

**To Premier Daniel Andrews and
The Standing Committee on Environment and Planning**

Submission to Parliamentary Inquiry into Unconventional Gas

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I am a resident of [REDACTED] in Melbourne, a support worker in a homeless men's shelter, devotee of good food and beautiful places in Victoria and an undergraduate student of biology. I have serious concerns about the detrimental repercussions of unconventional gas mining on Victoria's farming, tourism, and hospitality industries, the damage it would do to our unique flora, fauna, and clean water and food security. As a long-term employee in the welfare sector I am also apprehensive for the job security of rural workers and the emotional outcomes that loss of both arable land and lasting employment would have in a sector where there is already a high rate of suicide.¹

I have visited areas of East Gippsland and Western Victoria that are currently under licence for unconventional gas extraction and am horrified such an unsightly, toxic industry is being considered for some of our most beautiful, productive areas. It would be reckless to compromise our food security when global warming threatens food production worldwide, and truly irresponsible to risk our clean water when world water shortage is imminent.²

Only a total, and permanent ban on all unconventional gas-mining activities will protect the people, jobs, water, food, flora and fauna of Victoria.

Terms of Reference:

(1) The prospectivity of Victoria's geology for commercial sources of onshore unconventional gas:

This is not an area I feel I am qualified to comment on, however, I am acutely aware that large deposits of the fuels we are currently digging and drilling for are the results of the last few mass extinctions, and are running the risk of fuelling the next "great dying" through climate change. Any consideration of "prospectivity" must take into account the implications of extracting the products of past extinctions in order to fuel the next.

¹ <http://www.tandfonline.com/doi/abs/10.1080/j.1440-1614.2006.01776.x#.VZfEKROqpBc>

² <http://www.theglobeandmail.com/news/world/water-crisis-coming-in-15-years-unless-the-world-acts-now-un-urges/article23551722/>

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

Each of the above issues deserve lengthy consideration, and I will deal with them individually though briefly:

- **Environmental Risks:** The process of exploration, preparation and extraction cause considerable habitat fragmentation in the laying down of roads and well pads. Habitat fragmentation can break up corridors of land through which species move, and endanger them by preventing access to food and breeding partners. The reduction in numbers of species diminishes gene pools, resulting in greater vulnerability to illness.³

Many species are extremely sensitive to changes in their environment. Continuous lighting,⁴ and noise may drive useful genera, such as insect eating birds away from farmlands⁵ and deplete their numbers. Loss of any single species from an area can have far-reaching and unpredictable effects on many others, resulting in a trophic cascade.⁶

The risk of contamination of water is also a risk to aquatic species⁷, whose sensitivity may be even greater than that of many mammals, due to their restricted range. Accidental spills may kill significant numbers of animals in affected areas. The water used in hydraulic fracturing may also flush contaminants to the surface, including radioactive materials hazardous to animal, plant and human life.⁸ This was the case in the Pillaga State Forest spill from June 2011 to April 2012. The contamination of one area resulted in elevated levels of ions, metals and hydrocarbons, increased alkalinity and salinity in water and elevated salinity in soils and water at the site of the spill.⁹ Trace element levels were found to be “up to 171 times naturally occurring levels for metals such as Zinc and numerous others including Lead, Arsenic and Chromium.”¹⁰

³ <http://www.devilark.com.au/dftd>

⁴ http://news.nationalgeographic.com/news/2003/04/0417_030417_tvlightpollution.html

⁵ <http://www.bioone.org/doi/abs/10.1525/om.2012.74.1.6>

⁶ <http://www.esajournals.org/doi/abs/10.1890/04-1269>

⁷ http://switchboard.nrdc.org/blogs/amall/fish_and_wildlife_entire_popul.html

⁸ <http://www.theoec.org/publications/radioactive-shale-gas-fracking-wastes>

⁹ http://www.stoppilligacoalseamgas.com.au/wp-content/uploads/2011/12/The_Truth_Spills_Out_Final_May_2012_without_appendices.pdf

¹⁰ [ibid](#)

The use of water in gigalitres may result in lowering of the water table, creating a shortage of water for plant growth and animal use.¹¹ The consumption of water upstream, potentially impacting downstream supply, is particularly problematic during times of drought, and is inadvisable while facing worldwide water shortage.¹²

Gas is often promoted by industry as a less carbon intensive form of energy than coal, but this volatile fossil fuel has been found to leak into the atmosphere during extraction, storage, transport and consumption.¹³ Gas may be proven to have a more profound greenhouse effect than many other fossil fuels.

- **Land productivity:** The loss of land area due to gas extraction infrastructure, including roads, well pads and evaporation ponds, will reduce the amount of land available for farming. The lighting and noise that are part of the 24/7 process of gas extraction are likely to disturb livestock and frighten away insectivorous birds useful to grain and vegetable farming.

The constant movement of trucks to and from well pads increases the chance of exposure to pathogens such as the potato cyst nematode and grapevine phylloxera.¹⁴ These destructive parasites can be transmitted in soil and require strict biosecurity procedures in order to isolate vulnerable crops or affected areas.

Soil health is an essential element of agricultural productivity, and the introduction of toxic chemicals, such as those used in unconventional gas extraction, can damage arbuscular mycorrhizae essential to the health of trees and of many food crops. Studies have demonstrated that remediation may be lengthy and difficult once such damage has occurred.¹⁵

The process of pumping water underground, then extracting it, flushes out toxic chemicals, heavy metals and salts. Victorian soils already suffer from a widespread salinisation problem and damaging further areas of fertile land would reduce the area available for farming.

¹¹<http://www.wildlifetourism.org.au/discussions/conservation-of-wildlife-and-habitats/coal-seam-gas-and-australian-wildlife/>

¹²<https://www.climatecouncil.org.au/droughtreport2015>

¹³http://www.edcnet.org/learn/current_cases/fracking/Duke_Methane_Study.pdf

http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/docs/Marcellus_NE_01-12-11.pdf

¹⁴<http://www.depi.vic.gov.au/agriculture-and-food/horticulture/wine-and-grapes/viticulture-biosecurity/viticulture-biosecurity-grape-phylloxera>

¹⁵<http://www.sciencedirect.com/science/article/pii/S092913939800153X>

Although Methane is not toxic in itself, the possibility of pushing oxygen from some areas of soil, destroying aerobic bacteria and other organisms, and creating an anoxic, unproductive soil has not been examined. Such analysis should be undertaken, as anoxic soils are very difficult to remediate especially where toxins such as heavy metal and uranium have been introduced.¹⁶

The area of greatest concern to farming is the contamination of aquifers and loss of water due to the massive volumes used in unconventional gas extraction processes.¹⁷ Contamination has already occurred in Australia¹⁸ at the Santos coal seam gas project in the Pilliga Forest, NSW.

- Public health risks:** The risks to human health are numerous and far reaching. Airborne pollutants are the most likely to affect human health. A study by the Southwest Pennsylvania Environmental Health Project found high incidence of skin rashes, nausea and vomiting, abdominal pain, breathing difficulties, eye irritation and nosebleeds among families living in the vicinity of unconventional gas drilling sites.¹⁹ There were also cases of respiratory and neurological ailments. Higher rates of cancer and other health conditions have been found among residents living within a mile of shale gas wells in the US. These effects have been attributed to airborne pollution associated with the wells, including ethylbenzene, 1,3-butadiene trimethylbenzenes, aliphatic hydrocarbons and xylenes. The stage of well completion, including hydraulic fracturing, and return to the surface of gas and fluids, is most implicated in disease.²⁰

“Over one hundred known or suspected endocrine disrupting chemicals”²¹ are among hundreds of chemicals used in the hydraulic fracturing process. Endocrine disrupting chemicals can cause birth defects; infertility and cancer²² Accidental spills and aquifer leakage due to fracturing and interconnection are therefore a high risk to human health. These chemicals

¹⁶ <http://www.sciencedirect.com/science/article/pii/S1385894711007376>

¹⁷ <http://s3.amazonaws.com/academia.edu.documents/30256385/ntn-csg-report-sep-2011.pdf?AWSAccessKeyId=AKIAI56TQIRTWSMTNPEA&Expires=1436430033&Signature=PHNZr1FUsltOrKaec6doIr4rSvE%3D&response-content-disposition=inline>

¹⁸ <http://dea.org.au/news/article/media-release-doctors-alarmed-by-water-contamination-from-unconventional-ga>

¹⁹ <http://www.environmentalhealthproject.org/wp-content/uploads/2013/09/6.13.13-general.pdf>

²⁰ <http://www.deepdyve.com/lp/elsevier/human-health-risk-assessment-of-air-emissions-from-development-of-OwPeYOHSCu?shortRental=true>

²¹ <http://www.spencerfane.com/University-of-Missouri-Columbia-Study-Links-Endocrine-System-Health-Effects-to-Fracking-01-16-2014>

²² <http://medicine.missouri.edu/news/0214.php>

have been found to have effects at low concentrations and can be linked to developmental impairment and disease in adults.²³ Studies of ground water near hydraulic fracturing drilling sites have found higher levels of hormone-disrupting chemical activity than in areas without drilling.²⁴

Heavy metals and gases have been found in drinking water by the EPA in Wyoming and by others investigating at differing well sites in the US. The study in Endocrinology concludes, “ There is the potential for surface and groundwater contamination throughout the entire extraction process.”²⁵ There has not been sufficient time in Australia to examine long term effects of chemical exposure, nor sufficient time anywhere to examine intergenerational outcomes.

- **Risk mitigations:** Baseline studies, and consistent environmental monitoring will not prevent habitat loss, fugitive emissions, greenhouse gas production or light and noise pollution. In the case of spills where heavy metals, toxic chemicals or radioactive contamination is involved, remediation is difficult and slow, if at all possible. In the interim, the land is unsuitable for use or occupation. Baseline studies and environmental monitoring will not necessarily prevent accidents; merely allow us to accurately measure their impact.
- **Residual Risks:** Besides areas already covered above, in environmental impacts, residual risks would include the possibility of increased seismic activity²⁶, and unexpected seismic activity, adding to the likelihood of fugitive emissions, contamination of aquifers and chemical leaks resulting in soil contamination, elevated global warming and health risks.

Accidental spills occurring despite monitoring would result in the risks outlined above compromising the health of local biota and causing loss of livelihoods for local communities. Casing failure would have similar outcomes, and accidental loss of fracking fluids during transport to and from wells may also be residual risks. Flooding could release toxins and salts into the water and bushfires could be exacerbated by the presence of highly flammable methane.

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

- **Agricultural production and domestic and export market requirements:** The process of unconventional gas extraction has been found to cause illness and death in domestic animals.²⁷ Spills, accidental exposure and proximity to wastewater have been linked with stillbirths and breeding difficulties.

²³ [ibid](#)

²⁴ [ibid](#)

²⁵ [ibid](#)

²⁶ <http://www.sciencemag.org/content/348/6240/1204.short?rss=1&ssource=mfr>

²⁷ http://psehealthyenergy.org/data/Bamberger_Oswald_NS22_in_press.pdf

“Communities living near hydrocarbon gas drilling operations have become de facto laboratories for the study of environmental toxicology.”²⁸ The cited study found effects of domestic animal exposure and proximity to wastewater resulted in symptoms affecting “body condition, reproduction, milk production growth, neurology, urology, gastrointestinal, dermatological, musculoskeletal, and upper respiratory systems, and cases of burning of eyes, headache, and sudden death. The rate of loss in these cases would make dairy and meat farms unviable, as they would severely reduce profit margins.

Unconventional gas extraction would expose Victoria’s meat and dairy industries to contamination unacceptable to the stringent requirements of export markets. Products from South Gippsland are currently finding a very receptive market in China, but this market could easily be lost if cases of contamination were found. China’s requirements are understandably exacting.²⁹ This is a large market we don’t want Victorian farmers to lose, and only one of many examples of produce and markets that would be jeopardized if unconventional gas extraction commenced. Organic products would be greatly at risk and the Melbourne based fresh food and hospitality industries would lose both sources and reputation.

- **The legal rights of property owners:** I hope that the Victorian government would consider community desires to keep their land and towns free of gasfields. Their wishes have been made manifest through 62 Victorian communities declaring themselves “gasfield free”, with over 95% of the population in support of the declaration in the majority of cases. As property owners have made their objections clear government and mining companies may be liable, in cases of financial loss and health failure linked to unwanted gas extraction in declared areas.

It is clear that there is no social licence to explore for or extract natural gas in any of these communities. It may also be in breach of articles 12 and 17 of the Universal Declaration of Human Rights, as a form of arbitrary interference with home or property.

- **The impact on property values:** Loss of property value has been documented in Tara³⁰ and Chinchilla³¹ and in many parts of the United States where onshore gas extraction is occurring, and is especially prevalent in areas where bore water is used.³²

²⁸ [ibid](#)

²⁹ <http://www.austrade.gov.au/export/export-markets/countries/china/industries/Food-and-beverage#.VZ05zZOqpBc>

³⁰ <http://www.dailyexaminer.com.au/news/csg-to-cut-property-values/1644228/>

³¹ <https://www.dnrm.qld.gov.au/our-department/news/article/2015/march/2015-statutory-land-valuations/annual-valuations-released-for-western-downs-regional-council-area>

³² <http://www.resource-media.org/drilling-vs-the-american-dream-fracking-impacts-on-property-rights-and-home-values/#.VZ1FcZOqpBd>

- **Any implications for local and regional development, investment and jobs:** Rural industries supply income for generations of farmers, whereas gasfields produce unworkable land for short-term gain. Property prices in proximity to gasfields have dropped in Tara and Chinchilla, leaving residents in the difficult position of staying in a ruined landscape and facing health risks, or leaving with insufficient funds to set up elsewhere.

Loss of jobs in farming would be linked with losses in hospitality and tourism, resulting in overall decreases in work opportunities in rural areas. The mining industry has grossly overstated employment opportunities.³³

As “the prices of the four biggest resource exports – gas, coal, iron ore and copper – plunge”³⁴ there will be concomitant losses in jobs. Conversely, if the unconventional gas industry is banned, work in farming and food industries is set to increase as export demand increases.³⁵ Expansion of the renewable energy sector is also likely to “yield more jobs” than any fossil fuel industry.³⁶

(4) The ability of potential onshore unconventional gas resources contributing to the State’s overall energy sources including:

- **An ability to provide a competitive source of energy and non-energy inputs for Victorian industries; an affordable energy source for domestic consumers:** It is already evident that unconventional gas extraction has increased the price of gas for domestic consumers in manufacturing and households.³⁷ The expansion of the market and resulting export parity has lifted prices for Victorians. Any who are aware of the enormous Bass Strait natural gas resources, estimated to hold sufficient for domestic supply for the next thirty years, would be dismayed at the price increases due to this unnecessary and costly expansion.³⁸
- **Carbon dioxide emissions from these sources:** Methane is at least twenty times more potent a greenhouse gas than carbon dioxide, and fugitive emissions of methane³⁹ from wells⁴⁰ have proven to be a

³³ [Downloads/Gas%20Fact%20sheet%20FINAL%20\(3\).pdf](#) The Australian Institute

³⁴ <http://www.smh.com.au/business/the-economy/why-everything-you-think-about-the-economy-in-2015-is-probably-wrong-20150116-12iouc.html>

³⁵ <http://www.austrade.gov.au/export/export-markets/countries/china/industries/Food-and-beverage#.VZ3k1pOqpB>

³⁶ <http://cleantechnica.com/2015/06/23/investment-renewable-energy-yields-jobs-fossil-fuel-sector/>

³⁷ <http://www.abc.net.au/news/2015-03-26/gas-price-supply-crisis/6349436>

³⁸ <http://www.energyandresources.vic.gov.au/about-us/publications/Gas-Market-Taskforce-report-p.18>

³⁹ <http://www.edcnet.org/learn/current-cases/fracking/Duke-Methane-Study.pdf>

⁴⁰ http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/docs/Marcellus_NE_01-12-11.pdf

problem in the US, resulting in one case, in the estimated equivalent of emissions from one to three million cars.⁴¹ One study highlights the underestimation of the GHG emissions from unconventional gas extraction, transport and use, stating that the methane emissions from natural gas wells have a greater impact on climate change than coal or oil.⁴²

(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:

Before addressing these issues it is important to bear in mind that no amount of regulation can prevent unforeseen accidents, especially in an industry that is comparatively new. Any spills would be extremely difficult to deal with, as research into remediation has not been carried out in the time available. “Without rigorous scientific studies, the gas drilling boom sweeping the world will remain an uncontrolled health experiment on an enormous scale.”⁴³

- **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:**

There are areas of study that have not commenced or produced results to date, and need to be completed prior to any consideration of this issue. These would include studies of soil health, including remediation trials, soil biota surveys prior to and following exposure to methane, and extraction fluids, and studies of biota within varying hypothetical ranges of gasfields.

The risks involved in such an unexamined industry remain too high for any part of the industry to be undertaken in Victoria’s fertile farmlands.

- **Performance standards for managing environmental and health risks, including water quality, air quality, chemical use, waste disposal, land contamination and geotechnical stability:** It is my considered opinion that the only form of risk management suitable for the unconventional gas industry is a total ban.

(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:

⁴¹Potential Health and Environmental Effects of Hydrofracking in the Williston Basin, Montana, Joe Hoffman, Geology and Human Health

⁴²[Howarth RW et al \(2011\). Methane and greenhouse-gas footprint of natural gas from shale formations. Climatic Change Letters. DOI 10.1007/s10584-011-0061-5](#)

⁴³http://psehealthyenergy.org/data/Bamberger_Oswald_NS22_in_press.pdf

- It is difficult to comment on extant reviews that range from those concerning human health, to those supported by industry such as the Gas Market Taskforce report, however ample evidence of the risks inherent to unconventional gas extraction can be found in anecdotal evidence, peer reviewed studies,⁴⁴ university based studies⁴⁵ and medical studies.⁴⁶ The New York State sponsored report⁴⁷ sites lack of evidence to support the process, where there are incidences of harm but no evidence that unconventional gas extraction can be carried out safely. These are also the reservations expressed in “Environmental health impacts of unconventional natural gas development: A review of the current strength of evidence”, AK Werner, S Vink, K Watt, P Jagals - Science of the Total Environment, 2015 - Elsevier⁴⁸

As the reviews not driven by vested interests have not yet concluded that the process is safe it would not be prudent to proceed.

It is also of great concern that the Victorian Government may be considering allowing unconventional gas extraction in this state when the affected communities are in opposition to the process. 62 communities across Gippsland and Western Victoria have declared themselves “Gasfield Free” with the support of over 95% of surveyed residents. Councils across affected areas have voted for total bans on unconventional gas extraction and many states and countries world-wide have implemented total bans on all unconventional gas mining including: New York, several Californian Counties, Hawaii, Vermont and towns in Texas and New Jersey, New Brunswick in Canada, Wales, Northern Ireland, France, Bulgaria, and areas of Italy, Spain, Austria and New Zealand.

I believe that the current Victorian government has the best interests of its constituents at heart and will serve in a manner that will protect us and future generations. I am therefore calling on you to protect the welfare, health and jobs of the citizens of Victoria, the Victorian environment, flora and fauna, our water, food and land, and place a total, unconditional ban on the exploration and mining for unconventional gas.

44 http://psehealthyenergy.org/data/Bamberger_Oswald_NS22_in_press.pdf

45 http://serc.carleton.edu/NAGTWorkshops/health/case_studies/hydrofracking_w.html

46 <https://www.deepdyve.com/lp/elsevier/human-health-risk-assessment-of-air-emissions-from-development-of-OwPeYOHSCu?shortRental=true>

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

48 <http://www.sciencedirect.com/science/article/pii/S0048969714015290>