National Australia Bank

NATURAL GAS AND LNG MARKET OUTLOOK

NOVEMBER 2017

Photo: Ernest McGray Jr Flickr

HIGHLIGHTS

CONTENTS

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The connection of Eastern Australia to global LNG markets has seen domestic prices face a wild year. Domestic spot prices, which as recently as 2015 were below $4/GJ, surged above $10/GJ earlier this year, reaching (and indeed exceeding) export parity. Since mid-year, prices have trended lower and since the Commonwealth Government's agreement with gas suppliers in October, prices have sat at around $6-7/GJ.

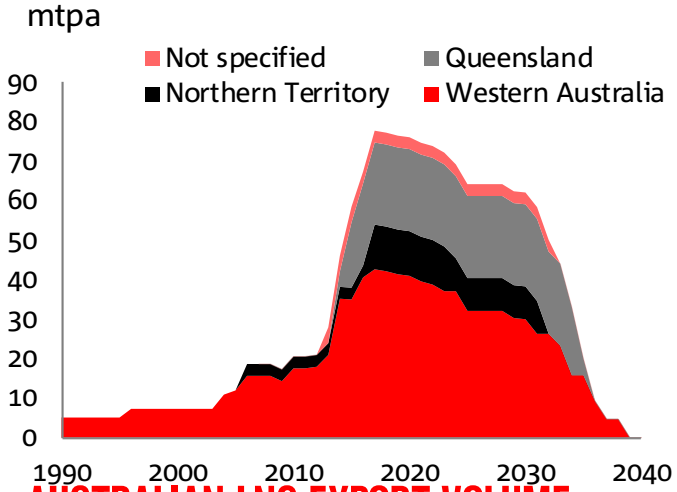
On the other hand, oil prices have risen faster than we had anticipated, with Brent now above USD63/bbl. As most of Australia's gas export contracts are tied to oil, this will likely present an upside to domestic prices, compounded by our forecasts for a lower Australian dollar. Furthermore, the performance of Queensland coal seam gas wells has been patchy and new well development is likely to be relatively high cost. Even if the Commonwealth's agreement with producers can create a surplus in the domestic market and therefore keep prices lower than export benchmarks until 2019, it is likely that the 2020s will see renewed international integration. This means that gas prices will continue to equal export prices, minus transport costs. Pressure on traditional gas sources, such as Bass Strait, will mean that field depletion will be more rapid than under a no export scenario.

One saving grace for prices may well be the speed with which the US is gearing up for LNG export amid a domestic gas glut. If East Asian prices move away from oil and towards Henry Hub +, there may be downward pressure on Australian export prices. Nonetheless, the era of $2-4 gas in eastern Australia is well and truly over.

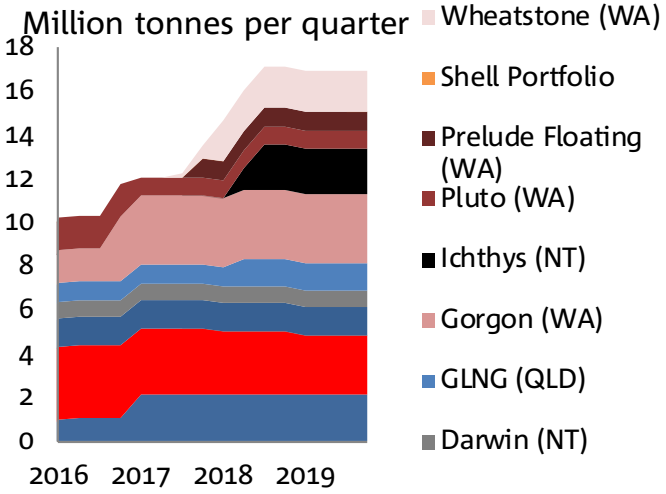
Over the next few months, our main focus will be the impact of higher gas prices (and tighter supply) on the National Electricity Market (NEM). The NEM was already struggling with higher gas requirements for South Australia and Victoria, but the failure of generators at Loy Yang A and Yallourn has placed Victoria in a tricky position in the lead-up to summer. This dependence on high cost gas generation will put upward pressure on wholesale electricity prices over summer. If this continues for an extended period, retail prices will rise further (although wholesale costs only represent around 20-25% of a typical retail bill).

AUSTRALIAN LNG EXPORT VOLUME FORECASTS

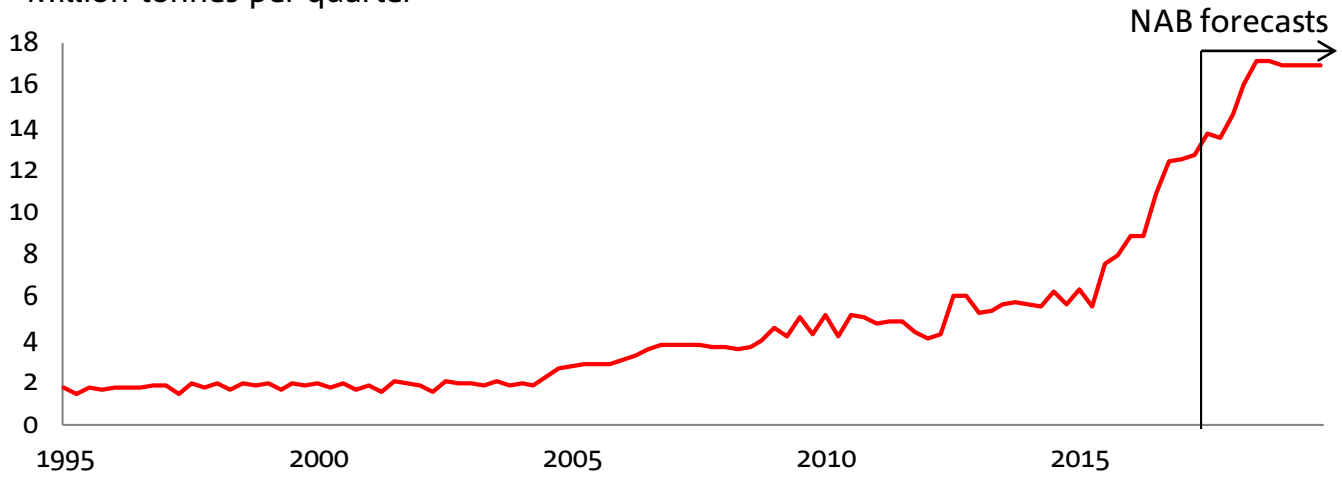
CONTRACTED LNG SUPPLY



FORECAST OUTPUT PER TERMINAL



AUSTRALIAN LNG EXPORT VOLUME



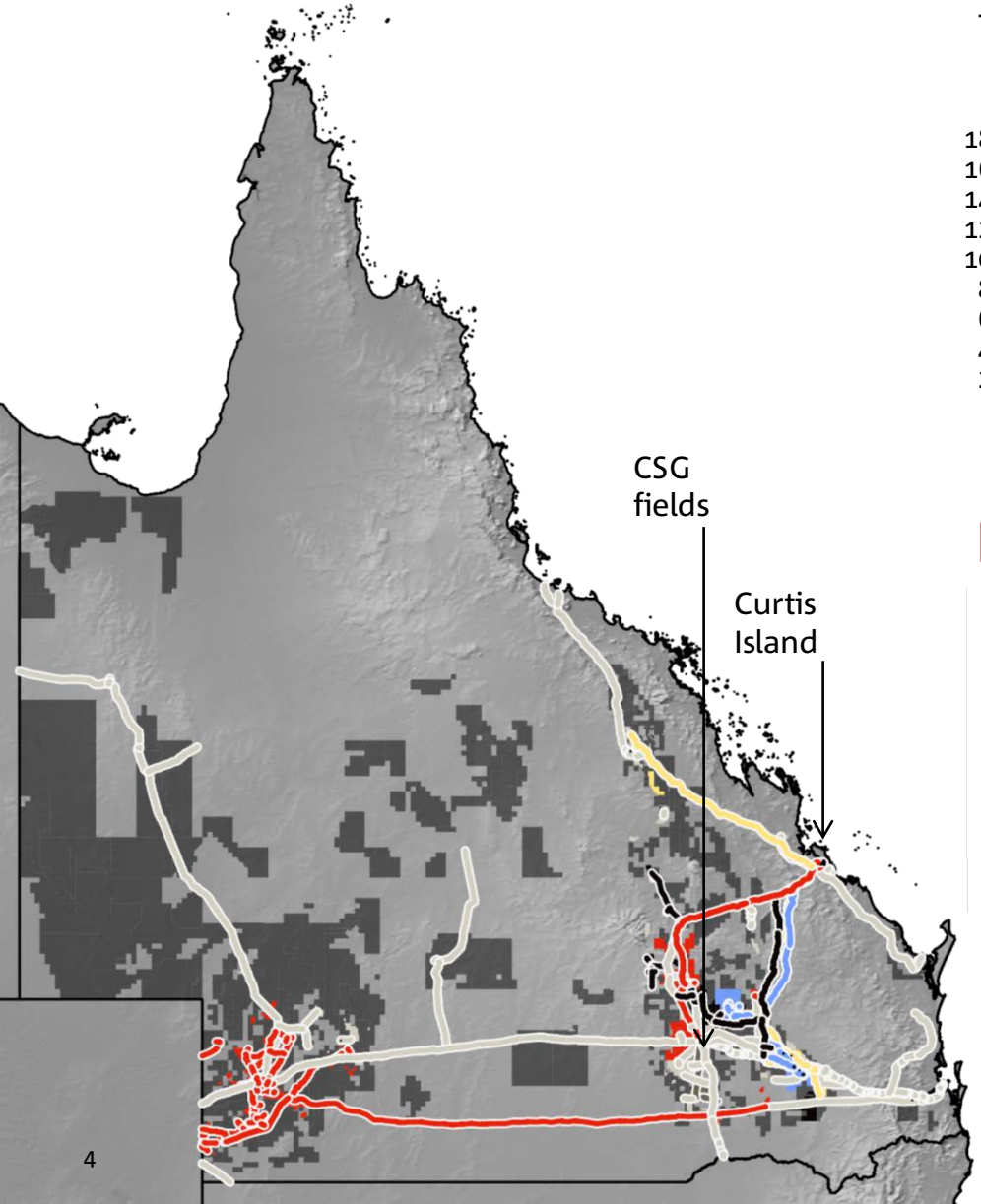
Source: Bloomberg, Poten & Partners, APPEA, Department of Industry, Australian Bureau of Statistics Oxford Institute for Energy Studies and NAB Group Economics

Australian LNG exports continue to ramp up, with almost 13.8 million tonnes shipped in the Q3 2017, up 25.7% y/y. We see exports as essentially flat in Q4, but increasing again in 2018. We forecast that Australia will export 58.1 million tonnes of LNG in 2017-18, based on the assumption that some terminals will run well below nameplate capacity. This forecast is somewhat below the Department of Industry's forecast of 63.3 million tonnes over the period.

There are two LNG terminals still under construction in Australia: Prelude FLNG off the coast of Western Australia and Ichthys in Darwin. When they are complete late this year and next year respectively, Australia will have a nameplate export capacity of around 85 million tonnes – the largest in the world.

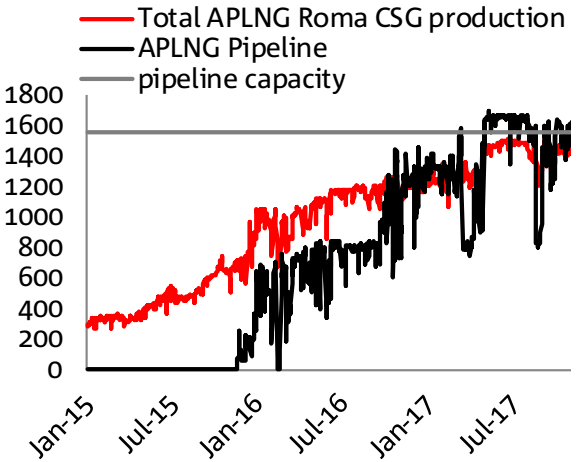
However, we do not expect actual exports will reach this level as some of the Queensland LNG terminals will be forced to run well below capacity. The following page shows the performance of upstream Queensland CSG assets as well as the amount of feed gas being sent to terminals. AEMO data shows that only APLNG is running close to capacity. QCLNG (owned by Shell) can trade on a portfolio basis and send much of its CSG to the local market, while Santos CSG production continues to lag exports (see page 4).

QUEENSLAND CSG PRODUCTION AND TERMINAL FLOWS



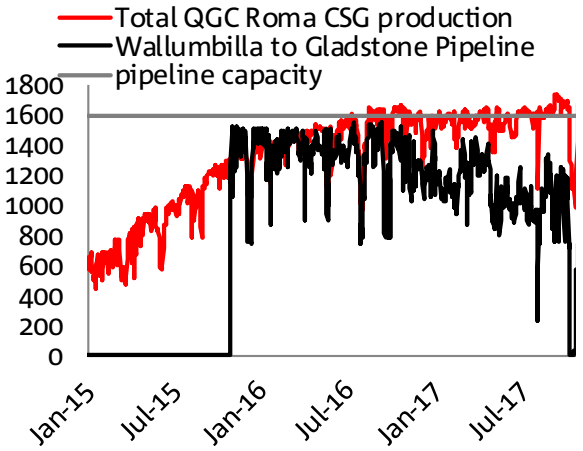
APLNG

TJ/day



QCLNG

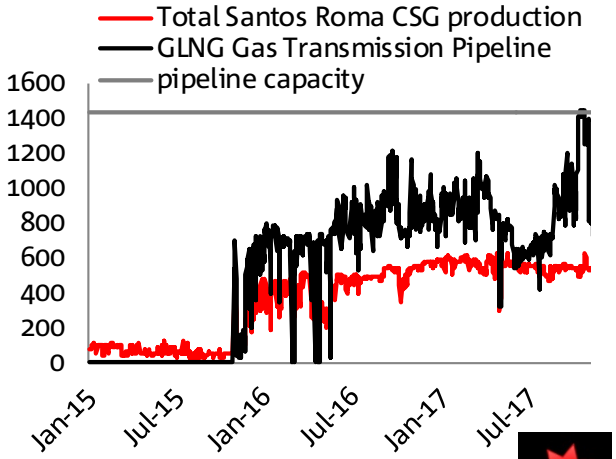
TJ/day



LICENCES AND PIPELINES

GLNG

TJ/day

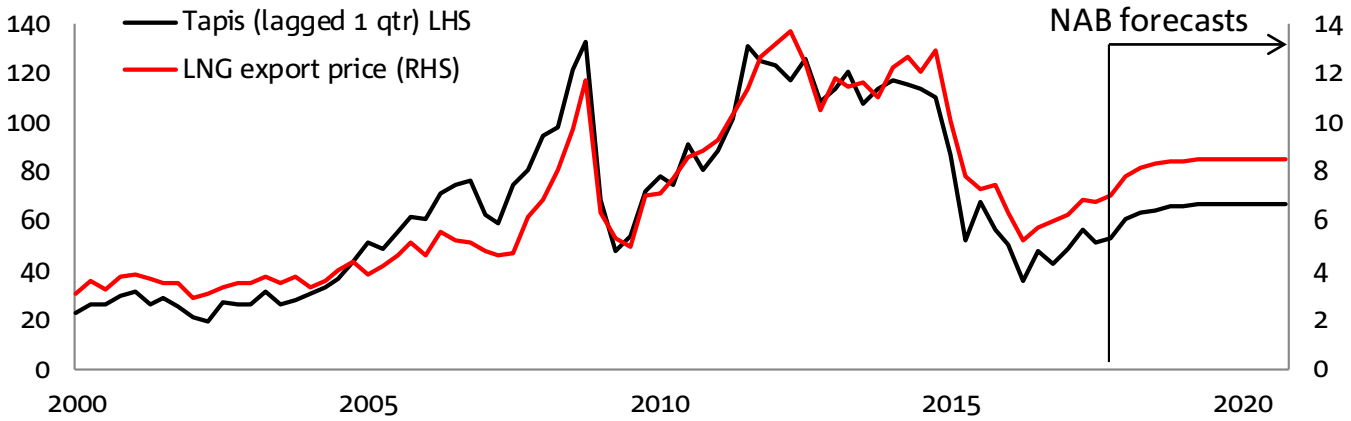


Source: AEMO, AER, Queensland Government, APPEA and NAB Group Economics

AUSTRALIAN LNG EXPORT PRICE AND VALUE FORECASTS

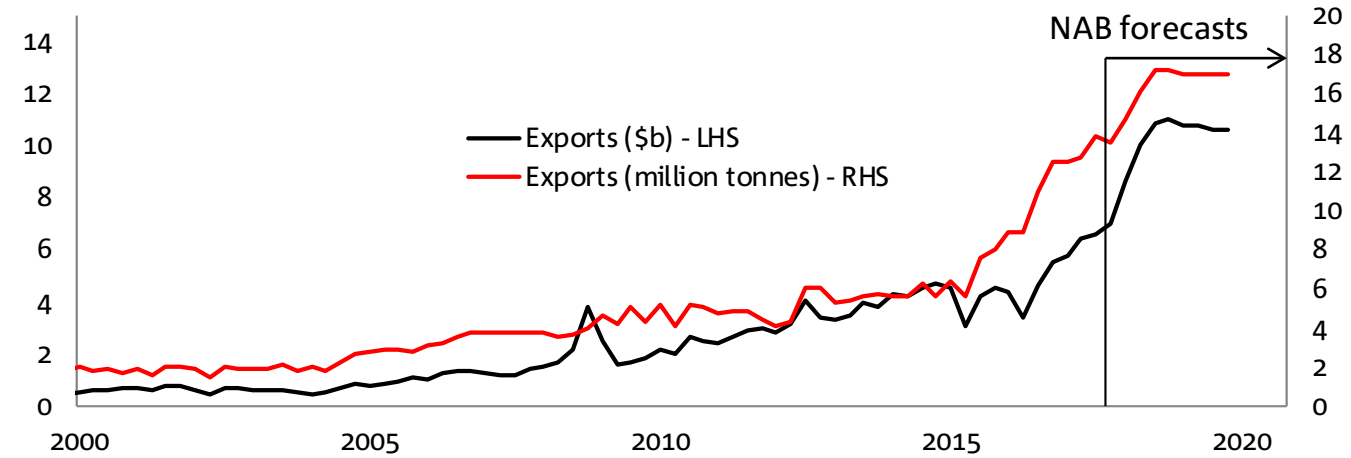
NAB LNG EXPORT PRICE INDICATOR AND LAGGED OIL PRICES

USD/bbl (LHS), USD/GJ (RHS)



VALUE AND VOLUME OF AUSTRALIAN LNG EXPORTS

AUD billion per quarter (LHS), million tonnes per quarter (RHS)



Source: Bloomberg, Poten & Partners, APPEA, Department of Industry, Australian Bureau of Statistics and NAB Group Economics

Our Australian LNG export price indicator acts as an implied LNG export price. It is based on Australian Bureau of Statistics international trade data and LNG cargoes. A history of this series from 2000 is shown to the left.

With oil prices back on the rise and the AUD set to depreciate a little further, Australian LNG export prices will be higher in 2018. We now forecast that our LNG export price indicator will reach AUD10.64/GJ in Q1 2018, up from AUD8.60/GJ in Q3 2017. We see export LNG over AUD11.50/GJ by the end of next year, which will present a major challenge to domestic gas remaining in single figures despite government intervention.

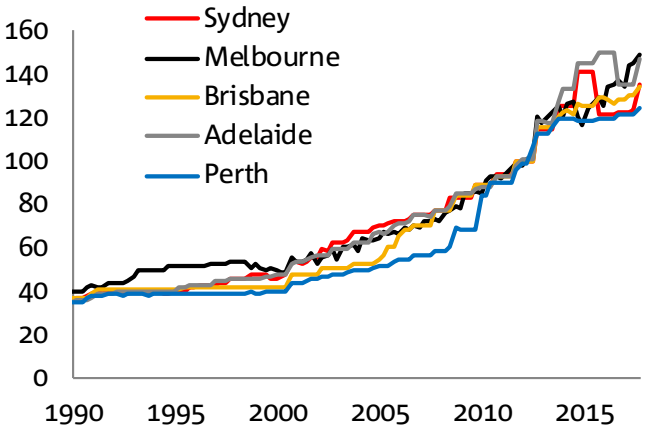
However, the trajectory of crude oil prices is highly uncertain. Although Saudi Arabia and Russia have supported extended OPEC/Russia supply cuts, the main driver of higher prices has been geopolitical risk. Conflict between Iraq and the Kurds for Kirkuk and more recently upheaval in Saudi Arabia and a political crisis in Lebanon have been major drivers of concern in the market.

We expect Australian LNG exports to total almost AUD32.3b in 2017-18 and over AUD43.3b in 2018-19. We expect LNG to contribute 0.3, 0.4 and 0.1 ppts to GDP growth in 2017, 2018 and 2019 respectively.

IMPLICATIONS FOR DOMESTIC GAS MARKETS

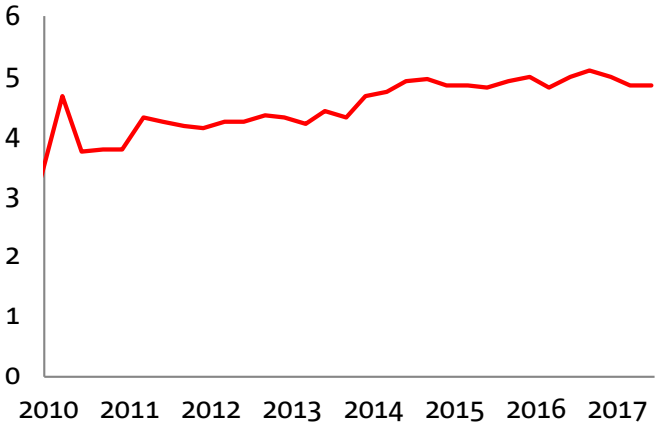
GAS CPI (INC. OTHER FUELS)

Index number



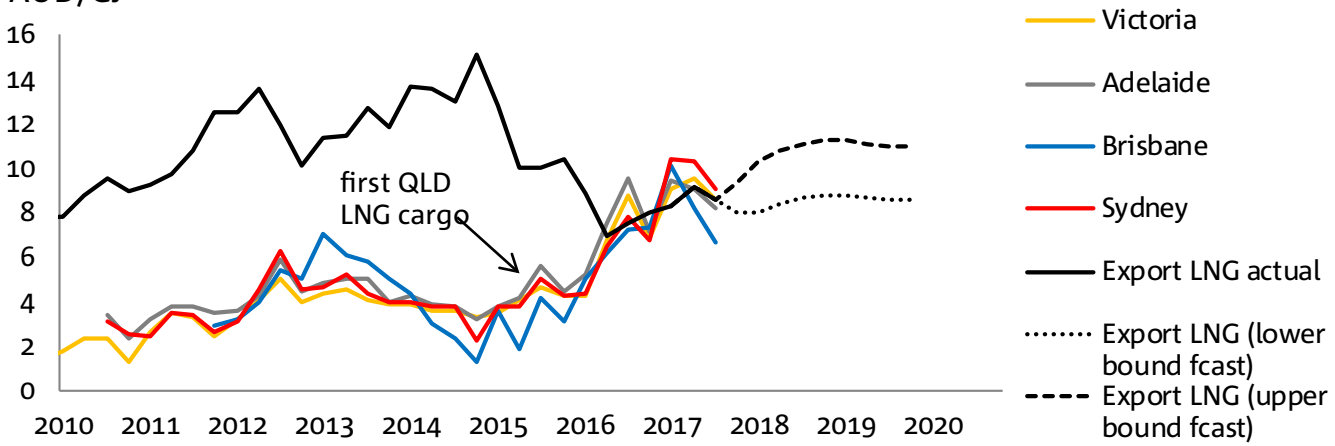
WA DOMGAS PRICE

AUD/GJ, quarterly



AEMO SHORT TERM TRADING MARKET QUARTERLY AVERAGE PRICE

AUD/GJ



Source: AEMO, Gas Bulletin Board, WA Department of Mines and Petroleum, Australian Energy Regulator, Bloomberg and Australian Bureau of Statistics

In 2015 Eastern Australia became connected to global gas markets with the construction of three LNG terminals at Curtis Island. As an isolated market, Eastern Australia had enjoyed low wholesale prices in the order of AUD2-4/GJ. With gas producers now able to send gas offshore, Australia is now subject to prevailing prices in East Asia, most of which are oil-linked and well above historic Australian norms.

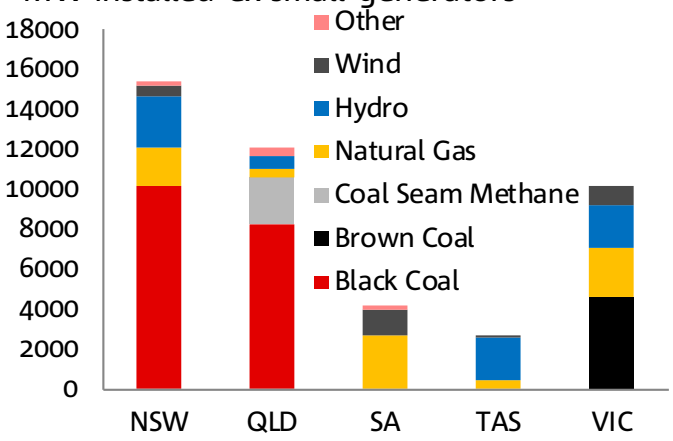
Although LNG export prices are hovering in the AUD8-9/GJ range at present (including the costs of liquefaction etc.), reports suggest that gas suppliers are offering wholesale contracts at up to AUD10/GJ on the expectation of a recovery in LNG export prices. Furthermore, it is difficult to secure contracts for more than 18 months to 2 years, despite much longer term contracts being available to overseas importers of Australian LNG.

While domestic spot prices have trended lower since Q2, reflecting a move towards more accurate netback (export minus liquefaction and pipeline costs) prices as well as political pressure from the Commonwealth, summer remains a risk for Eastern Australian prices and possibly supply. If export prices move higher, following oil, domestic prices could again exceed AUD8/GJ and elevated electricity use could drive prices even higher.

IMPLICATIONS FOR WHOLESALE ELECTRICITY MARKETS

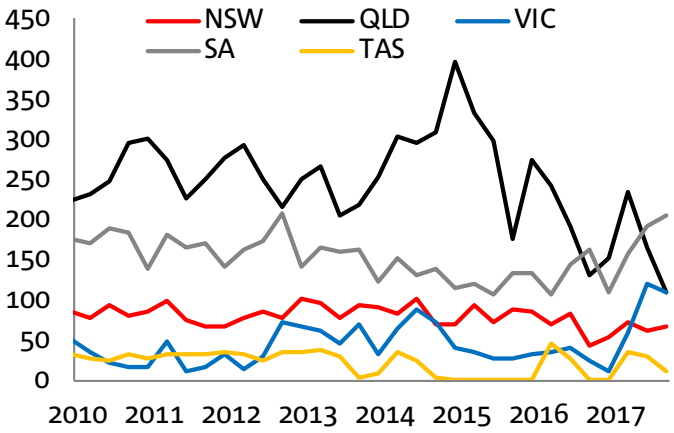
NEM INSTALLED CAPACITY BY STATE

MW installed ex small generators



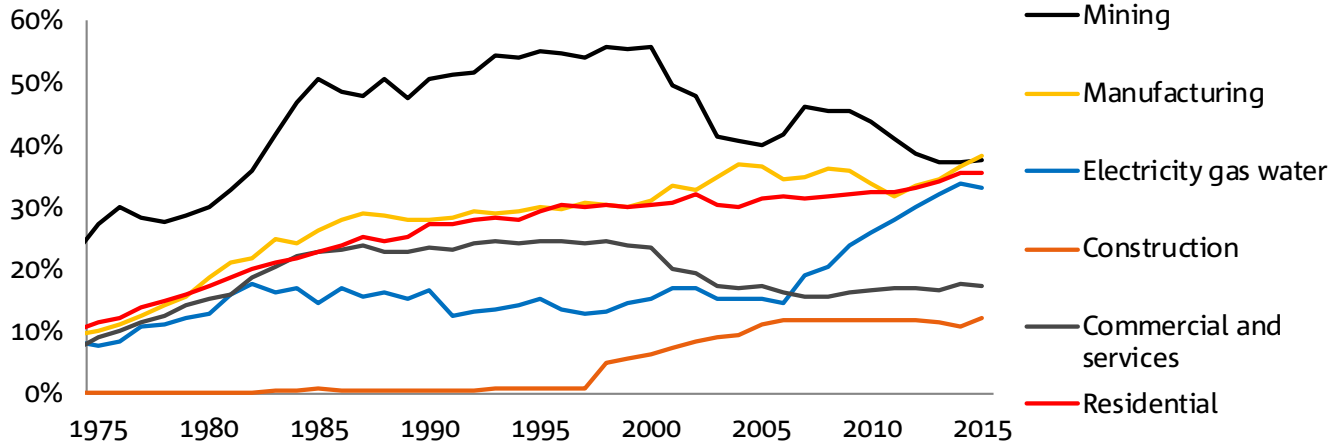
GAS USED IN ELECTRICITY GENERATION

Average daily TJ



GAS SHARE OF TOTAL ENERGY USE

By sector, annually



Source: AEMO, Department of Industry, AER and NAB Group Economics

Since the beginning of gas exports from Queensland in early 2015, gas used in electricity generation has fallen markedly in Queensland (from a peak average daily use of 396TJ/day in Q4 2014 to just 109TJ/day in Q3 2017). However, Victoria and South Australia have increased their gas use markedly since 2016, reflecting the closure of coal generators Hazelwood, Northern and Playford B. Victoria's average daily gas use for electricity generation was up 370% y/y in Q3 2017. Victoria's problems have recently been compounded by the failure of around 900MW at Loy Yang A and Yallourn W.

This would have been a major market shift when gas was $2-4/GJ, but at $6-10/GJ there are profound implications for wholesale markets. This is likely to be felt in two ways: firstly, higher wholesale prices will improve profitability for remaining coal fired generators, potentially keeping them in service for longer (although AGL will still close Liddell as scheduled), and secondly any new build generators are more likely to be renewable. The SA government announced a 150MW solar thermal plant for Port Augusta in August, claiming it would pay a maximum $78/MWh for electricity from the plant – the cheapest offer received. Spot electricity prices in South Australia averaged $103/MWh in Q3.

APPENDIX I: WA AND NT DEVELOPMENTS

Wheatstone LNG
- Capacity: 8.9 mtpa
- Status: Operational since 2017
  Ownership: Chevron 64.14%, KUFPEC 13.4%, Woodside 13%, Wheatstone 8%, Kyushu 1.46%
- Cost: AUD32.2 billion
- Employment: 5,000 construction, 400 ongoing

Ichthys LNG
- Capacity: 8.9 mtpa
- Status: Completion in 2018
- Ownership: INPEX 62.245%, Total 30%, others 7.755%
- Cost: AUD37.7 billion
- Employment: 4,000 construction, 700 ongoing

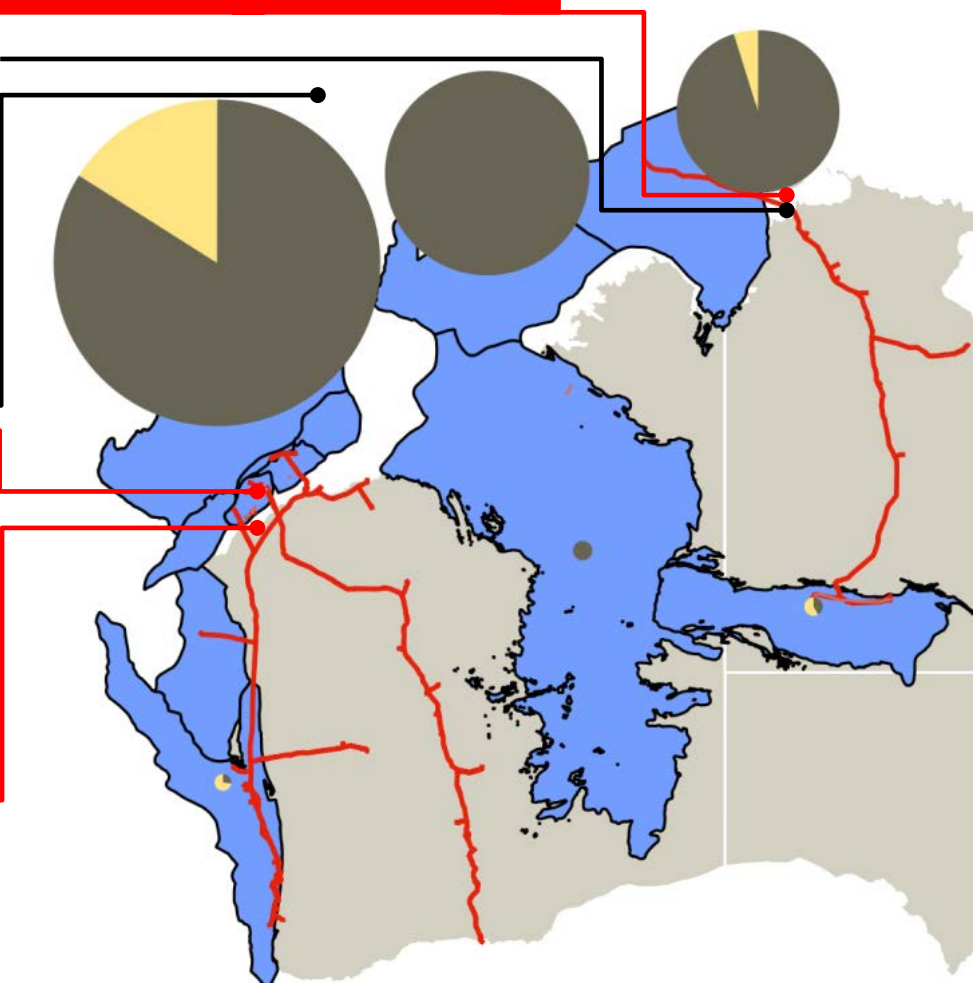
Darwin LNG
- Capacity: 3.7 mtpa
- Status: Operational
- Ownership: ConocoPhillips, Santos, INPEX, Eni, Tokyo Electric, Tokyo Gas
- Cost: NA
- Employment: Not known

Gorgon LNG
- Capacity: 16.6 mtpa
- Status: Operational since 2016
- Ownership: Chevron 47.3%, ExxonMobil 25%, Shell 25%, Osaka Gas 1.25%, Tokyo Gas 1%, Chubu 0.417%
- Cost: AUD60 billion
- Employment: 10,000, 300 ongoing

Prelude FLNG
- Capacity: 3.5 mtpa
- Status: Completion in 2017
- Ownership: Shell 67.5%, INPEX 17.5%, Kogas 10%, OPIC 5%
- Cost: AUD12.6 billion
- Employment: Not known

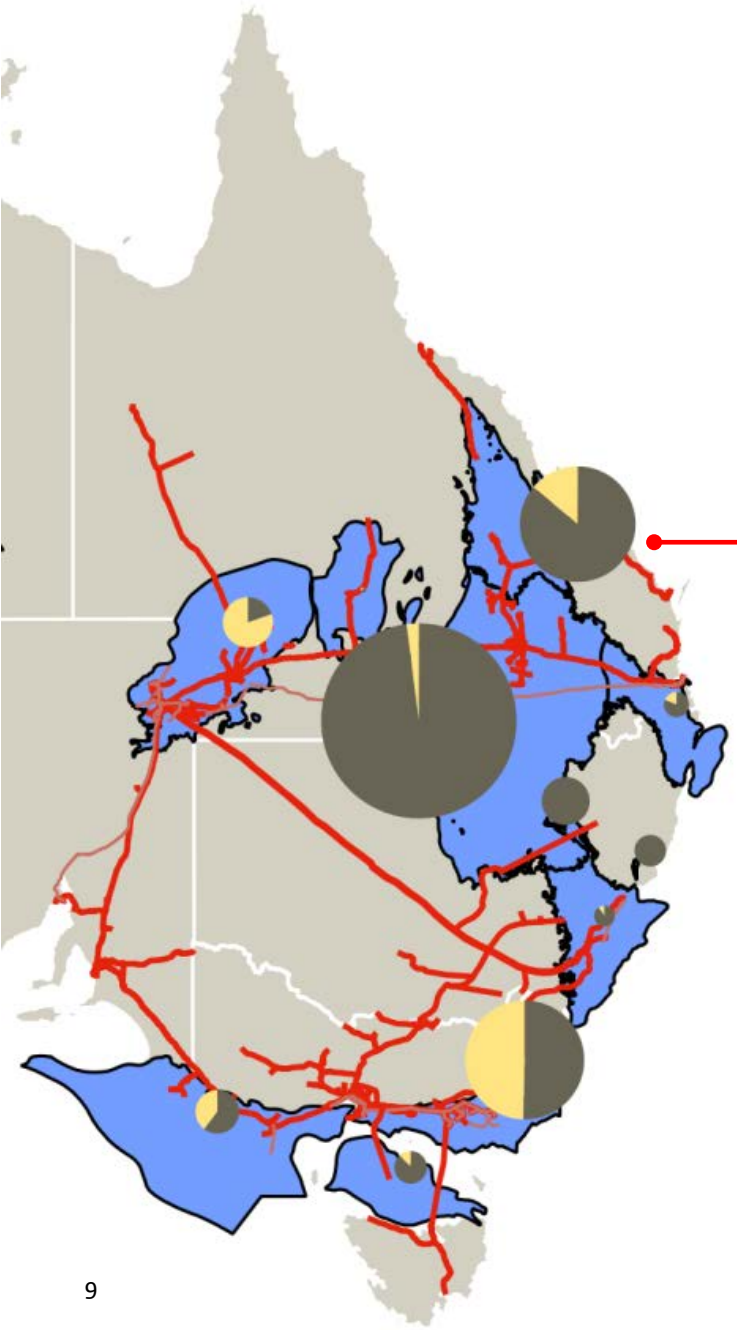
North West Shelf
- Capacity: 16.3 mtpa
- Status: Operational since 1989
- Ownership: BHB Billiton, BP, Chevron, MIMI, Shell, Woodside
- Cost: NA
- Employment: 1,000+ ongoing

Pluto LNG
- Capacity: 4.3 mtpa
- Status: Operational since 2012
- Ownership: Woodside
- Cost: NA
- Employment: Not known



Source: Company reports, APPEA, Oxford Institute for Energy Studies, Department of Industry, Geoscience Australia, Australian Bureau of Statistics and NAB Group Economics

APPENDIX II: EASTERN AUSTRALIAN DEVELOPMENTS



Gas basins
Past gas production
Gas remaining
Gas pipelines

Note: relative size of pie charts denote relative gas resources in each basin.

Australia- Pacific LNG (APLNG)
- Capacity: 9.0 mtpa
- Status: Operational since 2015 (1 of 2 trains)
- Ownership: Origin 37.5%, ConocoPhillips 37.5% Sinopec 25%
- Cost: AUD24,700 billion
- Employment: 6,000 construction 1,000 ongoing

Gladstone LNG (GLNG)
- Capacity: 7.8 mtpa
- Status: Operational since 2015
- Ownership: Santos, Petronas, Total, Kogas
- Cost: AUD21.2 billion
- Employment: 5,000 construction 1,000 ongoing

Queensland Curtis LNG (QCLNG)
- Capacity: 8.5 mtpa
- Status: Operational since 2015 (1 of 2 trains)
- Ownership: British Gas (being acquired by Shell) 73.75%, CNOOC 25%, Tokyo Gas 1.25%
- Cost: NA
- Employment:5,000, 1,000 ongoing

Source: AEMO, Queensland Government, APPEA and NAB Group Economics

National Australia Bank