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INQUIRY INTO COAL SEAM GAS

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Introduction

Thank you for the opportunity to make a submission to the NSW Legislative Council Inquiry into Coal Seam Gas (CSG).

It is important to note that the failure of both the current or former state Government's to undertake an investigation into the impacts of CSG has not been due to a lack of community engagement on this issue. Groups such as the Lock the Gate Alliance and its member groups have, for several years, raised genuine concerns about this industry. There is now broad and growing support across all parts of NSW for a moratorium on further CSG development until the social, environmental, economic and health impacts are fully understood. Many within the campaign support a total and permanent ban on CSG mining in this state.

Something is clearly wrong about how this industry is rolling out. Despite broad community concern almost nothing has shifted since the change of government. What has been announced by various ministers has been piecemeal and does not appear to have been backed up with policy or regulatory change. Instead, what has happened is more exploratory approvals and drilling across areas like Putty, near Warragama Dam, in areas of the Upper Hunter, around Newcastle, the Mid-North Coast and Northern Rivers. Increasingly local government is turning against this industry. Moratorium motions have been passed across many councils impacted by CSG and more direct actions have been taken by councils to hinder exploratory activities. It is not difficult to see why councils are taking these action given they were never consulted about the issuing of exploration licences over their shires and council areas in the first place. For a government that campaigned on returning development decisions back to communities, the failure to listen to those communities on issues of extractive industries like CSG is striking.

Recently the question of a right to say no to access for gas companies has prompted responses from some in Government along the lines that - no one landholder should have the right to say no and that the resources belong to the crown and should be exploited for the benefit of all Australians. The obvious extension to that argument is that if the community is prepared to leave the resources in the ground – perhaps because they feel the costs to their community, their local economies, their agricultural land, water and the environment of exploiting those resources is too great – then the community should have a right to say no. Increasingly that is a call being made by many within the community.

The Government has had sufficient time to take action to explore and rectify the issues with this industry. The CSG companies and Industry bodies have had more than sufficient time. They have both failed and for these reasons, this inquiry is really a people's inquiry and a last opportunity for the industry. It is less about presenting advice to the government in a final report, rather it is about helping the community to form a final position on whether or not they will accept CSG in NSW.

It is the community that should decide on the future of CSG and I sense they will make that decision and will take the appropriate action – Government should then follow.

About the author

I declare at the outset that I am currently employed as a Policy Advisor to Greens NSW Member of the Legislative Council Jeremy Buckingham who is the Deputy Chairperson of General Purpose Standing Committee No. 5 and is participating in this inquiry.

I do not feel that my role within Mr Buckingham's office should preclude me from making a submission or detract from due consideration of the details of this submission. I have several years of experience in mining and CSG campaigning and have spent significant time researching this issue and speaking with community groups and individuals about the impact of the CSG industry.

The content of this submission is my own work and does not represent the views of Mr Buckingham or the Greens NSW.

Summary

The inquiry terms of reference are extremely wide ranging and I know that many experts are contributing to this inquiry in their areas of specialty. This submission will focus on the following areas:

- Ground and surface water impacts,
- Fracking and chemical impacts,
- Royalties and economic impacts,
- The role of CSG in NSW's future energy supply, and
- Greenhouse gas impacts.

It will also highlight how I see the NSW Government's Strategic Regional Landuse Planning fitting into this process. I also see a real need to revisit first principles in relation to energy policy and state revenue raising as a way of opening up honest discussion around this topic.

Key Issues

While this submission focuses on the limited number of issues highlighted above, there are a broad range of concerns which I believe should be critically considered by the committee. At the centre of the CSG debate are questions of environmental, social and health impacts including:

Water

- The ability for **fracking chemicals and chemicals naturally occurring** in the coal seam to enter and **contaminate aquifers** and surface water systems; and

- The **long term impacts on aquifers** including from contamination, depressurisation of the coal seam and potential drawdown.

Greenhouse Gas Emissions / Air Emissions

- **Total (lifecycle) Greenhouse Gas Emissions** for CSG in the Australian context, especially in regard to fugitive emissions; and
- The **impact of air emissions** (particularly from Volatile Organic Compounds) that are mobilized from the coal seam during drilling, fracking or gas production on human health and the environent.

Social Implications

- the **displacement of existing industries, particularly agriculture** but including other industries located in areas identified as having coal and gas resources;
- **social impacts** on communities that would increasingly become gas towns. These relate to impacts of temporary non-local work forces or shift work (eg. drive-in, drive-out);
- a **narrowing of the skills base** in regions as other industries are pushed out resulting in reduced opportunities for young people in those areas; and
- a **failure of government's to provide adequate infrastructure** to support local needs instead focusing infrastructure spending on supporting mining activities.

Landholder Issues

- the **uncertainty for many land owners** given
    - significant amounts of the state are subject to mineral and/or petroleum exploration licences;
    - these licences seems to be simply renewed as a matter of course; and
    - the current act guarantees a right of access to gas companies.
- **Community division** created by gas companies targeting specific landholders for access while keeping neighbors in the dark;
- **regulatory environment in relation to access agreements** for both the exploration and production phases; and
- The **impact of the agricultural potential of land** subject to or impacted by CSG exploration or production.

Other Environment Issues

- Associated **bio-diversity impacts** linked to gas infrastructure including wells, pipeline and road infrastructure, processing facilities and compressor stations.

Recommendations

Noting up front that I am of the opinion that the environmental, social, health, and economic risks of CSG are significant and that the opportunity cost of investing in CSG instead of renewable energy is enormous, I cannot see how government with an sense of appropriate risk management should allow this industry to develop. I therefore recommend that the inquiry call for the NSW Government to:

1) Prohibit CSG and other new fossil fuel development within NSW

Should government decide that despite the risks, that it wants to proceed with this industry, then these risks should be minimised as much as possible by the following conditions:

General (not identified in the body of this submission)

2) Limiting any CSG development to supply domestic electricity that replaces existing coal-fired power stations.
3) No CSG development be allowed in the following areas:
   a) Areas that are currently used or have the potential to be used for commercial agriculture
   b) With drinking water catchments
   c) State Conservation Areas, Nature Reserves, Travelling Stock Routes or crown land with significant biodiversity values.
   d) Within 5km of cities and towns
4) Conditions be developed to protect Australian consumers from gas price rises that would otherwise not exist if an export industry was not developed.

The following recommendations fall out of the body of this submission:

Questionable Assumptions

5) That this inquiry, due to its broad terms of reference and limited time and resourcing, focus on the critical science, facts and risks as they relate to CSG processes as opposed to questions of energy supply priorities, state revenues and employment.

Strategic Regional Landuse Plans

6) The inquiry call on the Government to introduce a moratorium on CSG development (any exploration or new production) in an area until a Strategic Regional Landuse Plan is completed and has the demonstrable support of the local community.

Ground and Surface Water

7) A ban on CSG within drinking water catchments, and/or within a certain distance of creeks and rivers;
8) A requirement for full hydrological and hydro-geological studies, considering catchment wide impacts, before assessment of all CSG pilot and production projects;

9) A levy on CSG companies to implement a rigorous and fully independent surface and ground water monitoring regime for all CSG pilot and production projects with results required to be published on a public website; and
10) A requirement for waste water management plans to be fully specified in advance of project approval.

Fracking / Chemical Use

11) A moratorium on the use of drilling and fracturing chemicals ('fracking chemicals') used in CSG and shale gas extraction, until these chemicals have been fully assessed for their health and environmental hazards by the Australian industrial chemicals regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS).

CSG Demand and Supply

12) That the inquiry recognise in its report that the availability of the CSG resource in NSW and a projected demand for the resource should not be considered sufficient justification for allowing the industry to develop. Rather, a decision to proceed should be based on careful consideration of the potential costs including opportunity costs associated with that decision.

Lifecycle emissions

13) That the inquiry report recognises that the there remains uncertainty over the lifecycle emissions of CSG.
14) That the inquiry report identifies that the claims by industry of CSG being 70% less greenhouse intensive than coal fired power is clearly without basis.
15) That the inquiry recommends that the government commission an Independent Inquiry to report to the NSW Environment Minister on the total lifecycle emissions of CSG in NSW and requests CSG companies cooperate fully with that inquiry.

General

Questionable Assumptions

It is clear from government statements up to this point that CSG development has been pursued on the basis of three assumptions:

- that gas, and particularly CSG in the NSW context, will play an important or even critical role in the state's future energy supply;
- that CSG represents a low emission transition fuel; and
- that CSG development will provide economic 'benefits' by way of jobs and government revenue.

I do not accept these assumptions as they are able to be clearly challenged on points of fact. Other options clearly exist to provide energy security, government revenue and jobs growth. Like most things there are costs and benefits to all of these options. Recognition of the true costs of environmental, social and health impacts as well as the opportunity cost of CSG is essential. In particular, the opportunity cost of heavy investment in CSG is a lack of investment in renewable energy, an energy source that will last millennia, not decades.

It is encouraging that some of these issues have been included in the terms of reference and there is an opportunity, to some degree, to challenge these assumptions in this forum. It is important to note however that these are highly contested and increasingly politicised questions that could no doubt be the subject of long and detailed inquiries in and of themselves. I am of a view that the inquiry should not make decisions on the basis of energy or economic need in the first instance and that the majority of the inquiry's time should be directed to establishing the critical science, facts and risks as they relate to CSG processes. This will enable better consideration of the potential costs of the industry by Government and the community. In the event that government makes decisions to proceed on the basis of the assumptions highlighted above, at least it will be clear what information has been disregarded in making those decisions and the community will be armed with that information.

Recommendation:

- That this inquiry, due to its broad terms of reference and limited time and resourcing, focus on the critical science, facts and risks as they relate to CSG processes as opposed to questions of energy supply priorities, state revenues and employment.

The role of the NSW Government Strategic Regional Land Use Policy

The Coalition made a promise during the NSW State Election campaign to implement a Strategic Regional Landuse Policy (SRLUP). The policy committed the government to:

1. strategic land use planning to better understand the constraints to, and opportunities for growth;
2. reforms to the planning assessment process to improve monitoring, compliance and cumulative impact assessment;
3. reforms to mining and CSG legislation to protect strategic agricultural land and associated water resources; and
4. tougher planning assessments while strategic land use plans and planning reforms are developed.

The government set its own timeline for delivery of regional land use plans (RLUPs) with one plan due for completion within one year of taking office and for plans to be started in that time across the major coal regions of the state. All plans across the state are due to be completed within three years.

It is understood that local communities will have the opportunity to provide input into the development of the RLUPs. This is in stark contrast to the way CSG exploration licences have been issued in the past, without any community consultation or due regard to whether or not CSG development of any sort is suitable for that area.

The community is looking forward to the opportunity to have input into these plans and are watching closely to see the result of the first plans for the Upper Hunter and Gunnedah Basins. The Government has also repeatedly waived away concerns about CSG on the basis that RLUPs are being developed. It makes no sense to allow further development of the CSG industry while the SRLUP process takes its course. The ability to protect strategic agricultural land and water resources in particular will be significantly undermined if any further development occurs before the various RLUPs are implemented. The inquiry should highlight the role these plans should play in determining the appropriateness of any future development and recommend a complete moratorium on any further CSG development until these plans are finalised.

Recommendation:

- the inquiry call on the Government to introduce a moratorium on CSG development (any exploration or new production) in an area until a Strategic Regional Landuse Plan is completed and has the demonstrable support of the local community.

The environmental and health impacts of CSG activities

Effect on ground and surface water systems

CSG is trapped within the coal seam by water pressure. In order to access the gas, water must be extracted from the coal seam to reduce the pressure and allow the gas to flow. This can be a large amount of water but varies across different areas and within different coal seams.

There are three key issues associated with ground and surface water systems in relation to CSG:

1. Potential drawdown of aquifers due to the depressurisation of the coal seam.
2. Creation of linkages between coal seams and freshwater aquifers and contamination associated with movement of fracking and naturally occurring chemicals via these linkages.
3. Managing the water extracted (known as produced water) to allow the gas to flow.

A number of key references highlight the uncertainty and risks of CSG in relation to water systems:

- The National Water Commissioner raised concerns about the volume of water that would be extracted by CSG development in a position paper in December 2010 stating that *"Current projections indicate the Australian CSG industry could extract in the order of 7,500 gigalitres of co-produced water from groundwater systems over the next 25*

years, equivalent to ~300 gigalitres per year."[i] This volume is more than half of existing total extraction from the Great Artesian Basin.

- The same policy statement also stated that: *"The production of large volumes of treated waste water, if released to surface water systems, could alter natural flow patterns and have significant impacts on water quality, and river and wetland health."*[ii]
- In media statements in July 2011 the National Water Commissioner reaffirmed the concerns of the authority publically stating that the CSG industry presents *"significant potential risks to water and our water management as a result of the scale of the development of the sector."*[iii]
- In 2010 the US EPA launched a study into the impact on underground drinking water from Hydraulic Fracturing.[iv] A previous EPA study released in 2004 was strictly limited to the impacts of the injection of hydraulic fracturing fluid on underground drinking water – although this 2004 study is often sighted by industry as giving it a clean bill of health[v].
- In November 2010 an *Assessment of Impacts of the Proposed CSG Operation on Surface and Groundwater Systems in the Murray-Darling Basin*[vi] was conducted with a focus on CSG projects planned for Southern Queensland and highlighted potential dewatering impacts on alluvial aquifers, and subsidence impacts on surface water flows.
- A 2005 report: *Coal Bed Methane Hazards in NSW* concluded that "the development of a significant gas field in the district (Wyong) based on Coal Bed Methane will severely impact on the security of supply of this water, by radically altering the groundwater levels, and purity".

Despite growing evidence and public statements from experts of these risks to groundwater in particular, the only large scale CSG production in NSW to date has not conducted any groundwater monitoring. AGL at its Camden project in Sydney's Southwest have acknowledged to the local community in public meetings that no groundwater monitoring was required to be done or has been done in the petroleum production lease areas since operations started in 2001. They do however plan to conduct baseline analysis and ongoing monitoring for the proposed Northern Expansion. This begs the question, if it is a good idea now, why not then. It is either a cynical public relations exercise or a recognition that they were lucky to get away without appropriate regulatory constraints in the first place.

AGL Gloucester Case Study

The recently approved AGL Gloucester Project provides a good case-study of the potential water issues associated with CSG development. Gloucester is at the base of the World Heritage listed Barrington Tops National Parks, one of the wettest areas in NSW. It's flowing creeks and rivers are a feature and the narrow valley floor has a history of agriculture, primarily grazing with water being taken directly from the creek systems or from ground water from the alluvial aquifer or the shallow bedrock aquifer. 65 registered bores are in the immediate vicinity of the project area and it was recognized in the projects Environment Assessment (EA) that many unregistered bores were likely in the area supplying stock, irrigation and domestic water as well as for local coal mining operations.

In February 2011 AGL was approved to drill 110 gas wells in the first stage of a 330 well gas field. The company expects the equivalent of one Olympic swimming pool (2ML) per day of

produced water to be extracted across the field[vii]. Once at 330 wells, the volume is expected to be 6ML per day or 2190ML per year, enough water for over 27,000 people based on average consumption rates.[viii]

The EA for the project in relation to ground water is based on a review of existing data, to create a conceptual model. No hydrogeological study was done, despite recognition of previous reports (in 2001) that "extensive faulting occurs throughout the Basin" and " The faulting known to exist within the Gloucester Basin is likely to have resulted in the development of secondary permeability and localised increases in aquifer hydraulic conductivities". A number of pilot trials were conducted, however limited information is provided in relation to the timeframes and the extent of monitoring of alluvial and shallow bedrock aquifers during these trials. Detailed information was provided to the Planning Assessment Commission (PAC) separately but not provided at the time submissions were being called for from the general public. No conclusion is drawn in the EA about the long-term potential impacts. Instead, the potential for impacts appears to be downplayed and the promise of a Groundwater Management Plan offered to identify and manage impacts as they occur.

The produced waste water is proposed in the EA to be stored in water storage ponds before processing.[ix] As highlighted above this is equivalent to the volume of 365 Olympic size swimming pools a year and is expected to result in 1095 tonnes of salt as a byproduct of processing. This will need to be managed by AGL. The EA provides no clarity on how the salt will be managed and based on the nature of the waste will either be processed locally, transported to Sydney or to Taree to a waste facility.

The Gloucester area receives up to 2000mm of rain annually, which raises questions about the safety of water storage ponds and salt and the risk of accidental release into the catchment. The nature of the Gloucester Valley is that it feeds water into two catchments, the Manning and Karuah. Downstream from Gloucester, these systems provide water for significant agriculture, aquaculture (oysters) as well as communities along the NSW mid north coast.

The determination by the PAC provides justification for its decision which includes the following statements:

- In considering the assessment before it the Commission was conscious of both the limited extent of experience with commercial CSG extraction in New South Wales to date and the likely significant future expansion of this type of extraction in the State.
- The Commission also apprised itself of some of the extensive documented experience of coal seam gas extraction in the USA and related environmental issues (USEPA 2004, Evaluation of impacts to underground sources of drinking water by hydraulic fracturing of coalbed methane reservoirs, EPA 816-R-04-003)
- Some geological uncertainty is, of course, inevitable in underground gas extraction and mining operations… The Commission nevertheless accepts the position, implicit in the Department's recommendation for approval, that it is possible to develop the gas field by adaptive management.

The decision at Gloucester represents a "suck it and see" approach to managing ground and surface water risks. Despite the following facts:

- a lack of detailed hydrogeological information in relation to the project area and recognition of that uncertainty by the decision maker;
- Identification that CSG is a new and immature industry;
- the reliance by the decision maker on a US EPA report that was extremely limited in its scope and was essentially under review by the launch of a new and more extensive study (as highlighted above);
- No reference in either the EA or the decision statement of the serious concerns of the federal water commissioner;
- No reference to potential issues raised in the 2005 NSW report or the 2010 Qld report (identified above).

The project was approved subject to an adaptive management approach to manage issues as they might arise.

The issues at Gloucester, if this industry is allowed to roll out at this point, will be mirrored across the state. It is clear that there is a lack of information to make informed risk assessments and this is accompanied by a general acceptance within the Planning Department and the PAC that this lack of information can be simply adaptively managed. It is difficult to suggest recommendations for improving this process, as there is a clear prima facie case that this project should have never have seen the light of day. It is near the top of water catchments for two large populations areas in the Mid-North Coast supplying drinking water, it has existing agriculture reliant on water from local sources including bore water, it has high rainfall making waste water management more difficult and has recognized faulting (already known) increasing the risk contamination and drawdown of overlying aquifers. But regardless of these base facts, the suck it and see approach is clearly not acceptable.

Based on the inherent failing of the planning system to adequately assess risks, as a way of managing these limitations the following recommendations are made:

Recommendations:

- A ban on CSG within drinking water catchments, and/or within a certain distance of creeks and rivers
- A requirement for full hydrological and hydro-geological studies, considering catchment wide impacts, before assessment of all CSG pilot and production projects;
- A levy on CSG companies to implement a rigorous and fully independent surface and ground water monitoring regime for all CSG pilot and production projects with results required to be published on a public website; and
- A requirement for waste water management plans to be fully specified in advance of project approval.

Effects related to hydraulic fracturing / the use of chemicals

Hydraulic fracturing or 'fracking' risks contamination of fresh water aquifers. Fracking forces a mix of water, sand and chemicals into the CSG well at high pressure to fracture the surrounding coal in order to improve gas flow rates. It also has the potential to create fractures outside of the seam and can link the CSG wells with fresh water aquifers. This potentially exposes fresh

water aquifers to fracking chemicals and other contamination existing within the coal seam**.** Much of the chemical concern in relation to CSG is related to fracking, either by way of the fracking chemicals used or the mobilization of chemicals from within the coal seam made worse by fracking.

These key media reports and studies present a general picture of the concern in relation to fracking:

- Fracking has been banned in France[x], is currently suspended in areas of the UK[xi], is suspended pending review in Quebec, Canada[xii] and had a ban within New York state in the US which has now been lifted and replaced with strict conditions including maintaining the ban within primary aquifers and within the drinking water catchments[xiii].
- A recent report showed fracking near water bores increased methane levels in those bores to potentially explosive levels.[xiv]
- On 26 August 2011 Arrow Energy reported traces of BTEX chemicals were found in water monitoring bores in their Tipton West and Daandine gas fields. At 15ppb, Benzene traces in one sample represent a level 15 times higher than drinking water standards.
- The water that comes up from the coal seam is often saline and contains naturally occurring chemicals from within the coal seam. The National Toxics Network released a report in June 2011 indicating that the BTEX chemicals (Benzene, benzene, Toluene, Ethylbenzene and Xylene) are found naturally in the coal seams and that the fracking process can release BTEX from the natural-gas reservoirs, which may allow them to disperse into the groundwater aquifers or to volatilise into air.[xv]
- On 4 August 2011 the NSW Environment Minister issued a formal warning to AGL in relation to an uncontrolled gas and water release at a CSG well near Campbelltown. AGL was found to have been in breach of its environmental protection licence.[xvi] It is fair to say that any chemicals that had been previously put down that well would have potentially been released into the environment (in this case very close to homes and a school).
- In June 2011, media reports of seismic activity in the UK was linked to fracking activites resulting in a halt to the practice.[xvii]

Failure to assess fracking chemicals

The National Toxics Network (NTN) produced a briefing paper in February 2011 on Hydraulic Fracturing.[xviii] The paper claimed that only 2 of the 23 most recognised fracking chemicals had been assessed by the Australian industrial chemicals regulator and that none had been assessed for use in fracking.

Note: This paper by NTN should form the basis of reading on these issues and NTN should be asked to give evidence at the inquiry's hearings.

The briefing paper called for: "federal and state governments to implement a moratorium on the use of drilling and fracturing chemicals used in CSG and shale gas extraction, until these chemicals have been fully assessed for their health and environmental hazards by the

Australian industrial chemicals regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS).

At the recent hearings of the Senate Rural Affairs and Transport committee inquiry into the Management of the Murray Darling Basin which includes terms of reference for CSG, both NTN and NICNAS gas evidence and accepted that NTN play a vital role in alerting the regulator to chemical risks and that the regulator is thousands of chemicals behind in assessment and is under-resourced.

(Transcript not available at time of writing but should be available at: http://www.aph.gov.au/hansard/senate/commttee/committee_transcript.asp?MODE=YEAR&ID=187&YEAR=2011)

Quantities of chemicals used

Despite the constant claims by industry that the chemicals used in fracking are household chemicals, they are clearly industrial chemicals used in industrial quantities. In the Camden Northern Expansion development application[xix], AGL are proposing to use fracking for this project and in section 4.3 it is made clear under the *Drill and Frac Water Management* section that "*The delivered volume required for fracture stimulation of a well is in the order of 250 to 500 kilolitres (kL)…".*

In section 12.2.3 AGL note that: *"Fracing fluid typically consists of 90% water, 9.5% sand and 0.5% additives by volume."* AGL also acknowledge in the project description that there may be a need to re-fracture stimulate wells.

From these figures, the total volume of chemical per frack is between 2,500 and 5,000 litres. If all of the 72 proposed wells in the project area are fracked only once that is between 180,000 and 360,000 litres of chemicals injected into the ground in the Scenic Hills area alone. It would be difficult to fit these chemicals under the average kitchen sink.

Government Fracking Moratorium

The NSW Resources and Energy Minister made a media statement on 21 July[xx] that NSW would introduce a fracking moratorium until 31 December 2011. Despite this being widely reported as a continuation of the moratorium on fracking it was the first time a pause had been placed on this process in NSW.

It is important to note that there has been no clarification from the Minister or the Government in relation to how this moratorium is being implemented. A number of critical questions remain including:

1. Will fracking be allowed during the moratorium period at sites with existing development consent (for example at AGL's Camden Gas Project)?

2. Can any exemptions to the moratorium period be granted and what is the process for granting the exemption, who is the decision maker?
3. What information or evidence is being sought by the government during the moratorium period so that an informed decision can be made about whether or not to continue the moratorium?

Questions along these lines where asked of Departmental staff at the Senate Inquiry in Canberra (already mentioned) with answers given that suggested that there was no direction from Government as to how these issues were to be managed.

Of greatest concern is the seeming lack of research being commissioned or sought out to inform decision-making at the end of the moratorium period. It makes no sense to institute a moratorium, undertake no work to investigate the issue and then allow the practice to resume at the end of the period, no better informed than at the start of the moratorium.

As mentioned in the previous section relating to water impacts, the US EPA is currently undertaking a detailed study into the impact of Hydraulic Fracturing on Drinking Water Supplies. The New York Environment Regulator has recently announced tight restrictions on both fracking and drilling in or around drinking water catchments, primary aquifers and creeks and rivers.

Recommendations:

- The recommendations proposed in the previous section also apply here.
- a moratorium on the use of drilling and fracturing chemicals ('fracking chemicals') used in CSG and shale gas extraction, until these chemicals have been fully assessed for their health and environmental hazards by the Australian industrial chemicals regulator, the National Industrial Chemical Notification and Assessment Scheme (NICNAS).

Effect on greenhouse gas and other emissions

Please see the section on "Relative whole-of-lifecycle emission intensity of CSG versus other energy sources".

The economic and social implications of CSG activities

Royalties payable to the State / Economic impacts

The CSG industry currently enjoys a 5-year royalty holiday in NSW. The royalty arrangements in NSW are 0% for the first five years, 6% in year 6, 7% in year 7, 8% in year 8, 9% in year 9 and 10% in year 10 and for remaining years. [xxi]

In 2010 royalties from CSG were only $462,000[xxii]. This will not increase much, if at all, over the next six years at least as no new CSG production has come on-line in the last year and any new production will not start paying royalties for at least five years.

The royalty holiday regime has the potential to significantly impact on the way CSG development is proposed in NSW. There is significant incentive to progressively develop the field a few wells at a time and try to get maximum production from those wells within the first five years. Because the royalties are paid at the well-head and not over the entire field it is possible for royalties to be drastically minimised through this approach.

By trying to exhaust quickly and then moving on it creates significant uncertainty in the minds of the community that is confronted by the industry with concentrated effort and constant expansions. It also creates the potential for risky practices to try to get maximum flow rates early through aggressive fracking that would logically add more risks in relation to underground water contamination.

In Camden AGL is just moving into its tenth year with 80 plus production wells operating over two phases. Some wells are already exhausted and the company is now applying for stage 3, the Northern Expansion. It appears that AGL are applying this approach and it will have the impact of minimising royalties payable to NSW.

It is important to note that CSG royalties in Qld are a flat 10% for the life of the well.

NSW under the current arrangements will miss out on a significant revenue source if the five-year royalty holiday is retained.

Any suggestion by industry that an increase is not feasible should be considered against the likely revenue increases that the CSG companies will enjoy once the export terminals on the east coast come on-line. Recent media reporting[xxiii] suggests that the price of domestic gas will increase dramatically on the back of rising wholesale gas prices with producers able to sell gas into the export market. The current international price is about 3 times that of the domestic gas price in the Eastern States. This is set to dramatically increase the profit margins for CSG companies in the medium term with export due to start in Queensland in 2014.

Recommendation:

- The NSW Government should immediately increase Petroleum Royalties to 10% in line with Queensland.

The role of CSG in meeting the future energy needs of NSW

Nature and extent of CSG demand and supply

There are a number of future energy options for NSW including existing coal fired power, current and future gas for heating, cooking and electricity generation, renewable energy and any mix of these. How these options are managed is essentially a political question and linked to both federal and state policy settings in relation to climate change and energy policies.

While these decisions will be made in the context of ongoing public and political debate, what we do know now is the intention of companies currently engaged in CSG development in NSW.

While some of the projects flagged in NSW at the moment will provide gas for domestic power generation such as at Wellington Power Station (660 MW not yet under construction and able to be supplied by existing conventional gas[xxiv]), Wilga Park Power Station (16MW currently in operation)[xxv] and a new power station planned at Casino (Metgasco – 30MW not yet under construction[xxvi]), these are relatively small power stations compared to current NSW electricity supply. In addition, only 6% of Sydney's domestic gas is supplied by CSG from the AGL Camden Gas field[xxvii]

The bulk of CSG projects currently being developed in Queensland and proposed for NSW are targeted to the export market. Options in NSW include export from a Liquefied Natural Gas plant at Newcastle as being proposed by Eastern Star Gas[xxviii]. Metgasco in Queensland are proposing an offshore processing and export facility off the coast of Ballina[xxix] and a pipeline to Queensland would see the major deposits currently under exploration in the Gunnedah Basin and north to the Queensland border transported to Gladstone in Queensland where four major export terminals are planned[xxx]. Santos recently purchased Eastern Star Gas[xxxi] and with an interest in one of the major export facilities approved for Gladstone[xxxii], a pipeline to link the gas fields between Narabri and the Queensland border is likely to be a priority.

The Australian Energy Market Operator 2010 Gas Statement of Opportunities for Eastern and South Eastern Australia[xxxiii] states in relation to east coast gas that the scale of LNG export will drive a substantial amount of CSG reserve development in Queensland and New South Wales.

It is clear that the current gas reserves in NSW could provide power for NSW for a significant period of time. But it is also clear that it is not the intention of government or industry to hold on to these resources for local energy needs and that the bulk is planned for export.

A question needs to be asked as to whether or not it is appropriate to foist the environmental, social and health costs of CSG exploitation onto NSW communities to supply export demand for LNG.

The argument that continues to be made by government and industry is that CSG is a cleaner burning fuel that should be used in a transition to renewable energy. The fact that the greenhouse gas emissions profile for CSG is subject to significant uncertainty undermines this argument in the first instance (see next section). Secondly, the lack of discussion by industry or government about retiring coal-fired power stations to be replaced by gas suggests that this is not a serious consideration and that gas is seen as an additional resource, not an alternative or transition.

The NSW Government is continuing to pursue the Cobbora Coal project to supply coal in the long term to the existing coal fired power stations. Under the current privatised Gentrader model it is difficult to see how these plants will be retired or retrofitted for gas.

It also needs to be noted that there is growing evidence that renewable technologies have matured to the point that there is no need for a transition fuel to fill any gap in energy demands. NSW currently has over 2,200 MW of wind energy installed, approved or proposed[xxxiv]. Recently in Spain a solar thermal power station with molten salt storage was commissioned demonstrating the ability to generate 24hour electricity from solar power[xxxv]. More of these plants are on the way and offer a clear alternative, particularly for regional development and employment without the environmental impacts that CSG is likely to have.

Beyond Zero Emissions[xxxvi] have articulated a plan that offers a blueprint for a rapid transition to 100% renewable energy generation in NSW and have specified locations with excellent solar and wind resources. This is supported by the Government's own analysis of solar and wind resources in NSW as described in the 2010 Department of Planning Discussion Paper on Planning for Renewable Energy Generation[xxxvii]

The demand and supply assumptions for NSW CSG do not need to be based on an extrapolation of the status quo. Industry or treasury modeling based on the current situation should not be the only guide to decision making in relation to CSG. There are other energy options for NSW, there is the ability to focus on sustainable industries for economic development and leave the CSG in the ground.

While it is useful to the inquiry to identify the extent of supply and demand as it relates to NSW CSG resources, that should be done in the context of understanding the imperative to develop a clearer understanding of the potential cumulative impact of proceeding with CSG development only – the bigger the industry, the bigger the environmental, social and health impacts. If these resources are largely going overseas through the investment of foreign capital or the purchase of gas, then it is clearly a case of Australia suffering the costs while the benefits are exported.

Recommendation:

- That the inquiry recognise in its report that the availability of the CSG resource in NSW and a projected demand for the resource should not be considered sufficient justification for allowing the industry to develop. Rather, a decision to proceed should be based on careful consideration of the potential costs including opportunity costs associated with that decision.

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

There is significant uncertainty in relation to the greenhouse gas emission footprint of the CSG industry in NSW.

Claims by industry of CSG being a clean, low emission technology are not supported by science. APPEA deliberately uses comparisons of combustion only in making claims that emissions from gas-fired electricity is up to 70% fewer than from coal power. This is completely misleading and ignores the fact that there is not agreement on the total carbon footprint for CSG, particularly in relation to fugitive emissions.

A recent media release from APPEA provides a number of examples of how misleading information is used to confuse the facts around the emissions profile of CSG. The three primary reports mentioned in this release do not specifically mention CSG. The final report, conveniently not hyperlinked in the media release is not so easy to track down but appears to show significant differences in the fugitive emissions factors across different CSG examples. The comparison chosen compares one of the best possible CSG cases with one of the worst coal cases. Furthermore it is not clear what the basis of the assumptions around fugitive emissions are and how the fugitive emission factors have been determined and why the differences.

It is also the case that the energy costs associated with water treatment (a necessary requirement with policy shifts away from evaporation ponds), and which is known to be energy intensive, are not included in any of the assessments.

While there is limited research that has been conducted in this area, what has, points to unconventional gas as having little if any greenhouse gas benefit over coal fired power.

A Cornell University study suggests that the fugitive emissions (methane that escapes into the atmosphere during the production of gas) created in Shale Gas production in the US was so significant as to potentially make the carbon footprint of shale gas larger than coal when used for electricity generation. The processes for Shale Gas extraction are similar to those used for CSG.[xxxviii]

Methane is 20 times more greenhouse potent than Co2 over a 100 year timescale[xxxix] which pushes up its carbon equivalent footprint. It is even worse if it is turned to LNG for export because a significant portion, estimated at around 10% of the gas is used in the refrigeration process to liquefy the gas.[xl]

As mentioned earlier, the organization Beyond Zero Emissions, supported by the University of Melbourne released in July 2010 their Zero Carbon Australia Plan[xli]. This details that Australia (including NSW) could move to 100% renewable electricity using existing commercially available technologies within 10 years. This is a fully costed plan that is cost comparable to maintaining our existing energy supply but reduces carbon emissions to a fraction of that under a fossil fuel based scenario.

There are alternative energy options that are commercially available today and will allow a rapid transition away from fossil fuel power.

These facts clearly strike at the credibility of statements by industry and government that CSG is part of a low carbon economy or is a low emission transition fuel and further assertions that renewable energy simply can't take the place of fossil fuels.

Recommendations:

- That the inquiry report recognises that the there remains uncertainty over the lifecycle emissions of CSG.
- That the inquiry report identifies that the claims by industry of CSG being 70% less greenhouse intensive than coal fired power is clearly without basis.
- That the inquiry recommends that the government commission an Independent Inquiry to report to the NSW Environment Minister on the total lifecycle emissions of CSG in NSW and requests CSG companies cooperate fully with that inquiry.

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[i] http://www.nwc.gov.au/resources/documents/Coal_Seam_Gas.pdf
[ii] http://www.nwc.gov.au/resources/documents/Coal_Seam_Gas.pdf
[iii] http://www.theaustralian.com.au/national-affairs/plea-to-watch-water-quality-national-water-commission/story-fn59niix-1226115575097
[iv] http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm
[v] http://www.appea.com.au/images/stories/mb_files/Factfile_Gasland_final.pdf
[vi] http://www.environment.gov.au/epbc/notices/assessments/pubs/coal-seam-gas-operations-impacts.pdf
[vii] AGL Gloucester Project EA, http://majorprojects.planning.nsw.gov.au/page/project-sectors/transport--communications--energy---water/pipelines/?action=view_job&job_id=3194
[viii] Based on average household water consumption of 80.5kL of water use per year per person: http://www.nwc.gov.au/www/html/236-water-use-in-australia.asp
[ix] https://majorprojects.affinitylive.com/public/6292c8af2d506df412e52b5dccae282b/Volume1_Environmental_Assessment_11Nov09.pdf
[x] http://www.naturalgaswatch.org/?p=679
[xi] http://www.icis.com/Articles/2011/06/01/9465292/fracking-suspended-in-uk-following-possible-earth-tremors.html
[xii] http://www.cbc.ca/fp/story/2011/06/30/5031205.html
[xiii] http://www.dec.ny.gov/press/75403.html
[xiv] http://www.pnas.org/content/108/20/8172
[xv] http://ntn.org.au/wp-content/uploads/2011/07/NTN-CSG-Report-July-2011.pdf
[xvi] http://www.jeremybuckingham.org/wp-content/uploads/2011/08/4Aug_Warning-Letter-from-OEH.pdf
[xvii] http://www.independent.co.uk/news/science/small-earthquake-in-blackpool-major-shock-for-uks-energy-policy-2291597.html
[xviii] http://ntn.org.au/wp-content/uploads/2011/07/NTN-CSG-Report-July-2011.pdf
[xix] http://www.agl.com.au/Downloads/V1_MainReport_pt01.pdf
[xx] http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/400728/Minister-Hartcher-med-rel-end-of-moratorium.pdf
[xxi] http://www.dpi.nsw.gov.au/minerals/resources/royalty
[xxii] http://www.parliament.nsw.gov.au/prod/lc/qalc.nsf/18101dc36b638302ca257146007ee41a/38aa3b44b953655eca25788700233402?OpenDocument
[xxiii] http://www.theaustralian.com.au/business/economics/gas-rush-may-spur-huge-rise-in-prices-in-southern-states/story-e6frg926-1226134309733
[xxiv] http://www.ermpower.com.au/power/wellington
[xxv] http://www.easternstar.com.au/powergeneration.html
[xxvi] http://www.metgasco.com.au/page/richmond_valley_power_station.html
[xxvii] http://www.agl.com.au/about/EnergySources/indevelopment/Pages/Camden-Gas-Project.aspx

[xxviii] http://www.easternstar.com.au/pdf/factsheets/04_LNG.pdf
[xxix] http://www.northernstar.com.au/story/2011/05/03/plenty-pipeline-for-metgasco-chief-peter-henderson/
[xxx] http://pipeliner.com.au/news/all_pipelines_lead_to_gladstone_queenslands_burgeoning_lng_industry/041805/
[xxxi] http://www.theaustralian.com.au/business/mining-energy/santos-in-agreed-offer-for-eastern-star-gas/story-e6frg9df-1226096649416
[xxxii] http://www.glng.com.au/
[xxxiii] http://www.aemo.com.au/planning/1410-0001.pdf
[xxxiv] http://en.wikipedia.org/wiki/List_of_wind_farms_in_New_South_Wales
[xxxv] http://en.wikipedia.org/wiki/Solar_Tres_Power_Tower
[xxxvi] http://beyondzeroemissions.org/
[xxxvii] http://www.planning.nsw.gov.au/LinkClick.aspx?fileticket=qAqn4Nkun04%3D&tabid=394&language=en-AU
[xxxviii] http://graphics8.nytimes.com/images/blogs/greeninc/Howarth2011.pdf
[xxxix] http://www.epa.gov/methane/
[xl] http://www.propublica.org/documents/item/methane-contamination-of-drinking-water-accompanying-gas-well-drilling
[xli] http://www.energy.unimelb.edu.au/uploads/ZCA2020_Stationary_Energy_Report_v1.pdf