

Sunday 21 May 2017

### **Please accept my submission to the Narrabri Gas Project**

I am working in agricultural research with a keen interest in ecological agricultural systems. I have been living in Victoria since 1996 actively participating in many different community groups in particular those caring for the environment. I am privileged to have traveled Australia extensively and having witnessed firsthand the detrimental impact of the rapidly expanding mining industry on communities and the landscapes over nearly two decades, the prospect of allowing the Unconventional Gas (UCG) industry establishing in any States or Territories, principally anywhere in the world, is politically, economically and environmentally irresponsible to the extreme.

Based on the experience in other parts of the world where the UCG industry is more advanced, including in Queensland. I do not believe that this industry can co-exist safely with other land uses like farming, conservation, and tourism.

I urge you to diligently read the comprehensive Final Supplemental Generic Environmental Impact Statement (SGEIS) issued by the New York Department of Environmental Conservation. The report, comprising of over 2000 pages, notes that considerable uncertainty over the adverse environmental and public health consequences of fracking has "grown worse over time."

Considering that it took the New York Department of Environmental Conservation seven-years of research and over 260,000 public comments to produce the Final Supplemental Generic Environmental Impact Statement (SGEIS) highlights the complexity and uncertainty surrounding Unconventional gas mining.

I would like to make it clear that since this report was published new and extensive scientific evidence continue to proof the very extensive safety uncertainties including a wide range of health, environmental, climate and economic concerns.

It would be irresponsible to suggest anything else than to reject the Narrabri Gas Project and instead I believe there is a compelling case to place a permanent ban on all unconventional gas mining across New South Wales and indeed Australia.

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### **Please NOTE:**

I have include the following documents as part of my submission, due to the large file size of the SGEIS report (Volume 1 and Volume 2), the documents can be accessed via the following web link: <http://www.dec.ny.gov/energy/75370.html>

The second document is the "Compendium of scientific, medical and media findings demonstrating risks and harms of fracking (Unconventional gas and oil extraction)". The full report can be accessed via following web link: <http://concernedhealthny.org/compendium/>

### **Local communities and Farmers reject the Narrabri Gas Project;**

Gas drilling will industrialise the landscape, impact on rural communities and people in adjacent areas and it is highly 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 water and energy intensive to produce, and will emit significant greenhouse gas emissions.

There are hundreds of cultural sites as well as songlines and stories connecting the Gamilaraay to the forest and to the groundwater beneath. Gamilaraay people are deeply involved in the battle against UCG, and have told Santos they do not want their country sacrificed for a coal seam gas field.

The benefits associated with any royalties that are likely to be delivered as a result of drilling are negligent compared with the enormous tax payer subsidies given to the mining industry. In addition, the high risk of likely costs to tax payers to deal with the many negative impacts on the environment, health and economy, long after the industry has left; far outweigh any short term benefits.

Why would New South Wales even consider putting some of our best farmland, vibrant communities and significant natural landscapes at risk by allowing this short term industry to proceed for only minimal royalty returns to the state?

In particular when this industry does not have a social license to operate, as shown by extensive community surveys that shown an average of 96% opposition to UCG. This stretches across a massive 3.2 million hectares of country surrounding the Pilliga forest, including 99 communities. Hundreds of farmers have participated in protest actions unlike any previously seen in the region.

**The Narrabri Gas Project poses unacceptable environmental, productivity, public health, mitigations and residual risks;**

Responsible decision making where risk is involved and science is still gathering momentum requires the application of the precautionary principle. It is clear that many problems with the industry may take years, and potentially decades, to be fully understood. To gain a better understand of the full implications of UCG industry please read the comprehensive Final Supplemental Generic Environmental Impact Statement (SGEIS) and Compendium of scientific, medical and media findings demonstrating risks and harms of fracking (Unconventional gas and oil extraction).

It would be reckless to unleash this industry on New South Wales with all the evidence that is emerging about contamination events associated with UCG mining and "grown worse over time" as stated in the SGEIS report.

Major environmental impacts associated with UCG are highlighted in Chapter 6.4 Ecosystems and Wildlife of the SGEIS report. Despite having its origin in America the principals are directly relevant to the Narrabri Gas Project and in general the world.

The report describes in great detail the significant negative impact from fragmentation on all terrestrial and aquatic habitat types, including forests, grasslands, shrub lands, rivers and wetlands. Of particular concern is habitat fragmentation, transfer of invasive species and potential impacts on endangered and threatened species.

Fragmentation is an alteration of habitats resulting in changes in area, configuration, or spatial patterns from a previous state of greater continuity, and usually includes the following:

- Reduction in the total area of the habitat;
- Decrease of the interior to edge ratio;
- Isolation of one habitat fragment from other areas of habitat;
- Breaking up of one patch of habitat into several smaller patches; and
- Decrease in the average size of each patch of habitat.

Habitat fragmentation from human infrastructure has been identified as one of the greatest threats to biological diversity.

## **The Pilliga is a haven for threatened wildlife;**

The Pilliga is one of 15 nationally listed 'biodiversity hotspots' and is vital to the survival of threatened species like the Koala, Spotted-tailed Quoll, Black-striped Wallaby, Eastern Pygmy-possum, Pilliga Mouse and South-eastern Long-eared Bat. The forest is home to over 200 bird species and is internationally recognised as an Important Bird Area. The Narrabri Gas Project would fragment 95,000 hectares of the Pilliga with well pads, roads, and water and gas pipelines - damaging vital habitat and threatening the survival of endangered species.

Risk of fires would increase throughout the Pilliga's tinder-box conditions. Methane flare stacks up to 50m high would be running day and night, even on total fire ban days. The Pilliga is prone to severe bushfires. The project would increase ignition sources as well as extracting, transporting and storing a highly flammable gas right within this extremely fire-prone forest.

## **Unacceptable public health risks;**

Major health impacts associated with UCG are highlighted in Volume 2, Appendix A Public Health Review of Shale Gas Development of the SGEIS report, they are:

- Air impacts that could affect respiratory health due to increased levels of particulate matter, diesel exhaust, or volatile organic chemicals.
- Climate change impacts due to methane and other volatile organic chemical releases to the atmosphere.
- Drinking water impacts from underground migration of methane and/or fracking chemicals associated with faulty well construction.
- Surface spills potentially resulting in soil, groundwater and surface water contamination and surface water contamination resulting from inadequate wastewater treatment.
- Community impacts associated with boom-town economic effects such as increased vehicle traffic, traffic accidents, road damage, noise, odor complaints, increased demand for housing and medical care, and stress.

Furthermore, the 'Compendium of scientific, medical and media findings demonstrating risks and harms of fracking (Unconventional gas and oil extraction) adopted for use in many areas of the world including Australia, highlight many significant issues. The full report has been supplied with this submission.

1. Growing evidence shows that 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.
2. Drinking water is at risk from drilling and fracking activities and associated waste disposal practices. As documented by the Pennsylvania Department of Environmental Protection in a review of its records, 234 private drinking water wells in Pennsylvania have been contaminated by drilling and fracking operations during the past seven years. These do not include drinking water wells contaminated by spills of fracking waste water or wells that went dry as a result of nearby drilling and fracking activities. In California, the injection of liquid fracking waste directly into groundwater aquifers threatens contamination of large numbers of public drinking water supplies.
3. Drilling and fracking emissions often contain strikingly high levels of benzene. A potent human carcinogen, benzene has been detected in the urine of well pad workers (at levels known to raise risks for leukemia), in private drinking water wells

contaminated by fracking operations, and in ambient air at nearby residences. In some cases, concentrations have far exceeded federal safety standards. Such exposures represent significant public health risks.

4. Public health problems associated with drilling and fracking are becoming increasingly apparent. Documented indicators variously 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.
5. Natural gas is a bigger threat to the climate than previously supposed. Methane is not only a more potent greenhouse gas than formerly appreciated, real-world leakage rates are higher than predicted. Within the last five months, multiple teams of independent scientists have published data on fugitive emissions that, all together, call into question earlier presumed climate benefits from replacing coal with natural gas. Further, evidence increasingly suggests that the natural gas abundance brought by fracking is slowing the transition to renewable energy and is thus exacerbating, rather than mitigating, the climate change crisis.

These findings are reflected in rapidly increasing research conducted within Australia, for example, the study “Impact of the mining industry on the mental health of landholders and rural communities in southwest Queensland” by the Royal Australian and New Zealand College of Psychiatrists 2013 in the *Australasian Psychiatry* 21(1) 32–37. States that: “The scale, and speed of growth, of mining and coal seam gas has introduced numerous new social issues for regional and local economic development, including employment and skills shortages, a shortage of affordable housing, social inequities and lack of appropriate infrastructure and services. All the issues related to mining and coal seam gas industry were seen as having created tremendous mental health problems for the landholders and associated rural communities in the region.”

Doctors for the Environment point out that a range of other hazardous chemicals are reported to be used in Australian fracking operations for CSG including 2-butoxyethanol and ethylene glycol. Research compiled by Doctors for the Environment found that 2-butoxyethanol is easily absorbed and rapidly distributed in the human body and is particularly toxic to red blood cells, carrying the risk of haemolysis, and damage to spleen, liver and bone marrow. Ethylene glycol is used to make anti-freeze and when ethylene glycol breaks down in the body it can affect kidney function as well as the nervous system, lungs and heart.

Again, the Final Supplemental Generic Environmental Impact Statement (SGEIS) and the Compendium report supplied with this submission addresses many more of the impacts of UCG such as risk mitigations and residual risks of unconventional gas activities.

Based on the conclusions above alone; suggesting anything else than to ban all unconventional gas mining permanently would be irresponsible.

### **There are a range of reasons why UCG cannot co-exist peacefully with the environment and the community;**

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

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.

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 mining. Given all these obvious impacts it is difficult to imagine that an UCG industry will not impact negatively on rural property value.

Based on the experience of farmers in Queensland where the coal seam gas (CSG) industry has already become entrenched and its problems are starting to be documented, I do not accept the premise put forward by the industry that UCG operations can peacefully co-exist with farming.

The Siding Springs Observatory, situated in the Warrumbungles and adjacent to the Pilliga, is under threat from the Narrabri Gas Project due to light and dust pollution. The area has been internationally recognised as a 'dark sky park' and the 50m high gas flares proposed by Santos threaten the viability of the facility.

### **Competition with farmers over water;**

Groundwater plays a vital role in sustaining agriculture, and hence our economy and lifestyle. Mining 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 are already over committed. Additionally, there are already substantial concerns about subsidence and over use of aquifers across Australia.

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 mining is that there is a wide variety of opinions on just how much water is used.

Additionally, there is the matter of how much water will be extracted from coal or other gas seams in the fracking process, and how this will affect the water table.

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.

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 'flow back rates of 10 to 70%' There could be several wells per pad, based on multiple horizontal drill lines, increasing the water consumption substantially.

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

Again many examples are listed in the Final Supplemental Generic Environmental Impact Statement supplied with this submission.

## **The potential for contamination of groundwater;**

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

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 rapidly growing evidence of contamination incidents associated with shale and tight gas drilling. Many examples are listed in the Final Supplemental Generic Environmental Impact Statement (SGEIS) supplied with this submission.

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

## **The Narrabri Gas Project risks precious water sources, including the Great Artesian Basin - Australia's largest groundwater aquifer;**

The Narrabri gasfield poses a real risk to our two most precious water resources: the Great Artesian Basin and the Murray-Darling Basin. The area of the Great Artesian Basin with the highest recharge rates is almost entirely contained within the Pilliga East forest. In a worst-case scenario, the water removed for CSG extraction could reduce water pressure in the recharge areas - potentially stopping the free flow of waters to the surface at springs and bores across the whole Great Artesian Basin.

Creeks in the Pilliga run into the Namoi River - a part of the Murray Darling Basin. This system is vulnerable to contamination from drilling fluid spills and the salty treated water produced from the proposed Narrabri Gas Project.

Well failure through blowouts, annular leakage (along the well) or radial leakage (perpendicular to well) is the primary cause of groundwater contamination from unconventional gas production. Research consistently has shown that on average there is an immediate bore failure rate of 6% which then increases to 50% within 30 years and continues to increase. The risks are too great and cannot be mitigated.

Again many examples are listed in the Final Supplemental Generic Environmental Impact Statement supplied with this submission.

## **Climate change;**

Climate change impacts due to methane and other volatile organic chemical released into the atmosphere during unconventional gas extraction and use is no better than burning coal. To have even a 75% chance of meeting the 2°C warming limit, at least 77% of the world's known fossil fuel reserves (coal, oil and gas) cannot be burned. 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.

Any discussion about energy policy needs to consider the implications of climate change. In the case of UCG, which requires access to land in a way that adversely impacts on local farming activity and the environment, 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 and clearing of native vegetation.

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 invasive activities like coal and gas mining.

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

A responsible energy policy for New South Wales would rule out any further coal, gas, or oil development. In terms of our future energy supply mix, we must remember that UCG is a fossil fuel. The widespread burning of fossil fuels are the main single cause of human induced global warming. The only way to stop, or at least minimise, the impacts of climate change is to stop burning fossil fuels, not dig up and burn more.

Despite high energy and resource needs involved in extracting UCG, indirect emissions of carbon dioxide from fossil fuels used during extraction and direct emissions of carbon dioxide from end uses consumption are relatively small compared to the fugitive emissions of methane from leaks in the UCG production. Methane is a far more powerful greenhouse gas than carbon dioxide.

Again many examples are listed in the Final Supplemental Generic Environmental Impact Statement supplied with this submission.

### **Implications for local and regional development, investment and jobs;**

In terms of regional centres near to gasfields, there will be a mixed impact. The experience in places like Queensland is that a small number of businesses 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 from the rental market.

Furthermore, increased pressure on infrastructure by the influx of mining activity will drive up council rates, service based businesses such as farms, farm supply, auto mechanics, hospitality, tourism etc, will find it increasingly difficult to be able to employ staff at affordable wages leading to high general living costs for residents and visitors, essentially driving away vital workforce needed by the agricultural and service sectors, residents and tourism.

The Compendium report highlights that the economic and job prospects claimed by industry are greatly exaggerated, abstracts of two examples from pages 85 and 87 of the report state that:

"May 27, 2014 – A Bloomberg News analysis of 61 shale drilling companies found that the economic picture of shale oil and gas is unstable. Shale debt has almost doubled over the last four years while revenue has gained just 5.6 percent. For the 61 companies in their analysis, Bloomberg News reported: "In a measure of the shale industry's financial burden,

debt hit \$163.6 billion in the first quarter.” Further, Bloomberg News noted that drillers are caught in a bind because they must keep borrowing to pay for exploration needed to “offset steep production declines typical of shale wells .... For companies that can’t afford to keep drilling, less oil coming out means less money coming in, accelerating the financial tailspin.”

“November 21, 2013 – The Multi-State Shale Research Collaborative released a six-state collaborative report demonstrating that the oil and gas industry has greatly exaggerated the number of jobs created by drilling and fracking in shale formations. The report found that far from the industry’s claims of 31 direct jobs created per well, only four jobs are created for each well. It also demonstrated that almost all of the hundreds of thousands of ‘ancillary’ jobs that the drilling industry claims are related to shale drilling existed before such drilling occurred. As Frank Mauro, executive director of the Fiscal Policy Institute put it, “Industry supporters have exaggerated the jobs impact in order to minimize or avoid altogether taxation, regulation, and even careful examination of shale drilling.”

Again many examples are listed in the Final Supplemental Generic Environmental Impact Statement and the Compendium report supplied with this submission.

The comprehensive ‘Compendium of scientific, medical and media findings demonstrating risks and harms of fracking (Unconventional gas and oil extraction) report concludes that: Growing evidence shows that 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.”

Again many examples are listed in the Final Supplemental Generic Environmental Impact Statement supplied with this submission.

### **The risks and impacts posed by UCG cannot be managed;**

Even in Australia, history has shown that regulation of industry does not work, there are countless examples where loop holes are exploited by industry to flaw any regulations put in place.

The Narrabri Gas Project has a long history of spills and leaks of toxic UCG water—Santos cannot be trusted to manage the project safely.

Santos has already contaminated a freshwater aquifer in the Pilliga with uranium at levels 20 times higher than safe drinking water guidelines, as well as lead, aluminium, arsenic and barium. In addition, there have been over 20 reported spills and leaks of toxic UCG water from storage ponds, pipes and well heads. Santos cannot be trusted.

Santos has no solution for disposing of the hundreds of thousands of tonnes of salt that will be produced. Between 17,000 and 42,000 tonnes of salt waste would be produced each year. This industry would leave a toxic legacy in NSW.

Based on mounting evidence of the negative impacts of UCG mining in Australia and elsewhere around the world, I believe the best and simplest policy response to regulate this industry is to ban it. Many other jurisdictions around the world including Victoria in Australia have chosen to place an outright ban on UCG and/or the process of fracking.

I urge you to reject the Narrabri Gas Project and instead ban all unconventional gas mining permanently.

Dated, Sunday 21 May 2017