

## Desertec-Australia/GENI Submission -- GREEN Paper

Desertec-Australia and the Global Energy Network Institute encourage the government to resist pleas by fossil fuel industries for exemptions to the strictures of carbon pricing and carbon trading. Instead of making Australia's economy stronger, exemptions will make Australia's economy weaker. Exemptions merely delay important reforms and investments industry must make to adapt to a competitive new global economy based on low emission energy sources.

In its "Roadmap to a Solar/Geothermal Australian Economy By 2050," Desertec-Australia lays out a plan by which Australia can develop its greatest comparative advantages in solar and geothermal and exploit those to satisfy its own internal energy needs and those of Asia. The vision represents an amalgam of Desertec-Australia's and GENI's views.

Unfortunately, the liquid natural gas (LNG) industry offers an example of potential perversities that could be introduced by allowing exemptions to carbon pricing for particular industries. Applying carbon pricing broadly allows market signals to work. Giving exemptions encourages sclerosis. In our comments below, Desertec-Australia and GENI will be defending 'the market' against the febrile caterwauling of rent seekers.

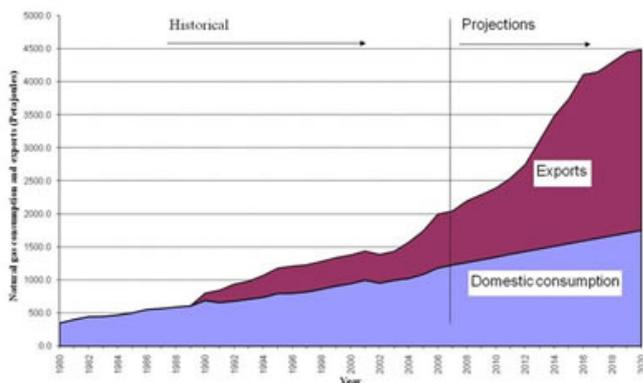
Liquid natural gas is a form of compressed natural gas made suitable for economical transport by ship. Compressing and freezing the natural gas takes a lot of energy. This results in greenhouse gas emissions. The LNG and natural gas industry needs to reduce this.

One way to do so is to make greater use of pipelines. To date, pipelines have been considered more expensive than LNG for long distance deliveries. But carbon pricing -- universally applied -- changes this at the margin. When added to the benefits of bundling long-distance infrastructure such as gas pipelines, power lines and fiber optic cables, the economics of energy distribution could be changed, creating a positive 'tipping point' for which carbon pricing would get the credit.

Desertec-Australia believes Australia should develop its solar and geothermal energy resources in the Outback and deliver that energy to Eastern domestic markets over High-Voltage Direct Current (HVDC) power lines. TREC also believes the solar/geothermal resource in the Outback is so huge it would make sense to build HVDC power lines to Asia.

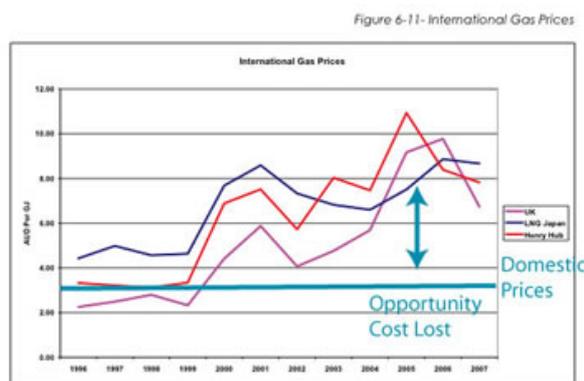
Desertec-Australia believes that Australia has such huge renewable, low emission resources to offer the Asia-Pacific region that the carbon credits/carbon revenues/carbon impost savings from generating and selling such energy on international markets will, over time, be sufficient to provide an adequate return on investment in needed international delivery infrastructure.

Desertec-Australia believes this is even more the case if infrastructure costs can be shared with other industries, most notably telecommunications and, more importantly, the natural gas industry.



Exports of natural gas from Australia are expected to rise in coming years

Source: "Australia's Natural Gas: Issues and Trends," Research Paper no. 25 2007-08, Mike Roarty; Australian Federal Parliament Library



Source: EnergyQuest

International markets are a rational place to put Australia's natural gas supplies since prices are higher there

Source: EnergyQuest

This is particularly so given the large amount of coal seam methane gas in Queensland. Ultimately, Australia should export this gas and use the proceeds to decarbonise the Australian economy. One way to get this huge amount of coal seam gas to market would be to pipe it across to Port Hedland or Karratha to be put into a pipeline to Asian markets. If it does this, Australia will increase its foreign trade receipts and, if invested wisely in a reformed domestic economy characterised by carbon pricing, it can build 'first mover' and 'fast follower' skills in renewable energy that it can sell overseas later.

**Figure 4**  
Coal seam methane production

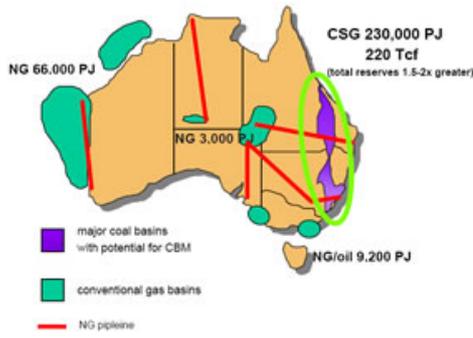
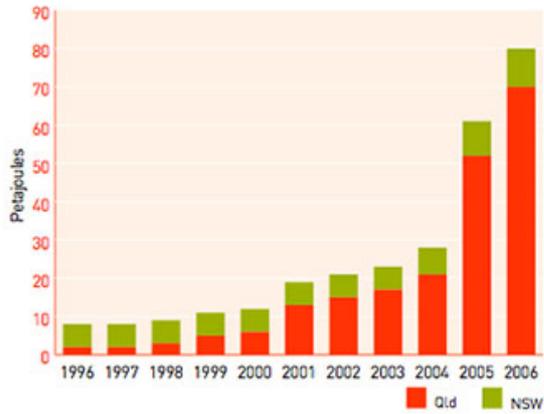


Figure 1 Australian reserves of natural gas and CSG



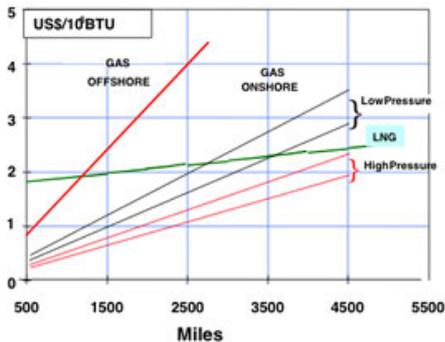
Source: EnergyQuest

*In addition to large Northwest shelf gas supplies, Australia has huge northeastern supplies of coal seam methane*

*Coal seam methane production is exploding. Some of that should find its way into international markets.*

Given Australia's geographical isolation, all of its natural gas sold offshore is transported to international markets as LNG. The reason is that natural gas pipelines laid through ocean areas are considered uneconomic compared to LNG for distances above 800 miles (1,333 kilometers). That's because, among other things, the cost of labor in laying oceanic natural gas pipelines is roughly 50% higher than terrestrial ones.

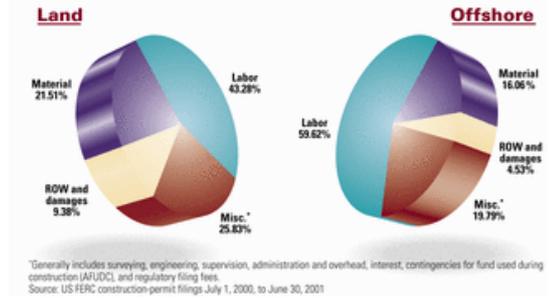
**Figure 6 - Pipes/LNG competition for 30 10<sup>9</sup> m<sup>3</sup>/year capacity**



*Traditionally, offshore natural gas pipelines become more expensive than LNG transport for distances greater than 1,300 kilometers*

Source: International Energy Agency

**PIPELINE-CONSTRUCTION COSTS — ESTIMATED**



\*Generally includes surveying, engineering, supervision, administration and overhead, interest, contingencies for fund used during construction (AFUDC), and regulatory filing fees. Source: US FERC construction permit filings July 1, 2000, to June 30, 2001

*This is largely due to the higher costs, especially labor, of laying seafloor natural gas pipelines.*

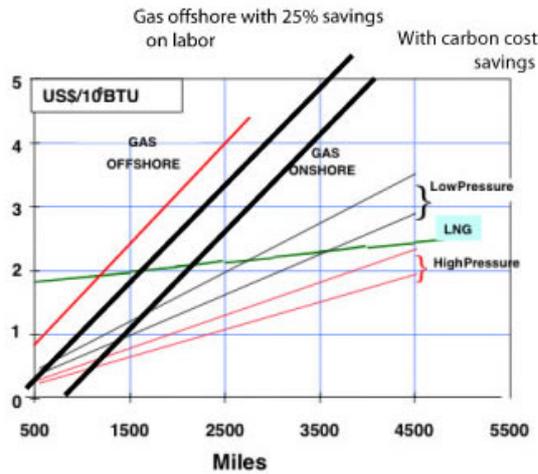
Source: Oil & Gas Journal

But turning natural gas into LNG is an energy intensive process, adding as much as 30% to the carbon emissions of the underlying natural gas, making the gas a much less clean fuel. If full carbon pricing were applied to the emissions involved in natural gas/LNG conversion and back again, it could revamp the economics of pipelines versus LNG transport to Asian markets.

Back of the envelope arithmetic indicates that if labor costs of laying offshore natural gas pipelines is 50% of the total costs, sharing those labor costs with another bit of infrastructure should reduce the cost of laying subsea natural gas pipelines by 25% (ie half of 50%). Should carbon pricing raise the cost of LNG conversions, that would mean the gap between economical transmission of natural gas to end markets through pipeline or through conversion to LNG should become tighter.

That, in turn, eventually begs a revisit of the cost curve of subsea pipelines versus LNG. As the revised chart indicates, it could push the 'crossover' point between pipelines and LNG to somewhere between 3,000-4,000 kilometers, enough to connect Port Hedland to the Natuna Field pipeline off Malaysia, itself the centrepiece of the proposed Trans-ASEAN Gas Pipeline. This, in turn, opens up intriguing possibilities *if* the price mechanism is allowed to do its work properly.

**Figure 6 - Pipes/LNG competition for 30 10<sup>9</sup> m<sup>3</sup>/year capacity**



*With saved carbon imposts and shared expenses taken into account, the economics of long distance natural gas pipelines change*

Source: International Energy Agency , Oil and Gas Journal, APEC

Pipelines involve three basic stages and LNG five, as illustrated below:



Figure 2: Stages in Gas Pipeline Projects



Figure 3: Stages in LNG Projects

*LNG is a much more complicated method of shipping natural gas than by pipeline*

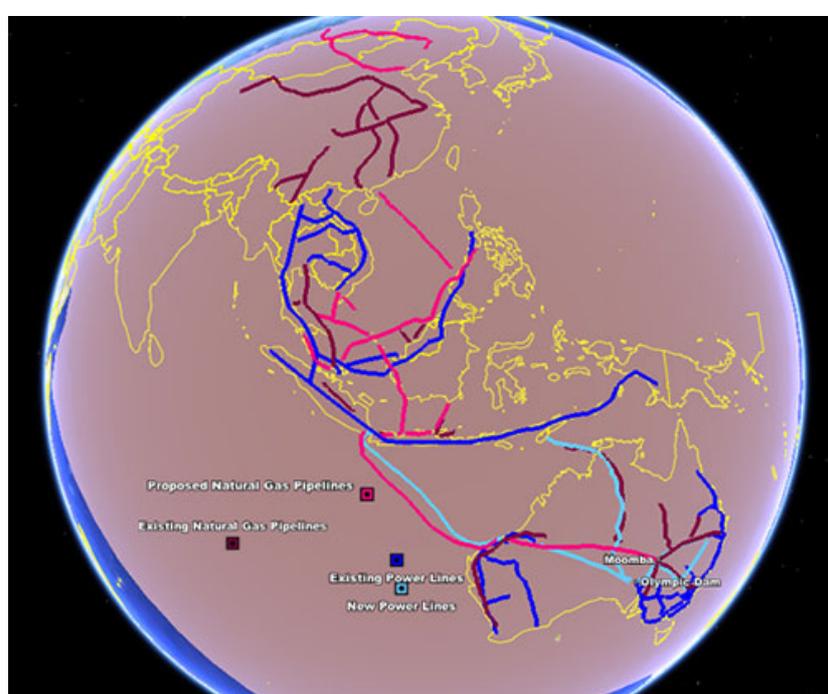
Source: "Cross-Border Natural Gas Trade in APEC Economies," APEC, 2006

The underlying point here is that there is huge scope to use proper price mechanisms to make desirable changes that can reduce Australia's, and Asia's, greenhouse footprint. Huge amounts of new and replacement energy extraction and delivery infrastructure must be built in coming decades. The International Energy Agency estimates the size of the task at \$30 trillion. Having proper price signals encourages a proper assessment of alternatives.

At present, unfortunately, Asia's energy infrastructure remains fragmented. But these fragments offer intriguing visions of what a fully interconnected hemisphere in the realm of energy could bring.

In the graphic below, Australia's Eastern and Western electricity grids are presented in dark blue, with [TREC-DESERTEC/GENI-proposed](#) new power lines (both domestic and international) lines presented in lighter blue. Background on these can be gleaned from the [Desertec-Australia Roadmap To a Solar/Geothermal Australia](#). Existing natural gas transmission pipelines in Australia, Asia and China are presented in dark red, with a reddish pink used to indicate proposed new pipeline routes in Asia proposed under the Trans-ASEAN Gas Pipeline (TGAP) plan, with the same color used to indicate a potential Olympic Dam/Moomba-Port Hedland/Karratha/Indonesia link that could also include high-voltage direct current power lines carrying concentrating solar power and geothermal energy from Australia's interior to the energy markets of Asia.

The result is a pan-Asian electricity and natural gas infrastructure [anchored by Australian solar and geothermal baseload power](#) with a pan-Asian natural gas system used for load balancing and hydropower from the area around Kunming in southwestern Chinese used for regional peaking power.



*Carbon pricing could provide some of the initial impetus for Australia to connect to the energy networks of Asia*

Source: TREC

This vision is highly ambitious and inevitably long-term. It involves applying the economic theory of 'comparative advantage' in energy on a regional scale. It also assumes price-signal-distorting handouts aren't given to particular industries that could slow progress toward the goal of curbing climate change. Clearly, natural gas is a desirable export for Australia. Turning it into carbon emission intensive LNG should be reassessed in light of the changing price signals that carbon levies will create.

A more efficient, cleaner natural gas export industry is just one example of the positive externalities that can result from holding the line against exemption-seeking industries and allowing the 'invisible hand' of the market to do its job without interference. Industries will become stronger through a 'tough love' approach from government. They will become weaker through government acquiescence.

If the goal is to combat climate change and make Australia richer place and Asia more geopolitically secure, developing a universally beneficial, common carriage energy infrastructure in which everyone has an incentive to 'play by the rules' can only help avoid future conflict over energy.

**GENI's Vision:** a world in which all people have access to ecologically sustainable energy.

**GENI's mission:** Educate world leaders and the public about the critical viability of the interconnection of electric power networks between nations and continents, with an emphasis on tapping abundant renewable energy resources.

**Desertec-Australia's Vision:** 'Clean Energy from Deserts' powering 21st Century society

**Desertec-Australia's mission:** To educate world leaders and the public about the renewable energy potential of some of the world's most uninhabited regions: the world's 'deserts.'