Submission No 447

INQUIRY INTO COAL SEAM GAS

Organisation: Australian Petroleum Production and Exploration Association

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NSW Legislative Council Coal Seam Gas Inquiry

APPEA Comments

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1. Introduction

The Australian Petroleum Production & Exploration Association (APPEA) is the peak national body representing the oil and gas exploration and production industry, including the coal seam gas (CSG) and liquefied natural gas (LNG) industries. Collectively our membership accounts for around 98 per cent of Australia's oil and gas production.

The opportunity presented by CSG for Australia is unmatched by any other commodity. Australia's CSG resource places the nation in a position to maintain long-term, clean energy security domestically and also internationally through LNG exports. CSG makes it possible for Australia to meet growing energy needs over the coming decades while incorporating a strategy to curb greenhouse emissions and address the risk of global climate change.

Like all societies around the world, Australia faces three major, interdependent challenges:

1. to maintain and expand energy supplies to meet growing consumer demand

2. to address the social and ecological risks posed by rising greenhouse gas emissions and the potential for human−induced climate change, and

3. to continue economic growth in line with community expectations.

The development of Australia's CSG resource should be central to government planning aimed at achieving these objectives. In doing so, Australia can reduce its emissions intensity by developing its CSG resource in a way that will drive economic growth in regional areas and reinvigorate regional towns.

In addition to this submission, APPEA has commissioned for the Committee's consideration an analysis of the economic significance of CSG in New South Wales from ACIL Tasman, an independent economic consultancy relied upon for advice by many entities in Australia including the NSW and Australian Governments.

The ACIL Tasman report assesses two scenarios:

1. A Base Scenario under which NSW CSG production continues to grow to support use in the NSW market

2. A CSG Freeze Scenario under which no additional NSW CSG growth occurs beyond current production levels.

We anticipate that an additional supplementary report by ACIL Tasman that will examine the effect of NSW CSG development of a scale that would support LNG export will be ready before the Committee undertakes hearings in Sydney on 17 November 2011.

2. What is coal seam gas and how it is produced

2.1. What is coal seam gas

CSG is natural gas from coal and is the purest form of natural gas (methane). As an end use product it is identical to natural gas and can be used for the same purposes including electricity generation, domestic heating and cooking, and also as a primary feedstock in

fertiliser production. Methane is odourless, colourless, and non-toxic. Other sources of methane include cattle and other animals, garden compost, and decomposing organic matter in swamps and rivers.

In terms of potential resources, there may be in excess of 250 trillion cubic feet of CSG in Australia[1], equivalent in energy content to over 40 billion barrels of oil and enough to run a city of five million people for 1000 years.

2.2. CSG exploration and production

CSG exploration and production can be divided into four basic stages:

1. Core wells: These take physical samples of rocks which are analysed in the laboratory for properties such as gas content. Core wells may be drilled at a density of approximately one every 30 km^2.

2. Seismic: In some cases more information is required to understand the depth and geology of the resource under the ground and this is provided by seismic.

3. Pilot test wells: Also known as appraisal wells these are drilled to demonstrate that gas can flow to the surface in commercial volumes. Pilot test wells are normally drilled in groups of three to five with each well approximately 750m apart and each pilot test spaced several kilometres apart.

4. Production wells: These are drilled to supply gas to customers and vertical wells may be spaced some 750m apart. Horizontal wells (separate laterals within the coal seams) may be clustered on pads and more widely spaced. One CSG well on a 15m x 15m plot can produce the equivalent energy as 85,000 tonnes of coal.

The above estimates are provided as a guide only as the nature of each CSG project is tailored to suit landholder and environmental requirements in addition to geology. For these reasons there is no one-size-fits-all solution for CSG development.

2.3. Well construction

CSG wells are the lifeblood of the CSG industry and represent a major investment by CSG companies. A great deal of effort goes into their construction to ensure that wells are isolated from overlying geological strata, including overlying aquifers. They are designed and constructed using proven procedures and equipment. An unsuccessful well that leaks water or gas will be unproductive and must be sealed and redrilled at great expense.

CSG wells use essentially the same drilling technology as that used by the water bore drilling industry, the geothermal industry, and the mining industry. Relative to water bores CSG wells are constructed and completed to a significantly higher standard to ensure well isolation and control.

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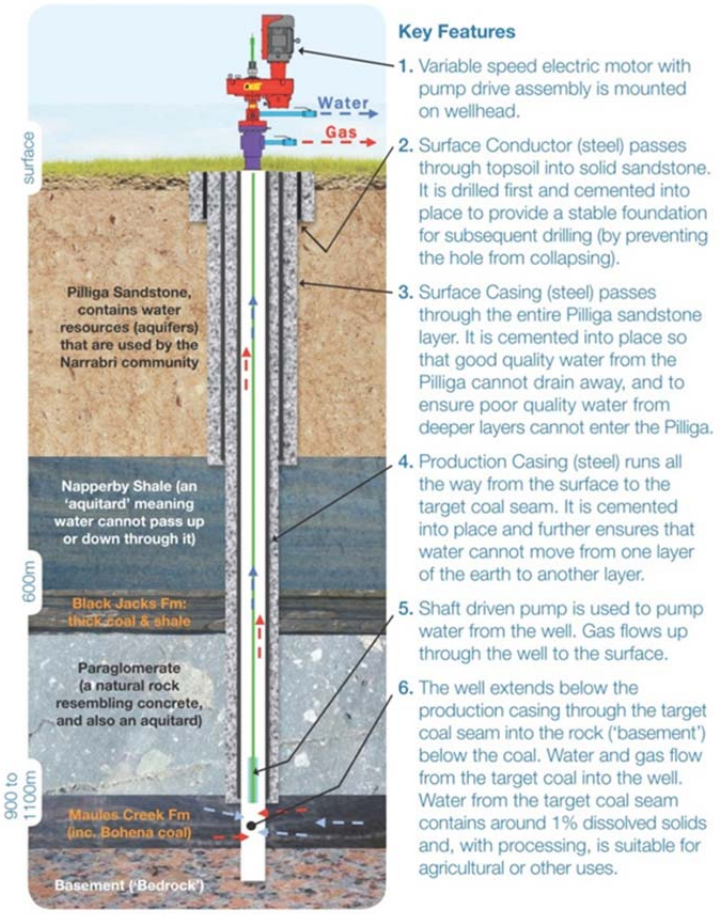
[1] *Australian Energy Resources Assessment*, Australian Government, http://www.abare.gov.au/publications_html/energy/energy_10/ga_aera.html

A basic schematic of a CSG well is shown in the figure below, however well design varies to account for the geology of the area.

Figure 1 – Basic schematic of a CSG well



2.4. Well completion methods

Coal seams typically consist of a matrix of natural fractures that allow gas and water to move through the rock to a wellbore. However, these may allow only a slow rate of flow. After a well is drilled down to the coal seams and isolated from the overlying strata, work may be undertaken to increase the flow of gas into the wellbore to commercial rates.

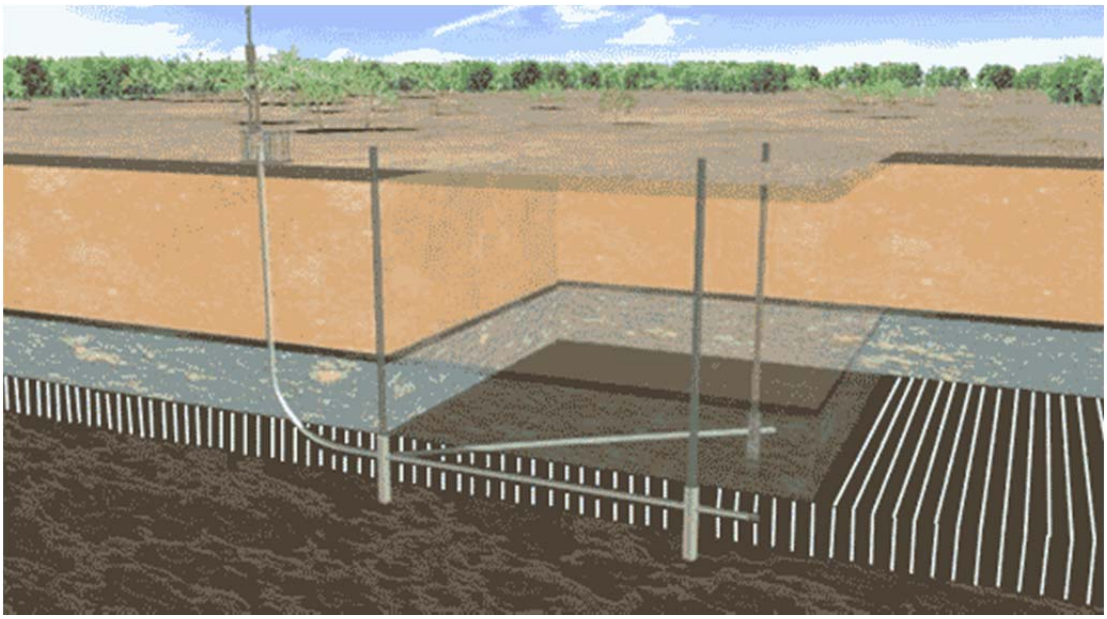
A number of methods have been developed to increase the flow with each one typically suited to different coal characteristics. Two methods that have been employed in NSW are:

- drilling long horizontal wells through the coal seam; or
- fracture stimulation of the coal seam to connect the wellbore to the existing natural fracture network

Horizontal well completions

The figure below shows a horizontal well completion. These are undertaken to increase the surface area of the coal seam that is exposed to the well, which increases the rate of gas flow.

Figure 2 – Horizontal well completion



Fracture stimulation

Fracture stimulation (or 'fraccing') is a process that uses pressure to create an artificial fracture network to allow gas to flow to a well to improve the gas production rate from the well.

Fraccing has been done safely for over 60 years in the United States, where more than one million wells have been fracced, and in Australia since 1968. Government assessments of the facts and science of the process have concluded that it is a safe practice.

For example, the United Kingdom House of Commons released a report on shale gas and fraccing in May 2011[2] which found:

"…no evidence that the hydraulic fracturing process involved in shale gas extraction – known as 'fracking' - poses a direct risk to underground water aquifers provided the drilling well is constructed properly."

The findings of the House of Common report are consistent with those of the 2004 United States Environmental Protection Agency study[3] which was specific to CSG and concluded that "that the injection of hydraulic fracturing fluids into [coal seam gas] wells poses little or

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[2] *Energy and Climate Change Committee - Fifth Report Shale Gas*, http://www.parliament.uk/business/committees/committees-a-z/commons-select/energy-and-climate-change-committee/news/new-report-shale-gas/

[3] *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs Study* (2004), http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_coalbedmethanestudy.cfm

no threat to [underground sources of drinking water]". The EPA is currently updating this study.

Contents of fluids used in fracture stimulation are not secret and can be found on the APPEA website www.appea.com.au/images/stories/mb_files/APPEA_fraccing_chemicals.pdf.

3. Economic benefits

As noted above, APPEA has commissioned ACIL Tasman to undertake a study of the economic significance of CSG in New South Wales. The study compares economic outcomes under a scenario in which New South Wales CSG production expands steadily so that it becomes the main source of gas supply in the state (the Base Scenario) with an alternative scenario in which NSW CSG production does not expand beyond current levels (the "CSG Freeze" Scenario).

The Study, provided in full as an attachment to this submission, finds that the "CSG Freeze" Scenario would result in:

Gas market impacts

- A reduction in overall gas consumption in Eastern Australia compared to the Base Scenario, with the gap widening over time to 139 PJ/ per annum (PJ/a) by 2035
- Gas consumption in NSW would be up to 25 PJ/a lower.
- Wholesale gas prices between 20% and 25% higher in NSW, Victoria, South Australia and Tasmania; 8% to 9% higher in Queensland by 2030
- Wholesale gas prices (real 2010 $/GJ) in Sydney $1.34/GJ higher on average relative to the Base Scenario over the period 2025 to 2035.

Electricity market impacts

- Increased dispatch of coal-fired plant with less gas used for electricity generation compared to the Base Scenario, leading in turn to an increase in CO2 emissions from the electricity generation sector of about 4 million tonnes per year by 2030.
- Electricity prices generally higher in all regions of the Eastern Australian electricity market, with the price gap increasing over time and strongest in Victoria, South Australia and Tasmania
- NSW wholesale electricity prices on average 7.4% higher relative to the Base Scenario over the period 2020 to 2030.

General economic impacts

- A reduction of around $4.3 billion (real 2011 dollars) in direct capital investment in upstream CSG development and loss of around $2.7 billion of associated recurrent operating expenditure foregone in New South Wales over the period to 2035

- While these losses will be at least partly offset by increased investment and expenditure on gas production elsewhere in the country, the net result sees a reduction in real NSW Gross State Product of $7.15 billion in total over the period to 2034–35.
- This equates in net present value terms (7% discount rate) to a $2.4 billion reduction in real value-added.
- NSW real income $15.5 billion lower in total over the period to 2034–35 ($5.1 billion lower in net present value terms which equates to approximately $700 per NSW resident).
- Total employment in New South Wales 1,361 lower per year on average (FTE basis).
- New South Wales government revenue $1.5 billion lower in total over the period to 2034–35 (which equates to $174 million in net present value terms at a 7% discount rate).

The positive effect of CSG development in NSW is unambiguous.

Similar benefits are seen in the only jurisdiction in Australia where the CSG industry is developed to a significant degree. Modelling by the Queensland Government shows that a CSG-LNG industry with a capacity of 28 million tonnes per annum (a mid-range estimate) would create more than 18,000 jobs, generate $850 million in annual royalties, and result in capital investment of $40 billion.

Most jobs and economic activity associated with the industry will be in regional areas, and the towns of the Surat Basin, where most activity is centred, are now booming. Today, there are more than 8,500 people working in the CSG industry and the sector supplies one third of Eastern Australia's natural gas.

The 2011-12 Queensland State Budget clearly shows the effects of the industry on the State's economy. Growth in investment is forecast to increase by 27.75% in 2011-12 and remain above 21% in 2012-13, with much of this growth attributable to CSG industry investment, with economic growth forecast at 5% and 5.25% in 2011-12 and 2012-13 respectively. This is in contrast to the NSW economy which in the 2011-12 State Budget is forecast to grow by just 2.5%.

APPEA understands that with any growing economy issues such as a higher cost of living in some towns, competition for skilled labour, stretched government services (e.g. health and local councils) and increased demand on infrastructure such as roads, may arise.

The Government and industry clearly recognise these challenges and Environmental Impact Statement commitments for CSG projects address cost of living, competition for skilled labour, impacts to government services and demand on infrastructure amongst other things. Proponents are also required to develop a Social Impact Management Plan which details how these commitments will be realised.

APPEA agrees that the impact of resource industry growth on regional towns should be properly managed by government and industry working together and notes that challenges that are associated with growth are far preferable to managing economic decline or stagnation.

4. Greenhouse benefits and other emissions

Australia's natural gas reserves have the unique potential to significantly reduce greenhouse gas emissions at low cost. This can occur both within Australia through the greater use of natural gas (particularly for electricity generation), and throughout the Asia Pacific region by LNG exports.

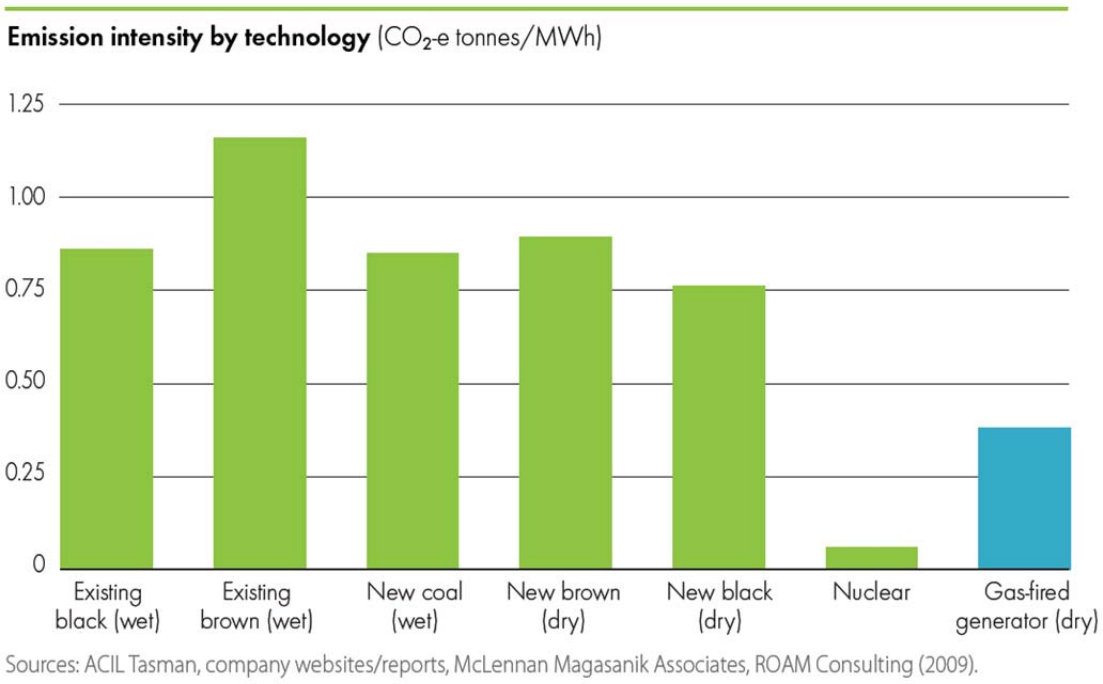
Gas fired power is not limited by weather conditions or the time of day, and can be brought online quickly, making it suitable for both base load and peaking power generation. When used in its own right to generate electricity, the energy produced from CSG produces up to 70 per cent less greenhouse gas emissions than current coal-fired power generation. Further, when combined with intermittent, low emission energy sources such as wind and solar to provide reliable energy supply, gas can make an additional contribution to reducing Australia's greenhouse gas emissions.

As LNG, CSG can also cut emissions in overseas export markets. For every tonne of greenhouse gas emissions generated by LNG production in Australia, up to 4.3 tonnes are avoided in Asia when this gas is substituted for coal in electricity generation. A CSG-LNG project exporting 10 million tonnes of LNG per annum to China could avoid more than 32 million tonnes of global CO2 emissions each year, and over a 30-year project life, such a project could avoid 968 million tonnes of CO2, almost double Australia's total annual greenhouse gas emissions[4].

A comparison of emissions intensity by technology is shown in the figure below.

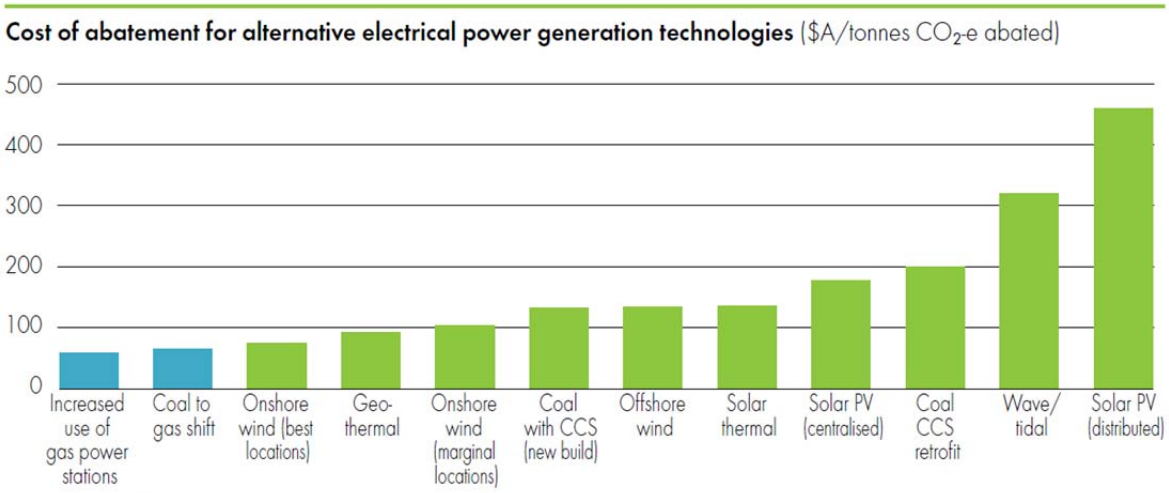
[4] http://www.appea.com.au/images/stories/steve_files/appea%20csg%20greenhouse%20gas%20emissions%20study%20executive%20summary.pdf

Figure 3 – Emissions intensity by technology



Further, as shown in in Figure 4 below, moving to gas fired generation is the lowest cost abatement technology for power generation.

Figure 4 – Cost of abatement for alternative electrical power generation technologies



Source: ClimateWorks Australia (2010). Note: The ClimateWorks Australia report does not consider the cost of nuclear power in Australia.

4.1. Relative whole-of-lifecycle emission intensity of CSG versus other energy sources

A number of recent public assertions have sought to suggest the greenhouse gas emissions of CSG are unknown, not well understood, and/or result in lifecycle emissions from CSG being comparable to coal fired power generation. This is not true and such claims are made in the face of clear evidence and scientific consensus to the contrary.

Fugitive emissions are known and measured. Since the passage of the *National Greenhouse and Energy Reporting Act 2007* every major gas company in Australia – CSG or otherwise – has been legally required to monitor, measure or estimate, and report all emissions associated with its operations to the Department of Climate Change and Energy Efficiency; including fugitive emissions and emissions associated with venting, combustion, and flaring. No emissions are undisclosed.

Fugitive emissions - whether associated with coal seam gas or conventional gas - make no difference to the fundamental point that emissions associated with gas-fired electricity are up to 70 per cent fewer than traditional sources of electricity generation. This is illustrated in work published by:

- The CSIRO www.csiro.au/science/EnergyFuturesForum.html
- The International Energy Agency www.iea.org/co2highlights/CO2highlights.pdf, and
- Sydney University: www.isa.org.usyd.edu.au/publications/documents/ISA_Nuclear_Report.pdf

The Australian Energy Market Operator has also published: *Fuel resource, new entry and generation costs in the National Energy Market* - undertaken by ACIL Tasman. This shows the relative emission intensity of Australia's existing, and planned, power stations.

Importantly it also measures "fugitive emission factor – that is, emissions relating to the production and transport of fuel – are also provided (in kg CO2-e/GJ of fuel)."

The report shows that with fugitive emissions included, Queensland's CSG-fired power stations such as Darling Downs, are around 70% less greenhouse intensive than Victoria's Hazelwood plant. It also shows that planned CSG-fuelled plants, such as the Spring Gully project – will be closer to 75% cleaner than Hazelwood.

Some of the relevant information follows, but the report can be found at http://www.aemo.com.au/planning/419-0035.pdf.

AEMO Report Table 19 Emission factors and intensity for existing and committed QLD stations

Generator	Combustion emission factor (kg CO2-e/GJ of fuel)	Fugitive emission factor (kg CO2-e/GJ of fuel)	Total emission factor (kg CO2-e/GJ of fuel)	Total emission intensity (tonnes CO2-e/MWh sent-out)	Total emission intensity (tonnes CO2-e/MWh generated)
Condamine	51.3	2.0	53.3	0.40	0.39
Darling Downs	51.3	2.0	53.3	0.42	0.39

Data source: ACIL Tasman, various sources

AEMO Report Table 22 Emission factors and intensity for existing and committed VIC stations

Generator	Combustion emission factor (kg CO2-e/GJ of fuel)	Fugitive emission factor (kg CO2-e/GJ of fuel)	Total emission factor (kg CO2-e/GJ of fuel)	Total emission intensity (tonnes CO2-e/MWh sent-out)	Total emission intensity (tonnes CO2-e/MWh generated)
Hazelwood	93.0	0.3	93.3	1.53	1.37
Loy Yang B	91.5	0.3	91.8	1.24	1.15

Data source: ACIL Tasman, various sources

AEMO Report Table 23 Emission factors and intensity for advanced proposals

Generator	Combustion emission factor (kg CO2-e/GJ of fuel)	Fugitive emission factor (kg CO2-e/GJ of fuel)	Total emission factor (kg CO2-e/GJ of fuel)	Total emission intensity (tonnes CO2-e/MWh sent-out)	Total emission intensity (tonnes CO2-e/MWh generated)
Spring Gully	51.3	1.0	52.3	0.38	0.37

Data source: ACIL Tasman, various sources

4.2. Other emissions associated with power generation

Increased use of natural gas also offers other environmental benefits relative to coal fired power generation including reduced particulates emissions, reduced emissions of sulphur dioxide (an important contributor to smog and acid rain), and significantly lower demand for water for power station cooling.

Emissions factors per unit of energy input from gas, oil, and coal are shown in the table below.

Figure 5 – Emissions factors per unit of energy input

Emission factors	Pounds / Billion BTU		
	Gas	Oil	Coal
Carbon dioxide	117k	164k	208k
Nitrogen oxides	92	448	457
Sulphur dioxide	0.6	1,122	2,591
Particulates	7	84	2,744

Notes to the table of emission factors:

No post combustion removal of pollutants. Bituminous coal burned in a spreader stoker is compared with No. 6 fuel oil burned in an oil-fired utility boiler and natural gas burned in uncontrolled residential gas burners. Conversion factors are: bituminous coal at 12,027 Btu per pound and 1.64 percent sulphur content; and No. 6 fuel oil at 6.287 million Btu per barrel and 1.03 percent sulphur content - derived from Energy Information Administration (EIA), Cost and Quality of Fuels for Electric Utility Plants (1996).

Source: Energy Information Administration (IEA), Office of Oil and Gas. Carbon Monoxide: derived from EIA, Emissions of Greenhouse Gases in the United States 1997, Table B1, p. 106. Other Pollutants: derived from Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Vol. 1 (1998).

5. Water

CSG production involves the coproduction of water as the gas is held in coal seams by water pressure and this must be reduced for gas to flow. Water production for each well peaks in the

early stages of well life before decreasing. The water produced is generally of marginal or poor quality and is generally not tapped by other water users for these reasons. Extracting water from coal seams can also cause gas to flow into farm bores tapping those seams – a fact known by farmers in the Surat Basin for many decades.

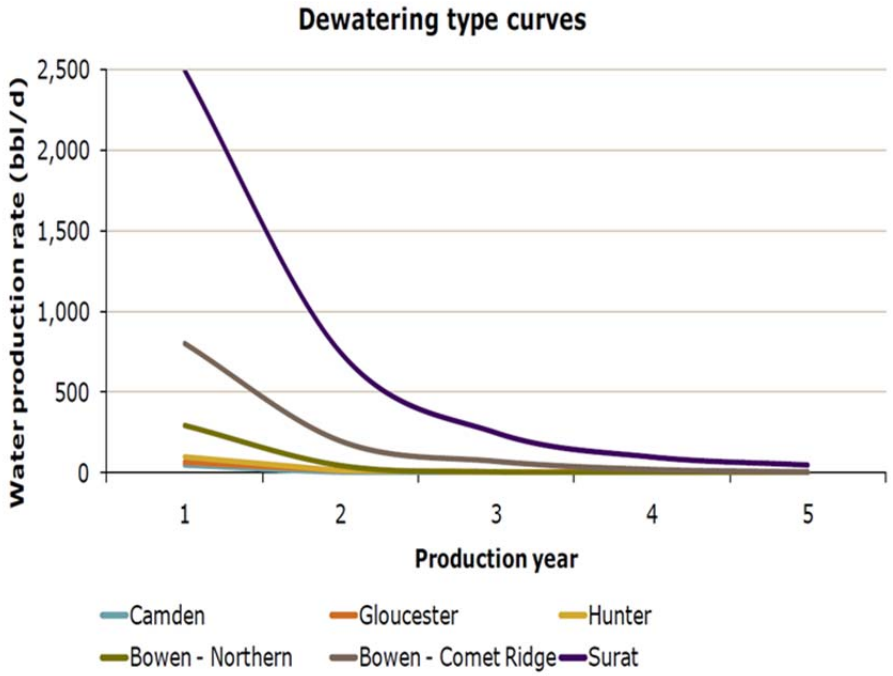
CSG companies are not consumptive users of water in the traditional sense as the water produced is treated and beneficially reused either by the company or another water user, or can be reinjected underground.

Through the treatment and beneficial use of water extracted from coal seams, the CSG industry is providing the economic impetus to transform a poor quality source of water into clean water source that can be used for agriculture or town water supply.

In general, NSW differs markedly from the Queensland main CSG producing area, the Surat Basin, in terms of water extraction associated with CSG as the volume of water produced varies considerably depending on geology and as such varies from location to location. Even though similar in age and type to the Permian Bowen Basin coals in Queensland, the produced water volumes are generally less and the water quality a little more saline than these basins in Queensland.

As shown in the figure below, the experience of the industry to date is that CSG wells in NSW produce less water than those in the Surat Basin in Queensland. Water quality is generally poorer because of the lower aquifer permeabilities, longer residence times, and lack of connectivity with shallow aquifers, steams and recharge areas. In this regard, it is notable that the higher salt content of coal seam water relative to the aquifers relied upon for agriculture is a clear indication that the coal seams are geologically isolated from other aquifers – if this were not the case, water quality would be homogenous.

Figure 6 – CSG dewatering curves by basin



Groundwater extraction and by extension, the quantity of water that may be available for beneficial uses such as irrigation and industry, must, therefore, be considered on a case by case basis.

In NSW CSG water extraction is regulated by water sharing plans (WSPs). WSPs establish rules for sharing water between the environmental needs of the river or aquifer and the consumptive needs of water users. Aquifer access licences and aquifer interference approvals apply (or will soon apply) to CSG dewatering activities, and there are different works and use approvals to differentiate between different types of water use such as town supply, rural domestic supply, stock watering, industry and irrigation.

Consequently, in NSW there is no difference between the water extraction rights of an irrigator, for example, and a CSG company. Licences have equal validity and licensees have equal access to the water source.

The statutory planning and approvals process in NSW aims to ensure there is no impact on the environment, or on the ability of existing water users to access water from the issuance of new water rights. There are, however, fallback provisions (such as restricting water extraction) available to the Minister if other water users are affected. Where there is a potential impact on an overlying aquifer from water extraction, the extractor is required to purchase a water right in that overlying aquifer in addition to their own water right. There are also 'make good' requirements in some water sharing plans, and these apply to all water users.

6. Land access

The resource industry in Australia is founded on the basis that the State owns subsurface resources (including groundwater resources) and issues the rights to explore and produce to third parties. A return to the community is then provided through secondary taxation arrangements such as royalties.

Under this arrangement, resource proponents are given access by the Government to land to explore for and produce resources, and the NSW Government requires proponents to enter into access arrangements with private landholders and pay compensation.

In NSW, petroleum companies seeking to explore for or produce oil or gas on privately owned land must enter into a land access and compensation agreement. If agreement cannot be reached then a Ministerial intervention can be sought, however such an action is rarely if ever requested.

In NSW, compensation can be paid for:

- damage to the surface of land, to crops, trees, grasses, or other vegetation (including fruit and vegetables) or to buildings and improvements, being damaged, which has been caused by or which may arise from prospecting operations;

- deprivation of the possession or of the use of the surface of land or any part of the surface;

- severance of land from other land of the landholder;

- surface rights of way and easements;
- destruction or loss of, or injury to, disturbance of or interference with stock;

  damage consequential on matters referred to in the legislation..

Access agreements negotiated with landholders are similarly comprehensive, and cover matters such as when access is permitted, the activities to be undertaken and their location, and conditions to be observed by proponents.

With over 1,800 access agreements in place in Queensland alone and no companies seeking compulsory access, APPEA considers that there is ample evidence that private landholders, agriculture, and the CSG industry can, and do, coexist successfully. By providing a stable long-term income to landholders, and potentially a new supply of water separate from existing water rights, the CSG industry will also open up new opportunities to landholders in terms of their ability to secure finance for property improvement and other activities.

APPEA notes that claims have been made with respect to a perceived negative impact of CSG activity on the value of agricultural land. We are not aware of any evidence provided in support of such claims, but note that were it proven, such an impact would be compensable under NSW law.

7. Food security and agricultural activity

Prime agricultural land is an important finite resource. CSG has a relatively small footprint on the land surface and therefore previous government assessments have concluded that the industry can coexist successfully with agriculture.

CSG does not destroy land productivity as more invasive resource industries may and there is flexibility in the placement of CSG production facilities, which do not permanently alienate the land. CSG producers also have strict rehabilitation requirements placed on them under environmental legislation and the conditions of environmental authorities that apply to development activities.

During the construction phase of CSG infrastructure on a property, there may be disruption to farming and livestock operations and this would be subject to appropriate compensation. However, during the longer term operations phase of a CSG project, only limited impact on farming and livestock operations occurs. There are already in existence CSG developments on properties that demonstrate CSG operations and normal farming and livestock operations can coexist.

There have been assessments of the impact of CSG activity on the sustainability of agricultural land as part of the environmental approvals process. In Australia, these have primarily occurred in Queensland as most industry activity occurs in that State. Queensland has recently introduced a policy to protect prime agricultural land after extensive consultation with a broad range of stakeholders.

The impact of CSG activity on agricultural productivity was examined during the development of this policy and the final policy states the following:

"*Well-designed CSG operations may be able to be accommodated under this policy without permanently alienating the land. For example, gas wells and pipelines are usually considered to have a temporary impact as the land can be restored back to strategic cropping land when the development ends. This type of infrastructure carried out in an appropriate manner may be able to proceed on strategic cropping land.*

However, high-impact CSG infrastructure such as water storage ponds and gas compression stations may permanently impact on strategic cropping land and a proponent would not be able to undertake these activities in Strategic Cropping Protection Areas, except in limited 'exceptional circumstances'.

In Strategic Cropping Management Areas, proponents would be assessed to ensure that they make all reasonable efforts to avoid and minimise any impacts on strategic cropping land. Any proponents of CSG infrastructure that is unable to avoid strategic cropping land and likely to cause its permanent alienation will be required to mitigate their impacts to ensure Queensland's agricultural cropping productive capacity is maintained.

It is important to recognise that some CSG companies are already making efforts to structure their developments in a way which facilitates co-existence with strategic cropping land. For example, the Queensland Government is aware of CSG proponents who have committed to actions such as:

- *increasing the spacing between wells and adopting a flexible approach to the placement of wells (for field development);*
- *undertaking a trial of constructing and restoring a transmission pipeline on intensively farmed land (for major pipeline development) using world-leading practices to demonstrate that soils can be removed and replaced in layers to maintain the existing soil profiles; and*
- *ensuring that the area can be rehabilitated with precision to minimise impacts on farming businesses.*

These actions seek to facilitate CSG operations in a manner that allows them to co-exist with strategic cropping land, and are a positive response to the strategic cropping land policy."

In NSW, the Department of Planning and Infrastructure (DPI) has announced a range of Strategic Regional Land Use initiatives to address community concerns over potential land use conflicts. For example, the DPI has introduced the following arrangements pending the implementation of its Strategic Regional Land Use Policy:

- a requirement that all new coal seam gas, petroleum extraction and coal applications be accompanied by an Agricultural Impact Statement. Agricultural Impact Statements will require an assessment to identify what potential impacts a project may have on agricultural land;
- public notification of Guidelines which will inform the assessment of impacts on strategic agricultural land from proposed developments; and
- development of an Aquifer Interference Regulation which will introduce a suite of new measures to regulate activities that impact on aquifers.

8. Health

The CSG industry is extremely serious about the health and safety of its workers and the public. CSG as extracted from the ground is typically 98-99% methane, a non-toxic gas used safely throughout the world for heating and cooking in homes. Methane is also lighter than air and therefore, when exposed to the atmosphere, does not collect at ground level.

While some have alleged adverse health impacts associated with CSG extraction, no credible evidence has been provided to support these claims. This is in marked contrast to the standards expected, rightly, of the industry itself which must justify and provide scientific evidence in support of all that it does.

APPEA strongly believes that government regulation should be based on a balanced consideration of facts and scientific evidence, not unsubstantiated claims, myths and allegations dressed up as 'the precautionary principle'. We encourage the Committee to ensure that all material it takes into consideration is evidence-based.

9. Conclusion

The CSG industry is an economic, social and environmental game changer for Australia. It's development in Queensland is transforming the State's economy and will underpin economic growth for decades to come. NSW could soon be on the same trajectory. At the same time, the industry is producing a low emissions energy source that will enable Australia and our trading partners to reduce greenhouse emissions at low cost.

The industry is highly scrutinised and regulated, with every aspect of the major LNG projects and the industry more generally, scientifically examined and assessed. To obtain environmental approvals CSG-LNG projects have gone through an assessment process lasting several years and the Queensland Government has taken a cautious approach to environmental conditioning. The assessment process will be ongoing with monitoring and an adaptive conditioning process for the life of projects. This intensive process not only ensures the highest environmental standards are met but, in the context of water, will also greatly add to the already substantial body of knowledge of groundwater resources in the areas where the industry operates.

We urge the Committee to support the responsible and sustainable development of this important resource.