Australian Petroleum Production and Exploration Association Submission #465



First Floor 48-50 Smith Street Darwin NT 0800

> GPO Box 1782 Darwin NT 0800

p: +61 8 8943 0675 e: darwin@appea.com.au w: www.appea.com.au

11 September 2017

Justice Rachel Pepper Chair Scientific Inquiry into Hydraulic Fracturing in the Northern Territory GPO Box 4396 Darwin, NT 0801, Australia

Email: fracking.inquiry@nt.gov.au

Dear Justice Pepper,

Please find attached a further submission to your Inquiry from the Australian Petroleum Production & Exploration Association.

This submission responds to several questions on notice and other matters which arose during APPEA's second appearance before the Inquiry Panel in Tennant Creek on 10 August 2017. It also provides commentary on some issues addressed in the Inquiry's Interim Report, dated 13 July 2017.

APPEA looks forward to continued engagement with the Inquiry on your important work. Please contact should you or your staff wish to discuss any aspect of this work.

Sincerely,

Matthew Doman Director – South Australia/Northern Territory

Adelaide +61 8 7087 7111 adelaide@appea.com.au Brisbane +61 7 3231 0500 brisbane@appea.com.au Perth +61 8 9426 7200 perth@appea.com.au



the voice of australia's oil and gas industry



11 September 2017

# Scientific Inquiry into Hydraulic Fracturing in the Northern Territory – Additional Comments on Interim Report and Public Hearings



### Contents

3
3
8
2
16
20
28



### Introduction

This submission responds to several questions on notice and other matters which arose during APPEA's second appearance before the Inquiry Panel in Tennant Creek on 10 August 2017. It also provides commentary on some issues addressed in the Inquiry's Interim Report, dated 13 July 2017.

This submission should be read in conjunction with APPEA's first submission to the Inquiry, dated 30 April 2017, a supplementary submission dated 30 June 2017 lodging a report by EcOz Environmental Consulting on the comparative environmental impacts of various industries in the Northern Territory, our response dated 23 August 2017 to the Panel's request for further information, and our hearings before the Panel in Darwin on 10 March 2017 and in Tennant Creek on 10 August 2017.

### Ch.7 Water

### Well Integrity

There was considerable discussion of well integrity issues and potential water impacts raised in the Interim Report and Public hearings. At our appearance in Tennant Creek, we highlighted several additional studies in this area which are discussed further here.

Extensive evidence has been provided to the Inquiry on well integrity, and the interim report provides a good overview of the topic (page 27). APPEA suggest the final report of the Inquiry should be expanded to include further information on well integrity including well barriers, and the role that barriers play in ensuring well integrity. The numerous types of active and reactive barriers, including well casing, drilling muds, and blowout preventers, is central to ensuring ongoing safe operations of the well. In addition to our own submission, barriers are covered in more detail in submissions by Origin, Santos, Pangea, and Schlumberger.

The important distinction between a barrier failure and a full well integrity failure continues to be misunderstood or, worse, deliberately misrepresented. As has been noted regularly by industry witnesses, well integrity failures are exceptionally rare; a barrier failure is more common but does not have the consequences of a well failure. This illustrates the importance of clear information on the issue being presented by both industry and governments. For example, the submission by hydrogeologist Dr Mathew Currell<sup>1</sup> appears to confuse low well failure numbers with individual barrier failures. The paper by Davies et al uses discredited reports and investigates both "well barrier <u>and</u> integrity failures in the published literature". The Davies et al paper was also criticised by European researchers Thorogood and Younger<sup>2</sup> who found the paper to have "dangerously misleading conclusions".

<sup>&</sup>lt;sup>1</sup> Submission #311 and transcript #367

<sup>&</sup>lt;sup>2</sup> Thorogood, J. L., and Younger, P. L. (2015) *Discussion of "Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation*" by R. J. Davies, S. Almond, R.S., Ward, R.B. Jackson, C. Adams, F. Worrall, L.G. Herringshaw, J.G. Gluyas and M.A. Whitehead. (Marine and Petroleum Geology 2014). Marine and Petroleum Geology, 59. pp. 671-673. http://eprints.gla.ac.uk/96049/1/96049.pdf



Another common source of confusion arises from a study from Professor Anthony Ingraffea<sup>3</sup>. The study uses data from sustained casing pressure (SCP). SCP often pertains to pressure within a well that is still sealed off from groundwater, due to the outer layers of the well remaining intact. In no way is SCP analogous to a well leak. Origin Energy's submission explains why the Ingraffea study is flawed<sup>4</sup>. The misleading Ingraffea work is referenced in numerous submissions to the Inquiry<sup>5</sup>. Professor Ingraffea is championed by opponents of natural gas development. He is a self-admitted biased advocate, and acknowledges that his studies are a "form of advocacy". Professor Ingraffea has stated publicly: *"I'd be lying if I told you I went into every one of those [studies] with an entirely objective, blank opinion."*<sup>6</sup> His work has frequently been criticised by other academics, including his Cornell University colleague Professor Lawrence Cathles.<sup>7</sup>

APPEA is disappointed that Lock the Gate made claims about well integrity at the hearings supposedly on the basis of findings in a paper by Raj Kiran et al (yet to be published)<sup>8,9</sup> These claims misrepresent the Kiran paper which examines how drillers and cementers identify and address well integrity risks. APPEA sought the views of the author who advised us:

"The goal of the paper was to identify and evaluate the problems related to different issues regarding well integrity. There are several techniques to mitigate these problems that have already been adopted in the industry. Until and unless we identify the problems as we do in every industry we can't find out the solutions. This paper nowhere suggests that the oil and gas activity in unconventional resources should be banned. Each operation has their own set of risks, be it a space exploration, nuclear industry or aviation. The industry spends a huge amount of effort and resources to cater with the underlying risks."<sup>10</sup>

APPEA would suggest that the interim report could provide more information on the very low probability and consequences of a full barrier loss. The most common leak point for a producing well, as identified by King and King, is "at the surface, being failed gaskets or valves, which can be easily and quickly repaired."<sup>11</sup> In the case of an abandoned well, such a leak is very unlikely, given the substantial physical barriers used to plug the well and the fact that the gas contained in shales or coals is deeply below the surface and not under pressure. The risk of leakage from decommissioned shale gas wells is therefore very low.

<sup>10</sup> Kiran, Raj, by email, 24 August 2017

<sup>&</sup>lt;sup>3</sup> Ingraffea et al, (2014) Assessment and risk analysis of casing and cement impairment in oil and gas wells in Pennsylvania, 2000–2012 <sup>4</sup> Submission #153, pages 175-178

<sup>5</sup> For example: AFANT (#190), Arid Lands Environment Centre (#88), Central Australia Frack Free Alliance (#93)

<sup>6</sup>Leading Anti-Fracking Professor: Our Studies are 'A Form of Advocacy' https://energyindepth.org/national/leading-anti-fracking-professor-our-studies-are-a-form-of-advocacy/

<sup>7</sup> New York Times Reversal: Cornell University Research Undermines Hysteria Contention that Shale Gas is "Dirty"

https://www.forbes.com/sites/jonentine/2012/03/02/new-york-times-reversal-cornell-university-research-undermines-hysteria-contention-that-shale-gas-is-dirty/#7fbaf1ba311e

<sup>&</sup>lt;sup>8</sup> Submission #330

<sup>&</sup>lt;sup>9</sup> Kiran et al, (2017 unpublished) *Identification and evaluation of well integrity and causes of failure of well integrity barriers (A review)* <u>https://www.researchgate.net/publication/317409329 Identification and evaluation of well integrity and causes of failure of w</u> <u>ell integrity barriers A review</u>

<sup>&</sup>lt;sup>11</sup> King, George E. and King, Daniel E., *Environmental Risk Arising from Well-Construction Failure — Differences Between Barrier and Well Failure, and Estimates of Failure Frequency Across Common Well Types, Locations, and Well Age,* 2013, November 2013 SPE Production & Operations, available at: <u>shale.palwv.org/wp-content/uploads/2014/02/SPE-166142-PA-P2-copy.pdf</u>



### Additional References on Well Integrity

- Torbergsen, B., et al. (2012) Introduction to well integrity <u>https://www.norskoljeoggass.no/Global/2013%20Dokumenter/Andre%20vedlegg/INTRO</u> <u>DUCTION%20TO%20WELL%20INTEGRITY%20-%2004%20December%202012.pdf</u>
  - joint project between members of the Norwegian Oil and Gas Association's Well Integrity Forum (WIF) and professors at NTNU and UIS
- King, G., (2012) SPE 152596 Hydraulic Fracturing 101: What Every Representative, Environmentalist, Regulator, Reporter, Investor, University Researcher, Neighbor and Engineer Should Know About Estimating Frac Risk and Improving Frac Performance in Unconventional Gas and Oil Wells. <u>https://www.onepetro.org/conference-paper/SPE-152596-MS</u>
- Dusseault, M., (2000) SPE 64733 Why Oilwells Leak: Cement Behavior and Long-Term Consequences, <u>http://www.hydrorelief.org/frackdata/references/65704543-Casing-Leaks.pdf</u>
- King, G., Velencia, R., (2014) SPE-170949-MS Environmental Risk and Well Integrity of Plugged and Abandoned Wells <u>https://www.onepetro.org/conference-paper/SPE-170949-MS</u>
  - The purpose of this paper is to explain basic concepts of well construction and illustrate differences between single barrier failure in multiple barrier well design and outright well integrity failure that could lead to pollution, using published investigations and reviews from data sets of over 600,000 wells worldwide
- NORSOK. 2013. Standard D-010 Well Integrity in Drilling and Well Operations. Published by Standard Norge. Rev. 4. June 2013 <u>http://www.standard.no/pagefiles/1315/d-010r3.pdf</u>
  - Comprehensive discussion of barrier systems in wells. A free document, developed and published by Norwegian standards bodies.
  - Criteria covers well barriers (Primary and secondary), monitoring and minimum acceptable design factors for casing and cement. load factors are considered and estimated effects of temperature, corrosion and wear shall be included in the design factors.
- Jerald C. Dethlefs et al (2011), *Assessing Well Integrity Risk: A Qualitative Model*. <u>https://www.onepetro.org/conference-paper/SPE-142854-MS</u>
  - For successful delivery of Well Integrity, there needs to be an understanding of the risks that can cause undesirable events such as safety hazards or loss of containment.

### Decommissioning

The principal technique applied in well decommissioning (or plugging and abandonment), is the plugging of the well which creates an impermeable barrier between two zones. The most common material used for plugging wells is a specifically engineered cement. A cement plug consists of a volume of cement that fills a certain length of casing or open hole to prevent vertical migration of fluids.

Decommissioned wells can leak if improper or incomplete plugging and abandonment is undertaken.

As highlighted in our appearance at the Tennant Creek hearings, there have been numerous recent studies that have analysed the long-term behaviour of cement and steel in abandoned wells. Much of the recent research has focused on the long-term storage of carbon dioxide through Carbon Capture and Storage Projects. It is important to note that the literature on



corrosion and cement degradation considers CO2 stored at high pressure to be more aggressive than methane (Popoola, Grema, Latinwo, Gutti, & Balogun, 2013).

Yamaguchi, Shimoda, Kato, Stenhouse, Zhou, Papafotiou, Yamashita, Miyashiro & Saito (2013) have investigated the long-term corrosion behaviour of cement in abandoned wells under CO2 geological storage conditions by simulating the geochemical reactions between the cement seals over 1,000 years. The researchers concluded that the cement seals would see minimal alteration that would not impact the overall integrity of the well. This led the authors to conclude that cement would be able to isolate CO2 and upper aquifers over the very long-term.

Other studies include Pearce (2005) Huerta (2008), Lecolier (2008) and Van der Kuip (2011). Cement plug integrity in CO2 subsurface storage was examined by Van der Kuip, Benefictus, Wildgust & Aiken (2011). Using estimates for degradation after 10,000 years, they came to similar conclusions to Yamaguchi et al, stating that "mechanical integrity of cement plugs and the quality of its placement probably is of more significance than chemical degradation of properly placed abandonment plugs". Van der Kuip found degradation of materials over time, but importantly the analysis suggested no barrier failure after 10,000 years (given standard and well set cement plug) which led the authors to conclude that cement would be able to isolate the upper aquifers over the long-term.<sup>12</sup> To forecast the durability of cement, durability tests have to mimic the *in situ* processes of the cement. Consequently, the conclusions of the ageing tests can vary (Lecollier, 2007).

New technologies are being introduced to further ensure the long-term integrity of cement, such as self-healing cement<sup>13</sup>, or the use of self-expanding Bentonite clay (Towler 2016).

The NSW Chief Scientist, when investigating this topic in relation to coal seam gas, concluded that, if wells are properly designed, installed and maintained, the risk of long-term leakage from both the casing and cement can be considered minimal.

Shale gas fields in the Northern Territory have the benefit of being able to start with a clean slate and a high standard for permanently closing a well can be set. Modern advancements in well cementing technology and new mechanical systems can be applied to plugging of gas wells. This suggests well failure rates should be lower than the already-low rates experienced in the Australian onshore oil and gas industry over the last 50 years.

### Monitoring of abandoned wells

There have been calls from some witnesses for ongoing monitoring of decommissioned wells.

As noted above, leaks from these wells are very unlikely for numerous reasons: for example, the barriers and other measures taken to plug the well, the depth of the gas below the surface and the lack of pressure to force the gas to rise.

The industry aims to achieve 100 per cent containment, supported by risk-based monitoring programs of decommissioned wells.

All abandoned wells are reported, along with information on the well abandonment procedure. Permanently decommissioned wells are still covered by a company's risk management system.

<sup>&</sup>lt;sup>12</sup> Van der Kuip M, Benedictus T, Wildgust N, Aiken T (2011) High-level integrity assessment of abandoned wells <u>http://www.sciencedirect.com/science/article/pii/S1876610211007922</u>

<sup>&</sup>lt;sup>13</sup> For example Schlumberger self-healing cement <u>http://www.slb.com/~/media/Files/cementing/product\_sheets/futur\_ps.pdf</u>



Once a well is abandoned, monitoring is undertaken for a period of time to ensure proper setting of the cement plug and check. Mechanical issues, such as setting of the plug, will be identified within the first five years after the well is decommissioned. Monitoring techniques generally involve indirect methods such as near surface measurements and remote sensing. At an appropriate time, ongoing monitoring generally ceases and the periodic or ad hoc monitoring is under taken.

### Additional References:

- Global CCS Institute (2017), Well Plugging and Abandonment Techniques
   <u>https://hub.globalccsinstitute.com/publications/long-term-integrity-co2-storage-</u> %E2%80%93-well-abandonment/2-well-plugging-and-abandonment#fnt2\_001
- Fields, S.A., Martin M.M., 1997. *The Plugging Process: Securing Old Gas & Oil Wells for the protection of the Environment*. Proceedings: Decommissioning Workshop, September 1997, California, USA.
- Huerta, N., Bryant, S., Conrad L., (2008) Cement Core Experiments With a Conductive Leakage Pathway, Under Confining Stress and Alteration of Cement's Mechanical Properties Via a Reactive Fluid, as an Analog for CO<sub>2</sub> Leakage Scenario <u>https://www.onepetro.org/conference-paper/SPE-113375-MS</u>
- Popoola, Grema, Latinwo, Gutti, & Balogun, (2013) *Corrosion problems during oil and gas production and its mitigation*. International Journal of Industrial Chemistry.
- Krilov Z, Loncaric B and Miksa Z, (2000). SPE 58771 Investigation of a Long-Term Cement Deterioration under a High-Temperature, Sour Gas Downhole Environment, SPE 58771 <u>https://www.onepetro.org/conference-paper/SPE-58771-MS</u>
- Lecolier E, Rivereau A, Le Saout, G. and Audibert-Hayet, A. (2007). Durability of Hardened Portland Cement Paste used for Oilwell Cementing. Oil & amp; Gas Science and Technology – Rev. IFP, Vol. 62, No. 3, 335–345 <u>http://www.hydrorelief.org/frackdata/references/lecolier\_cement\_durabilityogst07012.p</u> df
- Lecolier, E., Rivereau, A., Ferrer, N., Audibert, A and Longaygue, (2006). Durability of Oilwell Cement Formulations Aged in H2S-Containing Fluids, Paper IADC/SPE-99105 presented at the IADC/SPE Drilling Conference held in Miami, Florida, USA, 21–23 February 2006
- Towler , B. (2016) University of Queensland. *Field Trials of Plugging Oil and Gas Wells with Hydrated Bentonite* <u>https://www.onepetro.org/conference-paper/SPE-182199-MS</u>
- Smith, D., (1990) Cementing, SPE Monograph vol. 4, Society of Petroleum Engineers, Dallas TX. <u>http://store.spe.org/Cementing-P14.aspx</u>
- Yamaguchi, Shimoda, Kato, Stenhouse, Zhou, Papafotiou, Yamashita, Miyashiro & Saito (2013), The Long-term Corrosion Behavior of Abandoned Wells Under CO2 Geological Storage Conditions: (3) Assessment of Long-term (1,000-year) Performance of Abandoned Wells for Geological CO<sub>2</sub> Storage
   http://www.sciencedirect.com/science/article/pii/S1876610213007467
- Yamaguchi, K, Shimoda, S, Kato, H, Stenhouse, MJ, Zhou, W, Papafotiou, A, Yamashita, Y, Miyashiro, K, & Saito, S. (2013). The long-term corrosion behaviour of abandoned wells under CO2 geological storage conditions: (3) Assessment of long-term (1,000-year) performance of abandoned wells for geological CO2 storage Energy Procedia, 37, 5804-5815.



### Ch.9 Greenhouse Gas Emissions

There are several statements in the Interim Report on Australia's GHG emissions methodology which APPEA believes are outdated. Criticism from Lock the Gate and others during the most recent Public Hearings also demand a response.

The onshore gas industry across Australia, including in the Northern Territory, is required to measure, report and account for all of its greenhouse gas emissions, through the *National Greenhouse and Energy Report Act 2007* (NGER Act), which established the National Greenhouse and Energy Reporting Scheme (NGERS)<sup>14</sup>, and associated *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (NGER Determination)<sup>15</sup>, which provides methods and criteria for calculating greenhouse gas emissions and energy data under the NGER Act and the *National Greenhouse and Energy Reporting (Measurement) Technical Guidelines* (NGER Technical Guidelines)<sup>16</sup>, which are designed to assist reporters to understand and apply the NGER Determination. The NGER Technical Guidelines outline calculation methods and criteria for determining greenhouse gas emissions, energy production, energy consumption and potential greenhouse gas emissions embodied in natural gas.

Emissions from <u>all</u> stages of onshore production, supply and use are reported by the Department of the Environment and Energy (the Department) in Australia's *National Greenhouse Accounts*<sup>17</sup>. Estimates of fugitive emissions of methane during onshore gas extraction activities are based on facility level data submitted by companies through NGERS. These estimates are reported by the Department within the *National Greenhouse Accounts* as part of fugitive emissions from gas exploration, natural gas production and processing, venting and flaring. The emissions estimation methods used in the *National Greenhouse Accounts* are subject to external independent review each year by an Expert Review Team selected by the United Nations Framework Convention on Climate Change (UNFCCC)<sup>18</sup>.

The Department reviews these emissions estimation methods to take account of the latest developments in Australia and overseas. In undertaking these reviews, the Department consults with stakeholders in Australia, and monitors scientific developments and technical improvements to other countries' emissions reporting methodologies.

Improvements to the measurement and reporting on greenhouse gas emissions from onshore gas development, including in relation to fugitive emissions, have been the focus of ongoing work by

- <sup>15</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/nger/determination</u> for more information.
- <sup>16</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/nger/technical-guidelines</u> for more information.

<sup>&</sup>lt;sup>14</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/nger</u> for more information. NGERS is administered across Australia, including in the Northern Territory, by the Clean Energy Regulator. For information about the Regulator's administration of NGERS, see <u>www.cleanenergyregulator.gov.au/NGER/About-the-National-Greenhouse-and-Energy-Reporting-scheme</u>.

<sup>&</sup>lt;sup>17</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/tracking-emissions</u> for more information.

<sup>&</sup>lt;sup>18</sup> See <u>unfccc.int/documentation/documents/advanced\_search/items/6911.php?priref=600009533#beg</u> for a copy of the most recent UNFCC report for Australia.



the Department and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) since 2012.

This work has led to the publication of numerous reports, based on both desktop and field research, which in turn have further refined the emissions factors used in NGERS and its reporting framework.

As part of this work program, five key reports have been released:

- Review of literature on international best practice for estimating greenhouse gas emissions from coal seam gas production, August 2012<sup>19</sup>: Pitt & Sherry was commissioned to review international best practice in methods for the estimation of fugitive emissions from coal seam gas (CSG) extraction, with a view to determining whether there have been any recent developments in methods which may differ from methods used for conventional natural gas and be applicable to estimating emissions from CSG in Australia.
- Review of methods for the estimation of greenhouse gas emissions from diffuse sources associated with unconventional gas fields, August 2013<sup>20</sup>: Pitt & Sherry was commissioned by the Department to undertake a literature review of methodologies that may be used to determine fugitive emissions from diffuse sources associated with CSG and other unconventional gas fields, and to assess the potential for these methodologies to be used for regulatory perspective in Australia. This paper examined methodologies for quantifying diffuse emissions from unconventional gas fields, assessing the available measurement techniques for accuracy, practicality and maturity. The objective was to determine which methods, if any, are suitable for use by regulators in Australia and, in particular, suitable for inclusion in the NGER Determination.
- Field Measurements of Fugitive Emissions from Equipment and Well Casings in Australian Coal Seam Gas Production Facilities, June 2014<sup>21</sup>: this report was the result of a collaborate project over 18 months in 2013 and 2014 between the Department and CSIRO to measure fugitive emissions associated with leakage from CSG facilities and well casings. The study collected field data measurements from 43 CSG wells in Queensland and New South Wales. Measurements were made using a vehicle fitted with a methane analyser to determine total emissions from each CSG well. In addition, a series of measurements were made on each pad to locate sources and quantify emission rates. CSIRO found that, of the 43 wells examined, three showed no emissions. The remainder had some level of emission but generally the emission rates were very low, especially when compared to the volume of gas produced from the wells. No evidence of leakage of methane around the outside of well casings was found at any of the wells sampled. CSIRO concluded in the report that the range of fugitive emission

<sup>&</sup>lt;sup>19</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/review-of-literature-coal-seam-gas-</u> <u>production</u> for more information.

<sup>&</sup>lt;sup>20</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/review-methods-unconventional-gas</u> for more information.

<sup>&</sup>lt;sup>21</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/csg-fugitive-emissions</u> and <u>www.appea.com.au/media\_release/csiro-report-points-to-environmental-benefits-of-csg</u> for more information.



leakage measured was consistent with the emission factor currently used in the NGERS methodology for estimating emissions from equipment leaks.

- Methane emissions from CSG well completion activities, May 2017<sup>22</sup>: the aim of this study was • to measure fugitive methane emissions from well completion and workover activities at both hydraulically fractured and non-fractured wells with the view to assisting the Department in developing Australian-specific emission factors for these operations. Measurements were made on a number of wells that were being completed or worked over at the time instrumentation was available in the field. In relation to the observation of emissions from a single well workover, APPEA notes the statements in the report that "not all workovers require compressed air for the clean-out so the results from this well are unlikely to be indicative of workover emissions more broadly." and "...it is recommended that further measurements be conducted on a larger sample of wells, especially on workovers." These wells and the completion procedures used during the measurements were typical of others in these production fields. The results of this study were used to update the methods in the National Greenhouse Accounts for Australia's 2017 submission to the UNFCCC and under the Kyoto Protocol. Of most relevance, the study found fugitive emissions from well completion events in CSG fields are significantly lower than is currently provided for in the national inventory.
- Update on recent empirical evidence on fugitive emissions from the gas industry, June 2017<sup>23</sup>: the Department has supported empirical research into fugitive emissions of methane from Australian CSG fields since 2013. The estimation methods used for Australia have been updated in light of this new evidence for Australian CSG gasfields. The Department has also updated estimation methods for Australia drawing from recent, relevant US experience, where gaps in the Australian data exist. The new estimation method updates for the Australian inventory mainly concern the treatment of leakages and few updates were implemented for the estimation of emissions from equipment vents or from flaring activity for this inventory. The changes to the treatment of leakages stemmed from the separation of gas production processes currently identified by the IPCC Guidelines into new sub-categories used by the US EPA and the provision of more explicit methods that identified emissions from more components of the gas supply chain.

The final of these reports, *Update on recent empirical evidence on fugitive emissions from the gas industry,* post-dates the Inquiry's Interim Report and updates or, in many cases, supersedes findings made in Chapter 9 of the Interim Report.

The work has updated or validated relevant emission factors, reinforced the comprehensive and world-leading nature of the NGERS framework and pointed to areas where future research will be undertaken.

In particular, the estimation methods used for Australia have been updated in light of new evidence for Australian CSG fields and the new evidence of emissions from US gas systems more generally.

<sup>&</sup>lt;sup>22</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/methane-emissions-csg-well-completion-activities and www.appea.com.au/media\_release/low-methane-emissions-from-csg-well-completions-new-csiro-report more information.</u>

<sup>&</sup>lt;sup>23</sup> See <u>www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/fugitive-emissions-update</u> for more information.



The new estimation method updates for the Australian inventory mainly concern the treatment of leakages. Few updates were implemented for the estimation of emissions from equipment vents or from flaring activity for this inventory. The changes to the treatment of leakages stemmed from the separation of gas production processes currently identified by the IPCC Guidelines into new sub-categories used by the US EPA and the provision of more explicit methods that identified emissions from more components of the gas supply chain.

The major sub-categories of fugitive emission sources are highlighted in below.



### Emission estimation segments for the gas supply chain

### Source: Department of the Environment and Energy (2017)

The development of updated national inventory methods for fugitive emission leakages, highlighted in the Department's report, drew on the following information sources:

- Australia-specific factors derived from CSIRO research, where available,
- Application of more complex NGERS methods 'method 2'<sup>24</sup> where appropriate, and
- Factors derived from US and international research:
  - Well completions for fractured wells,
  - Offshore gas platforms,

<sup>&</sup>lt;sup>24</sup> The NGER Determination provides methods that allow for both direct emissions monitoring and the estimation of emissions through the tracking of observable, closely-related variables. This framework reflects the approaches of the international guidelines governing the estimation of national greenhouse gas inventories and international practice such as for the EU *Guidelines for the Monitoring and Reporting of Greenhouse Gas Emissions* and the US EPA *Greenhouse Gas Mandatory Reporting Rule*. Under method 1, emissions may be estimated by reference to reportable data such as fossil fuel consumption, evidenced by invoices, and the use of specified emission factors provided in the Determination. More complex measurement processes (method 2) may produce estimates at a facility level through sampling and analysis of the carbon content within fuel consumed and other qualities that affect actual emissions generated by its combustion at a facility. See <u>www.environment.gov.au/system/files/pages/c520d047-2c52-46df-9843-7e57612fa63a/files/nger-2011-explanatory-statement.pdf</u> for more information.



- Gathering and boosting stations and gas processing plants, and
- End of transmission infrastructure.

Most relevant for the Inquiry, the Department's report concludes the "new methods have led to emission estimates for Australia that are broadly consistent with outcomes reported for the United States by the US EPA, while also taking into account data from Australian empirical evidence and industry conditions." (Update on Recent Empirical Evidence on Fugitive Emissions - Page 10).

### Emissions limits are set for the onshore (and offshore) gas industry through the Emissions Reduction Fund (ERF) Safeguard Mechanism

The Emissions Reduction Fund (ERF) safeguard mechanism, set out in the National Greenhouse and Energy Reporting Act 2007 (the Act), through amendments included in the Carbon Farming Initiative Amendment Act 2014, that establish the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (safeguard Rule), sets baselines for facilities emitting over 100,000 tonnes of carbon dioxide equivalent greenhouse gas emissions (100kt CO<sub>2</sub>-e) each year and requires emitters to keep emissions within those baseline levels<sup>25</sup>. Baselines are set by the Clean Energy Regulator.

<u>All of Australia's major onshore gas facilities, offshore gas facilities and LNG facilities are covered</u> <u>by the ERF's safeguard mechanism</u>. Under the safeguard Rule, a full list of facilities for which baselines have been established is publicly available from the Clean Energy Regulator's website<sup>26</sup>.

In a similar way, <u>any</u> onshore gas facility established in the Northern Territory that emitted over 100kt CO<sub>2</sub>-e per year would be covered by the ERF safeguard mechanism and, under the safeguard Rule, would have a baseline set by the Clean Energy Regulator that it would then need to keep emission levels within.

### **Ch.12 Social Impacts**

There was considerable discussion of our industry's "Social Licence to Operate" in APPEA's appearance before the Inquiry panel in Tennant Creek. The Chair expressed interest in any community survey results industry may have indicating attitudes towards onshore oil and gas activity.

The concept of Social Licence has been frequently discussed in relation to our industry's activities in recent years. Social Licence is a new "risk" added to the sub-themes under Social Impacts in the Interim Report.

The industry has always regarded the support of local communities and the informed consent of landholders as essential to the long-term partnerships that enable our activities to be successfully conducted.

We believe that the most important form of social licence is the informed consent of the people most directly affected by industry activities, namely traditional owners, land owners and leaseholders, and the support of the local communities where the industry operates.

baselines-table for more information.



This social licence is confirmed by the acceptance of the local community in the areas where activity actually takes place – where operators have clearly formed partnerships with their host Traditional Owners and host pastoralists. It is essential that, at the current stage of onshore gas development in the Northern Territory, these partners work together to build knowledge of the opportunity that development may present to all stakeholders.

Social licence is often presented by critics of the industry as being associated with wider popularity of an industry, including in communities far removed from areas of activity. While broader community attitudes can influence political sentiment towards the industry and in turn shape government policy, they do not represent social licence in the sense of the direct relationship between proponents and communities which host development.

Nonetheless, the industry is interested in the attitudes of these broader communities and has devoted considerable time and resources to responding to their questions and concerns. In the NT, this has included frequent community meetings in areas remote from development, including Darwin, Palmerston and the Rural Area. APPEA has had a presence at the Territory's regional shows for several years, and takes this opportunity to talk to, and listen to, the community. We take note of all significant interactions with people who visit our stands. This year our representatives who attended the regional shows in Alice Springs, Tennant Creek, Katherine and Darwin noted discussions with 209 people. Of these, the vast majority (65%) reflected supportive attitudes towards our industry, 29% were neutral and only 6% opposed development. In terms of location, Darwin had the largest assessed support at 74%. The lowest support was in Katherine at 53%.

Of course these figures only reflect the attitudes of people who chose to visit the APPEA stands. Many people who opposed fracking may simply have walked past. People who visited the Lock the Gate stands no doubt held more strongly negative views.

The conversations at the regional shows were again consistent with our engagement with people right across the Territory in a variety of forums, but as the Panel has observed, when public forums are held in major population centres the majority of attendees are opposed to the expansion of the natural gas industry, many loudly so.

As on a range of issues, it remains the case that people who oppose an activity or development are more motivated to express that view than those who support or accept it.

The so-called *negativity bias* has been the subject of widespread analysis by psychologists and social researchers and appears to increasingly influence discussion of matters of public interest. The related concept of *vocal minorities* and *silent majorities* has also been widely examined, including by Mustafaraj, Finn, Whitlock, and Metaxas<sup>27</sup> who analysed social media discussion of a 2010 US Senate election and warned against interpreting the views of the most vocal people as representing those of the wider community.

<sup>&</sup>lt;sup>27</sup> E. Mustafaraj, S. Finn, C. Whitlock and P. T. Metaxas, "Vocal Minority Versus Silent Majority: Discovering the Opinions of the Long Tail," 2011 IEEE Third International Conference on Privacy, Security, Risk and Trust and 2011 IEEE Third International Conference on Social Computing, Boston, MA, 2011, pp. 103-110. doi: 10.1109/PASSAT/SocialCom.2011.188. <u>http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6113101&isnumber=6113084</u>



In order to test broader community attitudes, professional opinion polling is often a more useful indicator.

To that end, APPEA noted with interest the opinion poll published in the NT News<sup>28</sup> on 31 August 2017 highlighting community attitudes to towards the Government's moratorium on fracking. The poll conducted by MediaReach suggested 51% of Territorians support the moratorium, 28% oppose it and 21% were undecided.

While support for the moratorium is significant, it was markedly lower than in a similar poll conducted for APPEA by Crosby Textor Australasia in May last year. Detailed responses are provided below. The poll showed 65% of respondents supported the moratorium.

However, it was equally significant that, despite the political focus on fracking in the run-up to the 2016 Territory election, a clear majority of Territorians (54%) still supported onshore gas development.

Majority support for onshore gas development <u>and</u> the moratorium may appear inconsistent, but it suggested many voters saw the moratorium as a pause not a permanent ban, and was consistent with other data that showed they did not trust the previous Government to regulate it.

The decline in support for the moratorium reported in the recent NT News poll – albeit still a slender majority – is consistent with continuing concerns about weakness in the NT economy. A majority of respondents to the poll (53%) did not believe the economy was improving. That result compared to 41% of respondents in last year's Crosby Textor poll who thought the economy was either "OK but getting worse" or "already bad".

The Crosby Textor poll also asked Territorians what issues were of most concern to them before last year's election. Despite heavy media attention on fracking and related issues, respondents did not rank these issues among their major concerns. As in other surveys, issues such as education, health, crime and the economy were regarded as higher priorities.

The focus on these principal concerns appeared to be borne out in the election result itself. It was notable that the political parties that had campaigned hardest against fracking during the election campaign attracted very little support from Territorians. The Greens attracted less than 3 per cent of votes, around one third of the Territory-wide vote they received at the previous Federal election, while the One Territory party, which made opposing fracking its principal policy, won less than 4 per cent of the vote.

None of the above is to deny that there are strongly-held views on hydraulic fracturing in the community, and that the industry and government must work harder to respond to genuine questions and concerns, as well as provide independent information to counter the false and exaggerated claims frequently made.

This is a critical aspect of this Inquiry's work as was highlighted in the Interim Report.

<sup>&</sup>lt;sup>28</sup> Walsh, C. "Fracking to divide Territory Labor", NT News 31 August 2017, p. 7



### 2016 APPEA / Crosby Textor polling

The Crosby Textor poll commissioned by APPEA canvassed the opinions of 400 Territorians between 19-22 May last year. The principal questions and results were:

*Q*) What are the most important issues of concern to you and your family that you want the NT Government to be doing something about at the next election? What else? What else?

- Education 23%
- Health 17%
- Crime 12%
- Economy and finances 15%
- Environment 11%
- Employment 10%
- Mining and resources 9%
- Roads/bridges/highways 8%
- Gas/fracking 7%

### N.B. Issues below 5% excluded

- Government and politicians 7%
- Indigenous issues 7%
- Immigration 7%
- Cost of living 6%
- Youth 6%
- Taxes 5%
- Rural and regional 5%
- Social/welfare 5%

*Q)* What's your view of the state of the Territory's economy? Do you think overall economic conditions in the NT at the moment are already good, just ok, but is now improving, just ok, but doesn't look like changing, just ok, and it might get worse or already bad?

- Already good 4%
- Just OK, but is now improving 21%
- Just OK, and doesn't look like changing 29%
- Just OK, and it might get worse 28%
- Already bad 13%
- Undecided 4%

*Q*) ... The natural gas industry has been exploring, extracting and producing, gas for almost 30 years in the Northern Territory and would like to continue to explore for gas and expand their onshore operations. From what you have read, seen or heard about natural gas, even if it is just a slight leaning or guess, would you say that you support or oppose on-shore natural gas operations in the Northern Territory?

- Support: 54%
- Oppose: 36%
- Don't know/no opinion: 9%

*Q)* The NT Labor Party has recently said they will put a moratorium on the on-shore extraction of gas in the Territory; that is, they will stop fracking of gas in the NT. From what you have read, seen or heard about this, even if it is just a slight leaning or guess, would you say that you support or oppose the Labor Party's moratorium on the on-shore extraction of gas?

- Support: 65%
- Oppose: 26%
- Don't know/no opinion: 9%

Further detail is provided in Appendix 1.



### **Ch.13 Economic Impacts**

APPEA would like to respond to claims by witnesses such as The Australia Institute and IEEFA on the economic impacts of onshore gas development and market opportunities for Northern Territory gas. The Panel had several questions on these issues at the Tennant Creek hearings.

### Australian gas consumption

The Independent Review into the Future Security of the National Electricity Market: Blueprint for the future report to the COAG Energy Council by Dr Alan Finkel Australia's Chief Scientist in June 2017, recommended a Clean Energy Target and the removal of blanket bans and moratoriums on gas development. It said:

Access to a reliable and affordable gas supply is in the interest of all Australians for its direct use for heating, as a feedstock chemical for industrial processes and as a fuel for electricity generation. In the NEM, gas-fired generation can provide a reliable, low emissions substitute for ageing coal-fired generation, and can provide essential security services to complement variable renewable electricity (VRE) generation.<sup>29</sup>

The report goes onto say that there is an increasing interdependency between gas and electricity and efficient gas markets have a central role to play in maintaining energy security and reliability as Australia reduces its emissions in line with international commitments.

The report suggests to facilitate this outcome effective government policy and regulatory settings have a dual role. They should facilitate new investment and enable development of Australia's gas resources and address any community concern about the environmental and social impacts associated with unconventional gas extraction.<sup>30</sup>

A report released by McKinsey & Company on 14 March 2017, *Meeting east Australia's gas supply challenge*, examined the level of investment needed in future gas infrastructure for eastern Australia to ensure stability of supply and prices. The report concluded that gas customers would pay a high price if restrictions on developing new gas projects continued. McKinsey & Co found that there are sufficient undeveloped resources and efficiency opportunities to meet our future needs. To turn those undeveloped resources into new supply, \$50 billion must be invested by the industry, including in the Northern Territory, in the next 15 years.<sup>31</sup>

The report found that eastern Australia's domestic gas demand in the base case is projected to remain at current levels throughout the outlook period to 2030, at around 700 PJ. However, a previous report by McKinsey and Company titled *the role of natural gas in Australia's future energy mix*, released in June 2016, found that there are economic opportunities for gas to play a larger role in the transport and power generation sectors in Australia. It found that owing to its lower emissions profile it could play a significant role in helping lower Australia's total emissions. The resultant increased demand could total 191 PJ resulting in a total domestic demand in 2030 of 892 PJ.<sup>32</sup>

<sup>&</sup>lt;sup>29</sup> Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future, Commonwealth of Australia 2017, June 2017, p. 105.

<sup>&</sup>lt;sup>30</sup> Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future, Commonwealth of Australia 2017, June 2017, p. 106.

<sup>&</sup>lt;sup>31</sup> McKinsey and Company, <u>Meeting east Australia's gas supply challenge</u>, March 2017.

<sup>&</sup>lt;sup>32</sup> McKinsey and Company, <u>Meeting east Australia's gas supply challenge</u>, March 2017, p. 9.



Australia has an immense opportunity to develop its vast gas resources and help the world in lowering its emissions. Natural gas power generation has on average about half of the emissions of coal-fired plant without compromising on reliability or security.

### Natural gas: the fastest growing fossil fuel to 2040

### International Energy Agency: World Energy Outlook 2016

The International Energy Agency (IEA), in its *World Energy Outlook 2016* (WEO) has forecast that natural gas will be the fastest growing fossil fuel for its outlook period to 2040. In its central forecast scenario (the 'New Policies' Scenario) natural gas demand is expected to increase by 49 per cent by 2040, to total 5,219 billion cubic metres (bcm) from 3,500 bcm. Natural gas will increase its share of total global energy demand to 24 per cent by 2040.



### Chart: Natural gas demand by selected regions in the New Policies Scenario

Source: IEA, World Energy Outlook 2016 released November 2016

According to the IEA, the power generation sector and the industrial use of gas both account for 35 per cent each of the increasing gas consumption to 2040. The IEA in its WEO report says:

...natural gas is the least carbon intensive of the fossil fuels and thus burning gas is a much more efficient way to use a limited carbon budget than combusting coal or oil. Gas is especially advantageous to the transition if it can help smooth the integration of renewables into power systems along the way. Ultimately, the case for gas as a relatively



clean and flexible source of energy remains very strong, especially for countries that have large resources within relatively easy reach.<sup>33</sup>

In terms of gas supply, the IEA forecasts natural gas production to increase by 48 per cent globally to total 5,219 bcm in 2040, up from 3,536 bcm. Increased production is expected to be dominated by unconventional gas, which increases by 3.5 per cent per year, reaching 1,704 bcm by 2040.

The IEA forecasts Australia's gas production to more than triple to 197 bcm in 2040 up from 63 bcm, growing at an average annual rate of 4.5 per cent. Yet Australia only accounts for 8 per cent of the growth in global production.<sup>34</sup>

The IEA forecasts the United States, Canada and Australia will lead global unconventional gas development in the medium-term before other unconventional gas resource rich countries start to produce more, notably China and Argentina. Among the unconventional gas types, shale gas is forecast to account for two-thirds of the production growth.

Inter-regional gas trade is forecast to increase by 70 per cent to total 1,100 bcm by 2040. IEA forecasts Australia's gas exports to increase to 136 bcm, up more than 5 times from 2014 levels by 2040.

Australia's proximity to the gas hungry Asian continent is a major advantage as Australia competes in the global gas market for export share. In its WEO report the IEA states:

From the early 2020s, European import growth is robust and contributes – together with strong growth in Asian gas import demand – to exceptionally rapid trade growth in that period. Our projections suggest that, around 2025, the current surplus in LNG capacity has by-and-large disappeared.<sup>35</sup>

The IEA forecasts that around \$9.4 trillion investment is needed in global gas supply over the outlook period to 2040. Half of this investment is needed over the period in those countries that will lead gas production growth after 2025.

### **BP Energy Outlook 2017**

In a similar way to the WEO, the *BP Energy Outlook 2017* released in January 2017, forecasts natural gas to be the fastest growing fossil fuel out to 2035, overtaking coal to the second largest fuel source in the world, after oil. Total natural consumption between 2015 and 2035 is forecast to increase by 38 per cent, with most of the growth coming from Africa, Asia-Pacific and the Middle East. The Asia-Pacific region accounts for 41 per cent or 488 million tonnes of oil equivalent (mtoe) of total growth in natural gas consumption between 2015 and 2035.<sup>36</sup>

<sup>&</sup>lt;sup>33</sup> <u>IEA, World Energy Outlook 2016</u>, p. 163.

<sup>&</sup>lt;sup>34</sup> <u>IEA, World Energy Outlook 2016</u>, p. 181 Table 4.3.

<sup>&</sup>lt;sup>35</sup> <u>IEA, World Energy Outlook 2016</u>, p. 194.

<sup>&</sup>lt;sup>36</sup> <u>BP Energy Outlook 2017</u> – summary tables, *Energy consumption by fuel*.



The *BP Energy outlook* also forecasts that half of the growth in global imports will be met by LNG.<sup>37</sup>

### ExxonMobil 2017 Outlook for Energy: A view to 2040

The *ExxonMobil 2017 Outlook for Energy* forecasts that natural gas is the largest growing fuel source, providing a quarter of global energy demand by 2040. It goes on to say that the abundance and versatility of natural gas is helping the world shift to less carbon intensive energy for electricity generation.<sup>38</sup>

ExxonMobil forecasts gas share of global primary energy consumption to increase from 22 per cent in 2015 to a quarter in 2040, with gas consumption increasing 44 per cent in the period 2015-2040.

ExxonMobil forecasts power generation from gas to increase by 51 per cent as compared with a total growth in power generation from all fuels of 37 per cent by 2040.

Gas consumption in the Asia-Pacific region doubles in the period between 2015 and 2040, according to the ExxonMobil Outlook.<sup>39</sup>



### Chart: 2015 and 2040 Global share of primary energy by fuel

Source: ExxonMobil 2017 Outlook for Energy: A view to 2040

<sup>&</sup>lt;sup>37</sup> <u>BP Energy Outlook 2017</u>, p. 35.

<sup>&</sup>lt;sup>38</sup> ExxonMobil 2017 Outlook for Energy: A view to 2040, p. 5.

<sup>&</sup>lt;sup>39</sup> ExxonMobil 2017 Outlook for Energy: A view to 2040, Outlook for Energy 2017 data pages.



### **Ch.14 Regulatory Reform**

This section responds to material presented in the Interim Report.

### 14.3.2 Petroleum Schedule

The Panel describes the Schedule as focussing "more on the interest holder engaging in certain activities and less on setting and achieving environmental outcomes for that activity." APPEA agrees. The Panel's statement should not be read as criticism of the Schedule. Rather, as the Panel has highlighted, all references to environmental management were removed from the Schedule in July 2016 following the promulgation of the Petroleum Environment Regulations. With that in mind, it should come as no surprise that the Schedule does not have a focus on environmental matters.

### 14.4.1 Operationalising the precautionary principle

In Australian legislation, the concept of Ecologically Sustainable Development (ESD) and the precautionary principle are common. Provisions relating to ESD and the precautionary principle are contained in specific environmental management legislation and can be referenced by other Acts and regulations. For example, in Australia, the principles of ESD are found in the EPBC Act and in subsidiary petroleum legislation such as the *Petroleum (Environment) Regulations 2016 (NT)* and the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (WA)*.

APPEA supports that decision makers must have regard to all relevant factors (such as social or economic considerations) when making decisions. The use of ESD and the precautionary principle does not prohibit activity from proceeding. On the contrary, it is inappropriate to use the precautionary principle to avoid all risks. Any application of the precautionary principle must be proportionate and consideration of practicability is required.

APPEA notes that the proposed Territory wide environmental reforms propose to operationalise the precautionary principle and the principles of ESD in conjunction with developing new 'Territory Environment Objectives'. APPEA supports this approach.

We recommend that the Panel's final recommendations to the government support these proposals and not create regulatory duplication and potential unintended consequences by attempting to include these provisions in the Petroleum Act.

### 14.4.4 Minimum Standards

As outlined in the Interim Report, the NT petroleum regulatory framework has a combination of objective and prescriptive regulations, through the application of the Petroleum Environment Regulations (objective) and the Schedule (prescriptive).

As indicated in previous APPEA comments to the Panel<sup>40</sup>, industry does not support prescriptive measures such as proposals for the NT Government to set methane limits that duplicate existing regulatory requirements set by the Commonwealth.

<sup>40</sup> Submission #380 & #421



Industry does support the use of regulatory instruments such as Codes of Practice for well construction and decommissioning. It is vital that the right regulatory instrument is applied for technical standards such as these, to ensure innovation and technical advancements can be quickly adopted. This is the case in Queensland, where the *Code of Practice for Constructing and Abandoning Petroleum and Associated Bores*<sup>41</sup> was introduced in 2011 and has since been updated 3 times to reflect improvements in scientific understanding.

### 14.4.5 Regulator

At APPEA's public hearing in Tennant Creek on 10 August we made reference to several wellregarded reports that provide the foundation for effective regulatory frameworks, in particular for the petroleum industry.

The first report is the 2009 Productivity Commission's *Review of Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector*. The second is the 2012 Organisation for Economic Cooperation and Development's *Recommendation of the Council on Regulatory Policy and Governance*.

There is no one-size-fits-all model best practice framework for regulation of the upstream petroleum sector. Models vary according to the level of activity, the size of the public sector, the complexity of the legislative framework in place, for example.

An example of different approaches in Australia is to compare South Australia and offshore Commonwealth waters. Both jurisdictions have a mature petroleum industry with a long history of activity, yet each has vastly different regulatory approaches. South Australia has a single agency<sup>42</sup> that regulates titles administration, policy / promotion and operational risk. The Commonwealth has established three separate agencies<sup>43</sup> and different governance structures<sup>44</sup> for those same regulatory functions.

In terms of regulatory capture, APPEA has serious concerns with the assertion made in the Interim Report that evidence was presented to the Panel that the regulator (DPRI) is inappropriately aligned with industry and is therefore reluctant the regulate. APPEA reviewed the two submissions referenced in the Interim Report that purported to have such evidence<sup>45</sup>.

Upon review, APPEA found no evidence presented of examples of regulatory capture. Indeed, it appears that comments in the NARMCO<sup>46</sup> submission have been misrepresented in the Interim Report.

NARCMO's comments are reproduced below:

There is a risk that the regulatory body becomes reluctant to regulate. There are government agencies and community organisations who have capacity to highlight this behaviour should it become apparent.

<sup>45</sup> Submission #189, p. 4 and submission #186, p.10

<sup>&</sup>lt;sup>41</sup> Code of Practice for Constructing and Abandoning Petroleum and Associated Bores

https://www.dnrm.qld.gov.au/ data/assets/pdf file/0011/119666/code-of-practice-csg-wells-and-bores.pdf

<sup>&</sup>lt;sup>42</sup> Department of the Premier and Cabinet

<sup>&</sup>lt;sup>43</sup> NOPTA, DEE & NOPSEMA

<sup>&</sup>lt;sup>44</sup> The NOPSEMA Advisory Board provides advice and makes recommendations to the responsible Commonwealth Minister, state and Northern Territory ministers and the COAG Energy Council on NOPSEMA's performance of its functions and policy and strategic matters.

<sup>&</sup>lt;sup>46</sup> Submission #186, p.10



There is equally a risk that the regulatory body becomes overzealous in their role in response to a portion of the community who are anti-fracking. The industry has limited options to appeal such behaviour should it occur.

NARMCO considers these risks to be acceptable, and they do not have a sufficient impact to warrant a ban on hydraulic fracturing.

It is clear from these comments that the potential for regulatory capture by pro and anti-industry proponents is a risk, yet contrary to the statements in the Interim Report, no evidence has been presented to the Panel of inappropriate industry behaviour.

### 14.4.6 Access to Justice

APPEA notes with interest the Panel's views on incorporating judicial and merits review provisions within the Petroleum Act.

In terms of decisions to grant petroleum titles, APPEA is concerned that providing review and appeal processes will undermine the role of an elected Government to act as the custodian and manager of the Territory's natural resources on behalf of all Territorians. In particular, APPEA considers that Government acreage release processes, including through identifying 'no-go zones', should be the preferred method for considering where petroleum activity can take place.

In the case of managing environmental risks, APPEA considers that including review provisions in the Petroleum Act is likely to lead to significant regulatory duplication.

As the Panel is aware, the NT Government is in the process of undertaking wide ranging reforms to its environmental regulatory framework.

One aspect being proposed in this reform process is to include 'access to justice' provisions in new Territory wide environmental management legislation.

APPEA's submission to the recent Environmental Regulatory Reform Discussion Paper supported the concept of review processes in new or updated legislation covering all activities in the NT<sup>47</sup>.

APPEA considers that, during the environmental assessment and appeals process, legislation should clearly state that only comments directly related to the proposed Territory Environmental Objectives (TEO's) will be taken into consideration by the EPA and the Environment Minister.

With this in mind, only proponents (or applicants) and directly affected stakeholders should be allowed to appeal decisions based on the TEO's.

As an industry body, APPEA does not believe that we, or other industry advocacy associations like the Northern Territory Cattleman's Association (NTCA), Amateur Fishing Association of the Northern Territory (AFANT), or NT branches of the Australian Computer Society or the Motor

<sup>&</sup>lt;sup>47</sup> See: <u>denr.nt.gov.au/ data/assets/pdf\_file/0005/436037/17-Submission.pdf</u>



Trades Association, should be given legal standing to challenge decisions made on petroleum activities.

Every legal challenge comes at a cost – whether justified or not – to the Government (through reduced or delayed royalty streams), proponent and the broader community (through reduced or delayed employment or contract opportunities).

It is clear that some environmental groups, some of whom claim to represent agricultural interests, are seeking to 'game' the unique judicial review provisions that apply in other jurisdictions to delay appropriately approved tourism, agriculture and resource projects<sup>48</sup>.

In its initial strategy document on how it would approach its campaigning, Lock the Gate stated that it would *"look for opportunities for strategic legal action."* Stating that a new gas industry *"may provide avenues for legal challenges under both State and Federal laws"*, Lock the Gate identified six 'legal' strands. One strand is to undertake targeted litigation to delay and defeat specific coal and gas proposals.

This tactic was also highlighted in a leaked strategy developed by a wide range of environmental groups in late 2011. That multimillion dollar strategy, *Stopping the Australian Export Coal Boom*<sup>49</sup>, explicitly stated the intention to use legal review mechanisms to delay or stop projects. This document stated:

"Our strategy is essentially to disrupt and delay key projects and infrastructure...

We will lodge legal challenges to the approval of all of the major new coal ports as well as key rail links (where possible), the mega-mines and several other mines chosen for strategic campaign purposes.

[Legal challenges] can also expose the impacts, increase costs, raise investor uncertainty, and create a powerful platform for public campaigning."

In its submission<sup>50</sup> to the Inquiry, the Environmental Defenders Office NT, presents an argument in support of reversing the burden/onus of proof to make operators automatically liable for any pollution that occurs as a consequence of its activities.

The EDO's reasoning for this reversal is in fact the foundation upon which outcomes based risk regulation is based on. The NT regulatory framework is designed to reduce all risks to as low as reasonably practicable (ALARP), after mitigation strategies, before an activity is approved by the Minister.

Reversing the onus of proof and removing the standard requirement for the applicant to pay costs could provide further motivation for vexatious claims, based on the above known strategies, to be pursued.

APPEA calls on the Panel to include the following recommendations in its Final Report in regards to the proposed new Territory wide environmental management regulatory framework<sup>51</sup>:

<sup>&</sup>lt;sup>48</sup> See: <u>www.couriermail.com.au/news/queensland/ecoactivists-hold-up-34-billion-worth-of-queensland-projects/news-story/44195381295203d8c14ba7f8edbb3216</u>

<sup>&</sup>lt;sup>49</sup> See: <a href="http://www.abc.net.au/mediawatch/transcripts/1206">www.abc.net.au/mediawatch/transcripts/1206</a> greenpeace.pdf

<sup>&</sup>lt;sup>50</sup> Submission #213

<sup>&</sup>lt;sup>51</sup> See: <u>denr.nt.gov.au/environment-information/environmental-regulatory-reform-program</u>



- the inclusion of limited merits and judicial review,
- legal standing for proponents (or applicants) and directly affected stakeholders,
- the onus of proof placed on those persons seeking to challenge decisions, and
- litigation costs be borne by the losing party, be they the Crown, industry proponents or the litigation applicant.

### 14.5 Land Access

APPEA strongly supports policies that foster coexistence. As outlined in our submission, the approach of working together to support development in both the agriculture and resources sectors continues to be the most effective way to manage land access in Australia. Questions asked of APPEA by the panel indicated further information on land access arrangements and compensation would be beneficial.

APPEA does not support a right of veto for pastoral leaseholders. Likewise, it is clear that there should also not be an unfettered right of access for the natural gas industry. The summary provided in the Interim Report on page 124-125 is a good summary of this issue.

Governments are the custodians of public good resources, including land and underground minerals and resources. It is appropriate that government determines how public good resources can be accessed through an open and transparent process that ensures that potential developers (above and below ground) have the necessary experience and expertise to develop those resources in a responsible manner.

APPEA and the NTCA worked with the then Department of Mines and Energy to develop a land access process where petroleum companies and landholders will be required to reach a land access agreement before exploration activities are approved and can begin. Notification and consultation requirements must also be followed as petroleum titles are being assessed and granted.

We also support a body like the GasFields Commission Queensland. A recent review has found that the Commission has contributed substantially to improved coexistence of landholders, regional communities and the onshore gas industry in Queensland.

### **Conduct and Compensation Agreement**

A Conduct and Compensation Agreement (CCA) is a common provision in resources legislation (such as QLD, WA, and NSW) and is a legal agreement made between a landholder and a resource company that relates to the activities or conduct proposed to be undertaken and, where there is impact on the landholder, compensation arrangements for those activities.

A CCA enables landholders to negotiate how petroleum activities are conducted on their property as well as the compensation to be paid. Each agreement made with a landholder is unique, reflecting the characteristics of the particular property and the proposed activities and infrastructure to be hosted.

A CCA details how activities will be conducted on the property and ensures landholders are properly compensated for the effects and impacts of authorised activities (compensatable effects). In Queensland for instance, a compensatable effect means:

- Deprivation of possession of land's surface
- Diminution or decrease in land value



- Diminution or decrease in land use, including reduced use that could be made through any improvements to it
- Severance of any part of the land from other parts of the land, or from other land that the landholder owns
- Any cost, damage or loss arising from the carrying out of activities on the land.

A compensatable effect may also include any necessary and reasonable legal costs incurred for the negotiation or preparation of an agreement. (*Guide to Land Access in Queensland - 2016*).

There are currently 5,800 land access agreements signed in Queensland, with over 3,000 of those agreements actively hosting activity or infrastructure. Other agreements cover already completed pipelines, preliminary exploration, or may host future activity. Between 2011/12 and 2015/16 over \$300 million in total compensation was paid to landholders in Queensland.

Compensation payments negotiated as part of land access arrangements, including both up-front and ongoing components, can be an important income source for farmers.

### How is compensation determined?

APPEA was asked by the inquiry review panel as to how compensation is determined and whether a compensation 'calculator' was used.

Around Australia natural gas operations are designed to minimise and avoid impact wherever possible and only then is a tailored compensation package arrived at. Importantly, the planning for an activity is done in collaboration with the landholder and considers their preference for infrastructure, wells, etc.

In fundamental terms, landholders are compensated for any revenue losses from their land while gas activities take place. Other costs may also be factored in such as the cost to mitigate loss during the construction period.

The value of compensation paid and the terms of CCAs are not considered confidential by industry and industry does not require confidentiality, however in most cases landholders prefer confidentiality clauses to be included as compensation payments are in essence personal financial information for the landholder.

In 2015 the Independent Pricing and Regulatory Tribunal of NSW (IPART) completed a review of compensation arrangements for landholders who host coal seam gas (CSG) exploration and production activities on their land. The review's purpose was to recommend a framework for estimating benchmark compensation rates to guide NSW landholders in negotiating land access agreements with gas companies. As a part of this process IPART was asked to develop a compensation calculator. IPART ultimately concluded that *"this approach was unlikely to produce compensation benchmarks that were useful for landholders. Given the wide variation in landholders' individual circumstances, it would likely produce a very wide payment range, and it would be difficult for landholders to identify where they might fall within this range." (IPART 2015). IPART instead developed a spreadsheet model that landholders can use to estimate their own compensation benchmarks.* 

However, Standard 'compensation calculators' are typically not helpful. There are vast differences between landholder properties, landholder preferences, the nature of petroleum activities proposed, and the potential impact those activities will have on the business activities (or land use) of the landholder. As such, any 'indicative' figure produced by a standard calculator is likely



to be incorrect and misleading in any specific circumstance. For this reason there is no 'standard calculator' for compensation in most jurisdictions. Some companies have published guidelines for the calculation of compensation, including Santos for its Narrabri Gas Project in NSW<sup>52</sup>. In Queensland, industry, government and landholder groups have instead focussed on improving the quality of information and professional advice and support available to landholders so that landholders can make informed decisions and effectively negotiate conduct and compensation agreements that suit their individual circumstances. This approach has proven far more effective than the use of standard calculators.

In 2015 the Independent Pricing and Regulatory Tribunal of NSW (IPART) completed a review of compensation arrangements for landholders who host coal seam gas (CSG) exploration and production activities on their land. The review's purpose was to recommend a framework for estimating benchmark compensation rates to guide NSW landholders in negotiating land access agreements with gas companies. As a part of this process IPART was asked to develop a compensation calculator. IPART ultimately concluded that *"this approach was unlikely to produce compensation benchmarks that were useful for landholders. Given the wide variation in landholders' individual circumstances, it would likely produce a very wide payment range, and it would be difficult for landholders to identify where they might fall within this range." (IPART 2015). IPART instead developed a spreadsheet model that landholders can use to estimate their own compensation benchmarks.* 

### CSIRO study into compensation and farm productivity

In 2016, CSIRO undertook research to better understand the types of compensation that could be expected in particular types of farming land in Queensland. The study does not take into account compensation paid by industry to landholders and additional benefits such as water for irrigation and crops, improved roads and surrounding infrastructure, but does provide a guide as to how compensation can be calculated. (Marinoni and Gascia 2016)

The research focuses on calculating costs over a timeframe of 20 years, within a study area of 11,500 hectares and containing 155 wells on several individual properties and including a significant area of company owned land hosting major infrastructure. Revenue losses in the study area amount to \$9.44 per hectare per year.

### **Additional References**

- Guide to Land Access in Queensland (2016) <u>https://www.dnrm.qld.gov.au/\_\_\_data/assets/pdf\_file/0004/480388/guide-land-access.pdf</u>
- Agforce Queensland, Submission 235, Select Committee on Unconventional Gas Mining, March 2016, accessed on 16 June, 2016, <u>http://www.aph.gov.au/DocumentStore.ashx?id=89b3b806-4782-4b02-8abd-</u> <u>cb5a55b75c52&subId=410809</u>
- Commonwealth of Australia, 2015. *Review of the socioeconomic impacts of coal seam gas in Queensland. In: Department of Industry Innovation and Science*. Commonwealth of Australia, Canberra. <u>https://industry.gov.au/Office-of-the-Chief-</u>

<sup>&</sup>lt;sup>52</sup> See: narrabrigasproject.com.au/community/landholders/



<u>Economist/Publications/Documents/coal-seam-gas/Socioeconomic-impacts-of-coal-seam-gas-in-Queensland.pdf</u>

- DNRM, (2016) QLD land Access Code <u>https://www.dnrm.qld.gov.au/\_\_\_data/assets/pdf\_file/0004/442633/land-access-code-</u> <u>2016.pdf</u>
- Multiple Land Use Framework <u>https://industry.gov.au/resource/Mining/Pages/Multiple-Land-Use-Framework.aspx</u>
- (2013) Multiple Land Use Framework Research report, <u>https://industry.gov.au/resource/Mining/Documents/MLUFBackgroundSummary.pdf</u>
- Marinoni, O., Gascia, J., (2016) GISERA A novel model to estimate the impact of Coal Seam Gas extraction on agro-economic returns http://www.sciencedirect.com/science/article/pii/S026483771630076X? rdoc=1& fmt=f ull& origin=ShoppingCart& ct=1& zone=rslt\_list\_item&md5=7b0707f16ff878e496b76d4 315d901fd
- NSW Independent Pricing and Regulatory Tribunal (2015) Landholder compensation for gas exploration and production <u>https://www.ipart.nsw.gov.au/Home/Industries/Energy/Reviews/Gas/Landholder-</u> <u>compensation-for-gas-exploration-and-production?qDh=2</u>
- Origin Energy (2016), submission to select committee on unconventional gas <u>http://www.aph.gov.au/DocumentStore.ashx?id=77e25ef3-cac4-40e5-9c07-3ebbb388fb02&subId=411918</u>
- QGC (2016), QGC response to public hearing and submission (public hearing, Dalby, 17 February 2016) <u>http://www.aph.gov.au/DocumentStore.ashx?id=67eb1302-c5e4-4c6fb109-705cc3cb0a4d</u>
- QGC Pty Limited & Ors v Vogt [2017] QLC 20 (PGP147-14) WA Isdale 13 April 2017 Determination of compensation payable for coal seam gas related activities <u>http://www.sclqld.org.au/caselaw/QLC/2017/020</u>
- Santos (2016) Landholder benchmark compensation rates: Gas exploration and production in NSW: Draft Report <u>https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-gas-submissions-submissions-landholder-compensation-for-csg-draft-report/online\_submission - santos ltd - a. hicks - 30 oct 2015 121322178.pdf
  </u>





Appendix 1

# APPEA NT Gas Research

May 2016

### Aim & Summary Methodology



- To understand and track public awareness and opinion of natural gas and fracking in the NT.
- To understand and track public awareness and opinion of gas in the NT in order to inform the communications and activities required to secure support.
  - Quantitative survey research, conducted 19th 22nd May 2016.
  - A telephone survey of n=400 randomly selected residents.
  - Total sample accurate to a minimum +/-4.9% margin of error (at the 95% confidence interval).
  - Minimum quotas and data weighting on area, sex and age to ensure proportional sampling and accurate representation.
  - Note: Alice Springs data contains inflated sampling error due to small sample size of n=34. Results indicative only.
- Questionnaire designed to provide a benchmark on the following.
  - Contextual issue agenda and outlook (economic).
  - Opinion of on-shore gas activity.
  - Awareness and opinion of Labor's proposed moratorium.

2 © 2017 C|T Group





## The Context: Outlook & Issue Agenda





### Issue Agenda – Area





This issue agenda varies by area still, e.g. crime and indigenous issues are bigger issues in Alice Springs, and it seems that people in Darwin are less concerned with mining and resources issues.

© 2017 C|T Group

### NT Economy Perceptions – Total





In parallel with economic and employment concerns, the economic outlook for the NT has worsened somewhat. That is, Territorians now see themselves as less shielded.

Q5) What's your view of the state of the Territory's economy? Do you think overall economic conditions in the NT at the moment are already good, just ok, but is now improving, just ok, but doesn't look like changing, just ok, and it might get worse or already bad?

© 2017 C | T Group





© 2017 C|T Group



© 2017 C|T Group

Q5) What's your view of the state of the Territory's economy? Do you think overall economic conditions in the NT at the moment are already good, just ok, but is now improving, just ok, but doesn't look like changing, just ok, and it might get worse or already bad?





# Opinion of NT Gas Reserves & Moratorium





Despite a recent spike in media coverage and public discussion, a majority of Territorians support on-shore natural gas operations.

Q8) The Northern Territory has significant gas reserves, with nearly 2,500 kilometres of onshore gas pipelines and more than 500 kilometres of offshore pipeline gas pipelines connecting Darwin to operating gas fields. The natural gas industry has been exploring, extracting and producing, gas for almost 30 years in the Northern Territory and would like to continue to explore for gas and expand their on-shore operations. From what you have read, seen or heard about natural gas operations in the Northern Territory?

10 © 2017 C|T Group



### On-shore Gas Support – Area



gas for almost 30 years in the Northern Territory and would like to continue to explore for gas and expand their on-shore operations. From what you have read, seen or heard about natural gas, even if it is just a slight leaning or guess, would you say that you support or oppose on-shore natural gas operations in the Northern Territory?



Again, that negativity towards onshore gas projects is driven by voters outside Darwin, and particularly (though indicatively) those in Alice Springs.

> 11 © 2017 C|T Group

On-shore Gas Support - Vote ■ Total ■ Country Liberals ■ Labor ■ Total others ■ Soft voters 829 TOTAL SUPPORT



80%

90%

Q8) The Northern Territory has significant gas reserves, with nearly 2,500 kilometres of onshore gas pipelines and more than 500 kilometres of offshore pipeline gas pipelines connecting Darwin to operating gas fields. The natural gas industry has been exploring, extracting and producing, gas for almost 30 years in the Northern Territory and would like to continue to explore for gas and expand their on-shore operations. From what you have read, seen or heard barry and ratural gas even if it is just a slight leaning or guess, would you say that you support or oppose on shore natural gas operations in the Northern Territory?

40%

12 © 2017 C|T Group

# 0% 50% Q8) The Northern Territory has significant gas reserves, with nearly 2,500 kilometres of onshore gas pipelines and more than 500 kilometres of offshore pipeline gas pipelines connecting Darwin to operating gas fields. The natural gas industry has been exploring, extracting and producing,

Strongly support

TOTAL OPPOSE

Strongly oppose

Undecided

0%



### On-shore Gas Support – Demographic

■ Total ■ Male ■ Female ■ 18-34 Years ■ 35-54 Years ■ 55+ Years



Q8) The Northern Territory has significant gas reserves, with nearly 2,500 kilometres of onshore gas pipelines and more than 500 kilometres of offshore pipeline gas pipelines connecting Darwin to operating gas fields. The natural gas industry has been exploring, extracting and producing, gas for almost 30 years in the Northern Territory and would like to continue to explore for gas and expand their on-shore operations. From what you have read, seen or heard about natural gas, even if it is just a slight leaning or guess, would you say that you support or oppose onshore natural gas operations in the Northern Territory?



Men are bigger supporters of onshore gas operations in the Northern Territory than women.

18 to 34 year olds are also more supportive of on-shore gas operations than older age groups.

> 13 © 2017 CIT Grous



Q8) The Northern Territory has significant gas reserves, with nearly 2,500 kilometres of onshore gas pipelines and more than 500 kilometres of offshore pipeline gas pipelines connecting Darwin to operating gas fields. The natural gas industry has been exploring, extracting and producing, gas for almost 30 years in the Northern Territory and would like to continue to explore for gas and expand their on-shore operations. From what you have read, seen or heard about natural gas, even if it is just a slight leaning or guess, would you say that you support or oppose on-shore natural gas operations in the Northern Territory? Acaution: Low sample size (n<60)

14 © 2017 C|T Grov



# Moratorium Support – Total



Despite this support for gas, there is also majority support for Labor's moratorium on gas extraction in the NT – so clearly many people who support the activity also support a pause.

Q9) The NT Labor Party has recently said they will put a moratorium on the on-shore extraction of gas in the Territory; that is, they will stop fracking of gas in the NT. From what you have read, seen or heard about this, even if it is just a slight leaning or guess, would you say that you support or oppose the Labor Party's moratorium on the on-shore extraction of gas?





Q9) The NT Labor Party has recently said they will put a moratorium on the on-shore extraction of gas in the Territory; that is, they will stop fracking of gas in the NT. From what you have read, seen or heard about this, even if it is just a slight leaning or guess, would you say that you support or oppose the Labor Party's moratorium on the on-shore extraction of gas?

16 © 2017 C|T Group



### Moratorium Support - Vote

■ Total ■ Country Liberals ■ Labor ■ Others ■ Soft voters





Labor's proposed moratorium was most heavily supported by Labor voters, but is also supported by soft and minor party voters. Importantly, more CLP voters oppose than support it.

Q9) The NT Labor Party has recently said they will put a moratorium on the on-shore extraction of gas in the Territory; that is, they will stop fracking of gas in the NT. From what you have read, seen or heard about this, even if it is just a slight leaning or guess, would you say that you support or oppose the Labor Party's moratorium on the on-shore extraction of gas?

### Moratorium Support - Demographic

■ Total ■ Male ■ Female ■ 18-34 Years ■ 35-54 Years ■ 55+ Years



C|T GROUP

© 2017 C|T Group

Labor's proposed moratorium is more heavily supported by women than it is by men.

Labor's proposed moratorium is also more heavily supported by younger demographics than older demographics.

Q9) The NT Labor Party has recently said they will put a moratorium on the on-shore extraction of gas in the Territory; that is, they will stop fracking of gas in the NT. From what you have read, seen or heard about this, even if it is just a slight leaning or guess, would you say that you support or oppose the Labor Party's moratorium on the on-shore extraction of gas?

18 © 2017 C | T Group