Paradigm Resources

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ACN 602 694 155

Professor Mary O'Kane AC
NSW Chief Scientist & Engineer
Level 48 MLC Centre
19 Martin Place
Sydney NSW 2001

Thursday 16 March 2017

Dear Sir/Madam,

I write on behalf of Paradigm Resources to provide a response to your Terms of Reference as it relates to our activities and the issue of energy security, especially as it relates to NSW, where Paradigm Resources operates.

The state of NSW, is particularly vulnerable to the issue of energy security because of its dependence on coal-fired electricity generation and its reliance on other States for natural gas supplies.

It is our view, that if action is not taken soon to provide certainty to the industry, the State risks continuing energy price rises, growing unreliability of the electricity network, loss of energy intensive industries, diminishing investment opportunities and job losses, particularly in regional NSW.

Energy security is not just related to price but also to physical availability and reliability of energy supply.

Meeting peak summer demand for electricity requires a combination of energy sources. Natural gas provides the flexibility to ensure stability in the electricity grid, enabling the increased contribution of intermittent renewable energy sources, provide price competition in the energy market while ensuring reliability of supply.

It is for this reason that we have prepared the enclosed paper which may be of interest to your review.

In particular, this paper aims to highlight the role gas could play in creating policy options for the State and assist in addressing a range of economic, social and environmental issues.

Natural gas is one of cleanest and economical sources of fuel for large-scale baseload and peaking power generation. When combined with renewable energy it can contribute enormously to reducing the amount of Australia's greenhouse gas emissions.

Electricity produced from gas produces 50-70% less greenhouse gas emissions than current coal-fired power generation facilities.

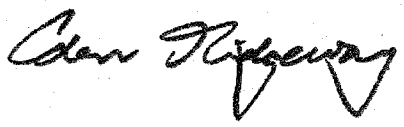
It also identifies that there is an opportunity for conventional gas discoveries in far western NSW and that Aboriginal people are willing to invest in regional NSW not only for the benefit of Aboriginal people but also to contribute to the economic development of the State.

Our paper explores the issues of:

- energy security and the importance of gas exploration, especially to NSW
- the importance of regional economic development
- reducing greenhouse gas emissions
- the benefits to Aboriginal people and the sharing of benefits
- gas potential for western NSW, and
- clarity of commitment required from governments.

I am happy to provide this paper to your Review and would be more than willing to provide any clarification at any stage

Regards,

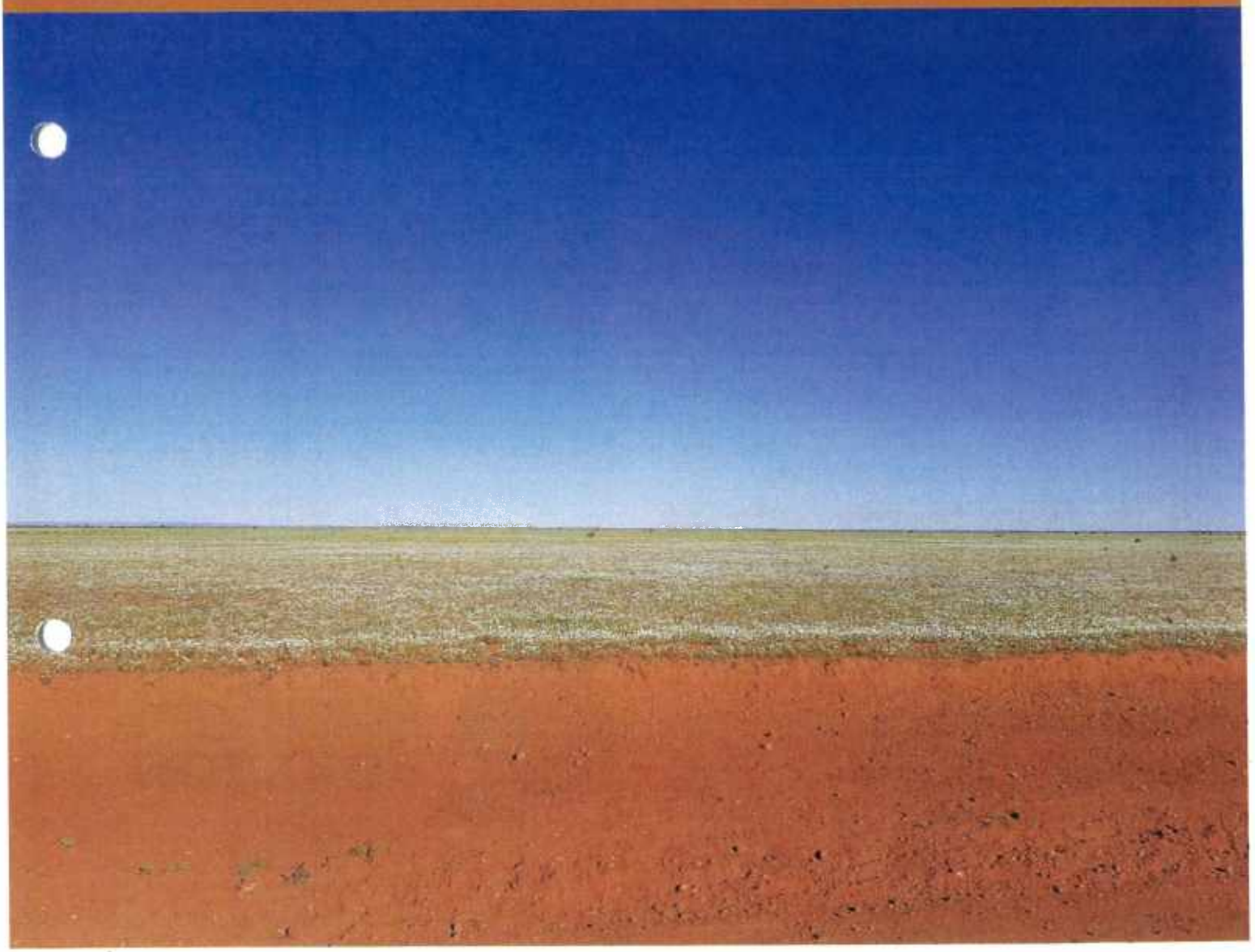


ADEN RIDGEWAY

Chairman

The Future of Natural Gas in NSW

2017 Strategy Paper



Paradigm Resources

www.paradigmresources.com.au

Our Story

Paradigm Resources is a unique commercial and cultural collaboration between Aboriginal people and the resources industry. It is the culmination of over three years of negotiations and discussions, starting with a simple commitment to work together to identify and develop resource opportunities. It is now a full commercial partnership, with a jointly owned resource exploration company.

Through this joint venture company, the parties have made mutual commitments to identify and develop opportunities for Aboriginal participation in the resources industry at every stage and at a strategic level.

Paradigm Resources leverages on the industry and cultural expertise of its Board of Directors and management. Together, we can achieve sound commercial outcomes, as well as give Aboriginal people of NSW a real stake in the resources industry. It is a company that is committed to local economic opportunities, and a sustainable, well-regulated resources industry in NSW.

Our journey began with one single step, but we know many more steps will need to be taken if we are to succeed in our commitment to making Aboriginal land councils across NSW sustainable.

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Photograph on the back cover is courtesy of NSWALC Councillor Craig Cromelin, who is a Director of Paradigm Resources Pty Ltd

Introduction from the Chairman

"The free and informed consent of Indigenous peoples must be gained prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilisation or exploitation of mineral, water or other resources" *(Article 32, UN Declaration on the Rights of Indigenous Peoples).*

Paradigm Resources is an energy and resources development company which is half-owned by the State's premier Aboriginal body – the New South Wales Aboriginal Land Council.

Our plan remains the creation of economic opportunities for Aboriginal people through the involvement in the resources industry, so that new self-supporting income streams can flow into Aboriginal communities across NSW to underpin their existing resilience and independence.

Gas exploration will endure as the centrepiece of Paradigm's strategic focus and our success in securing an amendment to the Gas Plan legislation in NSW that gives us first rights to apply for gas exploration licenses over the Darling Basin in the far west of NSW provides us with the legal right to make this a reality.

Energy abundance and economic growth are inextricably linked. Affordable, plentiful energy is what built nations such as Australia and it is essential for eliminating inequality, creating regional stability and building communities of resilience.

This report has been written to exhibit where real opportunities exist, not only to shore up energy security, but also provide future opportunities for Aboriginal communities to participate in the real economy across NSW. As such this report should be viewed as the State of Play for the Natural Gas Industry in NSW.

Aden Ridgeway
Chairman, Paradigm Resources

Executive Summary

This paper is about providing a new direction for NSW, by creating an opportunity to address the issues of:

- energy security
- climate change and
- regional economic development.

Australia is a global leader in energy exports, yet State and Federal Governments are struggling to develop a consolidated plan to address:

- rising energy prices
- domestic gas shortage
- greenhouse gas emissions and
- energy security.

The resultant lack of energy security is directly linked to negative economic and social impacts from either physical unavailability of energy, or prices that are not competitive or are overly volatile.

The contribution of renewable energy to the network is growing rapidly because of government commitments (and incentives) to reduce greenhouse gas emissions, while coal-fired generators are shutting down. Unfortunately, renewable energy is an intermittent generating source and insufficient planning has been given to how electricity supplies can be maintained during periods of peak demand when renewables contribution is reduced.

NSW is particularly vulnerable because of its dependence on coal-fired electricity generation and its reliance on other States for natural gas supplies. If action is not taken, the State risks continuing energy price rises, growing unreliability of the electricity network, loss of energy intensive industries, diminishing investment opportunities and job losses, particularly in regional NSW.

While a range of strategies need to be implemented to address these challenges, development of a local competitive natural gas industry is critical.

In recent years, the focus of gas exploration in NSW has been on coal seam gas. However, community opposition to gas exploration close to urban centres and prime agricultural land has seen the government impose tighter restrictions and ultimately a moratorium on onshore gas exploration. This has resulted in a dramatic decrease in gas exploration investment in the State.

The solution lies in the State's far west, where the potential exists for major conventional gas discoveries west of Cobar in the Darling Basin. This area of the State is prospective for natural gas and has the advantage of a low population density and few competing land-uses. The natural gas targeted is not coal seam gas but conventional gas contained in sandstone reservoirs.

The New South Wales Aboriginal Land Council (NSWALC) has identified the development of energy and mineral resources as an important opportunity to empower and benefit Aboriginal people. NSWALC believes that involvement in the resources industry will allow it to underpin future economic prosperity, job security and community interests of Aboriginal people and their neighbours in regional NSW.

NSWALC believes that investing in gas exploration in western NSW provides a unique opportunity to develop Indigenous gas resources and stands ready to commit to investment in regional NSW.

This paper is designed to provide the rationale and reason for the NSW Government to give priority to the staged release of conventional natural gas exploration areas in the Darling Basin. It does so from a common sense perspective as well as acknowledging the unique leadership role that can be played by Aboriginal people in NSW, especially through the NSW Aboriginal Land Council and Paradigm Resources.

This is a rare opportunity and one thing which is certain is that a year from now governments will applaud making the right decisions in a timely manner today.

Introduction

The Facts

1. Australia is the world's ninth largest energy producer, producing almost 3% of the world's energy and exporting over 60% of its total energy production. This makes Australia a member of an exclusive club being one of a handful of countries who are net energy exporters.

2. Australia's position as a major global energy exporter is built on a wealth of energy resources; with 31% of the world's uranium, almost 10% of the world's coal and 2% of the world's natural gas resources (see figure over page).

3. Coal is Australia's primary energy export, being the world's largest exporter of coal. Australia is the world's third largest exporter of both uranium and LNG, and by 2020, is on track to become the world's largest LNG exporter.

4. Australia also has access to extensive renewable energy resources (wind, solar, geothermal, hydro, wave, tidal and bioenergy). While hydro energy resources have been largely developed over the past decades, utilisation of wind and solar energy resources have become an increasingly important component of the nation's energy mix in response to the government's commitment to reduce greenhouse gas emissions.

The Challenge

Yet despite these natural advantages we are seeing escalating electricity and natural gas prices, rising concerns over energy security and decreasing network reliability with load shedding and blackouts occurring during periods of peak demand.

NSW is almost totally dependent on gas supplied from neighbouring States. The unpredictable security of gas supply, due to a shortage of gas predicted to occur in the next five years, will have profound impact on the State's economy, energy demands and power generation needs. In NSW, higher energy prices, particularly for gas, are already affecting a range of energy intensive industries resulting in job losses, especially in regional centres.

The Solution

This paper aims to highlight the role gas could play in creating policy options for the State and assist in addressing a range of economic, social and environmental issues.

It also identifies that there is an opportunity for conventional gas discoveries in far western NSW and that Aboriginal people are willing to invest in regional NSW not only for the benefit of Aboriginal people but also to contribute to the economic development of the State.

This paper explores the issues of:

- energy security and the importance of gas exploration, especially to NSW
- the importance of regional economic development
- reducing greenhouse gas emissions
- the benefits to Aboriginal people and the sharing of benefits
- gas potential for western NSW, and
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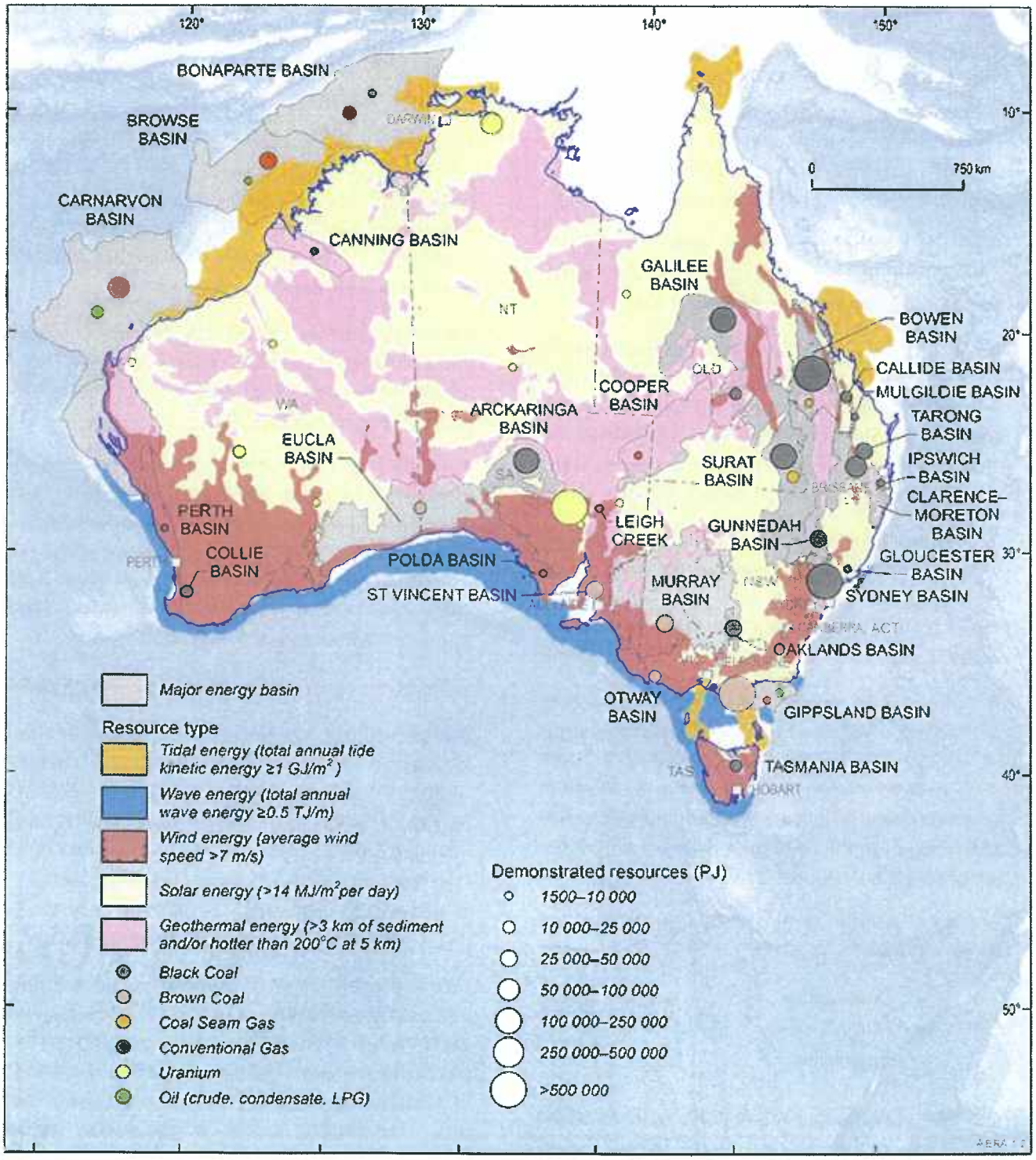


Figure 1: Australia's Energy Resources (Geoscience Australia, 2016)

Energy Security

Why is gas so Important?

Recent events have forced energy security to the forefront of public debate. The February blackouts in South Australia and the threat of load shedding on 10 February in NSW, during one of the hottest periods experienced in the last decade, demonstrate the fragility of our energy network.

Network fragility, coupled with substantial increases in electricity and gas prices, has raised community concern regarding energy security.

While residents in NSW avoided blackouts on 10 February, the Tomago Aluminium Smelter near Newcastle was forced into partial shut-down. Disturbingly, the 600MW Colongra gas-fired power station on the Central Coast was unable to start due to lack of gas (AEMO, February 2017).

In a politically, economically and environmentally volatile world, energy security is an increasingly important consideration and will undoubtedly figure as an election issue in both State and Federal politics.

It is the role of government to ensure long-term energy security by facilitating the supply of energy in line with economic development and sustainable environmental needs. It is also the role of government to ensure that the energy system can react promptly to sudden changes within the supply-demand balance.

Energy security in its most basic form consists of three criteria:

- Availability
- Affordability
- Reliability

The Australian Energy Market Commission's report "2016 Residential Electricity Price Trends" shows that residential electricity prices have risen and are expected to rise over the next two years to 2018/19, driven by significant increases in wholesale costs following the retirement of the Hazelwood coal-fired power station in Victoria (AMEC, 2016).

As more wind and solar generated energy enters the market and base-load coal generators retire, we expect to see variations in residential power prices and impacts on the reliability of the electricity network.

The AEMC 2016 report estimates that the residential electricity market offer price for a representative consumer in New South Wales is expected to increase by 0.9% in 2017/18 and 6.9% in 2018/19. This is equivalent to an annual average increase of 3.9% over the two years.

Australia's weather and climate are also changing in response to a warming global climate system. Australia has warmed by around 1°C since 1910, with most warming since 1950.

Australia's top five warmest years on record have included 2013, 2014 and 2015. In addition, the duration, frequency and intensity of extreme heat events have increased across large parts of Australia with the number of days per year over 35°C increasing in recent decades (CSIRO and Bureau of Meteorology, 2017).

What does it mean to have energy insecurity?

Energy security is not just related to price but also to physical availability and reliability of energy supply. Uncertainty and instability in the supply of energy are particularly unwelcome in industry and manufacturing. Lack of gas and unreliable electricity supply drives away investment and can cause existing industries to relocate interstate, resulting in local job losses and economic decline.

Meeting peak summer demand for electricity requires a combination of energy sources. Natural gas provides the flexibility to ensure stability in the electricity grid, enabling the increased contribution of intermittent renewable energy sources, provide price competition in the energy market while ensuring reliability of supply.

Another negative consequence is price shocks. An increase in energy prices create hardship for low income earners and pensioners while slowing economic growth by reducing consumer expenditure and driving away investment.

Why is gas exploration important to NSW?

In the United States of America (USA) the development of large shale gas resources has revitalised much of the manufacturing industry there and created hundreds of thousands of jobs.

In Australia, we are facing gas supply shortages, lack of competition between producers and higher gas prices. Long-term availability of gas is not helped by State governments imposing restrictions and moratoriums on gas exploration.

The reinvigoration of US industry is predicted to create one million jobs by 2025. When combined with employment generated from the shale gas development itself and its supply chain, this could total more than two million jobs by 2025 (Cooper et al, 2016).

In NSW, over 95% of the gas consumed is imported from other States and there is a lack of competition in the supply of gas to the NSW market. Once AGL's Camden Gas Project ceases operation in 2023, 100% of NSW gas demand will need to be imported from interstate.

Gas-powered generation (GPG) is expected to support the achievement of Australia's climate change commitments by replacing higher CO2 emitting coal-fired power stations, and complementing the increase in renewables. However, GPG growth is expected to stretch available domestic gas supply, with the greatest supply challenge between 2018 and 2024 (AEMO, 2016).

The lack of GPG capacity is a particular problem for NSW because of a heavy reliance on coal for our primary energy needs, combined with a lack of local gas production.

The Australian Competition and Consumer Commission (ACCC) recently completed the Inquiry into the Competitiveness of the Wholesale Gas Industry (ACCC, 2016).

The report found that the key factors creating uncertainty about future gas supply on the east coast were:

- the magnitude of gas flows to the liquefied natural gas (LNG) projects which are removing gas from the domestic market
- the low oil price which is resulting in declining investment in gas exploration and lower production forecasts for both domestic and LNG projects
- a moratorium and regulatory restrictions, which are greatly affecting onshore gas exploration.

While it may be possible for NSW to continue to import gas from other States, it would result in the State continuing to pay higher gas prices because of the cost of transporting gas over long distances and lack of local competition.

NSW, as a consequence, would miss out on the many benefits of a local gas industry including:

- increased competition between gas suppliers driving down gas prices
- job creation, new infrastructure and the attraction of industries dependent on gas to regional NSW
- support for the development of renewable energy projects in NSW
- increased tax revenue to the State through royalty payments on natural gas production.

Regional Economic Development

Mineral resources, agriculture and tourism are the major contributors to the economic development of regional NSW.

Jobs in the resource sector result in additional employment opportunities that develop in other related sectors.

Spending by the resource sector not only supports direct business suppliers, but also results in flow through effects to other suppliers. Increased disposable income of workers in the region leads to increased demand, consumption and investment. Some of these economic benefits will also flow through to capital cities and other regional centres. Resource development leads to increased government revenue, both directly from the project through taxes and royalties, and from economic growth more broadly.

While resource projects bring significant economic benefits to regional centres and the State, Gas projects are fundamentally different because of the opportunities they create to support and attract other industries. Access to affordable gas is critical to many of our most important regional industries.

Gas is used in food processing, dairy production, brick making, glass manufacture, greenhouses, abattoirs, fertilizer manufacturing and power generation.

Development of gas projects in NSW are vital to supporting existing industry and attracting new investment.

Role of Gas in reducing Greenhouse gas emissions

In an effort to meet greenhouse emissions targets, renewable energy has been the focus for government incentives to increase their contribution to the electricity market while reducing coal-fired generation and this is to be commended. Unfortunately, right now, renewable energy is an intermittent generating source. If the sun does not shine or the wind does not blow, alternative sources of power must fill the demand-supply gap.

Natural gas is one of cleanest and economical sources of fuel for large-scale baseload and peaking power generation. When combined with renewable energy it can contribute enormously to reducing the amount of Australia's greenhouse gas emissions.

Electricity produced from gas produces 50-70% less greenhouse gas emissions than current coal-fired power generation facilities.

The direct use of natural gas to displace electricity in industrial, commercial and residential applications can bring even greater reduction in greenhouse gas emissions. Gas can displace electricity in industrial processes; space heating and cooling; water heating; and powering appliances such as cooktops, ovens, clothes dryers, and refrigerators.

In addition, as fuel cell technology develops and becomes more cost-effective, it is possible to envision entire communities fuelled by gas alone, with highly efficient gas-based fuel cells delivering the electricity.

Fuel cells generate electricity through a clean electrochemical reaction, creating electricity from natural gas with up to 60% thermal efficiency. As a result of this process fuel cells produce very low emissions or harmful pollutants and can create high-quality, reliable electricity.

The more gas generation that NSW has as part of the fuel mix for electricity generation, the greater percentage of renewables that the network can support. Gas plays an important role in addressing the intermittent nature of renewable energy and has the ability to rapidly meet peak demand.

Benefits to Aboriginal people

The NSW Aboriginal Land Council (NSWALC) has been actively pursuing investment in the NSW gas industry since 2011. NSWALC currently has first application rights over areas in western NSW where it previously was the applicant for petroleum exploration licences.

Investment in conventional gas exploration by the NSWALC has great potential to improve the economic and social circumstances of Aboriginal people across the State. The development of a gas industry and flow on effects through the development of related industries will result in greater employment opportunities for Aboriginal people in regional NSW.

The NSWALC's vision is for direct participation of Aboriginal people and organisations in the resource sector that will, through culturally appropriate and sensitive practices, result in significant enrichment to the way resource development is pursued in NSW. Aboriginal people can significantly impact positive decision making around sustainability, environmental protection, preservation of culture and community wellbeing.

Some of the other benefits include

- training opportunities for Aboriginal people;
- contracting and business development opportunities;
- development of a sustainable and independent source of funding for community benefit programmes;
- broad economic improvement in far west NSW;
- long term involvement in the resources sector which can be leveraged into other opportunities to improve outcomes for Aboriginal people in partnership with industry.

NSWALC has identified the development of energy and mineral resources as an important opportunity to empower and benefit Aboriginal people. The NSWALC believes that its participation in the resources industry will allow it to underpin future economic prosperity, job security and community interests of Aboriginal people and their neighbours in regional NSW.

NSWALC is focused and determined to develop Indigenous gas resources and stands ready to commit to investment in regional NSW.

Sharing the benefits

Sustainable development is often defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Furthermore, it must consider economic, environmental and social concerns.

The NSWALC is in a unique position to identify and protect Aboriginal culture and heritage, and conduct petroleum and resource exploration projects in a way that is environmentally sustainable, culturally sensitive and benefits Aboriginal and rural communities in NSW.

However, the NSWALC recognises that local landholders are critical partners in any resource development.

Compensation for landholders and populations affected by the granting of an exploration or production licence is a legal obligation on the titleholder. While the value of the compensation needs to meet expectations, there is a growing recognition that 'one-off' cash payments are not a sufficient answer.

The traditional mechanisms applied through the Petroleum (Onshore) Act 1991 means that landowners are only eligible for compensation in respect of those costs that are a consequence of the title holder carrying out operations on the land, while most of the benefits flow through to the State in the form of taxes and royalties.

NSWALC believe that a new model needs to be developed that makes landholders partners in resource development. To facilitate this NSWALC is committed to engaging with landholders to reach equitable agreements where landholders share in the benefits from resource development.

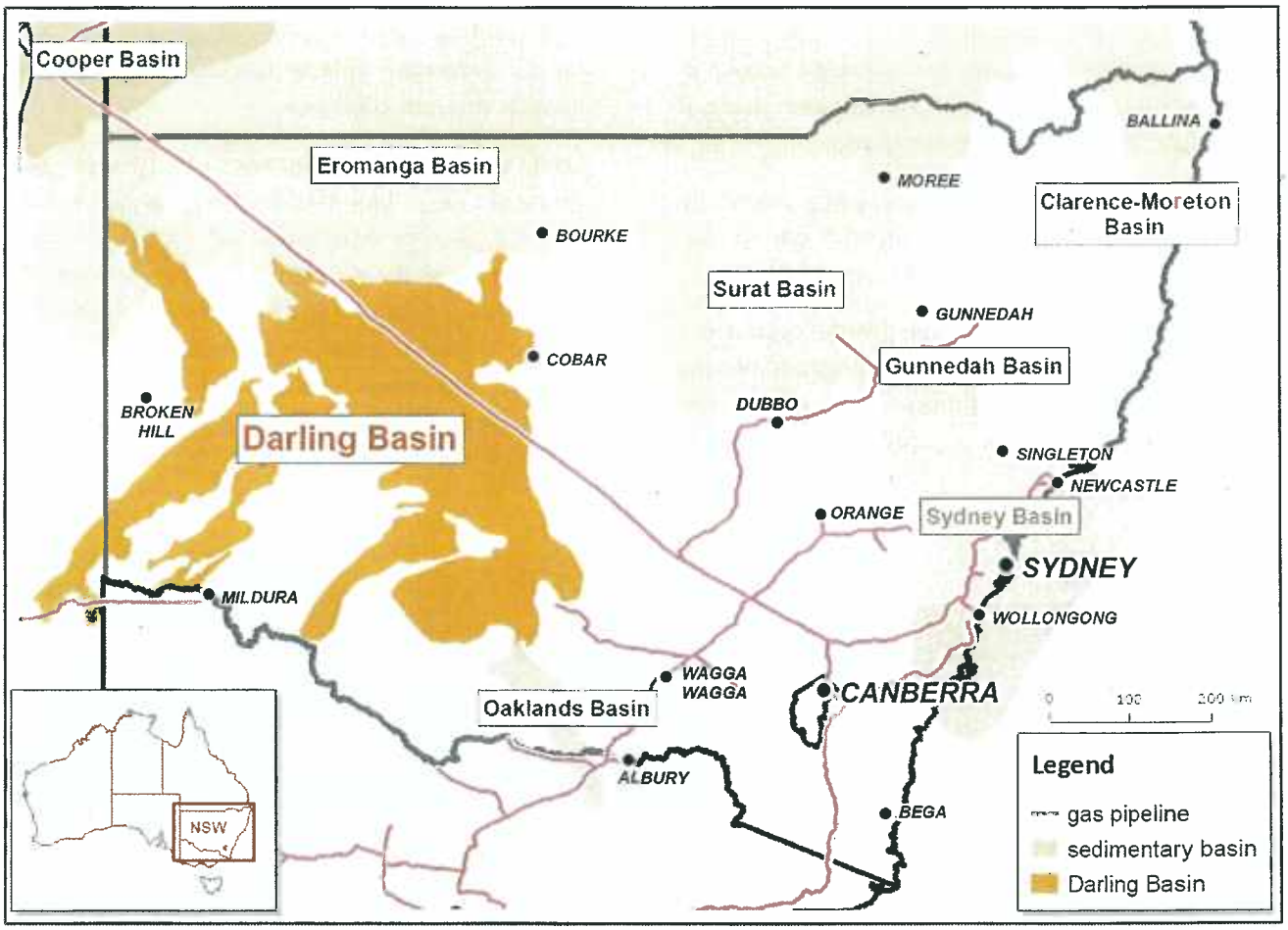
The gas potential of Western NSW

In recent years, the exploration for gas in eastern Australia has focused on coal seam gas. However, NSW has the potential for major conventional gas discoveries in the far western part of the State.

An area ranging from Broken Hill in the west to Cobar in the east, known as the Darling Basin, contains rocks known to have the potential to host major gas fields. In fact, gas is produced from the Gilmore Gas Field within the Adavale Basin located to the north in Queensland in an area geologically very similar to the Darling Basin.

Despite this potential, the Darling Basin is largely unexplored with only a handful of old exploration wells drilled in the region.

The Darling Basin also has a major infrastructure advantage in that the Moomba to Sydney Gas Pipeline runs through the middle of the basin. This allows any discovery in the basin to be rapidly developed to supply the NSW gas market.



Previous Government commitments

Prior to the NSW government's Gas Plan, NSWALC had applications for petroleum exploration titles in the Murray-Darling Basin. These applications, along with all others at the time, were expunged by an amendment to the Petroleum Act in late 2015.

The flow-on effect of cancelling applications and licences has damaged NSW on a broader scale by discouraging established energy companies from investing in NSW, ultimately relegating NSW to the lowest priority for exploration investment in Australia (Fraser Institute, 2017).

The amended Petroleum Act provides that NSWALC (and other applicants at the time) have first right to re-apply for petroleum exploration licences in the area in which they previously had applications.

What can Government do?

The NSW government introduced its Gas Plan in November 2015, including a Strategic Release Framework for the controlled, strategic release of exploration titles. To date the government has not released any areas for gas exploration.

The government should consider giving priority to the staged release of conventional natural gas exploration areas in the Murray-Darling Basin.

This area of the NSW is prospective for natural gas and has the advantage of a low population density and few competing land-uses. The natural gas targeted is not coal seam gas, but conventional gas contained in porous sandstone reservoirs. Unlike coal seam gas, large volumes of conventional gas can be extracted without fracking using a small number of production wells.

Exploration and development of natural gas resources takes time. Delay in implementing the Strategic Release Framework will result in more time and opportunity lost before gas production could occur. Sound and timely decision making now can lead to a positive energy outcome for the State and allow government to underpin long term energy security as well as provide certainty to the people of NSW and industry.

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About the Author

Brad Mullard has been involved in the Minerals Industry in Australia for past 37 years. He has extensive knowledge and understanding of the resources and energy sectors and has been involved in policy development, resource assessment and regulation of the State's mineral resources.

In his former role of Executive Director Mineral Resources, he provided strategic advice to Government in the areas of mineral development proposals, State energy infrastructure and landuse planning.

Over the last 25 years, Brad has been employed in senior positions within government with responsibility for the management and leadership of a diverse range of staff and programs. This has included the management of professional staff including geologists, mining engineers, environmental scientists and specialist administrative staff.

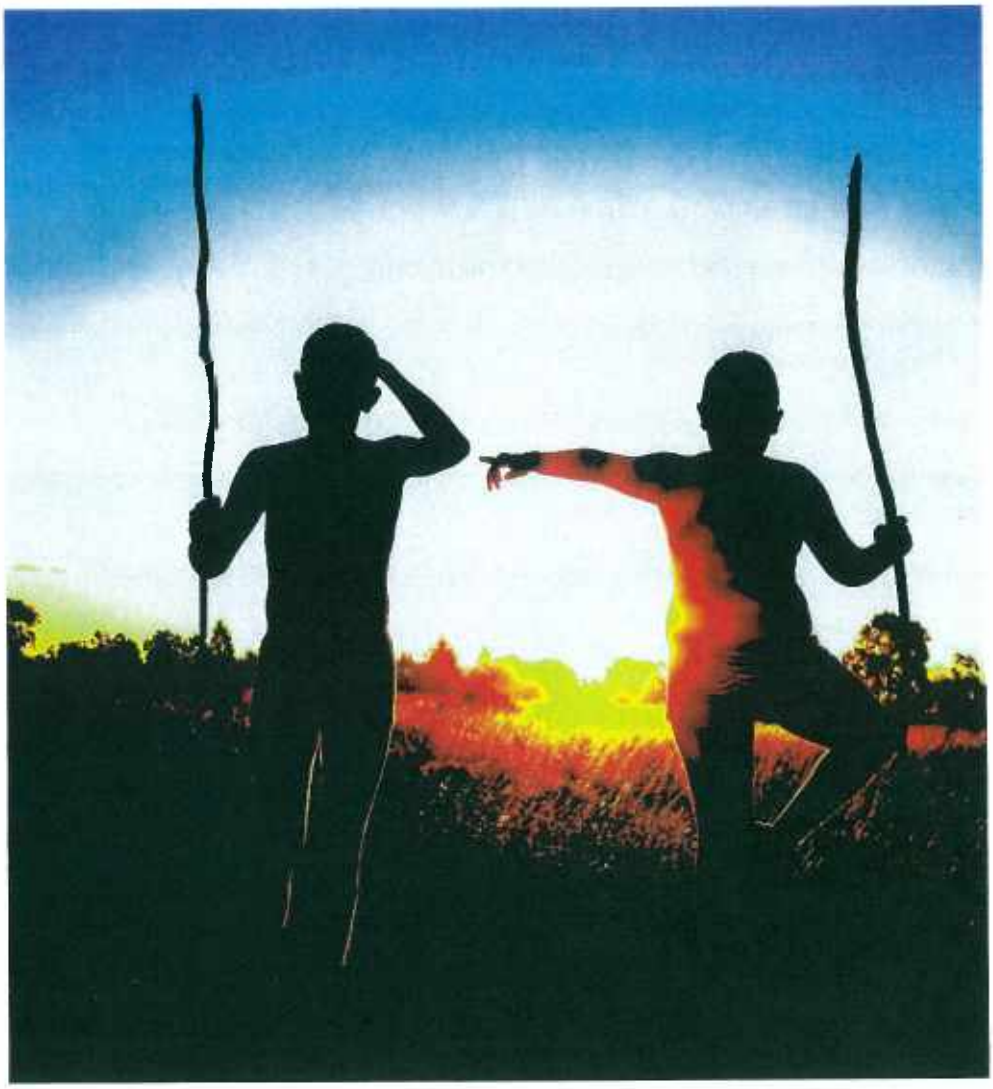
Brad has extensive knowledge of political processes acquired during his 35 years in the public sector. He has been involved in the development of legislation, participation in whole of government policy development, community consultation, appearances before parliamentary inquires (both State and Federal), attending estimates committee hearings and participation in national committees in the capacity as an expert in mineral resources.

Brad has represented the NSW government on high level committees including the National Low Emission Council, NSW Coal Innovation and the National Carbon Storage Taskforce.

In 2012, Brad was awarded the Public Service Medal for outstanding public service to policy development, assessment and allocation of energy and mineral resources in New South Wales.

Currently Brad provides consultancy services related to coal and petroleum resource development.

Brad graduated from the University of Newcastle (NSW) in 1978 with a Bachelor of Science degree majoring in geology.



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