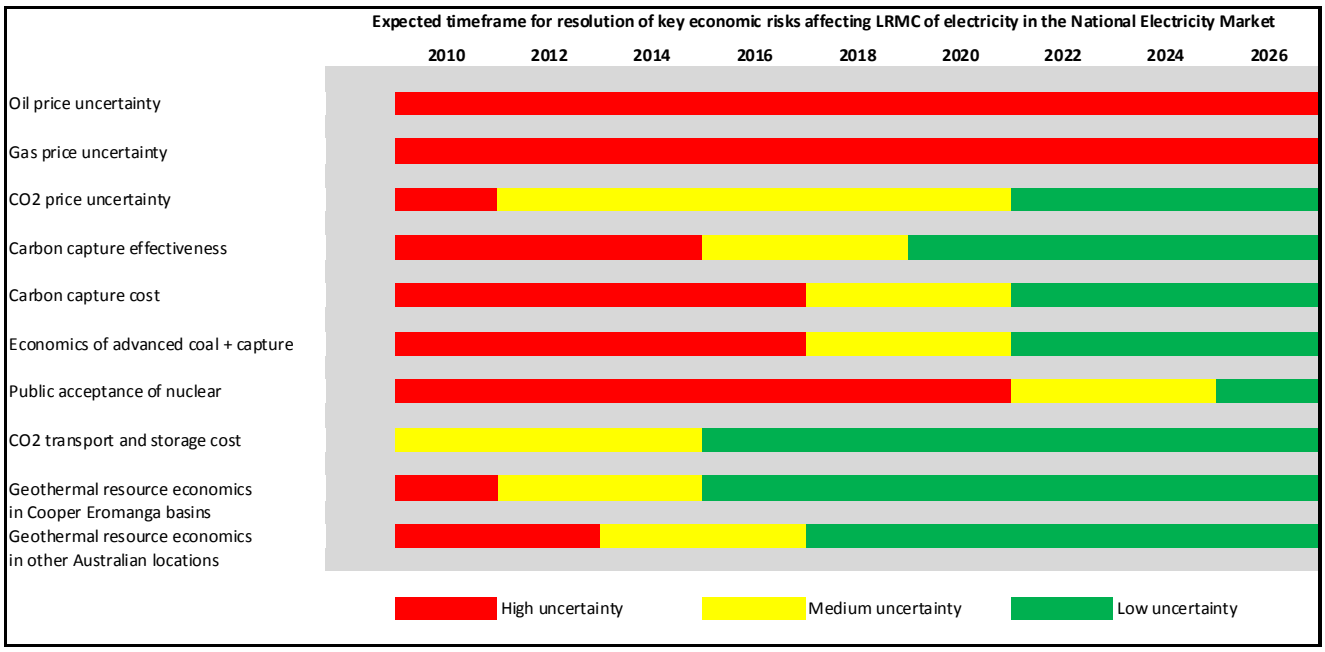

Figure 1: Expected timeframe for resolution of key economic risks affecting LRMC of electricity into National Electricity Market[1]

Energy security is inexorably linked to issues around climate change, carbon emission reduction, energy efficiency and enhancing Australia's capacity to generate energy from renewable resources. Investment is needed in each of these areas in order to ensure that Australia is able to maintain its growing energy requirements, despite a carbon constrained world.

According to the Australian Government's report, Australia's Low Pollution Future: The Economics of Climate Change, through to 2050, electricity generation will continue to contribute to 34% of Australia's carbon emissions.[2] A range of responses, including a significant increase in the generation of renewable energy is therefore essential if Australia is to achieve its long-term 2050 target of reducing carbon emissions 60 per cent below 2000 levels.[3] These responses will need to ensure the development and deployment of an appropriate range of technologies to enable achievement of ambitious emission reduction goals.

A balance is necessary to ensure for example that while Carbon Capture and Storage may have an important role to play in cutting carbon emissions, it cannot be relied upon solely or disproportionately. Further wind power technology is currently available as the lowest cost form of renewable energy, and so it should play an important role in enhancing Australia's renewable energy capacity. However this cost advantage is expected to be eroded over time as emerging renewable technologies move through the development and deployment stages. In addition, wind is subject to uncertain supply and is unlikely to be in a position to meet Australia's peak demand profile or base-load requirements and care should be taken to

[1] Webb, A. Geodynamics Limited

[2] http://www.treasury.gov.au/lowpollutionfuture/report/html/03_Chapter3.asp

[3] Australian Government's National Emissions Trajectory, http://www.climatechange.gov.au/whitepaper/factsheets/pubs/006-australias-national-emissions-targets.pdf

ensure that it is not excessively deployed to the detriment of the market. Indeed it is important that market based incentives such as the RET and the CPRS do not create incentives which will encourage excessive deployment of a technology which is not able to meet base-load and peak demand requirements.

The nature of renewable energy industries is such that significant investment is relatively recent, leading to a dynamic and fast changing environment. It is therefore important that policy mechanisms are dynamic and flexible enough to incorporate new and emerging technologies as they become available, develop or become economic.

At the present time it is not possible for emerging renewable energy technologies to compete with wind power on a level playing field. This is principally due to a combination of factors including technology availability, predictable risk profile and current cost levels reflecting the relative maturities of the technologies. These combine to give a significant advantage to wind power in terms of access to capital and relative straightforwardness of deployment.

However the significant advantages of wind over emerging renewable energy technology types in the short term creates a significant risk of a lack of balance in Australia's renewable energy portfolio over the medium to long term. A lack of balance in the electricity generation technologies taking advantage of the RET may result in:

- A reliance on wind power generation to achieve the RET, while geothermal, solar and ocean power will have a limited profile
- Increased cost burden on the entire electricity market framework from the need to have fossil fuelled generation back-up to cope with intermittency issues and the requirement to undertake deep augmentation of the transmission system to cope with the increased capacity that is only utilised for a proportion of the time.
- An over-reliance on wind hampering the Australian Government's efforts to ensure generation of Australian base-load energy to supplement and in some cases replace fossil fuels sources. This could mean the ongoing need to "fire-up" fossil fuel based generation to support peak demand times. eg during Summer on the Easter seaboard.
- Over the long term an uneven playing field will develop, with wind having taken the vast bulk of the benefit of the RET, with other technologies effectively locked out. In order to catch-up, emerging technologies will either need to operate commercially without relying on the support of the RET or seek assistance through non-market mechanisms, such as government grants.
- Australia will miss its real and present opportunity to be a leader in emerging renewable technologies such as geothermal from hot rocks, large scale solar and ocean power.
- In the case of geothermal, this new sector could have limited access to funding from those willing to invest in renewable energy. This will also be an issue over the early years of the RET, which is likely to see significant deployment of wind power assets, with limited participation from emerging technologies such as geothermal, large scale solar and ocean energy.

While wind has a range of advantages, it is not necessarily the lowest cost option for renewable energy generation. A comparison of long run marginal costs of various

generation technologies undertaken by McLennan Magasanik Associates (MMA), on behalf of the Australian Geothermal Energy Association provides a cost comparison for various renewable and non-renewable energy types, under the Treasury CPRS -5 scenario.[4] The analysis shows a fairly wide range in the costs of renewable energy, with some reductions in costs between 2020 and 2030. For example Wind is projected to cost $102/MWh in 2020 and $96/MWh in 2030; with solar thermal $250/MWh in 2020 and $229/MWh in 2030, while geothermal from hot dry rocks (EGS) is $99/MWh in 2020 and $95/MWh in 2030.

These figures illustrate that while wind has an advantage over geothermal in relation to technology risks and relative ease of deployment, over the long run geothermal energy will cost on par with wind. Importantly however, geothermal will be able to supply base-load energy and peak supply sufficient to meet peaks in demand, while wind is an intermittent resource requiring significant standby capacity to ensure reliability and underutilised network assets.

Further, there are likely to be significant advances amongst the emerging technologies which will result in cost reductions beyond what can currently be reliably predicted. It is therefore of utmost importance to achieving Australia's emission reduction targets that a range of renewable energy options are supported through development and commercial demonstration stage. It is only with significant support and investment that emerging technologies will come down the cost curve and prove competitiveness.

The importance of a broad spectrum of policy responses to ensure energy security

The Australian Government has a range of measures in place which will significantly contribute to enhancing development of renewable energy, together with stimulating a greater renewable energy generation capacity.

The Government's Geothermal Drilling Program (GDP) will yield best results if it is extended to prospects in a range of locations. This will develop our understanding of available geothermal resources and provide insights as to how to best exploit them, possibly at a combination of locations and at a combination of drilling depths.

The Renewable Energy Demonstration Program (REDP) will yield most useful results if it is able to enable demonstration of a range of projects across a range of renewable energy types. With the selection of projects with significant merit this approach is the best method to provide us with a range of viable renewable energy alternatives.

As stated above, maximising the range of technology types will minimise the risk of the "wrong" technology being deployed.

Due to the developing and fast changing cost structures of different technologies, policy responses need to be sufficiently dynamic and flexible to enable the inclusion of new technology types as these technologies develop. For example, given the size and impact

[4] http://www.agea.org.au/media/docs/mma_comparative_costs_report_2.pdf

the Government's RET will have on stimulating the development of new renewable energy projects, it is important that projects nonetheless represent a broad range of renewable energy types, including emerging technologies. The alternative would be to see a vast skewing of Australia's renewable energy response to wind power which is intermittent and unlikely to be able to match Australia's energy demand profile.

Finally measures which would indirectly facilitate the deployment of emerging renewable technologies should be introduced as soon as possible. This includes the need to modify the existing National Electricity Rules in relation to the connection of large scale remote renewable generation facilities to the National Electricity Market (NEM). This is an important step in enabling remote geothermal and solar projects to transmit electricity into the NEM.

In order to optimise the outcomes of the REDP it will be necessary to continue and extend the program for follower projects as this approach will maximise both the research and development and commercialisation benefits of this funding.

Benefits of accelerating development of emerging technologies

Policy measures aimed at encouraging the development and deployment of emerging renewable energy resources will encourage the creation of infrastructure and development of emerging renewable energy industries and generate employment, but will also encourage development of new technology locally by the private sector. With many advanced countries moving to cut carbon emissions and limit their reliance of fossil fuels, the economic pay-off of a strong local renewable energy sector which generates valuable Australian intellectual property is likely to be a key competitive advantage in the global economy.

Given the importance of renewable energy to the future of the world economy, it is of utmost importance that Australia develops local skills and a local industry to ensure renewable energy exports are part of Australia's export profile. Renewable energy industries may be as important to the future of Australian exporting as wheat or wool were in times past.

Direct employment from emerging technologies is likely to be significant. The Power to Change: Australia's Geothermal Future,[5] report, sponsored by the World Wildlife Fund and the Australian Geothermal Energy Association, has found that based on the installation of 2,200 MW of geothermal power, employment in the industry is projected to reach 3,800 full-time equivalent jobs in 2020, rising to 9,500 by 2030 and almost doubling again to 17,300 by 2050 (not including the complete supply chain). A similar report sponsored by the WWF and Carnegie Corporation found that an Australian wave energy industry will create 3,210 jobs by 2020, including jobs in local manufacturing and maintenance. By 2050 this figure is expected to grow to 14,380 jobs.[6]

A broadly based renewable energy sector will also maximise the opportunities for innovation. As a source of base-load, emission-free energy, geothermal has the capacity to change

[5] http://wwf.org.au/ourwork/climatechange/powertochange/

[6] http://wwf.org.au/ourwork/climatechange/powertochange/

energy dynamics. For example, GDY is currently investigating incorporation of a data centre near its Cooper Basin plant, as part of the off-take of its first 25MW plant. This is a visionary development in the changing economics of climate change, and will match the needs of modern cloud computing (with its marked, annually increasing appetite for energy) with the capacity of GDY to provide reliable emission free energy in a secure environment. Given the need for cloud computing to demonstrate reductions in its carbon emissions, despite massive growth, this innovation has the capacity to bring a new and growing industry to Australia, promising many new zero emission, hi-tech jobs.

Regulatory Regimes

Electricity generation utilising geothermal energy sources uniquely spans the regulatory responsibilities of both mines and energy portfolios. While in most jurisdictions these policy responsibilities are located in a single agency, it is nonetheless the case that policy processes and responses are generally bifurcated between the two policy streams.

Given that geothermal is answerable to mines portfolios (eg granting of tenements, drilling permits) and the energy portfolio (access to transmission infrastructure, regulation as a power generator, regulation of the NEM) it is vitally important that the processes of these agencies are aligned in order to streamline various regulatory processes, avoid unnecessary duplication and to minimise the regulatory burden imposed on the geothermal sector.

There is a risk that, given it spans two highly regulated portfolios, geothermal exploration and production will be subject to double the level of regulatory burden experienced by a company in either the mines or energy sectors. While Geodynamics does not have a fixed view on this matter, it may be justifiable and necessary to establish an entirely distinct regulatory process, located in either the mines or energy portfolio, to avoid over-regulation.

Consistency across the Jurisdictions - Commonwealth, States and Territories

Government regulatory action in relation to the development of the geothermal industry is tending to keep pace with and in some cases is in advance of the development of the sector. This is especially the case in South Australia, Queensland, New South Wales and Victoria. Given this, it is a relatively straightforward proposition for relevant jurisdictions to agree to and to maintain uniformity in advance of significant regulatory and legislative activity. Geodynamics encourages the Commonwealth, States and Territories to consult together and with industry to ensure the development of uniform legislation and regulation with regard to geothermal energy.

There has been some consideration of the royalty regime to be implemented in relation to the Geothermal sector. Royalties in relation to geothermal should be based on the proposition that the sector is likely to experience a highly capital intensive development phase. During this phase any royalty regime ought to be based allowing the geothermal sector an opportunity to recoup on funds already invested and to reinvest in order to optimise production.

As such there are strong arguments for an extended period of royalty exemption or “holiday” while the industry undergoes its upscaling of commercial operation and moves to profitable operation over an extended period.

While this would enable those at the forefront of geothermal exploration and development to move to a profitable position sooner, it would also ensure the experience and learnings of first movers could be utilised sooner by industry followers.

Royalty policy should provide for high levels of allowance claims in recognition of very high and risky exploration and development expenses. The requirement to pay royalties raises the issues of competitive neutrality in relation to geothermal vis a vis other renewable technologies. In the case of geothermal it is likely that royalty regimes will be implemented in all jurisdictions where this technology operates. However other renewable power sources, such as solar are unlikely to be charged royalties. This raises a question of equity, which may to some extent be accommodated by royalty holidays and the ability to be able to claim exploration and development costs against royalty obligations.

Policy in relation to the setting of royalties should have an overriding guiding tenet of encouraging the geothermal sector by not creating a royalty burden until the industry is in a long term stable position. Royalty policy should also be cognisant of the importance of enabling the geothermal sector to reinvest and rapidly expand in view of the significant contribution the sector can make by assisting the economy to mitigate the costs of reducing carbon emissions.

It is also important that royalty policy should be as uniform as possible across the jurisdictions in order to maximise competitive neutrality and to limit the cost on industry that would result from multiple royalty regimes. Geodynamics is of the view that uniformity of royalty policy across the jurisdictions is both optimal and highly possible. While it is recognised that royalty policy is within the jurisdictional competence of the States and Territories, the Australian Government can take a positive and effective role in encouraging and brokering uniformity through the Council of Australian Governments and possibly the Ministerial Council for Commonwealth-State Financial Relations, the Ministerial Council on Energy and the Ministerial Council on Mineral and Petroleum Resources.

Geodynamics has reviewed and is comfortable with the approach of the South Australian Government in relation to its geothermal royalty regime.

Role of the Australian Government

Geodynamics sees the role of the Australian Government as critical to the development of the geothermal industry. This is both in terms of achieving national economic development goals and also in achieving the Government’s stated emission reduction targets and renewable energy targets. There is therefore an important role for the Australian Government in establishing uniformity and a range of issues, including royalties, obtaining regulatory uniformity, environmental regulation and native title. Without the involvement of the Australian Government it is likely that regulatory costs in these areas will be significantly and unnecessarily increased.

Geodynamics has been encouraged by the progress made through the Council of Australian Governments 'technology roadmap' for geothermal energy and the Australian Geothermal Industry Development Framework. Together these initiatives provide a framework for accelerating the development of geothermal energy resources and technology in Australia.