

# The Australia Institute

Research that matters.

**Presentation to the Scientific Inquiry into Hydraulic  
Fracturing in the Northern Territory: Greenhouse gas  
emissions.**

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# The Australia Institute

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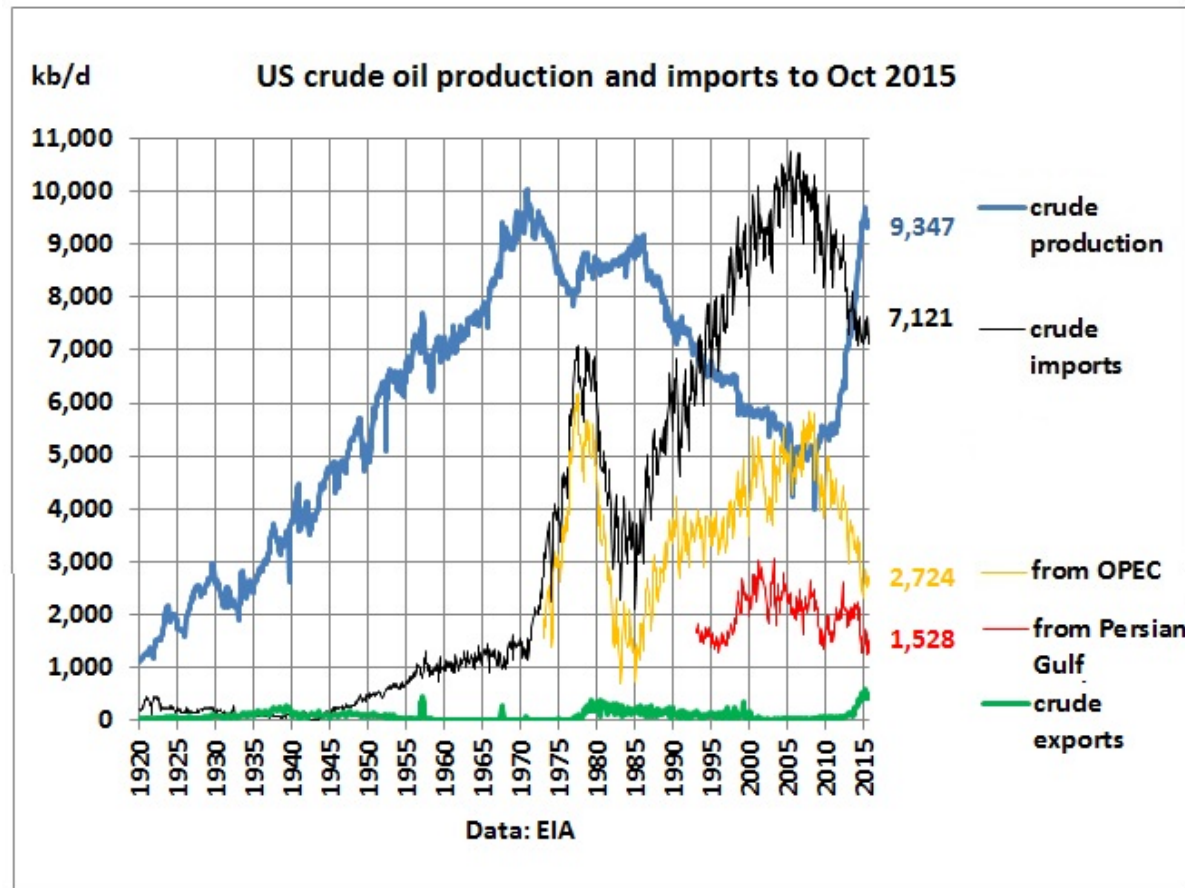
- Independent climate and energy research for over 20 years.
- Body of research on unconventional gas impacts over the last five years.
- Publish the National Emissions Audit.
- Climate and Energy program, continuing the work of The Climate Institute.
- Commissioned 2 reports from University of Melbourne, on methane emissions cited in the DFR.
  - Forcey and Leffluer (2016), Review of Methane emissions from unconventional gas in Australia, MEI/ UoM.
  - Laffleuer (2016), The risk of migratory emissions from QLD CSG. MEI/ UoM.
- Submission on economic impacts to Inquiry

Ian Dunlop,

“... in addressing the potential impact of NT fracking on global and regional climate change, it is fundamentally flawed, as it ignores the systemic existential risk which is now being locked in by global climate inaction, none more so than in Australia”

“...To suggest that the development of a major shale gas hydraulic fracturing industry in the NT would have negligible impact on global climate warming, and that the associated emissions, whether fugitive or life cycle, represent a medium risk of low consequences, demonstrates a serious failure to understand the existential nature of climate change risk, and its potentially catastrophic impact on the NT, Australia and humanity in general.”

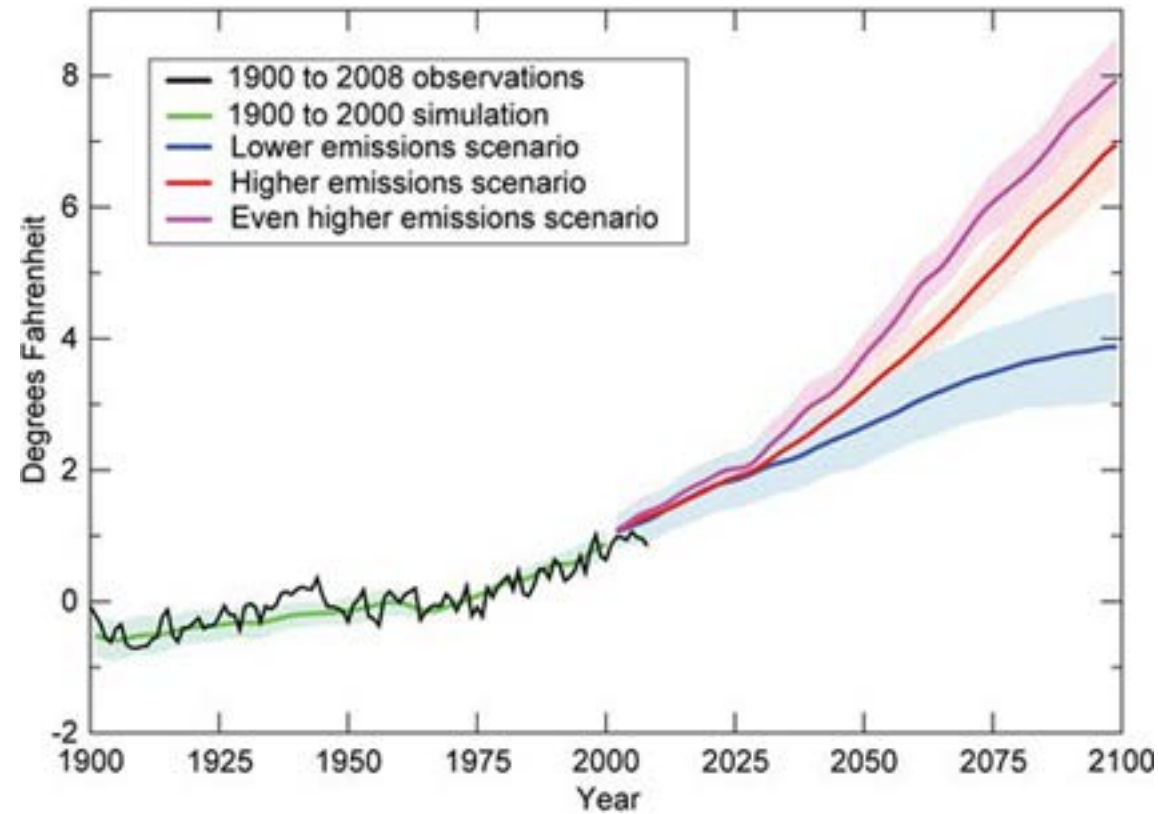
“...the ‘shale gale’ gas revolution turned the US from an energy importer into an energy exporter.”  
....Inquiry report P 5



“Shale gas is a form of natural gas and is an important source of energy in the Australian energy market.” S. 9.9.1 ??

- Australian shale oil production is currently zero

World bank 4-5 degree warming “incompatible with an organised global community”,



# Global warming getting real in the NT

- Darwin days over 35 degrees C
- 2017 = 11
- 2070 = 308 (without global action to reduce emissions) [Australian Government 2017]
- Heatwaves kill more Australian than all other natural disasters combined. [Hughes et.al. 2016]

Hughes et.al. (2016): <https://www.climatecouncil.org.au/silentkillerreport>

Australian Government: <http://www.environment.gov.au/climate-change/climate-science-data/climate-science/impacts/nt>

Does the Inquiry really believe that increasing Australia's emissions by 5% per gas field is a “low consequence” ?

- *GHG emissions from any new onshore shale gas field in the NT (producing 1,000 TJ/day or 365 PJ/y) **would contribute around 5% of Australian GHG emissions** and on a global basis, 0.05% of global GHG emissions [P9 Draft Final Report]*
- *Consequence - **low**, given that GHG emissions (from any new shale gas field) will contribute a very low proportion of net global GHG emissions [Risk Matrix P22 Appendix 4]*



# Australia's Paris Commitments

- 26 - 28% below 2005 levels by 2030
- Which industries does the Inquiry believe should shoulder the additional 5% emissions reduction to make room for each new gas field in the NT?

# Does the Inquiry believe that emissions equivalent of 22 % of Australia's emissions is acceptable?

**Table 9.4:** Quantity of life cycle GHG emissions and comparison to the total GHG footprint for Australia.

Total gas production TJ/day	Location of emissions	Life cycle GHG emissions <sup>148</sup> per year Mt CO <sub>2</sub> e/y	Proportion of Australia's emissions for 2015 <sup>149</sup> %
	Based on a 100-year GWP (= 36)		
1,000 <sup>150</sup>	Australia	26.5	4.5
200	Australia	5.3	0.9
3,400 <sup>151</sup>	Australia	38.9	6.6
3,400 <sup>152</sup>	Australia and overseas <sup>153</sup>	98.8	
	Based on a 20-year GWP (= 87)		
1,000	Australia	31.6	3.9
200	Australia	6.3	0.8
3,400	Australia	56.2	7.0
3,400	Australia and overseas	116.3	

# Terms of Reference

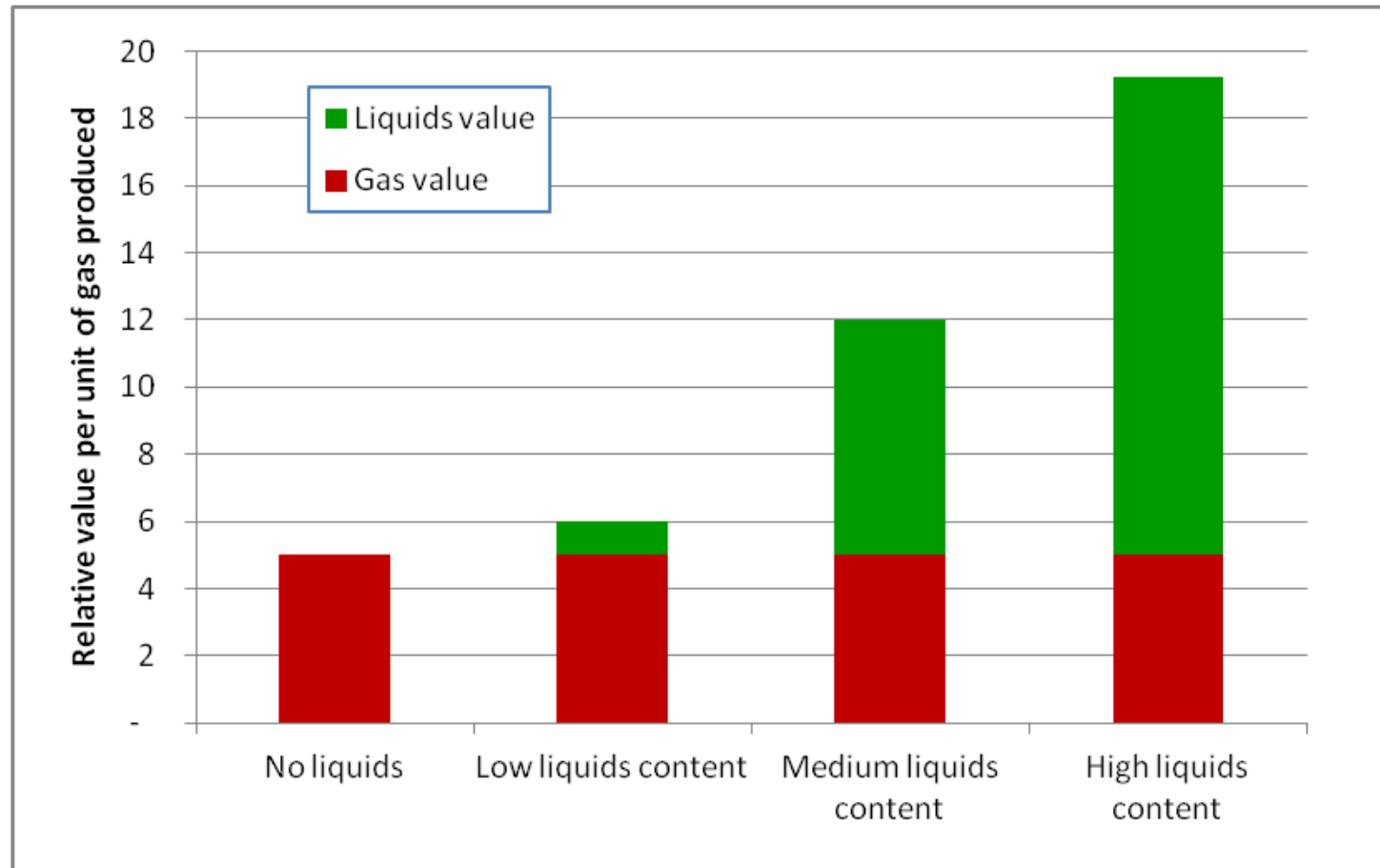
1. assess the scientific evidence to determine the nature and extent of the environmental impacts and risks, including the **cumulative impacts** and risks, associated with **hydraulic fracturing of unconventional reservoirs** and the Associated Activities in the Northern Territory.

- Why only one gas field?
- Why ignore shale oil?

# Why was shale oil ignored in the DFR?

- US EIA assesses 4.7 bbl recoverable shale oil in NT
- Likely to be a “key driver” of development Geoscience Australia
- Proponents actively and publicly targeting shale plays in NT
- US shale fracking largely driven by liquids. Most basins produce both Shale oil and gas

# Illustration of relative gas and liquid hydrocarbon values.



(Gas valued at \$5/GJ and liquids at \$50/bbl.)

Source: Forcey T, (2018) Inquiry submission.

# One gas field of 365 PJ/y....really?

## **Marcellus Shale**

- Resource 224,000 PJ, smaller than NT (257,276). [source: EIA (2015)]
- Production 6860PJ/y (2017). Source [EIA 2017]

## **Queensland CSG**

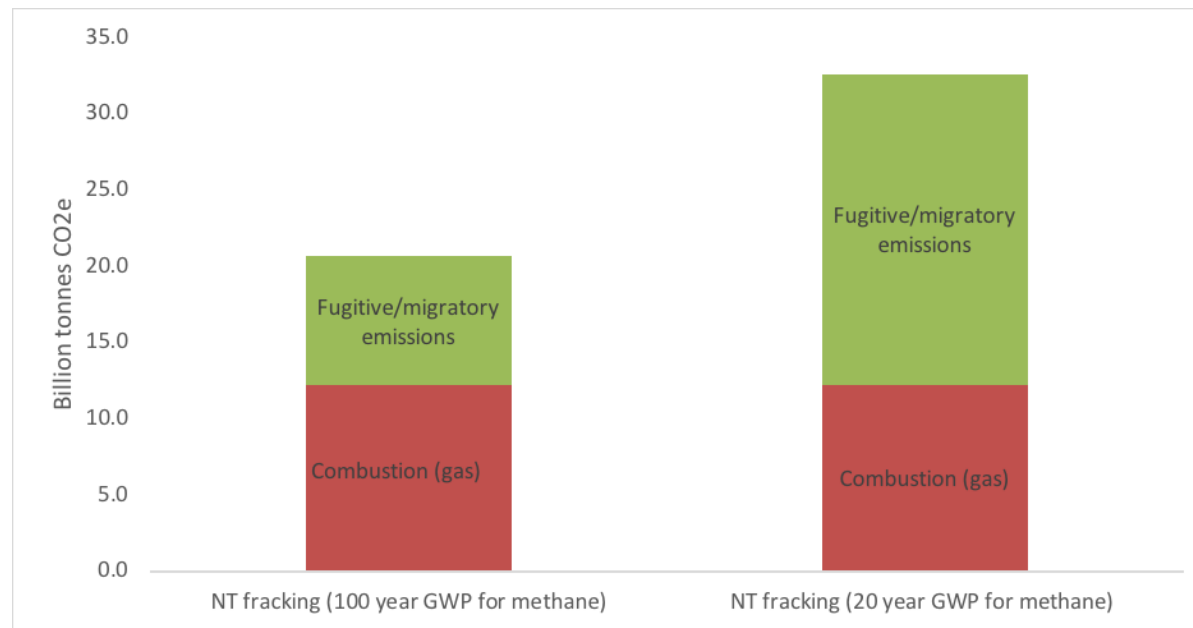
- Smaller resource (around 130,000 PJ, half NT) [AEMO 2017]
- Zero to 1500 PJ year in under 8 years

EIA 2015: <https://www.eia.gov/outlooks/aeo/assumptions/pdf/oilgas.pdf>

EIA 2017: [https://www.eia.gov/naturalgas/weekly/img/201712\\_monthly\\_dry\\_shale.png](https://www.eia.gov/naturalgas/weekly/img/201712_monthly_dry_shale.png)

AEMO 2017: <https://www.aemo.com.au/Gas/National-planning-and-forecasting/Gas-Statement-of-Opportunities>

257,276: PJ equivalent to 50- 130 coal power plants running for 40 years



Assumes 5% methane emissions

Comparison of “fugitive emissions” to total CO2 warming is misleading and incorrect.

- ***“annual fugitive methane emissions from natural gas production are about 0.2% of the annual anthropogenic greenhouse warming effect of carbon dioxide (based on data over the past decade).”***
- What is the purpose of this comparison? The warming impact of subset of gas emissions compared to total carbon dioxide emissions. The report is on Greenhouse gas emissions not “fugitive emissions”.
- Calculations: Footnote 17 (**=2.3% x 0.19 x 0.33**).



2.3%

- “the climate effect of methane compared to the annual added climate effect of anthropogenic carbon dioxide greenhouse effect *over the decade.*”
- Uses **incorrect GWP** (36 X CO<sub>2</sub>) 100 year for decadal calculation.
- Using correct GWP (110 x CO<sub>2</sub> IPCC) the climate effect is **7%**
- Using radiative forcing it is 6%

# 0.19

*The proportion that fossil fuel methane emissions make up of total global methane emissions.*

- This comparison is misleading. It **includes natural sources** such as swamps. Only anthropogenic sources should be used as we have no control over natural sources.
- On a 558 Mt<sub>25</sub> CH<sub>4</sub> budget, 59% is anthropogenic (328Mt CH<sub>4</sub>). Of that 328Mt, 105Mt comes from fossil fuels, representing **32%** of the total anthropogenic budget, rather than 19%.

0.33

“fugitive emissions from natural gas are one third of the emissions from fossil fuels globally”

- Why are oil emissions not included in this? NT fracking will include shale oil, so oil emissions should be included in the comparison.
- Oil and gas are believed to make up two thirds of man fossil fuel methane emissions, so this comparison should use **0.66**

# The missing 18%!

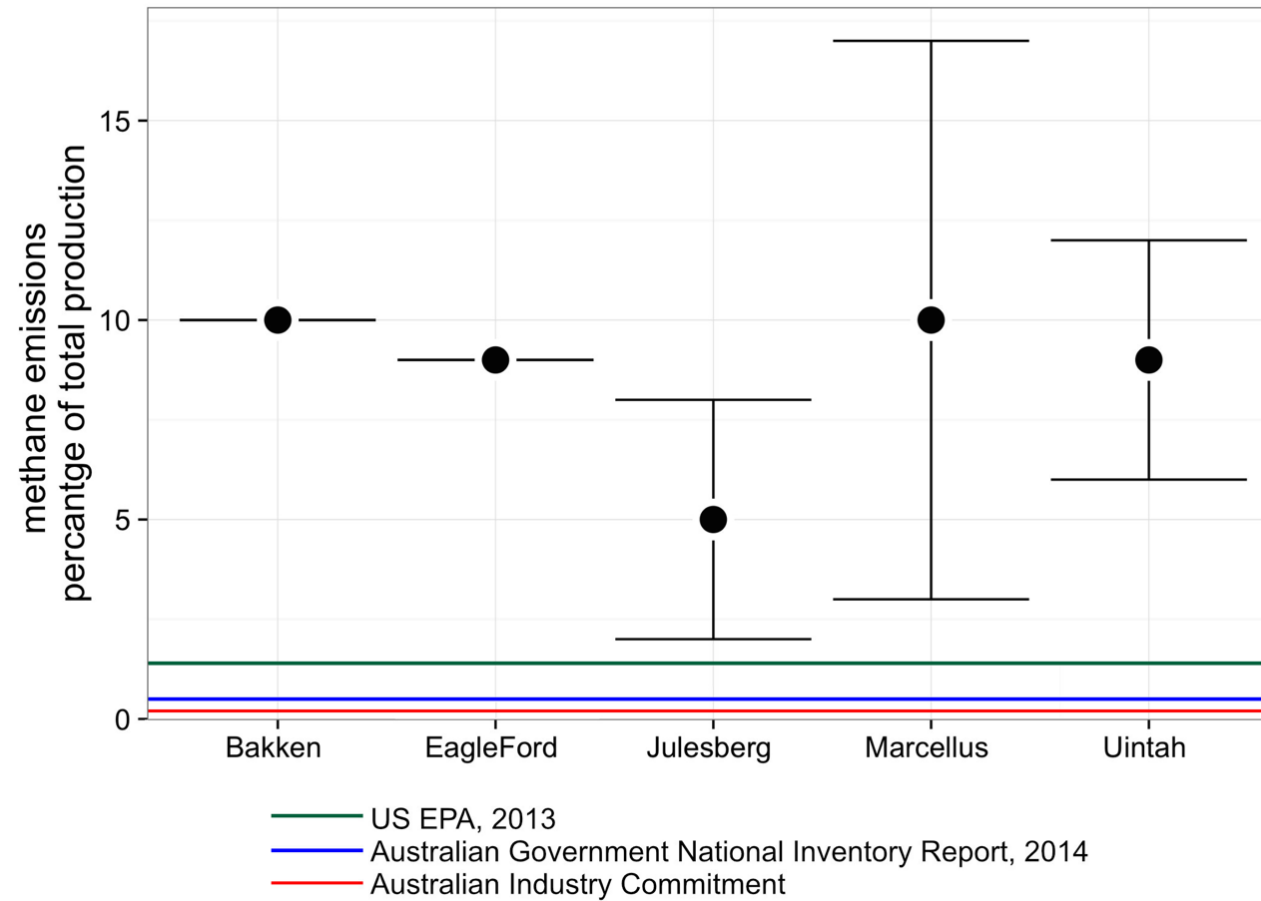
*“The most glaring omission is that is the effect of methane emissions from gas production are being compared to the total global carbon dioxide emissions, without acknowledging that 18.2% of the carbon dioxide emissions come from that same gas production” !*

Dimitri Laffleur submission

# Decline in fossil fuel methane as a % of global methane is incorrect

- Both global and US methane emission have increased recently. US methane emissions are thought to be 30% of global increase, coinciding with US shale expansion.
- *DFR: “Schwietzke et al noted that methane emissions from natural gas as a fraction of production have declined from approximately 8% to 2% over the past three decades”.*
- This is outdated. NOAA/ NASA research Worden et.al. reconciled methane budget anomaly finding that in fact both methane and agricultural emissions had increased, **fossil fuel methane has increased by 12-19Mt/y CH<sub>4</sub>** ...coinciding with US shale expansion.

# Measured methane emission up to 17% of production

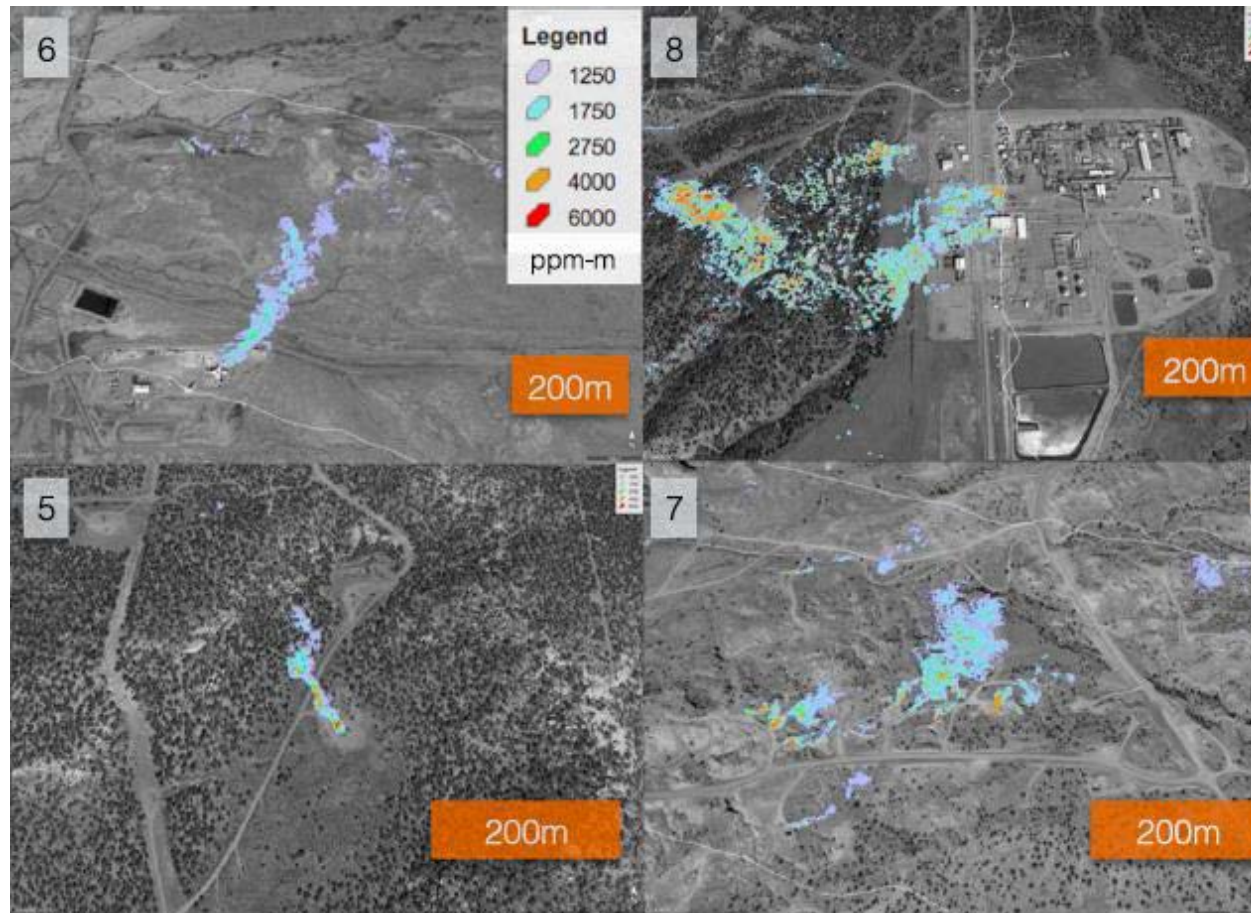


# Top down v bottom up

*...in particular, it is difficult, if not almost impossible, to distinguish between the many sources of emissions when considering the results from 'top-down' investigations. DFR*

This is incorrect, all the main top down studies distinguish between sources of methane.

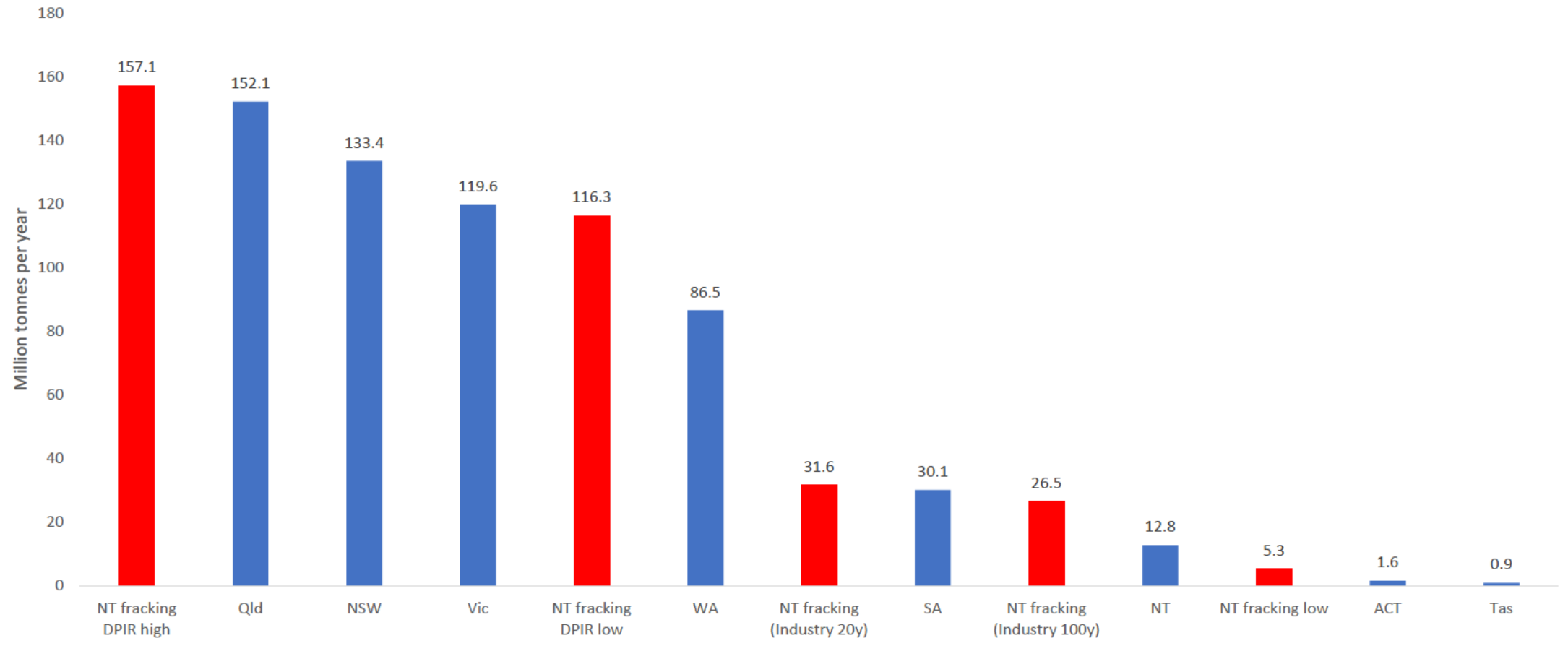
Frankenberg et.al. (2016) used top down infrared imaging able to accurately identify individual methane plumes as small as 2 kg per hour.





# Recommendation

That development of gas fields in the Northern Territory should **not** go ahead under any circumstances, regardless of the level of fugitive emissions from the hydraulic fracking operations.



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