

Submission
No 284

INQUIRY INTO COAL SEAM GAS

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Date received: 07/09/2011



Response to the NSW General Purpose Standing Committee Inquiry into coal seam gas

September 2011

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Executive Summary

The Australian Lot Feeders' Association (ALFA), the peak body for the cattle feedlot industry, appreciates the opportunity to provide input into the NSW General Purpose Standing Committee No. 5 inquiry into the environmental, economic and social impacts of Coal Seam Gas (CSG) activities.

The statistics surrounding the past and future predicted growth of the CSG industry are staggering with an expected 100% increase in forecast production over the next 20 years. Given that water is a by-product of the CSG extraction process, this inquiry into the impacts of CSG is particularly salient.

ALFA concerns regarding CSG are primarily associated with its impacts upon the quantity, quality and pressure of ground water in the GAB. Notably, and despite Government assurances regarding the plethora of environmental license conditions and legislation, we remain unconvinced that there is sufficient knowledge regarding the current and cumulative CSG impacts on ground water to effectively prevent such impacts. For instance, there is currently insufficient understanding of hydraulic connectivity between the coal measures and aquifers, rates of water movement, depth of the coal seam, the thickness of confining layers, the effect of faulting or fractures; and the impact of fracking on such connectivity. There is also no environmentally sustainable method to dispose of the concentrated chemicals, salt and other contaminants that are built up in evaporation ponds. It is estimated that Queensland alone will have 30 million tonnes of salt built up over the next 30 years. Accordingly, we do not believe that current State and Federal legislation will prevent or rectify the potential environmental damage from CSG extraction.

Moreover, given the significant royalties received from CSG extraction and the parlous condition of state Government budgets in CSG areas at present, we believe that this represents a significant conflict of interest whereby the long term environmental concerns are jeopardised in the interests of short term monetary gain. Because of concerns regarding state Government royalties and perceived independence with respect to license approval decisions, along with the rapidly expanding nature of the CSG industry across state boundaries, ALFA believes that there needs to be Federal oversight of the CSG industry to provide consistency and independence.

We believe that whilst the CSG industry may well provide more benefits to state economies and employment than agriculture in the short term, the costs in terms of lost agricultural production, health issues from contaminated drinking water along with lost biodiversity may well exceed such amounts. Regardless, cost benefit analysis of license approvals on an individual or cumulative basis have not undertaken so we may never know. Importantly, the full extent of such externalities may not be fully understood for decades to come, far too late for Government's or the CSG industry to rectify (even assuming this is possible). In addition, the short term benefits from this finite resource will inevitably be overtaken by the long term value of agricultural production particularly given future world food security requirements. However, whether agriculture will be able to deliver such production in the face of GAB damage due to CSG extraction remains to be seen.

ALFA also believes that increasing concerns regarding ground water contamination from CSG extraction aptly demonstrate that state and federal legislation needs to adopt a more precautionary principle approach. Refusal to recognise such concerns will eventually be to Government's peril, particularly if such contamination of the GAB cannot be 'made good' by the CSG industry – another issue where conjecture abounds.

We also maintain concerns regarding potential market access issues associated with beef residue impacts from the cattle consumption of water contaminated by the fracking chemicals used in the CSG extraction process. Australia currently exports around 65% of production to over 110 markets - trade that was valued at \$4.4 billion in 2010. Notably, whilst the beef industry has recently begun testing for fracking chemicals, our major export customers currently have zero tolerances for such chemicals meaning that any detection may potentially close the market to Australian producers. This would have major negative ramifications.

Recommendations

- That a precautionary principle approach be adopted in regard to CSG policy until more knowledge and understanding is obtained regarding;
 - a) ground water aquifers and aquifer interconnectivity;
 - b) the current and cumulative damage of CSG activities on ground water quantity, quality and pressure;
 - c) the ability of CSG companies to 'make good' such damage;
 - d) the export trade risks associated CSG water contamination;
 - e) the full life cycle emissions for CSG development up to electricity generation;
 - f) an environmentally sustainable method to re-inject treated CSG water back into the aquifers where water was extracted;
 - g) an environmentally sustainable method to manage salt and other contaminants extracted from treated CSG water;
- That federal legislative oversight of CSG activities be undertaken to remove the current conflict of interest surrounding exploration/ licensing decisions and royalties payments; and to obtain interstate legislation consistency.
- That assessment of the long term cumulative impact of CSG activity and long term economic, social and environmental value of agriculture be taken into account when making decisions under the proposed Strategic Regional Land Use Policy.
- That CSG companies fund independent monitoring and testing of ground water quantity and quality in aquifers where CSG activities are undertaken.
- The CSG industry treats all extracted CSG water.
- That the data from such independent monitoring and testing be made publicly available on a suitably relevant website.
- That the number of compliance and enforcement officers employed within the Division of Mineral Resources be increased.
- That the Petroleum (Onshore) Act 1991 be amended to allow farmers to refuse access to CSG companies if they so desire.

Background

The grain fed cattle industry has a value of production of \$2.7 billion and employs some 9000 people directly and indirectly. Nearly 40% of Australia's total beef supply, 80% of beef sold in domestic supermarkets and the majority of beef industry growth over the last 10 years has been due to the grain fed cattle sector. Whilst the domestic market is the largest single market for grain fed beef, 65% of production is exported to more than 110 countries throughout the world.

There are approximately 600 accredited feedlots throughout Australia with the majority located in south east Qld; the northern tablelands and Riverina areas of NSW with expanding numbers in Victoria, South Australia and Western Australia. Feedlots are generally located in areas that are in close proximity to cattle, grain supplies and water.

ALFA data states that 29% of feedlots across Qld, NSW and VIC are solely dependent on surface water, 49% dependent on groundwater with the remainder able to access a combination of the two. The availability of ground water is vital for the feedlot industry from a number of different perspectives. It is imperative for cattle survival prior to feedlot entry, for feedlot cattle and general feedlot operations, for a range of inputs included in the cattle ration (grain, oil seeds, legumes, silage, hay and straw) and for future industry expansion. Water in feedlots is used for stock drinking purposes, dust suppression, feed processing, cattle washdown, effluent management, general cleaning; and for staff and office amenities. Of these, stock water consumption is by far the most significant.

With the world's food demands set to double between now and 2050 due to burgeoning population levels, Australia as a net exporter of agricultural produce has an important role to meet such demand. However, water is likely to

become less available in future. Climate change is set to decrease rainfall and increase evaporation levels, increased competition with the environment will reduce water availability while increased competition between industry sectors including the CSG industry will further aggravate water security concerns.

Environmental and health impacts of CSG activities

Impacts on ground water quantity, quality and pressure

CSG (ie methane) is typically found in the natural fractures and cleats of underground coal seam particles. CSG production involves extracting methane from coal seams by reducing the groundwater pressure that keeps the methane trapped in the coal. A primary by-product of this process is water, which is often rich in salts and other constituents that render it unsuitable for many direct beneficial uses.

The statistics surrounding the past and future predicted growth of the CSG industry are staggering. The CSG industry peak body, states that CSG production has increased from around 375 billion cubic feet in 1986 to around 1.12 Trillion cubic feet (Tcf) in 2008, an amazing 200% increase. By 2029/ 30, CSG production is forecast to increase to 2.233 Trillion cubic feet (another 100% on 2008 levels). The CSIRO estimates that there are between 143-476 Tcf of CSG reserves in Qld alone ie on average another 112 years of production at 2029/ 30 levels. Whilst the CSG industry is currently predominantly located in Queensland, the industry growth in NSW is likely to be considerable with large proportions of the state currently under exploration license.

Given the expected growth in the CSG industry, an enormous amount of water will be extracted. Around 40,000 CSG wells are proposed over the next 40 years in Australia. 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. In comparison, the current total extraction from the Great Artesian Basin is approximately 540 gigalitres per year¹. Notably, the bore discharge from the GAB is currently 27% higher than its sustainable yield (ie 570 ML versus 450 ML). Whilst it is difficult to accurately determine the ground water impact of CSG extraction until site-specific monitoring systems are in operation and baseline well data levels detailed, it is nevertheless clear that CSG activity will place pressure on already stressed ground water aquifers. In NSW, certain GAB areas are already under significant pressure with for instance entitlements for the Eastern Recharge Groundwater Source exceeding its sustainable yield by approximately 300%. CSG activity in this area therefore will exacerbate such over-extraction.

ALFA is concerned that CSG activity to remove this water will reduce the quantity and quality of remaining potable water in overlying and underlying aquifers through the extraction itself, the interconnectivity that currently exists or via the interconnectivity brought about by hydraulic fracturing undertaken by CSG operators. To this end the concerns from the National Water Commission in regard to CSG are pertinent²;

- Extracting large volumes of low-quality water will impact on connected surface and groundwater systems, some of which may already be fully or overallocated, including the Great Artesian Basin and Murray-Darling Basin.
- Impacts on other water users and the environment may occur due to the dramatic depressurisation of the coal seam, including:
 - changes in pressures of adjacent aquifers with consequential changes in water availability
 - reductions in surface water flows in connected systems
 - land subsidence over large areas, affecting surface water systems, ecosystems, irrigation and grazing lands.

¹ National Water Commission (2010) *Position Statement, CSG and Water*, sourced from the internet 30/8/11 http://www.nwc.gov.au/resources/documents/Coal_Seam_Gas.pdf

² National Water Commission (2010) *Position Statement, CSG and Water*, sourced from the internet 30/8/11 http://www.nwc.gov.au/resources/documents/Coal_Seam_Gas.pdf

- 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. There is an associated risk that, if the water is overly treated, 'clean water' pollution of naturally turbid systems may occur.
- The practice of hydraulic fracturing, or fracking, to increase gas output, has the potential to induce connection and cross-contamination between aquifers, with impacts on groundwater quality.
- The reinjection of treated waste water into other aquifers has the potential to change the beneficial use characteristics of those aquifers.

Industry is particularly concerned that the drilling and fracking process could lead to contamination from fracking chemicals and the reduction in quantity, quality and flow of good quality ground water due to intermingling with inferior quality CSG water found in different sedimentary layers. Further, naturally occurring chemical compounds within the coal seam (eg Benzene, Toluene, Ethylbenzene and Xylene) could be mobilised and through pathways/connectivity find their way to good quality groundwater supplies. It is understood for example that hydraulic connectivity between the Central Condamine Alluvium and both the Walloon Coal Measures and some GAB aquifers has been demonstrated by analysis of bore water levels and water quality data (KCB, draft in review; Hillier, 2010). The dewatering of aquifers may also lead to subsidence issues which could alter overland flow paths initiating new erosion features in susceptible areas. Additionally, subsidence may also change or cause fracturing in aquifers which may alter the hydraulic connectivity.

Inequity between agriculture and CSG operators regarding water and native vegetation management

ALFA acknowledges that the removal of water from CSG activity may well be less than current demands from agriculture and other users. However, agricultural producers have stringent license and water entitlement arrangements in place, are required to pay for water extracted and are prevented from over extracting water. As a result, the resource is used sustainably and equitably. In distinct contrast, CSG companies whilst licensed for extracting water greater than 3 megalitres, can still remove whatever water is considered necessary without restriction. Importantly, given the onus of proof requirements under current legislation, it is almost impossible for other water users to demonstrably prove that negative impacts on aquifers were due to CSG extraction. This is because aquifer base line levels have not been determined and other users don't have the resources, skills and monetary capabilities to demonstrably determine cause and effect between CSG activities and aquifer damage.

This legislative inequity also applies to native vegetation with farmers unable to clear native vegetation from their land yet CSG companies are able to undertake such activities on service roads and CSG well sites without requirements for permission or fear of sanction. Both examples demonstrate not only legislative inequity but discrimination regarding the management of important ecological assets.

Inadequate legislation and legislative oversight

ALFA acknowledges that the legislation and license approval conditions surrounding CSG extraction has indeed increased in recent years. However, the legislation is inconsistent across jurisdictions, continues to have major gaps and ignores the precautionary principle approach that should be adopted. In NSW for example, the lack of a precautionary principle approach has recently been clearly evidenced when exploratory drilling in the Sydney suburb of St Peters was allowed to go ahead despite the previous state government assessing some of the environmental risks as "uncertain". In Queensland, legislation surrounding CSG and water (which is likely to be the benchmark for other states), does not seek to prevent CSG ground water impacts and only requires the CSG operator to 'make good' for water quality impacts if declines in aquifer levels also occurs. The lack of adequate legislation and independent monitoring of ground water is particularly pertinent given the litany of alleged contamination incidents and other environmental problems witnessed in both Australia and overseas in recent years.

Without independent monitoring and random inspections of CSG bores, the industry is effectively 'self-regulated'. No other industry that has the potential to have such an enormous detrimental impact on the environment – and on our vital, life-giving water – is allowed to conduct their business without such requirements.

Separation Distances

In the absence of further research, ALFA will be encouraging its members to seek a safe separation distance between CSG wells and their water entitlement bores. There is currently no mandated buffer distance between water bores used for the purpose of stock intensive and a CSG well, yet CSG extraction and hydraulic fracturing are factors which risk bore water quantity, quality and pressure, particularly for those water bores that span coal measures. There is a misconception that water bores that access overlying aquifers are less at risk than those accessing the aquifers underlying the coal seam. However, many bores accessing the overlying aquifers transverse coal seams as they are converted oil bores. Recently the Queensland Government has introduced a 2 kilometre buffer distance between CSG development and towns greater than 1,000 people. However, the announcement is seen more as a political exercise as it ignores the environmental, social and economic impacts of CSG development on smaller towns and other land owners.

Reuse of CSG water

The majority of water removed by the CSG extraction process is saline and cannot be used for irrigation, livestock consumption purposes, dust suppression or aquifer reinjection unless treated beforehand. Whilst reinjection of treated CSG water into aquifers may lessen the impact of drawdown created by the dewatering of coal seams, it is understood that a significant amount of further technical work is required to determine appropriate reinjection targets, timing and water quality/treatment needs. For example, reinjection of water has significant engineering and sequencing challenges as well as difficult water quality issues including changes in mineral saturation status. Regardless, the arguments surrounding the reuse of CSG water are largely peripheral in so far as they do not address the core issue regarding the cumulative and unsustainable removal of water from the GAB in the first instance.

While a small number of cattle feedlots in Queensland have begun to utilise untreated CSG water, due to high salinity levels it must be considerably 'shandied' with good quality water to be tolerable for livestock consumption. Accordingly, only small amounts of CSG water are utilised. As very few CSG companies treat extracted water at present, the cattle feedlot sector does not believe that cooperation between the two industries offers significant benefits for the industry.

Cumulative build up of evaporation pond contaminants

Currently, CSG water must be held in holding ponds where evaporation leads to the cumulative build up of chemicals, salt and other contaminants. It is estimated that Queensland alone will have 30 million tonnes of salt built up over the next 30 years. Industry is concerned about the potential impacts if these minerals and chemicals contaminate soil structures along with surface/ ground water if not disposed correctly. With climate change predictions indicating reduced rainfall (and hence reduced replenishment of the GAB), ALFA does not believe that there is sufficient knowledge and hence justification to support continued CSG ground water extraction particularly in terms of the quantities associated with the Government approvals undertaken to date.

Effect on greenhouse gas and other emissions

The CSG industry actively promotes the industry on the basis of its greenhouse emission reduction credentials when compared to coal based energy production. However, recent reports have suggested that life cycle emissions from CSG development have been significantly underestimated. This is primarily due to estimates that the Global Warming Potential for methane has been undervalued and due to the volume of methane leakages from CSG wells³⁴. These reports suggest that CSG development may in fact have higher life cycle emissions than coal fired power generation. Accordingly, it is necessary that a full life cycle emissions analysis for Australian CSG to electricity generation (including production, pipeline transport, liquefaction, shipping, regasification, transportation and generation) needs to be completed.

³ Howarth R; Renee Santoro R, and Ingraffea A, (2011). *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations*, Department of Ecology & Evolutionary Biology, Cornell University, Ithaca, NY 14853 USA.
<http://www.sustainablefuture.cornell.edu/news/attachments/Howarth>, sourced from the internet 5 September 2011.

⁴ Shindell D (2007), *Methane impacts on climate change may be twice previous estimates*.
<http://www.nasa.gov/vision/earth/lookingatearth/methane>, Sourced from the internet 5 September 2011.

Economic and social impacts of CSG activities

Legal property rights of land owners and property values

The transfer of petroleum rights to Crown ownership in 1955 has meant that farmers cannot legally prevent CSG exploration and extraction activities. As a result, the negative impacts on their business and amenity are then subject to access/ compensation agreement negotiations in which land owners are at a significant market power disadvantage owing to disparities in size, expertise and confidentiality requirements. Many solicitors, banks, land valuers and other consultants cannot provide services to landholders because they are already working for or representing CSG companies. This has caused great frustration with landholders who feel in some cases they cannot get an unbiased opinion on matters such as land value. In addition, and unbeknownst to many landholders, these access agreements are in perpetuity and hence bind all future owners. If agreement negotiations break down, CSG companies have the legislative authority to obtain exploration and extraction permission and as a result land owners feel as though they have little recourse. This lack of property rights for land in which farmers have not only paid for but have directed considerable and often intergenerational energy and resources represents a significant slap in the face.

Whilst ALFA has not seen any formal reports on this topic, anecdotal evidence suggests that already Queensland land owners affected by CSG activities have witnessed a reduction in agricultural land values. This is due to negative production impacts from affected ground water, property right concerns and a diminution in landscape aesthetics. This is particularly relevant given conceptual development plans approved by the Queensland Government which propose gas field grids with wells spaced as little as 750 m apart over an area from Goondiwindi to Gladstone.

Food security and agricultural activity

The issue of food security has gained increased prominence in recent times. It is now common knowledge that the world's population is forecast to hit 9.2 billion in 2050 and global food production is required to more than double between now and then. If this were not challenging enough, we are expected to do it with less water, a more volatile climate, less greenhouse gas emissions, less arable land, less fertiliser, less fuel and oil; and less Government research and development. With increased competition for land and water by non agricultural industries, the challenge is then only aggravated. Due to uncertainty of what CSG development will occur on their properties in the future, many landholders across Queensland have already indicated a lack of confidence to develop and expand their property and/or operations. This may further impact Australia's ability to deliver upon food security requirements into the future. Government needs to put the fundamental food interests of future generations both in Australia and overseas ahead of short term energy interests given that alternative energy sources exist but not alternative food sources.

Whilst the NSW Government has developed a Strategic Regional Land Use Policy, the on the ground delivery of this policy remains to be seen. With the cornerstone of the policy involving a triple bottom line approach, of particular interest will be how the cumulative environmental and social impacts of CSG development will be assessed. ALFA argues that prime agricultural land should be permanently excluded from CSG development given potential impacts on ground water, world food requirements into the future due to population rises; and because CSG access roads and well infrastructure interrupt arable cropping areas thereby increasing costs of production.

Regional development, investment and employment, and State competitiveness

The Queensland CSG experience has provided some salient learning's for NSW. From a regional development perspective, it is true that CSG development has led to financial injections and increased employment opportunities in regional communities. However, what is more pertinent is that the majority of income generated from CSG activity is not spent in the region but in the capital cities where these transient workers reside.

In terms of employment, rural and regional communities have found that the majority of jobs have not been sourced locally but from other areas. In addition, the jobs that have been sourced locally by the cashed up CSG industry also presents other challenges for less profitable rural industries with competition driving up the price of labour. With

agriculture unable to match wage levels, many agricultural industries are finding it difficult to obtain appropriately qualified employees.

Transient workers have also increased housing competition in rural towns thereby affecting affordability and availability for employees involved in other industries.

Importantly with transient workers not living permanently in rural areas, the social fabric of these communities has been negatively affected. Rural and regional communities rely on the voluntary contributions of its local inhabitants to contribute and participate in services and events such as rural fire services, shows, school activities, pony clubs etc.

Royalties payable to the state

Given the significant royalties received from CSG extraction and the parlous condition of state Government budgets in CSG areas at present, we believe the current arrangement whereby State Government approval of CSG licenses then precipitates significant royalty payments represents a large conflict of interest. As a result it is arguable that State Governments disregard the long term environmental concerns from CSG activities given the short term monetary gains on offer.

Because of concerns regarding state Government royalties and perceived independence with respect to license approval decisions, along with the rapidly expanding nature of the CSG industry across state boundaries, ALFA believes that there needs to be Federal oversight of the CSG industry to provide interstate consistency and independence.

Trade and industry impacts of CSG activities

ALFA also maintain concerns regarding potential domestic food safety and market access issues associated with beef derived from cattle consuming water contaminated by CSG activities. Australia currently exports around 65% of production to over 110 markets - trade that was valued at \$4.4 billion in 2010. Notably, whilst the beef industry has recently begun testing for fracking chemicals, our major export customers currently have zero tolerances for such residues meaning that any detection may potentially close the market to Australian producers. This would have major negative ramifications for the beef industry.