Name: Adele van Rosmalen
[redacted]

I thank the Environmental and Planning Committee of the Legislative Council of the Parliament of Victoria for this opportunity to contribute to the inquiry into unconventional gas in Victoria.

Currently I am a registered school teacher doing some CRT work but predominantly a stay-at-home mother of three young children aged 3, 5 and 9 years. My partner and I run a small business including a block of modest owner-operated holiday flats in Metung. I am involved in a range of community groups including a committee member of Friends of the Gippsland Lakes Parks and Reserves and a founding member of Frac Free East Gippsland.

I had children late in life and the decision to do so plagued me with each. Our world is changing so rapidly and many of the freedoms that we've enjoyed throughout our lives may not be available to our children or theirs. Such things as access to clean air, water, earth and food have always been considered basic human rights and yet we're watching them become increasingly poisoned, privatised and a socio-economic privilege. The implications of this are enormous and I know industry proponents purport a rational high-ground in regard to "science, not emotion"; but feelings are a part of human nature and it's wrong to discredit those wanting to protect the social and environmental justice that we've known and enjoyed.

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

I see this as a moot point. Our government has a social and moral responsibility to use conventional gas reserves as we transition to clean, renewable energy sources.

> *Fracking is the deadly enabler that keeps the whole fossil fuel party going far past the time of its curfew*[i]

We should not be exporting fossil fuels when they can be avoided as an energy source and when we know[ii] [iii] that they cause significant harm. Access to clean energy sources should not be a privilege of the wealthy while the poor live are forced to live with dirty energy sources. As a resource-exporting nation we have a responsibility not to perpetuate this environmental injustice but to be assist third-world countries transition away from their reliance on fossil-fuels.

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

Environmental risks:

The environmental risks extend to water contamination; air pollution; noise pollution; light pollution; wildlife and biodiversity; methane migration; fugitive emissions; fluid migration; climate change; fracking waste; radioactive releases and contamination; depletion of clean water; earthquakes and seismicity; industrialisation; blow-outs, spills and explosions; inherent engineering problems that worsen over time including leaking wells; abandoned and undocumented wells; and flood risks.[iv] [v]

New studies are raising the possibility of methane migration into aquifers through unseen cracks and fissures that no cementing or casing protocols, no matter how strictly applied, can prevent.[vi] [vii] Other new findings are showing how unmapped, long-abandoned wells can become re-pressurised during nearby operations and serve as a conduit for the contamination of drinking water.[viii]

Land productivity risks:

Land productivity is significantly reduced as a result of infrastructure that causes extensive patterns of disturbance on the landscape including roads, pipelines, well sites, substations, low point drains, high point vents, and perpetual traffic, noise and light. This all has to be negotiated by grain and vegetable growers who plant in straight rows.[ix] [x]

Productivity is also put at risk from contamination as a result of "land farming" operations or even the *threat* of contamination.

> *Fonterra New Zealand has told Taranaki dairy farmers it won't take milk from any new farms in the area, due to the cost of testing for contamination.*[xi]

Landholders have chemical use/exposure requirements for certification of their product that can result in buyers cancelling supply contracts. However it's unclear as to who is responsible for contamination of livestock feed and water that result from unconventional gas mining operations.[xii]

Earlier this year, contamination from Linc Energy's decommissioned coal gasification plant resulted in a 320km^2 exclusion zone at Hopeland where oats, corn, mung beans, watermelon, rockmelon, cotton and grain for stock feed are grown.[xiii] [xiv]

Other issues include livestock mortality, infertility and animal stillbirths.[xv]

Public health risks:

The health effects of unconventional gas mining vary depending on the type and pattern of human exposure but include increased risks of cancer; respiratory disease; nose, throat and eye irritations; neurological problems; and birth defects.[xvi] Air, water and soil pollution create a complex mix of persistent, bio-accumulative, toxic, carcinogenic, mutagenic, teratogenic, and endocrine disrupting substances, some which can seriously injure human health even in minute quantities . A review of the chemicals used in shale gas fracking found that 75% could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; 40-50% could affect the brain/nervous system, immune and cardiovascular systems, and the kidneys; and 37% could affect the endocrine system; and 25% could cause cancer and mutations. Documented indicators include increased rates of hospitalization, ambulance calls, emergency room visits, self-reported respiratory and skin problems, motor vehicle fatalities, trauma, drug abuse, infant mortality, congenital heart defects, and low birth weight.[xvii] Although the precise level of risk to human health is indeterminate, proof of public health risks are starting to emerge. While some health issues are immediately obvious, many only manifest over time and it's not easy to prove causation due to the complexities of multiple exposure pathways, multiple possible chemical toxicants, multiple sources of contamination, and changes in toxicant concentration over time.

Last year a family in Texas were awarded $2.9 million as a result exposure from contaminated groundwater, solid toxic waste and airborne chemicals that they contend caused years of sickness, killed pets and livestock, and forced them out of their home for months. Their health problems started in 2008 after "a multitude" of drilling operations popped up near their ranch however they didn't initially make the association and it wasn't until blood tests showed the presence of fracking fluid chemicals that they fully realised the cause of their problems. Aruba Petroleum then unsuccessfully appealed the jury's decision claiming the family could not prove the emissions that made them sick came from their wells. Although not the first lawsuit against an energy company for damages related to fracking in the U.S., this case marked an important precedent as the first jury award for personal injury. Cases are usually dismissed or settled out-of-court, some with strict confidentiality agreements in place such as one 2013 settlement that barred two young children from talking about fracking for their entire lives. [xviii] [xix] [xx] [xxi] [xxii] [xxiii] [xxiv]

'List of the Harmed'[xxv] is an ever-expanding list that began as a web blog project in Pennsylvania nearly ten years ago to catalogue verifiable reports of harmful results connected to shale gas exploration. It now lists over 16,000 affected residents from all over America (some entries represent multiple people) with each entry cataloguing the location, type of facility, any toxic exposure or event and the resulting symptoms, with further links and more detailed information.

> *From polluted water to dead farm animals, from rashes and rare illnesses, to explosions, fatalities, accidents, spillages and breaches of law, the evidence piles higher and higher, that everywhere fracking occurs, ordinary people suffer.*[xxvi]

The health hazards are substantial and no assurance can be given that Australia's regulatory system is adequately robust to protect human health. This alone should be clear grounds for adopting the precautionary principle and either extending the moratorium or completely banning the process.

Social Risks:

I have added to these TOR this often overlooked issue of social and environmental justice. The health burdens, pollution, resource depletion, and risks from unconventional gas mining will be borne by us, the rural communities that are covered by exploration licences. In the meantime, the decision making is ultimately made by our governments to whom the financial benefits also accrue (through royalties); with financial benefits also going to the predominantly foreign owners of the resources.

Those at heightened risk include workers; the elderly, who may be more vulnerable; children, who would likely shoulder much of the health burden; and to rural, agricultural and indigenous communities, where gas extraction occurs. The use of fly-in, fly-out and drive-in, drive-out workforces, regularly used in Australian gasfield developments, have come under scrutiny for their negative influence on community cohesion. Such workforces increase the cost of living in rural communities and are associated with high levels of alcohol and drug use, mental health issues and violence. In the USA there is also evidence that sexually transmitted infections have increased in local communities with oil and gas development.[xxvii] At Victoria's desalination plant, a secret report revealed bikie gangs ran drugs and prostitutes for workers.[xxviii]

> *Fly-in, fly-out (FIFO) mining is killing towns in central Queensland and tearing families apart, a state parliamentary inquiry has been told.*
>
> *Stories of marriage breakdowns and struggling businesses in once-thriving towns feature heavily in submissions to the Palaszczuk government's parliamentary inquiry into the impact of 100 per cent FIFO practices on regional communities.*[xxix]

Please indulge my digression. I was born and bred in Traralgon before which my parents had lived at Yallourn where they'd both worked for the SEC. Similarly I had grandparents, uncles, aunties, cousins and brothers who all worked for the SEC. I, too, completed my work experience at the SEC and in more recent years (since privatisation in 1995) worked for a major contractor at the Latrobe Valley mines. Prior to 1995, brown coal mining was an integral part of the local community and our state's economy; tens of thousands of local residents were employed by the SEC; hundreds of apprenticeships were offered; the SEC was a world leader in OH&S and occupational training. There were social club events,

picnics, late night shopping, a flourishing economy and Victoria had the lowest electricity tariffs in the world. After the Kennett Government privatised the SEC and sold our state's assets, the Gippsland region went from being the highest employment area to the highest unemployment area; the economy collapsed; depression, drug abuse, domestic violence and sexual assault increased; profits now go off-shore; electricity prices have grown exponentially; the electricity market is now so complex for consumers; complaints to the Electricity Ombudsman have risen significantly; our electricity assets are now owned by overseas governments; our high cost of electricity is subsidising the low costs of electricity in Singapore and China; SP Ausnet made a $255m profit in 2012 and very little of this is being reinvested back into Victoria; we've lost the control of our economy because private enterprises set the tariff rate for householders and industry; we've gone from preventative maintenance to reactive maintenance; emergency blackouts are getting longer since privatisation; high voltage equipment is failing more frequently; in the last 10 years all the distributors have underspent on maintenance by $50m/year; fires are caused by electrical faults and firefighters are put in danger by preventable fires. Twenty years on and the impact of the sale is still impacting.[xxx] There has been no nett benefit to Victoria following privatisation; in fact it cost us millions to stop the massive fire at the Morwell Mine last year after GDF Suez removed the fire suppression equipment and failed to tell authorities.[xxxi]

I'm not suggesting that the SEC was perfect, nor am I advocating fossil fuels as an energy source now that we know and can do better. What I'm trying to illustrate is the importance of social enterprise that benefits whole communities on many and varied of levels; the vulnerability of communities that become reliant on mining; and the need for diverse economies that ensure community renewal.

<u>Risk mitigations:</u>

Theoretically, prevention, reduction or containment of manageable risks could be achieved through:

- A well-implemented integrated management system that meets Australian and international standards
- Robust regulations and adherence to industry best practices (particularly in relation to well design and casing)
- Mandating full disclosure of products and banning substances known to be harmful
- Rigorous training
- Strict oversight
- Monitoring and enforcement procedures
- Governments should also ensure that companies somehow secure enough money (for restoration of land and to mitigate any potential impacts on land and water) in order to avoid "extract and run" practices (where a company declares bankruptcy

after large accidents or simply after the end of UG extraction to save on restoration costs)

Realistically, however, even the most stringent regulations and practices could not completely eliminate breaches because of human error, equipment failure, unknown geological and hydro-geological features, unknown subterranean forces, and the unpredictability of fracture lines. You cannot manage risks when you don't know what the risks are, so even if "done properly", unconventional gas mining may result in unavoidable impacts (just less so than if it's not "done properly").

> *Regulations are simply not capable of preventing harm. That is both because the number of wells and their attendant infrastructure keeps increasing and, more importantly, because some of fracking's many component parts, which include the subterranean geological landscape itself, are simply not controllable.*[xxxii]

Given the complexity and scale of technical issues, and the extensive and expansive infrastructure, effective regulation, monitoring and inspections are impossible. Data from the Colorado Oil and Gas Commission showed that fracking-related chemical spills in Colorado exceed an average rate of one spill per day. Of the 495 chemical spills that occurred in that state over a one-year period of time, nearly a quarter impacted ground or surface water. Sixty-three of the spills spread within 1,500 feet of pigs, sheep and cows, and 225 spread within 1,500 feet of buildings. 234 private drinking water wells in Pennsylvania were contaminated by drilling and fracking operations during the past seven years. These do not include drinking water wells contaminated by spills of fracking wastewater or wells that went dry as a result of nearby drilling and fracking activities.[xxxiii]

<u>Residual risks:</u>

Road infrastructure and networks are built to erect well rigs, processing stations, pipelines and to transport water (to and from), chemicals, and to provide maintenance.

> *Scientists have estimated that an average drilling and hydraulic fracturing operation and its accompanying infrastructure can span at least 30 acres for a single well pad, creating a giant ecological footprint.*[xxxiv]

High volume truck movement increases noise pollution and it fragments habitats. Wide-scale land clearing fragments habitat, which increases road kill, which attracts predatory wildlife, which in turn impacts sensitive bird and wildlife. The disturbance of soil from habitat fragmentation can also create a breeding ground for invasive species.

> *Several recent studies have outlined the serious impacts of habitat fragmentation. One found that habitat fragmentation of forest ecosystems can reduce biodiversity up to 75 percent.*[xxxv]

No set of regulations can prevent these problems but the far-reaching consequences will remain for generations to come. Initiatives such as the appointment of a Threatened Species

Commissioner and a federally funded threatened species program in an efforts to halt biodiversity decline is pointless if we don't ensure good-quality habitat and water resources.

There are an estimated three million abandoned oil and gas wells in the United States; the locations of many are unmapped and unknown. No set of regulations can prevent these problems.[xxxvi]

There is a culture of disrespect for the environment within the Australian mining industry, and enforcement of law only leads to lying and cover-ups. Until our natural assets are truly valued, no set of regulations will prevent these problems.

Testimony of a CSG drill rig worker

I contacted the Gasfield Community Support group after hearing Laurence Springborg saying on the radio that no workers in the CSG industry had become sick, and the air and water tests were good quality.

I started in the industry in 2008, and worked for 3-½ years on a mobile drill rig. Initially I was employed by Mitchell drilling who were taken over by AJ Lucas. With the exception of one well, at all other times Mitchell drilling /AJ Lucas were contracted to Santos. I was employed as the "offsider" initially, graduating to senior drillers assistant.

One of the tasks was mixing chemicals into the mud pits to pump down the drill string. There were different polymers used. They pumped "mud" down the drill string. (Salt water, KCL and polymer JK261, (a lubricant)). On an average lease, if they were not taking losses, you would use an average of 12 tons of KCL and 15 pallets (720 drums /10,800kg of polymer) to keep the viscosity up and lubricate the drill bit. The polymer was mixed in the pits through a hopper. The polymer had to be sprinkled into the hopper and it was blowing in the face, in the eyes; we were constantly breathing it in. This happened for hours at a time. We had masks, with a diaphragm sometimes, otherwise paper.

The masks were also used when mixing the cement for the casing if Halliburton did not come in and we were doing the cement job ourselves.

When drilling down, going through the Permian or Jurassic riverbeds which were very permeable, sometimes the drilling muds would disappear.

They could take huge losses We took core samples when Santos told us to. They took core samples on every drill hole, usually about 600 metres in depth. 80% of the time they got pretty good returns - getting most of the returns back up the drill into the pits. But 20% of the time, especially in Fairview, east of Injune, they couldn't stop the losses.

They could use approximately 20 tons of KCL (semi-trailer loads full) with water. There was 50,000 litres of water in each of three pits. On one rig, in a 12 hour shift we used 27tons of KCL along with 100,000 litres of water and multiple other chemicals.

The next 12 hour shift would then come on and this could go on for days doing exactly the same thing until the losses were stopped. They would use 9.4 heavy - saturation point- lots of KCL, JK261, CR650-polymer. The KCL was to "weigh down" the gas bubble. When they were taking losses they would use 'frac seal fine', composed of silver paper, coarse saw dust, trying to fill the hole, to block it.

They tried to stop the loss by plugging the hole. They would use maybe 10 different chemicals including bentonite, they would keep pumping down, trying to fill the losses. If the muds were going disappearing) gases could be coming in; they had to try and block it off with a different medium, and keep pumping it down the drill string to seal the hole. They tried to weigh down the gas bubble. They were worried about gases coming back in and the risk of explosion; it was a very dangerous time and happened often (maybe 20%of the time).

In the Gunnedah basin south of Coonabarrabin, they drilled a hole and hit the fresh water aquifer.

Fresh water was pouring out of the hole, diluting the salt content. They had to bring trucks in to take the water away; they put the casing in and tried sealing it off with cement on the outside of the drill string.There were problems in the Gunnedah basin because the aquifers were close to the surface, they had to get through the aquifers and keep drilling to get to the coal seam. They got a drill string stuck in one particular hole. They brought in black stuff in a 1000 litre container, called "pipe free". I'm not sure how it worked. I think they pumped it down the drill string to try to free up the soil and recover the expensive equipment from the hole. It stunk to high heaven. It was very smelly, dangerous: we were told not to get any on our skin. It happened in a hole in Fairview; Santos owned the property near Injune.

On every fifth hole or so they got stuck but could get the tool free without major problems apart from patience and time. But if the tool sheared off they fished for the tool or cemented the hole up and moved on a couple metres, cutting their losses and started drilling again. (This happened about three times when I was there but there was only one time they used "pipe free".) It is a big problem for them and expensive if they lose tools down the hole.

Weatherfords did the logging. They used radiation sources. I heard that they had lost tools down the hole, but not at the time I was there.

At times there were problems with the end plug with gas bubbling through the cement, they couldn't stop it. There were bubbles coming up through the water that was sitting over the cement in the cellar. I saw it three or four times.

On Fairview, there were lots of drill holes, it was like a porcupine. Drill holes could be as little as 150 meters apart at times, at other places kilometres apart. There are now a lot of production wells there.

I started getting sick, with nose bleeds on a regular basis in 2011. I had never had a nose bleed in my life before. My work schedule was– out for 18 days, home for 9 with 2 days travelling out of it. (I am an organic farmer, totally self-sufficient and solar powered, and I was trying to set myself-up for older life. I was working out there for the money. I was cautious about saying anything- I had lost a job before for speaking out). I was better when got home on days off; when I went back out, again there was blood dripping from my nose. I had nose bleeds in the shower.

We broke up earlier than expected at the end of 2011 because of wet weather. I was coughing and couldn't clear my chest. I went to the doctor in late November/ early December. He listened to my lungs and sent me for a CXR.

I had a terrible feeling of anxiety and just felt terrible. The anxiety was there all day from the minute I woke up to when I went to bed. I was sent for a CT scan and told I had moderate emphysema. I had only smoked for a couple of years, age 19 and 20, not since. I looked up the internet and seen Dr Roger Allen near the Wesley. I did a test lasting 6 hours and had a lung biopsy. I was told I had inflammation, lung infection, bronchitis. I wanted compensation, adamant that the cause was what I had been using at work. Dr Allen wouldn't commit to what was causing it. I had sickness benefit for a couple of months - I was off for a couple of months then they told me I was fit to work. I wouldn't go back to mixing chemicals; they told me there was nothing else for me - got nothing for me. They wiped their hands of me.

Now I am back on the farm. I am not coughing as much. I still haven't 100% capacity in my lungs. I have cough and phlegm and loss of lung function. When I was working on the rigs I would have spasm of my hands. I would grab a set of stilsons to do up a drill joint, when trying to let go I couldn't open my hand. I had to use the other hand to open the knuckles back up.

There was lead based grease, real thick grease, used on the drill joints, also a zinc based grease called ZN50. The young fellows I was working with here getting it all over themselves. It is carcinogenic.

They were using 20kg buckets in a 10 day period.The other driller, age 27, had bad skin. It looked like dermatitis. He had red skin around his eyes and hairline. It would look better each time he came back from break. We lost contact.

A lot of people are out of work, with a downturn in the industry. It was a 24 hour rig, 12 hour shift, 4 on crew, driller, and senior offsider, 2 junior offsiders.There was always a crew on break. Apart from the people you work with you don't know other people.

There were big camps. We lived in camps or hotel accommodation, up to 80% of the time in camps.

People complained about the water at times. The truck just didn't look hygienic. The water was next to the septic tank which overflowed several times. People were getting stomach bugs. I am unsure if the drinking water was bore water.

Santos took the drinking water away a couple of times because of complaints.

The water in the mud pits was recycled to the next lease for drilling. The drill cuttings went back into the pits. When in the Gunnedah basin they started lining the pits with big plastic liners. They didn't tend to line them in Queensland. There were hundreds of tons of cuttings. It was a problem. I'm not sure what happened to the pits, or the plastic or the cuttings.

When we were out there, if there was 4 inches of rain the salt water in the pits started flowing over.

If they knew the rain was coming, they would try and pump the mud out and dump it somewhere else like in new pits Santos planted fodder trees, not Australian natives. I think they planted them to get rid of coal seam gas water by using it for irrigation. There were maybe 10,000acres that Santos planted. That then became a problem. Now seeds have washed out and are growing on the sides of the road, in waterways. They have become a pest now.

The industry took off very quickly; it went from a controlled Australian industry with a few different Australian companies and rigs, to overnight rigs coming in from Canada, Mexico, everywhere.

Whatever controls they went through in the past seemed to have disappeared over night.

When I worked in the Gunnedah basin, there was lots of protest by the locals, and road blocks to go through. There were also open cut coal mines being licenced to overseas buyers (particularly the Chinese) who were buying the land up. The farmers didn't like it. Because of the protest our image had to be squeaky clean and there was a lot more control on the industry than in Queensland. Problems with farmers were not such a problem in Western Queensland. There was an occasional well on their property, maybe up to 10 wells on big properties. Santos was building a big airport. I didn't see any protest by farmers in Queensland. It was not a problem on big properties. Santos and Origin own some big properties.

Arcadia Valley, north of Injune is a magic pristine country of big aboriginal significance. It is a rift valley, with a huge escarpment and caves. It shouldn't have been touched, it should be heritage listed.

AJ Lucas had one rig in the Arcadia valley and disturbed sacred aboriginal sites. There were maybe six holes. There was no more or no less care than in Fairview. I think it was a shame. The wastage was immense. In a 12 hour shift 2000 litres of diesel was used just for an exploration rig. (For the production rig to get the gas out of the ground, the fuel usage would be astronomical.) In addition to the drilling there were air conditioners and generators running all the time. There were 100's of rigs in the area. There were diesel spills and leaks.

Other waste, Industrial bins full of plastic drums were emptied twice a week; there was a huge amount of food wasted.[xxxvii]

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

East Gippsland's custom industries are agriculture and tourism & hospitality, both for which a fundamental requirement is clean, healthy land and water. As discussed in previous sections of this submission, industrialisation of the land as well as contamination from unconventional gas mining operations through pathways of air, soil and water indicate and inability for coexistence in areas of agriculture and food production.

Water levels in the Latrobe Aquifer, Gippsland Basin, have been falling for a few decades due to extraction rates (120,000ML/yr in 2000) far exceeding ground water recharge rates

(estimated at 80,000ML/yr in 2000 and assuming no discharge to the continental shelf due to reversal of aquifer pressures due to extraction).[xxxviii] This is already impacting irrigators:

> *Impacts noted included loss of artesian conditions, increased pumping durations and the need to lower pumps in bores. Some 62 bores in the Latrobe Aquifer Group were identified at risk, with an associated* potential *cost of $10M to redress. SKM (2003) revised this estimate as between $3.8M and $5.3M (present value) over the next 30 years.*[xxxix]

Offshore oil and gas production makes up the majority of the total extraction with significant contribution resulting from the dewatering of the coal mines in the Latrobe Valley. Agriculture and other industrial purposes use only a small part of the total water extraction.[xl] Unconventional gas mining, which is an extremely water-intensive practice, would only further increase the competition for water usage. Every tight gas well is hydraulically fractured, sometimes multiple times, and according to gas industry figures, each time they are fracked they use about 11 million of litres of water.[xli]

A gaping omission in the recent 'Report on community and stakeholder attitudes to onshore natural gas in Victoria'[xlii] was the exclusion of the tourism industry as a key stakeholder. The impact of falling water levels in the Latrobe Aquifer include:

> *Land subsidence, leading to coastal erosion, inundation, water logging and onshore salination. Localised subsidence is measured and well documented in the vicinity of the Latrobe Valley mining operations. The Gippsland coast is considered to be particularly vulnerable to any subsidence, since the Gippsland Lakes are only separated from the ocean by a narrow, low sand barrier.*[xliii]

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

We can't afford to compromise our agricultural quality.

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

Of course property owners should have the right to deny access to mining companies. However water, air, noise and light don't recognise boundaries and to that extent unconventional gas mining should never occur anywhere.

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

While some people and businesses in the community will benefit from an unconventional gas mining industry, it will mostly be during the construction phase and nowhere near to the extent that the industry purports.

(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;

Renewable energy should be our focus for competitive sources of energy input.

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

I fully support a domestic gas reservation policy from our conventional gas supplies. It's ludicrous that we don't have one. A dairy farmer doesn't buy his milk from the supermarket, nor should we purchase our own gas from an overseas market.

(c) carbon dioxide emissions from these sources;

Although difficult to measure, there is an ever-growing body of evidence showing worrying results of carbon dioxide emissions from gas mining. Most recently, twelve research teams took measurements over an area that included 30,000 oil and gas wells, 275 compressor stations and 40 processing plants in the Texas fracking region that showed methane emissions to be 50% higher than EPA estimates.[xliv]

(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

Further scientific evidence before any activity is approved should be the bare minimum recommended outcome of this inquiry.

(b) performance standards for managing environmental and health risks, including water quality, air quality, chemical use, waste disposal, land contamination and geotechnical stability;

No activity should occur until thorough baseline testing has been completed. Full disclosure of chemicals should be enforced. Audits of off-shore wells for integrity should be conducted so that the onus to prove safety is placed upon the industry.

(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 look at the *Concerned Health Professionals of NY's Compendium of Scientific, Medical, and Media Findings Demonstrating the Risks and Harms of Fracking (Unconventional Gas and Oil Extraction)*.[xlv]

In regard to the 'Report on community and stakeholder attitudes to onshore natural gas in Victoria'[xlvi], although it presented a comprehensive précis of issues based on the qualitative study, and it reflected the public's position based on the quantitative study, it was deceptive by not presenting a more detailed reflection of the qualitative study (which was the more substantial aspect of the process). At times it uses persuasive language (the *do not support* cohort 'feel' and 'perceive' issues on the same topics that the *support* cohort are credited with matters-of-fact), and it was particularly disappointing not to see the tourism industry included as a significant interest group, especially considering how much our region depends on it.

The Queensland government recently conducted an inquiry into the impact of fly-in, fly-out workforces.

In conclusion, I again thank the Environmental and Planning Committee of the Legislative Council of the Parliament of Victoria for this opportunity to contribute to the inquiry into unconventional gas in Victoria.

There is so much more I wanted to write but I'm weary and unfortunately I have run out of time to elaborate on many of the above topics. My children were sick last week and I have been this week just gone and I was still up at 4am trying to finish this submission but it's a big ask to expect ordinary citizens to shift their lives over to fighting these hugely powerful vested interests. I have spent much of my personal and family time learning and raising awareness about unconventional gas mining over the last two years and I trust my efforts have not been in vain. Thank you for considering my submission.

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