

Submission to Inquiry into Unconventional Gas in Victoria

From: Peter Wonfor, [REDACTED] [REDACTED]

To: The Environment and Planning Committee Inquiry into Unconventional Gas in Victoria

I would like to make this Submission to the State Government's Inquiry into Unconventional Gas and would like to express my thanks for the opportunity to do so.

I live in an area in which agriculture and tourism are major industries and which support the area communities and a way of life as well as its economy.

My concerns are more for future generations than the current one; it can be argued that we as the current generation are selfishly and self-indulgently committing future generations to degraded health/longevity, food costs/availability and easy access to affordable safe water, let alone quality of life. This potentially catastrophic situation can be avoided or significantly ameliorated by changing our current priorities and policies from those supporting and subsidising outdated fossil-fuel based energy to those that would transition to currently available renewable energy sources and develop and deploy new ones.

Overall Summary

My conclusion that UCG (or any other euphemistic terms that may be invented in an attempt to conceal it) should be permanently banned is based on the following:

- UCG cannot coexist with agriculture on a long-term sustainable basis. And the areas of greatest interest for UCG are in conflict with some of the best and most productive agricultural land in Australia.
- UCG will have seriously detrimental effects on two of Victoria's most significant industries, i.e., agriculture and tourism
- Allowing UCG will provide big profits for the few at vast direct and indirect cost and negative consequences to the population as a whole.
- It is not the "clean" source of energy it is made out to be when the by-products and consequences of its production are included in the calculation.
- The industry both at home and abroad has proven that regulation, oversight, company assurances etc. do not prevent problems, some of which are serious and irreversible or uncorrectable.
- There are significant health risks not only to those living in or near the gasfields but to the population as a whole as a result of contamination of natural resources.
- Contamination and depletion of groundwater is guaranteed. As climate change advances groundwater is going to become an increasingly vital resource and cannot be put in jeopardy.
- UCG only creates a significant number of jobs according to models used by the industry. If the more realistic Australian Bureau of Statistics assessments are used the jobs creation is non-existent or negligible.
- UCG will not keep domestic gas prices low; prices will inexorably float up to the significantly higher export prices thanks to permissions granted to construct environmentally damaging export facilities.
- UCG extraction involves the use of chemicals that the companies will not define publicly. There can be no commercial justification for this reticence since this is logically not a secret of commercially competitive significance. One must therefore assume that they are known to be or risk being found to be dangerous.
- Remediation as practiced by the industry is an oxymoron.
- Australia is the worst (or one of the worst depending on source) polluters per capita in the world. It is behoves Australia to take unilateral action and leave fossil fuels in the ground to the maximum possible extent to correct this by investing in and supporting renewable energy sources instead of subsidising and supporting 19th and 20th century fuels and technologies. Australia will derive significant advantage in the long-term by taking this approach.
- There are some outright bans of fracking that have been introduced worldwide. Fracking is an integral component in the UCG extraction process and should be banned outright in Victoria also.
- We cannot trust an industry that continues to operate in the USA under a complete exemption from oversight by the Environmental Protection Agency -- a deal the industry negotiated over 40 years ago.

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Introduction

By way of introduction I would like to point out that The United Nations Framework Convention on Climate Change (UN FCCC) of which Australia is a signatory has proposed that the collective global aim should be to limit the human-driven increase in average temperature to no more than 2°C above pre-industrial levels (UN FCCC 2010). The implications of meeting just this limit (and not meeting it) are discussed in "Unburnable Carbon: Why We Need To Leave Fossil Fuels In The Ground"⁽¹⁾ published by the Climate Council. The conclusion is that if the world is to avoid non-catastrophic temperature rises only a fraction of the already-proven fossil fuel reserves can be mined and burned. While this situation is not directly included in the Terms of Reference for this Inquiry it needs to be included as a "backdrop" to the Inquiry's deliberations. It raises issues such as

- It is now time to select which of these proven fossil fuel resources will be used and which left in the ground
- The cleanest fossil fuels must be selected for exploitation -- with the calculations to include by-products of extraction, transportation, processing (e.g. liquefaction for transport/storage) and storage/safe disposal of waste products in addition to burning the end product.
- We must conserve as much as possible for purposes for which there are no current alternatives. The best method of conservation is to leave it where it is -- in the ground where its value can only increase with time.

(Before hiding behind the argument that Australia cannot "go it alone" and putting off action until international agreements are made we must remember that there is a powerful reason for Australia to unilaterally set a good example for others to follow. In all rankings Australia comes out badly⁽²⁾ and in some cases is the No 1 worst polluter on a per capita basis.⁽³⁾⁽⁴⁾ We need to invest in and support renewable energy sources to start correcting this shameful position and start clawing our way up to a position of which we can be proud rather than one of being viewed with derision by the international community. And we must not forget that being an innovator, developer and leader in the renewable energy field offers tremendous economic and employment potential as evidenced by Germany in its uptake of solar energy and the consequential establishment of a vibrant and profitable equipment supply industry.)

Victoria is a densely populated state which is heavily reliant on agriculture and associated food processing. Nature-based tourism is also significant across much of the state where the UCG industry wants to get established. Gas drilling would industrialise the landscape, and impact on rural land dwellers and people in adjacent areas. It is likely to have significant public health impacts. UCG is a fossil fuel which will, as indicated above further entrench our current reliance on coal and gas as energy sources and suffer its consequences. It is energy intensive to produce, and will produce significant greenhouse gas emissions. The benefits associated with any resulting royalties realised as a result of exploitation need to be carefully weighed against consequential negative economic impacts. The costs are likely to far outweigh any short-term benefits.

Based on the experience in other parts of the world where the industry is more advanced, including North America, Canada, and here in Australia in Queensland and New South Wales, I am unconvinced that this industry has a track record proving it can co-exist safely with other land uses like farming, tourism and conservation.

I believe there are compelling reasons to place an outright and permanent ban on all onshore unconventional gas exploitation in Victoria.

An introductory observation about organizations such as The Australia Institute, The Climate Council, Friends of the Earth and other such not-for-profit organizations referenced in this submission is appropriate; they are frequently derided by the fossil fuel industry, its supporters and vested interests as biased. That is a matter of opinion, and the same argument can be made against references and organizations quoted by the UCG industry, its supporters and vested interests. The organizations such as those named above are not-for-profit and are staffed by people passionate about what they are doing with the long-term sustainable well-being of the

1 <http://www.climatecouncil.org.au/uploads/a904b54ce67740c4b4ee2753134154b0.pdf>

2 <http://www.wwf.org.au/?4300/Australians-worlds-seventh-biggest-polluters-global-report>

3 <http://www.abc.net.au/news/2009-09-11/australians-the-worlds-worst-polluters/1425986>

4 http://www.climateinstitute.org.au/verve/resources/tci_australiaabigpolluter_mythbuster_august2011.pdf

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planet and its population as a whole as their objective. These individuals receive little or no financial reward and the organizations are run on a budgetary shoe-string. This is in stark contrast to the motivation of the UCG industry, its funding and the funding of some of the organizations and individuals they support and quote. Accusations and statements made by the industry need to be considered with this in mind.

And finally, I point out that this industry does not have social license to operate, as shown by the 60+ community declarations against allowing UCG that have already happened across southern Victoria with more to come.

On the basis of the above I would like to make this submission to the State government's Inquiry into unconventional gas. I should make it clear that I do not support the exploitation of UCG. I will therefore restrict my comments to those Terms of Reference that seem most relevant to me.

I urge you to recommend that Victoria ban all unconventional gas activity permanently.

I am prepared to speak at the Public Hearings of the Inquiry and would appreciate the opportunity to do so.

My comments on the terms of reference follow.

(1) the prospectivity of Victoria's geology for commercial sources of onshore unconventional gas;

In considering the prospectivity of Victoria's geology for commercial sources of onshore unconventional gas, the potential risks posed -- in particular to groundwater resources depletion and contamination -- by any exploration or extraction activities must be included. This also needs to include the treatment and disposal of waste and by-products.

It is clear that compared with black coal, Victoria's brown coal resource will be marginal in terms of the commercial viability of coal bed methane or coal seam gas. A number of companies have been searching for commercial quantities of unconventional gas deposits such as Tight Gas for several decades. Despite all this work, and despite regular announcements from some companies that success is imminent, no commercial production in Victoria prior to the moratorium has been announced. Given this it is quite likely that the resource would in any case prove to be only marginally viable in commercial terms. As a result, return to the state via royalties can be expected to be negligible, and potentially significantly negative when considered against the probable impacts on agricultural production and tourism. (Please see map on page 7)

The areas of the state that are most likely to contain UCG resources are south of the Great Dividing Range. These areas, stretching from the South Australian border to Bairnsdale, includes much of our best grazing and dairy country, and a considerable portion of our fruit and vegetable production.

Why would we consider putting some of our best farmland permanently at risk by allowing this industry to proceed for only minimal royalty returns over a relatively short term to the state? The precautionary principle *must* prevail (see (2) below.)

(2) the environmental, land productivity and public health risks, risk mitigations and residual risks of onshore unconventional gas activities;

Application of the precautionary principle is the only responsible decision making protocol where risk is involved and the underlying science is uncertain. It is clear that many problems with the industry will take years, and potentially decades, to be fully understood as evidenced in the case of the USA by the recognition of problems 30+ years after drilling. It would be reckless to unleash this industry on Victoria with all the evidence that is emerging elsewhere both in Australia and abroad about contamination events associated with UCG activities.

Please see section (3) for detailed comments on the environmental risks associated with unconventional gas activity.

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Health risks will be primarily associated with

- Water, air and land contamination that will affect health both directly by contact and indirectly via ingestion of food and water.
- Surface water contamination resulting from contaminated water leaking/spilling/deliberately released and finding its way into natural surface waterways.
- Contamination of groundwater that is subsequently used for domestic and/or agricultural water purposes.
- Fugitive emissions and waste products released to the atmosphere.
- Significantly greater dust and particulate levels resulting from heavy truck and machinery movements and surface treatment/processing plants.

Please recall that each of the thousands of wells needed to extract UCG uses about 20,000 litres of water per day. This water becomes contaminated *by definition* when used in the extraction process. The contaminants include not only naturally occurring pollutants *currently locked up* in the gas-bearing underground strata but also the chemicals added to that water as part of the extraction process, notably fracking (hydraulic fracturing) and any additional pollutants they caused by their reaction with the coal. One can only surmise that the reason the mining companies steadfastly refuse to publicly disclose what chemicals are used is because they pose risks.

Fugitive emissions, including the powerful greenhouse gas methane (22+ times that of CO₂) are insidious in that they pose health risks at very low levels and are invisible. That they result from UCG activities is of course hotly denied by the industry and vested interests, but the sudden appearance of visible fugitive gas emissions following UCG activities makes these assertions appear to be based on wishful thinking rather than fact. The Condamine River near Chinchilla, QLD as seen in this video is an example.⁽⁵⁾

Dust is a well-known health hazard; all-weather gravel roads criss-crossing the gasfield and between well-heads linking water holding ponds with treatment plants that are then used by heavy vehicles and machinery 24/7 will significantly raise airborne dust levels with resulting health consequences.

Specific public health impacts from air pollution have been the subject of a number of health research reports. Those cited in The Urgent Case for a Ban on Fracking (2015) explain how the “episodic and fluctuating” nature of the toxic plumes of pollutants from industry sites means that standard air quality measures (which average over a region, and average over stretches of time) can miss the “intensity, frequency or durations of the actual human exposures to the mixtures of toxic materials released regularly at [unconventional natural gas development] sites.”⁽⁶⁾ The authors summarize these health problems as including “respiratory, neurologic, and dermal responses as well as vascular bleeding, abdominal pain, nausea, and vomiting.” The authors suggest that the episodic and fluctuating nature of the industry’s pollution explains the current disconnect between the many reports of health problems, on the one hand, and on the other hand the contrary claims of minimal air quality impacts, based on air quality measurements that smooth out, and thus fail to detect, the actual peak exposures experienced by individuals.⁽⁶⁾

Concerned Health Professionals of New York published a comprehensive paper in December 2014 "Compendium Of Scientific, Medical, And Media Findings Demonstrating Risks And Harms Of Fracking (Unconventional Gas And Oil Extraction)"⁽⁷⁾ The conclusions to be drawn from it are yet more evidence of the health risks posed by UCG

The Australia Institute also has an informative document "Is Fracking Good for your Health" that is available for download⁽⁸⁾

5 <http://www.abc.net.au/4corners/stories/2013/04/01/3725150.htm>

6 http://www.foodandwaterwatch.org/reports/the-urgent-case-for-a-ban-on-fracking/#_ga=1.251982729.1016386784.1436338924 (page 21)

7 <http://concernedhealthny.org/wp-content/uploads/2014/07/CHPNY-Fracking-Compendium.pdf>

8 <http://www.tai.org.au/content/fracking-good-your-health>

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(3) the coexistence of onshore unconventional gas activities with existing land and water uses, including —

(a) agricultural production and domestic and export market requirements;

Please see below for my comments on the likely impacts on agricultural production.

(b) the legal rights of property owners and the impact on property values; and

(c) any implications for local and regional development, investment and jobs;

UCG activity fundamentally industrialises landscapes. Gas drilling operations require all-weather access roads and pipelines to interconnect the multitude of required well-heads, drill pads and processing equipment, waste ponds, water treatment sites and flaring pits,. It will profoundly change the rural nature of the areas where it is allowed to become established as it has in Queensland, New South Wales and abroad.



Tara, QLD -- Industrialised



QGC Drill



Pilliga/Santos Pond

UCG drilling is proposed by the industry across large sections in the south of Victoria. These are the areas that receive the best rainfall and have lower average temperatures compared with the north of the state, and are the areas experiencing the most rapid population growth. With the state government encouraging people to move to regional centres and natural

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population growth we will continue to see regional centres grow, especially in these milder and coastal sections of the state.

There can be no doubt that these communities that have not already done so will, in general, object to the industrialisation of rural landscapes that will occur as a result of gas drilling. There will be visual and noise pollution, plus increased heavy traffic use of local roads. It is likely there will be local short term distortion of the rental and property markets. There is no guarantee that any employment generated will significantly benefit local communities given it will rely on specialist skills. Given all these obvious impacts it is difficult to imagine that a UCG industry will not impact negatively on rural property values. And as discussed later the UCG industry is *not* the creator of the vast number of jobs (direct and indirect) that it claims to be.⁽⁹⁾

In terms of regional centres near to gasfields, there will be a mixed impact. The experience in places like Queensland is that a small number of businesses prosper, but long term residents will be impacted by a boom and bust cycle in both the property and rental markets. For towns with significant numbers of lower income families, there is a real risk that existing residents will be displaced.

(a) co-existence with agricultural production

I feel that a key issue relating to whether we should allow this industry to become established in our state is the question of its likely impacts on agricultural production and hence both domestic and export economies.

Victoria is Australia's largest food and fibre exporting state. The value of food and fibre exported from Victoria increased 12 per cent in 2013-14 to reach a record \$11.4 billion, accounting for 29 per cent of all farm exports from Australia.⁽¹⁰⁾ Bear in mind that Victorian farmers achieve this despite Victoria's share being only around 3 per cent of Australia's arable land.

The dairy industry in Gippsland is the highest value agribusiness industry in the region. In 2006 it produced 30% of Victoria's milk production and 20% of Australia's dairy production, making it one of Australia's leading dairy regions. Milk production comprises about half the total value of Gippsland's agricultural commodities and earns an estimated farmgate value of \$624 million.⁽¹¹⁾ (Dairy Australia, 2006)..

In terms of livestock grazing, Victoria plays a significant role in the overall pattern of export production. Victoria's beef cattle industry generally supplies smaller, younger animals for the domestic market and also higher quality stock for the Japanese market.⁽¹²⁾

The DEPI Beef Industry Profile of December 2014⁽¹³⁾ indicates that:

- In 2012-13, the Victorian beef industry had a gross value of around \$1.3 billion.
- In 2013-14, 459 kilotonnes (kt) of beef and veal was produced, which is up from 369 kt in 2012-13.
- The beef cattle industry is Victoria's most geographically extensive industry.
- The value of Victorian fresh, chilled and frozen beef and veal exports increased from 2012-13 by 55 per cent to \$1.0 billion in 2013-14, representing 14 per cent of the Australian total of \$7.2 billion.

9 http://theconversation.com/three-myths-the-coal-seam-gas-industry-wants-you-to-believe-24422?utm_medium=email&utm_campaign=Latest+from+The+Conversation+for+18+March+2014&utm_content=Latest+from+The+Conversation+for+18+March+2014+CID_1175685d65ebfeb592001726ec96240e&utm_source=campaign_monitor&utm_term=Three%20myths%20the%20coal%20seam%20gas%20industry%20wants%20you%20to%20believe

10 <http://www.depi.vic.gov.au/agriculture-and-food/food-and-fibre-industries>

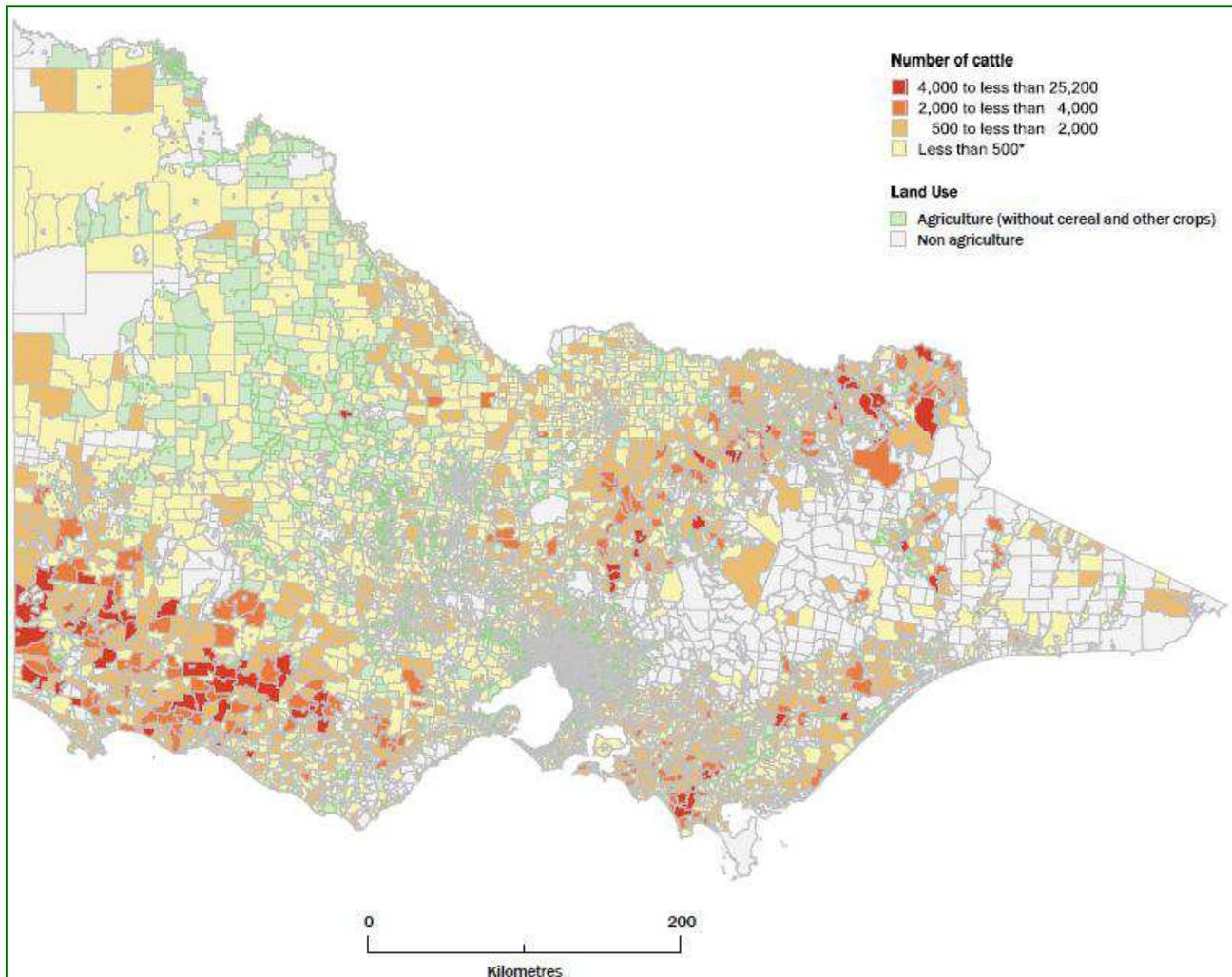
11 <http://www.depi.vic.gov.au/agriculture-and-food/food-and-fibre-industries/region-overviews/gippsland>

12 <http://www.dpi.vic.gov.au/agriculture/about-agriculture/publications-resources/industry-profiles-archive/beef-industry/victorias-beef-cattle-industry-profile-summer-2012> (requires login)

13 http://www.depi.vic.gov.au/_data/assets/pdf_file/0005/292172/1-Beef-Industry-Profile_December-2014-Update_MASTER.pdf

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Please note also in the map (below) from the above-referenced document the similarity of the area used by this agricultural sector and that under consideration for UCG. (Please note this does not include dairy cattle.)



Beef cattle distribution (DEPI Beef Industry Profile of December 2014)

In addition to significant production of fruits and vegetables in the areas under exploration for various forms of UCG, organic production is of growing importance. The organic industry is growing rapidly in Gippsland according to the Organic Farmers Association of Australia (OFA). "Organic dairy, horticulture and beef production are leading this development. An organic dairy co-operative based in West Gippsland processes approximately 80% of Australia's certified organic milk with products distributed throughout Australia and abroad. The only Victorian certified organic meat processor is situated in the region. Currently it supplies organic meat domestically and is in the process of building export capability"

The southern half of the state has a strong and growing viticulture industry which produces a variety of generally cool climate wines.

It can be argued that the organic sector in particular will be very vulnerable to the perception of contamination that could come with new coal or CSG operations. When the current exploration licenses for UCG are considered, it is clear that large sections of highly significant farmland are being considered for gas production.

There are a range of reasons why UCG cannot co-exist peacefully with farming:

Competition with farmers over water

Groundwater plays a vital role in sustaining agriculture in Victoria, and hence our economy and lifestyle. Mining of either coal or gas (and especially UCG) is a very water intensive

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process. With the prospect of an expanding mining sector, fossil fuels and agriculture can be expected to be in increasing conflict over limited water supplies in coming years.

It can be argued that when recharge rates are considered, many aquifers in Victoria are already over-committed. Additionally, there are already substantial concerns about subsidence and over use of aquifers across Gippsland as a result of mining activity. One example comes from Yarram in South Gippsland, where according to former VFF regional president Rob Grant, a major aquifer has dropped a metre a year since offshore oil production began in the 1970s. As is noted in the Gippsland Water Atlas (GWA),¹⁴ the offshore oil and gas industry withdraws a substantial volume of water from the aquifer. This occurs outside the State's jurisdiction and is not directly accounted for in state government water allocations, even though it is connected to the aquifer beneath Gippsland (GWA, p21). It is estimated that Esso currently extracts about 100,000 mega litres of seawater, oil and gas each year from oil and gas reservoirs via rigs located between 20 and 80 kilometres offshore.⁽¹⁵⁾

As reported in The Gippsland Farmer (October 2012), "water levels at irrigation bores had dropped 10 metres since the turn of the century" and are "largely attributable to ongoing offshore oil and gas industry operations". This has already cost farmers in affected areas because of the need to drill deeper to maintain water supplies and pay for more power to generate the extra lift. Efforts by Yarram farmer Bill Bodford resulted in a \$5 million compensation package to irrigators in the Yarram and Bairnsdale areas affected by falling water levels, to help them upgrade pumping equipment. Who will be responsible for farmers having to spend more to access groundwater should a UCG industry be allowed to become established?

It is likely that there will be localised economic competition for water between agricultural users and miners should gas production become commercialised. As noted in the GWA, 'in coal, oil and gas extraction industries where ground water is used for operational purposes, its value is enormous compared with other uses' (p27). Many farmers already struggle with high production costs and downward pressure on farm gate prices for their product. If miners, in effect, drive up water prices, this will impact on farmers who need to buy water allocations. While new water entitlements are difficult to obtain, existing entitlements may be traded where it is not used fully by the license holder. If miners are willing to pay good money for farmers' entitlements this could have negative impacts on farming output. Temporary transfers are fairly cheap. However if commercial production does occur, miners would need to organise a permanent transfer, which can be ten times more expensive (GWA, p27).

We really do not know how much mining and drilling the industry thinks it can get away with in Victoria. A number of the more aggressive companies now speak of 'localised' nodes of activity in places like Seaspray and inland from Port Campbell. A number of players in the UCG industry are quietly secretive in regards to what their long term intentions are. What we do know is that fossil fuel production in the state already consumes vast quantities of water, especially in Gippsland. If new coal and gas operations do become established, the conflict for water between agriculture and mining can be expected to be the first point where sharp battle lines will be drawn.

The question of how much water will be needed by industry will depend, of course, on how many drill operations are ultimately approved. A difficulty in assessing the likely impact of any approvals of UCG drilling is that there is a wide variety of opinions on just how much water is used. Something of considerable community concern is the process of hydraulic fracturing ('fracking') not only from risks of chemical contamination but also how much water is likely to be used with each frack operation. The degree to which this will affect the water table is of great concern.

As industry often explains, the process of fracking involves pumping a mixture of water, sand and chemicals into coal seams or rock in order to release methane gas. The mix is often referred to as being "98%' water". That might sound benign, but this translates to a massive

14 Gippsland Water Atlas, Southern Rural Water (2012)

15 Gippsland Farmer, October 2012, p4

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2% of potential contaminants. We are talking about megalitres of fluid. (See page 11 below and this link ⁽¹⁶⁾ for the kind of problems that can occur even when this industry is "regulated")

According to Tina Hunter, an Assistant Professor at Bond University, "the fracking of one CSG well can require as much as 5 million litres (ML) of water, although often only 2 - 3 million litres of water is used. In this process, a high-pressure mix of water, sand and chemicals is injected into the reservoir to release gas." ⁽¹⁷⁾

Ms Hunter explains that "the same amount of water will return to the surface. When the water comes to the surface after fracking, it will in all probability have an increased salt content (brine water) and contain chemicals that were used in the fracking process".

"This returned water, known as "produced water", requires some form of treatment or storage. It cannot be released back into the water cycle unless treated. If it is released untreated, it can cause major contamination of surface and ground water resources".

The Gippsland Water Atlas produced by Southern Rural Water says that CSG is likely to "use 100 ML per year of groundwater per well to release the gas from the coal"

Obviously this water, which is pumped from above ground as part of the frack is most likely to come from existing surface or ground water supplies, which will need to be allocated by a water authority.

Fracking will also bring water from the seams that are being drilled to the surface. The ABC compiled likely water use from a variety of sources, and said:

"In September 2010, the Water Group provided a report to (federal) Environment Minister Tony Burke that highlighted the wildly different estimates of water extraction and the limited amount of information that had so far been published. In an appendix, the Water Group cited comments from Origin Energy senior engineer Robert Kane which had been published in Gas Today in 2009".

Mr Kane was reported as saying that bores would extract between 0.1 megalitres a day and 0.8 mega-litres a day. A mega-litre is one million litres. He was referring to operations in Queensland, where the resource being drilled is black coal. Brown coal, which is primarily found in Victoria, is a wetter coal, which has a higher water content, so the average amount of water brought to the surface may be higher than in Queensland. To give a comparison, according to Melbourne Water, an average person in Melbourne consumes 277 litres a day. ⁽¹⁸⁾

Mr Kane suggested a bore would have a production life of 15 years. It should be noted that these estimates are based on initial well flows extrapolated across the life of a bore, however flow rates fall significantly over time with repeated fracks. ⁽¹⁹⁾

Other forms of UCG also use substantial quantities of water in the drilling process. Shale and Tight Gas, which exist at deeper levels will need to be fracked, as confirmed by Lakes Oil in community consultations held in Victoria in early 2015. ⁽²⁰⁾ This means substantial volumes of water, even if fewer chemicals are used in the frack mix compared with CSG. The company said that wells may be in use for up to 20 years, although the main flow of gas is expected in the first few years of operation.

The Australian gas industry provides a figure of 11 million litres per shale or tight gas frack, however, many other sources suggest higher levels of water use. One estimate of water use in shale gas frack operations was '20 ML per frack', with 'flow back rates of 10 to 70%'. ⁽²¹⁾

16 <http://www.theland.com.au/news/agriculture/agribusiness/general-news/csg-water-irrigation-trial-shut-down/2729657.aspx>

17 <http://theconversation.edu.au/national-water-commission-calls-for-a-closer-look-at-fracking-3498>

18 <http://www.melbournewater.com.au/getinvolved/saveandreusewater/Documents/Water%20Outlook%20December%202013.pdf>
(see page 2)

19 <http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/water/>

20 Statements made by Tim O'Brien, Lakes Oil, at state government UCG community panel meeting, Traralgon, 25/2/15

21 Lakes Oil representative at state government UCG community panel meeting, 25/2/15

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Dr. Damian Barrett from the CSIRO ⁽²²⁾ says that shale gas drilling is likely to use 7 to 15 ML of water per frack (and up to 25 ML). There could be several wells per pad, based on multiple horizontal drill lines, increasing the water consumption substantially.

Like the water that is pumped into the ground as part of the frack to carry the sand and chemicals, this water will be contaminated with salts, whatever chemicals are used in the frack, and potentially any chemicals found in the coal seam itself. In the case of tight and shale gas, other potential contaminants from the frack mix could include biocides, corrosion inhibitors and friction reducers.

Competition with other water users

It is also possible that any new mining operations will come into competition with urban use. For example, the GWA (p49) notes that areas such as Loch Sport may need to rely on groundwater in future. This area is being targeted for Tight Gas operations.

Lower aquifers are used to support farming and town supplies (including Bairnsdale, Leongatha and Yarram) and coal mine de-pressurisation and offshore oil and gas developments are already the major users of this resource (GWA, p51).

The potential for contamination of groundwater

Apart from the question of industry accessing large volumes of water, there is also the matter of quality of ground water. Based on the experience in Queensland, concerns about contamination of aquifers or surface water from mining operations can be expected to become significant once operations become established.

The initial fear about UCG in Victoria was focused on CSG. The known contamination incidents in NSW and QLD are well documented. In the past two years, there has been growing concern about other forms of UCG, especially tight and shale gas. Industry proponents have been active in attempting to convince the community and local governments that tight and shale gas is fundamentally different to CSG and that fewer chemicals are used in the frack process and there is no risk of contamination.

Where industry admits to contamination incidents, they are generally referred to 'legacy' problems, and the result of poorer management regimes in other countries or older and poorer drilling technology. The take home message from industry is that 'new' technology has made the process safe and that Australia has excellent regulatory regimes to safely manage the industry. One has to wonder what independent *peer-reviewed* data on which these claims are based.

Globally, there is growing evidence of contamination incidents associated with shale and tight gas drilling. For instance:

- researchers have traced low levels of methane and other contaminants to a source of shale gas in the sprawling Marcellus Formation, which lies beneath much of New York state, Pennsylvania, West Virginia and Ohio. ⁽²³⁾
- Pennsylvania's Department of Environmental Protection has catalogued 243 cases of contamination of private drinking wells from oil and gas drilling operations. In some cases, one drilling operation contaminated the water of multiple wells, with water issues resulting from methane gas contamination, wastewater spills, and wells that simply went dry or undrinkable. ⁽²⁴⁾

There is also a fear of geo contamination – dangerous materials being brought to the surface in recovered water as a result of shale and gas fracking. These contaminants include heavy metals, naturally occurring radioactive materials (NORMs - including Radium, Thorium and Uranium), volatile and semi volatile organic compounds (VOC's) and high concentrations of salts.

22 From presentation at Onshore Natural Gas Community Panel, Camperdown, 26/2/15

23 Gas drilling taints groundwater. Chemical analysis links methane in drinking wells to shale-gas extraction. Jeff Tollefson (2013). Nature Journal of Science. <http://www.nature.com/news/gas-drilling-taints-groundwater-1.13259>

24 <http://thinkprogress.org/climate/2014/08/29/3477184/pennsylvania-fracking-water-contamination/>

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The AGL incident mentioned on p12 below demonstrates that disposing of "produced water" over the land surface on the assumption that land usage is unaffected in not an option

The Otway Basin west of Melbourne is a key location for shale gas potential. There are risks specific to the local geology. The Otway Basin is considered "structurally complex, which may increase the potential for fluid flow between gas shales and other units including aquifers".⁽²⁵⁾ The Otway Basin already has multiple users, ranging from conventional oil and gas, carbon capture and storage, groundwater (unconfined and confined), hot sedimentary aquifer (geothermal) and domestic water supply, which will make management of any UCG drilling complex when compared with less densely populated regions like the Cooper Basin.

The Gippsland Water Atlas shows that aquifers that run from East Gippsland to the Latrobe Valley, almost 150 km away, are connected. Therefore any contamination from drilling or over-allocation for mining can be expected to impact far beyond the local area. Obviously, once any form of chemical contamination occurs, it will be difficult, if not impossible to contain. The GWA notes that rates of decline of bore levels over large distances (for instance between Yarram and Bairnsdale) are 'remarkably similar' (p57), highlighting the likelihood that impact at any point in the aquifer may impact a broad area.

These aquifers lie under the Macalister Irrigation District (MID), the state's second largest irrigation zone, on the northern end of the Gippsland Plains, where Lakes Oil subsidiary Commonwealth is currently looking for brown coal. The MID has the highest concentration of ground water entitlements in Gippsland (GWA, p22). At present the aquifers are considered to be 'low salinity, high yielding alluvial aquifers' (p34).

Well failure through blowouts, annular leakage (along the well) or radial leakage (perpendicular to well) is the primary cause of groundwater contamination from unconventional gas production. These known problems pose unacceptable risks and UCG cannot be permitted as a result.

An additional concern expressed by some rural communities is that groundwater could be contaminated by drilling lines intersecting with older, unmapped drill holes from previous agricultural activity. As noted by people like Kieran Kennedy, the former mayor of South Gippsland, there are many old and undocumented drill lines into aquifers which could potentially be breached by new drilling operations for mining.

Despite regular assurances from industry, experience in the real world shows that contamination has, and does, occur. For instance, the National Toxics Network⁽²⁶⁾ reports that "methane can contaminate bores and water wells near gas wells. An analysis of 60 water wells near active gas wells in the US found most were contaminated with methane at levels well above US federal safety guidelines for methane. Quite apart from direct health considerations, remember that this methane is released to the atmosphere where it acts as a greenhouse gas 22+ time more powerful than CO₂. The majority of water wells situated one kilometre or less from a gas well, contained water contaminated with 19 to 64 parts per million (ppm) of methane. Wells more than a kilometre from active gas had only a few parts per million of methane in their water".

There has been substantial concern in the community about the possibility of contamination from BTEX chemicals (the chemicals Benzene, Toluene, Ethylbenzene and Xylene).

These compounds occur naturally in crude oil and can be found in sea water in the vicinity of natural gas and petroleum deposits. Benzene is a known carcinogen. According to the National Toxics Network,⁽²⁷⁾ "the fracking process itself can release BTEX from the natural-gas reservoirs, which may allow them to disperse into the groundwater aquifers or to volatilise into air. People may be exposed to BTEX chemicals by drinking."

25 http://www.acola.org.au/PDF/SAF06FINAL/Frogtech_Shale_Gas_Geology_and_Risks%20Jan2013.pdf (p 16)

26 <http://www.ntn.org.au/wp/wp-content/uploads/2011/11/NTN-submission-to-the-NSW-Inquiry-Into-Coal-Seam-Gas3.pdf>

27 <http://www.ntn.org.au/wp/wp-content/uploads/2011/11/NTN-submission-to-the-NSW-Inquiry-Into-Coal-Seam-Gas3.pdf>

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The use of BTEX chemicals is currently banned in Victoria. Even where no dangerous chemicals are used in gas operations, there is the fear that accessing and fracturing coal seams will release potentially dangerous materials (including those in the BTEX group) which are currently safely trapped deep under ground. These could be brought to the surface in the recovered water.

Doctors for the Environment point out that a range of other hazardous chemicals are reported to be used in Australian fracking operations for CSG including 2-butoxyethanol and ethylene glycol.

Research compiled by Doctors for the Environment ⁽²⁸⁾ found that 2-butoxyethanol is easily absorbed and rapidly distributed in the human body and is particularly toxic to red blood cells, carrying the risk of haemolysis, and damage to spleen, liver and bone marrow. Ethylene glycol is used to make anti-freeze and when ethylene glycol breaks down in the body it can affect kidney function as well as the nervous system, lungs and heart. ⁽²⁹⁾

Water: What They Say, Compared (emphasis added) ⁽³⁰⁾

The situation: AGL was permitted to carry out a trial of using coal seam gas (CSG) waste water for irrigation in northern NSW. [52 Megalitres of waste water were disposed of over a 2-year period.]

- Peter Jamieson, an operations chief with the NSW Environment Protection Authority, told a meeting in Gloucester that the agency determined the trial was "**unlikely to be sustainable in the long term**", according to a power point slide shown to the gathering.
- "The EPA reviewed the monitoring data from the irrigation trial and, based on this review, **would not support a continuation of the trial**," an EPA spokeswoman said.
- "The EPA was concerned about **the levels of salt and some heavy metals – the presence of these made the long-term viability of the program unsustainable**."
- AGL, meanwhile, said it had "**successfully completed**" the two-year trial, in which 52 megalitres of so-called produced water from the four pilot CSG wells were "**beneficially re-used**".
- "**We've been really happy with the results** from the Tiedmans Irrigation Program and as we only have a very small volume of produced water left, we made the decision not to apply for an extension of the program," John Ross, an AGL hydrogeology manager, said in a media release.

I acknowledge with thanks Doctors for the Environment Australia for the content in the first and for the last 3 of the following 4 links:

- The Doctors for the Environment Australia made the following very pertinent submission to the NSW Government Inquiry
<http://www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/F96D076732225603CA25791B00102098>
- Leading health advocacy organisation, Doctors for the Environment Australia, has today backed calls to establish a royal commission into the impact of coal seam gas mining on the people of Queensland.
<http://dea.org.au/news/article/media-release-doctors-back-call-for-royal-commission-into-the-effects-of-cs>
- Doctors alarmed by water contamination from unconventional gas mining:
<http://dea.org.au/news/article/media-release-doctors-alarmed-by-water-contamination-from-unconventional-ga>

28 <http://www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/F96D076732225603CA25791B00102098>

29 <http://www.atsdr.cdc.gov/toxfaqs/tfacts96.pdf>

30 <http://www.theland.com.au/news/agriculture/agribusiness/general-news/csg-water-irrigation-trial-shut-down/2729657.aspx>

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- Review of Coal Seam Gas Activities in NSW - Chief Scientist and Engineer Submission <http://dea.org.au/resources/submissions/review-of-coal-seam-gas-activities-in-nsw-chief-scientist-and-engineer-subm>

Interestingly, the submission document accessible through this last link includes the paragraph

Quote:

In Australia, sixty-one environmental incidents were reported to the peak industry body APPEA in the 2011–12 year, and it notes, “The Australian industry still has some way to go to match safety performance in other parts of the world”.

http://www.appea.com.au/images/stories/Policy - Safety and Health/2012%20appea_hse.pdf

Unquote

Also interestingly, this link now results in a "404 Page Not Found" Error and, if the document has been moved as the page implies is possible, all efforts to find it have failed.

Climate change

Any discussion about energy policy needs to consider the implications of climate change. In the case of UCG, which requires access to land in a way that is likely to adversely impact on local farming activity, there is an additional consideration when it comes to climate change. UCG can be seen as one more land use, like urban sprawl, that results in changes to farming activity. There is slow but steady loss of farmland to urban development in key areas around the state. Yet climate science tells us that south eastern Australia will be affected by climate change in a way that will reduce food production. This makes our farmland even more important and in need of protection from continued urban sprawl and invasive activities like coal and gas mining. It should also be remembered that even though climate change is a significant factor that will influence future food production although, as yet, the exact impacts are not fully understood. According to the DPI, the general threats to agriculture from climate change across southern Australia include:

- a decline in productivity due to increased drought and bush fires
- some crop yields benefiting from warmer conditions and higher carbon dioxide levels, but increased vulnerability to reduced rainfall
- greater exposure of stock and crops to heat-related stress and disease
- earlier ripening and reduced grape quality
- less winter chilling for fruit and nuts
- southern migration of some pests
- potential increase in the distribution and abundance of some exotic weeds

The DPI says potential changes in climate may reduce productivity and output of Victoria's agricultural industries in the medium to long term. It is essential that we do not put one of the country's main food producing areas at risk from UCG drilling without fully understanding the possible long term impacts on groundwater and agricultural land.

Based on the experience of farmers in Queensland where the coal seam gas (CSG) industry has already become entrenched and its problems are well documented, we do not accept the premise put forward by the industry that UCG operations can peacefully co-exist with farming. While any potential onshore gas industry is unlikely to be of a scale of what is already found in sections of Queensland, we can expect that any impacts will be felt keenly given the relatively higher population density and smaller size of the average farm here in Victoria.

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(c) *any implications for local and regional development, investment and jobs;*

This inquiry provides our state with a significant opportunity to consider our future energy pathway. A key role for state governments is to set sensible economic policy and encourage the development of the economy in a way that will benefit the state's population as a whole. There is, of course, a desire amongst some in government to seek to approve any industry that will bring royalties and new economic activity. With an industry that comes with such negative consequences, there is a need to carefully consider the claims that this industry, if allowed to proceed, will have a net positive impact on our state's economy. This a position that needs independent objective review that includes the consequential costs (which at first sight might appear indirect) as well as the benefits.

Despite several decades of exploration for UCG resources, no one in the industry seems able or willing to provide an assessment of how big an 'ideal' industry would be in our state. There is ongoing uncertainty about the commercial viability of the actual UCG resource. We have been unable to find any public estimates of the likely income that will flow to the state through royalties or increased economic activity. The industry in Victoria has a record of been long on promises and short on delivery and is not to be trusted as an expert source of information on these questions. As has been shown in Queensland, industry claims about jobs, which typically derive from crude and unverifiable economic forecasting models based on data provided by the industry are often wrong if a project is actually approved and developed.

At the national level industry information about jobs is at best misleading and inaccurate. In an article with the intriguing title "Three myths the coal seam gas industry wants you to believe"⁽³¹⁾ at The Conversation we are informed by the industry peak body (emphasis added) "*We all realise natural gas projects would benefit the entire nation, increase our GDP by an estimated 1.5% and **directly and indirectly create 150,000 new jobs – this is in addition to the 100,000 jobs created by our gas industry last year alone.***" – Australian Petroleum Production & Exploration Association (APPEA) deputy chief executive Noel Mullen, July 2013⁽³²⁾

Those best placed to provide an estimate of the likely economic costs and benefits of an UCG industry are probably to be found in the state government's Treasury department. Already we are seeing the decline in production in some areas in Queensland and a post boom phenomena is becoming apparent. If the government is to seriously consider opening the state to UCG production, it is essential that we carefully study what happens after the boom before we open the gates. What is clear from places like Tara in Queensland is that some businesses benefit while many others suffer. There is some evidence that intensive UCG production could transform local economies in the short term away from current activity such as farming. One study from the USA cited in "An Urgent Case for a Ban on Fracking" (2015) says 'over the long-term, natural resource dependent communities experience relatively high rates of unemployment and poverty, instability, inequality, crime, and low educational attainment'⁽³³⁾.

Based on the experience of farmers in Queensland where the coal seam gas (CSG) industry has already become entrenched and its problems are well documented, we do not accept the premise put forward by the industry that UCG operations can peacefully co-exist with farming. While any potential onshore gas industry is unlikely to be of a scale of what is already found in sections of Queensland, we can expect that any impacts will be felt keenly given the relatively higher population density and smaller size of the average farm here in Victoria.

31 http://theconversation.com/three-myths-the-coal-seam-gas-industry-wants-you-to-believe-24422?utm_medium=email&utm_campaign=Latest+from+The+Conversation+for+18+March+2014&utm_content=Latest+from+The+Conversation+for+18+March+2014+CID_1175685d65ebfeb592001726ec96240e&utm_source=campaign_monitor&utm_term=Three%20myths%20the%20coal%20seam%20gas%20industry%20wants%20you%20to%20believe

32 <http://www.appea.com.au/2013/07/naturally-we-need-the-benefits-of-more-gas/>

33 http://www.foodandwaterwatch.org/reports/the-urgent-case-for-a-ban-on-fracking/#_ga=1.251982729.1016386784.1436338924 (page 22)

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(4) the ability of potential onshore unconventional gas resources contributing to the State's overall energy sources including —

(a) an ability to provide a competitive source of energy and non energy inputs for Victorian industries;

UNG cannot be a competitive source of energy when the costs of extraction, waste treatment and disposal, and consequential costs to established and nationally important agricultural output is included in the calculations.

(b) an affordable energy source for domestic consumers; and

This is another myth as explained in "Three myths the coal seam gas industry wants you to believe" ⁽³⁴⁾ Myth 2 is "More CSG will stop the gas price rises" This is clearly a false hypothesis on the grounds that the aim of the UCG industry is to *export* the gas to the significantly more lucrative export market. Domestic prices are destined to rise to match export prices no matter how much gas is produced.

(c) carbon dioxide emissions from these sources;

Myth 3: (see link in item (b) above) refutes the claim that "CSG can act as a low-emission 'bridge' from coal to renewables" The explanation is preceded by a quote from APPEA's *Our Natural Advantage* website. "Natural gas can help reduce greenhouse emissions, both here in Australia and across Asia, because it is so much cleaner than traditional sources of energy."

While this statement is true in terms of simply *burning* the fuel it is manifestly false with regard to UCG if the pollution and contamination resulting from its production is included in the calculations.

The only long-term sustainable solution is to invest in renewable energy sources.

Victorians currently use a lot of gas. Natural gas accounts for 19% of all energy used in Victoria and our consumption is expected to increase. Victoria has the largest residential gas demand of any Australian state, which is a result of various factors, including our relatively cooler climate, and the poor energy rating of much of our existing housing stock. Around 40% of our energy use occurs in industrial activity. ⁽³⁵⁾

Any energy policy based on mainstream science must, as a basic principle, rule out any new development of fossil fuels. In terms of our future energy supply mix, we must remember that UCG is a fossil fuel. The widespread burning of fossil fuels are the main single cause of human induced global warming. The only way to stop, or at least minimise, the impacts of climate change is to stop burning fossil fuels, not dig up more. To have even a 75% chance of meeting the 2°C warming limit, at least 77% of the world's known fossil fuel reserves (coal, oil and gas) cannot be burned. ⁽³⁶⁾ It is generally accepted that 2°C of overall warming is the absolute upper limit that is allowable if we are to avoid 'catastrophic' climate change.

A responsible energy policy for Victoria would rule out any further coal, gas, or oil development.

By definition, unconventional gases which are trapped in coal or rock seams are harder to extract than conventional gas. This means that more energy needs to be invested in producing the gas compared with conventional gas. This is because most UCG will require fracking in order to release the gas trapped in rock or coal seams for it to flow to the surface.

34 http://theconversation.com/three-myths-the-coal-seam-gas-industry-wants-you-to-believe-24422?utm_medium=email&utm_campaign=Latest+from+The+Conversation+for+18+March+2014&utm_content=Latest+from+The+Conversation+for+18+March+2014+CID_1175685d65ebfeb592001726ec96240e&utm_source=campaign_monitor&utm_term=Three%20myths%20the%20coal%20seam%20gas%20industry%20wants%20you%20to%20believe

35 <http://onshoregas.vic.gov.au/victorias-energy-supply/gas-in-victoria/demand-for-gas-in-victoria>

36 <https://www.climatecouncil.org.au/unburnable-carbon-why-we-need-to-leave-fossil-fuels-in-the-ground>

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The Energy Return on Investment (EROI) for UCG is typically much worse than for LNG. Given the rising cost of diesel (required in the fracking and other processes) it is difficult to see how UCG could compete with existing conventional gas supplies.

Therefore, it is difficult to see new production of UCG as being a panacea for rising energy prices. We need to use the existing offshore gas supply as a transition fuel, to give us 'breathing space' as we rapidly move to energy sources not based on fossil fuels.

Because of federal government plans to facilitate the massive production and export of liquid natural gas from ports in the north of Australia, Victorian gas consumers will increasingly be competing in a global market for their energy. Any government policy that seeks to protect energy consumers from continual price increases must look beyond fossil fuels.

- (5) the resource knowledge requirements and policy and regulatory safeguards that would be necessary to enable exploration and development of onshore unconventional gas resources, including —**
- (a) further scientific work to inform the effective regulation of an onshore unconventional gas industry, including the role of industry and government, particularly in relation to rigorous monitoring and enforcement, and the effectiveness of impact mitigation responses; and**
 - (b) performance standards for managing environmental and health risks, including water quality, air quality, chemical use, waste disposal, land contamination and geotechnical stability;**

Regarding (a) it is manifestly obvious from problems that have been experienced elsewhere and those coming to light that regulation is no guarantee of avoiding problems which in the long-term (i.e., long-term as in future generations, not political cycle "long-term") are likely to be devastating if not catastrophic. As mentioned elsewhere in this submission the track record of the industry proves it cannot be trusted to perform such monitoring. And rigorous monitoring by an independent authority is wishful thinking when the costs of such monitoring almost by definition make it impossible to achieve.

Regarding (b) there is an abundance of data from reputable sources quoted elsewhere that the environmental and health risks are so great that the only performance standard that will prove to be adequate in the long-term is a total and permanent ban on UCG. (Some of these references are repeated here for convenience)³⁷

It's almost as though the industry's unstated plan is to do whatever is necessary and make whatever undertakings are required to get approvals and make profits as fast as possible; then when problems occur to say something along the lines of "Sorry -- we were wrong. Unfortunately the problems are totally unfixable so we can't do anything about it. And by the way, our company (which it now turns out is merely a shell company) has no resources (because all the profits from the original company have been siphoned off to our offshore haven) so don't even bother trying to sue us for compensation."

It is the duty of the government to prevent this sort of scenario from being possible. And the only way to do this is to ban UCG permanently and give the incumbent industries and the communities the stability they need to thrive in the long-term.

From the negative examples of UCG drilling elsewhere in Australia and around the world, I believe the best way to regulate this industry is to ban it. This is the simplest policy response. Many other jurisdictions have chosen to place an outright ban on UCG and/or the process of fracking. Some examples are listed below.

³⁷

<http://concernedhealthny.org/wp-content/uploads/2014/07/CHPNY-Fracking-Compendium.pdf>

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Outright Fracking Bans

USA

New York – December 2014 – this was implemented on the basis of health risks after expert investigation and the publication of a New York State Department of Health Report.
http://www.nytimes.com/2014/12/18/nyregion/cuomo-to-ban-fracking-in-new-york-state-citing-health-risks.html?_r=0

https://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf

San Benito County, California – April 2014

http://www.mercurynews.com/science/ci_26866639/san-benito-countys-measure-j-voters-backing-anti

Mendocino County, California – 4th November 2014 – this ban on fracking was implemented as part of a community Bill of Rights to “natural and chemical free communities and ecosystems, a clean environment, and self-government by the people, without manipulation and overwhelming influence from corporations.”

It imposes considerable penalties for breaches.

http://ballotpedia.org/Mendocino_County_Community_Bill_of_Rights_Fracking_and_Water_Use_Initiative,_Measure_S_%28November_2014%29

Santa Cruz County, California – May 2014 -

<http://www.reuters.com/article/2014/05/21/california-fracking-idUSL1N00700J20140521>

Highland Park, New Jersey - Sep 17, 2013 – An ordinance to ban fracking was passed by Highland Park Borough Council.

http://www.nj.com/middlesex/index.ssf/2013/09/highland_park_becomes_first_town_in_nj_to_ban_fracking.html

Secaucus, New Jersey – 26th June, 2012 - The mayor and Town Council banned fracking and fracking waste water “in a resolution that states that the drilling process causes environmental hazards.”

http://hudsonreporter.com/view/full_story/19312259/article-Secaucus-bans-%E2%80%98fracking%E2%80%99-Local-officials-also-call-for-statewide-and-national-ban-?instance=secondary_stories_left_column

Denton, Texas, – 4th November 2014 - by citizen ballot – permanently prohibits fracking within the city limits.

<http://www.dallasnews.com/news/politics/headlines/20141105-denton-fracking-ban-passed-in-landslide1.ece>

Hawaii – October 2013 - unanimous County council bill banned hydraulic fracturing.

<http://hawaiitribune-herald.com/sections/news/local-news/council-oks-ban-fracking.html>

Vermont – 17th May 2012 – Vermont was the first US state to ban fracking. The Governor stated that protection of drinking water is more important than increased access to natural gas.

http://www.huffingtonpost.com/2012/05/17/vermont-fracking-ban-first_n_1522098.html

UK

Wales - from February 2015 – “effectively making it impossible for shale gas developments to receive planning permits in Wales.”

<https://uk.finance.yahoo.com/news/wales-votes-against-shale-gas-190742367.html>

Northern Ireland – July 2014 – the environment minister promised that there will be no fracking in Northern Ireland unless it can be proved “safe beyond doubt”.

<http://www.belfasttelegraph.co.uk/business/news/fracking-drilling-will-not-be-allowed-in-northern-ireland-unless-its-proven-safe-warns-environment-minister-mark-h-durkan-30469238.html>

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EUROPE

France -30th June 2011 - Ban on hydraulic fracturing was voted in by parliament. The International Energy Agency claims that France has more plentiful reserves of shale gas than most of Europe, but France's Constitutional council threw out a 2013 challenge to the law by US based Schuepbach Energy

<http://www.dw.de/french-court-rejects-challenge-to-anti-fracking-legislation/a-17151744>

Current President François Hollande has promised the ban will be maintained for his five-year term.

<http://www.bbc.com/news/business-23311963>

Luxembourg – 13th November 2012 – the Luxembourg parliament voted against a motion to extract underground shale gas based on environmental concerns.

<http://www.wort.lu/en/luxembourg/no-fracking-of-shale-gas-in-luxembourg-50a37ff8e4b0e83edf95f923>

Bulgaria – 18th January 2012 - Bulgaria banned exploratory drilling for shale gas. On 14th June 2012 Bulgaria imposed an absolute ban on fracking and revoked Chevron's shale gas permit.

<http://www.theguardian.com/world/2012/feb/14/bulgaria-bans-shale-gas-exploration>

Spain – 30th January, 2014 – fracking was banned in Catalonia as part of the urban planning law.

http://ccaa.elpais.com/ccaa/2014/02/01/catalunya/1391210321_238105.html

– fracking was also banned in Cantabria, followed by La Rioja and Navarra later that year.

http://sociedad.elpais.com/sociedad/2013/04/08/actualidad/1365443283_986703.html

“The Rioja Government has implemented the principles of preventive action and caution advocating the European Union (EU) on environmental protection.”

<http://www.larioja.com/20130531/local/region/gobierno-rioja-prohibe-usar-201305311150.html>

Navarra – banned hydraulic fracturing for exploration and extraction “under the provisions of the Regional Law of Urban Planning and Land Regime of Navarre.”

http://www.diariodenavarra.es/noticias/navarra/mas_navarra/2013/10/10/el_parlamento_prohibe_quot_fracking_quot_navarra_pese_upn_ppn_132959_2061.html

Canton of Fribourg, Switzerland – April 2011. Decision not to renew exploration licence of Schuepbach Energy, and all other licences suspended “for an undetermined period.”

<http://coalseamgasnews.org/news/world/switzerland-joins-worldwide-ban-on-gas-fracking/>

Austria – March 2014 - a fracking ban was enshrined in the Vorarlberg State Constitution.

<http://www.vol.at/fracking-verbot-wird-in-vorarlberger-landesverfassung-verankert/3907751>

Italy – September 2014 – a ban introduced as part of the Law of Stability 2014 in order to protect groundwater and soil and promote “efficient use of national water resources.”

<http://www.ilfattoquotidiano.it/2014/09/04/fracking-commissione-ambiente-da-vietare-il-ministero-mai-autorizzato/1110626/>

NEW ZEALAND

Christchurch/Aotearoa– April 2012 – A unanimous vote by Christchurch City Council to declare the city a frack free zone, citing impact on the local environment, water supply and earthquakes.

<http://archived.ccc.govt.nz/council/proceedings/2012/april/cnclcover12th/ConfirmedMinutesCouncil12April2012.pdf>

Kaikoura – April, 2012 - The Kaikoura District Council declared itself a frack-free zone.

If the committee does not feel it can recommend an outright permanent ban on UCG, it could look to the example of New Brunswick in Canada. Shale gas was a major issue in the New

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Brunswick election of September 2014. Many commentators [stated](#) that the election a referendum on shale gas extraction.

Quote:

As a result of the election, the New Brunswick parliament, on 18th December, 2014 introduced Bill 9, which placed a moratorium on the process of fracking. The moratorium will not be lifted unless the following five conditions are met:

1/ The industry gains a social license to operate.

This will be sought through extensive consultation and engagement exercises with New Brunswickers in order to identify whether the industry has been able to achieve social acceptance.

2/ Clear and credible information about the industry.

This will permit the government to compile clear and credible information about the impacts of hydraulic fracturing on public health, the environment and water in order to better inform a decision to allow the industry to proceed. This will allow the province to “develop a country leading regulatory regime with sufficient enforcement capabilities”.

3/ An infrastructure Plan;

“This analysis and planning will enable us to mitigate potential impacts on our public assets and address other related issues such as the disposal of waste water.”

4/ Proper consultations with First Nations;

“This exercise would have to ensure that we are fulfilling the crown’s obligations under the duty to consult”.

5/ Maximized benefits

There would need to be clear benefits for the people of New Brunswick for the industry be allowed to proceed.

Does this moratorium make a distinction between hydraulic fracturing with propane and water?

Although there are some differences between hydraulic fracturing with propane and hydraulic fracturing with water, the moratorium applies to hydraulic fracturing by any means.”

http://www2.gnb.ca/content/gnb/en/news/news_release.2014.12.1404.html

Bill 9 can be found here - <http://www.gnb.ca/legis/bill/FILE/58/1/Bill-9-e.htm>

Unquote

- (6) relevant domestic and international reviews and inquiries covering the management of risks for similar industries including, but not limited to, the Victorian Auditor-General Office’s report Unconventional Gas: Managing Risks and Impacts (contingent upon this report being presented to Parliament) and other reports generated by the Victorian community and stakeholder engagement programs.**

While we await the Auditor-General Office's report the following list of outright bans is a powerful indication that others have performed investigations and come to the conclusion that UCG is not viable and should give us cause for thought. This list appears below.

Please also see section 5 above.

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CSG Water Treatment Ponds -- R.I.P Pilliga Forest