



The Wilderness Society Victoria
Submission to
Parliament of Victoria's
Inquiry into Unconventional Gas in Victoria
July 2015

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Introduction

The Wilderness Society is a community-based environmental advocacy organisation supported by over 40,000 members. Established in 1976, we have been at the forefront of Australia's most historic environmental campaigns, including the Franklin River, Fraser Island, Wild Rivers, Marine Parks, Tasmanian forests, numerous World Heritage areas and James Price Point in the Kimberley. Our organisational purpose is to protect, promote and restore wilderness and natural processes across

Australia for the survival and ongoing evolution of life on Earth. Our organisational vision is to transform Australia into a society that protects, respects and connects with the natural world that sustains us.

The Wilderness Society Victoria recognises, in the statements made within this submission, the Indigenous peoples of Victoria as the original custodians of country and acknowledges the rights, interests and aspirations of Traditional Owners.

The Wilderness Society appreciates the opportunity to make comment on this important issue.

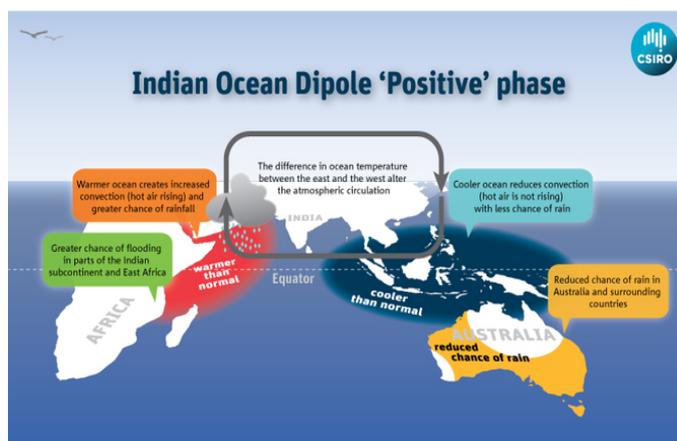
The fact that there has been a moratorium on onshore unconventional gas in Victoria for some years suggests there is already grave concern about the introduction of this industry into the lands of the state. This concern has been demonstrated more fully this month with the Victorian Farmers Federation asking for at least a further five year moratorium, (11). Moratoriums are not mandated easily or lightly and it is evident that the issue of unconventional gas is of serious concern to Victorians. The Auditor General's Report into '*Unconventional Gas: Managing Risks and Impacts*' is not expected to be tabled in the Victorian Parliament until August 2015 but should add valuable information to the current inquiry ,(1). The industry has been long enough around that there is a large body of evidence as to what has happened both overseas and in other states of Australia.

Taking into account this evidence it appears that for a state like Victoria the outlook for an onshore unconventional gas industry is negative, not positive. The Wilderness Society Victoria will argue, therefore, that unconventional gas mining should not go ahead in Victoria and that it should be banned.

In this submission "unconventional gas" refers to methane gas deposits trapped in coal seams, shale or tight sand, a gas that is sourced from different – unconventional – rock layers in the earth rather than from types of layers where natural gas has more traditionally been found. It is usually more difficult to extract than conventional gas requiring different techniques, for example, horizontal drilling and the globally controversial practice of hydraulic fracturing, 'fracking', (1).

The context of Climate change

Long term it is predicted Victoria will become a drier state. Climate Change science has reached a high level of certainty in this research,(8). For example much like [El Niño](#) in the Pacific Ocean, the [Indian Ocean Dipole](#) , (IOD) has far-reaching consequences, and these effects, according to the CSIRO research, are likely to strengthen under climate change, (13). Under climate change most of southern Australia will be drier. Over the past 50 years, the IOD index has been trending upwards. Climate models suggest it will continue to do so over the next one hundred years, (ibid). This overarching factor must underpin all decisions in relation to onshore unconventional gas in Victoria. The Terms of Reference for this inquiry do not highlight sufficiently this fundamental aspect that has to be taken into account in any examination or recommendations in regard to this fossil fuel energy source.



Source ibid.

Further, the latest scientific research demonstrates that tackling climate change requires that most of the world's fossil fuels be left in the ground, unburned and not be used at this juncture in human history, (5). This includes Victoria. Energy policies that continue to support substantial fossil fuel use or introduce new sources of emissions are inconsistent with tackling climate change. In the context of the International Panel on Climate Change, IPCC, calling on the world to keep two thirds of the fossil fuel reserves in the ground if we are to avoid dangerous climate change, this inquiry should call for fossil fuel subsidies to be phased out quickly so the state can move to renewable energy and not merely go down the path of another fossil fuel industry. Long term jobs and long term benefits should prevail over a short term industry that ultimately has very little benefit to Victorians especially in relation to land use.

Governments do not have to make a trade-off between growth and preventing climate change, (10). Victoria's coal plants are nearing the end of their lifetimes, while concurrently the costs of renewable energy technologies such as solar and wind continue to fall. Steffen and Rice, in [Work by ClimateWorks Australia and ANU](#) show Australia can 'decarbonise the economy with little or no cost' through energy efficiency and renewable energies, (9). On the contrary, action to slow global warming could result in a period of "discovery, innovation and investment". At the moment there is, it seems, only an assumption that unconventional gas would be bring cheaper gas to Victorians, (TOR 4).

No social licence for unconventional gas in Victoria

Many Victorians are already voting with their feet and, for example, at their own expense, switching to clean solar for their energy needs. The Wilderness Society Victoria believes there is already a social licence for a renewable energy future for the state. We would request this inquiry explore what the state government needs to do to step up the action to a renewable energy future both in the immediate and in the long term and not go down the path of an energy source that that involves a high degree of risk.

It would be wise for the Victorian Government to take note of how the more information and more experience of unconventional gas people have the more it leads them to opposition. This appears to be especially true among land holders and farmers - whether it is in Lancashire in England, (Economist 4-10 July 2015, p49), in the farming communities of Queensland where unconventional gas has been permitted or in the deep soil Liverpool Plains of New South Wales (The Australian 10 July 2015). There is no evidence to think this will be any different in Victoria given the relatively high level of opposition the prospect of this industry has generated already and where local opposition has spurred shires to vote to keep the industry out of their regions - for example the Glenelg Shire, in 2014 adopting a resolution that it be "an unconventional gas free zone", likewise others such as the Colac Otway and Indigo shires, (Appendix 3).

Water - ground and surface (TOR 3 and 5)

In the scenario of the state's drying climate (see above) water is already, and increasingly so, an asset to be protected and maintained for the long-term in Victoria. Much of our surface water is in poor condition, wetlands drained, rivers degraded and riparian systems in need of repair. Increasingly ground water is being tapped for agriculture. With the high use of water by unconventional gas mining and the very real danger of chemicals and toxins contaminating the ground water aquifers in Victoria we would argue this state is not a place to allow this industry and therefore needs to place a ban on the industry developing. It is not worth the risk. It would seem extremely unwise to allow unconventional gas to take hold in Victoria. Rather, every effort should be taken to protect water, natural bushlands and farming food lands and to reduce the use of fossil fuels in both the immediate and long term.

The findings of the *State of the Environment Report 2013* on Victoria's surface water quality are relevant in this context, (11). During work on this report the Commissioner for Environmental Sustainability was unable to obtain a comprehensive statewide assessment of surface water quality for Victoria and found therefore it was not possible to report on water quality trends since the previous State of the Environment report, including whether water quality objectives are being met, (11).

In addition, comments on groundwater from the same report are a cause for not introducing unconventional gas mining into the landscape considering there is 'inadequate baseline data to make assumptions about impacts' (ibid) as well as a lack of evidence. The report finds

- "there remain critical gaps in our understanding of the condition of Victoria's groundwater resources. An investigation by the Victorian Auditor-General's Office was unable to determine if groundwater use in Victoria is sustainable
- There is no statewide information on long-term changes in groundwater salinity or the statewide occurrence of groundwater contamination
- For shallow aquifers, groundwater levels declined from the late 1990s to 2010 due to a combination of increased groundwater use and reduced recharge both from surface water irrigation and rainfall. Since 2011, groundwater levels across Victoria have generally risen or remained stable in response to increased rainfall
- For deep aquifers, long-term declines have continued in Gippsland associated with the Latrobe Valley coal mines and offshore oil and gas extraction. In other areas, restrictions on use and a return to wetter conditions have led to stable or rising groundwater levels.

Victoria has many significant waters. Wetlands have suffered significant degradation throughout the state and across the globe. Recognition of the latter has led to the formation of the RAMSAR Convention where 'Australia has obligations under the Ramsar Convention and the JAMBA and CAMBA bilateral migratory bird's agreements to conserve waterbird habitat, (13).

In far western Victoria, for example, such as in and around Lake Mundi and Weecurra and in the Roseneath chain of fresh-water swamps that run along the base of the Kanawinka fault escarpment, there are groundwater recharge areas as well as native bird habitat. It is high risk to have potentially damaging unconventional gas introduced into such a region.

Water systems in this region are complex and interconnected and outcomes of unconventional gas are likely to be detrimental. Aquifers are already used by local towns and farms and should not be subject to the heavy use by unconventional gas mining. In the still naturally vegetated parts of this

region the forests form a balance to the highly cleared land immediately to their east and are necessary for survival of native species and water catchment, (See detail next section).

The dangers are real and documented. We have instances from other parts of Australia , where, for example, over 20 million litres of wastewater is being discharged by coal seam gas miners into the Condamine River each day and the river has recently been seen 'bubbling like a spa bath' after nearby coal seam gas mining. (Lock the Gate Alliance website). Disposal of huge volumes of frack fluids and chemical filled water from the mines poses many problems. Injecting the waste water deep into geological formations is not the answer as the toxic water can migrate through unmapped faults, fractures and through aquifers.

Overall, it would seem the most prudent way forward is not to introduce the high water using industry that also increases emissions and has high leakage risk as is evident in a paper prepared for presentation at the SPE International Oil and Gas Conference and Exhibition in China held in Beijing in 2000, (7).

This document on leakages contains very good, clear diagrams and information that may be useful to the Inquiry Committee. We can provide a pdf on request.

Risks to Native vegetation including Forests (TOR 2)

Victoria is the most cleared of the Australian States and fragmented landscapes make up almost 79% of the state, executive summary, Remnant Native Vegetation Investigation (RNVI). This investigation also finds continued degradation of remaining native vegetation is currently the major threat to Victoria's biodiversity (ibid p7).

The introduction of unconventional gas will exacerbate this already stressed environmental situation by further degrading the landscape. For example, the exploration mapping shows that unconventional gas would threaten the surviving north-south running ecosystems on the far western edges of the highly cleared Victorian basalt plains, (See map in section on tourism)

Many native species have sought sanctuary here as agriculture has intensified on the plains and in areas such as the Dundas Tablelands. As wetlands to the east are increasingly used for cropping with the result of remnant vegetation being degraded, the bushlands to the west, such as Roseneath, Drajurk, Weecurra, Kanawinka and the line of state forest blocks south from these towards the lower Gleneg National Park should be kept unconventional gas free. The values of these areas for biodiversity survival into the future are now of priority and cannot be replaced once destroyed.



A year after a toxic spill in the Pillega Forest NSW

As a priority there should be no more clearing of the native vegetation of this highly cleared state.

Current unconventional gas maps, for example, cover native forest areas in far western Victoria. Many of these, such as gum woodlands are threatened ecosystems while others, such as the stringy bark and heathy ecosystems, are the essential food and habitat for many species including the nationally endangered South-eastern Red-Tailed Black-Cockatoo. Native mammals and large forest owls, at the western edges of their ranges, also rely on both wet and dry forest in the region. None of these should be allowed to be destroyed for the short term unconventional gas industry that can leave long term problems once it has ended.

These forests form vital habitat sanctuary for native species that have lost the adjacent richer soil areas to which they had former access to survive, especially in times of drought. These forests and remaining patches of native vegetation, (including the line of north–south forests already mentioned) form the public land core of important rehabilitation projects. One of these is Habitat 141, initiated by local land holders, scientists and organizations, which, to make the replanting more effective, relies on the remaining native forests and woodlands as an older anchor while the new plantings mature in coming decades.

To this and other rehabilitation works in central Victoria and in highly cleared areas in Gippsland, for example, the Gippsland Plain, unconventional gas mining, with the risks of vegetation clearing and water contamination, would be a major setback. The setback would not only be to the revegetation works themselves on the land but to the social cohesion such projects build in local communities, (see descriptions and case studies in VEAC ref 8 and 9).

In the context of climate change already discussed fugitive methane gas leakages and destruction of carbon storing forests are of serious concern with the introduction of an unconventional gas industry.

Agricultural production and farmlands (TOR 3 and 5b)

Victoria is a prime food producing state. The coexistence of onshore unconventional gas activities with existing land and water uses will be very difficult to manage as many of the farm land and water uses are intensive – namely dairy, vegetable growing and a variety of crops. The highly productive food industry in Victoria is already well established and much of this long term industry’s success depends on long term healthy land and clean water. The unconventional gas industry is, above all short term, having a short peak period followed by decline. Moreover because of its nature, in that *short term* operation, unfortunately, it can also damage the current long term and possible other, long term industries.



If it is given the go ahead the likely very uneasy coexistence of onshore unconventional gas activities with existing land and water uses will lead to damage to the various economies, the environment

and social cohesion of the Victorian farming and rural town communities: "Fracking and agriculture don't mix. And agriculture is very important to this shire, as is the environment. With fracking you lose both ways. It upsets the water table, so the water can't then be used for agricultural purposes, whether it's cropping or stock. And the agricultural land here is prime ... (Appendix 3).

As mentioned earlier in this submission, Victoria would be much better placed to seriously explore clean, long term energy production as soon as possible. Now that solar energy for example is coming down in price and storage is improving it would seem the moment in history when there should be all out effort to develop this energy source, and other renewables, to a high level that will support industry on a long term basis. It is not the moment to delay such development nor is it the moment in history to begin, in Victoria, another round of degradation to the land, its waters and ecosystems through introducing unconventional gas mining.

Rich farm soils which have now become the valuable the food producing areas throughout the state are assets which must be nurtured for the long term. Unconventional gas mining is a risk to these soil assets. Part of this serious risk of degradation arises from the nature of Victoria's geology. Some of these factors follow.

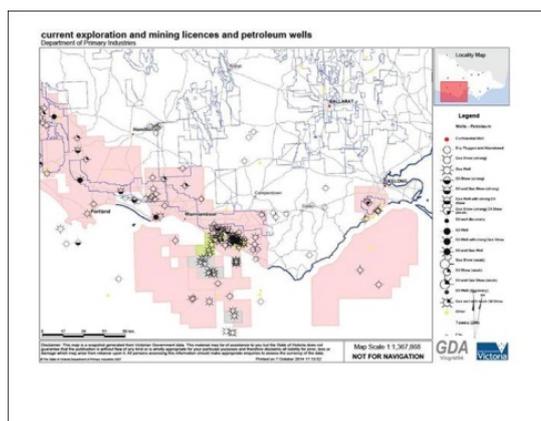
Geology (TOR1 and risks TOR2)

Although Australia is one of the most stable of continents there is a serious question about the geology in Victoria which we believe would prohibit the introduction of unconventional gas. In addition, the increase in leakages of old gas wells as time goes on and the question of who is to monitor and repair the wells after the mining ceases have not been answered.

- complex surface and underground aquifer systems not yet fully understood (see earlier section on water)
- the presence of limestone regions - in far south west
- unstable coastlines along the southern edge of Victoria
- areas where streams flow inland and underground and not to the sea
- important streams and wetlands which rely on underground as well as surface water
- fault lines in the far west including the Kanawinka Fault stretching from Portland to Naracoorte
- fault lines in Gippsland where earthquakes occur and are felt as far away as Melbourne
- complex volcanic and lake systems
- research - paper written about faults and coal mining in Illinois describes the range of effects that faults can have on coal mining activity including; physical displacement of coal seams which may make them difficult or impractical to mine ...opening pathways for the influx of water and gas into underground workings, introduction of impurities (2)
- research - recent US study of fracking waste water from shale gas wells found levels of radionuclides 3200 times higher than US safe drinking water guidelines. (TOR2)
- shale formations can contain high levels of radioactive material. Drilling and fracking shale can release very high levels of radioactive Radium 226. Radium decays rapidly and emits extremely hazardous Radon Gas; Radium 226 has a half life of 1600 years and is over 1 million times more radioactive than the same mass of uranium, (ibid).

Tourism (TOR 3c)

Victoria is a very beautiful and diverse state. From desert landscapes to the cliffs on coasts from basalt grasslands to all manner of various forests, from creeks that disappear into sands in western Victoria to streams and rivers that water fertile soils in Gippsland the state has a vibrant local and overseas tourist industry worth many millions of dollars.



Map of some of the exploration licences in Victoria

The maps depicting the exploration of onshore unconventional gas show clearly the mining would encroach on some of the most loved tourist precincts, examples including the scenic coasts and lakes of Gippsland, the Great Ocean Road, the Budj Bim Heritage Landscape and the extensive Kanawinka Geotrail that stretches across south western Victoria and into South Australia.

Large numbers of tourists from overseas and locals visit these areas in a tourism industry that focuses on natural beauty and not industrial vistas. Like food farming this industry is long term and important to Victoria. There are precedents for not permitting industries that damage a region's tourism, environmental and economic activities. The Kimberly is one example where in 2012 the West Australian Government determined that mining would not be permitted around Horizontal Falls. It was deemed a threat to the region's unique geological features and to the economic and environmental values of the coast's tourism, (4).

Conclusion

Overall, onshore unconventional gas in a time of climate change involves too many risks to the environment in this mostly cleared state of Victoria, risks to farming and food supplies, to a number of protected species, to social cohesion, to cultural heritage, to regional surface and groundwater and to tourism. The risks of this short term industry are great both immediately and long term on the health and safety, amenity and quality of life of Victorian rural areas and towns. Our assessment is that the risks far outweigh any rewards, which, at this point are very tenuous.

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Appendix 1

Victorian Auditor-General's Office Website

Managing mining approvals: Environmental conditions

Now: Unconventional Gas: Managing Risks and Impacts

Unconventional gas is natural gas that is sourced from different—unconventional—rock layers in the earth rather than from the types of layers where natural gas has more traditionally been found. It is usually harder to extract gas from these unconventional sources and can require some different techniques, such as horizontal drilling and hydraulic fracturing

The issues surrounding unconventional gas exploration and production in Australia and globally are complex, technical, wide ranging and in some cases, contentious. Victoria is still in the early stages of understanding the potential for an unconventional gas industry. There has been some exploration for unconventional gas in

Victoria but no commercial production and there is currently a moratorium preventing hydraulic fracturing and new onshore exploration for all types of gas, including from unconventional sources. Community views in relation to the development of an unconventional gas industry vary greatly.

This audit is being undertaken to inform Parliament about Victoria's preparedness to effectively respond to emerging risks and challenges in the event that unconventional gas activities proceed in this state. This will include examining recent activities and approaches to manage the risks and impacts associated with unconventional gas exploration and production.

The audit will determine whether Victoria is well-placed to effectively respond to potential environmental and community risks and impacts in the event that unconventional gas activities proceed in this state.

The report is expected to be tabled in August 2015.

Appendix 2

Excerpt from Briefing Paper. The following abbreviated account is taken from a briefing paper compiled January 2012 by the Wilderness Society and Conservation Council of WA. <http://nofrackingway.org.au/wp-content/uploads/2012/04/No-Fracking-WAy-Factsheet.pdf>

Consumption and Chemicals - Water and Pollution Risks

Of 23 chemicals commonly used in Australia in fracking only 2 have been assessed for safety by the Australian National Industrial Chemicals Notification and Assessment Scheme. Many are known carcinogens.

There is evidence from around the world that links fracking to contamination of groundwater from chemicals and gas. Frack fluids and or gases can make their way into groundwater through:

- Migration of fluids and gases through small existing underground fault systems.
- Migration of fluids and gases along the outside of gas well casings and through well failure.
- Leaching of wastewater ponds into shallow aquifers, or spilling over into surrounding countryside.

Where fracking occurs, an estimated 5-19 million litres of water is used per hydraulic frack. Up to 20 million litres of water is used to drill a hole depending on the depth. Thousands of wells may be required to extract gas from a single gas field, adding further stress to WA's dwindling water resources. Currently fracking is taking place directly below the Yarragadee and Parmelia aquifers, putting our most valuable water resources at risk.

Waste Water Disposal - Water Contamination and Earthquake Risks

Due to the huge volumes and toxic nature of frack fluids, wastewater often cannot be treated. Commonly, companies dispose of huge volumes of wastewater by injecting it into deep geological formations at high pressure. This method can result in migration of waste water through unmapped fault systems.

This method of waste water disposal has also been associated with earthquakes in the UK and US. Seismic activity in a gas field increases the risk of well casing failure which can lead to further risk of groundwater contamination. Quakes can also lead to damage of surrounding property and community infrastructure.

Another method of waste water disposal being used in WA is simply leaving the toxic frack fluids and potentially radioactive shale cuttings in open, earthen 'evaporation ponds'. Solids are eventually disposed of – usually into a waste facility, meaning the waste never leaves the environment.

WA requires a moratorium on all unconventional gas activities. This moratorium needs to be subject to a strong standard of regulation, and a public understanding of all potential risks in order to protect WA's water resources, environment and communities. France and Belgium have recently banned fracking. Other European countries, some US states, South Africa, and also NSW, currently have a moratorium in place on unconventional gas exploration and production until risks to water resources, food production, environment and communities are fully understood.

Radiation Risk

Shale formations can contain high levels of radioactive material. Drilling and fracking shale can release very high levels of radioactive Radium 226. Radium decays rapidly and emits extremely hazardous Radon Gas, Radium 226 has a half life of 1600 years. Radium is over 1 million times more radioactive than the same mass of uranium. A recent US study of fracking waste water from shale gas wells found levels of radionuclides 3200 times higher than US safe drinking water guidelines.

An Expensive and Dirty Energy Source!

Over the full life cycle, from exploration to end use, shale gas/tight gas projects are a higher greenhouse gas emitter than conventional gas, or even oil or coal. This comes from "fugitive" emissions of methane, plus CO² emissions from production, processing, transport, and end use. A US study showing very high carbon and methane pollution from shale and tight gas production makes this possibly the world's dirtiest fossil fuel. A single shale/ tight gas well costs' approximately \$13 million to bring into production.

Appendix 3

The Age Indigo Shire Council says it is "totally opposed" to coal seam gas industry March 15, 2015

A country Victorian council has sent a strong message to the coal seam gas industry, adopting a formal policy that it is "totally opposed" to the industry operating in its shire.

Councillors from the Indigo Shire Council in Victoria's north east, which includes locations such as Beechworth and Rutherglen, voted unanimously at the council's most recent meeting to oppose the industry.

The vote meant that councillors with a range of political backgrounds and allegiances united in their opposition. Among the elected councillors are people who have run for Parliament as candidates for the Nationals, the Greens and Labor.

A motion proposing the policy was put forward by Jenny O'Connor, a member of the Greens and a candidate at recent state and federal elections for the party.

Cr O'Connor told her fellow councillors that the activities of the onshore gas industry were in "complete contravention" of a range of council principles and ambitions, including the conservation of the natural environment, and the pursuit of sustainable economic growth through tourism, agriculture and business opportunities.

Victorian government mapping showed "the presence of coal seams within the northern areas of the Indigo Shire," she said.

"There is strong evidence that coal seam gas is damaging to the environment, for farm land and for water resources. This and the stated desire of our residents that council protects agricultural land and manages our resources for the full benefit of the Indigo Shire community are compelling.

"It is therefore imperative that Indigo Shire Council draws a line in environmental best practice and makes a stand against coal seam gas exploration and mining within our boundaries and advises the minister accordingly," she said.

But the acting chief executive of the Australian Petroleum Production & Exploration Association, Paul Fennelly, criticised the council's move.

"It's disappointing council has made a decision based on misinformation about an industry that has been safely supplying natural gas to households and businesses for decades," he said.

"There is no evidence to suggest there is natural gas present in the shire and there are no exploration permits for gas anywhere near Indigo.

"Victoria is home to the largest number of natural gas users in Australia (about 1.8 million users) but remains the only Australian state with a ban on exploration. It should be lifted immediately."

In an interview with *The Sunday Age* the Indigo Shire mayor, Bernard Gaffney, said the council's position reflected the views of the community.

"Fracking and agriculture don't mix. And agriculture is very important to this shire, as is the environment. With fracking you lose both ways. It upsets the water table, so the water can't then be used for agricultural purposes, whether it's cropping or stock. And the agricultural land here is prime. And one thing has to give – and with us it's coal seam gas exploration," he said.

Cr O'Connor said the council's stance came after a community consultation process. "We should be investing in renewable energy and north east Victoria is an absolutely prime site for that," she said.

While the Indigo Shire is not the authority that approves licences for coal seam gas exploration or mining, its stance is more than symbolic. It does have the power to issue or deny planning permits which cover activities that a mining company may require, such as road or building construction on land in the shire.

Indigo is not the only country shire with concerns about the industry. Last year the Glenelg Shire, which includes places such as Portland, adopted a resolution that it "be an unconventional gas free zone."

Energy and Resources Minister Lily D'Ambrosio said that under the former government coal seam gas was treated as a political football. "If anything, now is the perfect time to have a thorough and considered inquiry into onshore gas in Victoria, based on robust scientific evidence and community engagement. Given the significant community concern about onshore gas developments, we're maintaining the existing moratorium while the inquiry establishes the facts."

The Andrews government has pledged to hold a parliamentary inquiry into the coal seam gas industry. Currently, there is a hold on onshore gas exploration drilling works, a hold on approvals for hydraulic fracturing and a hold on the granting of new exploration licences for all types of onshore natural gas".