

Fast and loose

Analysis of Santos's eleventh-hour Narrabri Gas Project documents

Santos's last minute submission of new economic and gas supply modelling undermines the integrity of the assessment process. It is also misleading in many regards, notably in basing much of its case on a production cost for the Narrabri gas field presented as an independent estimate but in fact provided by Santos themselves.

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August 2020

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ISSN: 1836-9014

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Summary

Santos has submitted last-minute documents to the planning process relating to its Narrabri Gas Project. These documents contain misleading claims and flawed analysis that overstate the case for the project.

Santos has previously stated that the Project would have no impact on Australian gas prices, a position shared by the Department of Industry, Planning and Environment (DPIE) in recent public hearings. Seemingly in response to DPIE's statement, Santos' new modelling claims the opposite – that it will reduce gas prices.

This modelling assumes a production cost estimate of \$6.40/GJ. Santos and its consultants misrepresent this estimate as an independent estimate by Core Energy and AEMO. In fact the production cost is was supplied to AEMO by Santos and contradicts Core Energy estimates. In fact, these sources estimate the Project would have production costs of up to \$9.36/GJ.

The modelling assumes Narrabri will add to overall east coast gas supply thus reducing the price. This is based on the incorrect assumptions that gas supplying NSW from other sources that would be displaced by the NGP will not be not be exported and that Santos does not exercise market power

Santos misleadingly omits pipeline transport costs in its comparison of LNG import prices.

Arguments that the NGP will help avoid gas shortfalls incorrectly assume that additional supply will not simply allow increased withdrawals for export. Even if Narrabri gas does supply NSW (and there is no guarantee of this), the equivalent amount of gas that would otherwise supply NSW from the Cooper Basin or elsewhere can simply be exported.

The likelihood of this situation has been vividly demonstrated by recent revelations from the ACCC that 18 cargoes of LNG, equivalent to 10 percent of annual east coast gas supply were exported to Asian customers at lower prices than were offered Australian customers.

The benefit cost analysis provided by Santos is contradicted by Santos' own accounts. Santos values the project at nil in its accounts, while the new assessment predicts a benefit of \$2 billion. This contradiction is explained by:

- High gas prices assumed
- No update in line with yields in unconventional gas fields
- Unrealistic cost estimates
- No discussion of pipeline requirements.

DPIE's assessment report ignores this huge disparity on the basis of one paragraph in a review it commissioned. The review was by one of Australia's most controversial economists, Brian Fisher, who is closely linked with the mining, oil and gas industry.

Jobs modelling assumes the covid crisis keeps labour markets oversupplied for the next 25 years.

Santos' comments document includes other misleading claims relating to:

- National emissions policy, or lack thereof
- The scale of project emissions
- Gas in Australia's energy transition

The Project should be rejected by the IPC as its economic benefits clearly do not outweigh its costs and the potential costs it imposes on the NSW community.

Introduction

The Australia Institute, and many other organisations and individuals, have dedicated significant time and resources over several years reviewing detailed economic modelling and gas supply arguments presented in Santos' EIS, Santos' response to submissions, the Department of Planning Industry and Environment (DPIE) assessment and its public economic review.

Santos's economic case, including issues relating to gas price and supply, and the DPIE assessment of that case, were roundly criticised by many experts through the submission and public hearing process. The Director of NSW Department of Planning David Kitto admitted to the IPC that in his view the NGP would not reduce gas prices in NSW.

In response, Santos has now rewritten its economic case and submitted it on the final day of the public consultation period.

The new material submitted by Santos goes far beyond responding to questions from the IPC. The new modelling contradicts previous modelling, markedly increasing claims of economic benefits and jobs. It also contradicts Santos's previous modelling and acknowledgement to the Department of Planning's expert economic reviewer BAEconomic that the project would not reduce gas prices in NSW.

The Australia Institute welcomes the opportunity to respond to this new material. However, we urge the IPC to take into account that this eleventh hour rewriting of its economic case enables Santos to avoid the detailed scrutiny it would have had the new material been provided in a timely manner, in line with the clear and established process. This new material has not been assessed by the DPIE and has not been subject to public review. Outside experts and the community have only had seven days to respond, and it has avoided the important scrutiny of public hearings. This undermines the integrity of the process.

This submission highlights some of the most misleading claims of the new material in relation to gas supply and prices, energy transition and emissions.

This submission should be read in conjunction with the original Australia Institute Submission written by Mark Ogge and submitted on August 10 which covers more areas of concern about both Santos's original economic reports, and the DPIE's inadequate

assessment of the of the NGP. Reference is also made to our submissions on the Environmental Impact Statement (EIS) and Response to Submissions (RtS).¹

¹ Shields and Campbell (2017) Narrabri Gas Project: Submission, <https://www.tai.org.au/content/narrabri-gas-project-submission>; Shields and Campbell (2018) Narrabri Gas Project: Comments on Response to Submissions, <https://www.tai.org.au/content/narrabri-gas-project-comments-response-submissions>.

Project impact on gas price

Previous analysis provided by Santos assumed the project would have no impact on gas prices:

In analysing the economic impact of the Narrabri gas Project, it was assumed that the project did not add to total gas supply at the national level. Rather, it was assumed that it benefited NSW by being an alternative to new gas supply located outside of NSW. Therefore, **it was assumed that the project itself did not drive changes to gas market prices. In effect, the project was a gas price taker and not a price maker.**² (Emphasis added).

This assumption is entirely reasonable – the Project would be a small part of the East Coast gas market and would be a price taker under any kind of gas market assumptions. That position was confirmed by David Kitto, the director of the NSW Department of Planning, Industry and the Environment (DPIE) at the IPC hearings, who said it was the department's view that the \$3.6 billion project was relatively small and would not drive down prices:

And I think it would be fair to say...we're certainly not saying in our assessment that the Narrabri Gas Project [NGP] will reduce gas prices. I mean, when you look at it...it will produce a small amount of gas in relation to the whole of the market, the whole of the domestic gas market.³

Following the public hearing, Santos commissioned new gas market modelling from ACIL Allen that contradicts these earlier positions.⁴ In Santos' comments to the IPCN, CEO Kevin Gallagher presents this modelling as an "update" to "reflect current economic conditions". This is misleading. It is not an update. No similar modelling was included in the EIS or RtS documents. This is new analysis, seemingly in response to Mr Kitto's comment and the damage it has caused to the political case for the project. Looking at the modelling in detail, it is similarly misleading, based on unverified data provided by Santos, misrepresented as coming from independent analysts.

² Attachments to BAEconomics (2018), Appendix H2-B-Economic Expert Advice, P.5, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-6456%2120200611T102102.329%20GMT>

³ See IPCN (2020) Narrabri Gas Project, transcript MONDAY, 20 JULY 2020, https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2020/03/narrabri-gas-project/public-hearing/transcripts/200720-day-1-narrabri-gas-project-public-hearing-transcript_redacted.pdf

⁴ Acil Allen Consulting (6 August 2020) Report to Santos (Eastern) Pty Ltd, Narrabri Gas Project ; Update on Economics, p.23, https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2020/03/narrabri-gas-project/correspondence/santos-submission/200810-ngp-economics-report_acil-allen.pdf

ACIL ALLEN GAS MARKET MODELLING

ACIL Allen have conducted the modelling assuming a NGP production cost of \$6.40/GJ.

The production costs of gas fields are the costs of extracting the gas, usually to the point before it enters a pipeline for transportation to the market. The relative production costs of various gas fields are important because they indicate which fields are the most commercially viable.

In the context of Santos's new claims about the effect of the NGP on gas prices, the production cost is particularly important because the production cost plus any other costs of getting the gas to market (particularly transport and a commercial margin) represent a floor for the gas price. If a project is to be commercially viable, gas cannot be sold below the cost of producing it and supplying it to customers.

As such, if this cost is higher than the cost of gas currently or potentially supplying NSW customers in the future, then it cannot reduce gas prices, and could well increase them.

Based on this price ACIL Allen argue

After new sources of supply in the Gippsland Basin, the NGP is the next cheapest source of supply from 2C contingent resources as indicated in the supporting documentation to AEMO's 2020 Gas Statement of Opportunities report.⁵

The marginal cost for undeveloped 2P CSG reserves in Queensland is now estimated to be around \$5.70/GJ. With transportation costs of around \$2.50/GJ added on according to the latest tariffs posted by APA, the delivered cost will be north of \$8/GJ. It is expected that the Narrabri project will be competitive with these prices considering the ability of Santos to reduce costs of production to \$6.40/GJ.⁶

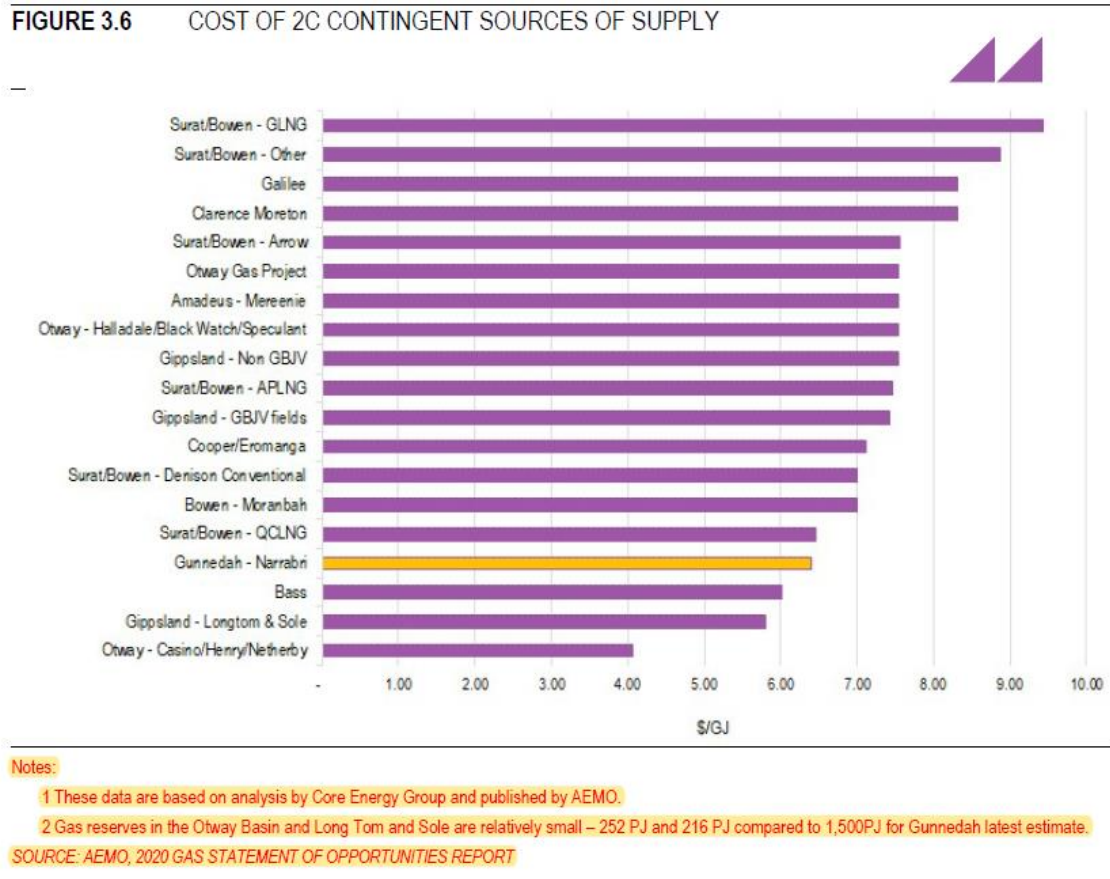
ACIL Allen present these production and delivery figures as based on analysis by Core Energy Group and published by AEMO. This is not the case. In fact the figure was supplied **by Santos** to AEMO and contradicts Core Energy Group analysis.

Figure 1 below shows production costs of various east coast and Northern Territory gas basins presented by ACIL Allen in the new economic report. Highlighted in the figure are the \$6.40/GJ production cost for the Gunnedah Basin, and ACIL Allen's presentation of this cost as an independent estimate by Core Energy and AEMO.

⁵ Acil Allen Consulting (6 August 2020) Ibid P.i

⁶ Acil Allen Consulting (2020) p.23

Figure 1: Production costs of 2C sources of gas supply in presented by Acil ALLEN



Source: Acil ALLEN (July 2020) p.19

As shown in Figure 1, ACIL Allen implies that the production cost of \$6.40/GJ is an independent estimate by Core Energy Group in analysis commissioned by AEMO.

However, the \$6.40/GJ figure does not appear in the cited publication, AEMO’s 2020 *Gas Statement of Opportunities* (GSOO). Instead, Core’s production cost estimate for a number of gas basins including Gunnedah is a range of \$7.28-9.36/GJ, well above the \$6.40/GJ attributed to them by ACIL Allen, as shown in Figure 2 below:

Figure 2: Extract from AEMO 2020 Gas Statement of Opportunities

Project / Supply Region	OPEX, Well Cost & Existing Plant Cost, Royalty & Tax AUD/GJ	OPEX, Well Cost & New Plant Cost, Royalty & Tax AUD/GJ	Including Appraisal, Acquisition & Exploration Cost AUD/GJ
Bass Basin	6.02		6.84
Casino, Henry and Netherby	3.51-4.63		0.00
Cooper Eromanga Basin	7.12		7.63
GBJV & Turrum & Kipper	6.29		7.43
Longtom & Sole	5.80		6.51
Moranbah	5.24	5.71	6.91
QLD CSG - Arrow Energy (excl. Moranbah)	6.61	7.55	0.00
QLD CSG - BG / QCLNG	6.45	7.39	0.00
QLD CSG - GLNG	8.44	9.44	0.00
QLD CSG - Ironbark / ORG	5.18		
QLD CSG - ORG / APLNG	6.60	7.47	7.93
QLD CSG - Other	0.00	8.87	9.38
Gippsland Basin - Other			
Clarence-Moreton Basin - Other			
Gunnedah Basin - Other			
Galilee Basin - Other			
Adavale Basin - Other			
Otw ay Basin - Other			
Central Petroleum Amadeus	6.77-8.30	7.28-9.36	7.28-9.87
Falcon Oil & Gas (Georgina Basin)			
Cash Maple			
Beetaloo Basin			
Gloucester Basin			
Coxco Dolomite			

Source: Core Energy (2019) *Gas Reserves and Resources and Cost Estimates Eastern Australia, NT*, p.11 https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2020/final_reserves_contracts_cost_report.pdf?la=en

The estimates in Figure 2 are derived by Core Energy, engaged by AEMO to “develop and estimate of the cost of production of reserves and contingent resources,” using its proprietary method which “incorporates extensive technical and commercial data, data models and GIS mapping technology to enable focused analysis of each supply region under consideration.” Core describe their methodology as follows:

The approach adopted is based on generally accepted best practice within the international oil and gas industry, including the following elements:

- Development of a database of remaining 2P gas reserves disclosed by operators and Government as at 31 December 2018
- Definition of individual supply areas, having regard to geology, permit areas and geographical boundaries
- Development of production scenarios for each supply area
- Identification and quantification of full lifecycle, sunk and go forward/marginal costs
- Derivation of breakeven price, utilising a proprietary model which adopts a net present value methodology.⁷

⁷ Core Energy and Resources (November 2019) *Gas Reserves and Resources and Cost Estimates Eastern Australia, NT*, p.7 <https://aemo.com.au/->

Core’s methodology, while not claiming to provide precise point estimates, provides a considered, independent estimate for production costs. The same cannot be said for the \$6.40/GJ figure, which does not come from Core or AEMO, but comes *from Santos*.

The \$6.40/GJ figure is shown in a zip file released with the 2020 GSOO, containing the supply input data files and another workbook containing a list of production cost assumptions. This latter workbook has different values for some basins to the Core Energy production costs estimates in the final 2020 GSOO, including the Gunnedah/Narrabri estimate, as shown in Figure 3 below.

Figure 3: Extract from AEMO production cost assumptions workbook for GSOO 2020

Gippsland	Gippsland - Non GBJV			7.54
Gunnedah	Gunnedah			6.40
Otway	Halladale/Black Watch/Speculant		4.99	7.54
Gippsland	Longtom & Sole		5.70	5.80
Amadeus	Mereenie	3.05		7.54
Moranbah	Moranbah	3.16	6.00	7.00
Otway	Otway Gas Project	2.70	5.90	7.54
Surat & Bowen	QLD CSG - APLNG	2.25	4.72	7.47
Surat & Bowen	QLD CSG - Arrow	3.27	5.63	7.55
Surat & Bowen	QLD CSG - GLNG	3.02	6.60	9.44
Surat & Bowen	QLD CSG - Other	3.81	6.74	8.87
Surat & Bowen	QLD CSG - QCLNG	2.54	4.48	6.45
Surat & Bowen	Surat / Bowen / Denison Conventional	2.85	5.95	7.00

Notes:

- (1) costs for prospective resources are unknown as they refer to undiscovered accumulations, but for the purposes of GSOO modelling have been set to be incrementally more expensive than all 2P and 2C fields.
- (2) costs for 2P undeveloped reserves are marginal only and do not include allocation of any past capex.
- (3) 2P developed reserves refer to those 2P reserves with existing wells, 2P undeveloped reserves are those reserves with wells yet to be drilled.
- (4) Gunnedah value provided by Santos and represents Santos' p50 (mid-case) production cost at the gate (post processing).
- (5) Overall production costs assumptions:
 - Production costs are the marginal cost of producing a GJ of sales gas to the point of sale into a transmission pipeline (inlet flange) and thus exclude transport cost.
 - Costs include operating cost, capital costs, royalty, tax and a return on capital.
 - Importantly they are not intended to reflect gas sale prices, only the marginal cost of actually supplying the gas.
 - For developed reserves production costs include largely marginal operating costs, royalties and tax.
 - For undeveloped reserves, marginal costs also include the cost of drilling and completion and marginal gas processing plant costs.
 - Where a gas plant does not exist the marginal cost will include an estimate of a per unit cost of capital and operating cost for that plant.

Source: AEMO (2020) GSOO 2020, supply input data files, production cost assumptions, <https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/gas-statement-of-opportunities-gsoo>

The highlighted ‘Notes’ section in Figure 3 shows that the \$6.40/GJ production cost estimate, which underpins Santos’s new claim that the NGP would lower gas prices, is not an independent estimate by AEMO and Core Energy. It is a figure supplied to AEMO *by Santos* that is between \$0.88-\$2.96/GJ lower than the independent Core Energy estimate.

None of the other estimates in Figure 2 are noted as being provided by the proponent companies.

/media/files/gas/national_planning_and_forecasting/gsoo/2020/final_reserves_contracts_cost_report.pdf?a=en

If ACIL Allen had used Core Energy's assessment as the basis for the modelling, the cost of Narrabri gas is far higher than the cost of Cooper Basin gas that is currently supplying well over half of NSW gas and would be displaced by gas from the NGP (discussed in more detail below). As such, the NGP is far more likely to raise gas prices for NSW customers than lower them.

ACIL Allen's discussion of the modelling result compares the \$6.40/GJ figure to costs of Queensland CSG delivered to NSW at "north of \$8/GJ". As ACIL Allen assume \$1.50/GJ transport costs for NGP gas, the fair comparison should be delivered cost of \$7.90/GJ to NSW customers. The total cost is therefore at best marginally competitive with Queensland CSG. But this assumes the lower production cost provided by Santos and not independently endorsed or verified. The cost estimates that in fact come from Core Energy would put the cost of delivered gas from NGP higher than competition from Queensland. On this basis, it is unclear how it could possibly reduce prices.

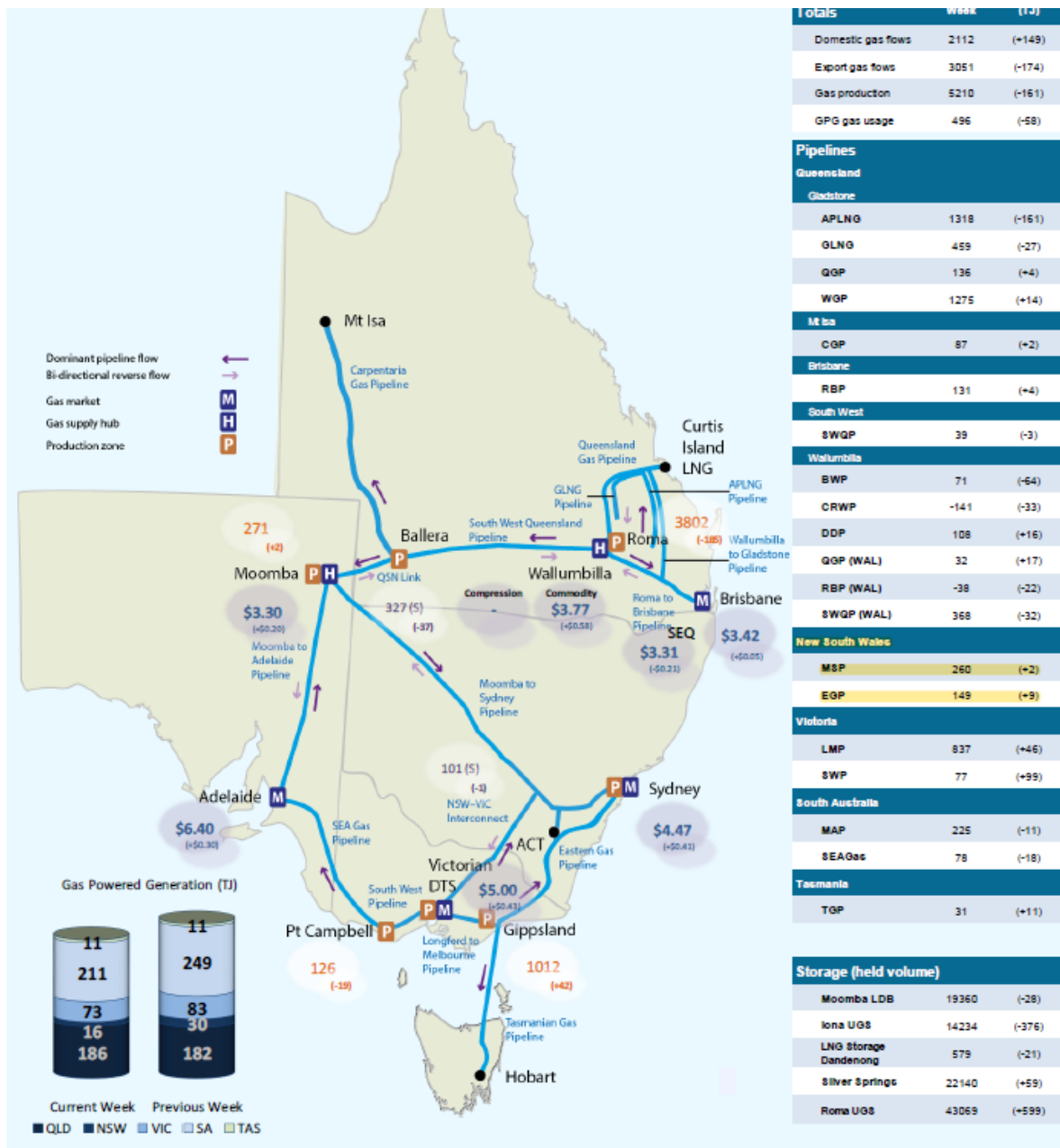
To put it another way, by putting the NGP supply into ACIL Allen's model with a low production cost, the model could only conclude that prices would decline. No other outcome is possible. This is not independent, rigorous analysis, but a certain outcome based on a flawed input, one provided by Santos and not verified by ACIL Allen.

NGP AND COOPER BASIN SUPPLY

As noted above, ACIL Allen argues that NGP gas will be competitive with Queensland CSG. This ignores the likelihood that NGP gas would displace supply to NSW from the Cooper Basin. The Cooper Eromanga Basin currently supplies most of NSW gas supply. NSW is supplied by two pipelines, the Eastern Gas Pipeline (EGP) bring gas from the Victorian fields, and the Moomba to Sydney Pipeline (MSP) bring gas predominantly from the Cooper Eromanga Basin.

Figure 4 below shows the gas flows for the week 2-8 August 2020. The gas flows for NSW for that week, 64% (260 TJ) was supplied by the MSP from the Cooper Basin, with the remainder coming from Victorian fields via the EGP:

Figure 4: Gas flows in ECGM August 2-8, 2020, TJ



Source: AER Gas Market Report 2-8 August, 2020, <https://www.aer.gov.au/wholesale-markets/market-performance?page=8>

As shown in Figure 4, some of the gas coming to NSW via the MSP may be provided from Queensland CSG via the South West QLD Pipeline (SWQP) feeding into the MSP, but the SWQP flows are small in comparison to the volume of gas being delivered to NSW from the MSP. These gas flows vary from week to week, but the flows discussed above are fairly

typical of the relative proportion of supplies to NSW from Victoria and the Cooper Basin over recent times.⁸

In contrast to Core Energy's production cost estimates for Gunnedah, the cost estimates for the Cooper Basin are almost exactly the same in both the Core Energy production cost estimates and AEMO assumptions spreadsheet. The reserve estimates align exactly between the two sources. Both are compared in Table 1 below.

⁸ AER Gas Market Report 2-8 August, 2020, <https://www.aer.gov.au/wholesale-markets/market-performance?page=8>

Table 1: Comparison of Cooper & Gunnedah Basin production cost estimates and reserves

	Basin	2P Developed	2P Undeveloped	2C
Production costs, Core Energy/ AEMO (\$/GJ)	Cooper Eromanga	\$2.44	\$6.36	\$7.17-\$7.12
Production cost, Core Energy/ AEMO (\$/GJ)	Gunnedah			\$7.28-9.36
Production cost provided by Santos (\$/GJ)	Gunnedah			\$6.40
Reserves (PJ)	Cooper	757	252	5,850
Reserves (PJ)	Gunnedah	-	-	971



Table 1 shows that the Cooper Basin 2P reserves alone are larger than total Gunnedah reserves, and that Cooper Basin reserves are six times larger than Gunnedah. It also shows that if we accept the independent Core Energy production cost over that supplied by Santos, Cooper Basin gas is between \$0.62 and \$6.92 cheaper than the cost of Gunnedah basin gas. The comparison to 2P reserves is justified because they are in fact larger than Gunnedah 2C reserves (there are no 2P reserves for Gunnedah). However, even if we only compare 2C reserves, Cooper Basin gas is between \$0.16 and \$2.19 cheaper than Gunnedah.

The transport costs of Cooper Basin gas to Sydney are also considerably cheaper. AEMO estimate that pipeline costs for Cooper basin gas along the Moomba to Sydney Pipeline (MSP) is \$1.12/GJ.⁹ Santos estimate that the pipeline cost to Sydney is (optimistically) \$1.50/GJ.¹⁰ The higher transport cost for Narrabri gas is because it would require a new pipeline from the gas field to the MSP, and then transport via the MSP which will take up capacity on the pipeline and is therefore likely to attract a similar tariff to if it was transported from the Cooper Basin.

As shown in Table 2 and Figure 5 below, when both the production costs and transport costs are taken into account, the range of costs for gas delivered to Sydney from the Cooper Basin are \$3.56-\$8.24/GJ compared to \$8.78-\$10.86 for Narrabri. The lowest estimate for Narrabri gas is higher than the highest estimate for the gas from the Cooper Basin that it

⁹ AEMO (2020) GSOO 2020, Reserve Costs assumptions, Supply Input Files, <https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/gas-statement-of-opportunities-gsoo>

¹⁰ Acil Allen Consulting (6 August 2020) Report to Santos (Eastern) Pty Ltd, Narrabri Gas Project ; Update on Economics, https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2020/03/narrabri-gas-project/correspondence/santos-submission/200810-ngp-economics-report_acil-allen.pdf

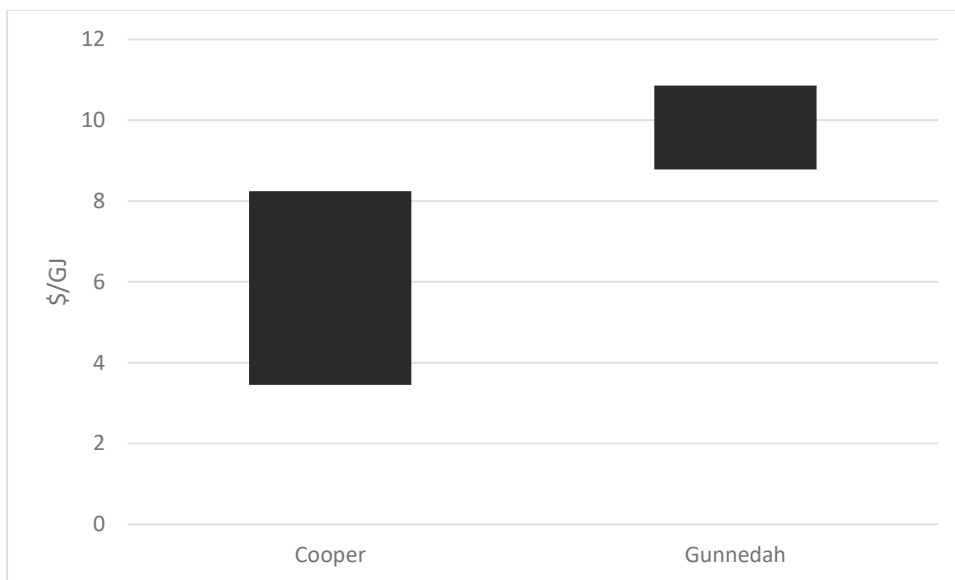
would displace. As such the displacement of Cooper basin gas with higher cost Narrabri gas means that the NGP could well increase gas prices to NSW customers.

Table 2: Comparison of Cooper & Gunnedah Basin delivered cost to Sydney

	Production cost (Core Energy/ AEMO)			Transport cost	total
	2p developed	2p undeveloped	2c		
Cooper Eromanga	\$2.44	\$6.36	\$7.07- \$7.12	\$1.12	\$3.56- \$8.24
Gunnedah			\$7.28- 9.36	\$1.50	\$8.78- \$10.86

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Figure 5: Comparison of delivered cost of Cooper and Gunnedah basin gas to Sydney



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A possible motivation for Santos wishing to supply NSW customers with gas from the NGP rather than the Cooper Basin, is that the production cost estimates for their 2C reserves of Queensland CSG for their Gladstone LNG export project (9GLNG), shown in Figure 6 below are even higher than Narrabri at \$9.44/GJ.¹¹

¹¹ Core Energy (2019) *Gas Reserves and Resources and Cost Estimates Eastern Australia, NT*, p.11
https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2020/final_reserves_contracts_cost_report.pdf?la=en

If Narrabri replaced Cooper Basin gas currently supplying NSW consumers, freeing up the lower cost Cooper basin gas for export, it would be lower cost source for supply of export gas, potentially creating a windfall gain for the company.

Figure 6: Core Energy GSOO production costs for 2C reserves

6.2. 2C Contingent and Prospective Resources

Project / Supply Region	OPEX, Well Cost & Existing Plant Cost, Royalty & Tax AUD/GJ	OPEX, Well Cost & New Plant Cost, Royalty & Tax AUD/GJ	Including Appraisal, Acquisition & Exploration Cost AUD/GJ
Bass Basin	6.02		6.84
Casino, Henry and Netherby	3.51-4.63		0.00
Cooper Eromanga Basin	7.12		7.63
GBJV & Turrum & Kipper	6.29		7.43
Longtom & Sole	5.80		6.51
Moranbah	5.24	5.71	6.91
QLD CSG - Arrow Energy (excl. Moranbah)	6.61	7.55	0.00
QLD CSG - BG / QCLNG	6.45	7.39	0.00
QLD CSG - GLNG	8.44	9.44	0.00
QLD CSG - Ironbark / ORG	5.18		
QLD CSG - ORG / APLNG	6.80	7.47	7.93
QLD CSG - Other	0.00	8.87	9.38
Gippsland Basin - Other	6.77-8.30	7.28-9.36	7.28-9.87
Clarence-Moreton Basin - Other			
Gunnedah Basin - Other			
Galilee Basin - Other			
Adavale Basin - Other			
Otway Basin - Other			
Central Petroleum Amadeus			
Falcon Oil & Gas (Georgina Basin)			
Cash Maple			
Beetaloo Basin			
Gloucester Basin			
Coxco Dolomite			

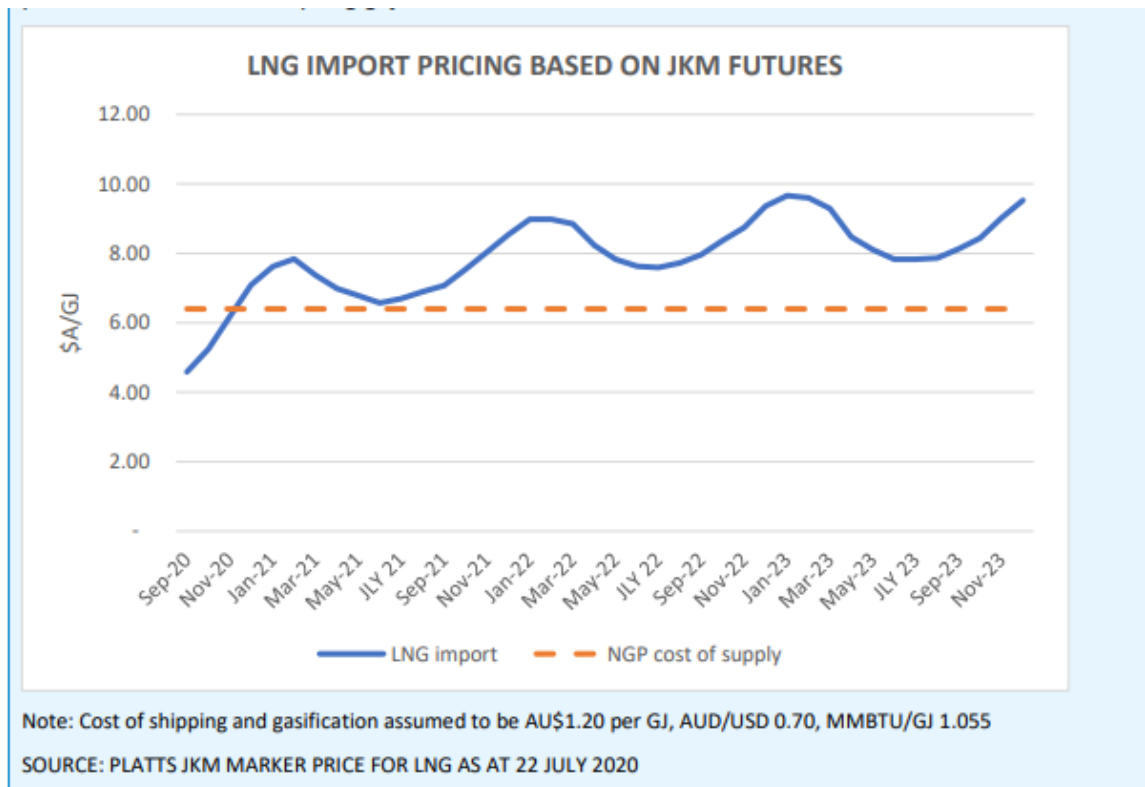
Source: Core Energy (November 2019) *Gas Reserves and Resources and Cost Estimates Eastern Australia, NT*, p.11 https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2020/final_reserves_contracts_cost_report.pdf?la=en

SANTOS’S MISLEADING LNG PRICE COMPARISON

In its submission to the IPC following the public hearing, Santos address the question of whether the NGP will be competitive with proposed LNG import terminals. The graph reproduced in Figure 7 below, presented by Santos, compares Platts projections for future Japan Korea Marker (JKM) import prices to gas prices from the Narrabri project.¹²

¹² Santos (10 August 2020) Narrabri Gas Project (SSD 6456) Submission to IPC following public hearing, 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

Figure 7: Chart from Santos submission following IPC hearings comparing Narrabri cost to projected LNG import prices



This graph is misleading for a number of reasons.

Firstly as discussed above, the estimated production cost of \$6.40/GJ used in this graph is Santos’s own estimate which is much lower than the Core Energy production cost estimate of \$7.28- \$9.36/GJ

Even if we accept Santos’s production cost estimate, this does not include the cost of transporting the gas by pipeline which ACIL Allen estimate at \$1.50/GJ. Including transport costs would raise the Narrabri “cost of supply” to \$7.90/GJ.

It is also unclear whether the Santos production cost estimate used includes an allowance for a commercial return on the project, whereas the JKM does because it is a global price rather than a production cost.

THE NGP WILL NOT PREVENT GAS SHORTAGES

Australia has no shortage of gas. Gas production in eastern Australia has tripled in just six years, allowing LNG exports of approximately double domestic consumption.

Because such vast quantities of gas are being extracted and exported every year, our gas resources will inevitably deplete. However, the NGP will have precisely zero effect on whether or not there are gas shortages in Australia in the future.

This is because Australia now has an interconnected gas network that is connected to export terminals. Gas produced anywhere in Australia can now be exported.

Santos has promised that gas from the NGP will be sold to NSW customers. It should be noted that this is an “in principal” memorandum of understanding and is not binding on Santos, let alone any future operator. In their Assessment Report on the project, DPIE did not recommend that NGP gas be supplied to NSW customers as a condition of approval of the project.

However, even if the gas is used in NSW, the promise is meaningless because it simply means that the equivalent amount of additional gas produced elsewhere can be exported.

The ability of gas producers to export gas rather than sell to domestic customers was demonstrated recently when the ACCC reported that 18 cargoes of LNG, equivalent to 10 percent of annual east coast gas consumption, was exported and sold as LNG at a price lower than offered to Australian consumers. As ACCC Chairman Rod Simms explained:

Queensland LNG producers sold 18 LNG spot cargoes into international markets in late 2019 and early 2020, equivalent to more than 10 per cent of annual domestic east coast demand. This gas was sold at prices substantially below domestic gas price offers, showing the importance of our continuing work to understand the drivers behind the price levels we are seeing across the domestic market.

It is also clear that recent Australian contract gas prices do not reflect overseas forward prices.

I am yet to hear a compelling reason from LNG producers as to why domestic users are paying substantially higher prices than buyers in international markets.¹³

It appears companies like Origin and Santos not only would prefer but are able to sell gas to overseas customers for less than they could sell it for domestically, rather than reducing gas prices for Australian customers.

Santos argue that Narrabri would enable it to enter into long term gas supply agreements (GSAs) to NSW industrial customers. However, Santos could equally offer long term secure GSAs to local customers from Cooper Basin reserves that currently supply over 50 percent of

¹³ ACCC (17 August 2020) Domestic gas users paying too much, <https://www.accc.gov.au/media-release/domestic-gas-users-paying-too-much>

the state's gas supply. As noted above, these reserves are many times greater than the Narrabri contingent resource and have lower production costs.

Those industrial users who believe the NGP would Narrabri will enable them to secure long term GSAs should question how the displacement of Cooper Basin supply with a smaller, more expensive source would achieve this.

The only way the Narrabri gas project could increase the NSW gas supply is if exports were capped, which would be energetically opposed by Santos and the other LNG exporters.

Economic assessment

In Santos’ comments following the public hearings, CEO Kevin Gallagher writes:

The economics of the Narrabri Gas Project stack up - Santos would not have already invested \$1.5 billion in the Narrabri Gas Project if they didn’t. Narrabri is an economically robust investment opportunity for Santos and one that will deliver numerous economic benefits for the community.

Mr Gallagher’s statement is contradicted by Santos’ own accounts. The relevant section of Santos’ latest annual report is shown in Figure 8 below:

Figure 8: Extract from Santos annual report on value of Gunnedah Basin gas assets

2019	Segment	Subsurface assets US\$million	Plant and equipment US\$million	Total US\$million	Recoverable amount ¹ US\$million
Oil and gas assets – producing:					
Barrow	Western Australia	–	34	34	nil
Other	Various	3	–	3	nil
Total impairment of oil and gas assets		3	34	37	
Exploration and evaluation assets:					
Gunnedah Basin	Queensland & NSW	11	–	11	nil ²
PNG – PPL 395 & PPL 464	PNG	9	–	9	nil ²
Other	Various	4	–	4	nil ²

Source: Santos (2020) *Annual Report 2019*, p87 <https://www.santos.com/wp-content/uploads/2020/02/2019-annual-report.pdf>

The highlights added in Figure 8 above show that Santos’ accounts consider the recoverable value from their Gunnedah Basin assets, mainly the Narrabri project, to be “nil”. This is not a recent development. As noted in The Australia Institute’s submissions on the EIS and RtS, Santos has carried the Narrabri project on its books at zero value since 2016, while co-owners CLP group wrote off all value in 2015.¹⁴

This should be a major concern for decision makers. If the project is not financially robust, it will fail to deliver on promised benefits, will require government subsidy and will have every incentive to cut corners on safety and environmental protection. The capacity of the project to fund its site rehabilitation requirements should be made clear before any further consideration is given.

¹⁴ Santos (2016), *Statement on Santos NSW assets*, <https://narrabrigasproject.com.au/2016/02/statement-on-santos-nsw-assets/>; Chambers (2015) *CLP writes off stake in Santos project*, <http://www.theaustralian.com.au/business/mining-energy/clp-writes-off-stake-in-santosproject/news-story/2619e923515725685b4b4fb0222af101>

Mr Gallagher continues, claiming:

In short, what the new analysis has found is that the impact for the local community and New South Wales more broadly has strengthened.

If Mr Gallagher's claim and ACIL Allen's modelling is to be believed, the Narrabri Gas Project may be the only oil and gas asset in the world that has increased in value in recent months. While ACIL Allen's modelling indicates that the Project's net present value (NPV) has increased by \$450 million, again, no such improvement is shown in Santos' accounts or announcements to the stock exchange. On the contrary, Santos wrote down the value of its assets overall by \$1.1 billion in July, along with most of Australia's oil and gas sector that saw \$23 billion written off, mostly in gas projects. Shell has written off \$12-13 billion, Woodside \$6 billion, Origin Energy \$1.2 billion, Total \$1.1 billion and Oil Search \$575 million.¹⁵ Write downs reflect both lower prices due to the covid pandemic and a transition away from fossil fuel demand.¹⁶

BENEFIT COST ANALYSIS

Mr Gallagher is wrong to state that "ACIL Allen has updated its assumptions on the Narrabri Gas Project to reflect current economic conditions." In relation to the benefit cost analysis, this statement is wrong on three points.

First, it was not ACIL Allen's analysis that was updated. The original EIS analysis was performed by different consultants, GHD. ACIL Allen incorrectly attribute the original analysis to BAEconomics. BAEconomics were commissioned by DPIE to review GHD's analysis and are not the authors of it. More importantly, GHD made it clear that the data and assumptions in their assessment were not their own, but came from Santos:

¹⁵ Argus Media (2020) *Australia bears biggest brunt of Shell write-down*

<https://www.argusmedia.com/en/news/2120146-australia-bears-biggest-brunt-of-shell-writedown> Woodside

Petroleum (2020) *Asset value review and other items*

https://newswire.iguana2.com/af5f4d73c1a54a33/wpl.aspx/6A986351/WPL_Asset_Value_Review_and_Other_Items

Origin Energy (2020) *Origin expects to recognise non-cash charges in FY2020*

https://newswire.iguana2.com/af5f4d73c1a54a33/org.aspx/2A1237021/ORG_ORG_expects_to_recognise_non_cash_charges_in_FY20

Williams (2020) *LNG producers write off \$20bn* <https://www.theaustralian.com.au/business/mining-energy/lng-producers-write-off-20bn/news-story/d6c4ad5813e55a00eee36200883c0eef>

Oil Search (2020) *Non-cash impairment expected to be recognised in 2020 interim results*

https://newswire.iguana2.com/af5f4d73c1a54a33/osh.aspx/2A1236477/OSH_Expected_non-cash_impairment

Write downs in USD have been converted to AUD at exchange rate of 0.70.

¹⁶ Williams (2020)

Figure 9: Extract from GHD report

GHD has prepared this report on the basis of information provided by Santos which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information. This information includes:

- Construction and operations expenditure estimates.
- The split of Santos' domestic and international shareholders.
- Long-term gas price estimates.
- Gas production estimates.
- Corporate tax and royalty payments.

It was outside the scope of this analysis to independently appraise project parameters such as forecast gas prices, capital and operating costs and gas production estimates.

Source: GHD (2016) Narrabri Gas Project economic assessment, p6

Figure 9 shows that it is not ACIL Allen's assumptions that have been updated, but Santos has given ACIL Allen different data to what was given to GHD. While the data may have changed, the approach to verifying it has not. ACIL Allen's report includes the disclaimer that "ACIL Allen consulting has relied upon the information provided by the addressee [Santos] and has not sought to verify the accuracy of the information supplied. Unless stated otherwise, ACIL Allen Consulting does not warrant the accuracy of any forecast or projection in the report." (p2)

To be clear, no consultant has updated any of their own assumptions. Santos has provided two different consultants with slightly different assumptions, none of which the consultants are prepared to stand by. The inability or unwillingness of GHD and ACIL Allen to scrutinise the information that their clients provide to them contravenes the *NSW Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*, which require assessment to "be based on rigorous, transparent and accountable evidence that is open to scrutiny."¹⁷

Second, it is not multiple 'assumptions' that have been changed, but one assumption – that capital costs have reduced by \$450 million in present value terms, which increases the net present value of the project by 29%. Despite such a large upward revision of the project's value, contradicted by Santos' own accounts, there is no source provided and no analysis to support the change. The analysis simply states that "drilling costs", "connection costs" and "cost of associated facilities" have declined in other Santos projects and that these declines are assumed to be realised in the current project. There is no discussion as to the differences or similarities between these costs and projects and how relevant they may or may not be to the Narrabri Project.

¹⁷ NSW Department of Planning and Environment (2015) *NSW Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*, p3.

Relatedly, the third error in Mr Gallagher's sentence is his claim that ACIL Allen's update reflects current economic conditions. While the capital costs have been reduced, partly based on Santos' Queensland coal seam gas experience, another aspect of that experience has been ignored. Key assumptions and inputs that should have been updated in the benefit cost analysis are:

- gas prices,
- production forecasts,
- operating cost estimates and
- pipeline access.

As discussed below, these assumptions should have been revised, and they explain the difference between the zero value of the project in Santos' accounts and the \$2 billion value in the benefit cost analysis.

Gas price in benefit cost analysis

It is remarkable that the latest benefit cost analysis assumes a price of \$8.70/GJ – the same assumption that GHD used in its initial modelling four years ago. Note this appears to be a wellhead price, not a delivered price. In the Santos submission following the public hearing, the company even states that in the first half of 2020 it has averaged a realised domestic gas price of \$5.40 per gigajoule. It is unclear if this price includes delivery. Note that the difference between the price currently received and the price in the benefit cost analysis is 38%, greater than the range in the sensitivity analysis.

This price is not expected to rebound in the short, medium, or possibly long term, as shown in the various write downs discussed above and made explicit in widely reported analysis on write downs and forecast lower oil and gas prices caused by the covid pandemic and by a transition to renewable energy:

The writedowns reflected both a lower oil price outlook and also a broader energy transition change, energy consultancy firm Wood Mackenzie said.

"These writedowns are not unexpected as we've revised the value of oil and gas assets in Asia Pacific by \$US200bn as a result of a lower oil price outlook," WoodMac senior analyst Daniel Toleman said.

"The writedowns reflect how the energy transition is impacting corporate strategy at the world's largest oil and gas companies. The European super majors are setting out on a path towards more sustainable and resilient businesses, better equipped for a future of lower fossil fuel demand."

Global major BP, which in June took a writedown of as much as \$US17.5bn, slashed its long-term energy price assumptions and even warned it may leave oil and gas in the ground amid a fast-moving transition away from fossil fuels.¹⁸

The \$8.70/GJ price to the wellhead provided by Santos to GHD and now ACIL Allen needs to be seen in the context of Santos’ history of optimistic oil and gas price forecasts. Table 3 below compares Santos forecasts to actual prices and futures markets. Red-coloured figures indicate forecasts that have proven to be over-optimistic. Green-coloured figures indicate price forecasts that have proven to be pessimistic:

Table 3: Santos oil price forecasts as per its annual report forecasts

	Brent oil price: \$US/barrel							
	2015	2016	2017	2018	2019	2020	2021	2022
Santos oil price forecast Dec 2014	\$55	\$70	\$80	\$90	\$90	\$90	\$90	\$90
Santos oil price forecast Dec 2015		\$40	\$60	\$70	\$75	\$75	\$75	\$75
Santos oil price forecast Dec 2016			\$60	\$70	\$75	\$75	\$75	\$75
Santos oil price forecast Dec 2017				\$55	\$60	\$65	\$70	\$70
Santos oil price forecast Dec 2018					\$65	\$66	\$68	\$74
Santos oil price forecast Dec 2019						\$65	\$65	\$73
Historic average price	\$52	\$44	\$54	\$71	\$64	\$40		
Brent Oil Financial Futures July 2020							\$46	\$48

Santos made a pessimistic oil price forecast. # is average to end June

Sources: Santos Santos Annual Reports, Statista (2018) UK Brent Oil Price Changes since 1976.

<https://www.statista.com/statistics/262860/uk-brent-crude-oil-price-changes-since-1976/>. CME

Group (2018) Brent Last Day Financial Futures Quotes. Price quoted for June each year.

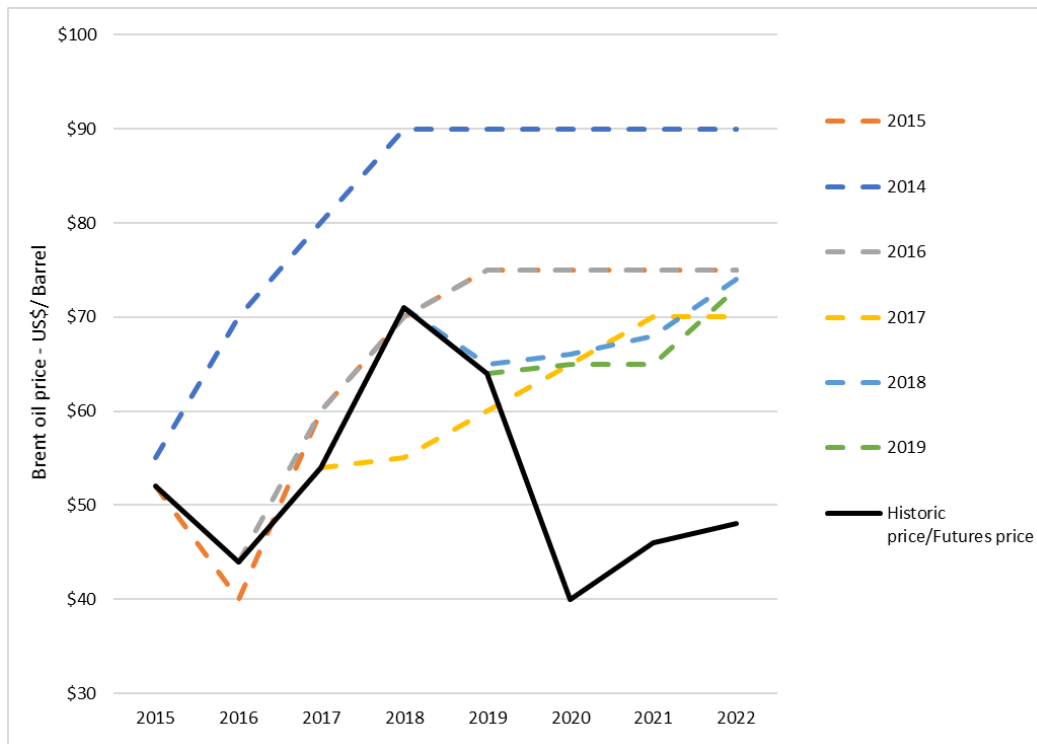
<http://www.cmegroup.com/trading/energy/crude-oil/brent-crude-oil-last-day.html>.

Table 3 above shows that Santos’ estimates are optimistic more often than pessimistic. Just as noteworthy is the size of the over-estimations compared to the under-estimations. The fifteen optimistic price forecasts average \$22 above the eventual price. Across the five pessimistic price forecasts, the under-estimated averages just \$5. In Figure 10 below we

¹⁸ Williams (2020) *LNG producers write off \$20bn* <https://www.theaustralian.com.au/business/mining-energy/lng-producers-write-off-20bn/news-story/d6c4ad5813e55a00eee36200883c0eef>

graph Santos’ oil price forecasts. The chart highlights that Santos forecasts are nearly always optimistic.

Figure 10: Santos oil price forecasts from annual reports



Sources: as for Table 3

As mentioned, current prices received by Santos are below the 30% decline explored in the sensitivity analysis. Santos’ general response to this topic is to state:

The positive outcome of the cost benefit analysis was found to be relatively insensitive to a range of variation in the in the [sic] input assumptions. The most extreme test was a reduction of 30 per cent in the gas price, which resulted in a net present value close to zero and a benefit cost ratio of close to one, under which circumstance the project would be of no economic value to the community.¹⁹

It appears that the point of the new analysis with lower capital cost is to give the impression that even under the “extreme” sensitivity test, the project retains a positive net present value. Given the volatile nature of energy markets, the claim that testing a change of 30% in gas price is in any way ‘extreme’ is extraordinary. Table 3 above shows that oil price swings of 30% are far from extreme.

¹⁹ Santos (2018) *Narrabri Gas Project: Response to Submissions*, p6-257.

Unconventional gas production declines

While Santos and ACIL Allen updated capital costs to reflect Santos' experience elsewhere, they have ignored the widespread experience of overestimated yields from these assets. Santos' Queensland coal seam gas fields have produced significantly less gas than forecast. Santos has chosen not to update the Narrabri assessment to take this into account. The assumed production from the Project remains what was assumed four years ago in the GHD analysis and has not been updated to reflect this experience.

This is even more unusual as there has been regular analysis on the problems of supply from unconventional gas developments, while discussion of capital cost savings are less common. Consultants, Rystad and EnergyQuest, have both produced extensive reports detailing the underproduction of the Queensland coal seam gas fields:

“Queensland’s \$84 billion LNG industry faces a gas supply shortage by 2025 which could render a third of the state’s gas export trains obsolete and ratchet up pressure on operators Origin Energy, Santos and Shell, consultancy EnergyQuest has warned. Coal seam gas from the Bowen and Surat basins, which feeds the three competing LNG projects, is unlikely to be sufficient to fill the six LNG trains operating, EnergyQuest says in a report today.”²⁰

“Queensland gas producers may be forced to cut exports from its \$84 billion LNG industry and shut down production units in the next decade due to falling coal seam gas production in the state, consultancy Rystad Energy has warned. Supplies from producing or under-development coal seam gas projects in Queensland are set to fall by 60 per cent in the next 10 years, based on reported remaining proven and probable reserves and well numbers.”²¹

Santos has experienced this production shortfall firsthand through its ownership in the GLNG Project. The project ran at only 56% of capacity in 2018 and 61% in 2019 and the plant has not had enough gas to fulfil its export contracts.²²

The over-optimism found in the Australian forecasts of coal seam gas reserves is not isolated. US shale gas projects have also produced much less gas than expected.²³ Despite

²⁰ Williams (2019) *Curtis Island LNG facing gas squeeze* <https://www.theaustralian.com.au/business/mining-energy/curtis-island-lng-facing-gas-squeeze/news-story/37972516328cbf57075b22c684aec09b>

²¹ Williams (2019) *Queensland coal seam gas shortfall threatening LNG exports, says Rystad*, <https://www.theaustralian.com.au/business/mining-energy/queensland-coal-seam-gas-shortfall-threatening-lng-exports-says-rystad/news-story/d0f9c2ec14c5cbbf15778e2f95d724c8>

²² Robertson (2020) *The Narrabri Gas Project – Submission to Independent Planning Commission*, p12.

²³ Olsen, Elliot and Matthews (2019) *Fracking’s Secret Problem—Oil Wells Aren’t Producing as Much as Forecast*, <https://www.wsj.com/articles/frackings-secret-problemoil-wells-arent-producing-as-much-as-forecast-11546450162>

apparently being updated to “current conditions”, the revised economic modelling ignores this.

unrealistic cost estimates

The key factor behind the difference between the zero value of the Narrabri Gas Project in Santos’ accounts and the \$2 billion net present value estimated in ACIL Allen’s update is production costs. As discussed above, the most recent AEMO/Energy Core estimates for Gunnedah/Narrabri production costs is a range of \$7.28 to \$9.36/GJ, with a midpoint of \$8.32.²⁴ Note that a production cost of \$8.32/per GJ is close to Santos/GHD/ACIL Allen’s assumed gas price forecast of \$8.70/GJ and far above Santos’ current average domestic received price of \$5.40/GJ. On this basis alone, the net present value of the project should be near zero or negative.

The ACIL Allen/GHD benefit cost analyses assume very low operating and capital costs. Operating costs in both analyses are \$2.20 per gigajoule, just a fraction of the \$6.40/GJ that Santos itself now claims or the AEMO/Core estimates of up to \$9.36/GJ. The ACIL/GHD analyses do not explicitly mention this figure, perhaps because it is so obviously unrealistic, but it can be derived from the present value operating cost figure of \$1,578 million and the production schedule in Table 4.3 of GHD’s report for the environmental impact statement.

It is difficult to include other costs like capital costs in this per gigajoule calculation based on the information in GHD and ACIL Allen’s analysis. Assuming capital costs occur through the life of the project, the new ACIL Allen analysis assumes total costs of \$4.36/GJ while the original GHD analysis used approximately \$4.89/GJ.

The Australia Institute’s original submission to the environmental impact statement pointed out these unrealistic assumptions. Santos’ response to submissions did not dispute this point or explain it. Instead it simply claims that GHD’s assessment met the NSW Guidelines.²⁵ DPIE’s Assessment Report does not explore this issue, nor does the economic review by BAEconomics.

No discussion of gas pipeline

The Australia Institute’s original submission highlighted that the Project requires a \$450 million gas pipeline and this further increases the likelihood of project delays and cost over-runs which reduce the net benefit of the Project. The construction of the pipeline is omitted entirely from the ACIL Allen and GHD assessments. The Santos RtS does not dispute the

²⁴ Core Energy (2019) *Gas Reserves and Resources and Cost Estimates*, p13, https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2020/final_reserves_contracts_cost_report.pdf?l a=en

²⁵ Santos (2018) *Narrabri Gas Project: Response to Submissions*, p6-264.

need for the pipeline or update the assessment to include it, although it claims some cost for transportation of gas is included in operating costs.²⁶

Neither DPIE or the economic expert discuss the possible project delays and cost over-runs due to the gas pipeline.

DPIE Assessment on project value

In considering the ACIL Allen analysis, the IPCN should be aware of DPIE's surprising lack of concern over the \$1.6 billion-dollar difference in estimates of the project's value in the Santos accounts and the GHD (and now ACIL Allen) analysis. This lack of concern is explained in just one paragraph of its Assessment Report, reproduced in Figure 6 below:

Figure 6: Extract from DPIE Assessment report

554. Dr Fisher noted that key concerns raised in submissions – including long term demand for LNG and the economic viability of the project in light of impairment charges adopted by Santos – do not affect the outcomes of the assessment, and/or do not appear to be consistent with recent ACCC forecasts for gas network prices in the East Coast gas market.

The Department is referring to a review of economic assessment in the EIS by Dr Brian Fisher of BAEconomics. The Assessment Report gives no detail as to why such a huge "impairment charge", equal to the entire value of the project, should not affect the outcome of the assessment. There is no further discussion of the multiple, detailed submissions on these points. More surprisingly still, the reviewer of these documents also fails to provide details as to why the longstanding financial non-viability of the project is not a major concern for decision makers.

FISHER REVIEW

As the new ACIL Allen benefit cost analysis is a minor adjustment to GHD's earlier analysis, the IPC should be aware of the review of this analysis by Dr Brian Fisher of consultancy BAEconomics. This analysis is flawed and commissioners should be aware of Dr Fisher's background in climate and energy politics and policy.

Dr Fisher sent a two page draft review to DPIE in June 2017, which Santos responded to in some detail in April 2018. Neither Dr Fisher's draft review nor Santos' response addressed the issue of the huge difference between Santos' financial evaluation of the project and the estimates in GHD's cost benefit analysis, relevant to the new ACIL Allen analysis. Instead, these documents focus on:

- Specifying costs and benefits to NSW rather than Australia.

²⁶ Santos (2018) *Narrabri Gas Project: Response to Submissions*, p6-257.

- Defining the local region in ACIL Allen’s analysis.
- Degree of foreign ownership of the project.

In June 2018, Dr Fisher wrote again to DPIE finding that his concerns had been “adequately covered in the Santos response”.

In October 2018 Dr Fisher sent a “Final Report” to DPIE that reviewed further revisions of the project’s assessment documents, as well as detailed submissions by The Australia Institute and Institute for Energy Economics and Financial Analysis.²⁷ Dr Fisher’s review of all these documents extended to just 1.5 pages, with the final paragraph addressing the difference between the GHD (relevant to the new ACIL Allen) cost benefit analysis evaluation and the proponents’ financial accounts:

The fact that the project proponent has taken an impairment on the project in its accounts is also irrelevant to the assessment of the project from the perspective of the community of NSW. As a publicly listed company in Australia, Santos is required to adhere to accounting rules and stock exchange standards. The value of a project recorded in the historical accounts of a company has no necessary bearing on the future value of the project to NSW (or to the company itself) should such a project be approved.

Many things about this response are surprising. First, the description of a multi-billion-dollar project being written down to nil as merely “an impairment” is an impressive piece of understatement.

However, financial analysis is different to economic cost benefit analysis. It is correct to say that a change of some percentage of the project’s value in company accounts need not be of concern to planning consent authorities. However, it is misleading to describe the complete write off of a project’s value on proponent accounts, an evaluation that has stood for over five years, as “irrelevant”. Planners should be informed as to the financial strength of the project, to assess its potential to deliver on promised benefits, potential need for government subsidy and ability to fund subsequent rehabilitation. In this case, planners should be sceptical that the project can deliver benefit to the state of NSW, as the company does not consider that it can deliver benefits to its shareholders.

Economic cost benefit analysis and financial analysis for accounting and investment purposes both attempt to find a similar thing – the net present value of future benefits and costs. In the case of Santos’ evaluation of oil and gas assets, they also consider climate policy, as stated in the latest annual report:

²⁷ Fisher (2018) *Appendix H2 – A – Economics Expert Advice*, p2,
<https://www.planningportal.nsw.gov.au/major-projects/project/10716>

For oil and gas assets, the expected future cash flow estimation is based on a number of factors, variables and assumptions, the most important of which are estimates of reserves, future production profiles, commodity prices, costs and foreign exchange rates. Current climate change legislation is also factored into the calculation and future uncertainty around climate change risks continue to be monitored. In most cases, the present value of future cash flows is most sensitive to estimates of future oil price and discount rates.²⁸

All of these factors are relevant to GHD's and now ACIL Allen's cost benefit analysis. The only legitimate reasons for a significant difference between economic and financial valuations would relate to 'external' costs and benefits such as environmental and social impacts, or financial factors such as loans and discount rates. Neither of these seem likely to apply in this case. External costs and benefits are estimated at low values in the EIS cost benefit analysis. A value of between \$164 million and \$268 million is estimated for social costs of carbon, while other external costs and benefits amount to only a few tens of millions in GHD's assessment.

Financing costs, such as repayment of loans, is included in financial analysis, but excluded from cost benefit analysis. This can also relate to different discount rates, which are generally higher in financial analysis. For example, CLP Group used a 10.5% real discount rate in its accounts and valued the project at zero.²⁹ Interestingly, GHD as part of sensitivity analysis used a very similar rate of 10.0%, and estimated the NPV of the Project to be \$1.1 billion.³⁰ This shows that the difference in the two valuations does not relate to the differences between financial and economic analysis, but to differences in the data and assumptions used within them. The proponents are giving one set of numbers to public planning processes and another set to private investors.

None of these possibilities are examined by Dr Fisher in his reviews. Other key points included in The Australia Institute submission, but ignored by Dr Fisher include:

- Santos' history of optimistic oil and gas forecasts.
- Project cost assumptions are low compared to AEMO-commissioned estimates.
- Potential for delays and cost over-runs due to the gas pipeline.
- The unverified assumptions GHD's assessment was based on.

²⁸ Santos (2020), p86

²⁹ CLP Group used a 13% discount rate and a 2.5% inflation rate which equates to a real discount rate of 10.5%. CLP Group (2015) *Annual Report 2014*, pp224, 204, [https://www.clpgroup.com/en/InvestorsInformationsite/Documents/Financial%20Report%20PDF/e_Annual%20Report%202014%20\(full%20version\).pdf](https://www.clpgroup.com/en/InvestorsInformationsite/Documents/Financial%20Report%20PDF/e_Annual%20Report%202014%20(full%20version).pdf)

³⁰ The alternative scenario of a 10% discount rate results in NPV of \$770 million to Australian shareholders. \$770 million divided by 70% (domestic ownership of the Project) equals \$1.1 billion. GHD (2016) p25.

- Discussion of optimism and strategic misrepresentation in project assessment and how this relates to the project.

Dr Fisher’s conclusions are made less surprising when seen in the context of the role he has played in the politics of mining and fossil fuels in Australia over several decades.

BACKGROUND ON DR FISHER AND BAECONOMICS

Mines and NSW planning issues

Dr Fisher and BAEconomics have been involved in both the NSW planning system and wider discussion around climate and energy in Australia for many years. They have worked for the proponents of some of the most controversial fossil fuel projects in NSW and have been heavily criticised:

- **Rocky Hill Coal Project.** Ultimately rejected by the NSW Land and Environment Court, with the judgement describing Dr Fisher’s evidence as “speculative and hypothetical”.³¹
- **Warkworth Coal Project.** Rejected by Land and Environment Court and subsequently approved under changed planning rules. Peer review of BAEconomic assessment stated, “*We are concerned that the report takes the approach of doing the minimum required to address the Secretary’s requirements, without making sufficient effort to provide analysis that is useful for decision makers and stakeholders.*”³²
- **Hume Coal Project.** Despite BAEconomics estimating a net benefit of \$316 million to the NSW community, DPIE states, “*the Department does not consider that the economic benefits outweigh the likely adverse impacts on the environment and community.*”³³

While Dr Fisher and BAEconomics are known to the planning system as consultants to coal mine proponents, the review of the Narrabri Gas Project is the first time Dr Fisher has been commissioned to conduct a review of economic assessment for the Department, as far as we are aware. Until this project, all the economic assessment peer reviews DPIE has commissioned have been from consultancies that do not regularly consult to the coal industry. For example:

- Airly mine – reviewed by Centre for International Economics (CIE)

³¹ Gloucester Resources Limited v Minister for Planning [2019] NSWLEC 7, <https://www.caselaw.nsw.gov.au/decision/5c59012ce4b02a5a800be47f>

³² See Deloitte’s April 2015 Peer review of Economic Assessment of Warkworth Continuation Project, page ii.

³³ DPIE (2018) Hume Coal Project and Berrima Rail Project Assessment Report, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-7172%2120190820T023400.760%20GMT>

- Angus Place mine – CIE
- Springvale – CIE
- Rix’s Creek – CIE
- Mount Owen – CIE
- Drayton South – BDA Group
- Rocky Hill – CIE
- Terminal 4 – CIE
- Vickery – reviewed by Marsden Jacobs. Dr Fisher was commissioned to review the assessment by proponents, Whitehaven.
- Hume Coal – BIS Oxford reviewed BAEconomics’ assessment. Unusually, another peer review was later commissioned to determine whether BIS Oxford’s recommendations had been addressed by BAEconomics’ response. The second review was by Stoeckel Group.

These reviews began in 2014 as a response to criticism of the Department’s internal reviews of economic assessments. Land and Environment Court decisions on the Warkworth and Ashton South East Open Cut mines were influential and finally a “scathing” Planning Assessment Commission finding on the Wallarah 2 mine on the Central Coast prompted then Minister Goward to start external reviews.³⁴

The above list of project reviews is not intended to be comprehensive, but to demonstrate that it is unusual, if not unprecedented, for DPIE to commission a review of a mining or gas project from a consultant closely aligned with the mining and gas industry. Dr Fisher’s relationship with the fossil fuel industry goes back decades.

Wider relationship to mining and fossil fuel industries

Dr Fisher is best known as the head of the Australian Bureau of Agriculture and Resource Economics (ABARE), a role he had from 1988 to 2006, aside from a brief stint in the Department of Primary Industries and Energy.³⁵ While ABARE is a government agency, under Dr Fisher’s leadership, much its modelling work was funded by organisations such as the Australian Coal Association, the Australian Aluminium Council, BHP, Exxon and other fossil fuel-intensive interests. Dr Fisher refused a request from the Australian Conservation Foundation to take part in the steering committee for the modelling without providing an explanation.³⁶

³⁴ Mckenny and Whitbourn (2014) Mining assessments to be beefed up after scathing review, <https://www.smh.com.au/national/nsw/mining-assessments-to-be-beefed-up-after-scathing-review-20140616-zs9sd.html>

³⁵ Fisher (n.d.) Curriculum Vitae - Brian S. Fisher, <http://www.baeconomics.com.au/wp-content/uploads/2017/06/Brian-Fisher-Full-CV-June17.pdf>

³⁶ Hamilton (2007) *Scorcher*, Black Inc. p62.

Dr Fisher also played a role in climate negotiations for Australia under the Howard Government, hardly a period of climate policy success for Australia. Former Liberal Party staffer Guy Pearse wrote about climate policy in the Howard years:

Fisher was undoubtedly responsible for some very good economic analysis relevant to the agricultural, resources and energy sectors. However, as the exclusive provider of economic advice on climate change, ABARE has consistently pandered to the needs of the Liberal Party and the desires of ABARE's emission-intensive clientele...Fisher's great talent was to include the truth, but to assist to obscure it. Time and again, the results that Fisher presented in his reports to government, and the scenarios and assumptions behind them, lent themselves to misrepresentation by the Howard government.³⁷

Towards the end of the Howard Government's term in office, Dr Fisher left ABARE to join various consultancies linked with fossil fuel industries and right-wing politics. He first went to Charles River Associates, a US company that consulted to the American Petroleum Institute,³⁸ before joining former Howard staffer Henry Ergas at "hard right" consultancy Concept Economics.³⁹ Journalist Bernard Keane observed:

Fisher, latterly having joined right-wing economist and Liberal adviser Henry Ergas and former Howard staff at Concept Economics, was hired by the Minerals Council to prepare an independent analysis of Treasury's modelling of the impact of emissions trading. Fisher was then, remarkably, hired without any selection process by a Coalition-controlled Senate committee to continue his attack on Treasury's modelling at taxpayers' expense. The proliferation of such "expert" opinions available for hire has dramatically lowered the quality of economic debate in Australia.⁴⁰

Dr Fisher's work for the Minerals Council of Australia (MCA) continued through the 2010s. He praised the MCA as "intelligent and thoughtful" in a speech to a mining conference that included a memorable description of the renewable energy industry:

All of those people are in fact a complete dead weight loss to society. They are imposing a cost on you. Those lawyers and other individuals, I wish them no malice of course, but those people are a dead weight loss and they would be much better employed in helping you do useful things in terms of enhancing the exports of

³⁷ Pearse (2007) *High and Dry*, Viking, iPhone version page 743.

³⁸ Hamilton (2007) p137.

³⁹ Keane (2015) *Meet Turnbull's adviser for scorched-earth economics*, <https://www.crikey.com.au/2015/11/13/meet-turnbulls-adviser-for-scorched-earth-economics/>

⁴⁰ Keane (2009) Correspondence on Quarterly Essay 33 Quarry Vision: Bernard Keane, <https://www.quarterlyessay.com.au/correspondence/correspondence-bernard-keane>

Australian minerals instead of wasting their time protecting an industry that's imposing more costs on you.⁴¹

Dr Fisher was subsequently appointed to the Abbott Government's review of the Renewable Energy Target, headed by climate sceptic oil executive Dick Warburton.⁴²

Dr Fisher's most recent major controversy came prior to the 2019 election when he published modelling of the costs of climate policies. Dr Fisher's research contradicted twenty-two other similar modelling exercises,⁴³ however, his findings were reported in The Australian newspaper as demonstrating "apocalyptic" costs would stem from Labor's policies.⁴⁴ These reports were widely cited by the Morrison Government in the election campaign.

In August 2019, with the Morrison Government re-elected, Dr Fisher gave a seminar at the Australian National University titled, apparently without irony, *Any chance Australia will ever see the use of first best climate and energy policy instruments?*. When challenged about The Australian's sensational reporting of his modelling results, and that perhaps such modelling and reporting contributed to the lack of efficient climate policy, Dr Fisher claimed that he had not given his reports to The Australian, that he had simply put them on the BAEconomics website and that he did not know how the newspaper had found them. "Well, people read websites," he claimed.⁴⁵

This was clearly untrue. Not only is The Australian's first article on Dr Fisher's modelling marked "exclusive", and features quotes from Dr Fisher, but the BAEconomics website shows that Dr Fisher's report was posted at 10.49pm, just 11 minutes before The Australian's article was published on its site. It is clear that Dr Fisher gave the report to The Australian with the knowledge that the paper's editorial angle would result in coverage advantageous to the government and his clients in the fossil fuel industry.

⁴¹ Fisher (2013) Minerals Week Seminar, <http://www.baeconomics.com.au/wp-content/uploads/2013/08/BRIAN-FISHER-speech-to-Minerals-week-2013.pdf>

⁴² Brewster (2014) *Renewable Energy Target review defends panel member Brian Fisher against conflict of interest claims*, <https://www.abc.net.au/news/2014-06-05/renewable-energy-target-panel-defends-conflict-interest-claims/5501372>

⁴³ Swann and Merzian (2019) *A Model Line-up*, <https://www.tai.org.au/content/new-analysis-brian-fisher-modelling-climate-outlier>

⁴⁴ Benson (2019) *Carbon cut apocalypse: cost of ALP energy plan*, <https://www.theaustralian.com.au/nation/climate/carbon-cut-apocalypse-cost-of-alp-energy-plan/news-story/96c9af15d670a6725146e356fd4b6414>; The Australian (2019) *Facing the high costs of climate change policies*, <https://www.theaustralian.com.au/commentary/editorials/facing-the-high-costs-of-climate-change-policies/news-story/dc9c627ea6a14c1cb15ad745d5ef4855>

⁴⁵ The Australia Institute attended this seminar and has an audio recording of it. Some details can be found on the ANU site - <https://acde.crawford.anu.edu.au/news-events/events/14989/any-chance-australia-will-ever-see-use-first-best-climate-and-energy-policy>

Dr Fisher's actions show that he is not an independent, objective analyst. He is a politically partisan campaigner for fossil fuel industry interests. He should not have been commissioned to review GHD's assessment of the Narrabri project and the review he provided fails to explain the egregious difference between the value placed on the project in the proponents' accounts and the value estimated in the EIS.

There has been huge pressure on the NSW Government to approve the Narrabri Gas Project, with Prime Minister Turnbull publicly pushing for its approval in 2017.⁴⁶ Deputy Prime Minister and then Resource Minister Barnaby Joyce owned land near the project, which had been highlighted as a conflict of interest.⁴⁷ With major flaws in the Narrabri Gas economic assessment, highlighted in submissions over several years, commissioning a review from the Department's usual reviewers, who are relatively independent of the mining and gas industry, would have likely resulted in a critical review and politically difficult discussion around the economics of the project.

Confronted with this situation, appears that the Department went "shopping" for a reviewer that would suit the circumstances. Senior executives in the DPIE's Resource Assessment Team would be aware of Dr Fisher's history, reputation and biases. Far from pushing Dr Fisher to expand on the short, simplistic review that he conducted, the Department has hidden behind it.

The Independent Planning Commission should demand a thorough, genuinely independent examination of these issues.

MACROECONOMIC ANALYSIS

The most recent assessment from ACIL Allen updates its computable general equilibrium (CGE) modelling on the economic impact of the project. This is particularly relevant to estimates of employment impacts of the project.

In most CGE models, projects like Narrabri are assumed to redistribute jobs not 'create' them. This is because the models are 'full employment' models that assume that there is no unemployment now or in the future. The GDP effects observed in such models result from

⁴⁶ Murphy (2017) *Turnbull renews pressure on NSW premier to approve Narrabri gas project*, <https://www.theguardian.com/australia-news/2017/oct/05/malcolm-turnbull-renews-pressure-on-nsw-premier-to-approve-narrabri-gas-project>

⁴⁷ Hannam (2017) *'Conflict of interest': Calls for Barnaby Joyce to sell CSG-linked land*, <https://www.smh.com.au/politics/federal/conflict-of-interest-calls-for-barnaby-joyce-to-sell-csglinked-land-20170926-gyor0x.html>

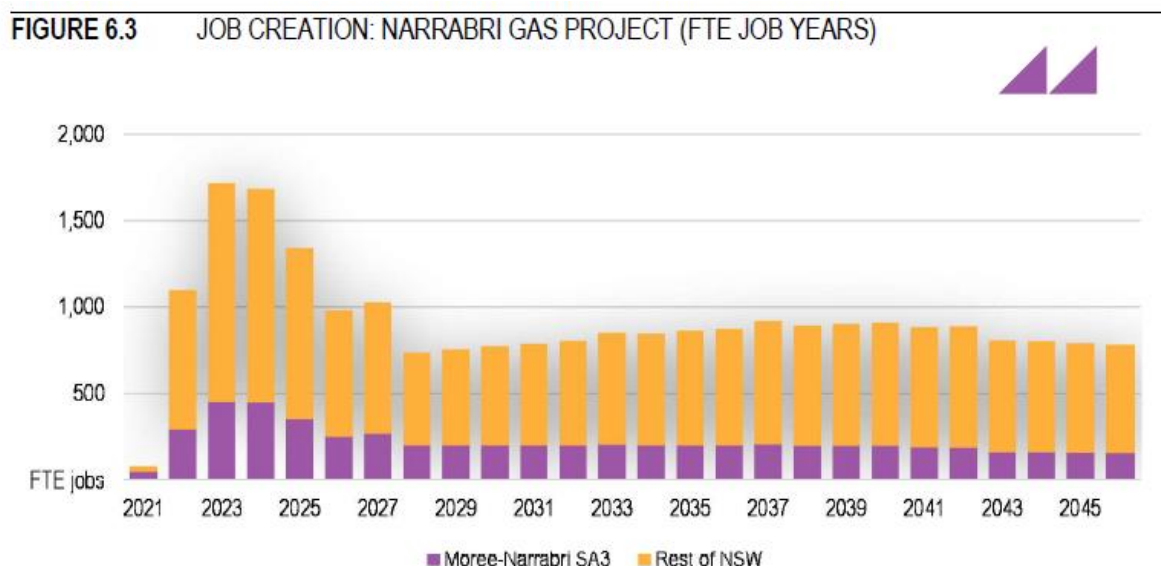
new projects drawing labour and capital away from low value uses and into higher value uses.

However, in this case ACIL have relaxed the full employment assumption, in whole or in part, which means that the project ASSUMES that there will be an increase in employment if the project goes ahead. In their words, from page 37:

A major reason for this was relaxing the employment constraint. The employment constraint assumed in the previous assessment limited the growth in economic activity and incomes. With this constraint relaxed, employment constraints in the Moree-Narrabri region are less limited and result in less crowding out of other economic activity and, accordingly, incomes. **A fully unconstrained labour market assumption** (where all additional labour demands generated by the project at the reference case real wages could be met without constraints) **would be expected to have noticeably higher results for output, income and employment.**

While it can be argued that in the middle of a pandemic it is appropriate to relax the full employment constraint, it is interesting that ACIL Allen’s figure 6.3 shows that the relaxation of this constraint is far from temporary, with post construction employment remaining higher out until at least 2046. This is shown in Figure 11 below:

Figure 11: Extract from ACIL Allen analysis showing employment impact



Source: ACIL Allen

It seems unlikely that it will take 26 years for the current ‘slack’ in the labour market to unwind and, in turn, it seems highly unlikely that the employment effects ACIL are reporting are likely to occur.

ACIL should explain what assumptions they have made about the labour market and how long they think it will take the Morrison government to get the economy back to full employment - 26 years seems very pessimistic.

Also, ACIL seem to have assumed that the pandemic has lowered the cost of capital. While interest rates are lower it seems unlikely that it will be cheaper to manufacture, transport and install complex capital equipment in a COVID constrained world than in a world with no social distancing.

ACIL should explain what assumptions they have made about the impact of COVID on international and domestic supply chains, manufacturing costs, transport costs and installation costs as a result of COVID. It seems inconsistent to assume a permanent shift in the labour market but no adverse impact of COVID on the supply chain.

Misleading claims on energy transition and emissions

The new Santos documents assert numerous times that gas is essential for reducing emissions, increasing the case for the Project. The importance Santos attaches to these claims is clear from their prominence in the letter from the CEO Kevin Gallagher at the beginning of this document. For example, Mr Gallagher states that gas and renewable energy “must coexist to deliver the energy security and reliability our society demands”.⁴⁸

The evidence Santos gives for these claims is misleading, presented without context, out of date and in some cases false.

NO POLICY TO STOP NGP INCREASING EMISSIONS

Santos tries to reassure the IPC that Australia has climate policies and emissions targets that will cover the project. Australia is not on track to meet its emissions targets, which are themselves inadequate.⁴⁹ This is because Australia has no effective national climate policy.

Santos cites the federal Safeguard Mechanism (SM) as a policy that would manage NGP emissions in line with Australian international commitments. Santos fails to mention the policy has been an unmitigated failure. The SM provides no regulatory constraint on emissions because it gives facilities overly generous emission limits that are repeatedly revised up. This is why Australian emissions have not fallen and are not on track to meet Australia’s emissions target. The SM has allowed emissions in covered sectors to rise by more than emissions saved in the electricity sector, and emissions in covered facilities to rise by more than the abatement purchased by the Commonwealth.

It is surprising that anyone would cite this policy as reassurance of effective emissions management.

The lack of effective climate policy means additional fossil fuel projects are likely to contribute to Australia failing on its climate commitments.

⁴⁸ Santos (n.d.) *Narrabri Gas Project (SSD 6456) Submission to IPC following public hearing*, p. 2, 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

⁴⁹ NB Kyoto carryover credits are not legally recognised under UNFCCC for use towards the 2030 commitment under the Paris Agreement. See Climate Analytics Australia (2019) *No Legal Basis for Australia’s Use of Kyoto Credits*, <https://www.tai.org.au/content/no-legal-basis-australia-s-use-kyoto-credits>

PROJECT EMISSIONS ARE LARGE

Santos dismisses concerns about project greenhouse gas emissions on the basis they are ‘only’ 0.2% of Australian national emissions. Santos ignores the fact they are a much bigger share of current NSW emissions (0.7%),⁵⁰ of the national abatement task to 2030 (1.5%),⁵¹ and of the NSW abatement task for 2030 (2.7%).⁵²

Santos figures for direct emissions are also far bigger than the employment benefits claimed by Santos as a share of current Australian employment (even on its numbers, 0.01-0.02%). Santos seems to think the claimed employment benefits are large, so it is unclear why it does not think the emissions are larger.

The main emissions impact from the NGP project is from burning the gas it would produce. DPIE identified the full lifecycle emissions of the NGP as between 120.6 and 127.8 Mt CO₂e over its lifetime. This is equivalent to almost an entire year of NSW emissions (131.7 Mt CO₂e in 2018).⁵³ In an average year, the project’s gas would contribute 4% of NSW annual emissions.

Yet in one paragraph Santos tries to dismiss responsibility for these downstream ‘Scope 3’ emissions by claiming they are the responsibility of the end users and that they will displace a high emitting energy source.

Emissions from fuels are calculated by the amount of greenhouse gases they add to the atmosphere when they are combusted. Santos does not appear concerned that scope 2 emissions are the scope 1 emissions of someone else, so it is unclear why it would use this argument regarding scope 3.

Scope 3 emissions have been a key consideration of recent court and IPC decisions, made in light of NSW government policy and legislation.

In *Gloucester Resources Limited v Minister for Planning [2019]* (the ‘Rocky Hill’ case), the court upheld the longstanding requirement for consent authorities in NSW to consider the full impacts of projects including direct and indirect impacts, which includes Scope 3

⁵⁰ Department of Industry, Science, Energy and Resources (2020) *AGEIS - National Greenhouse Gas Inventory – UNFCCC classifications*, <https://ageis.climatechange.gov.au/>

⁵¹ Projected emissions in 2030 less targeted emissions in 2030 (using 27% reduction on 2005). Department of Environment and Energy (2019) *Australia’s emissions projections 2019*, <https://publications.industry.gov.au/publications/climate-change/system/files/resources/4aa/australias-emissions-projections-2019-report.pdf>

⁵² NSW Government (2020) *Net Zero Plan. Stage 1: 2020-2030*, <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Climate-change/net-zero-plan-2020-2030-200057.pdf?la=en&hash=D65AA226F83B8113382956470EF649A31C74AAA7>

⁵³ AGEIS (2020) State Greenhouse Gas Inventory, <https://ageis.climatechange.gov.au/SGGI.aspx>

emissions.⁵⁴ The proponent had claimed that its coal mine would displace coal elsewhere and so have no impact on overall scope 3 emissions. This defence was explicitly rejected in the Rocky Hill judgement:

The potential for a hypothetical but uncertain alternative development to cause the same unacceptable environmental impact is not a reason to approve a definite development that will certainly cause the unacceptable environmental impacts.⁵⁵

The reasoning applies equally to Santos' claim that its gas will displace higher emissions energy elsewhere. The potential for a hypothetical but uncertain alternative development to cause a more unacceptable environmental impact is not a reason to approve a definite development that will certainly cause unacceptable environmental impacts.

Moreover, as addressed in detail below, Santos' claim about displacement does not bear scrutiny, even on the sources it cites.

Following the Rocky Hill case, the IPC made two decisions in which scope 3 emissions played a substantive role, regarding the United Wambo coal mine, and the Bylong coal mine. In the Bylong decision, the IPC judged that failure to assess the project against the International Energy Agency's Sustainable Development Scenario (IEA SDS) made the claimed economic benefits highly uncertain. Again, this reasoning should apply to Santos, as shown below.

Santos cannot avoid responsibility for its full lifecycle emissions by claiming it is the responsibility of downstream users. The combustion emissions are a clear and inevitable consequence of fossil fuel extraction and are the main emissions impact of the project.

ENERGY TRANSITION REQUIRES NO NEW GAS

Santos presents numerous claims and references about the role of gas in reducing emissions that are highly misleading and makes no attempt to show its project is consistent with any climate scenario.

As leading ANU Climate Scientist Professor Will Steffen told the Independent Planning Commission (IPC), scientifically robust carbon budget analysis shows

Existing fossil fuel infrastructure will push us well beyond the Paris targets. That means quite clearly that we cannot allow any new or extensions to fossil fuel infrastructure. That would be in violation of the Paris agreement, and we have seen what it means to violate temperature targets in the bleaching of the Great Barrier

⁵⁴ NSW Land and Environment Court (2019) Gloucester Resources Limited v Minister for Planning [2019] NSWLEC 7, https://www.caselaw.nsw.gov.au/decision/5c59012ce4b02a5a800be47f#_Toc431204

⁵⁵ *Gloucester Resources Limited v Minister for Planning (2019)* NSWLEC [86], (par 545) <https://www.caselaw.nsw.gov.au/decision/5c59012ce4b02a5a800be47f>

Reef and fires that drastically impacted NSW and other parts of Australia over the summer.⁵⁶

Santos ignores key studies published in *Nature* that show

- more than half of Australian and global gas reserves must stay in the ground to meet climate goals (and note NGP resources are not even classified as reserves);⁵⁷
- no new gas or other fossil infrastructure can be built without breaching climate goals;⁵⁸ and
- without binding climate policy, increasing gas supply will most likely increase emissions, not decrease them.⁵⁹

Note the last study was co-authored by staff of BAEconomics, including Dr Brian Fisher, who conducted the review for DPIE of Santos' economic assessment.

Misrepresenting IEA reports

Santos cites the International Energy Agency *World Energy Outlook* (IEA WEO) as projection gas use to grow globally out to 2040 in its Sustainable Development Scenario (SDS).⁶⁰ But Santos cites the 2018 WEO, which is out of date. The most recent WEO from 2019 shows gas use *declines* globally out to 2040, with a 21% fall in gas used for power generation.⁶¹ Moreover, this scenario assumes high rates of carbon capture and storage that have been achieved nowhere; removing that assumption even less gas consumption.

As the UN Environment Program has shown, plans for new gas supply are in clear breach the IEA SDS scenario, and grossly inconsistent with the 1.5C goal of the Paris Agreement.⁶² This means that increased gas production and use, locked in by construction of new infrastructure, threatens to displace renewable energy rather than coal.

Santos cites approvingly from an IEA report on the *Role of Gas in Today's Energy Transitions*. Santos also fails to mention that the report warns gas "remains a source of emissions in its

⁵⁶ Professor Will Steffen, IPC NGP hearings, July 23, <https://www.facebook.com/climatecouncil/videos/671077576830703>

⁵⁷ McGlade & Ekins (2015) *The geographical distribution of fossil fuels unused when limiting global warming to 2 °C*, <https://www.nature.com/articles/nature14016>

⁵⁸ Tong et al. (2019) *Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target*, <https://www.nature.com/articles/s41586-019-1364-3>

⁵⁹ McJeon et al. (2014) *Limited impact on decadal-scale climate change from increased use of natural gas*, <https://www.nature.com/articles/nature13837>

⁶⁰ Page 9.

⁶¹ International Energy Agency (2019) *World Energy Outlook 2019*, pp. 38, 44

⁶² United Nations Environment Programme (2019) *Production Gap Report 2019*, <http://productiongap.org/>

own right and new gas infrastructure can lock in these emissions for the future”⁶³ and for this reason urges that coal-to-gas switching be confined to *existing* infrastructure.

Misleading appeal to international examples

Santos points to international examples as evidence for the need for more gas to reduce emissions.

Santos claims power generation in the United Kingdom is now around 40% from gas. Santos fails to mention this data is out of date: in 2020 so far, gas power generation has fallen to 30% of total supplied power, overtaken by renewable energy at 32%.⁶⁴ Santos also fails to mention UK coal power has been phased out due to climate policies including carbon pricing, which Australia does not have.

Santos also points to the United States where gas generation has increased. Santos fails to point out this is due to very low gas prices in the United States, far below NGP production costs, either those claimed by Santos or those estimated by Core. Moreover Santos elsewhere in their document rejects application of US fugitive emissions studies to Australia.

Santos fails to mention IEA report on *The Role of Gas in Today’s Energy Transitions* shows coal-to-gas switching played a small role in reducing US emissions, and even smaller roles in China, India and Europe. In all regions, gas played a smaller than renewables, and *far* small than ‘structural economic changes and efficiency’. Crucially, this historical analysis does not assess infrastructure ‘lock in’, which the report also warns threatens climate goals.

LOWEST COST PATHWAY IS LESS GAS NOT MORE

Santos cites AEMO’s recently released *2020 Integrated System Plan (ISP)* as promoting the role of gas in the National Electricity Market (NEM) and quotes AEMO stating under current settings there will be a need for more gas supplies from mid to late 2020s.⁶⁵

However, Santos here fails to mention numerous crucial pieces of information. Santos does not mention AEMO’s subsequent graph, on the next page, showing the amount of gas required for NSW is 27 PJ per year from 2028, far below NGP capacity and not exceeding NGP capacity until 2038. Moreover, this is derived from AEMO modelling of gas demand (for the GSOO) which sees gas power collapse in the mid 2020s and does not examine cost-effective options for reducing gas consumption in other sectors.

⁶³ International Energy Agency (2019) *The Role of Gas in Today’s Energy Transitions*

⁶⁴ GOV.UK (2020) *Energy Trends: UK electricity*, <https://www.gov.uk/government/statistics/electricity-section-5-energy-trends>

⁶⁵ AEMO (2020) *2020 Integrated System Plan (ISP)*, p. 56, [https://aemo.com.au/Energy systems/Major publications/Integrated System Plan ISP/2020 Integrated System Plan ISP](https://aemo.com.au/Energy%20systems/Major%20publications/Integrated%20System%20Plan%20ISP/2020%20Integrated%20System%20Plan%20ISP)

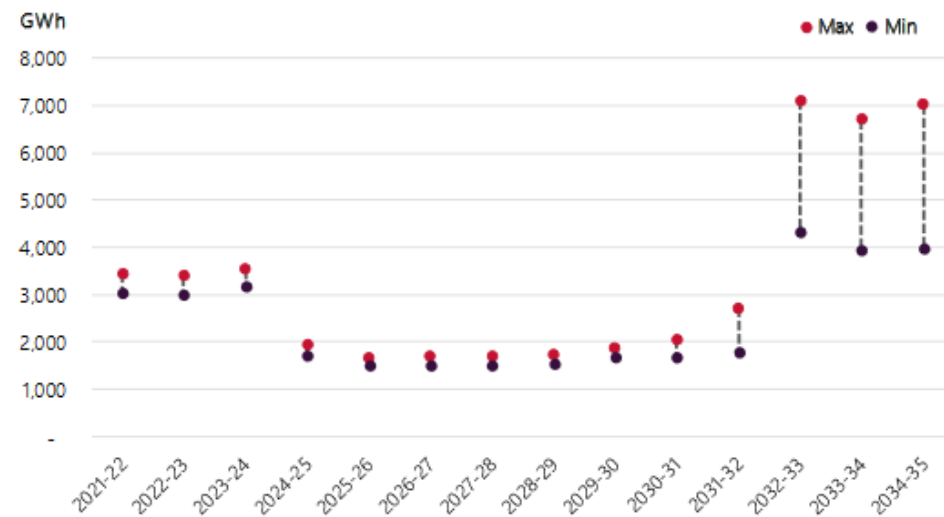
Crucially Santos completely ignores the clear conclusion of the AEMO ISP, that the optimal development of the NEM involves a lot more renewable energy, supported by storage, transmission and demand management, and a lot less gas-powered generation. Indeed this point is made *on the very same page* as the quote cited favourably by Santos - see highlighted sentences above highlighted paragraphs in Figure 12 below:

Figure 22: AEMO ISP comments on gas – what Santos ignores and what it cites

Santos ignores

Figure 19 below shows how the energy produced by GPG may increase after significant coal retires post-2032, but that the variability of GPG across different weather reference years becomes much more volatile³⁵. Note that this analysis has been prepared to show the potential variability of gas demand. **The absolute values of gas generation in this chart are lower than currently observed in the market. This is because they have been derived by minimising total system cost, which optimally uses all available resources.** In practice, exceptional events (such as the recent islanding of South Australia), AEMO directions to maintain system security, contract positions and strategic bidding by generators can increase the level of gas usage by GPG and increase costs to consumers.

Figure 19 Projected GPG generation across a range of reference years



Santos cites

Future scarcity of gas supply

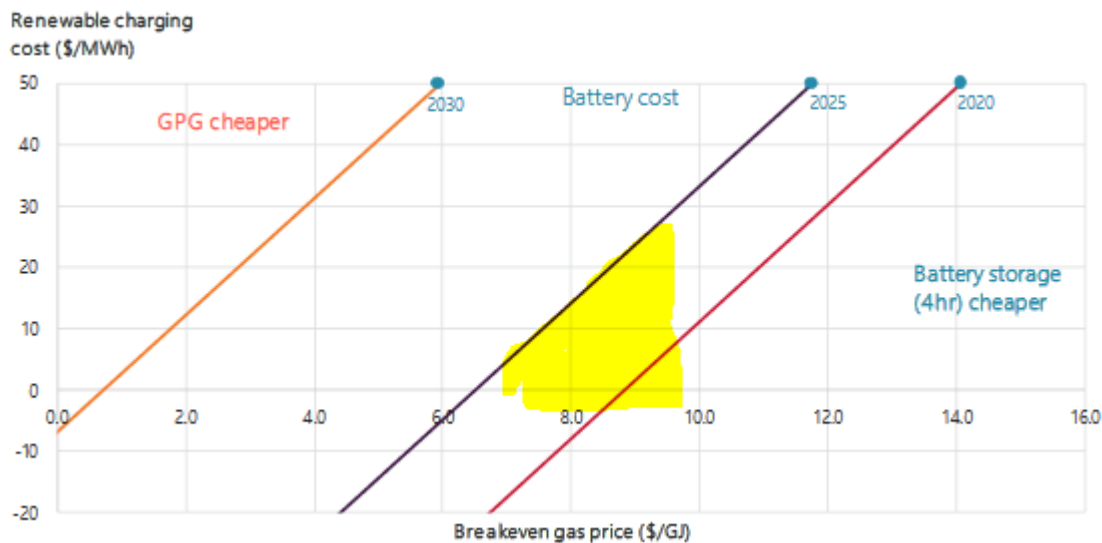
Confidence in GPG as an investable and dispatchable energy resource also depends on there being reliable, affordable gas fuel. Yet gas supplies are already tightening in Australia, with southern supply from existing and committed gas developments forecast to reduce by more than 35% over the next five years³⁶. After gas fields cease production between mid-2023 and mid-2024, gas supply restrictions and curtailment of GPG may be necessary, particularly during peak winter days.

To avoid this, southern Australia will need to either develop new local sources (and pipeline infrastructure), progress liquefied natural gas (LNG) import terminals or address pipeline limitations from northern Australia. ISP modelling forecasts approximately 120 PJ to 285 PJ of additional gas will be needed each year between 2024-25 and 2036-37 to meet residential, commercial and industrial gas demand, gas for LNG

Source: AEMO (2020) *Intergrated System Plan – Final Report*, page 56

Santos also ignores the analysis on the immediately preceding page that shows that renewable charged batteries already challenge the NGP on price. AEMO notes that “Batteries are typically re-charged in the middle of the day, when even today prices already reach \$0/MWh or even negative prices at times.”⁶⁶ This means renewable charged batteries undercut gas power fuelled by NGP: today at Core Energy’s estimates of production costs, and by 2025 on Santos’ new claimed production cost of \$6.40 / GJ. This is highlighted in Figure 13:

Figure 13: AEMO ISP: Breakeven cost analysis –new GPG versus battery capacity for providing daily peaking support



Source: Modified from AEMO (2020) 2020 Integrated System Plan (ISP), p. 55, Showing range of costs for delivered gas as per Core Energy analysis / Santos claims

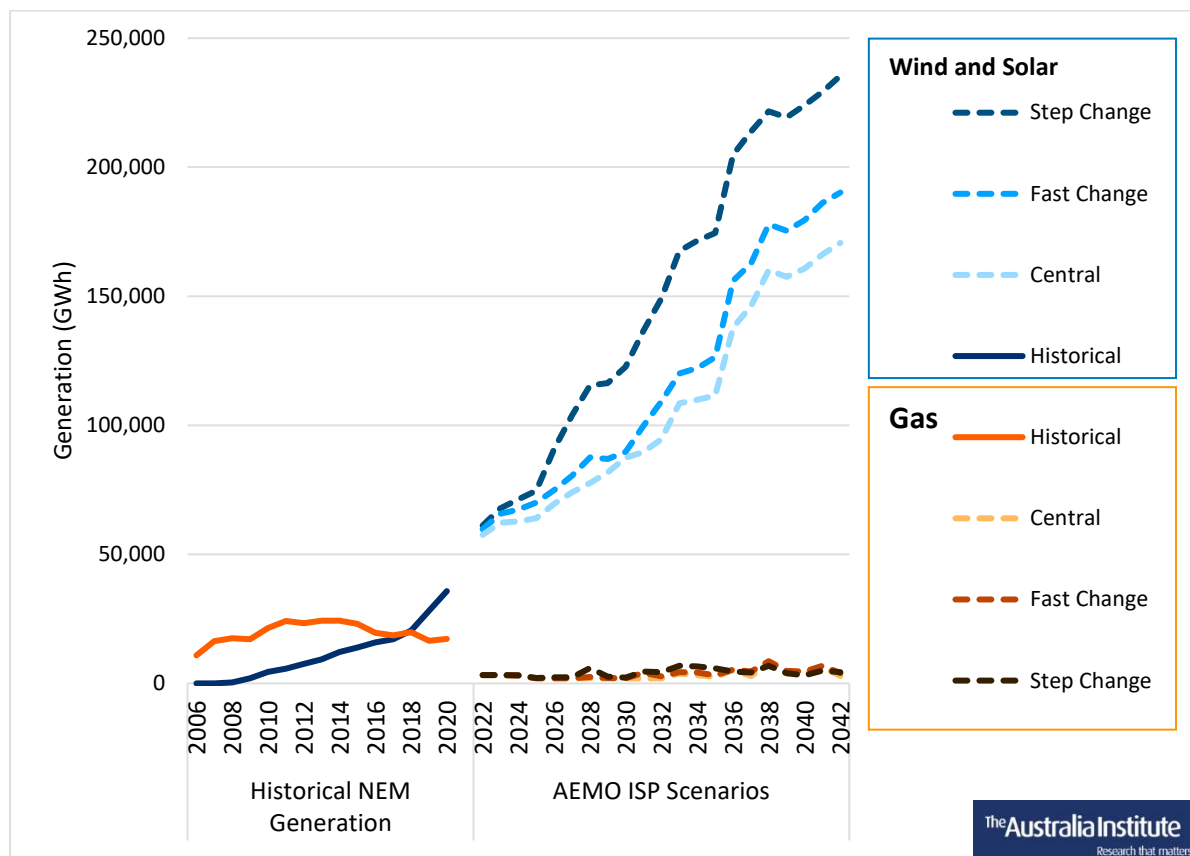
Santos ignore the fact that gas power generation in the NEM grew to mid-2010s, and has fallen since.⁶⁷ The AEMO ISP lowest cost scenarios show gas falling almost immediately and remaining low over coming decades. AEMO stresses these scenarios are “derived by minimising total system cost”. AEMO notes that “in practice” gas use may be higher for a range of reasons, like emergency events and “contract positions and strategic bidding by generators”, but adds where these factors increase gas generation they also “increase costs to consumers”.⁶⁸ By contrast with gas, renewable energy generation grows very strongly in each of these lowest cost scenarios, shown in Figure 14 below:

⁶⁶ AEMO (2020) 2020 Integrated System Plan (ISP), p. 55

⁶⁷ CCGT, OCGT, Steam, Reciprocating, and Distillate / liquids.

⁶⁸ AEMO (2020) 2020 Integrated System Plan (ISP) Report, p. 56

Figure 13: Gas vs renewables in the NEM – historical & AEMO ISP scenarios



Source: OpenNEM (2020) *OpenNEM: An Open Platform for National Electricity Market Data*, AEMO (2020) *2020 Integrated System Plan (ISP)*, 2020 ISP Generation Outlooks, Scenario 2 for “optimal path” in each case, optimal development pathway for each scenario, as per Table 10 in ISP report.

Across the NEM over the decade, gas use has fallen and wind and solar have grown dramatically, overtaking gas in 2018. In each of these scenarios, wind and solar generation continue to grow rapidly to 2042, while gas use falls dramatically.

This is because renewable technology is far cheaper, even when backed up with firming capacity. AEMO and the CSIRO have shown that new build renewable energy with storage is lower cost or competitive with gas peaking power stations in all scenarios and projected to become even more so over the life of the NGP.⁶⁹ Renewables are far cheaper on a standalone basis. Note not all renewables will need storage and overbuilding renewable capacity will often be cheaper than storage.

Similarly, in 2018 a major ARENA-commissioned study by ITP examined “the cost of firm energy from dispatchable renewable generation” from a range of sources and considered

⁶⁹ CSIRO (December 2019) *GenCost 2019-20: preliminary results for stakeholder review*, https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/Inputs-Assumptions-Methodologies/2019/CSIRO-GenCost2019-20_DraftforReview.pdf

together at a system level they “found it comparable to new build fossil-fired generation.” They concluded “a range of proven and affordable options is available to more than adequately cater for significantly increased levels of renewable energy in the Australian electricity mix” including “an eventual net zero emission technology mix by 2050”.⁷⁰

There is clearly little evidence supporting Santos’ claim that increased gas extraction is required to ‘transition’ Australia’s electricity system.

Gas supply, pipelines, power stations, industrial equipment and water and space heating systems built now delay the switch to zero emissions alternatives and will lock in emissions from gas in for decades to come.

⁷⁰ Lovegrove et al. (2018) *Comparison of dispatchable renewable electricity options*, p. 107, <https://www.arena.gov.au/assets/2018/10/Comparison-Of-Dispatchable-Renewable-Electricity-Options-ITP-et-al-for-ARENA-2018.pdf>

Conclusion

Santos's eleventh hour submission of new economic and gas supply modelling is a response to the comprehensive criticism of its economic case from a range of experts through the public submission process and in the public hearings.

It also undermines the integrity of the determination process because the community have spent significant time and resources over several years analysing Santos's previous economic case, and have had only one week to respond to respond to this new material. The new modelling contradicts previous modelling that was assessed by the DPIE.

The exaggerations, omissions and misrepresentations in the latest documents continue the poor standard of assessment that has surrounded the Narrabri Gas Project for nearly a decade. Consultant research that presents convenient findings, based on convenient assumptions provided by the proponent. Analysis barely scrutinised by a planning department that is either not resourced or not inclined to question the desires of powerful proponents, particularly when under political pressure. This is common not just to this project or elsewhere regarding 'megaprojects' in the NSW planning system, but is common worldwide.

Our earlier submissions on the NGP, put the assessment of the project in the context of economic literature that examines systemic biases in mega-project assessment. These biases are:

- Strategic misrepresentation –project promoters over-state benefits and under-state the costs in order to get a project approved. The incentives to do this for the Project are strong because of the strong objection to the Project;
- Over-optimism – humans are, on average, naturally over-optimistic;
- Planning fallacy – humans simply can't imagine all the ways a project could go wrong;
- Principal-agent problem – the incentives faced by management are not necessarily to make profits (often they are to make the company bigger) and management often leave a company before the consequences of poor project selection and development are felt.

These biases have been highlighted by economics Nobel Prize winner, Daniel Kahneman, and the world's most cited mega-project scholar, Bengt Flyvbjerg. Flyvbjerg tellingly explains why project modelling should be treated extremely sceptically:

Success in megaproject management is typically defined as projects being delivered on budget, on time, and with the promised benefits. If, as the evidence indicates, approximately one out of ten megaprojects is on budget, one out of ten is on

schedule, and one out of ten delivers the promised benefits, then approximately **one in one thousand projects is a success**, defined as “on target” for all three. Even if the numbers were wrong by a factor of two—so that two, instead of one out of ten projects were on target for cost, schedule, and benefits, respectively - the success rate would still be dismal, now eight in one thousand. This serves to illustrate what may be called **the “iron law of megaprojects”**: **Over budget, over time, over and over again. Best practice is an outlier, average practice a disaster** in this interesting and very costly area of management.⁷¹

In reference to benefit cost analysis:

When cost and demand forecasts are combined, for instance in the cost-benefit analyses that are typically used to justify large infrastructure investments, the consequence is inaccuracy to the second degree. **Benefit-cost ratios are often wrong, not only by a few percent but by several factors.** As a consequence, estimates of viability are often misleading, as are socio-economic and environmental appraisals, the accuracy of which are heavily dependent on demand and cost forecasts. These results point to a significant problem in policy and planning: **More often than not the information that promoters and planners use to decide whether to invest in new projects is highly inaccurate and biased making plans and projects very risky.**⁷²

Our initial submission cited studies from Westney, a Houston-based oil and gas industry consultant, EY and others that found the oil and gas industry suffers from these biases just as much as any other industry. As Williams wrote recently in *The Australian*, “Australia’s \$200bn LNG spending spree in the past decade has catapulted the country to be the world’s largest gas exporter but most projects have suffered cost blowouts and delays”.⁷³ The IPC has the latest example in front of it. The NGP should be rejected and end the cycle of overstatement and under-delivery of the gas industry in Australia.

⁷¹ Flyvbjerg (2014) *What you should know about megaprojects and why....*, p11, emphasis added.

⁷² Flyvbjerg (2008) *Curbing Optimism Bias and Strategic Misrepresentation in Planning...*, p5, emphasis added.

⁷³ Williams (2020)

