Submission No 560

INQUIRY INTO COAL SEAM GAS

Organisation: Eastern Star Gas

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Inquiry into Coal Seam Gas

September 2011

EasternStar GAS

CONTENTS

1. Executive Summary

Eastern Star Gas (ESG) is an ASX200, NSW-based owner and operator of petroleum licences. It holds extensive petroleum exploration interests in NSW. The chief project operated by ESG is the Narrabri Gas Project (NGP), located within Petroleum Exploration Licence (PEL) 238. Development approval for the NGP is being sought under NSW planning legislation and the Australian Government's Environmental Protection and Biodiversity Conservation Act, and ESG's activities are subject to over 25 separate legislation, policies and guidelines.

The Narrabri Gas Project offers an opportunity for a major development in regional New South Wales, bringing over $1 billion investment and 200 long-term jobs to the north-west. In addition to the regional benefits, this large new gas resource will provide a fuel for power generation in NSW with a reduced carbon footprint and foster the development of a new export industry, with the complementary development of a Liquefied Natural Gas facility at Newcastle.

Three characteristics are pertinent to describing the NGP in relation to the broader CSG industry:

- The type of existing land use in the area the project is to be developed;
- The relatively unique geology of the NGP coals; and
- The location of the coal seams underneath, and separate to, of the Great Artesian Basin.

The NGP is located largely within the Pilliga State Forest. Aggregate clearing of the State Forest section for the NGP amounts to a maximum of 2,410 hectares, equating to less than 0.5% of the broader Pillaga area. A portion of this area is only required for construction activities, and will be rehabilitated shortly after initial construction.

The area that ESG is seeking approval to develop the NGP does include some private landholdings. Any CSG activity in these areas is subject to reaching agreement with the individual landholders. Furthermore, if ESG was to seek agreement with private landholders for production wells, this would occur a number of years after production wells have been drilled in the Pilliga, so those landholders will see for themselves the low impact of the project.

Unlike other CSG projects that may use a combination of well completion methods, such as hydraulic fracturing, cavity completion or under-reaming, ESG has identified a single completion method for its development, being horizontal drilling. This involves deviation of the drillbit from moving vertically to a horizontal direction as the target coals are approached. None of the other completion technologies, including fraccing, are required.

The coals targeted for the NGP are deeper than most CSG projects. The main target coal seam lies around 800 to 900 metres below surface. The coals are not part of the Great Artesian Basin (GAB), and not only underlie it but are separated from these GAB aquifers by hundreds of metres of confining layers. As a consequence, water produced in the de-pressuring of the coals as a precursor to gas production is not drawn from sources that other water users in the community rely on.

ESG notes that NSW Petroleum (Onshore) Act 1991 (the Act) was drafted at a time when the NSW CSG sector was almost non-existent and the company sees benefits in this Inquiry looking at ways to improve the Act to better reflect the needs of proponents and communities as the sector matures. ESG sees significant benefits in improving the clarity of the Act, particularly around environmental issues and community engagement, to give proponents, regulators and the general public greater transparency around expectations and obligations.

In addition, ESG believes that significant benefits could be derived from improved coordination between the various departments and agencies who administer legislation in NSW for CSG purposes. The CSG sector is unique and the industry warrants a unique regulatory approach from the NSW State Government. ESG notes with interest the role of the LNG Industry Unit in the Queensland Department of Employment, Economic Development and Innovation (DEEDI) and its role in liaising with local authorities, peak industry bodies and proponents to develop a whole-of-government response to proposals. Given the breadth of issues involved in CSG exploration, production and transportation, the benefits of a one stop shop are profound. Many NSW departments and agencies are experienced in dealing with other components of the resources sector, most notably the coal industry. ESG believes that a lack of understanding of the attributes of the CSG sector has created challenges as CSG exploration gathers pace in NSW. A dedicated CSG Industry Unit could become an effective repository for information and advice within the NSW State Government, allowing a reliable and useful bank of corporate knowledge to be established for the benefit of all NSW departments and agencies.

2. Introduction

Eastern Star Gas (ESG) is an ASX200, NSW-based owner and operator of petroleum licences. It holds extensive petroleum exploration interests in NSW. From its listing in 2001, ESG has been focussed on the exploration and development of natural gas resources and has, since 2007, been almost solely focussed on the development of the extensive natural gas resources known to exist in the coal seams of north-western NSW.

The chief project operated by ESG is the Narrabri Gas Project (NGP), located within Petroleum Exploration Licence (PEL) 238 (and Petroleum Assessment Lease 2 and Petroleum Production Lease 3, located within the boundaries of, but separately titled to, PEL238). Development of the NGP is subject to assessment under NSW planning legislation, initiated under the previous State Government as a Concept Plan in November 2009, and as a Preliminary Environmental Assessment in September 2010. Director General Requirements (DGRs) were issued for the NGP in December 2009.

Development of the NGP is also subject to approval under the Australian Government's Environmental Protection and Biodiversity Conservation Act.

On 18 July 2011, ESG announced that it had received an offer from Santos to acquire 100% of ESG. The Board of ESG has recommended that ESG shareholders accept the offer when they have the opportunity to vote on the proposed acquisition in late October 2011. Subject to approval, ESG will become a wholly-owned subsidiary of Santos shortly thereafter. Santos is an ASX-listed Australian oil and gas company with natural gas exploration and production interests across Australia, including NSW. Santos has indicated that, upon a successful acquisition of ESG, it will sell 20% of the NGP to TRUenergy, with Santos holding operatorship of the project.

3. Background to the NGP

The NGP has characteristics common to other coal seam gas projects – for example, the need to reduce pressure in the coal seam by first removing water to enable the gas to desorb from the coal and flow to the wellbore, a relatively small surface footprint of infrastructure compared to some other common energy sources and the ability for other surface activities to continue as normal. APPEA, the petroleum industry's peak body has a significant amount of material on its website (www.appea.com.au) that provides information about the industry's operation in general.

However, like all industries, there are differences between companies and, in particular given the natural variation of geological and environmental factors, between projects. Whilst the high degree of commonality between CSG operations allows a legislative framework to be used, to be effective it must also be sufficiently flexible to accommodate the variability that occurs within the industry, allowing projects to proceed whilst ensuring sufficient safeguards are in place to protect the environment and the community.

Three characteristics are pertinent to describing the NGP in relation to the broader CSG industry:

- The type of existing land use in the area the project is to be developed;
- The relatively unique geology of the NGP coals; and
- The location of the coal seams underneath, and separate to, the Great Artesian Basin (GAB).

3.1. Existing Land Use

The NGP is located to the south of Narrabri, largely within the greater Pilliga Forest region, colloquially known in and around Narrabri as the Pilliga Scrub. The NGP lies within the north-eastern corner of the broader Pilliga Forest. The State Forest historically has been extensively logged and remains open for logging as well as recreational activities such as pig shooting. The broader Pilliga Forest includes Nature Reserves that, whilst previously the subject of logging activity, are now closed to logging activity. The Nature Reserves are also closed to petroleum activity, including CSG exploration and production.

Under the proposed development of the NGP, aggregate clearing of the State Forest section will amount to a maximum of 2,410 hectares, equating to less than 0.5% of the broader Pilliga area. A portion of this area is only required for construction activities, and will be rehabilitated shortly thereafter (for example, clearing of forest for wellsites require approximately 1.2 hectares during initial drilling, but around 40% of this will be rehabilitated shortly thereafter, leaving sufficient distance between the forest and the wellhead for fire protection purposes. On cleared land, the wellsite area requirement is far less).

The area over which ESG is seeking approval to develop the NGP does include some private landholdings. Any CSG activity in these areas is subject to reaching agreement with the individual landholders on access terms. Furthermore, if ESG was to seek agreement with private landholders, production wells in the Pilliga will have been operating for many years and landholders will be able to see for themselves the low impact of the project.

3.2. Unique Geology

The coals targeted for the NGP are deeper than most CSG projects. The main target coal seam lies around 800 to 900 metres below surface.

One of the issues typically encountered with coals at depth is that the consequently greater overburden (ie rock strata above the coal) has a deleterious effect on permeability, making it harder for water and gas to flow through the coal. The coals of the NGP are unique on the Australian east coast in that they have a one-dimensional, near-vertical fracturing syatem. This, combined with the strength of the coal, means the overburden can be supported at depth without significant loss of permeability or productivity. The natural vertical fractures that provide this permeability extend from the base to the top of each coal seam - an architecture that can be visualised by considering a sliced loaf of bread, the gap between each slice providing a workable analogy for the fractures.

The vertical fractured architecture of target coals has been a key parameter in determining the optimal design of production wells for the NGP. Unlike other CSG projects, that may use a combination of well completion methods including hydraulic fracturing, cavity completion or under-reaming, ESG has determined that lateral (or horizontal) wells are the preferred completion method for development of the NGP. Lateral wells are drilled by steering the drillbit so that it travels horizontally as it enters target coal seams. Whereas other projects may use lateral well technology to maximise the length of well within coal (in order to overcome low permeability problems), the purpose of lateral wells at the NGP is to maximise connectivity with the extensive natural fracturing system.

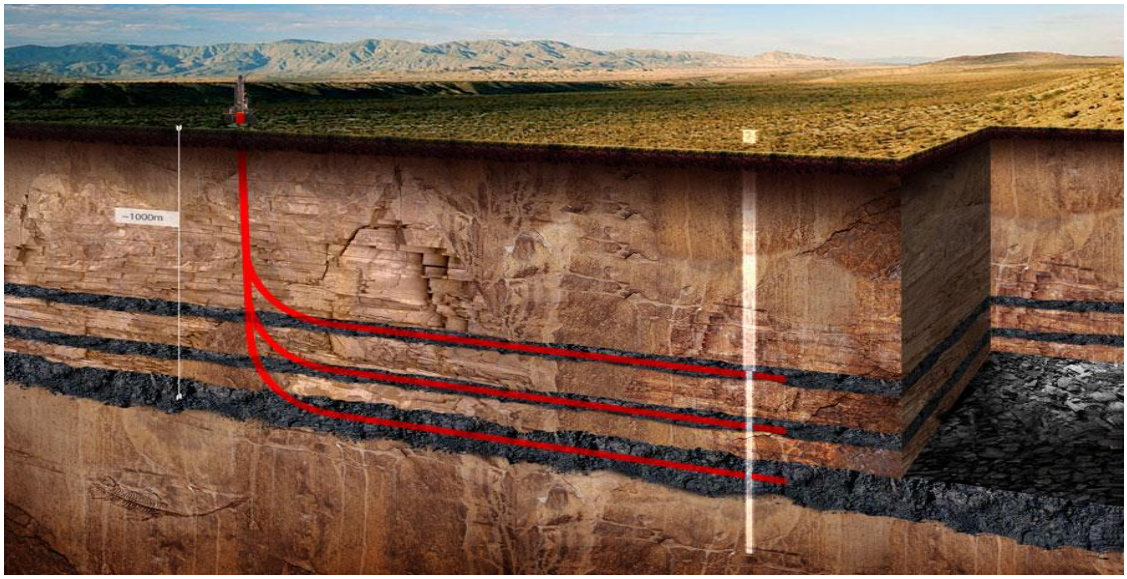

Figure 1: Diagrammatic representation of ESG's horizontal wells

3.3. Separation from the Great Artesian Basin

The depth of the NGP coals leads to another of its key characteristics. The coals are not part of the Great Artesian Basin (GAB), and not only underlie it but are separated from these aquifers by hundreds of metres of confining layers. Additionally, the water quality within the coal seams is too saline to be utilised to agriculture or domestic applications without expensive treatment. As a consequence, water produced in the de-pressuring of the coals

as a precursor to gas production is not drawn from sources that other water users in the community rely on.

4. Key Interactions with the Environment

4.1. The Pilliga

ESG is undertaking detailed environmental assessments of the potential impact on the Pilliga of the development of the NGP. A maximum of 2,410 hectares may be required to be cleared. However, as noted above, some of this clearing is temporary. Furthermore, as detailed engineering design of the project progresses, means of reducing this aggregate amount of clearing are being investigated.

In any case, the detailed Environmental Assessments that are being prepared identify potential impacts, and identify means of mitigating and managing these impacts. This detailed assessment will be provided to the NSW and Australia governments under their approval processes and, consistent with legislative requirements, will be available to the general public for review and comment.

Whilst these assessments are not yet complete, ESG anticipates that the development can occur in a manner that has minimal impact, and that full rehabilitation of cleared sites after their producing life will be able to occur.

4.2. The Great Artesian Basin

The gas (and water) produced from the NGP are from coals that underly the Great Artesian Basin, and have no hydraulic connection to the GAB. However, in recognition of the importance of groundwater resources to the community and state, ESG is undertaking additional steps to demonstrate this:

- ESG has commissioned independent modelling of the subsurface to test ESG's view of the hydraulic isolation. This modelling is based on the suite of data that has been gained by ESG through its exploration drilling to date, and other available sources;
- Modelling will continue to be updated throughout the life of the project, to ensure that the forecast remains that no interaction occurs; and
- Confirmation that production of water by the NGP has no effect on aquifers the community relies on will be undertaken through a detailed water bore monitoring program, to be run by ESG where private landholders agree to be a part of the program. Results of testing before and during production will be shared with the landholders.

To access the target coals, ESG must drill through the GAB. Three key factors ensure that this process poses no threat to the GAB:

- No contamination during drilling: the fluids used in drilling are of a standard equal to or higher than those employed by water users in drilling water bores. Furthermore, the wellbore is encased in steel which is cemented in place and pressure-tested, prior to drilling beyond the lowest reaches of the GAB;
- No contamination during the producing life of the well: the construction of the completed well, with steel casing from the coals all the way to the surface (cemented in place and pressure-tested; double casing through the GAB), provides a seal between the produced water and gas and the GAB.

- No contamination subsequent to the producing life of the well: at the end of the producing life of a well, it is “plugged and abandoned”. This process involves filling the steel-encased hole with cement, in 200 metre intervals, setting and pressure-testing of the cement. The resultant solid core of cement is very hard and envelopes the steel casing from the bottom of the hole to the surface. The structural integrity of the plugged hole is greater than the rock strata it passes through.

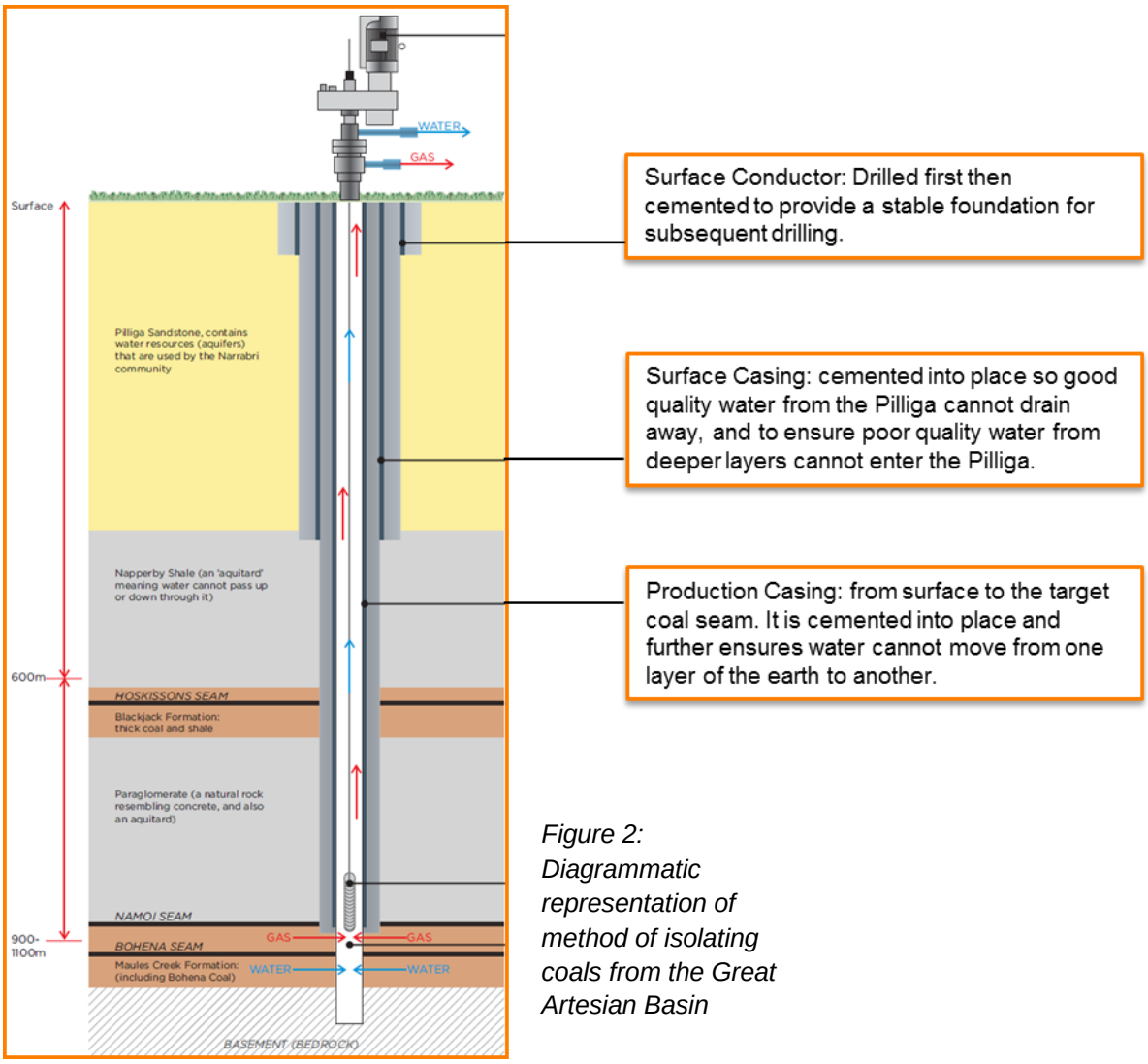

Figure 2: Diagrammatic representation of method of isolating coals from the Great Artesian Basin

4.3. Produced Water

Water produced from the target coals does not come from the GAB (in part evidenced by its salinity level and pressure relative to GAB aquifers) and due to its salinity, does require treatment if it is to be beneficially used. The NGP will use Reverse Osmosis (RO) to reduce this salinity to drinking-water standards (RO is being successfully used during the NGP’s pilot production phase and is the same technology used in large-scale desalination projects such as the plant at Kurnell in Sydney). The quality of this clean water is monitored.

The waste product of the RO process is a concentrated saline solution. The preferred method for dealing with this saline solution is currently being determined and will be set out in detail in the Environmental Assessment for government and public review. There are three main potential methods:

- Beneficial re-use: the salt in the NGP's produced water is primarily sodium bicarbonate, which is used in many applications. ESG is investigating the potential to develop a commercial-scale operation for the production of sodium bicarbonate using the NGP's produced water as a feedstock;
- Re-injection: the concentrated brine could be re-injected deep into layers not in hydraulic communication with GAB aquifers, potentially the target seams from which it came; and
- Concentration, removal and disposal at an approved waste disposal facility.

In all cases, containment of the untreated water and the saline concentrate will be contained and isolated from other sources of groundwater using lined and monitored ponds.

5. Key Interactions with the Community

5.1. Access rights

The NGP's development will be largely contained within State Forest. Access rights and obligations are set out in a long-term agreement executed by ESG and Forestry NSW. ESG anticipates that access to land held by private owners won't be sought for some years after the start of development of the NGP. Those private landholder will therefore have an opportunity to see how the project actually is rolled out over time, and assess for themselves ESG's statements about the low-impact nature of our activities.

ESG has previously stated that it will not force access to private landholdings. We remain confident of our ability to work with landholders to find mutually acceptable terms for access.

5.2. Implications for Narrabri and the region

ESG's operations have been focussed on Narrabri for years, and we have recognised the importance of being a part of that community. This is demonstrable through our policies of buying and employing locally wherever possible, and our active sponsorship and participation in community activities. In the year ending June 2010 alone, ESG injected around $15 million into the Narrabri economy and donations and sponsorships run to around $150,000 per annum.

Flow-on economic effects to the town of ESG's activities are also evident. ESG's contribution to Narrabri was formally recognised at the Narrabri Chamber of Commerce Advancing Narrabri Business Awards held on 2 September 2011, where ESG won the award for Business Supporting Local Business. ESG takes great pride in its role in the Narrabri business community.

In the development phase of the NGP, 200 long-term jobs (500 during construction) are expected. In addition, investment expenditure on the project is forecast to be around $1.3 billion in the first two years of construction alone. A further $1 billion will be invested as the well program rolls out over the project life.

5.3. Implications for NSW and Australia

In addition to the regional benefits, additional substantial investment and employment, both direct and indirect, will occur through the development of the NGP. The NGP's key initial markets are ERM Power's proposed 600 MW gas-fired power station in Wellington and ESG's proposed LNG Newcastle (LNGN) project. Direct investment in LNGN and the pipelines required to supply it and the power station is likely to be in the range of $1.5 billion to $2 billion.

Flow-on economic benefits will also result from these activities. Other identifiable benefits include development of a new export industry for NSW and reduced carbon footprint from generating power from gas rather than coal.

6. Key Interactions with Government

ESG notes that NSW Petroleum (Onshore) Act 1991 (the Act) was drafted at a time when the NSW CSG sector was almost non-existent and the company sees benefits in this Inquiry looking at ways to improve the Act to better reflect the needs of proponents and communities as the NSW CSG sector matures. ESG seeks to go above and beyond the specific requirements of the Act to ensure its activities are consistent with the intent of the Act. ESG sees significant benefits in improving the clarity of the Act, particularly around environmental issues and community engagement, to give proponents, regulators and the general public greater transparency around expectations and obligations.

ESG is also pleased that this Inquiry is investigating the interaction of the Act with other legislation and regulations. ESG complies with all relevant legislative requirements at State, Local and Federal level and takes its regulatory responsibilities very seriously. There is a broad range of legislation that covers the various activities involved with CSG. Notably, ESG is required to operate within the regulatory framework set out a number of pieces of legislation, policies and guidelines, including:

- The NSW Petroleum (Onshore) Act 1991
- The NSW Mining and Petroleum Legislation Amendment (Land Access Act) 2010
- Environment Protection and Biodiversity Conservation Act
- National Greenhouse and Energy Reporting Act 2007
- Environmental Planning and Assessment Act 1979
- Pipelines Act 1967
- Water Management Act 2000
- Protection of the Environment Operations Act 1997
- Forestry Act 1916
- Native Vegetation Act 2003
- Threatened Species Conservation Act 1995
- Roads Act 1993
- National Parks and Wildlife Act 1974
- Rural Fires Act 1997
- Catchment Management Act 1989
- Noxious Weeds Act 1993
- State Environment Protection Plans
- Infrastructure 2007 – SEPP Infrastructure
- Koala Habitat Protection – SEPP 44
- Major Projects, 2005 – SEPP Major Projects
- State Environment Planning Policies
- Mining, Petroleum Production and Extractive Industries, 2007
- Hazardous and Offensive Industries – SEPP 33
- NSW Biodiversity Strategy 1999
- Narrabri Council Local Environment Plan No 2

As one of the most advanced CSG explorers in NSW, ESG has had several years experience engaging with a range of departments and agencies at the State and Federal level. While ESG conscientiously adheres to the various legislative requirements listed above, the company believes that significant benefits could be derived from improved

coordination between the various departments and agencies who administer the above Acts in NSW. The CSG sector is unique and the industry warrants a unique regulatory approach from the NSW State Government. ESG notes with interest the role of the LNG Industry Unit in the Queensland Department of Employment, Economic Development and Innovation (DEEDI). The LNG Industry Unit acts as a one stop shop for CSG/LNG industry proponents seeking to engage with the Queensland State Government. The LNG Industry Unit liaises with local authorities, peak industry bodies and proponents to develop a whole-of-government response to proposals. The Unit is responsible for policy development relevant to CSG. Given the breadth of issues involved in CSG exploration, production and transportation, the benefits of a one stop shop are profound.

Given the potential for inconsistencies between elements of the NSW Petroleum (Onshore) Act and other pieces of NSW legislation, ESG believes there is merit in the NSW Government exploring the establishment of a similar CSG Industry Unit. ESG has received conflicting advice from different NSW departments and agencies on numerous occasions, particularly around planning and environmental issues. Many NSW departments and agencies are experienced in dealing with other components of the resources sector, most notably the coal industry. The CSG sector has markedly different exploration, production, transportation and commercial fundamentals to the coal sector and ESG believes that a lack of understanding of the attributes of the CSG sector has created challenges as CSG exploration gathers pace in NSW. A dedicated CSG Industry Unit could become an effective repository for information and advice within the NSW State Government, allowing a reliable and useful bank of corporate knowledge to be established for the benefit of all NSW departments and agencies. Such a Unit could ultimately improve the policy making apparatus for the benefit of proponents, communities and the State as a whole.

7. Conclusion

The Narrabri Gas Project offers an opportunity for a major development in regional New South Wales, bringing investment and jobs to the north-west. In addition to the regional benefits, this large new gas resource will provide a fuel for power generation with a reduced carbon footprint and foster the development of a new export industry, with the complementary development of a Liquefied Natural Gas facility at Newcastle.

Importantly, the development of the Narrabri Gas Project will be undertaken in a manner that minimises any real or perceived negative impact – water produced will be from completely separate resources than those used by regional communities, several years' history of development activity will be witnessed by the local farming community before any request to develop wells on private land is made, and the minimal clearing required of the Pilliga State Forest will ultimately be fully rehabilitated.

Eastern Star Gas prides itself in being a working, supportive member of the Narrabri community, building a Narrabri-based asset for the long term.