

21 August 2020

Office of the Independent Planning Commission NSW
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Dear Independent Planning Commission,

This is a submission objecting to the Narrabri Gas Project in accordance with the Commission's 'Additional Material' policy¹ and in response to the following new material provided to the Commission:

- the document entitled 'Submission to IPC following public hearing' (including attachments), provided by the Applicant on 10 August 2020², and
- the Department's 'Response to Independent Planning Commission Questions', provided to the Commission on 14 August 2020

Thank you for the opportunity to provide comment on this designated additional material for the Narrabri Gas Project (NGP) and taking the time to consider my submission.

Most of my response to the designated additional material is from my original submission.³ However, as this submission must specifically relate to the new material only, parts of the original submission will be quoted here as required to address the new material only.

Please note that this document does not supersede my original submission but is in addition to it.

Similar to my original submission, this submission will focus on the areas of economics, gas supply and demand, climate change impacts, gas as a transition fuel and alternative fuels to natural gas. However, comment will be provided in association with Groundwater Impacts and Ecological Impacts – Koalas.

Groundwater - Assertions that the Project is located in a major recharge zone for the GAB

Santos refuted the assertion that the Project is in a major recharge area of the GAB, and that this poses an unacceptable risk to aquifers of the GAB.

In my original submission I stated:

"The Pilliga Sandstone Aquifer is a high-quality shallow groundwater that local communities rely on for water for stock, domestic and irrigation purposes and is one of the main aquifers in the southern

¹ IPCN (n.d.) Policies - Additional material. Retrieved from <https://www.ipcn.nsw.gov.au/policies>

² Santos (2020, August 10) Narrabri Gas Project (SSD 6456) Submission to IPC following public hearing. Retrieved from <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2020/03/narrabri-gas-project/correspondence/santos-submission/200810-santos-final-submission-incl-attachments.pdf>

³ Roberts, A. (2020, August 3) Submission on Narrabri Gas Project - Alec Roberts. Retrieved from <https://www.newcastleclimatechangeresponse.org.au/news/submission-on-narrabri-gas-project-alec-roberts>

Great Artesian Basin. The Pilliga Sandstone is also the main outcropping aquifer in the Pilliga forest region within the project area, and this region and along with outcropping along the Warrambungle Range are recharge beds for the Great Artesian Basin in NSW.^{4 5} A near-surface aquifer, the Namoi Alluvium, is also a major water resource for agriculture in the region. Together these form the main source of water these communities rely on for their livelihoods.

The contamination of groundwater is a major environmental risk with Coal Seam Gas, with the major potential contamination from 'produced water' which is pumped from the underlying coal seams to depressurize the seams and allow gas to be released and be extracted. CSG produced water is typically of poor quality due to being located within the coal seams. The Narrabri region produced water is high in salinity and contains high levels of heavy metals, boron and fluoride and presents a major risk to groundwater contamination in the area.

Given a number of leaks and/or spills of produced water have already occurred within the 70 appraisal and exploration wells in the area, there is a strong likelihood with 850 wells that significant leaks and/or spills of produced water will occur throughout the life of the project risking contamination of the aquifers / recharge beds for the Great Artesian Basin and affecting the livelihoods of those that depend on this valuable resource.”³

The potential contamination of the aquifers flies in the face with the assessment that the project will “not result in significant impacts on people or the environment”.

Ecology – Koala

Santos stated (in quoting the NGP EIS) that the impacts of the Project on the current Koala population will not lead to a long-term extinction of a viable local population.

In my original submission I stated:

“The Pilliga Forest has been classified as a priority area for koala conservation. Energy and Environment Minister Matt Kean recently set a goal of doubling the number of koalas by 2050 in a bid to defy projections the marsupial could become extinct in the wild in NSW by mid-century.⁶ The Narrabri Gas project will result in the fragmentation of 85,000 hectares of the Pilliga Forest. Fragmented islands of koala habitat such as will result from this development which will result in unhealthy koala populations. Koalas need wide corridors to spread out to ensure effective breeding. Koala corridors are vital and are recognised generally as such in the new Koala SEPP and acknowledged by the NSW Chief Scientist (2016):

⁴ CSIRO (2018, August) Potential water impacts of coal seam gas in the Pilliga Sandstone. Retrieved from https://gisera.csiro.au/wp-content/uploads/2018/08/18-00384_GISERA_FACTSHEET_SGW-GABFluxFinalReport2pp_WEB_180807.pdf

⁵ Srekanth, J., Cui, T., Pickett, T. & Barrett, D. (2017) Uncertainty analysis of CSG-induced GAB flux and water balance changes in the Narrabri Gas Project area. CSIRO, Australia. Retrieved from <https://publications.csiro.au/rpr/download?pid=csiro:EP173269&dsid=DS3>

⁶ Hannam, P. (2020, July 26). Matt Kean aims to double koala population by 2050. Retrieved from <https://www.smh.com.au/environment/conservation/matt-kean-aims-to-double-koala-population-by-2050-20200725-p55fdc.html>

“Koala populations need large areas of connected habitat to maintain their viability. Habitat loss and fragmentation has resulted in population decline and has been identified as a significant threat to the species persistence in NSW.”⁷

Recent studies within the project area suggest a dramatic decline in koala populations. Surveys of the Pilliga forests in the 1990s suggest that the forests were carrying the largest population of koalas west of the Great Dividing Range in NSW, with the population estimated at 15,000. Repeat surveys within the Pilliga forests show a decline of over 80% since the 1990s.⁷

The impact of extreme weather events such as drought and extreme heatwaves on koalas is expected to increase with climate change and may also exacerbate other threats such as disease.⁸ The Pilliga forest koalas are likely to have faced extreme (but less frequent and long) heat events in the past and responded by retreating to creek lines with either available free water or a higher moisture content in the leaves of their food trees. However, land clearing within and on the periphery of the forests and from road construction since the early 1900s has resulted in creeks within the Pilliga forests silting up. Habitats that would have once likely functioned as a refuge during times of drought are now highly disturbed and are unlikely to provide the required level of protection for koalas.⁷

The planned significant fragmentation of habitat by the Narrabri Gas project will exacerbate the problems caused by earlier land clearance and may lead to the local extinction of the Koala. The potential local extinct of a vulnerable species appears to contradict the assessment that the project will “not result in significant impacts on people or the environment”.³

Why the Project is needed

Santos stated that a “growing component of energy demand will need to be met by natural gas supply to complement renewables growth and battery storage in Australia as ageing coal-fired power plants close over coming decades.”

The use of gas in electricity production has reduced in recent years and modelling of the future electricity grid and further evidence has indicated that it is unlikely that gas will play a major role in the transition from coal-fired power plants to renewable energy and storage.

In my original submission, I noted that,

“the electricity market has already moved away from gas, with a 59% decline in usage in the National Electricity Market since 2014, whilst renewable energy has increased by 25% during the

⁷ NSW Chief Scientist & Engineer (2016, December). Report of the Independent Review into the Decline of Koala Populations in Key Areas of NSW. Retrieved from https://www.chiefscientist.nsw.gov.au/_data/assets/pdf_file/0010/94519/161202-NSWCSE-koala-report.pdf

⁸ Lunney, Daniel & Crowther, Mathew & Wallis, Ian & Foley, William & Lemon, John & Wheeler, Rob & Madani, George & Orscheg, C. & Griffith, Joanna & Krockenberger, Mark & Retamales, Melissa & Stalenberg, Eleanor. (2012). Koalas and climate change: a case study on the Liverpool Plains, north-west NSW. 10.7882/FS.2012.022.

same period.⁹ Furthermore, flexible gas plants already in the grid are running well below capacity.¹⁰ AEMO forecast that increasing renewable generation developments in the NEM are expected to continue to drive down system normal demand for gas-powered generation.¹¹

The AEMO modelled the future electricity grid in its Integrated Systems Plan.^{12 13} The results showed for all scenarios that the transition from coal to renewable energy would not be via gas.¹⁰ The role of gas would be reduced with a decline in gas generation through to 2040.⁹ The report notes that to firm up the inherently variable distributed and large-scale renewable generation, there will be needed new flexible, dispatchable resources such as: utility-scale pumped hydro and large-scale battery energy storage systems, distributed batteries participating as virtual power plants, and demand side management.^{12 13} It also noted that new, flexible gas generators such as gas peaking plants could play a greater role if gas prices materially reduced, with gas prices remaining low at \$4 to 6 per GJ.¹³ However this is unlikely as gas prices have tripled over the past decade and expected NSW gas prices are over 60% more than this price.^{10 14} AEMO noted that the investment case for new gas-powered generation will critically depend on future gas prices, as gas-powered generation and batteries can both serve the daily peaking role that will be needed as variable renewable energy replaces coal-fired generation. In their 2020 Gas Statement of Opportunities report, AEMO predicted that as more coal-fired generation retired in the long term, gas consumption for gas-powered generation in the National Electricity Market was forecast to grow again in the early 2030s, recovering to levels similar to those forecast for 2020.¹¹ However, in a later report, AEMO determined that by the 2030s, when significant investment in new dispatchable capacity is needed, new batteries will be more cost-effective than gas-powered generation.¹³ Furthermore, the commissioning of the Snowy 2.0 pumped hydro project in 2026 will result in less reliance on gas-powered generation as a source of firm supply.^{11 13}

“AEMO noted that stronger interconnection between regions reduces the reliance on gas-powered generation, as alternative resources can be shared more effectively.¹³ The expansion network

⁹ Robertson, B. (2020, July 23). IEEFA update: Australia sponsors a failing gas industry. Retrieved from <https://ieefa.org/ieefa-update-australia-sponsors-a-failing-gas-industry/>

¹⁰ Morton, A. (2020, March 8). 'Expensive and underperforming': energy audit finds gas power running well below capacity. Retrieved from <https://www.theguardian.com/environment/2020/mar/08/expensive-and-underperforming-energy-audit-finds-gas-power-running-well-below-capacity>

¹¹ AEMO (2020, March). Gas Statement of Opportunities, March 2020, For eastern and south-eastern Australia. Retrieved from <https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/gas-statement-of-opportunities-gsoo>

¹² AEMO (2019, December 12). Draft 2020 Integrated System Plan - For the National Electricity Market. Retrieved from https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/isp/2019/draft-2020-integrated-system-plan.pdf?la=en

¹³ AEMO (2020b, July 30). 2020 Integrated System Plan - For the National Electricity Market. Retrieved from <https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en>

¹⁴ ACCC (2020, January) Gas inquiry 2017-2025 – Interim Report. Retrieved from <https://www.accc.gov.au/system/files/Gas%20inquiry%20-%20January%202020%20interim%20report%20-%20revised.pdf>

interconnection enables the growth of variable renewable energy without a significant reliance on local gas generation.¹⁵ Supporting this assertion, the AEMO announced a series of actionable transmission projects including interconnector upgrades and expansions and network augmentations supporting recently announced renewable energy zones.¹⁶ ¹³ AEMO noted that as each of these new transmission projects is commissioned, the ability for national electricity market regions to share resources (particularly geographically diverse variable renewable energy) is increased, and therefore demand for gas-powered generation is forecast to decrease.¹¹ The Marinus Link is forecast to be commissioned in 2036, with surplus renewable generation from Tasmania then being available to the mainland National Electricity Market, which would see further declines in gas-fired generation, despite continuing coal-fired generation retirements.¹¹ ³

Therefore, it is highly unlikely that a “growing component of energy demand will need to be met by natural gas supply to complement renewables growth and battery storage in Australia as ageing coal-fired power plants close over coming decades”.

Santos quoted from the 2020 ISP that

“GPG can provide the synchronous generation needed to balance variable renewable supply, and so is a potential complement to storage. The ultimate mix will depend upon the relative cost and availability of different storage technologies compared to future gas prices.”

In my original submission, I stated,

“However, the current installation of synchronous condensers in South Australia and other eastern states to increase system strength and stabilise the electricity network will reduce the need for gas-fired generators acting in the role of synchronous generators as more renewables enter the grid.¹⁷ Ancillary services are likely to utilise battery storage and synchronous condensers in the future and no longer require the use of gas-powered generation.”³

Santos stated that, “Additional gas is required in the domestic gas market to meet residential, commercial and industrial gas demand.”

Gas demand has been declining in recent years and predictions are that gas demand will not increase in the future and may decrease, therefore it is unlikely that additional gas will be required in the domestic gas market to meet residential, commercial, and industrial gas demand.

In my original submission, I noted that,

¹⁵ AEMO (2020c, July 30) 2020 ISP Appendix 2. Cost Benefit Analysis. Retrieved from <https://aemo.com.au/-/media/files/major-publications/isp/2020/appendix--2.pdf?la=en>

¹⁶ Energy Source & Distribution (2020, July 30). AEMO reveals Integrated System Plan 2020. Retrieved from <https://esdnews.com.au/aemo-reveals-integrated-system-plan-2020/>

¹⁷ Parkinson, G. (2020, May 25) Big spinning machines arrive in South Australia to hasten demise of gas generation. Retrieved from <https://reneweconomy.com.au/big-spinning-machines-arrive-in-south-australia-to-hasten-demise-of-gas-generation-64767/>

“demand for natural gas in NSW has declined over recent years. From 2014 to 2018, annual consumption of natural gas in NSW fell by 15 per cent, with the major contributor of this fall in consumption being the reduction in the use of gas for power generation.¹⁸ Whereas domestic demand for gas has fallen for use in manufacturing by 14%, it has dropped by a staggering 59% for power generation by since 2014.⁹ “

ACCC recently stated that “overall consumption of gas in the east coast was largely unchanged over the first five months of 2020 relative to 2019”¹⁹ and that the COVID-19 pandemic has not had a material effect on the overall level of production or consumption in the East Coast Gas Market. However, they stated that it is unknown whether the contraction in economic activity brought about by the COVID-19 pandemic will result in a decline in domestic and/or international demand for gas in 2021.

Commercial and Industrial (C&I) gas users utilise gas for applications such as a heat source for boilers and furnaces, for producing steam, or for drying processes, and as a feedstock to produce fertilisers, explosives, chemicals, and plastics. ACCC reported that a number of suppliers expected Gas Powered Generation (GPG) and C&I demand to be lower in 2020 and that many C&I users reported that they are slowing production due to the COVID-19 pandemic which raised the potential for significant adverse consequences for these users in having to pay for gas that they cannot use or on-sell (with take or pay contract obligations). ACCC concluded that there is now a considerable degree of uncertainty surrounding the demand for gas by gas users (non GPG) following the COVID-19 pandemic and the impact this has had on economic activity, both domestically and internationally.¹⁹

Whereas 2019 was somewhat of an anomalous year with failures in Coal Powered Generation resulting in additional GPG being utilised, the ACCC reported that GPG demand over the first five months of 2020 was 36% lower than over the same period in 2019.

In my original submission I noted that AEMO forecast that, “demand for gas-powered generation is predicted to continue to fall by over 85% from 2019 levels by 2028.”²⁰ ³

In my original submission I noted that,

“The ACT is planning to go gas free by 2025. This is expected to reduce their overall emissions by 22%. As part of the ACT Climate Change Strategy 2019-2025, all government and public-school buildings will be completely powered by 100% renewable energy eliminating the need for natural gas. The ACT has also removed the mandatory requirement for new homes built in the ACT to be connected to the mains gas network and will begin to introduce new policies to replace gas appliances with electric alternatives. Some 14% of residents have already converted over to 100%

¹⁸ Pegasus Economics (2019, August) Report on the Narrabri Gas Project. Retrieved from https://8c4b987c-4d72-4044-ac79-99bcaca78791.filesusr.com/ugd/b097cb_c30b7e01a860476bbf6ef34101f4c34c.pdf

¹⁹ ACCC (2020, July) Gas inquiry 2017–2025 Interim report July 2020. Retrieved from <https://www.accc.gov.au/system/files/Gas%20inquiry%20July%202020%20interim%20report.pdf>

²⁰ AEMO (2020, March 27) National Electricity & Gas Forecasting 2020 GSOO Publication. Retrieved from <http://forecasting.aemo.com.au/Gas/AnnualConsumption/Total>

electric.²¹” and that “There are moves in other jurisdictions to remove the mandatory requirement for a gas connection in new developments such as in South Australia.”³

In my original submission I noted that,

“AEMO forecasts further reductions in gas use as consumers fuel-switch away from gas appliances towards electrical devices, in particular for space conditioning. The Commonwealth and NSW Government are exploring options to free-up gas demand through electrification, fuel switching and energy efficiency.”²²

Fuel switching from gas appliances towards electrical devices can often be more economic. A 2018 study of household fuel choice found that 98% of households with new solar financially favoured replacement of gas appliances with electric. With existing/no solar 60-65% of households still favoured replacement of gas appliances with electric.²³

In the residential sector, for example, reverse-cycle air-conditioning is expected to reduce gas demand that could have arisen due to gas heating.^{24”3}

Therefore, it is unlikely that additional gas will be required in the domestic gas market to meet residential, commercial, and industrial gas demand.

Downward pressure on NSW gas prices and more jobs

Santos quoted the ACIL Allen analysis findings that,

“By the later 2020s and beyond, the Project will be among the lower cost resources.”

As lower cost supplies dry up the higher cost supplies will be utilised including NGP. NGP will only be “among the lower cost contingent resources” because lower cost supplies will be less available.

However, in my original submission I noted that,

²¹ Mazengarb, M. & Parkinson, G. (2019, September 16). ACT to phase out gas as it launches next stage to zero carbon strategy. Retrieved from <https://reneweconomy.com.au/act-to-phase-out-gas-as-it-launches-next-stage-to-zero-carbon-strategy-92906/>

²² Energy NSW. (2020, January 31). Memorandum of understanding, Retrieved from <https://energy.nsw.gov.au/government-and-regulation/electricity-strategy/memorandum-understanding>

²³ Alternative Technology Association (2018, July) Household fuel choice in the National Energy Market. Retrieved from https://renew.org.au/wp-content/uploads/2018/08/Household_fuel_choice_in_the_NEM_Revised_June_2018.pdf

²⁴ AEMO (2020a, July 30). 2020 ISP Appendix 10. Sector Coupling. Retrieved from <https://aemo.com.au/-/media/files/major-publications/isp/2020/appendix--10.pdf?la=en>

“according to an AEMO commissioned report, gas extraction costs from this field will be over twice the cost of other existing fields in the eastern gas region.⁹ According to AEMO, the Narrabri Gas Project is ranked 41 out of 51 actual and undeveloped gas projects and there are 18 developed and 22 undeveloped gas projects with lower estimated production costs than the Narrabri Gas Project.¹⁸

Santos quoted the ACIL Allen analysis findings that,

“The Project can place downward pressure on gas prices in NSW, potentially by between 4 per cent and 12 per cent from 2025 onwards. Even if 40 TJ per day is provided to establish a local fertiliser plant, a 3 per cent to 9 per cent price reduction in Sydney is estimated.”

It should be noted that this analysis is based on the spot market only under pure market conditions and not Gas Supply Agreement (GSA) prices. As noted by ACIL Allen, “Most wholesale gas is sold and transported under bilateral agreements between producers, pipeline owners, retailers and major users.” “the eastern Australian market continues to operate primarily based on long-term bilateral contracts, with the spot markets used largely to manage operational and contract imbalances” and “The spot prices provide an indication of short-term and seasonal variations in the supply demand balance and bear little relationship to long-term contract prices.” And that “Spot prices are a good indication of possible prices in short term contacts of up to 18 months. They are not a good indication of prices in longer term gas sales contracts.” Information obtained by the ACCC from gas suppliers in the east coast indicated that suppliers were unlikely to use expected future LNG spot prices to assess prices in domestic contracts with a term beyond three years.¹⁴

ACIL Allen further noted, “Most of the gas traded in the east Australian gas market is under long term gas sales agreements. It is difficult to model the impact of contracts on average prices of gas at different points in the market as the terms and prices contained in these gas sales agreements are not public.”

ACIL ALLEN noted that future prices in GSAs are likely to be driven primarily by:

- the marginal cost of undeveloped, contingent, and prospective resources after around 2026.
- longer term LNG price movements which in turn will be influenced by movements in oil prices, global economic conditions, and global LNG production capacity
- transmission pipeline capacity and the efficiency of the transmission system and capacity trading
- the level of competition in the eastern Australian gas market.

ACIL Allen also noted that with the commissioning of LNG import terminals “the pricing dynamics in the eastern Australian market will increasingly be influenced by LNG import pricing, and away from export parity pricing.”

In my original submission I noted,

“The marginal source of supply (the final source of gas supply needed to meet demand) is likely to set floor price in negotiations between gas suppliers and buyers in NSW.²⁵ This cost of production together with transmission costs to Sydney is currently some 20% less than the proposed Narrabri Gas Project. Furthermore, future marginal source of supply may be satisfied by imported LNG (where wholesale gas prices would be set to import parity levels) or through existing or developed lower cost domestic supplies (such as noted by AEMO).¹⁸ Under these circumstances, the Narrabri Gas Project would not provide the marginal source of supply for wholesale gas in NSW, and is thus unlikely to exert any influence over wholesale gas prices in NSW over the near or long term and therefore not contribute to any reduction in domestic gas prices.”³

The ACIL Allen modelling showed an overall increase in gas prices of over 30% in the medium term rising to over 40% in the longer term. The modelling indicated that the NGP would reduce the amount of increase in gas prices somewhat than without it for the spot market.

However, the estimated NGP production costs of \$6.40/GJ used in the modelling that are based on ACIL Allen’s internal data are below the AEMO estimates that the NGP will have costs at a minimum \$7.28/GJ.⁹ Using the AEMO estimates may give a different result with a reduced ability to “place downward pressure on gas prices”.

How these modelling results would potentially affect real gas prices over time for such a small potential reduction in gas price increase is drawn into question. Factors such as export parity, import parity, producers’ marginal costs of production are more likely to affect contract prices and thus overall gas prices. Therefore, this analysis may not be able to show whether the “Project can place downward pressure on gas prices in NSW”.

Santos quoted the ACIL Allen analysis findings that,

“Because of Santos’ commitment that all the gas produced from the Project will be available for the domestic market, a new competitive source of supply close to Sydney is expected and this will lead to more competitive prices on long term gas contracts, particularly into the late 2020s and 2030s.”

ACIL Allen’s analysis suggested that delivery of NGP gas delivered to Sydney would be competitive with Queensland supplied gas. However, this assumed NGP production costs of \$6.40/GJ. If the AEMO estimate of a minimum production cost of \$7.28/GJ is used then NGP is no longer competitive with Queensland supplied gas to Sydney.⁹

As for any changes to the level of competition, this is not an open market and has little visibility, it has very limited numbers of producers (5) (of which Santos is already one), a limited number of

²⁵ ACCC (2020, January) Gas inquiry 2017-2025 – Interim Report. Retrieved from <https://www.accc.gov.au/system/files/Gas%20inquiry%20-%20January%202020%20interim%20report%20-%20revised.pdf>

retailers (6), and an even limited number of pipeline owners (2), and GSA contract prices which make up the majority of gas demand are undisclosed.

The ACCC noted that the response of the LNG producers to increased domestic demand in 2019 highlighted their ability to divert gas into the domestic market when required and suggested Queensland gas could meet forecast demand should risks associated with southern states' production arise. They also noted that, "The capacity of LNG producers to seemingly increase domestic supplies to keep the East Coast Gas Market supplied with just enough gas may also point to broader competition and market power concerns."¹⁴

In my previous submission I noted that,

"Domestic gas prices in Australia have remained at levels far in excess of international parity prices. Whilst prices have fallen somewhat, they have not fallen by nearly as much as those in Asia or Europe. Domestic prices have remained some 30-40% higher than ACCC calculated export parity prices (a.k.a. "netback" prices).^{26/3}

Of increasing concern to the ACCC is the widening divergence between domestic prices offers and the LNG netback price. Domestic prices in Queensland now diverge from export parity LNG netback prices by more than \$2/GJ. ACCC find this extremely concerning, as it raises serious questions about the level of competition among producers in the East Coast Gas Market.¹⁹

Of even further concern to the ACCC is that since September 2019 there have been 18 LNG spot cargoes sold by Queensland LNG producers, with the prices received for these spot cargoes well below the prices being offered to the domestic market.¹⁹

The ACCC concluded that the spot cargo sales, together with the divergence that has occurred between LNG netback prices and domestic prices, brings into question what is driving the pricing strategies of LNG producers and other suppliers in the East Coast Gas Market, and the extent to which it reflects a more fundamental lack of competition amongst suppliers.

The problems with competition in the Australian gas market are complex and there is a lack of understanding on how these could be resolved.¹⁹ It is unlikely that projected reductions in the increases in gas spot prices by the NGP would have a significant impact on competition in the East Coast Gas Market.

The role of natural gas in a low-carbon economy

Santos stated that "Some submitters suggested that the Project should not be approved as it would contribute to an unacceptable increase in greenhouse gas emissions and that any forecast shortage in energy demand could be met by renewable sources of energy generation."

²⁶ Long, S. (2020, February 27). Gas giants misled governments and it is costing Australian jobs, ACCC boss says. Retrieved from <https://www.abc.net.au/news/2020-02-27/gas-giants-misled-governments-acc-cboss-rod-sims-says/12004254>

As stated in my original submission,

“To address the issue of dangerous climate change, Australia, along 196 other parties, is a signatory to the Paris Agreement, which entered into force on 4 November 2016. The Paris Agreement aims to strengthen the global response to the threat of climate change, by:

Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.²⁷

NSW Climate Change Policy Framework details the NSW Government’s objective to achieve net-zero emissions by 2050.²⁸ This long-term objective “sets a clear statement of government’s intent, commitment and level of ambition and sets expectations about future emissions constraints that will help the private sector to plan and act.” The Policy Framework states that the NSW Government will investigate how to embed consideration of climate change mitigation and adaptation across government operations including service delivery, infrastructure, purchasing decisions and regulatory frameworks. Furthermore, it states that Agencies will undertake additional policy investigation for sectors with significant opportunities and risks, including primary industries emissions and adaptation (Department of Primary Industries).

The IPCC report provides an estimate for a global remaining carbon budget of 580 GtCO₂ (excluding permafrost feedbacks) based on a 50% probability of limiting warming to 1.5 degrees relative to 1850 to 1900 during and beyond this century and a remaining carbon budget of 420 GtCO₂ for a 67% chance.²⁹

Committed emissions from existing and proposed energy infrastructure represent more than the entire carbon budget that remains if mean warming is to be limited to 1.5 °C and perhaps two-thirds of the remaining carbon budget if mean warming is to be limited to less than 2 °C. Estimates suggest that little or no new CO₂-emitting infrastructure can be commissioned, and that existing infrastructure may need to be retired early (or be retrofitted with carbon capture and storage technology) in order to meet the Paris Agreement climate goals.³⁰

²⁷ IPCC (2018). Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, Intergovernmental Panel on Climate Change. Retrieved from <https://www.ipcc.ch/sr15/>

²⁸ OEH (2018). NSW Climate Change Policy Framework. Retrieved from <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Climate-change/nsw-climate-change-policy-framework-160618.pdf>

²⁹ Meinshausen, M. (2019, March 19). Deriving a global 2013-2050 emission budget to stay below 1.5°C based on the IPCC Special Report on 1.5°C. Retrieved from https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0018/421704/Deriving-a-1.5C-emissions-budget-for-Victoria.pdf

³⁰ Tong, D., Zhang, Q., Zheng, Y., Caldeira, K., Shearer, C., Hong, C., Qin, Y., & Davis, S. J. (2019). Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target. *Nature*, 572(7769), 373-377. <https://doi-org.ezproxy.newcastle.edu.au/10.1038/s41586-019-1364-3>

Australia's remaining emission budget from Jan 2017 until 2050 for a 50% chance of warming to stay below 1.5C warming relative to pre-industrial levels was estimated to be 5.5 GtCO₂e.²⁹ Adding the GHG emissions expended in 2017³¹, 2018³², and 2019³³, this leaves just 3.8 Gt CO₂e remaining as at December 2019. This leaves 6-7 years left at present emission rates of the 2013-2050 emission budget to stay below 1.5°C. Therefore, at current emissions rates, Australia will have exceeded its carbon budget for 2050 by 2026.

It therefore follows that no new fossil fuel development in Australia that is not carbon neutral, including the Narrabri Gas Project, that is estimated to result in 94.2 million tonnes of greenhouse gases over the life of the project, can be permitted because its approval would be inconsistent with the remaining carbon budget and the Paris Agreement climate target.³³ It follows that the NGP would contribute to an unacceptable increase in greenhouse gas emissions.

Santos further states "These submissions ignore the critical role of natural gas in the transition to a low-carbon economy, recognised by the International Energy Agency, or the relative contribution of the Project to Australia's overall greenhouse gas (GHG) emissions, which is not significant."

In my original submission I noted that,

"Natural gas has often been touted as the "transition fuel" for the electricity sector to replace coal's greenhouse gas emissions and eventually paving the way for an emissions free future for Australia. This has been used as an argument for the approval of the Narrabri Gas project. This concept is out of date and I believe incorrect. It is simply too expensive and too emissions intensive to be so. Furthermore, the concept is based on the replacement of coal with gas which is effectively for electricity generation only. Gas is also utilised for heat through combustion both industrially and domestically producing greenhouse gases."

The response to the role of natural gas in the transition to a low-carbon economy can be found in my response to the following sections "Why the Project is needed", "Greenhouse gas and climate change - Reservoir CO₂ production", and "Greenhouse gas and climate change – Fugitive emissions"

Greenhouse gas and climate change - Reservoir CO₂ production

As noted in my original submission the Narrabri Gas field has high levels of CO₂ which will be vented into the atmosphere as part of gas extraction adding to the fugitive emissions from the

³¹ Climate Council (2018) Australia's Rising Greenhouse Gas Emissions. Retrieved from https://www.climatecouncil.org.au/wp-content/uploads/2018/06/CC_MVSA0143-Briefing-Paper-Australias-Rising-Emissions_V8-FA_Low-Res_Single-Pages3.pdf

³² Cox, L. (2019, March 14). Australia's annual carbon emissions reach record high. Retrieved from <https://www.theguardian.com/environment/2019/mar/14/australias-annual-carbon-emissions-reach-record-high>

³³ DISER (2020, May) National Greenhouse Gas Inventory: December 2019. Retrieved from <https://www.industry.gov.au/data-and-publications/national-greenhouse-gas-inventory-december-2019>

implementation of this project.³⁴ Santos disputes Dr Grogan's findings on the high levels of fugitive CO2 emissions from NGP. I suggest you review Dr Grogan's work with respect to the NGP; Dr Grogan is an independent expert in the field with specific knowledge on CO2 processes in geological formations.³⁵

Santos claims Narrabri gas has a very low CO2 content compared to "some existing sources of natural gas in the east coast gas market" but does not say where. As noted, the predicted fugitive CO2 gas emissions are high (up to 24%). I would like to see what these existing sources are and are they being used?

Santos also claim that they will "beneficially re-use CO2 where relevant in further support of achievement of emissions reduction targets" but appear not to be capturing and reusing any of the significant CO2 fugitive emissions resulting from gas extraction from the Narrabri Gas Project.

Finally, with respect to CO2 fugitive emissions, Santos state that the NGP will be subject to the GHG Safeguard Mechanism to manage their emissions (including CO2 fugitive emissions).³⁶ However, this is unlikely to have any positive effect on emissions, as less than 9% of companies subject to the Safeguard Mechanism have had to surrender carbon credits in 2018-2019 due to the scheme's weak rules.³⁷

Greenhouse gas and climate change – Fugitive emissions

Santos disputes that the Narrabri Gas Project EIS had underestimated the predicted fugitive methane emissions. Santos uses an "allowed" factor in its EIS of 0.0058% of methane fugitive emissions, according to the Australian Government National Greenhouse and Energy Reporting (Measurement) Determination 2008, clause 3.72.

As noted in my original submission,

"The CSIRO report "Fugitive Greenhouse Gas emissions from Coal Seam Gas Production in Australia"³⁸ noted that fugitive emissions for Natural Gas in Australia are estimated to be 1.5% of gas extracted. It should be noted that if fugitive emissions exceeded 3.1% then the emissions intensity would match that of coal (due to the fact that methane is 86 times more powerful as a greenhouse gas than CO2 over 20 years and 34 times more powerful over a 100-year time period).³⁹ They also

³⁴ Grogan, A. (2020, April 8). Cherry-Picking: Santos selects convenient data to deflect Narrabri gas challenge. Retrieved from <https://www.michaelwest.com.au/cherry-picking-santos-selects-convenient-data-to-deflect-narrabri-gas-challenge/>

³⁵ NWPA (2020, April). Narrabri Gas Project - Greenhouse Gas Claims Refuted. Retrieved from https://nwprotectionadvocacy.com/wp-content/uploads/2020/03/NARRABRI-GAS-PROJECT-GHG-claims-refuted-April-2020_web.pdf

³⁶ Clean Energy Regulator (2019, October 28). The safeguard mechanism. Retrieved from <http://www.cleanenergyregulator.gov.au/NGER/The-safeguard-mechanism>

³⁷ Mazengarb, M. (2020, April 1). Industrial emissions grow as polluters side-step safeguard caps. Retrieved from <https://reneweconomy.com.au/industrial-emissions-grow-as-polluters-side-step-safeguard-caps-30115/>

³⁸ CSIRO (2012). Fugitive Greenhouse Gas Emissions from Coal Seam Gas Production in Australia. Retrieved from <https://publications.csiro.au/rpr/pub?pid=csiro:EP128173>

³⁹ Robertson, B. (2020, January 30). IEEFA Australia: Gas is not a transition fuel, Prime Minister. Retrieved from <https://ieefa.org/ieefa-australia-gas-is-not-a-transition-fuel-prime-minister/>

noted that unconventional gas industry such as Coal Seam Gas would result in greater levels of fugitive emissions than the conventional gas industry.”

Methane leaks from natural gas production can make the process nearly as carbon intensive as coal. Therefore, Santos’s claim that “If the natural gas produced by the Project was simply used to displace coal-fired power generation in the Australian energy market, it would be expected that this would also reduce CO2 emissions.” may not necessarily be true due to fugitive emissions (both methane and CO2).

Santos states that

“demand will remain irrespective of whether the Project is approved and, if the Project is refused, the demand will simply need to be met by other energy sources including but not limited to LNG import into NSW via approved and planned facilities. These alternative sources of gas could be expected to have higher emissions impacts due to transportation requirements including liquefaction, transportation, regasification and other sources of emissions.”

Whereas imported gas via gas import terminals may have reasonably high emissions due to the liquefaction process, my original submission detailed other alternative sources of gas that had significantly lower emissions than the NGP and in the long term could replace the need for new gas such as proposed by the NGP.

It should be noted that these technologies Green Hydrogen and Biogas and Biomethane not only look to transition electricity generation away from natural gas but also for other uses such as combustion for heat.

From my original submission,

“Hydrogen

Hydrogen is a colourless, odourless, non-toxic gas that is an excellent carrier of energy and can be used for a broad range of energy applications including as a transport fuel, a substitute for natural gas and for electricity generation.⁴⁰ Hydrogen gas can be produced from water in a process known as electrolysis, and when powered by renewable energy, the hydrogen produced is free from carbon emissions, making it an attractive way to decarbonise transport, heating and electricity generation.⁴⁰

AEMO stated that, “Hydrogen has the exciting potential to become an alternative energy storage technology and a new export commodity for Australia” which could be used to help decarbonise the domestic heat, transport and the industrial and commercial sectors in Australia and noted that development of the hydrogen industry would potentially impact both natural gas and electric demands.^{24 12}

Several developments involving green / renewable hydrogen are either planned or underway in Australia.

⁴⁰ Tasmanian Government. (n.d.). Hydrogen. Retrieved from https://www.stategrowth.tas.gov.au/energy_and_resources/energy/hydrogen

AEMO highlighted the potential for green steel production in Australia due to abundant renewable resources and the increased demand for low emissions industrial commodities worldwide.²⁴ 'Green steel' can be made via a direct reduction process which uses hydrogen (made from renewable energy) as the heat source and reducing agent to produce pig iron. The by-product of the iron reduction process using hydrogen is water, rather than carbon dioxide in conventional steel making. Renewable energy is then used by an electric arc furnace to produce low-emissions green steel.

The Arrowsmith Hydrogen Project, which will be built at a facility in the town of Dongara, located 320km north of Perth, will utilise dedicated onsite renewable energy 85MW of solar power, supplemented by 75MW of wind generation capacity to generate 25 tonnes of green hydrogen a day and will be operational in 2022.⁴¹

ATCO's Clean Energy Innovation Hub, located in Jandakot in Western Australia, is being used to trial the production, storage and use of renewable hydrogen to power a commercial-scale microgrid, testing the use of hydrogen in different settings and applications including in household appliances.⁴² This includes optimising hydrogen storage solutions, blending hydrogen with natural gas and using hydrogen a direct use fuel. Green hydrogen will be produced from on-site solar using electrolysis, fuelling a range of gas appliances and blending hydrogen into the natural gas pipeline.

The \$3.3 million development project will evaluate the potential for renewable hydrogen to be generated, stored, and used at a larger scale. ATCO aims to assess the practicalities of replacing natural gas with hydrogen at a city-wide scale across a municipality.⁴³

The new chair of the Australian Energy Regulator, Clare Savage recently stated:

*"The national gas industry could also undergo significant change as some jurisdictions move towards a zero carbon emissions policy. This could have significant consequences for the future of gas pipeline networks. In response, the AER recently supported the future recovery of Jemena's investment in trialling the production of hydrogen from renewable energy for injection into its Sydney network. If hydrogen trials such as Jemena's prove successful, the natural gas networks could be re-purposed to distribute hydrogen. If not, the economic life of the assets could be limited."*⁴⁴

Biogas and Biomethane

Biogas is a renewable energy source, that is continuous and dispatchable, reliable, and local source of energy. Biogas can be converted into heat and/or electricity using boilers, generators or with

⁴¹ Mazengarb, M. (2020, April 29). Massive hydrogen project gets green light after securing \$300m investment. Retrieved from <https://reneweconomy.com.au/massive-hydrogen-project-gets-green-light-after-securing-300m-investment-68959/>

⁴² Energy Source & Distribution (2018, October 4). Nel awarded contract for Australia's first hydrogen microgrid. Retrieved from <https://esdnews.com.au/nel-awarded-contract-for-australias-first-hydrogen-microgrid/>

⁴³ ARENA (2018, July 3). Green hydrogen innovation hub to be built in WA. Retrieved from <https://arena.gov.au/news/green-hydrogen-innovation-hub-to-be-built-in-wa/>

⁴⁴ West, M. (2020, July 3). A Savage Call: energy tsar calls time on Australia's gas cartel. Retrieved from <https://www.michaelwest.com.au/a-savage-call-energy-tsar-calls-time-on-australias-gas-cartel/>

Combined Heat and Power units.⁴⁵ Biogas also provides an alternative route for waste treatment and, as such, can help divert waste from landfill. Biogas consists primarily of methane and carbon dioxide, with trace amounts of other gases such as hydrogen sulphide, water vapour, oxygen, and ammonia.⁴⁶ Biogas can also be upgraded into biomethane: a renewable gas that can replace natural gas with a chemical composition very similar to natural gas. Biomethane is produced from the separation of methane from the other gases.⁴⁶

Biogas and its industry offer many benefits:

- Biogas is a renewable energy source that assists the decarbonisation of the economy. A study of the replacement of natural gas by biomethane in France reduced GHG emissions by greater than 85%.
- Biogas is a secure, continuous and dispatchable source of energy that can contribute to national energy supply.
- Biogas also provides an alternative route for waste treatment and, as such, can help divert waste from landfill.
- The biogas industry supports local economies and regional communities, creating jobs, and offering new income sources, particularly for farmers.
- Biogas transformed into biomethane is a renewable gas that can replace natural gas, and can be used in homes for cooking, heating, and hot-water, or as a fuel for gas vehicles. It can be injected into the gas grid or used directly on-site. As biomethane has similar characteristics to natural gas, its injection into the gas grid does not require any adaptation of the existing infrastructure (neither the gas grid nor customer equipment connected to it). This is an opportunity for the gas and transport sectors to further assist the energy transition.⁴⁶

A landmark report commissioned by Bioenergy Australia last year identified the total estimated biogas potential to be 371PJ (103TWh) of available energy, which is enough to decarbonise industrial, commercial, and residential gas users currently supplied by distributed gas networks across Australia.⁴⁷

Australian business, industry and utilities recently signed an open letter to the Commonwealth Government advocating for biomethane to be injected into the gas distribution networks to enable the lowest cost transition to a decarbonised energy market and address a number of challenges including:

- Provide complementary reliable and flexible renewable resources for variable renewable energy.

⁴⁵ Ramos-Suárez, J. L., Ritter, A., Mata González, J., & Camacho Pérez, A. (2019). Biogas from animal manure: A sustainable energy opportunity in the Canary Islands. *Renewable and Sustainable Energy Reviews*, 104, 137–150. <https://doi-org.ezproxy.newcastle.edu.au/10.1016/j.rser.2019.01.025t>

⁴⁶ Carlu, E. Truong, T. Kundeviski, M. (2019, May). Biogas opportunities for Australia. ENEA Consulting – March 2019. Retrieved from: <https://www.energynetworks.com.au/resources/reports/biogas-opportunities-for-australia-enea-consulting/>

⁴⁷ Hughes, J. (2020, July 15). Business, industry and utilities back biogas for net zero Australia. Retrieved from <https://www.worldbiogasassociation.org/business-industry-and-utilities-back-biogas-for-net-zero-australia/>

- Allow heavy industry dependent on process inputs and high-quality heat to decarbonise using existing gas connections.
- Provide a pathway for Heavy vehicle decarbonisation.
- Allow domestic gas customers to decarbonise their energy supply using existing networks and appliances.⁴⁸

Both Renewable Hydrogen and Biogas/Biomethane can displace or replace natural gas as a fuel significantly reducing GHG emissions. These technologies show promise in Australia with the resources available locally. Once developed these would see assets such as the Narrabri Gas project left stranded.”³

Due to the above reasons I strongly object to the Narrabri Gas Project. Thank you again for the opportunity to comment. I look forward to hearing from you regarding this submission.

Yours sincerely,

Alec Roberts

⁴⁸ Bioenergy Australia (2020, June 9). Joint letter in support of Australian biomethane market development. Retrieved from <https://www.bioenergyaustralia.org.au/news/joint-letter-in-support-of-australian-biomethane/>