

Submission  
No 287

## INQUIRY INTO COAL SEAM GAS

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## Executive Summary

### Environment

- Coal Seam Gas is one of the cleanest, safest and most useful forms of energy. Coal Seam Gas's practical applications are that it can be used as a fuel to fire an electricity generator or for heating and cooking.
- Coal Seam Gas produces up to 70% less greenhouse gas emissions than coal-fired power generation. Generating electrical power from gas is the cheapest means of reducing greenhouse gases (\$/tonne of GHG) other than curtailing consumption.

### **CSG technology is already established, not new, and is being managed safely.**

- The Coal Seam Gas industry has operated internationally for over 30 years and has also operated in Queensland for over 16 years. It uses well established oil and gas technology.
- Metgasco understands the importance of protecting groundwater resources and utilises industry recognised practices to protect aquifers.
- Metgasco has not used fracking in its CSG operations but fracking has been used safely around the world for more than 60 years and in Australia for several decades. Its use has been reviewed and approved by governments in Northern America and England. There is no credible evidence that hydraulic fracturing impacts groundwater aquifers.

### **CSG can co-exist with other land uses**

- Gas exploration and development can co-exist with other land uses. Metgasco works in a constructive manner with landowners, respecting their needs. To date Metgasco has more than 300 different agreements with landowners, all of which have been negotiated on a voluntary basis.
- Land access payments to landowners provide an additional source of income for working farmers. An Investment Advisory company has estimated that the annual payment is ~5-10 times the value of agricultural output foregone from the land used for Coal Seam Gas operations.

### **The industry is already regulated**

- The NSW upstream gas sector is well regulated. Metgasco recognises the need for a strong and effective regulatory body and seeks regulations that are based on sound risk management principles and science.



- Moratoriums are not justified. The industry is already understood and regulated and the processes involved in the approval of exploration and production activities. It is the case by case reviews that determine acceptability. Industry wide moratoriums are ineffective.

### **NSW Economy**

- Development of the gas resources in New South Wales is important to supply clean energy to local communities, establish an industry capable of delivering jobs, economic growth and business opportunities to regional centres and to meet growing NSW power requirements.
- The royalties paid to the NSW government will clearly depend on the extent its coal seams are developed, but if the Queensland experience is an indication of future impact then NSW will experience significant economic growth as a result of CSG.
- Metgasco is committed to building a strong regional energy business in northern NSW and to creating jobs and economic opportunities for local residents.
- Metgasco and its CSG competitors have explored and invested in good faith and need the support of a government that is open for business in the form of timely exploration and development approvals.

### **Communication**

- Metgasco recognises that as part of the broader coal seam gas industry that it must communicate and engage with the Northern Rivers community to demonstrate the value that it adds.
- Metgasco also believes the government has a role in explaining to the community the benefits of the industry and the safety measures that are in place.



## **Introduction**

Metgasco Limited is pleased to provide input to the Inquiry into Coal Seam Gas by the NSW Legislative Council's General Purpose Standing Committee No. 5.

Metgasco Limited ("Metgasco" or "the Company") and its predecessors have been operating for 10 years and was listed on the ASX(ASX Code:MEL) on 24 December 2004. Headquartered in Sydney and with a regional office in Casino Metgasco is exploring and developing gas resources in the Clarence Moreton basin in northern NSW. Metgasco is solely focussed on developing energy resources in NSW, where over \$80 million has been invested in gas exploration over the past 10 years.

Metgasco has discovered large CSG and conventional gas resources and is in the process of developing and commercialising these resources as well as continuing current exploration efforts.

Since commencing exploration activities, Metgasco has worked closely with landowners, local and state government and the local community to ensure that operations are conducted in a safe and environmentally acceptable manner. Metgasco takes its environmental responsibilities very seriously and is proud that there has never been a reportable environmental incident since commencing operations.

Metgasco is committed to building an environmentally sustainable business that respects the rights of landowners and delivers social and economic opportunities to the local community.

Metgasco is aware of concerns raised recently by some parts of the community with respect to the coal seam gas industry and has always taken the approach of openness and transparency to address these concerns. Metgasco's submission to the NSW Legislative Council's inquiry into coal seam gas is a continuation of this open and transparent approach.

While some of the terms of reference are drafted to elicit a general and industry wide response, Metgasco's submission will provide, where possible, company specific references.

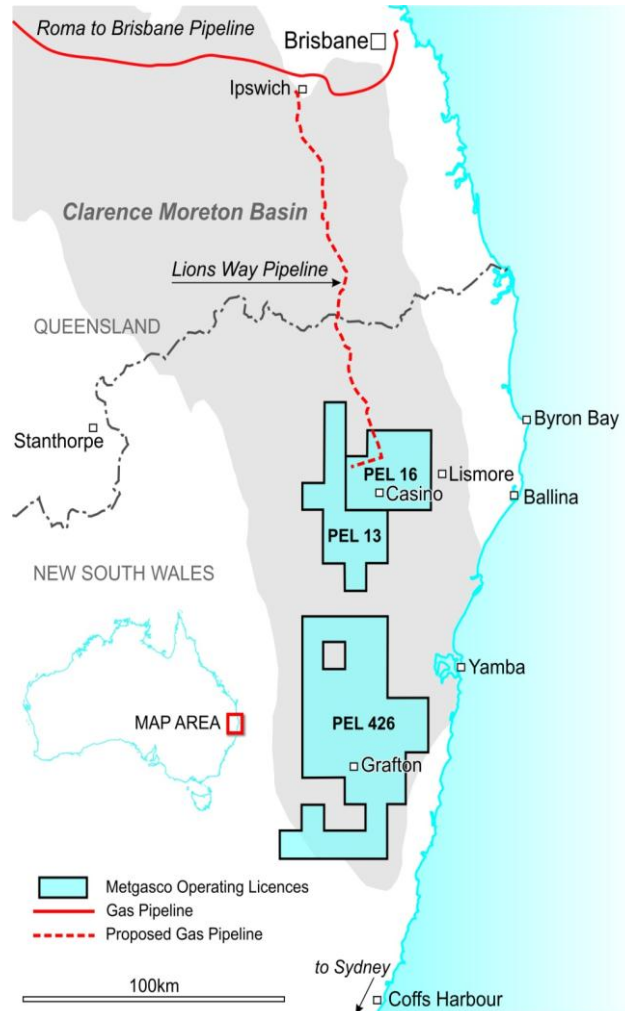
Before addressing the specific terms of reference for the Inquiry, the submission will discuss Metgasco's corporate and operational background.

## **Metgasco's Petroleum Exploration Licences**

Metgasco is one of a number of companies exploring in the Clarence Moreton basin in Northern NSW. Metgasco holds a 100% interest in three Petroleum Exploration Licenses (PEL 16, 13 and 426, indicated by the map below), covering an area of approximately 4,600 km<sup>2</sup>. The Company has established a large gas reserve position of 428 PJ in the 2P category and 2,542 PJ in the 3P category. (The annual gas demand for NSW is 140 PJ).

In late 2009 Metgasco announced the discovery of the largest conventional gas field in NSW – the Kingfisher gas field. Metgasco estimates that the gas resources in the exploration license areas could be as high as 24 TCF in coal seam gas and 2TCF in conventional gas (PMean OGIP estimates) - enough to supply the state of NSW for many years and to support an export LNG business.

This map illustrates Metgasco's petroleum exploration licence areas.



## What is coal seam gas?

Coal seam gas (CSG) is natural gas, which is essentially methane. Methane is not toxic and does not smell. It is one of the safest, cleanest and most useful of all energy sources.

Methane is produced from decomposing organic matter in a range of areas: swamps and rivers, rubbish dumps, garden compost and from cattle, other animals and people. The gas industry produces natural gas that can be found in many types of rocks underground including sandstones and coals. CSG is natural gas found in coals.

CSG's practical commercial applications are that it can be used as a fuel to fire an electricity generator or to assist with the production of agricultural fertiliser. From a domestic application, CSG can be used for heating and cooking. With over 90% of Queensland's gas



supply coming from CSG it is likely that most residents are practical beneficiaries of this industry.<sup>1</sup>

### **The CSG Industry is not new and is well understood**

Natural gas was first discovered in Australia in a water bore at Grafton race course in 1901. The gas industry has operated in Australia for over 100 years since supply commenced in 1906. The natural gas industry has a very good track record in safety and environmental management.

Metgasco has examined the composition of gas from numerous wells in the Northern Rivers region and results to date show that natural gas from coal seams in this region contains over 98% methane with virtually no CO<sub>2</sub>.

The CSG industry is now new. The CSG industry has operated internationally for over 30 years and has also operated in Queensland for over 16 years. CSG production techniques are well understood by industry participants who conduct their activities in accordance with industry codes of conduct.

### **Existing NSW regulatory environment**

The NSW upstream gas sector is well regulated and must comply with a number of acts including:

- Petroleum (Onshore) Act;
- Environmental Planning and Assessment Act;
- State Environmental Planning Policies;
- Native Titles Act (both State and Federal)
- National Parks and Wildlife Act;
- Native Vegetation Act;
- Rivers and Foreshores Improvement Act;
- Rural Fires Act; and
- Water Management Act and Water Act.
- Fisheries Management Act
- Threatened Species Conservation Act

In addition, Metgasco adheres to, where relevant, the American Petroleum Institute (“API”) standards for well construction and operation and the Australian Petroleum Producer and Explorers Association (“APPEA”) Codes of Conduct.

It is Metgasco’s policy to comply with or exceed all applicable government regulations and industry codes of practice.

Metgasco recognises the need for a strong and effective regulatory regime. Regulations must be based on risk assessments, with sound science and facts to support the basis for the regulations. Regulations must be meaningful and the industry cannot afford to have requirements that are not necessary or wait for an unnecessarily long approval process.

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<sup>1</sup> <http://www.appea.com.au/industry/csg.html>

Similarly, while Metgasco welcomes and supports this inquiry, we argue that moratoriums are not required or appropriate. There are already review, approval and consultation processes that work on a case by case base, and the industry is already understood. An extended moratorium does little if anything to increase understanding or improve review and approval processes.

If NSW wishes to encourage companies to take risks exploring and developing gas resources it needs a stable regulatory environment. No business wants to risk exploration and development expenditure and then find that the rules change before it can benefit from the commerciality or production phase.

Metgasco believes that industry can play a stronger role than it has in terms of self-regulation. Through the industry's peak body, APPEA, efforts are underway to improve upon existing industry wide codes of practice on issues such as land access and compensation, drilling etc.

## **How does Metgasco explore for gas?**

There are three types of activities conducted as part of an exploration program and these include:

1. *Drilling core wells.* These take samples of rocks which are analysed in the laboratory for physical properties such as gas content. Once all drilling and testing is completed, Metgasco rehabilitates the site to return it to pre-drilling state;
2. *Seismic testing.* Seismic is used to explore for natural gas by providing a picture of the sedimentary layers under the ground. It is recorded by special microphones called geophones which listen for echoes reflected off these layers (like an echo sounder on a boat); and
3. *Pilot production wells.* These are drilled and tested to see if the gas can flow to the surface in commercial volumes.

However, before this exploration occurs Metgasco must complete the following tasks:

1. explain the exploration process and enter into an agreement with a landholder and land occupier;
2. complete a Review of Environmental Factors (REF) which is approved by the NSW Department of Primary Industries (DPI); and
3. conduct a cultural heritage survey.

Metgasco complies with numerous other safety and environmental regulations and industry codes of practice. After work has been completed, the landowner must sign a Landowner/Occupier Rehabilitation Statement when the site has been remediated satisfactorily back to its original state before a bond, held by the NSW government, is refunded to Metgasco. The process relating to remediation and landowner consultation is addressed in Section 1(e) and Section 2(a) of the submission respectively.

## **Confusion between Shale Gas and CSG**

A common misconception is that the techniques used, and the risks associated with the extraction of coal seam gas, are the same as those associated with the extraction of shale gas (which is the predominant operation in North America).

Firstly, CSG is located much closer to the surface and has a much higher gas concentration than shale gas. In the case of Metgasco's operations, the Wallon Coal Measure (where CSG is located) is between 300 and 800 metres below the surface. It is quite common for shale gas to be located more than double that distance below the surface and, as a result, to be under much higher pressures.

Secondly, coal seam methane can be extracted using a number of different approaches such as long horizontal wells. In many cases it does not need hydraulic fracturing (only 5% of Australian coal seam gas wells are fraced). Shale gas on the other hand, usually requires both long horizontal wells and extensive fracing because the permeability (a measure of the ability for gas to move through the rock) is so much lower than in conventional or coal seam gas operations.

Thirdly, coal seam gas is largely methane whereas many of the shales gas operations produce heavier hydrocarbons as well (eg; propane, butane and pentane plus fractions).

Fourthly, CSG operations are quite different from either conventional or shale gas operations. To initiate gas flow it is necessary to pump water from the coal seam. As the operation continues, the volume of water that must be pumped declines. This is the reverse of conventional and shales gas operations, where the gas is held in pore spaces in the rock and can flow for some years before any water is produced. Increasing water production rates often determine the economic life of these types of wells (the reverse of CSG).

Coal seam gas operations should not be confused with Underground Coal Gassification, which is an entirely different technology. Metgasco notes that some CSG opponents are not aware of the differences.

## **Drilling Process**

Metgasco holds exploration licences and is in the process of gaining production licences.

As stated above, exploration in Metgasco's licence areas has revealed the presence of both conventional and non-conventional gas (CSG). The use of the words "conventional" and "non-conventional" no longer seems appropriate given the wide acceptance and implementation of tight gas, CSG and shale gas operations around the world. They are by practice all understood and relatively common place.

However, the key difference between 'conventional' and 'non-conventional' gas is the manner, ease and cost connected with extracting the gas. The 'non-conventional' sources of gas generally need some means to stimulate production such as horizontal wells to make them economic.

For conventional, tight gas (low permeability) and shale gas (very low permeability), the gas is held in pore spaces in the rock, not in caves or voids as some imagine. CSG is different

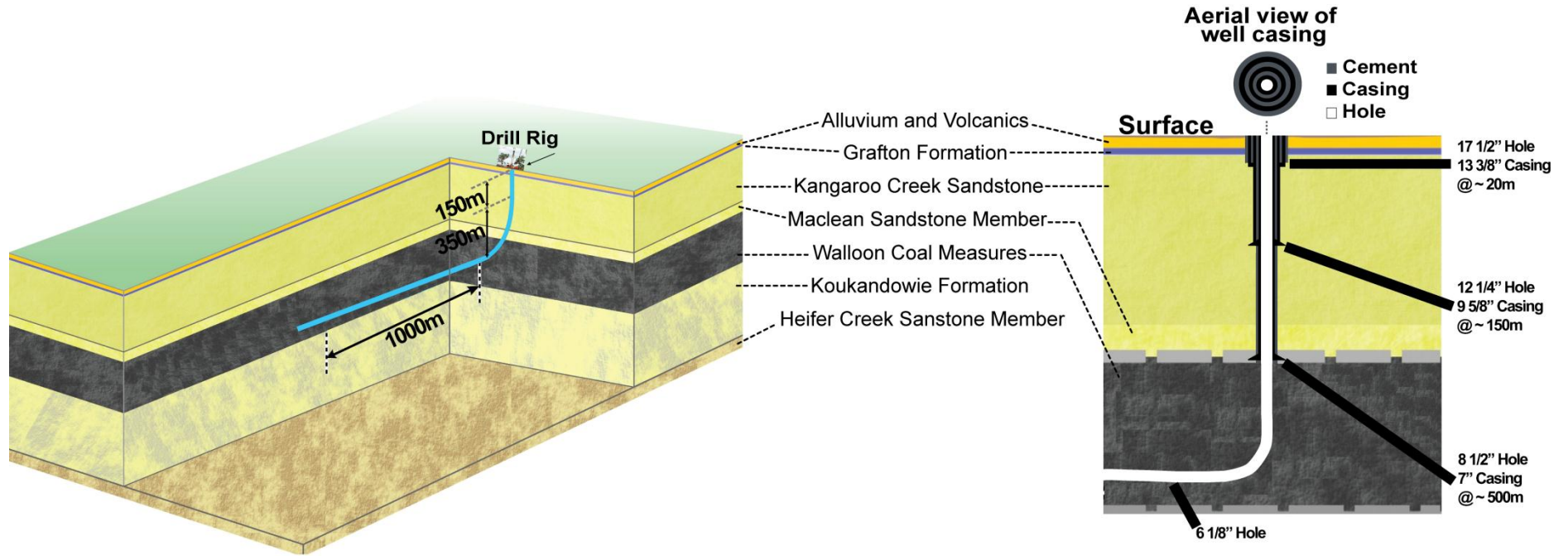




because the methane is physically attached to the coal and needs a pressure reduction, achieved by pumping out some water, to separate from the coal and flow.

Metgasco has tried a number of different approaches to optimise production from its coal seams and to date has found the use of horizontal later wells as the best production method, as per the figure below. Metgasco has not needed to hydraulic fracture our coal seams. Metgasco understands that only 5% of CSG wells in Australia to date (more than 3000 wells) have needed hydraulic fracturing.

## Drilling process – un-conventional (coal seam) gas



Metgasco uses a drilling technique that is common to the broader oil and industry worldwide and has been perfected over more than a 100 years. The wellbore design ensures that individual rock formations are isolated from each other, protecting overlying groundwater aquifers from the deeper coal seams. This technique is used to:

1. maintain hole stability for efficient and safe operation; and
2. protect the near surface ground and groundwater, maintain the existing pressure of the aquifers and to prevent any future communication between each and every formation encountered during drilling.

To accomplish this Metgasco uses barriers that are put in place sequentially during the drilling process (*see above for an illustration of this process*). The basic wellbore design consists of a number of alternating layers of cement and steel that is set in the rock from the surface to a depth below any groundwater aquifers. A detailed explanation of a typical process includes:

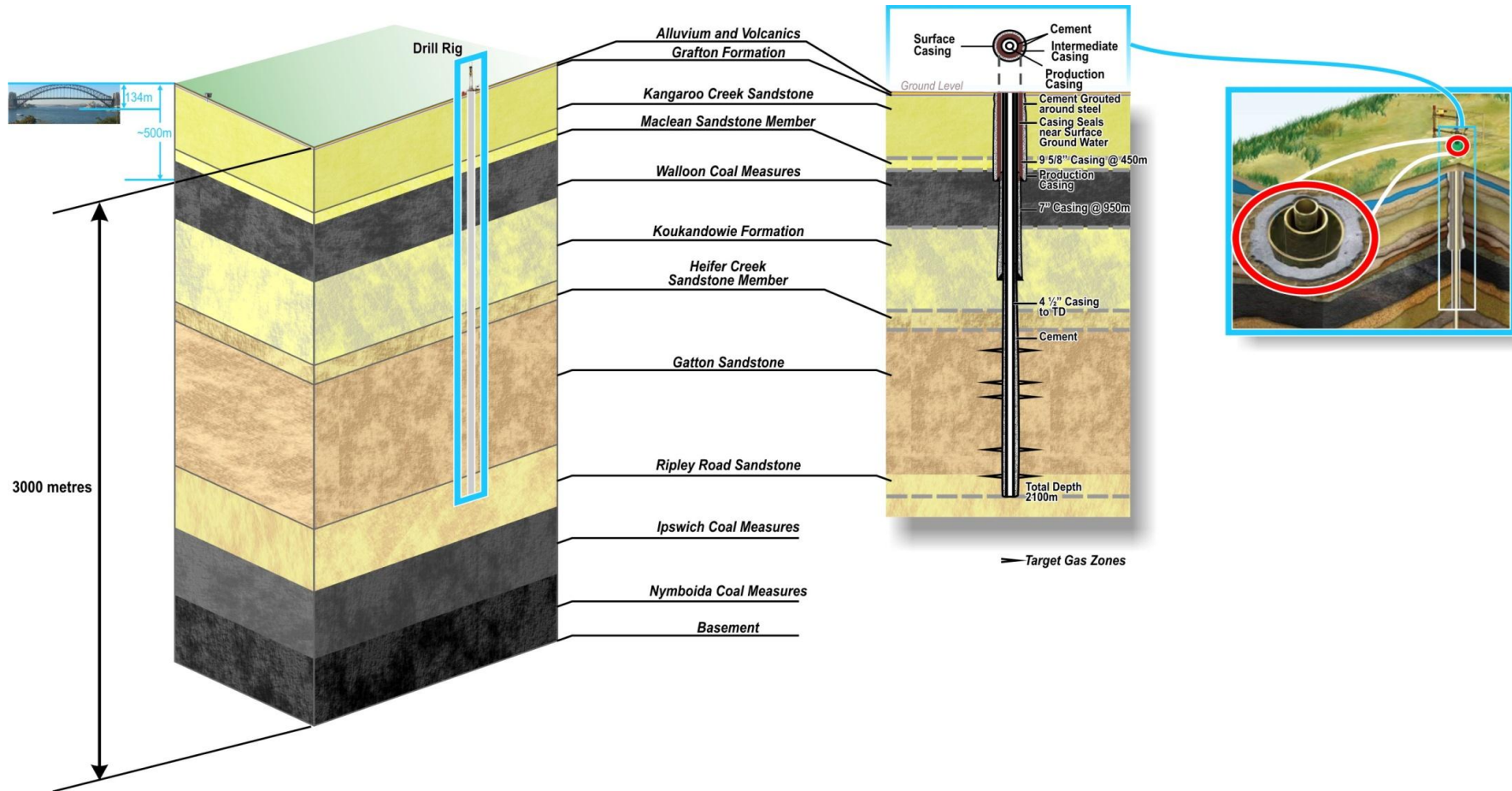
- 17 ½” diameter hole is drilled to a depth of 5 to 20 metres depending on the rock conditions close to the surface.
- 13 3/8” steel pipe (referred to as conductor pipe) is put in place and cement is pumped between the outside of the pipe and the exposed rock formations. The cement and casing is used to prevent fluid (water, gas, oil, etc) from moving between rock formations. Pressure testing is then conducted to ensure the cement has been successful in isolating the rock formations from each other and the surface.
- 12 ¼” diameter hole is drilled to a depth of 150-200m. Then a 9 5/8” steel pipe (referred to as surface casing) is put in place and cement is pumped from the surface between the outside of the casing and the rock formations and then back up to the surface. Pressure testing is again conducted.
- 8 ½” diameter hole is drilled to a depth of approximately 500m or more just above the coal seam. Then a 7” casing (referred to as production casing) is put in place and then cement is pumped from the surface around the pipe to isolate the rock formations from each other and then back up to the surface. This means that around the pipe, concrete is placed across the Maclean Sandstone Member, the Walloon Coal Measure (the coal seam) and all the way to the surface. Pressure testing is again conducted to ensure the cement is successful in isolating the rock formations from each other and the surface. (The Walloon Coal Measure, which lies between 300m and 800m below the surface, is well below the locally used aquifers which are located between 1-100m below the surface.)
- The integrity of the cement placed behind the casing is tested several times to ensure there is no leakage. This process enables any problems to be addressed while the drilling rig is on site.
- 6 1/8” diameter hole is drilled laterally up to 1000m along the coal seam. This completes the drilling of the well.

A pump is used to extract water and lower the pressure of the coal seam to allow the gas to flow to the surface. As will be explained below, the “produced water” from Metgasco’s coal seams has a low degree of salinity in comparison to other coal seam gas operations. The volume of water being produced is also relatively small.



Some of the gas from the well is used to run the drivers of the pump. As Metgasco is currently in exploration, the remainder of the gas cannot be stored and, according to regulatory requirements must be burnt to reduce the potential greenhouse gas impact of methane going directly into the atmosphere.

## Drilling process –conventional gas



The drilling process for conventional gas adheres to the same principles as for CSG wells. Namely, maintain hole stability for efficient and safe operation; protect the near surface ground and groundwater and maintain the existing pressure of the aquifers to prevent any future communication between each and every formation encountered during drilling.

The main difference being that the conventional gas wells are much deeper in the surface than the unconventional (coal seam) gas extracted from the Walloon Coal Measure. The conventional wells are drilled as deep as 2,000m below the surface, whereas the coal seam is between 300 and 800m from the surface. Both CSG and conventional wells are significantly below the aquifers used by land owners.

## **1. The environmental and health impact of CSG activities including the:**

### **1(a) Effect on ground and surface water systems**

#### *Practices in place to protect ground and surface water systems*

Metgasco understands the importance of protecting groundwater resources and utilises industry recognised practices to protect aquifers.

As stated previously, the methane is adsorbed in the coal and is released by pumping water out of the coal seam.

There a number of means of managing the water that is produced to the surface (see *Produced Water below*), without any contamination of ground water supplies.

As part of Metgasco's environmental assessment of the Richmond Valley Power Station and the Casino Gas Project, supplied to the Department of Planning in 2008, an analysis of water quality and quantity was conducted by leading engineering and environmental firm Klohn Crippen Berger.<sup>2</sup>

Metgasco's environment and development submissions have demonstrated that the amount of water produced from the coal seams and how the coals seams relate to the overlying aquifers. The water taken from the coal seams is not toxic but is generally too salty for salt intolerant plants. It is also isolated and deeper than the aquifers that have acceptable water for agricultural purposes means.

#### *Metgasco's knowledge of ground and water systems in the Northern Rivers Region*

As part of Metgasco's production licence application, it commissioned a study by Klohn Crippen Berger to assess the hydrogeology of the area and assess the potential impacts on the local aquifers. Metgasco is confident that its activities will have no adverse impacts on aquifers used for farming or other activities in the area.

The project site (and much of Metgasco's operations) lies within part of the Richmond River floodplain.

The following aquifers are relevant to the operations of Metgasco in PEL 16:

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<sup>2</sup> Metgasco's Environmental Assessment for the Richmond Valley Power Station and Casino Gas Project (August 2008)

- Quaternary Alluvium (0 – 20m);
- Grafton Formation sandstones (20 – 100m);
- Kangaroo Creek Sandstone (100 – 300m); and
- Walloon Coal Measures (300 – 800m).

The table below is a summary of the existing water bores within 10km of Casino and the aquifers used to extract water.

| Existing Water Bores within 10km of Casino |                 |        |
|--|-----------------|--------|
| Aquifer Formations                         | Depths (metres) | Number |
| Alluvium                                   | 0 to 20         | 179    |
| Grafton Formation                          | 20 to 100       | 272    |
| Kangaroo Creek                             | 100 to 450      | 8      |
| Walloon Coal Measures                      | 450 to 680      | None   |
| Unknown                                    |                 | 9      |
|  | Total           | 468    |

The Klohn Crippen Berger study found that groundwater used in the aquifers (ie Alluvium, Grafton Formation and Kangaroo Creek ) is used for irrigation, stock and domestic purposes.

The study also found that direct rainfall infiltration is a significant recharge mechanism for the Quaternary Alluvium and Grafton Formation.

The total rainfall in 2010 for the Casino area, which is where Metgasco's operations are predominantly based, is almost double the total rainfall for NSW for the same period.<sup>3</sup>

As mentioned above, the quality of the water varies from as good as normal drinking water supplies to water with a slightly salty content. All the salts found in CSG produced water are also commonly found in normal drinking water supplies but at higher levels.

Metgasco's study found that the existing data did not provide a basis on which to differentiate groundwater quality between the first three aquifers (ie the groundwater in Quaternary Alluvium, Grafton Formation and Kangaroo Creek was quite similar). However, the water extracted from the Walloon Coal Measure, which is where the coal seam gas is extracted, is generally of slightly poorer quality than overlying formations tending to have a higher salinity level (i.e. 3000µS/cm and 6000µS/cm EC).

<sup>3</sup> <http://www.bom.gov.au/nsw/>

Mr Rob O'Neill, Director, Water Policy and Planning for the NSW Office of Water, stated recently at an industry briefing, that the presence of saline water indicates a low level of connectivity between the various geological layers (ie the coal seams contain water with high salinity because they are isolated from other groundwater sources).

If there was existing connectivity in the geographic layers in the Clarence Moreton Basin then the water characteristic from the aquifers would more likely be the same.

The hydrogeological assessment found that due to the differences in the geological formations and dewatering (ie withdrawal of water) from the Walloon Coal measure (for Metgasco's operations) there is "unlikely to be a material impact"<sup>4</sup> on overlying formations.

These findings were similar to that observed by Parsons Brinckerhoff (a leading global transport, infrastructure and environmental consultancy) in the Surat Basin, "where dewatering of deep coal seams has negligible impact on shallow alluvial environments".<sup>5</sup>

This point is further reinforced by the fact that CSG wells in the northern rivers region produce low volumes of water compared to CSG wells in Queensland.

### *Produced water disposal*

In addition to the extraction of methane from the coal seam, two other components are brought to the surface in association with the gas and these are: -

- Coal fines – generally in very small quantities; and
- Water.

The coal fines are in very small quantities and are generally removed and disposed of as a solid waste.

There are a number of techniques available to manage the water produced with the gas. For current pilot wells Metgasco is storing the water in lined ponds built specifically for this purpose, relying on evaporation or subsequent later treatment.

For Metgasco' proposed Richmond Valley Power Plant, the environmental approval requires no discharges outside of our water holding ponds. These ponds are designed to prevent over-topping in the one in 100 year storm event. There are a number of means of treating produced water that are applied in the industry. Metgasco is reviewing a number of these to determine the best options for future water treatment. These include the use of reverse osmosis, re-injection into high salinity streams, introduction into natural wetlands with salt tolerant plants and supporting some agricultural activities after treatment, such as salt tolerant crops.

## **1(b) Effects relating to the use of chemicals**

Metgasco seeks to minimise the use of chemicals in its operations.

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<sup>4</sup> Metgasco's Environmental Assessment for the Richmond Valley Power Station and Casino Gas Project (August 2008)

<sup>5</sup> Parsons Brinckerhoff Pty Ltd, (2004) Coal Seam Gas Water Management Study



CSG operations use chemicals at the early phase of their operations, when the wells are being drilled, for short workover periods, and then if they are fraced or stimulated. Outside these periods, during the long production phase, very few chemicals, if any, are injected into the wells.

All chemicals used by Metgasco in its operations are approved for use in Australia and have Material Data Safety Sheets. There are no “secret” chemicals and any fluid that is used in drilling a well is disposed of according to accepted waste management principles. No chemicals or drilling fluids are discharged into the environment.

In Metgasco’s drilling operations it generally uses fresh water or produced water with up to 9% KCl (potassium chloride).

In normal drilling and workover operations a typical list of chemicals includes:

- Fuel, lubricants, industrial and welding gasses;
- Solvents;
- Biocides to prevent algae growth;
- pH buffers;
- Neutralisers; and
- Cleaning agents.

There are also speciality chemicals such as:

- Corrosion inhibitors;
- Friction modifiers to improve the drilling process

The concentration of any additives used in the drilling and fracing processes are very low, total additives typically less than 2%. All of the above chemicals are removed from Metgasco operations and placed in approved industrial waste disposal sites.

Metgasco has undertaken nitrogen foam fracturing in its operations on a conventional gas well in 2010. The chemical, commonly known as BTEX was not used as an additive in this process, nor will it be necessary in the future to add any chemicals that contain BTEX as an additive. The table below lists the chemicals that were used in this process:

| Name                   | Chemical               | Commonly found in                                |
|------------------------|------------------------|--|
| Acetic Acid            | Acetic Acid            | Vinegar  |
| K-35                   | Sodium Carbonate       | Washing Soda                                     |
| K-34                   | Sodium Bicarbonate     | Baking Soda – in all baked goods                 |
| FE-2                   | Citric Acid            | Lemon Juice                                      |
| GasPerm1100            | Ethanol                | Alcohol  |
| Hydrochloric Acid      | Hydrochloric Acid      | Pool chemical                                    |
| HAI-150                | No hazardous materials |  |
| GEL-STA L Stabiliser   | Sodium Thiosulfate     | Anti fungal and Tinea treatment                  |
| KCL Potassium Chloride | Potassium Chloride     | Fertiliser                                       |
| NF-6                   | Vegetable Oil          | Deep Frying                                      |
| NF-6                   | Aluminium Stearate     | E573 in chewing gum, instant coffee, baked goods |
| Caustic Soda           | Sodium Hydroxide       | Drain Cleaner                                    |

|                 |                                 |  |
|-----------------|---------------------------------|--|
| SP Breaker      | Sodium persulfate               | Bleach Hair Cosmetics  |
| HC 2A           |                                 | Foaming agent used in shampoos and other toiletries          |
| BC-140          | Monoethanolamine borate         | In cosmetics for controlling viscosity                       |
| BC-140          | Ethylene glycol                 | Brake Fluid  |
| BE-6            | 2-Bromo-2-nitro-1,3-propanediol | Used as preservative in cosmetics                            |
| CAT-3 Activator | EDTA/Copper Chelate             | Fertiliser   |
| WG-11           | Guar Gum                        | E412 used as a thickener in salad dressings, barbecue sauces |
| BE-7            | Sodium Hypochlorite             | Laundry Bleach, Solid Pool Chlorine                          |
|                 | Sodium Hydroxide                | Dishwashing tablets, Drain Cleaner                           |

All these chemicals are registered for use in Australia and have the required Material Safety Data Sheets and are registered for use in Australia.

### 1(c) Effects relating to hydraulic fracturing

Hydraulic fracturing (or fraccing) is a technique used to stimulate production rates from wells that has been used for more than 60 years around the world and in Australia for decades.

Hydraulic fracturing is a process that uses the hydraulic pressure of fluid pumped into gas wells to open coal seams and increase gas production.

It is a well understood technique and can be used safely. While the bulk of Australian CSG wells currently do not require fraccing, properly managed it is a safe practice and its use should not be dismissed because it may be necessary for some coal seams, tight gas fields and shale gas developments in Australia.

There is no credible evidence that hydraulic fracturing impacts groundwater aquifers.

Fraccing has been used safely around the world for more than 60 years and in Australia for several decades.

The practice has been extensively researched around the world and found to be a safe, environmentally sound method of extracting gas from unconventional reservoirs.

- In 2004, the US Environment Protection Authority (EPA) conducted an extensive investigation into the impacts of fraccing in coal seams on groundwater and concluded that *“the injection of hydraulic fracturing fluids into coalbed methane wells poses little or no threat to underground sources of drinking water.”*<sup>6</sup>
- The US EPA announced in June 2010 that *“Natural gas plays a key role in our nation’s clean energy future and hydraulic fracturing is one way of accessing this vital resource.”* The US EPA is currently reviewing the impact of fraccing in shales given the significant expansion in shale gas (as distinct from CSG) drilling activity. The initial research results are expected by the end of 2012.

<sup>6</sup> Evaluation of Impacts to Underground Sources June 2004 of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, US Environmental Protection Agency

- In the US, environmental regulation of the oil and gas industry is conducted by the States, as it is in Australia. The US Ground Water Protection Council (GWPC) is a non-profit organisation comprising state environmental and resource protection regulatory agencies.

The GWPC “understands that our nation's water and energy needs are intertwined, and that demand for both resources is increasing. Smart energy policy will consider and minimize impacts to water resources.”<sup>7</sup>

On June 25, 2010 the GWPC issued a statement refuting assertions in the Gasland movie and stating “In recent months, the states have become aware of press reports and websites alleging that six states have documented over one thousand incidents of ground water contamination resulting from the practice of hydraulic fracturing. Such reports are not accurate.” In fact, a number of US states have conducted investigations into the impact of hydraulic fracturing on groundwater resources and the environmental regulators of Ohio, Pennsylvania, New Mexico, Alabama, Texas, Louisiana, and Oklahoma have all advised that despite considerable investigation they have not documented a single incident involving contamination of groundwater attributed to hydraulic fracturing.

- Most recently the UK Energy and Climate Change Parliamentary Committee conducted an investigation into the development of shale gas and found:

*“Mitigation of the risk to water aquifers from hydraulic fracturing relies on companies undertaking the proper measures to protect the environment from pollution. However, there is no evidence that the hydraulic fracturing process itself poses a direct risk to underground water aquifers. That hypothetical and unproven risk must be balanced against the energy security benefits that shale gas could provide to the UK. We conclude that, on balance, a moratorium (on Fracking) in the UK is not justified or necessary at present”.*<sup>8</sup>

#### **1(d) Effect on Crown Lands including travelling stock routes and State forests**

While Metgasco’s exploration licences include some parts of crown land, no core wells have been drilled on crown land.

Metgasco is planning the construction of a high pressure 145km gas transmission pipeline from Casino to Ipswich (near Brisbane). This project which is still in planning phase may have an impact on crown land.

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<sup>7</sup> [www.dec.ny.gov/docs/materials\\_minerals\\_pdf/ogsgeisapp2.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/ogsgeisapp2.pdf)

<sup>8</sup> <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/795/79511.htm>



The Lions way pipeline will connect Metgasco’s operations in the Northern Rivers to the south-east Queensland gas transmission network, offering opportunities to participate in the domestic and LNG market.

Environmental Assessment Studies have been lodged and the regulatory review process is underway. However no final decision has been made as to the way that Metgasco intends to transport the gas from the Northern Rivers region to the market.

Gas pipeline technology is very safe. There are thousands of kilometres of gas pipelines around Australia, some of which go through sensitive environmental areas, such as the Blue Mountains and Gippsland (including Bass Strait), prime farmland and busy cities. These gas pipelines have very little impact on other operations, with few people even aware of their existence.

The proposed pipeline, which is between 12 and 20 inches in diameter, will be built under the existing Lions Way road to avoid any disruption to the adjacent Border Ranges. In the countryside south of the border region (eg; Kyogle), it will be built to normal standards (eg; buried more than 900mm with the top of the pipe generally 750mm below the surface) and will have minimal impact on farm use other than during the brief construction period.

## 1(e) Nature and effectiveness of remediation required under the Act.

The exploration company (in our lease areas Metgasco) is responsible for all rehabilitation and restoration required as a result of their activities.

Prior to commencing activities, the company is required to lodge a bond with the State Government which is only released once the site has been restored and the Government is satisfied that the restoration has been properly completed. To establish that the rehabilitation has been properly carried out the company is required to lodge specified documentation and certain declarations with the Government including an acceptance by the landholder.

The Government carries out periodic inspections both during and subsequent to the rehabilitation. In the event of a default by the exploration company the Government uses the bond to restore the site.

The petroleum and general mining industry has operated under this system over a long period of time.

A summary of the standard process utilised by Metgasco for site abandonment/rehabilitation work is as follows:

## **Stage 1:**

- Fluids removed from sumps and flare pit.
- Sumps and flare pit back filled with subgrade soil that has been stockpiled on site.
- Top soil spread across sump pits and flare pit.
- Excess soil and drilling cuttings removed from site.
- Safety barricades and silt barriers removed.

## **Stage 2:**

- Well cementing
- Phase 1: First phase of cementing well
- Phase 2: Second Phase of cementing well
- Phase 3: Third phase to run poly line in to cement final section of well
- Phase 4: Final stage to cut casing off 2m below surface & cap

## **Stage 3:**

- Hardstand removed
- Geofabric removed
- Final ripping, grading and spreading of top soil over site
- Grass seeding of site
- Fence and gate removed

## **1(f) Effect on greenhouse gas and other emissions**

There are numerous independent studies that have confirmed that natural gas from coal produces significantly fewer greenhouse gas emissions than the same amount of electrical power production from coal. Some of these studies include:

- The CSIRO ([www.csiro.au/science/EnergyFuturesForum.html](http://www.csiro.au/science/EnergyFuturesForum.html))
- The International Energy Agency ([www.iea.org/co2highlights/CO2highlights.pdf](http://www.iea.org/co2highlights/CO2highlights.pdf))

- WorleyParsons, a global engineering consultancy, completed a report in April 2011 comparing the amount of greenhouse gas emissions from a Chinese generator utilising LNG derived from CSG and black coal. The Worley Parsons analysis concluded that over a 30 year project life the annual savings of CO2 emissions are 968 million tonnes.<sup>9</sup>

The Queensland Premier, Anna Bligh, recently addressed this issue on 22 August 2011 and stated that:

"The CSIRO, which I think is one of the most well-respected science organisations on the planet, considered this issue in 1995 and, I think, put beyond any doubt that the emissions from coal-seam gas are considerably less, between 50 and 70 per cent, than coal-fired generation."<sup>10</sup>

The most prominent study to support a conclusion contrary to the established science (as above) is one authored by Professor Robert Howarth, who has asserted that the level of greenhouse gas emissions from methane is in fact greater than that emitted by coal. However, the conclusions of this study have been widely criticised. Professor Howarth does not use accepted time frames for his studies, misunderstands basic concepts about gas accounting, and has even criticised his own study by stating that the data used "are really low quality."<sup>11</sup> The US Department of Energy National Energy Technology Laboratory, has reaffirmed its view that methane produces 50% less emissions than coal in the production of electricity.<sup>12</sup> In addition, the Global Warming Policy Foundation, has written that Professor Howarth's conclusions "requires unrealistic assumptions...and (Professor Howarth) gets his numbers on high gas leakages (ie fugitive emissions) from shale gas wells from unreliable sources."<sup>13</sup>

Consulting firm, ACIL Tasman, has also undertaken a study that shows that, including fugitive emissions, the CSG fired power stations in Queensland, such as Darling Downs, "are around 70% less greenhouse gas intensive than Victoria's Hazelwood plant."<sup>14</sup>

The following analysis from the Australian Gas Association further compares the greenhouse gas emission for electricity production from coal and gas (kgCO<sub>2</sub>e/MWh).

## Gas

- WBP CCGT 395 – 444
- ABP CCGT 514 – 577
- WBP OCGT 579 – 650
- ABP OCGT 586 – 658

## Coal

- WBP Supercritical steam 41.7 800 – 810
- WBP Sub-critical steam 37.7 885 – 896
- ABP Black coal 36.8 907 – 918
- ABP Brown coal 27.7 1,246

<sup>9</sup> <http://www.appea.com.au/industry/csg/cleaner-energy.html>

<sup>10</sup> <http://www.theaustralian.com.au/national-affairs/anna-bligh-hits-greens-for-selective-science/story-fn59niix-1226118445326>

<sup>11</sup> <http://www.news.cornell.edu/stories/April11/GasDrillingDirtier.html>

<sup>12</sup> <http://blogs.cfr.org/levi/2010/11/18/is-gas-just-as-bad-as-coal/>

<sup>13</sup> "The Shale Gas Shock", Matt Ridley, Page 30

<sup>14</sup> <http://www.appea.com.au/news/media-releases.html>, *Greenhouse Gas Emissions of Coal Seam Gas*, 18 August 2011

The above illustrates that “while Australian best practice brown coal generators produce around 1200 kg CO<sub>2</sub>-e/MWh, Australian best practice combined cycle gas turbines produce around 550 kg CO<sub>2</sub>-e.”<sup>15</sup>

## **2. The economic and social implications of CSG activities including those which affect:**

### **2(a) Legal rights of property and owners and property values**

Metgasco prides itself on an open and transparent approach when dealing with landowners.

Metgasco works in a constructive manner with landowners, respecting their needs. To date Metgasco has more than 300 different agreements that cover our operations, from seismic to drilling wells. All of these agreements have been negotiated on a voluntary basis.

Metgasco’s existing operations are proof positive that CSG operations can and do co-exist with landowners.

Payments to landowners are determined on a case-by-case basis but are calculated primarily on the basis that some parts of the land will be temporarily unavailable for use by the landowner. Due to commercial in confidence issues, Metgasco is unable to provide details of its existing relationships with landowners.

However an equities research paper on the coal seam gas sector, published by Investment Advisory Group, Wilson HTM, states that landowners “are typically paid ~\$5k/well for the disturbance caused during drilling and ~\$1.5k/year/well for the life of the well.”<sup>16</sup>

Regular land access payments from Metgasco to landowners provide an additional source of income for working farmers, whose incomes can be highly variable depending upon weather conditions and commodity prices.

The Wilson HTM research paper also estimates that the “annual payment is ~5-10 times the value of agricultural output foregone from the land disturbed (which is 2% of the land involved).”<sup>17</sup>

Metgasco works closely with landowners to ensure that our operations fit in with the normal activities of the landowner.

Metgasco’s relationship with landowners is based on the following principles:

- Respect – we are the visitors and landowners own the land;
- Accessibility – we are always available to discuss landowners concerns
- Beneficial co-existence – we work with the landowner to ensure minimum disruption to day to day operations;

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<sup>15</sup> Australian Gas Association submission to the Joint Standing Committee on Treaties for the Inquiry into the Kyoto Protocol, Page 8

<sup>16</sup> Wilson HTM Equities Research – Coal Seam Gas Sector, John Young, (19 August 2011)

<sup>17</sup> ibid

- Consultation – we seek input from the landowners regarding site selection and where possible add meaningful and permanent value;
- Openness – we will provide any information requested of the landowner;
- Non-threatening – we do not rush the landowner into any decision;
- Mutually beneficial – we always provide a fair remuneration package

Metgasco's adherence to these principles has ensured that since our first land access arrangement was signed in 2007 excellent relationships have been maintained with current and past landowners. The categories of landholder access agreements include:

- Landowner Agreements (Exploration Wells)
- Seismic Access Agreements
- Seismic Consent Agreements

Typical requirements included in a Metgasco land access agreement for CSG extraction include:

| REQUIREMENTS   |
|--|
| Utilising existing tracks and in some cases upgrading the tracks. Track upgrading is undertaken in consultation with the Owner. Construction of additional temporary and permanent access tracks. Selection of the routes for new access tracks will be undertaken in conjunction with the Owner.  |
| <p>A selection criterion will be followed which includes:</p> <ul style="list-style-type: none"> <li>• consultation with the Owner;</li> <li>• avoiding sensitive environmental areas;</li> <li>• avoiding significant Aboriginal or cultural heritage sites;</li> <li>• utilising existing cleared vegetation areas;</li> <li>• compliance distance to nearby residences;</li> <li>• identifying &amp; managing the spread of weed species; and</li> <li>• identifying &amp; minimising soil erosion.</li> </ul> <p>On-ground work includes:</p> <ul style="list-style-type: none"> <li>• installing silt barriers to control sediment runoff;</li> <li>• grading topsoil &amp; stockpiling on site for later rehabilitation reuse;</li> <li>• importing hardstand (gravel) material; and</li> <li>• site area fenced off &amp; gate(s) installed.</li> </ul> |
| Owner will be notified of all exploration and/or production drilling activities.   |
| <p>Liquid &amp; solid wastes are removed from site. Metgasco will comply with its obligations in relation to:</p> <ul style="list-style-type: none"> <li>• minimising air emissions where possible; and</li> <li>• minimising noise output levels where possible.</li> </ul> <p>Ongoing monitoring, auditing and non-compliance inspections will be conducted.</p>   |
| Owner will be notified of upcoming demobilisation of drilling rig.   |
| Locations of flow lines will be identified in consultation with Owner. Metgasco will endeavour to construct infrastructure as follows:   |



|  |
|--|
| <ul style="list-style-type: none"> <li>• typically follow tracks, fence lines etc. to minimise impact; and</li> <li>• trenches are opened &amp; then back filled to minimise impact.</li> </ul>  |
| <p>Well Abandonment Plan submitted and accepted by Department of Primary Industries - Mineral Resources. Plan outlines environmental management. Owner will be notified of the abandonment of the Well.</p>  |
| <p>Owners are notified of the commencement of rehabilitation works.</p> <p>In consultation with Owner the site is rehabilitated back as close as possible to pre-existing condition including:</p> <ul style="list-style-type: none"> <li>• removal of hardstand (gravel) material;</li> <li>• removal of geofabric (geotechnical material separating gravel from ground);</li> <li>• ripping, grading &amp; spreading of stock piled top soil over site area;</li> <li>• grass seeding site area; and</li> <li>• removal of fencing &amp; gate(s) to be determined by Owner.</li> </ul> |
| <p>Final sign off of completion of rehabilitation and abandonment of Well site by the earlier of the Owner or the Department of Primary Industries.</p>  |

### *Local indigenous groups*

Metgasco has actively engaged with local indigenous groups and currently has a gas well operating on Boolangal Land Council land. Before drilling any well, Metgasco invites a representative from the local native title group to conduct a cultural heritage survey to ensure that areas of cultural significance are recognised, if present.

Metgasco supports the innovative “Greenteam Alliance” which provides a structure for assisting local aboriginals into work in natural resource management. The Greenteam Alliance undertakes land management work on a number of our operating sites.

The existing excellent relationship between Metgasco and private landowners proves that agriculture and the coal seam gas industry can co-exist.

### **2(b) Food security and agricultural activity**

Metgasco is very conscious of the high standards that Australian agricultural products must meet for both the domestic and overseas market.

As stated above, the principle of beneficial co-existence is a key element of Metgasco’s relationship with landowners. Metgasco prides itself on minimal interference with the day to day operation of the activities of its landowners.

A typical well site takes up a very small amount of the total landowner’s property, typically 1 to 2% of the land area. CSG operations can be designed to have a neutral or beneficial impact on the land.

## 2(c) Regional development, investment, employment, and State competitiveness

In the 2010 September quarter, the unemployment rate of the Northern Rivers region was 6.5% compared to the national average of 5.3%.<sup>18</sup> The labour force participation rate in Northern Rivers region was 53.3% in 2009 compared to the NSW rate of 62.6%.<sup>19</sup>

In 2007/08, the average personal income level of the Northern Rivers region was \$33,808 compared to the NSW average personal income level of \$56,301.

In June 2011, The Northern Star reported that the Australian Local Government Association's latest State of the Regions Report ranked the incomes from the Northern Rivers region 63rd out of 67 regions around the nation and also stated that the region's average income was 44% of the nation's richest region.

Northern Rivers Social Development Council chief executive Tony Davies stated in June 2011 that:

“The region's low ranking also fed off its high unemployment rate, its high rate of people scraping by on welfare and under-employment among those who did have a job. On top of that, some of our dominant industries, such as retail and hospitality, are already at the low end of the pay scale.”<sup>20</sup>

In the Richmond Valley LGA, which is a key part of the Northern Rivers region, the five largest industry employers accounted for almost 66% of total employment. The five main industry employers were, in order, manufacturing, retail trade, health and community services, education and agriculture.<sup>21</sup>

The Federal Minister for Regional Development, Simon Crean, stated in September 2011 that coal seam gas should be part of Australia's clean energy future and “a community that relies on one industry is always in trouble.”<sup>22</sup>

This narrow economic base was also recognised by Regional Development Australia<sup>23</sup> (Northern Rivers) as a headline issue for the area and recommended “support for local power generation based on recent gas finds” as a future need.<sup>24</sup>

Regional Development Australia (Northern Rivers) believes that the Metgasco proposed 30 megawatt gas fired powered station will have a significant impact on the local community “including social inclusion and employment.”<sup>25</sup> In addition, RDA (Northern Rivers) also stated that:

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<sup>18</sup> DEEWR

<sup>19</sup> ABS 3218.0

<sup>20</sup> <http://www.northernstar.com.au/story/2011/06/22/northern-rivers-lifestyle-money/>

<sup>21</sup> ABS 2006 Census

<sup>22</sup> <http://www.echonews.com.au/story/2011/09/08/tax-and-gas-the-future-says-crean/>

<sup>23</sup> Regional Development Australia is a nation-wide, federal government funded, initiative based on building partnerships and encouraging all governments and stakeholders to be responsive to local priorities and needs...Regional Development Australia will play a pivotal role in ensuring the long term sustainability of regional Australia. [www.rdanorthernrivers.org.au/](http://www.rdanorthernrivers.org.au/)

<sup>24</sup> Northern Rivers Regional Plan – vision to 2020 – strategy to 2012, page 84

<sup>25</sup> Northern Rivers Regional Plan – vision to 2020 – strategy to 2012, page 72



“Major projects such as the proposed gas development can also have substantial implications beyond our region especially through the provision of renewable energy sources and the reduction in the production and distribution of electricity from fossil fuel.”

Metgasco is committed to building a strong regional energy business in northern NSW and to creating jobs and economic opportunities for local residents.

To deliver on this strategy Metgasco has located its purchasing function in Casino and has actively sought to engage local businesses as much as possible through our local purchasing policy.

In the past 12 months alone, Metgasco has purchased goods and services from over 95 local north coast businesses and over 600 people have been employed in delivering goods and services to our sites. 25% of Metgasco’s expenditure is spent on local contractors.

Metgasco has a strong commitment to training and have established an in-house training programme through a local TAFE. This links career progression within our company to successful attainment of relevant skills.

Metgasco’s goal is to develop a strong regionally based energy business which:

- assists in maintaining the competitiveness of local manufacturing businesses by supplying competitively priced local gas;
- supplies gas fired power to the Northern Rivers region, thereby lowering greenhouse gas emissions and relieving the NSW Government from further investment in transmission lines to supply power to this area; and
- supplies gas to export LNG markets.

This is an ambitious agenda for a junior petroleum company, but it is one which Metgasco believes it can deliver on.

Metgasco has plans to supply gas to local customers in our regional area and to develop gas power stations in northern NSW to supply gas fired electricity to NSW customers.

The Company has received development approval from the Department of Planning to build a 30MW gas fired power project near the town of Casino. It is currently awaiting approval for its first Production Lease from the Department of Trade and Investment, Regional Infrastructure and Services.

Recently Metgasco advised the market that it had undertaken a review of the gas resources in its tenements and concluded that these are likely to contain CSG and conventional gas resources beyond the capacity of the domestic market to absorb. The Company has recently completed a feasibility study into supplying gas to an export LNG project. As northern NSW does not have any suitable onshore port facilities, Metgasco has evaluated three options:

1. a Floating LNG project to be located offshore NSW;
2. the development of a pipeline to Gladstone to supply gas to the LNG projects at Gladstone; and
3. the possibility of developing an LNG project at the Port of Brisbane.

A high level estimate of the economic impact of this potential development program on NSW is described below:

| Project                        | Capex Range<br>\$ Million | Construction<br>jobs direct<br>(approx)* | Operating Jobs<br>direct |
|--------------------------------|---------------------------|--|--------------------------|
| Richmond Valley Power Station  | \$50 - \$60               | 50+                                      | 5-10                     |
| Lions Way Pipeline             | \$120 - \$140             | 150                                      | 10                       |
| Field Development              | \$1,500 - \$2,250         | 550 – 600                                | 300 - 400                |
| LNG Export Project<br>1.5 mtpa | \$1,200 – 1,750           | 1,000                                    | 200                      |
| <b>TOTAL<sup>26</sup></b>      | <b>\$2,870 - \$4,200</b>  | <b>1,750 – 1,800</b>                     | <b>515 - 620</b>         |

\* The estimates of job creation is direct only and does not include the indirect jobs created by the multiplier effect

Metgasco recognises that as part of the broader coal seam gas industry that it must communicate and engage with the Northern Rivers community to demonstrate the value that it adds.

Metgasco also believes the government, as the ultimate owner of the resource, has a role in explaining to the community the benefits of the industry and the safety measures that are in place.

## 2(d) Royalties payable to the State

Under current state law, the NSW Government owns all petroleum and coal seam gas resources. The payment of royalties by gas companies is the mechanism used in NSW, and across other Australian states, to ensure that the people of NSW gain benefit from commercial enterprises that extract coal seam gas.

The Queensland Government has conducted a review of the petroleum royalty regime in light of the emergence of the LNG industry. Based on the large volumes of gas in Queensland it has been estimated that the State of Queensland could receive over \$850 million in royalties per year from gas sold.<sup>27</sup>

The royalties paid to the NSW government will clearly depend on the extent its coal seams are developed, but if the Queensland experience is an indication of future impact then NSW will experience significant economic growth as a result of CSG.

Metgasco acknowledges the Premier's jobs growth target of an additional 500,000 jobs over the next 10 years<sup>28</sup> and believes that the development of a gas market in NSW will assist in reaching this objective.

For Metgasco's proposed LNG plant, with LNG sales of 1.5 million tonnes / year, the project is estimated to realise total revenues of \$29 billion over its 20 year life and total royalties to

<sup>26</sup> Metgasco Ltd estimates

<sup>27</sup> Department of Employment, Economic Development and Innovation – Blueprint for Queensland's LNG Industry

<sup>28</sup> <http://www.smh.com.au/national/barrys-bible-the-word-is-jobs-20110903-1jrdc.html>

the NSW Government over this time period are estimated to be \$1.1 billion. This royalty estimate is conservative as it applies to production of less than 2,000 PJ. Metgasco sees the potential for more than 10,000 PJ of gas production, with higher royalties as result.

## **2(e) Local Government including provision of local/regional infrastructure and local planning and control mechanisms**

Metgasco has constructive relationships with the local councils within the petroleum exploration licence areas and adheres to all local government planning requirements.

## **3. The role of CSG in meeting the future energy needs of NSW**

### **3(a) Nature and extent of CSG demand and supply**

NSW is a big consumer of gas, but imports approximately 95% of its gas requirements from interstate. Every mainland state in Australia is supplied by its own gas supply - except NSW.

Metgasco believes that NSW has significant coal seam gas and conventional gas resources within the State which can make an important contribution to:

- regional employment and economic growth;
- reduced greenhouse gas emissions;
- improved energy security; and
- an improved State budgetary position through additional royalties to the State.

Investment in new gas fired generation in NSW is required to provide stable, secure low emission power and to support the introduction of renewable generation into our energy mix.

NSW faces two immediate energy challenges: growing demand for energy and pressure to adjust our economy to one which produces lower carbon emissions. Historically coal fired generation has supplied the majority of the State's power. But gas can play an important part in satisfying this energy demand in the future. NSW government forecasts expect gas to supply 30% of power demand in this time. The introduction of new gas fired power generation in NSW can assist in meeting the challenge of reducing the State's greenhouse gas emissions as gas fired power stations produce up to 70% less greenhouse gasses than coal fired power plants.

### **3(b) Relative whole-of-life cycle emission intensity of CSG versus other energy sources**

This issue has been dealt with in paragraph 1(f) of the submission.

### **3(c) Dependence of industry on CSG for non-energy needs**

Gas can have a positive impact on other industries in Australia that either rely on gas directly for production or currently rely on electricity through coal fired power stations.

In the Northern Rivers Region specifically, one of the major sources of employment, Richmond Dairies, has a significant requirement for gas in its production processes. Richmond Dairies' significant gas needs are currently serviced by LNG transported by road tankers.

It is likely that locally produced gas will halve energy costs.

It is also likely that other industries in Casino may develop on the basis of lower energy costs.

### **3(d) Installed and availability costs of CSG versus other stationary energy sources**

According to the Institute of Energy Research, the cost of electricity from new plants in the United States designed to open in 2016 from different sources has been approximated as follows in \$US per megawatt-hour<sup>29</sup>:

|                       |     |
|-----------------------|-----|
| • Solar thermal       | 312 |
| • Offshore Wind       | 243 |
| • Solar photovoltaic  | 211 |
| • Coal with CCS       | 136 |
| • Nuclear             | 114 |
| • Biomass             | 112 |
| • Wind                | 97  |
| • Coal                | 95  |
| • Gas with CCS        | 89  |
| • Hydro               | 86  |
| • Gas, combined cycle | 63  |

This information shows that gas, used in the production of electricity, is inexpensive compared with other methods to produce electricity. In Australia, this gap may widen further with the introduction of the Carbon Tax.

### **3(e) Proportion of NSW energy needs which should be base load or peaking supply and the extent to which CSG is needed for that purpose.**

Metgasco expects that there will be an increasing percentage of renewable energy in our generation mix in the future. All wind and solar projects experience periods of intermittency when wind or sunlight is unavailable to generate power.

In Australia our wind resources are only available around 8% of the time and our low wind events such as hot, still days in summer tend to occur on the days when everyone wants more power to run their air conditioners. Generally solar power is only available between 9 – 25% of the time and as anyone who has a solar hot water system knows, you need to have a backup supply, such as grid power or gas, to keep your showers hot on those cold, cloudy days.

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<sup>29</sup> U.S. Energy Information Administration, Annual Energy Outlook 2011 - [http://www.eia.doe.gov/oiaf/aeo/electricity\\_generation.html](http://www.eia.doe.gov/oiaf/aeo/electricity_generation.html)

When wind and solar resources are not available, natural gas power plants provide a cleaner alternative to coal to provide the power that wind or solar projects are unable to. When wind and solar projects “drop off” the grid because of a change in the weather, the electricity system needs to send signals to other power providers to start producing more power.

Only natural gas power plants have “fast start” capability that enable them to start producing power within minutes of receiving the signal that more power is required in the system. A recent South Australian study found that every 5,000 MW of wind power required 2,100 MW of natural gas fired power generation to back up power supply.

### **3(f) Contribution of CSG to energy security and as a transport fuel**

By the end of 2011 State Transit will have introduced over 650 new low-emission compressed natural gas (CNG) and diesel buses into its fleet of over 2100 buses. As CSG has the same qualities as CNG, CSG could also be a source of fuel for a number of Sydney Buses.<sup>30</sup>

As far as a transport fuel is concerned, there are fleets that can be converted to compressed natural gas, and Metgasco is reviewing the potential for mini LNG plants that could also provide fuel for truck fleets. There is some work to be done before the economics of these proposals can be confirmed.

NSW currently imports all its gas supplies, other than the relatively small contribution from AGL’s CSG operations near Sydney. NSW’s gas supplies from other states will not continue for much longer, with its traditional supply from the Cooper Basin declining and Queensland interests competing for existing gas supply.

If NSW wishes to achieve its goals of energy security it is essential that it develops its CSG resources. If it aims to reduce its dependence on coal generated electrical power as part of its greenhouse emissions, it needs more gas than it is currently importing, which makes it even more important to develop a NSW CSG business.

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<sup>30</sup> Australian Gas Association submission, op cit,