



POLICY POSITION PAPER

Under Territory Alliance there will be no more fracking in the Northern Territory.

NO FRACKING IN THE NT

www.territoryalliance.org



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Policy Proposal

Under Territory Alliance there will be no more fracking in the Northern Territory. Existing exploration licences will not be renewed, and no more production permits will be issued.

Existing production may continue where sufficient community and environmental safeguards are implemented. These include resolving issues around drinking water quality and security and minimising green house gas emissions across the whole gas value chain..

Urgent regulatory reform will also be undertaken to ensure independent oversight of existing works and the long-term responsibilities around decommissioning and rehabilitation of existing wells. Gas companies will be required to contribute their fair share to any regulatory and rehabilitation works.

Issues

The label of 'clean energy' is largely responsible for the greater social acceptance of gas over coal. However, there are considerable gaps in our current knowledge on the impacts of unconventional gas on health, the environment or on the likely outcomes of contamination events. Economic returns for communities and governments are often overestimated and environmental concerns dismissed as 'alarmist' and 'fear mongering' with only the most merger benefit from the industry being experienced by stakeholders that are closest to the risk. Regulatory regimes are often unsatisfactory, poorly monitored and weakly enforced; eroding community confidence in both the resource industry and the government.

Background

There is currently an oversupply of gas in the international market with 2020 looking to a worse crash than the 2015 bust. A sharper drop-off from an already flat and saturated market demand is expected to decrease overall demand by more than 7% for 2020 and has been described as the sharpest decline in 70 years. The glut is not expected to clear until after 2030.

This is not simply a short-term blip caused by a Covid related down turn but was a well-established trend even before the pandemic forced widespread industrial closures. It has been well known since 2017 that production was far outstripping demand, with both investors and production companies taken to task for their addiction to growth and to 'stop counting barrels and start making money'.

With demand falling and international prices below the cost of production major resource companies are deferring investment decisions¹. The Commonwealth Australian Domestic Gas Security Mechanism has also spooked the market with many established companies² exiting Australian projects citing the inability to secure long term supply contracts.

1 Woodside petroleum deferred \$60b Scarborough and Browse projects; Santos deferred \$4.7b investment in Barroosa and relinquished 2 NT exploration licences.

2 BHP, ExxonMobil, ConnocoPhillips and Eni

Natural gas is also becoming too risky for major investors. Risk adverse major investment banks³ are divesting shares and government bonds based on Green House Gas (GHG) emissions, particularly methane. These decisions pre-empt European Union sustainability taxonomy designed to ‘...leverage the contribution of the private sector in order to decarbonise the European economy and meet the objectives of the Paris Agreement on climate change’.

The decision to exempt natural gas from the taxonomy was based on energy production by natural gas not meeting the sustainability benchmarks for emissions levels (methane and CO²), impact on water sustainability (consumption and quality) and environmental damage across the whole life cycle of natural gas from extraction to storage, transport and end use.

It is estimated widescale onshore gas extraction in the Northern Territory would total 6% of Australia’s total greenhouse emissions. Methane has rapidly increased in the environment since 2004 and has a greater short-term heating effect in the atmosphere than CO², producing 86% more heat than the equivalent volume of CO² over a 25-year period.



3 Sweden’s Riksbank, The Norwegian Central Bank, European Investment Bank. Bank of England is reassessing all shares based on GHG emissions

Chemical fingerprinting has determined that more than 2/3 of the increase is due to natural gas rather than forest fires, wetlands or agriculture. These fugitive and migratory emissions only need to exceed 1% of total output for natural gas to be no more sustainable than coal. While NT Government studies dismissed the risk of unintentional emissions as inconsequential, however both independent Queensland and international studies noted increases of methane leakage in production areas with Robert Howarth, professor of Ecology and Environmental Biology at Cornell University stating:

“The best evidence indicates widespread contamination of drinking water wells within 1 kilometre of gas wells, and the rate of venting and leakage of methane to the atmosphere is sufficient to give shale gas a larger greenhouse gas footprint than any other fossil fuel.”

Apart from the atmospheric impacts of methane the risk of water and ground contamination cannot be overstated. Once the wells are drilled chemicals are injected to improve extraction by altering surface tension between the water and gas (improving viscosity), dissolve minerals, stabilise clays, prevent corrosion and biocides to prevent biological growth in the well. These return to the surface, with other contaminants sequestered in the shale rock⁴, where they need to be responsibly stored to prevent contamination of surface water courses, aquifers and topsoil. Most jurisdictions acknowledge resource companies are obliged to implement ‘make good’ arrangements in the event of a contamination, water quality or water draw down event.

4 Natural salts, heavy metals, hydrocarbons and radioactive materials

The practicality of providing alternate or replacement water in a long-term context is rarely quantified; particularly in remote and arid regions where impacted communities are remote and water resources are scarce and slow to recharge.

The environmental risks of resource projects are often minimalised and considered offset by projected economic advantage.

The projected economic benefits for the Northern Territory have been inflated by unrealistic best-case calculations of gas deposits and will increase the Territories GDP by less than 2%. It is also anticipated that the majority of this income will be redistributed under GST regulations to other jurisdictions.

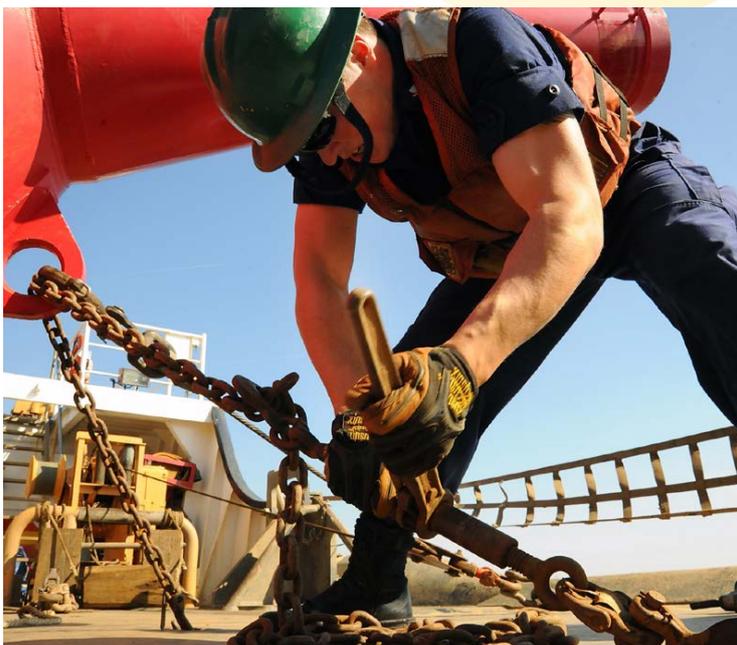
Likewise, the job growth benefits are likely to be largely exaggerated. The experience with the unconventional gas industry in other Australian jurisdictions demonstrates the workforce is highly specialised and very mobile especially during the peak construction phase. The NT Government's claims that the majority of the workforce can be locally source and trained into highly specialised roles is questionable and is likely to result in high numbers of fly-in fly-out workers akin to the recent INPEX construction project.

Hydraulic Fracturing (fracking) Details

Unconventional Gas refers to methane tightly packed into deposits of coal, shale or sandstone. The depth and type of reserve determines the extraction method used. NT reserves are predominately from deeper shale deposits (greater than 1300m) and the gas can only be extracted by the process of Hydraulic Fracturing (fracking).

Hydraulic fracturing refers to the process of drilling a hole vertically to the required depth then horizontally into the shale reserve. Water and a proprietary chemical/sand lubricating mix is then injected at extreme high pressure to 'fracture' the rock above and below the horizontal well, releasing the methane which mixes with the water and is reclaimed at the surface. This is a relatively new process utilised since the late 1990's and uses different processes to the historical natural gas exploration used from the 1940's⁵.

The Hydraulic Fracking process is usually distinct to the Coal Seam Gas (CSG)⁶ and Underground Coal Gasification (UCG)⁷ extraction process, although fracking has been used in Qld CSG projects to increase the production of poorly performing coal seams and to extend the life of existing wells (currently 10% projected to increase to 30-40%⁸). The three production terms are often used loosely and interchangeably, particularly in media and community forums, this has the potential to cause significant confusion in policy development, legislation and compensation regimes. Although some risks are unique to each



5 <https://www.greenmatters.com/p/fracking-water-pollution>

6 CSG – Sourced from around 300-1000m drilling accesses gasified water from coal seam reserves. Water and gas is extracted before being separated at the surface. This is the most common method of extracting onshore unconventional gas in Australia.

7 UCG - Oxygen and other propriety gas is pumped from the surface into underground coal seams. The coal seams are ignited, producing synthetic gas, also known as 'syngas', which is pumped back to the surface. This process has been tested in Qld by Linc Energy near Chinchilla and Cougar Energy near Kingaroy with disastrous outcomes.

8 <https://environment.des.qld.gov.au/management/activities/non-mining/fracking>

production method, many of the environmental and economic risks are consistent across the natural gas industry regardless of extraction method used.

The label of 'clean energy' is largely responsible for the greater social acceptance of gas over coal^{9,10}. However, there are considerable gaps in our current knowledge on the impacts of unconventional gas on health, the environment or on the likely outcomes of contamination events¹¹. Economic returns for communities and governments are often over-estimated particularly when measured against the short term nature of individual projects and the displacement industries that have greater sustainability over the long term.

Many jurisdictions either have a long-standing moratorium on unconventional gas extraction or have introduced legislation to ban onshore conventional gas exploration. In Australia the status of fracking in other jurisdictions is as follows;

Northern Territory

- » Moratorium lifted in 2018 allowing petroleum actives to resume on 51% of the Territory.
- » The NT Government committed to implementing all 135 recommendations of the NT Scientific Inquiry into Fracking (Pepper Report) and allocated \$5.33million over three years to implement the recommendations¹².
- » NTG website reports that only 58 of the recommendations are currently stated as complete (43%), 75 commenced (56%) and two not yet commenced (1%)¹³.
- » Of the 75 listed as 'commenced' many key

health, water and environmental measures have not undergone any action greater than 'initial policy development' (0% complete)¹⁴. None of the economic recommendations have been fully completed and many of the regulatory recommendations are yet to be completed including provisions for land access.

Victoria

- » The *Resources Legislation Amendment (Fracking Ban) Act 2017* was enacted to permanently ban onshore unconventional gas exploration and extraction.
- » The legislation retrospectively provided the state government protection from legal liability resulting from the ban and a government set buy back price for a limited period¹⁵.
- » The legislation stood up in the Victorian Supreme Court¹⁶ following a challenge from Lakes Oil seeking \$92million in damages for expenses incurred since the 2012 non legislated moratorium and \$2.6billion in lost future earnings. Their case was unsuccessful despite having signed letters of intent for the purchase of gas from its Wombat gas field¹⁷.
- » The court found that the intent of the legislation was unambiguous, without conflict to other provisions of the Petroleum Act and upheld the prior policy decision of the previously declared non legislated moratorium¹⁸.
- » A 2012 moratorium on onshore conventional gas extraction was lifted in March 2020¹⁹ with exploration being allowed to commence in mid-2021.

9 <https://www.sciencedirect.com/science/article/pii/S026483717305185>

10 <https://www.murdoch.edu.au/news/articles/fracking-policies-are-wildly-inconsistent-across-australia-from-gung-ho-development-to-total-bans>

11 The Australia Institute: Is fracking good for your health? An analysis of the impacts of unconventional gas on health and climate (2013)

12 <https://www.abc.net.au/news/2018-04-17/fracking-to-resume-in-the-northern-territory-moratorium-lifted/9666022>

13 <https://hydraulicfracturing.nt.gov.au/>

14 <https://hydraulicfracturing.nt.gov.au/action-items#>

15 <https://www.afr.com/companies/energy/victoria-wipes-away-liability-for-drilling-bans-20161123-gsvq8v>

16 <https://www.supremecourt.vic.gov.au/mirboo-ridge-pty-ltd-and-ors-v-minister-for-resources-2018-vsc-557>

17 <https://www.afr.com/companies/energy/victoria-wipes-away-liability-for-drilling-bans-20161123-gsvq8v>

18 *Mirboo Ridge & Ors v Minister for Resources* [2018] VSC 557 (21 September 2018) - <http://www.austlii.edu.au/cgi-bin/viewdoc/au/cases/vic/VSC/2018/557.html>

19 <https://www.afr.com/companies/energy/victoria-scraps-ban-on-conventional-onshore-gas-20200317-p54atk>

Western Australia

- » Allowed fracking up to 2017 when it placed a moratorium on all activity pending a review of the industry.
- » Fracking was subsequently banned in 98% of the state, with traditional owners and farmers having ‘...the right to say no to oil and gas production from fracking on their land.’²⁰

New South Wales

- » Fracking has been conducted on up to 85% of AGL CSG wells since 2001.
- » BTEX Chemicals are banned from use in fracking fluids.
- » A 12-month voluntary surrender scheme in 2014/15 saw the total area covered by petroleum licences reduce from 60% to less than 8% of the state²¹.
- » The cost has been significant with \$25million being paid to Metgasco for one licence amid shareholder dissent that the board caved into community pressure in making their decision²² (decision made 3-2) indicating the dangers to both the success and financial viability of buy back schemes.

Tasmania

- » A moratorium on unconventional onshore gas was imposed in 2014 for initially for 12 months while a review of the industry was conducted.
- » This has undergone a number of extensions with the most recent extending the moratorium until March 2025²³.

South Australia

- » Fracking of shale deposits have been conducted since 2012.
- » There is a 10-year moratorium on unconventional gas in the south east limestone region of the SA²⁴.

Queensland

- » Qld CSG industry has enjoyed long term bipartisan support and at the end of 2018 there were 10,664 gas wells across the state²⁵.
- » Although the majority of wells access coal seam measures 8% of the wells have already been hydraulically fracked to maximise returns. This number will increase to around 40% as other wells age and production diminishes.
- » BTEX chemicals are banned in fracking fluids.



20 <https://www.mediastatements.wa.gov.au/Pages/McGowan/2019/09/Hydraulic-fracturing-remains-banned-on-98-per-cent-of-WA.aspx>

21 <https://www.dailyexaminer.com.au/news/nsw-minister-announces-csg-buy-back/2812486/>

22 <https://www.smh.com.au/national/nsw/metgasco-accepts-25m-compensation-to-end-csg-at-bentley-in-nsw-northern-rivers-20151216-gloipi.html>

23 <http://www.mrt.tas.gov.au/portal/tasmanian-government-policy-statement-on-hydraulic-fracturing-fracking-2018>

24 <https://www.abc.net.au/news/2018-09-05/liberals-to-legislate-se-fracking-moratorium/10203578>

25 <https://www.queenslandcountrylife.com.au/story/6548577/decade-in-review-sparks-as-csg-takes-off/>

Economic Realities, Sovereign Risk and the Environment

It is a simple fact – there is too much gas in the market forcing prices down making further exploration uneconomical.

2020 is looking to be worse than the 2015 bust with a sharper drop off from an already flat and saturated market. Demand is expected to decrease by more than 7% for 2020²⁶ and is described as the sharpest decline in 70 years²⁷. The glut is not expected to clear until after 2030²⁸.

This is not simply a short-term blip caused by a COVID19-related down turn but was a well-established trend even before the pandemic forced widespread industrial closures²⁹. It has been well known since 2017 that production was far outstripping demand, with both investors and production companies taken to task for their addiction to growth and to ‘stop counting barrels and start making money’³⁰.

The result is fracking rigs across the world sitting idle³¹ including the \$200million Origin development in the Beetaloo Basin, in which Origin has indefinitely paused and exited production and exploration³². When prices are below US\$35 a barrel the cost of production exceeds cost of production and as prices rise over US\$50/barrel it begins to make gas too expensive³³ for energy production; particularly

against other power options such as renewables³⁴. Other Australian gas producers are also suspending production and deferring projects. Woodside petroleum has deferred \$60billion worth of investment decisions on its Scarborough and Browse projects³⁵. Santos has deferred a US\$4.7billion investment decision on its Barossa project³⁶ and recently relinquished two gas exploration licences in the Northern Territory³⁷.

The glut of natural gas and lack of demand is not only causing investors to suspend production and defer investments³⁸ but key players are also actively exiting the market due to concerns over sovereign risk. Traditionally sovereign risk has been associated with governments defaulting on debt or confiscating private assets such as the nationalisation of Iranian oil fields in 1951 and the Venezuelan Government seizing a General Motors plant in 2018.

More recently, however the term is being stretched to include any action or decision by a government to negatively impact a multinational company’s profitability³⁹, particularly when investment decisions have already been made on a project. It can also refer to government overregulation of a market, increased taxes and the removal of subsidies. The Commonwealth Government’s powers to reduce gas exports through the 2017 Australian Domestic Gas Security Mechanism is cited as one reason gas customers are hesitant to sign on for long term contracts⁴⁰, consequently increasing Australia’s sovereign risk.

26 <https://www.eia.gov/outlooks/steo/report/natgas.php>

27 <https://www.cnbc.com/2020/04/30/energy-demand-set-to-fall-the-most-on-record-this-year-amid-coronavirus-pandemic-ia-says.html>

28 <https://reneweconomy.com.au/origin-pulls-plug-on-gas-exploration-in-northern-territory-whos-next-32526/>

29 <https://www.csis.org/analysis/gas-glut-feels-different>

30 <https://www.wsj.com/articles/wall-streets-fracking-frenzy-runs-dry-as-profits-fail-to-materialize-1512577420>

31 <https://www.theguardian.com/environment/2020/apr/17/us-shale-industry-expected-shrink-oil-price-falls>

32 <https://reneweconomy.com.au/origin-pulls-plug-on-gas-exploration-in-northern-territory-whos-next-32526/>

33 <https://www.investopedia.com/articles/investing/072215/can-fracking-survive-60-barrel.asp>

34 <https://www.forbes.com/sites/dominicdudley/2019/05/29/renewable-energy-costs-tumble/#3d82a742e8ce>

35 <https://www.theaustralian.com.au/business/mining-energy/santos-says-sovereign-risk-sparking-cutback-in-energy-investment/news-story/ee4d802c634877f8f130a17076c22705>

36 <https://www.cnbc.com/2019/10/14/conocophillips-sells-northern-australia-assets-to-santos-for-1point39-billion.html>

37 <https://www.abc.net.au/radio/programs/nt-country-hour/nt-country-hour/12318808>

38 <https://www.afr.com/opinion/why-sovereign-risk-is-now-real-for-gas-industry-20180904-h14xbx>

39 <https://www.afr.com/opinion/why-sovereign-risk-is-now-real-for-gas-industry-20180904-h14xbx>

40 <https://www.reuters.com/article/us-eni-m-a-australia/eni-appoints-citi-to-sell-australia-gas-assets-sources-idUSKBN22R25P>

On these grounds ConocoPhillips/Santos have recently sold its shares in the Bayu-Baden Project and Darwin based Italian company Eni⁴¹ have also committed to selling out of the Bayu-Baden project as well as the NT Blacktip Gas Project, Yelcherr Gas Plant and Evans Shoal venture⁴². ExxonMobile has also recently formalised their intention to sell their Bass Strait production sites with partner BHP possibly following suit⁴³.

Domestic government decisions are not the only ones that can give rise to sovereign risk. The multinational nature of the resource industry means decisions of foreign governments and regulatory bodies can also adversely affect the viability of project investments in Australia⁴⁴.

In 2018 the European Union (EU) published its Action Plan on Financing Sustainable Growth⁴⁵ with the intention to reorient capital flows towards sustainable investment in order to achieve sustainable and inclusive growth. To enable this to occur the 'Establishment of a Framework to Facilitate Sustainable Investment' (the Taxonomy Regulation) seeks to create an EU-wide classification system (taxonomy) intended to provide firms and investors with a common framework for identifying to what degree economic activities can be considered to be "environmentally sustainable"⁴⁶.

The final draft of the taxonomy was agreed to in March 2020⁴⁷ with natural gas power production being excluded as not meeting sustainability

benchmarks. These benchmarks include not only the emissions directly related to energy production (power plant construction and power production) but the emissions, impact on water sustainability (consumption and quality) and environmental damage across the whole life cycle of natural gas from extraction to storage, transport and end use.

The priority of the EU taxonomy is to '...leverage the contribution of the private sector in order to decarbonise the European economy and meet the objectives of the Paris Agreement on climate change'⁴⁸ and even before confirmation natural gas was to be excluded European investors were already divesting themselves of risky investments. The European Investment Bank is planning to purge its investment portfolio of natural gas by 2020 and Sweden's Riksbank dumped its Queensland and Western Australian Bonds due to unacceptably high emissions⁴⁹. Bank of England Governor Mark Carney has also highlighted that the financial sector will need to become more aware of climate risk and that need will "...prompt re-assessments of the value of every single financial asset"⁵⁰ and the Norwegian central bank is also divesting itself of \$3.7billion of Australian fossil fuel shares⁵¹.

The holistic nature of the EU taxonomy in relation to natural gas may have broader implications for Australia if the sustainability taxonomy is coupled with the planned carbon tax on imports to the EU, as championed by France. The proposed carbon tax is likely to extend the sustainability benchmarks to not only produce imported from high emitting countries⁵², but also on products produced and imported to the EU by international

41 <https://www.reuters.com/article/us-eni-m-a-australia/eni-appoints-citi-to-sell-australia-gas-assets-sources-idUSKBN22R25P>

42 <https://www.afr.com/street-talk/eni-retreats-from-australian-gas-hires-citi-for-portfolio-sale-20200512-p54s1q>

43 <https://www.smh.com.au/business/companies/exxonmobil-to-formalise-sale-talks-for-bass-strait-assets-20200306-p547rc.html>

44 <https://www.afr.com/chanticleer/europe-s-heavy-blow-against-natural-gas-20200108-p53puh>

45 https://ec.europa.eu/info/publications/180308-action-plan-sustainable-growth_en

46 <https://www.ashurst.com/en/news-and-insights/legal-updates/agreement-reached-on-the-final-text-of-the-eu-taxonomy-regulation-summary/>

47 https://ec.europa.eu/knowledge4policy/publication/sustainable-finance-teg-final-report-eu-taxonomy_en

48 <https://www.euractiv.com/section/energy-environment/news/eu-tables-ground-braking-low-carbon-benchmark-for-green-finance/>

49 <https://www.theaustralian.com.au/commentary/swedish-bonds-withdrawal-may-be-the-thin-end-of-the-wedge/news-story/94df2620fd82c2ce5cafa26c58cbf497>

50 <https://www.afr.com/world/europe/sweden-sells-off-canada-australia-bonds-over-climate-change-20191114-p53akq>

51 <https://www.afr.com/companies/mining/norway-prepares-to-dump-up-to-3-7b-in-aussie-shares-20190613-p51xas>

52 Such as Australia according to UN calculations.

industries reliant on Australian natural gas⁵³. The EU's main concern about the environmental impact of natural gas centre around the fugitive releases of methane along the gas value chain⁵⁴. Natural gas releases approximately half of the CO₂ of coal which on face value make gas a more sustainable power source; however, it has been estimated that fugitive methane emissions only need to exceed 1% of total output for natural gas to be no more sustainable than coal⁵⁵. There is no universally accepted method for measuring emissions⁵⁶ and until there is it likely to be under reported by producers making it difficult for policy makers to make informed choices without falling foul of climate risk adverse investment policies. It is estimated widescale onshore gas extraction in the Territory would total 6% of Australia's total greenhouse emissions⁵⁷.

Methane has rapidly increased in the environment since 2004 and has a greater short-term heating affect in the atmosphere than CO₂, producing 86% more heat than the equivalent volume of CO₂ over a 25-year period⁵⁸. Until recently it has been assumed forest fires and agricultural land use has been the cause of this increase⁵⁹. Research by Cornell University⁶⁰ using chemical fingerprinting of atmospheric methane indicate that the rapid increase of methane is directly related to natural gas extraction with fracking accounting for over half of that amount⁶¹. This is supported by NASA research from 2018

showing natural gas accounts for 17Tg of the 25Tg of increased atmospheric methane in the decade from 2004⁶².

Unintentional methane releases from United States (US) fracking fields have been measured between 2 and 17%⁶³. In Australia the CSIRO conducted testing of fugitive methane emissions and reported little of concern however they focused on a bottom up approach and only looked at emissions from individual gas well heads not the infrastructure of seams and pipelines. In contrast Southern Cross University (SCU) conducted tests⁶⁴ for methane over Qld and NSW gas fields finding emissions were on average 3.5 times higher than expected and significantly higher than surrounding areas⁶⁵. Using chemical finger-printing the researchers from SCU were able to determine the high levels of methane in the tested areas was from gas fields as opposed to environmental or agricultural sources.

This is doubly significant considering a University of Melbourne paper in 2014 quoted CSIRO saying "*reliable measurements on Australian oil and gas production facilities are yet to be made*" and measurements are largely assumed resulting in underreporting.⁶⁶ The paper also made a distinction between 'fugitive emissions' (those emitted along the gas value chain and 'migratory emissions' that escape by '*...migrating upward and laterally out of its original reservoir, eventually reaches the earth's surface, and enters the atmosphere possibly at a considerable distance away from the site of original oil and gas, drilling or other disturbance.*'

53 <https://www.afr.com/policy/energy-and-climate/australia-is-a-prime-target-for-green-tariffs-20200127-p53uzm>

54 Regardless of extraction method

55 A Review of Current and Future Methane Emissions from Australian Unconventional Oil and Gas Production (2014) <http://climatecollege.unimelb.edu.au/review-current-and-future-methane-emissions-australian-unconventional-oil-and-gas-production>

56 Or identifying sources

57 <https://www.smh.com.au/national/fractured-future-water-fears-as-drilling-for-gas-begins-in-the-nt-20191003-p52xfj.html>

58 <https://www.scientificamerican.com/article/how-bad-of-a-greenhouse-gas-is-methane/>

59 <https://www.theguardian.com/environment/2019/aug/14/fracking-causing-rise-in-methane-emissions-study-finds>

60 <https://theconversation.com/methane-emissions-spike-natural-gas-production-fracking-and-agriculture-is-one-the-main-culprit-121868>

61 <https://www.biogeosciences.net/16/3033/2019/>

62 The remainder was attributed as 12Tg from wetlands and rice paddies and 4Tg from forest fires <https://www.nasa.gov/feature/jpl/nasa-led-study-solves-a-methane-puzzle>

63 <https://www.abc.net.au/news/2017-02-28/methane-emissions-from-coal-seam-gas-climate-change/8310932>

64 <https://www.scu.edu.au/engage/news/latest-news/2014/scu-scientists-publish-first-peer-reviewed-paper-on-australian-csg-methane-emissions.php>

65 <https://www.abc.net.au/7.30/research-questions-green-credentials-of-csg/4372348>

66 A Review of Current and Future Methane Emissions from Australian Unconventional Oil and Gas Production (2014) <http://climatecollege.unimelb.edu.au/review-current-and-future-methane-emissions-australian-unconventional-oil-and-gas-production>

In addition to undetected fugitive and migratory releases there is also the potential for accidents releasing catastrophic amounts of methane into the atmosphere. Two significant accidents in the US highlight these risks. The 2015 blowout of gas wells in Aliso Canyon, California was uncontained for 112 days releasing an estimated 134 metric kilo tonnes⁶⁷ of methane into the atmosphere, causing the evacuation of 1,700 homes and two schools for duration of the four-month period it took to cap the well. The significance of the blowout also affected California's ability to meet its emissions reduction targets effectively.

At the time of the incident atmospheric scientist Stephen Conley from University of California, stated: *"Unfortunately, this (Aliso Canyon) was not an isolated incident. These leaks happen, and they will continue to happen⁶⁸."*

In 2018 another blowout occurred in Ohio during the construction phase of an Exxon Mobil gas well. The blowout released 120 tonnes of methane per hour⁶⁹ and took the company 20 days to contain with a total of 60 metric kilotons of methane released into the atmosphere. The measurements for this blowout were taken from the European Space Agency's satellite using Tropospheric Monitoring equipment⁷⁰ (TROMPMI) and were five times more than estimated by Exxon Mobil.

Despite regular Australian gas industry statements regarding their safety and adherence to best standards⁷¹, incidents still occur⁷². In 2003 one man died after a well explosion east of Surat⁷³ and in 2011 an explosion occurred during the construction phase of an Arrow Energy well in Dalby, Queensland⁷⁴ the fourth incident relating to Arrow wells on that property⁷⁵. Interestingly in contrast to the US blowouts the Australian media and regulatory bodies fail to report or raise concern about how much methane was released in the environment as a result of these incidents.

Most of the criticism, and controversy, surrounding unconventional gas extraction is concerned with water and environmental contamination. Fugitive and migratory emissions contaminating drinking water received significant coverage in the wake of the 2010 US documentary 'Gasland'⁷⁶. The documentary focused on contamination of drinking water in areas of high gas extraction activity with sensational footage of tap water catching fire and bubbling (flammable) dams and rivers. Naturally the industry vigorously defended itself from the film's accusations stating the anecdotal methodology did not stand up to the rigorous scientific evidence relied on by industry⁷⁷ and funded a 2012 documentary 'Truthland' to rebuke many of the claims⁷⁸. Scientific research is however emerging in support of the anecdotal experience with Robert Howarth, professor of Ecology and Environmental Biology at Cornell University stating;

67 <https://www.washingtonpost.com/news/energy-environment/wp/2016/02/25/california-gas-leak-was-the-worst-man-made-greenhouse-gas-disaster-in-u-s-history-study-says/>

68 <https://www.washingtonpost.com/news/energy-environment/wp/2016/02/25/california-gas-leak-was-the-worst-man-made-greenhouse-gas-disaster-in-u-s-history-study-says/>

69 <https://www.nytimes.com/2019/12/16/climate/methane-leak-satellite.html>

70 <https://www.pnas.org/content/116/52/26376>

71 <https://stockhead.com.au/energy/australian-govt-calls-for-more-gas-exploration-after-research-finds-fracking-safe/>

72 <https://aidanricketts.com/contaminated-sites-and-accidents-related-specifically-to-csglng-in-australia/>

73 <https://www.energynewsbulletin.net/drilling/news/1058330/myall-creek-rig-super-died-protecting-others>

74

75 <https://www.beefcentral.com/news/dalby-well-blow-out-sent-gas-90m-in-air-landholder/>

76 <http://one.gaslandthemovie.com/home> and <https://www.hbo.com/documentaries/gasland-part-ii/synopsis>

77

78 <https://www.thenation.com/article/archive/fracking-industrys-dishonest-response-gasland/>

“The best evidence indicates widespread contamination of drinking water wells within 1 kilometre of gas wells, and the rate of venting and leakage of methane to the atmosphere is sufficient to give shale gas a larger greenhouse gas footprint than any other fossil fuel.”⁷⁹

Methane escaping into water has also been documented on the Condamine River near Chinchilla in Queensland, an area with significant CSG extraction activity and many domestic and stock wells are expected to be impacted⁸⁰. Although CSIRO research declared the leaks to be ‘naturally occurring’⁸¹ researchers from University of NSW, Connected Waters Institute, countered that there is not enough research to determine the long-term impact of CSG extraction and fracking on local aquifers. Their research has determined contamination and depressurisation and gas seepage can occur many kilometres from the original well site, particularly where fissures caused by fracking extend into porous or cracked rock allowing gas to escape to the surface. This is particularly so for the deeper aquifers contained in rock and shale formations where there is very little data⁸² compared to shallower aquifers in sand formations.

Apart from methane contaminating surface water and domestic drinking water aquifers, many hazardous chemicals are used in the fracking process. Chemicals are used to improve extraction by altering surface tension between the water and gas (improving viscosity), dissolve minerals, stabilise clays, prevent corrosion⁸³ and biocides to prevent biological growth in the well⁸⁴. This creates potential for contamination both in the drilling/extraction stage and with storage and transport of those chemicals throughout the lifecycle of the well. These chemicals include methanol, BTEX⁸⁵ compounds, lead, hydrogen fluoride, naphthalene, sulphuric acid, formaldehyde and arsenic⁸⁶.

Across the industry there are over 1,000 different products used in CSG and Shale fracking⁸⁷. Only a small number of these have CAS registry numbers listed on their MSDS sheets, this makes it very difficult to search for any environmental or health data on that product⁸⁸. A 2016 report⁸⁹ by scientists from Yale University, published in Journal of Exposure Science & Environmental Epidemiology⁹⁰, noted of the 1,041 fracking chemicals examined 73% did not have sufficient CAS registry information to determine toxicity levels. Of the 240 chemicals that had CAS registry numbers many are known to have reproductive toxicity (43%) or developmental toxicity (40%) or both (41%).

79 <https://www.safewater.org/fact-sheets-1/2017/1/23/fracking>

80 <https://www.chinchillanews.com.au/news/farmer-speaks-out-about-csg-impact-on-water-aquife/3772121/>

81 <https://theconversation.com/river-on-fire-even-if-its-not-coal-seam-gas-we-should-still-be-concerned-58718>

82 <http://www.connectedwaters.unsw.edu.au/research/projects/fractured-rock-systems>

83 <http://www.connectedwaters.unsw.edu.au/articles/2012/11/whats-hurry-csg-fracking>

84 National Toxic Network [Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate](#)

85 Benzene, toluene, xylene, and ethylbenzene

86 <https://www.businessinsider.com.au/scary-chemicals-used-in-hydraulic-fracking-2012-3#btext-compounds-2>

87 <https://www.nature.com/articles/jes201581>

88 National Toxic Network [Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate](#)

89 https://www.huffingtonpost.com.au/entry/fracking-fluid-health-study_n_568db472e4b0cad15e636b70?ri18n=true

90 <https://www.nature.com/articles/jes201581>

In Australia out of the 23 toxic chemicals known to be used by the industry only two have been assessed by National Industrial Chemical Notification and Assessment Scheme and neither of those two chemicals have been specifically assessed for their role in drilling or as hydraulic fracturing fluid⁹¹. Neither are chemicals used consistent across the industry with many companies having proprietary blends protected against full disclosure by commercial in confidence provisions. This causes problems with independent analysis of water for contaminants as many analytic labs either don't test for specific compounds used by individual companies or don't have the equipment to correctly test and identify the chemicals⁹².

Not only are hazardous chemicals being used in the drilling/fracking phase but other contaminants sequestered in the shale deposits are brought back to the surface in the flowback fluid⁹³; these can include natural salts, heavy metals, hydrocarbons and radioactive materials⁹⁴.

Currently only the chemicals used in the fracking fluids are required to be disclosed but there is no requirement in the Northern Territory for flow back fluids to be publicly reported on. Even if regulations required companies to fully disclose compounds within their fracking fluids testing regimes would have to be vigilant for unknown contaminants released from within the shale reserve.

The volume of water required for each well is also significant. It is estimated that there could be up to 1200 wells drilled over a 25-year period⁹⁵ with each well needing up to 80ML of water;

“Typical water volumes used are around 1–2 ML for well drilling, and approximately 1–2 ML for each hydraulic fracturing stage. In the US, the most recent long horizontal wells have required 30–40 fracturing stages. Recent indications are that this is analogous to any onshore shale gas industry to be developed in the NT⁹⁶.”

This would be of concern in the Beetaloo Basin where annual recharge of ground water is very slow at around 1m/year⁹⁷. **The Pepper Report also stated that surface water access for hydraulic fracturing should be prohibited⁹⁸ and there was “...not enough information for most of the onshore shale gas regions in the NT to be able to estimate the sustainable groundwater yield for any onshore shale gas industry⁹⁹” and there was “...insufficient information to permit a full assessment of the risks to groundwater resources from any shale gas industry established in the Beetaloo Sub-basin¹⁰⁰”.**

91 National Toxic Network [Hydraulic Fracturing in Coal Seam Gas Mining: The Risks to Our Health, Communities, Environment and Climate](#)

92 <https://www.scientificamerican.com/article/fracking-can-contaminate-drinking-water/>

93 <https://www.ecowatch.com/meet-anthony-ingraffea-from-industry-insider-to-implacable-fracking-op-1881680606.html>

94 <https://www.nature.com/articles/477271a>

95 <https://www.smh.com.au/national/fractured-future-water-fears-as-drilling-for-gas-begins-in-the-nt-20191003-p52xfj.html>

96 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 9

97 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 17

98 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 17

99 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 16

100 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 17

The water returning from the fracking process and separated from the gas is highly saline and contaminated with both the fracking compounds and other naturally occurring contaminants. While a quantity of this water is likely to be reused within the fracking process the Pepper Report recommended against the release of treated or untreated wastewater into surface water systems due to the difficulty in predicting “...the behaviour of any contaminants discharged to such systems. In particular, the variable nature of these temporary streams and waterholes would make it likely that discharged contaminants would be trapped in the waterholes left after the temporary streams ceased to flow”. Reinjection was also dismissed as an option due to risks associated with seismic activity and the consequences in the Territory geology not being fully investigated¹⁰¹.

It is likely the real impact of fracking in the NT would not outweigh the potential environmental and social impacts. Economic modelling undertaken by ACIL Allen Consulting as part of the scientific assessment of Fracking in the NT stated that regardless of whether the fracking moratorium was lifted or not key economic indicators for the NT would grow in the period to 2043¹⁰².

In the best economic scenario large scale gas production (GALE scenario) would only represent a 1.4% increase to the revenue base of the NT¹⁰³ from annual royalty income. The report also considered it highly likely that any royalty income would be ‘equalised away’ to other State and Territories in the GST distribution process¹⁰⁴. Further income from payroll tax and other duties is only likely to contribute \$11.1 million per annum in a maximum production scenario. Other estimated inputs into the economy include \$250,000 per pad to pastoralists during the production phase and Native Title payments estimated at 3% of proponent exploration costs and 10% of royalties during the production phases¹⁰⁵.

Given the negative job and economic impact experienced in the Territory after the completion of the construction phase of Inpex¹⁰⁶ any projected job growth would have to be questioned. It is estimated between 82 and 524 FTE jobs would be created with the construction phase favouring skills related to engineers, drillers, logistics personnel and labourers and engineers, geoscientists and technicians will compromise the bulk of the workforce in the production phase¹⁰⁷. Although the NTG has indicated the bulk of these jobs will be from home grown skill development programs however it is likely that many of the technical skillsets will be sourced from other jurisdictions in a fly-in-fly-out model used to support the Inpex construction.



101 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 20

102 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 45

103 THE ECONOMIC IMPACTS OF A POTENTIAL SHALE GAS DEVELOPMENT IN THE NORTHERN TERRITORY, p 151

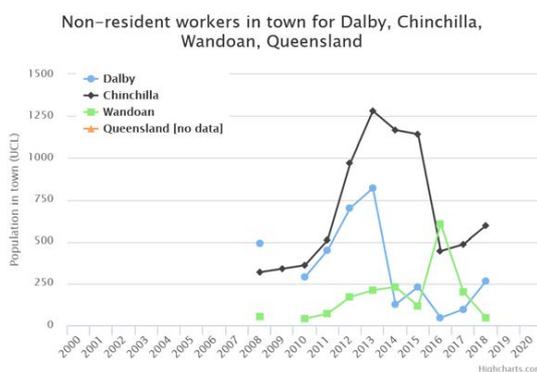
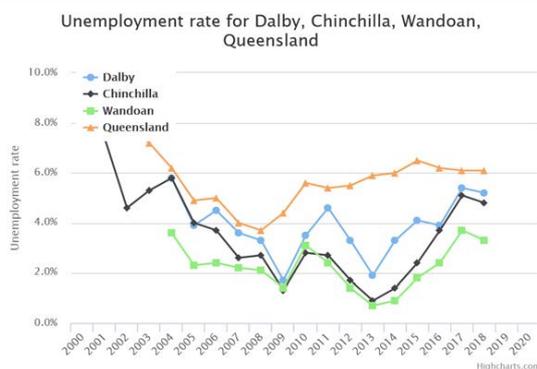
104 THE ECONOMIC IMPACTS OF A POTENTIAL SHALE GAS DEVELOPMENT IN THE NORTHERN TERRITORY, p 152

105 THE ECONOMIC IMPACTS OF A POTENTIAL SHALE GAS DEVELOPMENT IN THE NORTHERN TERRITORY, p 49

106 <https://www.abc.net.au/news/2019-03-29/nt-economic-depression-after-inpex-gas-boom/10947972>

107 THE ECONOMIC IMPACTS OF A POTENTIAL SHALE GAS DEVELOPMENT IN THE NORTHERN TERRITORY, p 155

One of the biggest draw cards for the unconventional gas industry is the number of jobs the industry brings to regional areas. In reality the highly specialised workforce is extremely mobile. Trades and unskilled labour are utilised for a very short period during the construction phase but are not required once the gas industry enters the production phase, they move on to the next project. Total FTEs across multiple projects are accumulated and promoted however the same employee is often rehired on a new project in the same role by the same company. The experience in Qld reflects this trend the following graph demonstrates a sharp rise in unemployment after the Darling Downs construction phase finished in 2014 and the high number of non-resident workers during individual regions construction.¹⁰⁸



There is very little benefit from unconventional gas exploration to the community most impacted by the industry. What little advantage there is, is short lived and often comes with a sizable hangover in the shape of business closures, community disruption and population dispersal¹⁰⁹. Concerns by impacted communities about environmental and social risk are either summarily dismissed or seen simply as an engineering problem that needs to be managed and overcome.

Overcoming community resistance to unconventional gas exploration is a key pre-requisite the industry is very aware of. In 2012 the International Energy Agency (IEA) published 'Golden Rules for a Golden Age of Gas' acknowledging that "...governments, industry and other stakeholders must work together to address legitimate public concerns about the associated environmental and social impacts."¹¹⁰. These rules have essentially underpinned an aggressive hearts and minds campaign to targeting local communities.

The application of the Golden Rules in the context of the Qld CSG industry was assessed by UQ 2017. The report noted that comments by respondents;

"...point out that the Golden Rules have a distinctly industry-centric framing. The rules are framed around a set of standards for what industry and governments should "do" in a set of key risk areas in order to be granted acceptance by the community. The assumption contained within this approach is that if company or government performance is of certain kind, community acceptance will follow. These comments, and the fact

108 <https://boomtown-indicators.org/compare>

109 Inquiry into fly-in, fly-out and other long distance commuting work practices in regional Queensland (report 9 55th Parliament) - Infrastructure, Planning and Natural Resources Committee October 2015

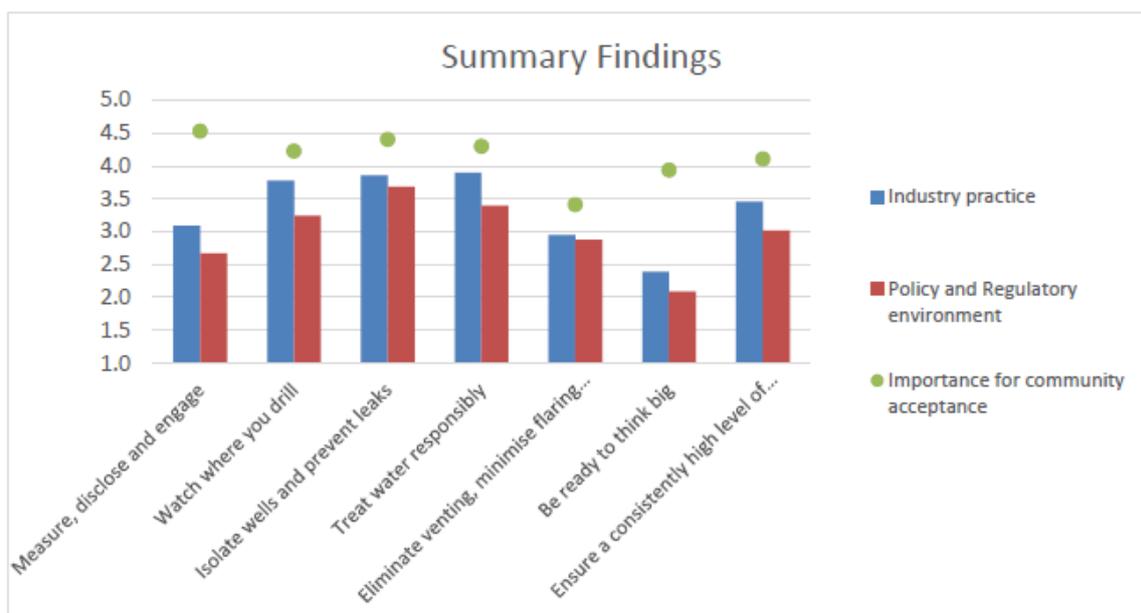
110 <https://www.iea.org/news/iea-sets-out-the-golden-rules-needed-to-usher-in-a-golden-age-of-gas>

the rule cluster focusing on community engagement and benefit sharing was rated highest for community acceptance by respondents, suggests that the rules themselves, as well as industries wishing to improve their performance, would do well to place the community experience in the centre¹¹¹.”

The report also noted the precarious role of government as both enabler and regulator of the industry with the ‘policy and regulatory environment’ component of each rule consistently rated lower than ‘industry practice’. Community comments reflected that the community opinion of the government was ‘absent’ and ‘bungling’ and they felt abandoned by a government ‘supportive of the industry as demonstrated in their unwillingness to restrict it’.

Government has attempted to address the lack of trust in the industry by increasing and making publicly available robust scientific studies demonstrating the low environmental impact and risk of the industry. This was also a recommendation by IEA who identified the cost to industry would be small – around 7% for a normal shale gas production site and would likely be offset by lower operating costs on bigger projects¹¹².

In 2011 QGC and Australia Pacific LNG partnered with CSIRO to form the Gas Industry Social and Environmental Research Agency (GISERA) to address “...the potential social, economic and environmental challenges and opportunities of the gas industry¹¹³” in Qld with a combined investment of \$15million over 5 years. In 2016 GISERA expanded to include AGL, Santos and Origin Energy with additional funding coming from NSW government and an expanded scope to conduct research in NSW.



111 Golden rules report p 25

112 <https://www.iea.org/news/iea-sets-out-the-golden-rules-needed-to-usher-in-a-golden-age-of-gas>

113 Originenergy.com.au - Our Approach - Gisera Jan 2016

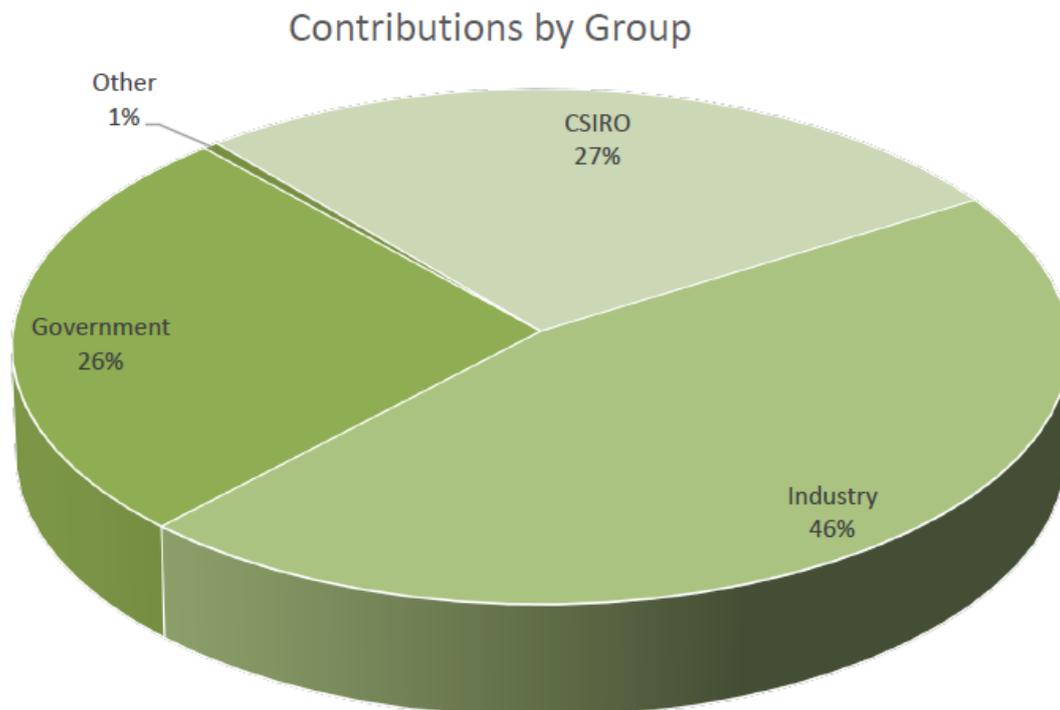
Over \$35million has been contributed to GISERAs with 46% (\$13.5million) coming from industry¹¹⁴;

While significant funding of research by industry is not uncommon it is concerning that industry representatives dominate appointments to GISERA's advisory committees. The industry has a lot to gain by proving

GISERA has a number of advisory committees established to direct funding and research. The National Research Management Committee (NRMC) has overall strategic management and control of GISERA¹¹⁵, reviews and approves research projects and approves allocation of funding, instructions provided to the Director of GISERA by NRMC must be complied with¹¹⁶.

The NRMC is made up of majority representatives from the gas industry; five industry representatives, three from CSIRO and one government representative. Decisions do not need to be voted on however if they do votes are made with a simple majority, with committee members allowed to vote in the best interests of the company they represent¹¹⁷. This of itself is concerning, as even with an equalisation process in place to minimise advantage of greater numbers, the persuasiveness of five industry voices over three others cannot be underestimated.

Committed contribution over life of GISERA, by group



114 GISERA Annual Research Development Plan and Budget 2019-20, p 14-15

115 3.5(a)

116 3.5(b)

117 The chair is from CSIRO but has no voting rights - <https://gisera.csiro.au/research-independence/national-research-management-committee/>

The Regional Research Advisory Committee (RRAC) is advisory in nature and gives research recommendations to the NRM. Each RRAC and is made up of one member per industry member, one CSIRO member and equal to industry representation and independent members as nominated by the NRM. Most RRACs have 50/50 representation between CSIRO/Industry and independent appointments however the high representation of industry on the NRM could easily predispose selection of RRAC independent appointments to bias.

The validity of the research itself and integrity of the scientists involved in the research is not the issue. It is the considerable influence of industry on both the NRM and individual RRAC that has significant scope for undue influence and bias. Many of the research programs are conducted with small sample sizes, short research periods and limitations set by industry on research scope and access to sources.

Industry imposed restrictions have been noted for a GISERA projects in Qld. For a project measuring methane emissions at well heads industry provided researchers with a list of wells available to be monitored (limited to production wells not those under construction or decommissioned). Of those wells made available by industry only 43 wells were chosen to take measurements from in a region that possesses over 5000 active wells¹¹⁸. A sample size of 0.83%

There was also a considerable degree of industry influence in the baseline methane emissions measurement project in the Beetaloo sub-basin. This research was conducted between July 2018 and March 2019. The project scope providing for vehicle mounted monitoring and by static broad-scale landscape background monitoring during the wet season due to predictions of unreliable road access. Each of the three research phases was for monitoring to occur between a 10-14 period traveling by roads and tracks anticipating up to 2000 km travelled per phase.

The project was paid for by NTG¹¹⁹ and the roads and tracks covered during the survey were at the guidance of Santos, Origin and Pangea¹²⁰, with further input from the resource industry relating to specific sites to be monitored. With the exception of the first monitoring period during the dry season of 12 days, the fire season study period of nine days and the wet season monitoring of seven days did not meet the minimum monitoring period for each phase set out by the project's scope¹²¹.

This short-term nature of the monitoring method was mentioned as a disadvantage in the final report along with the limitations set by being constrained to trafficable roads and tracks and favourable wind conditions. The project was further hampered by high heat and humidity affecting equipment, an unequal coverage of the research area by accessible roads and tracks, many planned routes not able to be accessed due to poor conditions.

Ultimately the main issue undermining the true independence of GISERA's research is that if unconventional gas exploration and production is as safe, as the industry argues¹²², there should be no need for industry to have such a significant influence on the decision making process of this research body. Especially where one of the stated aims of GISERA is to provide research, knowledge and opportunities to the gas industry¹²³.

118 <https://www.tai.org.au/content/gisera-and-threat-independent-science>

119 \$305,000

120 Final Report, p

121

122 Based on their own internal research which they won't release

123 2.2(a)

Robust regulations, monitoring and transparency is at the heart of gaining any social licence to undertake unconventional gas exploration and production. The government in its role of both enabler and regulator needs to implement regulatory framework that can keep abreast of developments in the industry protecting economic environmental and social priorities. These protections need to be relevant and enforceable during the both the exploration and production phase but well into the future ensuring any future impacts are borne by the company or industry responsible¹²⁴.

Even in Qld where water regulatory frameworks for water quality and well integrity have been described as ‘exemplary’, ‘world leading’ and ‘world class’¹²⁵ a recent report has highlighted several significant failures on departmental implementation of the regulations and industry oversight. The Qld Auditor General was critical of the departmental regulators ability to provide sufficient information on CSG related activities to determine whether the industry was being regulated in a manner to ensure it remained compliant with tenure and environmental obligations. The Auditor General was also critical that the Gasfields Commission “...is not performing its legislated oversight function”¹²⁶. The report also highlighted the inability for information to be shared between agencies inability for landholders to access information relevant to their land during land access negotiations with the resource industry.

Regulatory reform was a key area addressed by the Pepper Report with the report stating the public had an “acute lack of confidence” in the current regulatory framework. Key areas that the Inquiry sought to implement into law include; mandate transparency and accountable decision-making; mandate regular and rigorous monitoring and enforcement regimes; and impose tough penalties for non-compliance¹²⁷. Many of these areas have not been fully implemented despite gas activities being allowed to recommence¹²⁸.

Recommendations relating land access agreements are not fully implemented leaving landholders and communities subject to existing exploration and production permits in limbo particularly in regards to public liability¹²⁹, water draw-down of existing bores and the responsibility for long term impacts after decommissioning of exploration and production wells.

124 <https://www.sciencedirect.com/science/article/pii/S0264837717305185>

125 UQ review of Golden Rules for Gas in Qld context 2018, p 4 - PDF report accessible <https://natural-gas.centre.uq.edu.au/project/golden-rules-gas>

126 <https://www.abc.net.au/news/2020-03-09/audit-questions-confidence-in-csg-regulation/12026136>

127 SUMMARY OF THE FINAL REPORT - SCIENTIFIC INQUIRY INTO HYDRAULIC FRACTURING IN THE NORTHERN TERRITORY, p 48

128 <https://hydraulicfracturing.nt.gov.au/action-items#>

129 https://www.lockthegate.org.au/broker_farm_insurance_wont_cover_fracking_risks

