



ENGINEERS
AUSTRALIA

Scientific inquiry into hydraulic fracturing in the Northern Territory

Submission on the interim report

October 2017



ENGINEERS
AUSTRALIA

Engineers Australia
11 National Circuit, Barton ACT 2600
Tel: 02 6270 6555
Email: publicaffairs@engineersaustralia.org.au

www.engineersaustralia.org.au

Contents

- Scientific inquiry into hydraulic fracturing in the Northern Territory.....1**
- Introduction4
- Gas and the future of Australia’s electricity supply4
- Workforce capacity6
- Regulatory frameworks7
- The social compact.....8
- Conclusion and recommendations9
- Recommendations9
- Contact details10

Introduction

Australia has an abundant supply of gas reserves, both in conventional and unconventional supplies.

Shale gas and coal seam gas extraction is not a new concept in Australia, with Western Australia and Queensland using their reserves over many decades.

The Northern Territory sits atop one of the largest shale gas reserves in Australia at over 138 000 petajoules¹, enough gas to supply the Territory over the coming decades and leaving enough supply to provide valuable export dollars for Territorians.

Engineers Australia, as the peak body for engineers and engineering, welcomes the opportunity to provide a submission to the Northern Territory Government in response to the interim report of its Inquiry into Fracking.

The scope of the review was far reaching, touching on both practical and societal issues that future fracking projects may have. However, for the purpose of this submission, Engineers Australia will concentrate on the practical aspects of future shale gas extraction, i.e. is it, at this point, practical from an engineering perspective to commence extraction of shale gas in the Territory.

Societal issues (such as ensuring that indigenous communities are not adversely affected, are well compensated and remunerated through royalties, and that long term employment opportunities exist in for residents of remote communities) are matters that the Territory government needs to weigh up and consult with communities and land use stakeholders in a transparent and balanced way.

Gas and the future of Australia's electricity supply.

Electricity supply in Australia is fast approaching a juncture due to traditional fossil fuel power stations coming to the end of their economic lives, increased market pressure from renewable energies and community expectation regarding the need to address climate change. In recent years there have been falls in the demand for electricity due to industry restructuring, greater public awareness of energy conservation, the use of behind the meter renewables, energy efficiency and altered consumer behaviour. These factors are also responsible for projected modest growth in demand over the next 20 years.

Gas already plays an important part in Australia's energy mix in a number of states, and has been widely suggested as a short-term substitute for coal. This is because gas has lower emissions than coal and has the ability to respond more rapidly to grid demands.

Gas is an important part of Australia's energy mix, already making up a large percentage of the energy generation sources. With the ability to respond more rapidly to variable grid demands, and lower emissions than coal, gas has been suggested as a short-term substitute for aging coal fired power plants².

¹ Geoscience Australia, *Gas*, available at: <http://www.ga.gov.au/aera/gas>.

² Kirkland, J. 2010, *Scientific American*, *Natural Gas Could Serve as 'Bridge' Fuel to Low Carbon Future*. www.scientificamerican.com

In Australia, gas consumption by gas powered generation is forecast to reduce in the short term, but beyond five years it is expected to rise to support electricity consumption and to replace over 2,000 MW of expected coal-fired generation withdrawals³.

While gas fired generation will increasingly be used to complement intermittent generation from renewables, the extent of use will be dependent on the cost of gas, and on the environmental policy considerations of emissions reduction⁴.

While gas is presently a more expensive fuel than coal, open cycle and combined cycle gas turbines are competitive at times of intermediate and peak demand⁵. Gas is effective as a peaking plant with the ability to ramp up quickly, where coal-fired plants are not easily able to adjust to demand. The prospect of gas price increases or shortages has recently made headlines, and this stems from Australia's domestic market linking to the overseas gas markets. The eastern Australia gas market is becoming increasingly reliant on coal seam and shale gas and over the past 10 years the retail price of gas for households has increased by eight percent a year⁶. The use of gas for energy generation is expected to grow over the next 30 years.

In the power sector, using gas instead of oil for supplying electricity during peak times of demand, and for captive off-grid electricity generation, has the potential to save AU\$520 million annually by 2030 while also reducing carbon dioxide emissions by one million tonnes per year⁷.

Increasing gas fired generation for electricity supply can assist in a transition away from coal fired power stations, however it only remains part of the solution in a low carbon economy.

Access to a reliable, affordable, quality electricity supply is crucial to continued industrial and commercial prosperity, and to the standard of living enjoyed in the Northern Territory.

While there are supplies of liquid natural gas that could supply the energy sector over the coming decades, liquid natural gas has a finite limit.

To ensure that long term supply is maintained in Australia additional sources of gas will need to utilised, especially as the market drives towards the closure of coal fired generators along the east coast and Australia's commitment to the Paris accord requires Australia's greenhouse gas emissions to reduce to international levels.

Gas can be part of both of these solutions over the medium term.

As the Chief Scientist of Australia noted in his recent report, Australia is facing a supply issue for gas for the domestic market and without sufficient gas supply electricity generation in Australia will be under threat.⁸

Ample gas supply will also assist in the reduction of greenhouse gas emissions over the medium term as coal generating power stations are converted to gas turbines or gas turbine generators are developed to provide consistent electricity supply during peak periods.

³ Australian Energy Market Operator, 2015, *National Gas Forecasting Report*, www.aemo.com.au/Gas

⁴ Heyning, C and Segorbe, J, McKinsey and Company, *The role of natural gas in Australia's future energy mix*, McKinsey Australia and Energy Insights June 2016

⁵ Australian Energy Market Commission, 2016, *Australia's Energy Market: Electricity*, <http://www.aemc.gov.au/Australias-Energy-Market/Electricity/Generation>

⁶ Australian Government, Department of Industry and Science, 2015, *Energy White Paper 2015*, www.ewp.industry.gov.au

⁷ Heyning, C and Segorbe, J, McKinsey and Company, *The role of natural gas in Australia's future energy mix*, McKinsey Australia and Energy Insights, June 2016

⁸ Finkel, Dr A, *Independent review into the future security of the national electricity market*, 2017

Gas generators produce between approximately one third to one half the greenhouse gas per megawatt hour as brown coal generators and approximately one third the emissions of black coal.⁹

The report does not address the issue of generation specifically, but it cannot be discounted in consideration on whether to develop or not develop unconventional gas supplies in the Northern Territory. While the Territory derives 98 percent¹⁰ of its power from gas, having long term access to supply provides energy security for Territorians and allows for increased growth.

The report mentions greenhouse gas emissions as a source of public concern. The report states that greenhouse gas emissions upstream can be met at levels of two percent, however, this is a current structure and does not allow for future engineering technologies that could reduce this percentage further.

The United States, as the report notes, has reduced its own greenhouse gas (GHG) emission regime down to as low as 1.5 percent upstream of sites. Given the right regulatory framework and a specialised engineering workforce, it is easily conceivable that this emission level could be reduced further in the Northern Territory.

The review examined issues with regard to extraction, site and well management, including well integrity, decommissioning and land use.

In each of these instances the review found that the risks were minimal. Many of these issues can be covered by a highly skilled, trained and qualified workforce and with regulations that are fit for purpose, strong enough to discourage bad practice yet flexible enough to allow for innovation that can improve upon current standards.

Shale gas fracturing is a highly technological process, requiring highly qualified engineers to develop, maintain, monitor and eventually decommission wells.

The NSW Chief Scientist and Engineer reported that there is a 'rapid evolution of technological developments...' in onshore gas exploration and extraction and that risks can be managed through 'high standards of engineering and professionalism...' ¹¹ Engineers Australia echoes that advice.

Workforce capacity

Operators require a skilled workforce with sound knowledge of fracturing to ensure that the maximum amount of gas is extracted for the least amount of cost. The workforce must also be qualified enough to abide by regulations that ensure the integrity of the well.

For engineering-intensive operations, engineering expertise is required to answer critical questions that can arise during the lifecycle of the shale gas extraction process. The Northern Territory government as a significant and important stakeholder in the decision making process should ensure that it receives practical advice from qualified professionals.

Engineering expertise can make a substantial contribution to developing and improving the industry through the application of technical skills and knowledge of operational systems.

⁹ Finkel, Dr A, *Independent review into the future security of the national electricity market*, 2017

¹⁰ Engineers Australia, *The Future of Australian Electricity Generation*, 2017

¹¹ O'Kane, Professor M, *Final report – Independent review of coal seam gas activities in NSW*, 2014

Using engineering expertise will result in the government being a more informed buyer of this engineering intensive sector. That will in turn increase the likelihood of better value for money, and better regulatory frameworks that will be fit for purpose in terms of ensuring safe practice and enabling the development of technical innovations.

Unfortunately, the number of engineering professionals employed by government agencies has declined significantly over the decades. This means that governments have had less access to technical expertise which has affected the ability of government to be an informed buyer of engineering-intensive services. The cost of inadequate engineering expertise can be huge, anywhere up to 20 percent above the cost.¹²

This decline can be observed in the electricity, water and gas industry where the proportion of government employed engineers, Australia wide, fell by 40.8 percent from 1984 to 2005.¹³ In the Northern Territory, while general employment in the government sector rose by just over 15 percent between 2006 and 2011, the number of engineering specific positions in the Northern Territory government fell by 23.2 percent during the same period.¹⁴

For governments assessing the viability of new projects that are heavily reliant on engineering, ensuring the right professional is in the right place at the right time is the key.

Building engineering capability is about much more than the number of people with engineering qualifications. It is about entry level engineering education, acquiring the skills and competence for engineering practice, retaining experienced and competent engineers in the engineering profession and the development of diversity in the profession through increasing the number of women and indigenous people recruited to the profession.

A skilled engineering workforce will also allow for other professions to develop. For example, the NSW Chief Scientist and Engineer in her report to the NSW Government recommended that the development of a skilled workforce was fundamental to the development of onshore gas.¹⁵

The development of onshore gas in the Northern Territory would attract already skilled workers to the Territory who would pass on their knowledge and skills, establish businesses and support ancillary businesses through their participation, growing the economy and providing new investments.

Opening of onshore gas supplies will provide the opportunity for long term employment throughout the engineering supply chain in both Darwin and the regional and remote communities of the Northern Territory. This is because of the long life cycle of shale gas wells and the potential during that time for innovation to extend the life of the wells as better engineering technologies allow for greater extraction of gas.

Regulatory frameworks

Providing viable fit for purpose regulation for the shale gas industry in the Northern Territory will require flexibility and sound industry input to be successful.

¹² Engineers Australia, *Government as an informed buyer*, 2012

¹³ Engineers Australia, *Government as an informed buyer*, 2012

¹⁴ Australian Bureau of Statistics, 2011, *Dataset 2011 Census*, TableBuilder.

¹⁵ O'Kane, Professor M, *Final report – Independent review of coal seam gas activities in NSW*, 2014

Having knowledge of regulatory positions in jurisdictions outside of the Northern Territory, both domestically and internationally, is important, but the best outcome for the Northern Territory is a set of regulatory functions that are Territory-specific.

There are many players in the development of the gas sector (including drilling companies, chemical suppliers and the like), and given the unique terrains of the Northern Territory, any regulatory structure will need to be done in concert with all stakeholders.

For example, the panel's view that "...the likelihood of spills can be reduced with well-engineered wastewater containment facilities..."¹⁶ is one where local knowledge and expertise should be used, and practices regulated, to ensure that the correct engineers are undertaking this work.

The specifications of containment ponds that can withstand high intensity rainfall that is unique to the geographical location of the ponds in the Northern Territory, how these ponds are designed, by whom and how they are monitored will be specific to the Territory.

Additionally, the penalties for breaches of any set standards should have solid weight behind them to dissuade any breach of the regulations.

However, while regulation can establish a stick approach to compliance, effective regulation also allows for the setting of innovative standards.

It is important that government establish regulations that are not too prescriptive as to limit innovation and move industry standards away from international and Australian practices that are well established and tested.

Government should work closely with the industry to ensure that any regulations are updated as quickly as the industry updates standards and practices.

For regulation to be effective it should be constructed through consultative risk base analysis, and with much of the fracturing work to be done this would involve engineering specific knowledge.

The social compact.

The extraction of onshore gas supply carries many genuine concerns from the community.

Allaying concerns of the community requires informed, independent and transparent communications from both government and industry.

Concerns raised in the Northern Territory in relation to water and land use are not unique, nor are they new. The NSW Chief Scientist and Engineer noted concerns in the NSW with onshore gas extraction and community worries on extraction on water supply and land use during 2013 and 2014¹⁷.

The NSW Chief Scientist and Engineer made recommendations that included clear communication from government on the need for gas extraction, and that strong signals are established for industry to have strong compliance standards and that the community is continuously in communication with the government.¹⁸

¹⁶ Summary of the interim report – scientific inquiry into hydraulic fracturing in the Northern Territory

¹⁷ O'Kane, Professor M, *Final report – Independent review of coal seam gas activities in NSW*, 2014

¹⁸ O'Kane, Professor M, *Final report – Independent review of coal seam gas activities in NSW*, 2014

Engineers Australia supports these recommendations. Ensuring that the right information is delivered to the community requires independent and concise information from experts.

As mentioned earlier in this submission, hydraulic fracturing is a highly technical and ever-evolving industry and one that is engineering intensive.

Engineers can interpret and translate technological information to the community, business and government, ensuring, as far as possible, that policy decisions are properly informed and that risks and limitations are properly understood by both governments and the wider community.

Ensuring that the social compact can be developed between government and the community which allows industry to develop its social license to operate will rely on government having independent operational specific information delivered by qualified engineers at its fingertips and for the community to have an independent, industry specific expert at hand to discuss concerns as they arise.

Conclusion and recommendations

A thriving on-shore gas sector, acknowledging the cost and availability of energy, should be a key priority for sustainable economic growth in the Northern Territory.

Developing this important future sector of the Northern Territory economy is not restricted by the engineering technology currently available.

Providing a set of regulations that are both effective to prohibit high risk practices, while providing flexibility for innovation which can improve the shale gas sector to potentially become a nation leading or world leading sector, will help to drive investment and long term employment opportunities throughout the Northern Territory.

To be globally competitive the Northern Territory needs to develop long term and sustainable energy policies; energy policies that can be built on the back of a gas supply that can provide power to industry and the community for many decades.

Recommendations

Engineers Australia makes the following recommendations for action by the Northern Territory Government:

- Ensure representation of industry specific engineers, and scientists on future panels, boards or advisory committees.
- Ensure a greater focus on engineering advice in communications to inform the community in discussions on onshore gas extraction, thereby assisting industry to take charge of its social license to operate.
- Increase the number of engineers with industry experience in the NT regulatory bodies that are responsible for energy resources.
- Introduce a non-prescriptive and outcomes-focused approach to industry regulation, allowing flexibility for industry and technological innovation to mitigate environmental risks specific to Northern Territory projects.
- Require appropriate disclosure of water usage volumes and chemicals in fracking fluid and flow-back water.
- Introduce regulatory measures to ensure the integrity of well design and construction.

- Work with stakeholders to develop access and conduct agreements for contractors and companies entering gas tenements on private or Aboriginal land.

Contact details

Thank you for the opportunity to provide comments on the interim report of the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory. To discuss the issues raised in this submission further, please contact Mark Monaghan, General Manger of the Engineers Australia northern division, on (08) 89141701 or by email at MMonaghan@engineersaustralia.org.au.



ENGINEERS
AUSTRALIA