

**Submission  
No 703**

## **INQUIRY INTO COAL SEAM GAS**

**Name:** Mr Arthur Goode

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Arthur Goode

5 Sept 2011

Dear Sir,

**Re: Coal Seam Gas Inquiry**

I am a recently retired Chemical Engineer having spent my working life undertaking technical, operational and management duties in process, energy and environmental engineering disciplines for the heavy industry and mining sectors. My final 15 yrs were at senior and executive management levels with responsibilities that included representing my corporate employer in dealings with government, regulators and the community.

I am deeply concerned at the rate of development of the CSG industry without what I would consider to be a good understanding of some of the fundamentals. Whilst there is much literature available, most either comes from the industry or from green groups. I have been able to find little information published by independent researchers such as the universities, CSIRO or government departments; and what little there is, is often "derived" from parallel technologies eg coal mine gas drainage.

As with all developing technologies and resource projects I don't doubt there are a plethora of issues, and that compromise solutions exist for many. I do not consider myself competent to comment on many of these, so will restrict myself to three:

- The greenhouse impact of CSG
- Groundwater
- The status of the regulatory framework

**Greenhouse impact**

The greenhouse benefits of CH<sub>4</sub> as a combustion fuel c.f. coal are well understood and not contestable (40% - 50% reduction in CO<sub>2</sub>). Similarly, the direct contribution to greenhouse of uncombusted CH<sub>4</sub> is well understood (20-25 times greater than CO<sub>2</sub>). Estimates of additional emissions due to mining, downstream processing and transport of the respective fuels are more questionable.

Estimating methodology, such as those used for the National Pollutant Inventory (NPI) and the NSW Greenhouse Abatement Certificate guidelines are, in my experience, excellent tools *provided they have been derived for the specific activity*. That's OK for coal, as it is for natural gas. It would appear that CSG has aligned itself with the NG industry – this certainly gives it excellent greenhouse credentials but is easily challenged. As a mere 7% methane leakage annuls its greenhouse advantage, CSG's claim has become a topic of contention.

However, my concern is more fundamental. To release CSG from the coal reserve it is necessary to depressurize it by pumping out the groundwater. This is clear (albeit there are many issues raised with respect to groundwater quality and contamination). CSG proponents would have me believe that on completion of the project the wells are capped and that is all that needs to be done before moving on to the next gas field. As the industry does not see a need to restore the groundwater, the implicit assumption here is that CSG is contained simultaneously by two separate mechanisms – the hydrostatic pressure of the water, and the impermeability of the overlying rock strata. Diagrammatic sketches further demonstrate this by showing neat horizontal layers with just such containment. Whilst this can, and does, occur in nature, it is far more common to see layers with inclinations, folding, intrusions, fault lines, fracture planes – geological anomalies, discontinuities and irregularities of all kinds. Containment by geological stratigraphy cannot be assumed. Nor is the presence of at least one impermeable layer.

Obviously impermeable containment reservoirs do exist hence we have NG fields. But these must coexist with permeable rock strata otherwise the gas could not migrate into them. We can't have it both ways. I have read of 'dry' CSG fields – these must indeed rely on geological containment, and may well be the most propitious for CSG development.

Eventually the groundwater will be recharged into discontinued CSG fields (in itself a paradox – water can get in but gas can't get out?). This may take years, centuries or millennia. If only 20 – 70% of gas is economically recoverable (ref CSIRO, NSW Dept of Primary Industries) that leaves a lot of gas to slowly dissipate undetected into the atmosphere – far greater than the 7% that makes it greenhouse neutral. (The gross emissions of bubbling gas at the surface, often shown in the media, are an extreme example but are likely to be relatively local issues and I would expect the industry to have, or be able to develop, methods to avoid and/or control these adequately)

Some work on floor and roof permeability was published by CSIRO in 2010, but is embryonic and hardly a basis for a multibillion dollar industry (nor does it claim to be). I have also read of suggestions to pump 'coproduced water' from new fields into disused ones but only in the context of eliminating a water disposal problem, not a control strategy.

Fracking, even without ugly chemicals like BTEX, can only exacerbate the geological complexity.

Incidentally, I have received no responses from "Ask a question" websites run by CSG businesses.

## **Groundwater**

Disposal of co-produced water back into the subsurface, contamination of aquifers, draw down of groundwater levels etc are also a function of geology. Because this affects many people directly, and the Great Artesian Basin is a particularly unique natural asset, it is

receiving a lot of focus with many capable people and organisations now involved. I won't dwell further on these, except to underscore that we must not overlook a long-term view. If it takes 1million years for rainfall on the east coast to reach the middle of Australia via the GAB, then issues with local wells and waterways are at best a microcosm snapshot.

### **Status of Regulatory Framework**

CSG proponents and their peak bodies such as APPEA claim CSG is the most heavily regulated industry in the country. They are probably right, we have a penchant for ever increasing bureaucracy – but the industry specific regulations are specific to mineral or oil & gas resources. CSG is neither of these. CSG regulations are lagging well behind the rate of growth of the industry.

This creates two problems; lack of adequate control, and obfuscation of significant issues by excessive coverage of minor ones.

### **General**

We choose to live in a capitalist free market society. It is incumbent on business to maximize returns, requiring us to externalize as many costs as possible and minimize internal ones. Project advantages are talked up, issues and adverse impacts talked down, or simply not mentioned.

With our inherent anthropocentricity, this latter point is particularly relevant to long-term impacts that are outside our human timeframe or that are not obviously visible to our human senses. CSG, with so much of its impact below the surface and out of sight, and with manifestations that will only become apparent years down the track requires a strong regulatory control to ensure the environment and future generations are not compromised. No further approvals should be given until these are understood; approvals should be cognizant of a holistic, total industry impact, not just a single one proposal; and proponents must be able to demonstrate they have a detailed, high resolution understanding of the geology of the basins they are proposing to mine to ensure the above issues are not an existing or future problem.

I would like to finish with the general but disturbing observation of CSG that it has a strong and pervasive sense of an El Dorado. Gold rush fever. 600% returns! Just can't wait to get our hands onto it.

Thank you for listening,

Arthur Goode