



Friends of the Earth (Melbourne) Inc

Box 222, Fitzroy, 3065

www.melbourne.foe.org.au



Inquiry into Unconventional Gas in Victoria

Introduction

Friends of the Earth (Melbourne) Inc appreciates the opportunity to make a submission to the State government's Inquiry into Unconventional Gas (UCG).

We would like to make it clear that we do not support UCG drilling. This Inquiry is a watershed moment for our state in terms of future energy policy, and we hope the committee will recommend an outright ban on future UCG drilling operations.

We believe there is a compelling case to place an outright and permanent ban on all onshore unconventional gas drilling in Victoria.

This inquiry offers us our best chance to stop this industry before it gets established. Based on the experience in other parts of the world where the industry is more advanced, including here in Australia and in North America, we do not believe that this industry can co-exist safely with other land uses like farming, conservation, and tourism.

Victoria is a densely populated state which is heavily reliant on agriculture and associated food processing industries. Nature based tourism is also a significant employer across much of the state where the UCG industry wants to get established. Gas drilling will 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 further entrench our current reliance on coal and gas as energy sources. It is energy intensive to produce, which means it is unlikely to benefit consumers through creating lower energy prices compared with traditional gas. It will produce significant greenhouse gas emissions. The benefits associated with any royalties that are likely to be delivered as a result of drilling need to be carefully considered against possible negative economic consequences through direct impacts on other land users like farmers. The costs are likely to far outweigh any short term benefits.

And finally, we point out that this industry does not have social license to operate, as shown by the 60+ community gasfield free declarations that have already happened across southern Victoria.

We urge you to recommend that Victoria ban all unconventional gas drilling permanently.

Comments on the terms of reference.

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

It is clear that when compared with black coal, Victoria's brown coal resource will be marginal in terms of the commercial viability of coal bed methane/ coal seam gas (CSG). A range of companies have been searching for commercial quantities of unconventional gas resources such as CSG and tight gas for several decades. Despite all this work, and regular announcements from some companies that commercialisation is imminent, there was no onshore commercial production of UCG in Victoria prior to the moratorium being announced. Given this fact, it is quite likely that the CSG resource in particular will prove to be only marginally viable in commercial terms. As a result, return to the state via royalties can be expected to be negligible, especially when considered against the possible negative impacts on agricultural production.

The areas of the state that are most likely to contain commercial quantities of UCG resources are south of the Great Dividing Range. These areas, stretching from the South Australian border to Bairnsdale, include 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 at risk by allowing this industry to proceed for only minimal royalty returns to the state?

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

Responsible decision making where risk is involved and science is uncertain requires the application of the precautionary principle. It is clear that many problems with the industry may take years, and potentially decades, to emerge, let alone be fully understood. It would be reckless to unleash this industry on our state with all the evidence that is emerging about contamination events associated with UCG drilling.

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

Public health impacts

On the question of possible public health impacts of UCG, Doctors for the Environment says¹:

The fundamental public health issue is the potential for water contamination by chemicals which could seriously affect human health decades after exposure. Health impacts may arise from the use of fracking chemicals or from the release of hydrocarbons and other contaminants from the coal seams.

Pollutants – particularly volatile organic compounds – may be released into the air at the well head. In the United States, control measures determined by the US EPA in response to elevated levels of pollutants measured in several gas fields will be [phased in by January](#)

¹ <http://reneweconomy.com.au/2012/dealing-with-the-health-risks-of-unconventional-gas-99242>

2015 In Tara, Queensland, it seems possible that the high recorded levels of fugitive methane may also reflect the presence of pollutants which are [causing illness](#) in local communities – similar symptoms are under investigation by the USEPA.

Public health experience indicates that in a range of environmental contamination issues prevention is the best pathway to protection.

Regarding the specific public health impacts of air pollution associated with UCG drilling, a number of health research reports 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 data 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] sites.” The authors summarise 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 the contrary claims of minimal air quality impacts, based on air quality measures that smooth out, and thus fail to see, the actual peak exposures experienced by individuals.²

Fugitive emissions are a significant concern in all types of UCG mining. As noted elsewhere in this submission, a significant portion of the water from drilling returns to the surface accompanied by large quantities of methane. Some methane escapes into the atmosphere during drilling operations. This makes up the majority of so-called fugitive emissions, even taking into account leakage that occurs when the gas is being transported. A fundamental problem is that we don’t really know how much methane leaks out during the fracking process and researchers currently don’t agree on the figures.

A 2011 study by Cornell University concluded that fugitive emissions mean that shale gas would be even more environmentally polluting than coal. The study has come under criticism by people who question its methodology.

But the authors of the Cornell study have disagreed with the criticisms of their paper - and hard data on methane emissions from the drilling process appear to back them up^{3 4}.

There are public health concerns relating to all types of UCG, not just CSG. The fugitive emissions of natural gas during drilling and processing still exist, as with CSG. According to the US-based Physicians for Social Responsibility, “The modern form of hydraulic fracturing (hereafter referred to as HVHF *high-volume, horizontal fracturing*) differs from previous forms in both technique and magnitude, carrying with it a host of new public health and environmental concerns. ... Public health concerns about HVHF focus primarily on pollutant exposure from air emissions and water contamination; however, the entire life-cycle of unconventional shale gas extraction is potentially polluting”.

They conclude their research report into shale gas by saying⁵:
 “the large-scale development of shale gas resources and their potential impacts on human health and world climate call for the utmost precaution. Thus, the continuation of current moratoria and bans is prudent until the appropriate science documents HVHF’s effects on

² *The Urgent Case for a Ban on Fracking*. Food and Water Watch (2015) P 25

³ <http://www.carbonbrief.org/blog/2012/05/qa-on-fugitive-emissions-from-fracking/>

⁴ <http://www.nature.com/news/air-sampling-reveals-high-emissions-from-gas-field-1.9982>

⁵ http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/public-health-concerns-of-shale-gas-development.html#_ftn4

public health”.

On the question of the impacts of shale gas, the authors Shonkoff, Hays and Finkel, writing in 'Environmental Health Perspectives'⁶ say:

“There is evidence of potential environmental public health risks associated with shale gas development. Several studies suggest that shale gas development contributes to ambient air concentrations of pollutants known to be associated with increased risk of morbidity and mortality. Similarly, an increasing body of studies suggest that water contamination risks exist through a variety of environmental pathways, most notably during wastewater transport and disposal, and via poor zonal isolation of gases and fluids due to structural integrity impairment of cement in gas wells”.

(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 our comments on likely impacts on agricultural production.

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

UCG activity fundamentally industrialises landscapes. Gas drilling operations require access roads, drill pads and processing equipment, waste ponds and water treatment sites, flaring pits, and pipelines. Drilling operations will profoundly change the rural nature of the areas where it is allowed to become established.

UCG drilling is proposed by the industry across large sections in the south of the state. 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. The state government is encouraging people to move to regional centres, and natural population growth will continue to see the regions grow, especially in the milder and coastal sections of the state.

There can be no doubt that these communities will, in general, object to industrialisation of rural landscapes that will happen 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 and hence a 'fly in fly out' style of workforce. Given all these obvious impacts it is difficult to imagine that an UCG industry will not impact negatively on rural property values.

Experience elsewhere shows social impacts in areas that are in the grip of a UCG boom. Apart from hardship associated with changes in the rental and property market, there is the potential for broad physical and mental health consequences, and increased demand on emergency and other social services. How will this be quantified, and who will pay for it? There is growing evidence that living in or near gasfields is not good for people's mental

⁶ Seth B.C. Shonkoff, Jake Hays, and Madelon L. Finkel (2014) Environmental Public Health Dimensions of Shale and Tight Gas Development <http://ehp.niehs.nih.gov/1307866/>

or physical health.

In terms of the economic impacts on regional centres near to gasfields, there will be a mixed outcomes. The experience in places like Queensland suggests that a small number of businesses will do well, 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 people will be displaced entirely from the rental market in the short term and be forced to leave town.

UCG production will only occur for a limited number of years and so any proposal to open the gate to this industry must also plan for the post industry phase.

The experience in Queensland, where the industry is well advanced, is that the post boom decline has arrived earlier than expected. The mayor of a rural district in the heart of Queensland's CSG country says the industry's construction boom has ended quicker than expected, with the industry now shedding jobs. Western Downs Mayor Ray Brown told the ABC's Landline program he thought even the Government was "caught off the hook" by the speed of the decline ⁷. When the crash came it then impacted both the investment and rental market: The housing market in towns such as Dalby, Chinchilla and Roma responded quickly to the drop in employment opportunities (as the construction phase ended). Chinchilla real estate agent Don Hart said some investors were shocked to see how rapidly the market dropped. "The people that have invested in the houses are probably worried because their rents have halved" he said.

(a) co-existence with agricultural production

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.

Agriculture is a cornerstone of Victoria's economy, producing goods valued at more than \$11 billion a year. Victorian farmers do this with only around 3 per cent of Australia's arable land. Our output has been growing in recent years, from \$6.56 billion in 2007-08 to around \$9 billion in 2010/11. In 2012/13, the gross value of agricultural commodities produced was \$11.6 billion⁸.

With a 25% share of Australia's total food exports and a 28% share of Australia's total wool and fibre exports, Victoria is Australia's largest state food and fibre exporter ⁹.

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. By 2011, it was providing 23% of national milk production ¹⁰. Victoria's dairy product exports in 2013-14 were worth \$2.3 billion, an increase of 23 per cent from 2012-13. Overall, the three Victorian dairy regions (western

⁷ <http://www.abc.net.au/news/2015-06-27/coal-seam-gas-construction-boom-ends-in-qld/6575922>

⁸ <http://www.depi.vic.gov.au/agriculture-and-food>

⁹ http://www.ofa.org.au/papers/Victorian%20Organic%20Sector_Action%20Plan_12Dec08.pdf

¹⁰ <http://www.dairyaustralia.com.au/Industry-overview/Dairy-regions/Gippsland.aspx>

Victoria, northern Victoria and Gippsland) supply around 85% of national dairy exports¹¹.

In terms of livestock grazing, apart from supplying local markets, 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 market¹².

Apart from significant production of fruits and vegetables in the areas under exploration for various forms of UCG, organic production is also of growing importance. According to the Organic Farmers Association of Australia (OFA), the organic industry is growing rapidly in Gippsland. "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"¹³.

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 UCG operations. However perception of threat is a problem across all agricultural sectors. As noted by Director and principal of Gunnedah law firm Rural Law, Peter Long, "the perception of livestock coming into contact with heavy metals such as uranium (as a result of UCG contamination) could damage an exporter's business"¹⁴. Suzanne Wightman, a dairy farmer in Mardan, South Gippsland has expressed concerns about the threat of contamination: "For Australia to export overseas we need to have an immaculate product, so it'll be a huge lot of money lost to Australia (if contamination occurs)"¹⁵.

When the current exploration licenses for UCG are considered, it is clear that large sections of highly significant farmland is 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 for coal and gas (and especially UCG) is a very water intensive 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

11 http://www.depi.vic.gov.au/__data/assets/pdf_file/0006/292182/6-Dairy-Industry-Profile_December-2014-Update_MASTER.pdf

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

13 http://www.ofa.org.au/papers/Victorian%20Organic%20Sector_Action%20Plan_12Dec08.pdf

14 <http://www.theland.com.au/news/agriculture/general/news/csg-contamination-concerns-for-cattle-producers/2692841.aspx?storypage=0>

15 <http://www.abc.net.au/local/stories/2013/11/14/3891337.htm>

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 1970s¹⁶. As is noted in the Gippsland Water Atlas¹⁷ (GWA), the offshore oil and gas industry withdraws a substantial volume of fluid (oil, gas and water) from the aquifer. This occurs outside the states 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 megalitres of seawater, oil and gas each year from oil and gas reservoirs via rigs located between 20 and 80 kilometres offshore¹⁸.

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. 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 an UCG industry be allowed to become established? A deeper question would be: why would we allow short-term drilling to jeopardise long term farming?

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 farmgate prices for their product. If miners, in effect, drive up water prices, this will impact on farmers who need to buy water allocations. With the probable localised nature of any UCG production, this could cause pockets of hardship for agricultural producers unlucky enough to have gas production in their immediate area, although impacts are likely to be felt over a much wider region over time because of the interconnected nature of key aquifers. 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 a farmers entitlement 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. Some companies now speak of 'localised' nodes of activity in places like Seaspray and inland from Port Campbell. Others believe 'breakthrough' technology like Biogenic Methane Enhancement will open up large areas to CSG mining. A number of players in the UCG industry are secretive in regards to what their long term intentions are. Some appear to be primarily interested in testing for data to see if the resource will be commercially viable, with the intention of on-selling to other companies. This could easily bring unknown, 'cowboy' operations, which have no connection with or commitment to local communities, into the Victorian countryside. 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

16 Personal correspondence

17 Gippsland Water Atlas, Southern Rural Water (2012)

18 Gippsland Farmer, October 2012, p4

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') and apart from risks of chemical contamination, concern focuses on how much water is likely to be used with each frack operation. Additionally, there is the matter of how much water will be extracted from coal or other gas seams in the fracking process ('produced' water) and released into the environment. This issue is considered later in the submission.

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.

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 ¹⁹".

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 at the drill site 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.

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 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 'flowback rates of 10 to 70%'

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

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

²¹ 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.

Recovered (produced) water

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

“In September 2010, the Water Group provided a report to (then 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 megalitres a day. A megalitre 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, and hence 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 ²³.

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 fracks²⁴.

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 or rock seam itself.

Recovered water will need to be contained, treated and disposed of. Some proponents of the industry suggest that this water could then be used in agriculture. But has anyone actually tested whether this would be viable for produced water from Victorian seams, or how much it will cost to treat the water to an acceptable standard? This argument is symptomatic of the 'everything will be fine' approach taken by many industry supporters. Yet is not yet clear if it is viable in the real world.

Then there is the question of what happens if waste water contamination happens, for instance if there is a flow of produced water onto adjoining land or a waterway? Livestock producers have expressed concern they may be liable if standard residue tests find their animals are affected by contaminants from UCG operations²⁵.

Competition with other water users

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

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

²³http://www.melbournewater.com.au/content/water_conservation/water_use/water_use.asp?bhcp=1

²⁴ <http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/water/>

²⁵ <http://www.theland.com.au/news/agriculture/general/news/csg-contamination-concerns-for-cattle-producers/2692841.aspx?storypage=0>

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 town supplies (including Bairnsdale, Leongatha and Yarram) and coal mine depressurisation and offshore oil and gas developments are already the major user of this resource (GWA, p51).

Geelong's drinking water is predominantly sourced from forested catchments on the upper Barwon and Moorabool rivers. However, during periods of prolonged drought, water can be sourced from underground aquifers via the Barwon Downs and Anglesea borefields²⁶.

The Barwon Downs borefield is a crucial emergency water source for greater Geelong when surface storages are low. The Barwon Downs borefield consists of six bores that pump groundwater from an aquifer 300 to 630 metres below ground²⁷. In times of drought, the Anglesea borefield can supply up to 20 million litres a day, or around one-fifth of Geelong's demand²⁸.

The potential for contamination of groundwater

Apart from the question of industry accessing large volumes of water, there is also the matter of the 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 are 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.

However, 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.²⁹
- Pennsylvania's Department of Environmental Protection has catalogued 243 cases

²⁶ <https://www.barwonwater.vic.gov.au/learning/water-supply>

²⁷ <http://www.barwonwater.vic.gov.au/projects/barwon-downs-borefield-monitoring-program>

²⁸ <https://www.barwonwater.vic.gov.au/learning/water-supply>

²⁹ 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>

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.³⁰

- the United States Environmental Protection Agency (EPA) conducted a three-year water quality investigation of private drinking water wells around Pavillion, Wyoming. The EPA released a draft analysis of its data in December 2011 which indicated ground water contamination by compounds likely to be associated with natural gas production activities³¹.

There are also a number of known incidents of contamination associated with UCG drilling from operations here in Australia. For instance:

- Water contamination in an aquifer associated with a Santos coal seam gas project in the Pilliga Forest, NSW. A NSW EPA investigation found that storage facilities for contaminated water produced by a CSG mining project in the Pilliga Forest in NSW were inadequate, and that there was no evidence that the necessary testing and quality controls occurred. As a result, levels of heavy metals and radioactive substances are reported to be elevated in a nearby aquifer, with uranium levels well above Australian drinking water guidelines³².

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 may 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.

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”.³³

The Otway Basin, which underlies western Victoria, already has multiple users, ranging from conventional oil and gas, carbon capture and storage, groundwater, hot sedimentary aquifer (geothermal), and domestic water supply. This will make management of any UCG drilling complex when compared with less densely populated regions like the Cooper Basin, where shale gas is also being developed.

The Gippsland Water Atlas shows that aquifers that run from East Gippsland to the Latrobe Valley, almost 150 kilometres 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.

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

31 http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/public-health-concerns-of-shale-gas-development.html#_ftn4

32 <http://dea.org.au/news/article/media-release-doctors-alarmed-by-water-contamination-from-unconventional-ga>

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

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 has been 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 the well) are the primary causes of groundwater contamination from unconventional gas production.

Another issue that must be considered carefully is the potential for well casing failure to occur over time.

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 continues to, occur. For instance, the National Toxics Network³⁴ 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. 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) as a result of CSG drilling.

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 Network³⁵, "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."

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. The National Toxics Network has compiled a comprehensive analysis

³⁴ <http://www.ntn.org.au/wp/wp-content/uploads/2011/11/NTN-submission-to-the-NSW-Inquiry-Into-Coal-Seam-Gas3.pdf>

³⁵ <http://www.ntn.org.au/wp/wp-content/uploads/2011/11/NTN-submission-to-the-NSW-Inquiry-Into-Coal-Seam-Gas3.pdf>

of the dangers associated with the most commonly used chemicals contained in fracking fluids in Australia in the report 'Toxic Chemicals in the Exploration and Production of Gas from Unconventional Sources'³⁶.

Research compiled by Doctors for the Environment³⁷ 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 heart³⁸.

In the case of tight and shale gas, other potential contaminants from the frack mix could include biocides, corrosion inhibitors and friction reducers.

Direct impacts on the natural environment

There can be no doubt that an UCG industry will have direct localised impact on the natural environment in areas where the industry is established. Because of access requirements, pipelines and associated infrastructure, the industry will fragment landscapes and potentially damage remnant vegetation. Areas of proposed activity generally sit within our most modified landscapes, where remnant vegetation is of huge value. In the example of the Seaspray area, one locality targeted by the industry, relatively small pockets of natural vegetation that sit in a larger modified landscape, could be directly impacted by any drilling. There has already been one incident with a Lakes Oil gas flaring operation in the Seaspray area, where a fire got away from a drill site and started to burn adjacent sections of native vegetation. It was only quick intervention by the local CFA that stopped this potentially turning into a major fire event³⁹.

One area of specific concern is Farrells Wetland, which is located in the Seaspray area, adjacent to Lakes Oil's Wombat field. It is 10 kilometres WNW of Lake Reeve, and so a part of the Gippsland Lakes System.

36 http://www.ntn.org.au/wp/wp-content/uploads/2013/04/UCgas_report-April-2013.pdf

37 http://www.parliament.nsw.gov.au/Prod/parlment/committee_nsf/0/F96D076732225603CA25791B00102098

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

39 This event occurred at the Wombat-2 site near Seaspray on 29 January 2010



[Image: Farrells Wetland, showing adjacent tight gas well pads].

Historically this has been a thriving wetland, with water-level typically one metre deep.

Farrells dried up in the drought of the 1990s and early 2000s. Despite many years without drought, Farrells has not refilled. This may have been caused by a lowering of the water table, which frequently results from depressurising due to offshore gas/oil production. It is a concern that continued exploration drilling and possible onshore production pose significant risks to this and, potentially, other wetlands.

Currently, Farrells is a huge dry peat lake, flanked by dry sclerophyll forest (Eucalypts and Banksia Heathland). Whilst Lakes Oil holds title to most of the land Farrells is on, a small part is publicly owned.

A key principle in wildlife habitat protection in farming areas is to preserve existing wildlife corridors. Farrells is part of a crucial existing corridor from Mullundung State Forest almost to Bass Strait, and is a significant bushland remnant in this locality which has been targeted for tight gas drilling ⁴⁰.

As is noted above, there has previously been a fire that escaped from the Wombat 2 (W2) drilling operation. W2 is one kilometre east of Farrells, with a pine plantation and a large tract of bushland in between. It is well documented that gas well operations present a fire risk. It is also a common experience that fires in peat are almost impossible to extinguish, creating ongoing severe air and greenhouse pollution, with consequent health effects for humans and animals.

Increased seismic activity

There are a number of geological risk factors which may affect future shale gas development in Australia. Induced seismicity from fracture propagation has been identified as a key risk by industry sources ⁴¹. To give one example: in the USA, the Eola Field,

⁴⁰ Information from local resident

⁴¹ Various sources cited at

Garvin County in South-Central Oklahoma, more than 50 earthquakes were detected on January 18, 2011, with 43 large enough to locate the epicentres. These earthquakes were associated with an active fracking project being conducted in a nearby well. Studies and investigations have subsequently showed that there was a clear correlation between injection and seismicity. One example⁴² comes from the central and eastern United States where, for decades, the area consistently registered about 20 magnitude 3.0 or greater earthquakes per year. In the mid-2000s, this trend broke, and earthquake frequency increased, directly coinciding with the expansion of modern drilling and fracking.

Multiple threats to farming: Climate change and urban sprawl

As mentioned in the introduction to our submission, agriculture is a cornerstone of the Victorian economy. And while successive government's have urged Victorian farmers to be the 'food bowl of Asia' there are multiple threats to the long term future of farming in the state. Two key ones are urban sprawl and climate change. The proposal to allow UCG to develop in Victoria needs to be seen in light of these threats.

Any discussion about energy policy needs to consider the implications of climate change (this issue is considered in section 4 of our submission). 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 such as West Gippsland. 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. As inland south east Australia becomes hotter and drier, the relatively well watered and milder parts of southern Victoria are likely to become even more important in terms of food production.

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. What we do know underscores the need to protect valuable farmland. According to the (then) DPI⁴³, the general threats to agriculture from climate change across southern Australia include:

- a decline in productivity due to increased drought and bushfires
- 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

http://www.acola.org.au/PDF/SAF06FINAL/Frogtech_Shale_Gas_Geology_and_Risks%20Jan2013.pdf
(p 19 onwards)

42 The Urgent Case for a Ban on Fracking. Food and Water Watch (2015). P 13

43 Glimpsing Victoria's future climate, DPI briefing paper

- 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. Given that so much of Victoria's food production is reliant on groundwater, we must also carefully consider modelling around the climate change impacts relating to recharge rates for key aquifers. Any decision to open our state to UCG will have ramifications that will stretch over decades. The Committee must consider long term climate change predictions as part of the decision making process in this inquiry. 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.

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

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. This inquiry provides our state with a significant opportunity to consider our future energy pathway. 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 baggage, 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.

Despite several decades of exploration for UCG resources, no one in the industry seems prepared 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 resource. There are no public estimates of the likely income that will flow to the state through royalties or increased economic activity. The UCG industry in Victoria has been long on promises and short on delivery and is not to be trusted as an expert source of information on these issues. 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. An example of this is the case of the industry claims of job creation around the four large coal mines planned for the Galilee Basin in Queensland. Analysis of the industry claims by The Australia Institute suggest that only a third of the extra 27,000 jobs that have been claimed by supporters of the project could be on offer in 2030. The Institute says the higher figure is based on a "disputed" model that does not include the loss of jobs in other industries such as manufacturing⁴⁴.

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 a decline in UCG 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, with resulting economic impacts. One study from the USA says 'over the long-term, natural resource dependent communities

⁴⁴ <http://www.news.com.au/technology/environment/have-mining-job-figures-been-inflated-to-justify-reef-destruction/story-e6fr1p0-1227199903919>

experience relatively high rates of unemployment and poverty, instability, inequality, crime, and low educational attainment' ⁴⁵ as the post boom phase dominates.

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.

(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;

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

(c) carbon dioxide emissions from these sources;

Victoria has a good supply of conventional gas from offshore sources so there is no urgent need for new gas supplies. The Bass Strait fields contain an estimated 30 years supply at current production rates of about 400 PJ a year ⁴⁶. According to Citigroup, Eastern Australia will be so well supplied with gas through to early in the next decade that the glut in the market is causing delays to proposed new supply projects of "up to five years or more" ⁴⁷. The report of the Victorian gas industry task force, which was headed by former federal minister Peter Reith, warned of imminent shortages and price rises should Victoria not pursue UCG reserves, however the report has been discredited and is seen by many in the community as being alarmist ⁴⁸.

Victorians currently use a lot of gas. Natural gas accounts for 19% of all energy consumed in the state. 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. ⁴⁹ As is noted by the APA Group, who manage the Victorian Transmission System for delivery of natural gas, "commercial and residential gas use is strongly weather dependent ⁵⁰". Accordingly, we need a well considered demand management approach to energy supply, with comprehensive plans for each sector, rather than a simplistic 'we must drill or energy prices will go up' approach.

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

⁴⁵ Report cited in An Urgent Case for a Ban on Fracking (2015) p22

⁴⁶ <http://www.afr.com/it-pro/gas-no-longer-easy-in-victoria-20140923-jfybm>

⁴⁷ <http://www.theage.com.au/business/citigroup-expects-delays-to-east-coast-gas-projects-as-market-well-supplied-20150707-gi6cnk>

⁴⁸ <http://www.heraldsun.com.au/business/fracking-will-not-keep-local-gas-prices-from-rising/story-fni0dcne-1226755357248>

⁴⁹ <http://onshoregas.vic.gov.au/victorias-energy-supply/gas-in-victoria/demand-for-gas-in-victoria>

⁵⁰ <http://www.apa.com.au/our-business/energy-infrastructure/victoria.aspx>

remember that UCG is a fossil fuel. Methane is a very potent greenhouse gas, and although it is short-lived in the atmosphere relative to carbon dioxide, it is approximately 25 times more powerful over a 100 year timescale⁵¹. So leakage of methane directly into the atmosphere isn't a good idea if we want to keep greenhouse gas emissions down. The widespread burning of fossil fuels is 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 burned⁵². 2°C of overall warming is generally seen as being 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.

A starting point is to rule out use of gas in commercial energy production. As noted by the Victorian Energy and Earth Resources Department,⁵³ "natural gas is being (increasingly) used in electricity generation as an alternative to coal. Victoria currently has five gas fired stations, with two proposed plants under construction (Mortlake and Orford)". Victoria has excellent renewable energy resources. A Victorian Renewable Energy Target (VRET) with a meaningful target will help drive investment in renewables. Gas is no longer needed to meet either baseload or peak demand.

A second point of intervention must be for state government to assess where gas is currently used in domestic, commercial and manufacturing, and identify options to reduce gas use in each sector.

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

Some argue for the development of UCG resources as 'bridging' fuels as we transition towards non fossil fuel energy sources. This argument is flawed on several fronts. Firstly, if states and companies invest in a particular sector, there is then an economic imperative to gain as much commercial return as possible from the infrastructure that has been developed. This would mean that opening the state to UCG production would lock us into continued reliance on gas, albeit a dirtier form than the current LNG. The current Victorian government has had the good sense to cancel the 2015/16 budget allocation for the Energy for the Regions program, which invests in the roll out natural gas pipelines to regional centres. It should also use common sense and ensure that in terms of future energy sources we invest in the energy of the 21st century – renewables – rather than propping up a dirty source from the 19th and 20th centuries. Secondly, renewable energy is ready to deploy and is certainly commercially superior to new UCG production in terms of energy supply. Wind power is already cheaper than either coal or gas-fired power on the Australian electricity market, significantly so at \$80 per megawatt hour, compared to a

51 http://www.ipcc.ch/publications_and_data/ar4/wg1/en/tssts-2-5.html

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

53 <http://www.energyandresources.vic.gov.au/earth-resources/victorias-earth-resources/petroleum/gas-market>

coal-power price of more than \$140⁵⁴. In terms of household reliance on LNG, providing support for energy efficiency measures and efficient cooking, heating and cooling appliances are far superior ways of reducing our need for gas. Energy efficiency programs will also be job rich when compared with UCG production.

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 energy⁵⁵. Gas prices in Queensland are already going up because of the drive to an export orientated market⁵⁶ and Victoria's connection with the Eastern Australia Gas Infrastructure links us to these prices. As noted recently by analysts from Citigroup, despite "ample supplies" of gas, "customers will not see any relief on prices". Citi said, "wholesale prices will rise substantially from historical levels of \$3-\$4 a gigajoule. With most of the cheaper gas resources quarantined for LNG projects or legacy domgas contracts, prices of >\$5-\$8 a gigajoule are required to incentivise development of the next tier of gas resources". So, rising prices are not due to shortages in supply, rather they are caused by government policy and the 'need' to 'incentivise' future gas development⁵⁷.

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;

From the negative examples of UCG drilling elsewhere in Australia and around the world, we 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 include:

Outright Fracking Bans

USA

⁵⁴ <http://www.theage.com.au/comment/wind-power-tony-abbott-wind-farms-20150620-ghqzbj>

⁵⁵ http://www.aie.org.au/AIE/Documents/MEL140625_Richard_Lewis_Jacobs.pdf (p 10)

⁵⁶ http://www.aie.org.au/AIE/Documents/MEL140625_Richard_Lewis_Jacobs.pdf (p 18)

⁵⁷ <http://www.theage.com.au/business/citigroup-expects-delays-to-east-coast-gas-projects-as-market-well-supplied-20150707-gi6cnk>

- **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://hawaii.tribune-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>

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 14^h 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** – 30^h 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_pr_ohibe_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 Brunswick election of September 2014. Many commentators [stated](#) that the election a referendum on shale gas extraction.

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>

Given the fact that many problems associated with this industry can be expected to appear years after drilling operations have started, the only rational recommendation from this committee will be for a long term moratorium or ban.

This industry is not supported in regional Victoria. There are more than 60 regional communities that have already declared themselves coal and/or gasfield free, with an average of 95% support for the declarations. This industry does not have social license to operate. If allowed to proceed, it will face determined resistance every step of the way from affected communities. The government and all political parties should respect the right of communities to say No.

Some in government argue that it is not appropriate to place an outright ban on a whole sector like UCG. Yet this is exactly what we have done in the case of uranium (and the state has a ban on both exploration and mining). There is no reason why we can't do the same with unconventional gas.

(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.

Please see section 5 above.