



BRIEFING NOTE
THE NARRABRI
COAL SEAM GAS PROJECT
DECEMBER 2014



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There is currently considerable debate regarding how plans for of the export of Liquefied Natural Gas (LNG) from Gladstone, Queensland, will impact the supply and price of gas in NSW. It is generally accepted that the new export LNG terminals will divert gas away from domestic contracts, with the expectation that New South Wales wholesale gas prices are set to at least double in comparison to historical levels.

This note provides an analysis of the Narrabri Coal Seam Gas Project (NGP) from an Economic Value (EVA) perspective and considers, amongst other things, the question, "Can the development of the Narrabri Gas Project assist in putting downward pressure on gas prices in NSW?"

The development of Coal Seam Gas (CSG) assets in NSW is posited as a solution to concerns over a possible future shortage of gas in NSW. The NSW Government has also stated that increasing the NSW domestic supply of gas "will assist in putting downward pressure on prices."¹

Development of a coal seam gas project requires substantial capital investment. The thesis that the development of the Narrabri Gas Project (NGP) is a partial solution to gas pricing and supply issues typically never seems to consider either: that stakeholders will demand an appropriate economic return on their investment, or the feasibility of constructing a pipeline, or indeed the quantity of gas that would be supplied into the NSW market.

Putting aside pipeline construction uncertainties and likely landholder opposition, our research concludes that the likely substantial capital investment of the project means that if stakeholders in NGP are to enjoy at least cost-of-capital returns, the project will likely have little to no influence in driving lower gas pricing in NSW.

Tim Buckley
December 2014

¹Minister Anthony Roberts, 20 October 2014, Sydney Morning Herald

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Executive Summary

- An expected tripling of gas demand in Eastern Australia - largely created by the Queensland LNG export projects – is diverting “traditional” supply from the Cooper Basin producers and Queensland coal seam gas (CSG) away from NSW.
- The NSW wholesale gas market has entered a period of material change given that the LNG export netback value is now a factor in determining domestic prices. There have been numerous studies which have investigated the likely impact on Queensland LNG exports on Eastern Australian domestic gas prices and supply, and while all studies have concluded that gas prices will rise, there is no consensus on how fast they will rise, and to what level they will rise.
- Whilst analyses differ in the exact future trajectory of NSW gas prices, there seems little debate that NSW wholesale gas prices are set to at least double compared to historical levels. The question that is rarely, if ever, asked is: can coal seam gas development in NSW - in this case the Narrabri Gas Development - deliver gas into the Sydney market at competitive prices?
- According to Santos, the NGP could supply 200TJ/day, which is equivalent to approximately 50% of NSW gas needs. At its Investor Briefing on November 26, 2014, Santos noted a “likely 30% reduction in 2P reserves in 2014 to match phased development”. It is unclear what, if any implications there would be for gas production and/or total investment spend. We have therefore given the project the benefit of the doubt and assumed production of 200 TJ/day, and undertaken a scenario analysis of total investment. Given the delay in submitting an Environmental Impact Statement (EIS), if approved, the project would likely commence production in 2018 at the earliest.
- In February 2014 the NSW Government and Santos Ltd signed a memorandum of understanding (MOU) which states that, “Santos will construct the NGP and a purpose built pipeline heading south to connect into the existing NSW gas network, enabling supply to NSW customers”. However, the MOU states clearly it “is not a legal document”, and both parties will “commit to using their best endeavours to implement the commitments” in this MOU.² Even if the gas is delivered to NSW, there is no mention of at what price the gas would be delivered.
- When NGP is touted as a solution for future NSW gas supply, the fact that a pipeline needs to be built is rarely mentioned. A pipeline proposal for the NGP has not yet been submitted for assessment and recent history provides evidence of organized landholder opposition to gas pipeline proposals. Furthermore, whilst the MOU between the NSW Government and Santos only refers to a pipeline running south to NSW, the proposed “Queensland Hunter Gas Pipeline Project” would also run north to feed into the Queensland gas pipeline network via the Wallumbilla hub.
- As with all three LNG export projects, Gladstone LNG ((GLNG), 30% Santos) is short gas, and Santos would be incentivised to supply additional gas to GLNG from its own assets if the economics are favourable. Profit optimization would suggest that the direction of supply would logically be determined by optimizing economic returns for the NGP shareholders, in the absence of a legally binding MOU.
- Even if the gas does flow south to Sydney (as noted, the MOU between Santos and the NSW Government is non-binding, so Santos has no legal obligation to supply NSW), given the NGP’s likely total project investment, in order to at least cover its cost of capital it would likely need to charge higher Sydney wholesale prices than even the wholesale price forecasted in the ACIL Allen “CSG Freeze” scenario (\$7.20/GJ (Gigajoule) in 2018).³

Our research highlights that given that the NGP will likely have little to no influence in driving lower gas pricing in NSW, more research and investment into demand side solutions are going to be increasingly important.

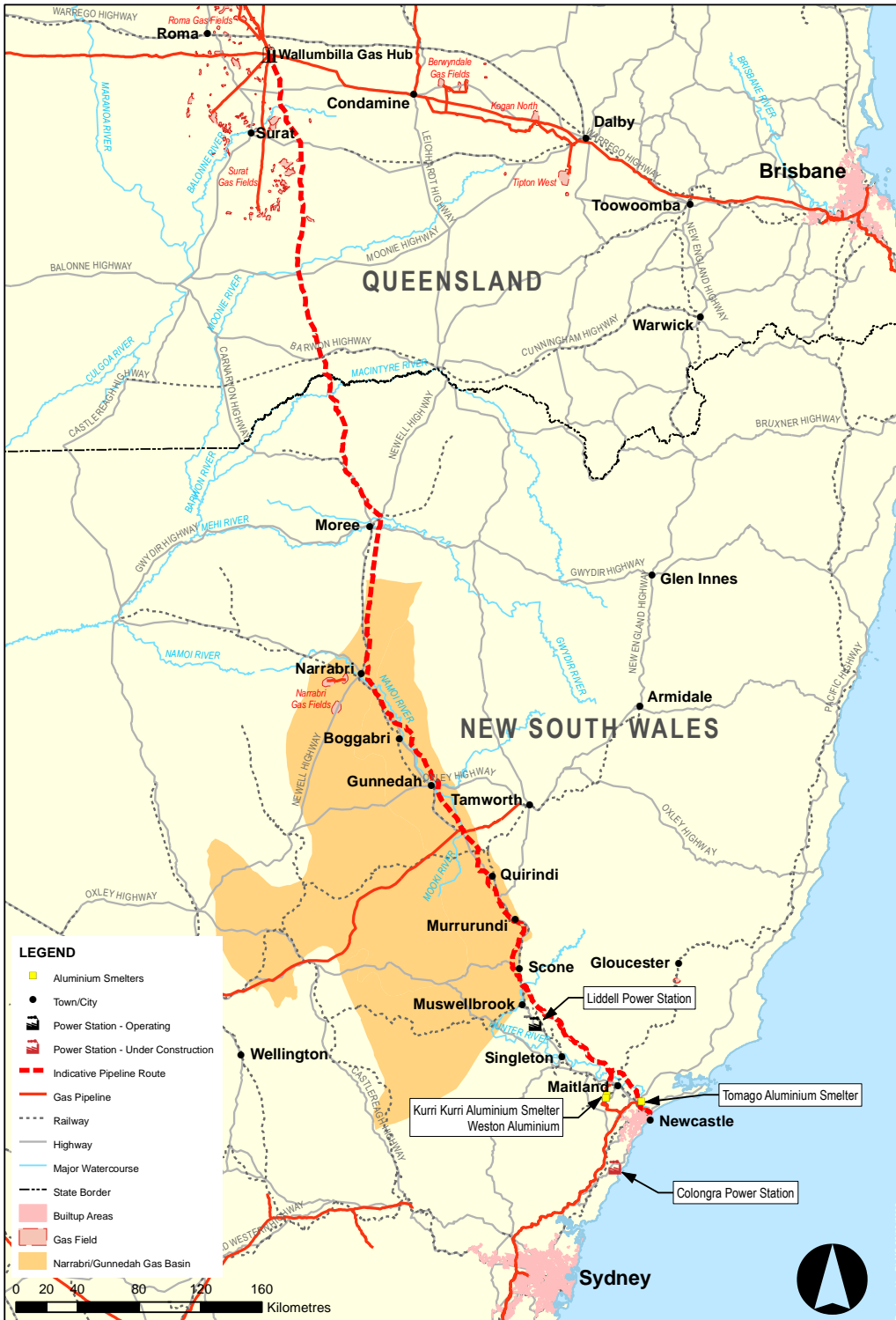
² NSW Government and Santos Ltd Memorandum of Understanding for the Narrabri Gas Project, 20 February 2014

³ ACIL Allen Consulting, “Future NSW Gas Supply and Usage; Economic Benefits of Increased Coal Seam Gas Development”, 25 July 2014, pg. vii

Background

In November 2011 Santos acquired 100% of the then operator of the Narrabri Gas Project (NGP), Eastern Star Gas (ESG). The project area covers approximately 98,000 ha and is located approximately 500km north of Sydney in the Pilliga State Forest in the Gunnedah Basin (See Figure 1). The project is expected to have an operational life of more than 20 years, and up to 850 production wells are proposed.

Figure 1: Regional Map and Indicative Pipeline



Source: The Australian Pipeliner, July 2011

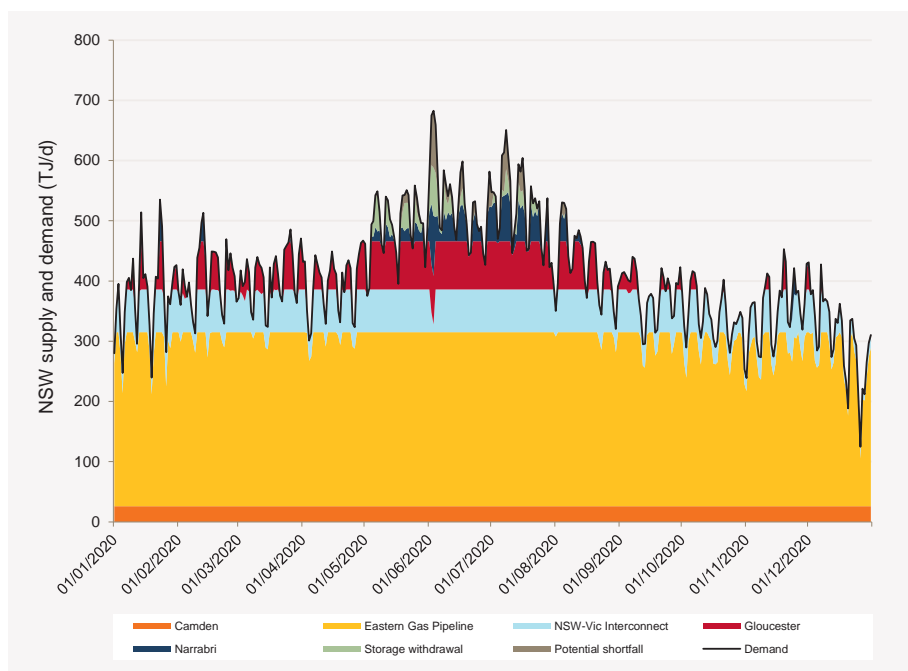
The NGP is a joint venture between Santos (80%) and Energy Australia⁴ (20%), with Santos being the operator of the project.

An MOU was signed on 20 February 2014 between Santos and the NSW government for a “timely” review process. According to this MOU, an Environmental Impact Statement (EIS) was expected to have been submitted by 30 June, 2014. However, at the time of publication of this report, Santos had still not submitted the EIS. (For more discussion of the MOU, see ‘The MOU between Santos and the NSW Government’.) Originally gas production from the NGP was targeted for late 2017 or early 2018, but clearly the delay in submitting the EIS will likely push a start date firmly into 2018, at the earliest.

Santos expects that NGP could supply 200TJ (Terajoules)/day, representing approximately 50% of NSW gas needs,⁵ and could produce for 25 years. Indeed, the recent “NSW Gas Plan” states that “The Narrabri gas project is currently under assessment in the NSW Planning System for gas production. The operators of this project have publicly committed that all gas produced from this project, if approved and developed, will be made available to the NSW market.”⁶

Notwithstanding this, modelling by AEMO (Australian Energy Market Operator Ltd) only assumes NGP as a 100 TJ/day processing facility with a 100 TJ/day pipeline, commencing from 2018.⁷ Consequently, as shown by Figure 2, AEMO modelling implies that NGP would likely only supply gas into NSW on peak winter days.

Figure 2 - Projected daily supply and demand for New South Wales in 2020 under conditions of reduced flow availability on the Moomba-Sydney Pipeline⁸



Source: Australian Energy Market Operator (AEMO), 2014

⁴ Energy Australia is owned by CLP Holdings Ltd, Hong Kong.

⁵ Santos Ltd, “Narrabri Gas Project : Our plans to develop natural gas for New South Wales”, pg. 7

⁶ NSW Gas Plan, NSW Government, pg. 13

⁷ Australian Energy Market Operator Ltd, “Gas Statement of Opportunities Update”, May 2014, pg. 4

⁸ Supply sources in this figure are stacked according to assumed production and transport costs. It does not represent the expected contribution or operating behaviour of these sources in the physical market.

The NSW Gas Supply “Crisis”

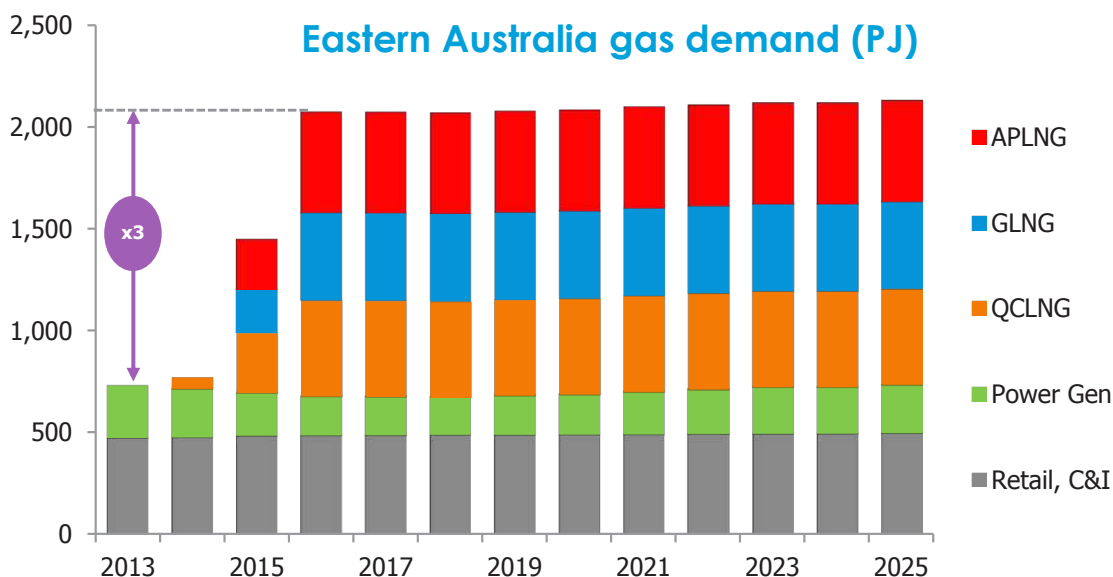
Historically the gas market in Eastern Australia has operated in isolation from other gas markets in Australia, and overseas, because there have been no gas exports from, or imports to, the region. Furthermore, historically gas demand has been met by conventional gas supplies.

Market dynamics have changed significantly with construction underway of three LNG export projects in Gladstone, Queensland, with QCLNG⁹ scheduled to start exporting in Q4 2014. This expansion is ultimately expected to approximately triple gas demand in Eastern Australia (see Figure 3 below).

In 2012, gas production in NSW represented only approximately 4% of final NSW gas demand.¹⁰ Furthermore, the average term to maturity of reseller contracts as at 2013 was 4.7 years on a volume weighted basis, with a sharp decline in contracted supply expected during 2016-2018.¹¹

Scarcity of material quantities of Queensland gas supply into NSW has resulted in NSW relying heavily on Southern gas supply. However, Victoria/NSW interconnect transmission constraints limit the amount of gas supply into NSW from southern suppliers.

Figure 3: Santos chart showing the expected tripling of East Coast Gas Demand due to LNG export terminals



Source: “Narrabri Gas Project: the responsible development of NSW’s natural gas resources”, Santos, 17 July 2014

Consequently, the NSW wholesale gas market has entered a period of material change given that the LNG netback value (the LNG netback value is the FOB value netted back to Gladstone or the wellhead by subtracting liquefaction and transmission costs) is now a factor in determining domestic prices;¹² in other words, the export price of LNG is now a key factor in determining domestic gas pricing.

⁹ Queensland Curtis LNG. BG Group (via QGC Pty Ltd) is the operator and majority owner of the QCLNG project.

¹⁰ Paul Simshauser and Tim Nelson, “Solving for ‘x’ – the New South Wales Gas Supply Cliff”, March 2014, pg. 6

¹¹ Paul Simshauser and Tim Nelson, “Solving for ‘x’ – the New South Wales Gas Supply Cliff”, March 2014, pg. 7

¹² Jacobs SKM, “New Contract Gas Price Projections”, 28 May, 2014, pg. 19

There have been numerous studies which have investigated the likely impact on Queensland LNG exports on Eastern Australian domestic gas prices and supply, and while all studies have concluded that gas prices will rise, there is no consensus on how fast they will rise and to what level they will rise.¹³ A historical ca \$3/GJ gas price in NSW will be linked to the north Asian export market price of circa \$6-9 over the medium term (equivalent ex-field netback price).¹⁴

As the Grattan Institute notes that, “the implications for manufacturing output and jobs in gas-intensive sectors are bad indeed.”¹⁵

Later in this report we examine what level of wholesale gas prices in NSW we think the NGP project would need to achieve in order to least cover its cost of capital (see section, “The Economics of NGP- the Importance of Invested Capital”).

The Memorandum of Understanding (MOU) between Santos and the NSW Government¹⁶

In an attempt to address the aforementioned changes in East Coast gas market dynamics, in February 2014 the NSW Government and Santos Ltd signed an MOU. The MOU states that because the NGP could potentially supply 25-50% of the State's natural gas needs, it has been designated a “Strategic Energy Project”.

In the event that the project is approved the MOU states that, “Santos will construct the NGP and a purpose built pipeline heading south to connect into the existing NSW gas network, enabling supply to NSW customers”.

However, the MOU states clearly it “is not a legal document”, and both parties will “commit to using their best endeavours to implement the commitments.”

Furthermore, there is no mention in the MOU as to what price the gas could be delivered, and there is certainly no mention in the MOU of the proposed northern section of the pipeline running north to Wallumbilla in Queensland (see “The Pipeline” section following).

¹³Jacobs SKM, “New Contract Gas Price Projections”, 28 May, 2014, pg. 29

¹⁴Paul Simshauser and Tim Nelson, “Solving for ‘x’ – the New South Wales Gas Supply Cliff”, March 2014, pg. 2

¹⁵“Gas at the Crossroads”, Grattan Institute, October 2014, pg. 1

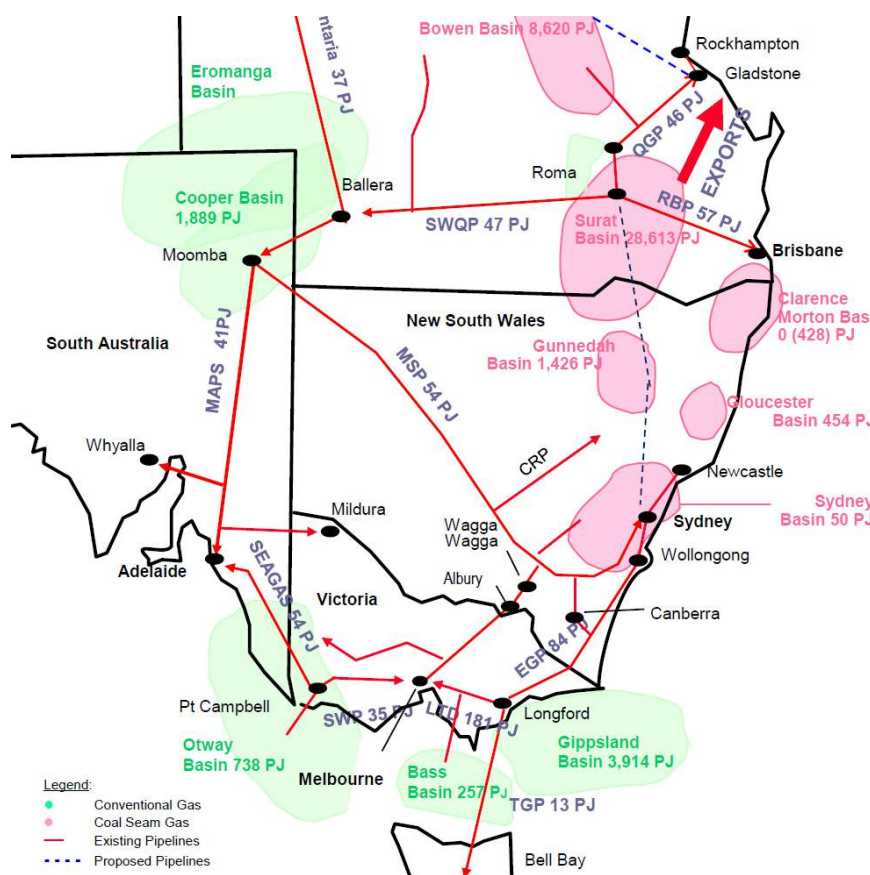
¹⁶ NSW Government and Santos Ltd Memorandum of Understanding for the Narrabri Gas Project, 20 February 2014

The Pipeline

Somewhat surprisingly, when NGP is touted as a solution for future NSW gas supply, the fact that a pipeline needs to be built is rarely mentioned. Indeed, in Santos' Preliminary Environmental Assessment it is stated that "the gas would then be piped via a high-pressure gas transmission pipeline to market. The gas transmission pipeline would be part of a separate approvals process and is not part of the proposed development."¹⁷

The proposed "Queensland Hunter Gas Pipeline Project"¹⁸ is a \$900m, 831 kilometre long gas pipeline that would run from the Wallumbilla Gas Hub in Queensland to Newcastle, via Narrabri (refer to Figure 4) Whilst the MOU between the NSW Government and Santos only refers to a pipeline running south to NSW, the proposed Queensland Hunter Gas pipeline would also run north to feed into the Queensland gas pipeline network via the Wallumbilla hub.

Figure 4: Eastern Australia Gas Infrastructure



Source: Jacobs, "Gas Wholesale Supply and Pricing", Australian Institute of Energy Seminar, Dr Richard Lewis, 25 June 2014

According to the Queensland Hunter Gas Pipeline company's website, both the Queensland and NSW sections of the pipeline have received government approval. This suggests that in the event that the entire pipeline is built, NGP could supply gas either south to Sydney, or north to Queensland. Profit optimization would suggest that the direction of supply would logically be determined by optimizing economic returns for the NGP shareholders, in the absence of a legally binding MOU.

¹⁷ Narrabri Gas Project, Preliminary Environmental Assessment, pg. 1

¹⁸ www.qhgp.com

Furthermore, if history is a guide, there is likely to be significant community opposition to the construction of a pipeline. For example, soon after acquiring Eastern Star Gas in November 2011, Santos announced that it would no longer proceed with the proposed 270 kilometre pipeline from the Narrabri project to the planned Wellington gas-fired power station. Santos vice-president James Baulderstone stated at the time that, “we are well aware Eastern Star’s Mullaley pipeline plan has been a divisive issue in the community... as an act of good faith we are committing today to withdraw Eastern Star’s application for the current Mullaley pipeline route.”¹⁹

Any alternative pipeline route would require a new pipeline approval process to be undertaken. Likely community opposition to pipeline construction across food growing areas and regulatory blockages surrounding clearing wildlife corridors and Travelling Stock Routes for pipelines, all point to further delays and costs to the project that could delay gas delivery, and therefore impact on the overall profitability of the project.

GNLNG has been a large purchaser of third-party gas²⁰

LNG production at GLNG (Santos has a 30% stake in GLNG, and is the project operator. The other investors are Petronas, Total and Kogas) is expected to commence in mid-2015, with ramp-up for train 1 expected to take 3-6 months. Start-up at Train 2 is expected in the June quarter of 2016, with a more gradual ramp-up of 2-3 years.²¹ Together both trains require approximately 1,200 TJ per day of gas.

All three LNG projects are short 2P (proven and probable) gas reserves and GLNG has been a large buyer of third party gas in the domestic market. In December 2013, Santos announced that the GLNG project participants had executed an agreement with Origin Energy for the purchase of 100 PJ of gas for supply to the GLNG project. The gas will be supplied at Wallumbilla over a period of five years commencing in January 2016, with pricing based on an oil-linked formula. Under the terms of the agreement, Origin can supply additional volumes of up to 94 PJ of gas during the same five-year period. This agreement added to existing agreements for the supply of 750 PJ of Santos portfolio gas to GLNG over a 15-year period, and an earlier agreement with Origin for the supply of 365 PJ of gas over a 10-year period.²²

Given that oil-linked gas prices are being paid to third-party providers, Santos would clearly be motivated to provide additional gas to GLNG from its own supplies if the economics are favourable.

¹⁹ ABC News, November 17, 2011

²⁰ Gladstone LNG.

²¹ Santos Ltd, “GLNG Investor Visit”, 25-26 June 2014, pg. 3

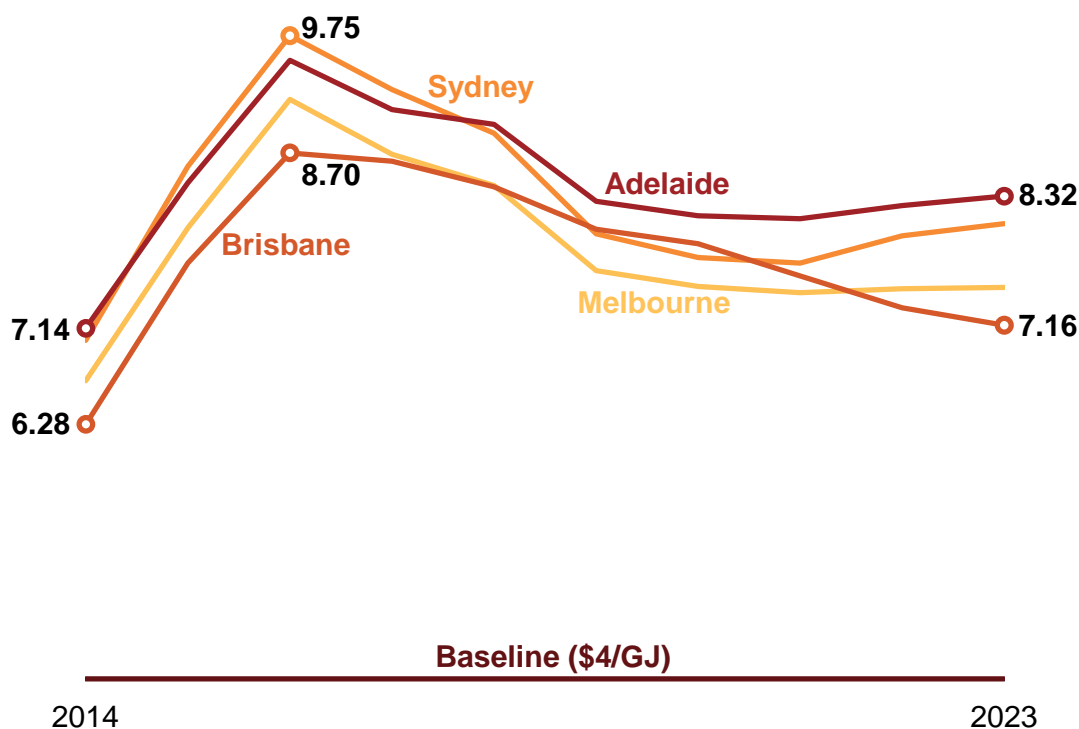
²² Santos Ltd announcement, 19 December 2013

Sydney Wholesale Gas Prices

Whilst analyses differ in the exact future trajectory of Sydney gas prices, there seems little debate that wholesale gas prices are set to at least double compared to historical levels.

For example, The Grattan Institute, using the results of modelling from Sinclair Knight Merz (see Figure 5 below), suggests that wholesale gas prices in Sydney will more than double from a baseline of \$4.00/GJ (average 2012-14 wholesale price for Eastern states) to peak at over \$9/GJ, and settle at approximately \$7.50-\$8.00/GJ from 2019. The Grattan report further notes that gas prices are not expected to return to historical levels, in part because “future gas extraction will “steadily become more expensive.”²³

Figure 5 – Forecast Wholesale Gas Prices (\$/GJ)



Source: “Gas at the Crossroads : Australia’s hard choice”, Grattan Institute, October 2014

The question that is rarely, if ever, asked is:

- (1) given the substantial capital requirements to develop coal seam gas projects, and
- (2) given the assumption that investors will demand an appropriate economic return;

can projects like the Narrabri Gas Development deliver gas into the Sydney market at prices at or below those projected by research groups?

The Narrabri Gas Project’s Preliminary Environmental Assessment²⁴ states that, “Potential would exist for improved competition on price. Improved competition on price would have flow on benefits for NSW’s economic efficiency, productivity and prosperity.” In the section following we analyse the validity of this assertion by examining the economics of the NGP.

²³ Grattan Institute, “Gas at the Crossroads: Australia’s hard choice”, October 2014, pg. 10

²⁴ Narrabri Gas Project Preliminary Environmental Assessment, March 2014, Executive Summary

The Economics of NGP – the Importance of Invested Capital

Santos has already invested more than one billion dollars²⁵ in NGP, with an estimated total project cost of \$2 billion dollars.²⁶

CSG production costs are extremely difficult to estimate. Well productivity is a key factor in determining costs, and as Jacobs SKM notes, “the wide gap between the estimates prepared by different consultants illustrates the degree of uncertainty in gas costs”.²⁷

Similarly, extraction costs are likely to be lowered in real terms through future technological change,²⁸ but conversely, future gas extraction will become more expensive. Hence, scenario analysis is an appropriate approach to evaluate project economics given future operating cost and investment uncertainty.

Economic Value Added (EVA) Method

The approach we have taken to examine the economics of NGP is to compare the estimated Return on Invested Capital (ROIC) of NGP under a range of total investment and production cost scenarios, compared with the Weighted Average Cost of Capital (WACC) of the project.

The WACC of a project is considered the minimum rate of return that a project needs to earn for its stakeholders (both debt and equity capital providers). In the case of NGP, we have assumed a post-tax WACC of 10.5%, which is within the range of forecasts for Santos' WACC.

ROIC is defined as net operating profits after taxes (NOPAT), divided by invested capital.

Simply put, in order to create Economic Value Added (EVA) for stakeholders, ROIC must exceed WACC. **Most importantly, the EVA calculation is heavily dependent on invested capital - the greater the capital investment the greater the required NOPAT to generate positive economic returns.**

Assuming that all gas is supplied into the Sydney market, we back-solve for the wholesale gas price that would needed to be achieved in order for NGP to at least meet its weighted average cost of capital i.e. the wholesale price point at which NGP would neither destroy nor create value for stakeholders (including Santos shareholders).

Key Assumptions

Production Start Date: As previously discussed, production at NGP was originally targeted for late 2017 or early 2018, but the delay in submitting the EIS would likely push a start date firmly into 2018.

Production: 200 TJ/day from 2018. This is probably a generous assumption given the implications of the delay in the submission of the EIS.

Project Investment: Santos has already spent approximately \$1.0 billion on the NGP as reported in the media, with a significant amount of capital investment still required for gas field infrastructure, gas processing facility and water treatment. We model two scenarios, one with the estimated total project cost of \$2.0 billion, and the other with a lower spend of \$1.5 billion.

²⁵ “The Northern Daily Leader”, August 11, 2014. “Santos has invested more than \$1 billion in this project, so it is a significant amount of money,” Santos Energy NSW boss Peter Mitchley told The Leader last week.’

²⁶ Santos NSW (Eastern) Pty Ltd, Narrabri Gas Project, Preliminary Environmental Assessment, March 2014, pg. 1

²⁷ Jacobs SKM, “New Contract Gas Price Projections”, 28 May, 2014, pg. 17

²⁸ Nature, “Limited Impact on decadal-scale climate change from increased use of natural gas”, Haewon McJeon et al, 2014, pg. 5

Cash Costs of Production: We model a range of \$3.50-\$4.50 /GJ, as per Jacobs SKM forecasts²⁹ which were derived from the ESG scheme document.³⁰ Given production would unlikely start before 2018 at the earliest, we have also modelled higher costs scenarios to allow for cost inflation.

Delivery Cost to Sydney: \$0.75/GJ (this is considered a conservative estimate)

Royalty: The NSW government currently levies a royalty payment at the rate of 10% of the 'well-head value'. The well head is the point where the gas reaches the surface and the 'well-head value' is the revenue less certain expenses incurred downstream of the well head.³¹

Depreciation for Tax Purposes: Accelerated depreciation over 15 years.

Results and Conclusions

The results of our analysis are presented in Figure 6. As an example, if cash costs of production are \$3.50/GJ (i.e. a delivered cost to Sydney of \$4.25/GJ) and total project investment is \$2 billion, a Sydney wholesale price of \$7.34/GJ would be required to meet the Weighted Average Cost of Capital.

Figure 6 – Sydney Wholesale Price (\$/GJ) required to meet NGP's WACC

Total Project Investment			
		\$1,500,000,000	\$2,000,000,000
Delivered Cost to Sydney/GJ (2018 Prices)	\$4.25	\$6.56	\$7.34
	\$4.75	\$7.05	\$7.83
	\$5.25	\$7.54	\$8.33
	\$5.75	\$8.04	\$8.82
	\$6.25	\$8.53	\$9.31

Source: IEEFA estimates

In our opinion, the bottom right corner of the table (higher investment and higher delivered costs) are the more likely outcomes given likely project delays and cost inflation – this would imply a Sydney wholesale price of more than \$7.50/GJ. By way of comparison, ACIL Allen³² forecasts a 2018 wholesale price of \$7.20/GJ in a "CSG Freeze" scenario (i.e. no further CSG development in NSW), and \$6.93/GJ in a scenario of an expanded NSW CSG production base.

Given that we think that the risk is on the upside to both NGP's total project investment and delivered cost, in order to achieve WACC returns it would need to charge higher Sydney wholesale prices than even the wholesale price forecasted in the ACIL Allen "CSG Freeze" scenario.

²⁹Jacobs SKM, "New Contract Gas Price Projections", 28 May, 2014, pg. 16

³⁰Eastern Star Gas, Scheme Document, September 2011, pg. 162

³¹ <http://www.resourcesandenergy.nsw.gov.au/>

³²ACIL Allen Consulting, "Future NSW Gas Supply and Usage; Economic Benefits of Increased Coal Seam Gas Development", 25 July 2014, pg. vii

Disclaimer

This report is for information and educational purposes only. It is for the sole use of its intended recipient. It is intended solely as a discussion piece focused on the topic of the NGP. Under no circumstance is it to be considered as a financial promotion. It is not an offer to sell or a solicitation to buy any investment referred to in this document; nor is it an offer to provide any form of neither general nor personal investment service.

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Background on the Author

Tim Buckley

Tim Buckley is Director of Energy Finance Studies, Australasia at the Institute of Energy Economics and Financial Analysis (IEEFA). Tim has over twenty-five years of experience in analysing major listed companies across a multitude of industries both within Australia and in the global context. Tim was a co-founder of Arkx Investment Management in 2007, a Sydney-based fund manager that invested in the leading global listed companies best leveraged to the move to a low carbon economic future. With the introduction of Westpac Group as a shareholder and investor in Arkx, at the start of 2010 Tim became joint Managing Director and head of Equity Research at Arkx. The Clean Energy Fund was closed in August 2013 due to lack of Australian investor interest.

Prior to this, Tim was Managing Director, Deputy then Head of Australasian Equity Research at Citigroup from 1998 to 2007. Tim was on the Citigroup Australasian Commitments Committee for five years to 2007 overseeing financial market transactions and underwritings. Tim was a top rated industrial analyst first with Macquarie Equities (1988-91) then County NatWest Securities (1992-96) in Australia, covering the leading industrial conglomerates as well as enjoying a specialisation in the forestry, brewing and wine sectors. Tim then moved to Singapore to cover the Asian equity market during 1996-1998 with Deutsche Bank, just in time to experience the Asian Financial Crisis!

Tim has authored a number of financial clean energy articles that have been published over 2011-2014 in RenewEconomy.com and Climate Spectator, Australia's two leading online renewable industry websites. Tim is working as a financial analyst in the areas relating to the move to a low carbon economy, including renewable energy, energy efficiency, electricity systems, plus fossil fuel and related infrastructure assets at risk of being stranded in this process.

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