

Executive Summary

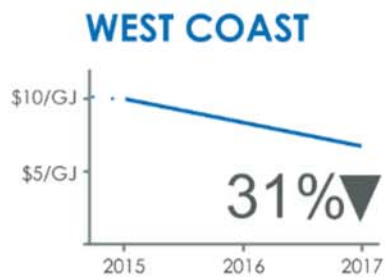


Gas price trend changes 2015 to 2017*

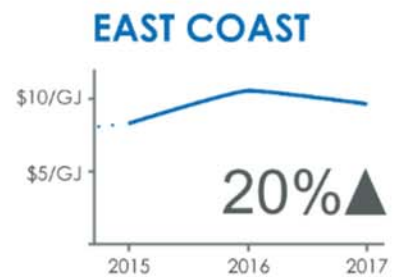


* percentage change is difference between delivered gas prices year 2015 and year 2017 only.

DELIVERED WHOLESALE GAS PRICES



Prices continue to decline from high prices in 2009.



Prices have increased (particularly in VIC), peaking in 2016 and easing in 2017 with a downward trend in all jurisdictions.



TOP 3

Transmission Pipeline Owners by Length

APA Group
13,529 km

Jemena
2,336 km

AGIG
1,867 km



Australian Pipeline Industry 22,534 km

1 Executive Summary

Gas price trends in Australia have transformed in the last three years.

This report, Gas Price Trends Review 2017, is a backcast of the gas price trends for a consumer of the types (i) large industrial, (ii) small industrial and (iii) residential, contracting for gas in a given year (including data from Gas Price Trends Review 2015) in Australia since 2006. The report extends the analysis performed in Gas Price Trends Review 2015 and is augmented by key definition and analysis of the evolutionary trends of the gas transmission pipeline industry.

1.1 Wholesale gas price trends

The average east coast's wholesale gas price has shown an increasing trend from 2015 to 2016, with Victoria almost doubling and peaking in 2016 at \$10.67/GJ. Since then the east coast wholesale gas pricing has shown a consistent downward trend in 2017 in all states.

Victoria is experiencing the highest wholesale gas prices on the east coast in 2017 and Gladstone is the lowest. This is a reversal from 2015 when Victoria was experiencing the lowest gas prices on the east coast and Gladstone was experiencing the second highest gas prices (second only to North West Queensland).

Table 1 below shows the divergent trends of wholesale gas prices in Australia.

Table 1: Wholesale gas price (excluding transmission costs) trend 2015 to 2017 by region (\$2017)

Region	2015 ¹	2016	2017
East coast high	\$10.60 NWQ	\$10.67 Victoria	\$10.00 Victoria
East coast low	\$5.45 Victoria	\$7.36 Gladstone	\$7.00 Gladstone
East coast average	\$7.60	\$9.78	\$9.19
Western Australia	\$8.17	\$6.09	\$5.00
Australia	\$7.82	\$8.40	\$7.63

The analysis of this trend indicates the high gas prices experienced in Queensland up until 2015 have migrated south to all states south of Queensland. The most affected states in terms of price escalation are Victoria and Tasmania.

Where up to 2015 and 2016, cheaper gas was migrating north to Queensland from Victoria, it is more the case in 2017, the gas supply dynamic seems to have matured and gas price escalation has moderated somewhat from the peaks of 2016 (consistent with the spot market trend). This appears partly due to the commencement of relatively stable operations

¹ Data for 2015 is from the previous Gas Price Trends Review 2015 report.

of the LNG plants compared to the hyper activity and disruptive uncertainty leading up to the commissioning and start up operations of three major gas consumers in Gladstone. Other key factors affecting price are further discussed in this report.

Western Australia's industrial consumer gas prices, on the other hand, have declined over 30% since 2015 and wholesale gas can be secured for under \$5/GJ in 2017.

The Northern Territory has a very thin wholesale gas market therefore gas price trends are not analysed in this report but an overview of the supply and demand for gas is discussed.

1.1.1 Delivered gas prices – large industrial consumers

The gas trends for large industrial consumers are defined to include the cost of transport of the wholesale gas to the respective consumer types.

For large industrial consumers (greater than 1PJ/a), the gas prices are the wholesale gas price with the additional cost of gas transport incorporated. Generally, this type of gas consumer secures its own gas supply direct from producers with or without transport and may manage any short-term supply or demand imbalance from the trading hubs or short-term trading markets.

In 2017, delivered gas prices to large industrial consumers range from the highest of \$12.21/GJ (including transport) in Tasmania to the lowest on the east coast of \$8.15/GJ (including transport) in Gladstone (ironically, the epicentre of the major price influencing LNG developments) to the west coast of \$6.97/GJ (including transport) delivered to Perth.

1.1.2 Delivered gas prices – small industrial consumers

For small industrial consumers (between 0.1PJ/a and 1PJ/a), gas is predominantly secured through retailers. The data of 120 contracts of consumers in NSW and Victoria has been analysed.

In 2015, Victoria's small industrial consumers' delivered gas prices were \$5.55/GJ (\$2017) compared to \$13.35/GJ in 2017. In 2015, NSW's small industrial consumers' gas prices were \$8.92/GJ (\$2017) compared to \$15.07/GJ in 2017.

The upward small industrial consumer gas price trend is consistent with the upward wholesale gas price trend with the exception there is no evident dip from peak wholesale gas prices in 2016 moderating in 2017. The small industrial gas price in 2017 continues in an upward trend.

1.1.3 Delivered gas prices – residential consumers

The retail offers, be they standing or market offers, in all major jurisdictions with residential natural gas supply tariffs have been used to understand the component costs. The components of residential gas prices are built up from wholesale gas costs, transport costs (including transmission and distribution), environmental costs (if applicable) and the retail cost components. Note the calculation methodology is specified in Appendix B. In 2017, residential gas prices (per unit) are highest in Queensland and lowest in Victoria. This is

despite the highest wholesale gas prices in Victoria. The high wholesale gas price is countered by the consumer critical mass in Victoria which has the largest residential consumer base, the largest state residential consumption and a relatively high gas distribution system energy density (GJ delivery per km of network).

Table 2 below summarises the extremities of the residential gas prices in Australia.

Table 2: Residential gas price 2017 sorted by price

Region	Gas price (¢/MJ)	Household consumption (GJ p/a)
Victoria	2.35	50.1
ACT	3.09	39
NSW	3.45	21.5
Tasmania	3.91	30
WA	4.12	14.5
SA	4.53	17.7
QLD	6.40	11.4
National ²	2.90	39.9

Analysis of the component trends from 2015 to 2017 of each region shows a national average increase in residential gas price of 2% over that period. ACT, NSW and SA have declined over the same period while the other states' residential gas prices have increased since 2015. The bigger movements in components are in the distribution and wholesale gas cost components which are buffered by the retailer component which in turn moderates the risk of price changes to the end consumer.

1.2 Gas transmission pipeline industry trends

Approximately 22,500km of onshore gas transmission pipelines, including the Northern Gas Pipeline currently under construction, are installed in Australia. The first three pipelines, Roma to Brisbane Pipeline, the Moomba to Adelaide Pipeline and (what is now called) the Victorian Transmission System, commenced operations 48 years ago in 1969. The Dampier to Bunbury Pipeline and Goldfields Gas Pipeline are the main transmission pipelines in Western Australia, each approximately 1,400km long. In the Northern Territory, the Amadeus Gas Pipeline and Bonaparte Gas Pipelines are the main pipelines predominantly supplying gas for electricity generation. These latter two pipelines are soon to be joined by

² The national average is calculated based on the volume-weighted average.

the Northern Gas Pipeline, currently under construction from Tennant Creek to Mount Isa, which will connect the north and east gas transmission pipeline systems.

Almost 13% (or 2,867km) of the total has been commissioned or is under construction since 2014 with over half of the total gas transmission pipeline system owned by APA (13,529km – this includes pipelines that APA Group has 100% and partial interests in).

Cost comparison between pipelines and tariffs are proportional to distance transported and potential tariff combinations analysed ranging from (an Australian context) relative low of 0.06 cents/GJ/km (or \$0.73/GJ) from the Cooper Basin to Adelaide via the Moomba to Adelaide Pipeline to a relative high of 0.23 cents/GJ/km (or \$3.91/GJ) from the Bonaparte Basin to Mount Isa via the Bonaparte Gas Pipeline-Amadeus Gas Pipeline-Northern Gas Pipeline.

The key trends that have stemmed from the changes in the gas market include:

- Flow reversal or bi-directional flow is reshaping the pipeline industry and its ability to respond to the shifting supply and demand relationship between Queensland and south-eastern Australia;
- The introduction of Generator Reliability Obligation and the National Energy Guarantee will create opportunities for the gas market to link up with renewable generation through the use of gas in power generation to provide firming capacity;
- Innovation in the services offered by pipeline companies including Operational Capacity Transfers, In-Pipe Trades and Multi-Asset services;
- There has been a noticeable trend towards shorter term gas supply agreements for several years, which has been highlighted in 2017 with the six domestic gas supply agreements publicly announced having terms of three years or less;
- Gas fired generators are taking advantage of the spot market to source gas in combination with non-firm transportation services in a more sophisticated way;
- Over the last 12 months, there has not been a general trend in the changes to published tariffs. Some of the changes include a reduction in the prices for reference services for a fully regulated pipeline, increases in line with CPI on un-regulated or light regulation pipelines and significant increases in tariffs on a light regulation pipeline (23%); and
- Innovation in the management of gas portfolios with the use of gas location swaps and gas time swaps by market participants.

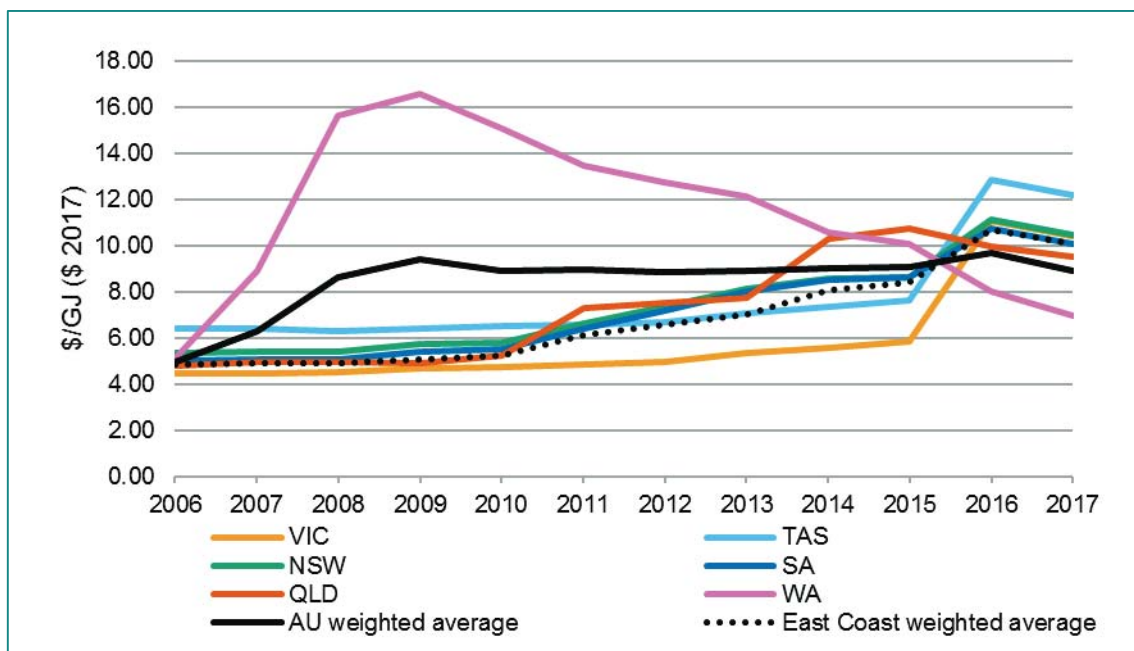
2 Key findings

2.1 Large and small industrial price trends

2.1.1 Wholesale gas prices have peaked

- The wholesale gas prices, on average, appear to have peaked on the east coast in 2016 and come back down in 2017 with gas prices starting to recede as can be seen in Figure 1.

Figure 1: Delivered gas price (\$2017) trends for large industrial customers on new gas supply agreements.



- There was a lot of scatter in the wholesale gas prices for 2017 which was not seen in the previous report. This was understandable in a supply constrained market as sellers explored pricing in what is also a very opaque market for price discovery – even for the sellers.
- Timing of execution of contracts was a big factor in pricing. Based on a limited dataset it appears that prices rose sharply in 2016 through to about July 2017 when they started to come back down. This coincided with more gas and offers coming into the market from supplies in Queensland (or swaps with Queensland gas from sources south and from Moomba possibly).
- Western Australia wholesale gas prices continued to reduce to relatively low levels as new wholesale gas supply and sellers entered the market, enhancing competition. This continued the deflation of the pricing bubble that was seen in WA in the 2015 report, probably close to cost of supply levels. Gas in WA is generally sourced from reservoirs rather than coal seam gas – it is cheaper to produce reservoir gas.

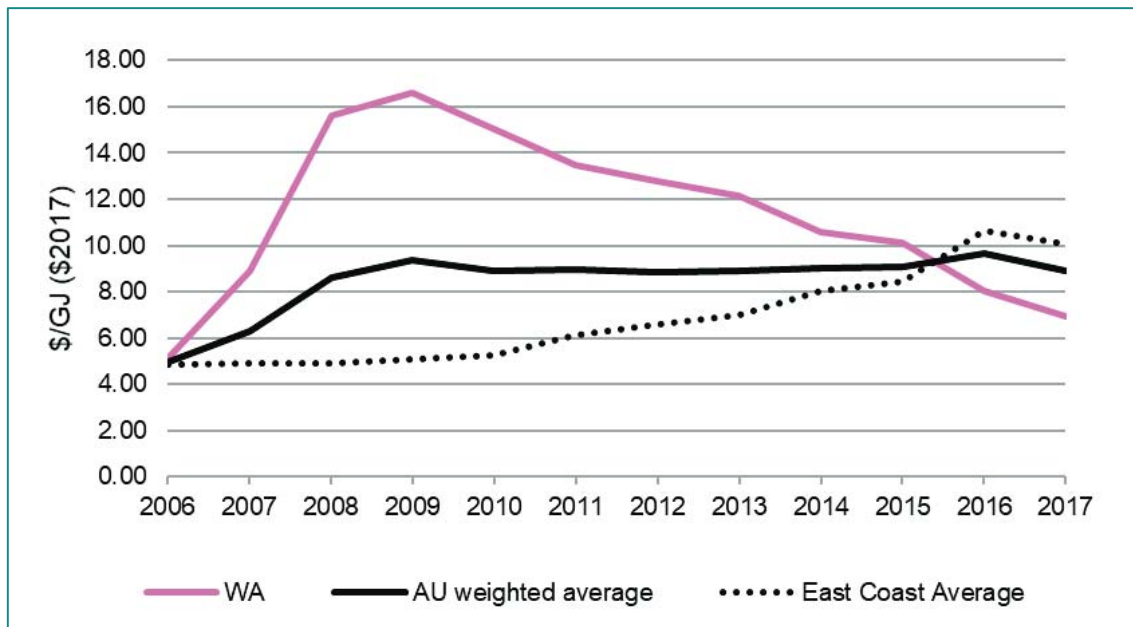
- This reinforced the conclusions from the 2015 report that gas prices reflect the supply and demand balance, albeit within an inefficient market for price discovery.

2.1.2 National average gas price trends

The average large industrial customer gas price for Australia has been developed by volume weighting³ the average prices of all the state jurisdictions (Queensland, NSW, Victoria, SA, WA and Tasmania). In 2017, the weightings were 11% NSW, 20% Victoria, 22% Queensland, 8% SA, 37% WA and 1% Tasmania. Northern Territory is excluded from the price analysis for reasons in section 1.1.

Figure 2 shows the large industrial gas pricing for the National average and the East and West regions from 2006 to 2017.

Figure 2: Australian weighted average large industrial gas price (including transmission) for National weighted average, East Coast weighted average and the West Coast.

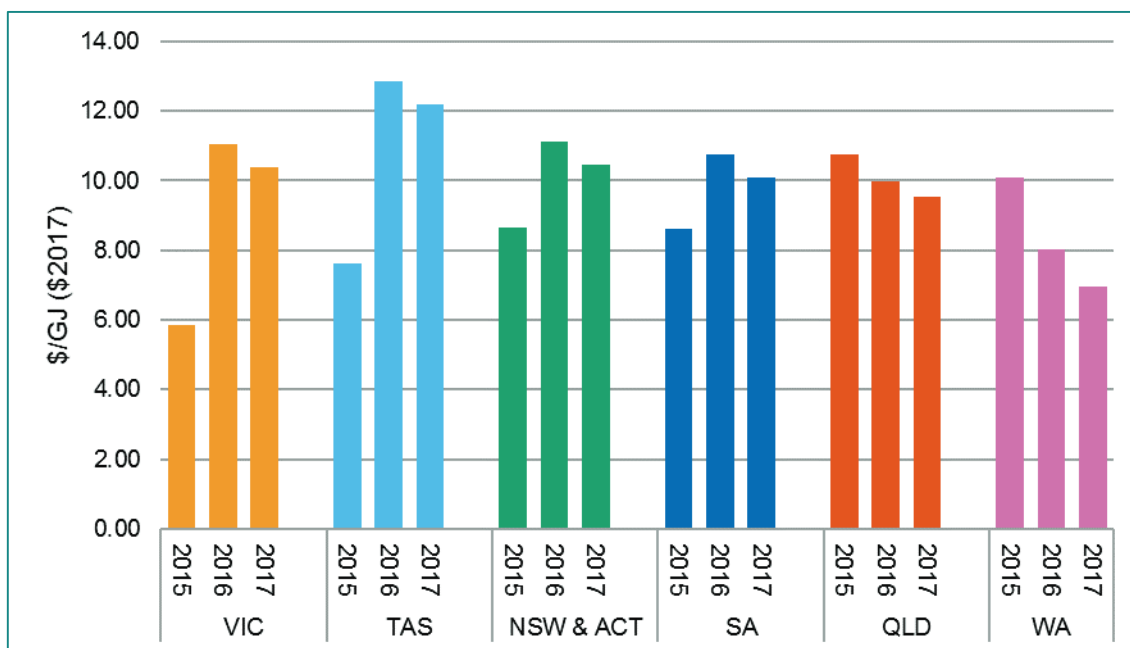


2.1.3 East coast wholesale gas price trend

- There has been a major reversal of pricing trends demonstrated since the Gas Price Trends Review 2015. In that report it was observed that the further away from Queensland customers were located, gas prices decreased – this has now reversed. Wholesale gas prices increase with distance from Queensland as can be seen in Figure 3. This most likely reflects changes in the sources of marginal wholesale gas supply.

³ This weighting has been based on the Australian Energy Statistics 2016, Chief Economists Office (Table Q1) that provides gas consumption by state up to 2015-2016. For the following years the 2015-16 ratios have been used as a proxy.

Figure 3: Average delivered gas price comparison 2015, 2016 and 2017 for large industrial users on new gas supply agreements (price includes wholesale gas and transport).



- When the LNG facilities in Queensland were competing for domestic gas reserves (above their own CSG developments) it meant southern gas buyers were paying prices reflecting the value of gas to those northern buyers, and
- In 2017 this trend reversed, and more gas has been made available from the northern gas fields into the southern market – it is now notable that wholesale gas in Victoria is more expensive than NSW, and NSW is more expensive than Queensland,
- In late 2017 Gladstone wholesale gas prices are reported to be \$7/GJ. This east coast reversal of this pricing trend may also indicate a timing issue as the market adjusts. As we noted, the scatter is very high in 2017 prices, and we may see more equalisation in 2018 and after.
- This trend has some logic:
 - The prices in NSW and Victoria may reflect the marginal costs of Queensland gas plus the haulage charges to transport it to those southern hubs,
 - The previous Gas Price Trends Review 2015 report observed that the Sydney wholesale gas market seems to be the price setting market on the east coast as it is almost entirely reliant on imported gas for what is a large gas market at some 150 PJ.
 - This report appears to continue to support that observation with the reversal of wholesale gas pricing along the east coast, however two notable outcomes are:
 - The delivered prices in Victoria and NSW are almost the same when transport and network charges are added back in (NSW transport and network charges are

a lot more expensive than Victoria, due to much larger transmission distances) potentially indicating some pricing strategy at work.

- Victorian prices may be more a reflection of supply and demand balance and timing of market adjustments on the east coast rather than reflective of localised production costs.

2.1.4 East coast average vs west coast – large industrial consumers

Table 3: Summary of differential factors comparing east coast and west coast

Factor	East coast 2017	Western Australia 2017
Delivered average gas price	\$10.08	\$6.97 (Perth)
Wholesale gas component	\$9.19	\$5.00
Transport component	\$0.89	\$1.97 (Perth)
Total consumption 2015-16 ⁴	887 PJ	563 PJ
Total production 2015-16 ⁵	1,606 PJ	1,754 PJ
Major consumers	Mining 15% Manufacturing 28% Electrical 33% Residential 18% Others 7%	Mining 20% Manufacturing 29% Electrical 47% Residential 2% Others 2%
Gas source ⁶	Conventional 41% Coal seam gas 59%	Conventional 100%
Policy settings	QLD Prospective Gas Production Land Reserve (PGPLR) NSW CSG exploration exclusion zones	WA Gas Reservation Policy 15% WA onshore fracking moratorium

⁴ Source: Department of the Environment and Energy, Australian Energy Statistics, Table Q, August 2017

⁵ Source: Department of the Environment and Energy, Australian Energy Statistics, Table Q, August 2017

⁶ Source: Department of the Environment and Energy, Australian Energy Statistics, Table R, August 2017

Factor	East coast 2017	Western Australia 2017
	Victoria Resources Amendment Legislation (Fracking Ban) Act 2017	
Spot markets	<0.1% through GSH	1% ⁷
Bilateral markets	>99.9%	99%

2.1.5 Small industrial gas prices

- Small industrial consumer gas prices escalated markedly in 2016 as the effect of tighter supply impacted and drove up the underlying wholesale gas prices. Prices in Sydney did not see the major increase in 2016 as was seen in Melbourne, but escalated markedly in 2017 and are set to decline in 2018 based on a limited set of forward pricing in some contracts.
- NSW wholesale gas prices are lower than in Victoria (as it was for larger industrial customers) with delivered prices being about the same once transport and networks charges are added.
- There are noticeable lags in pricing changes in rural Victoria and in Sydney which were like the observed lags in various regions in the 2015 report. However, major scatter occurred in the wholesale prices embedded in offers to this customer sector in 2017 which was not observed in the 2015 report.

⁷ Calculated from Gas Trading Australia volumes

Figure 4: Small industrial price scatter, New South Wales. Average wholesale gas price is the delivered large industrial wholesale gas price in NSW.

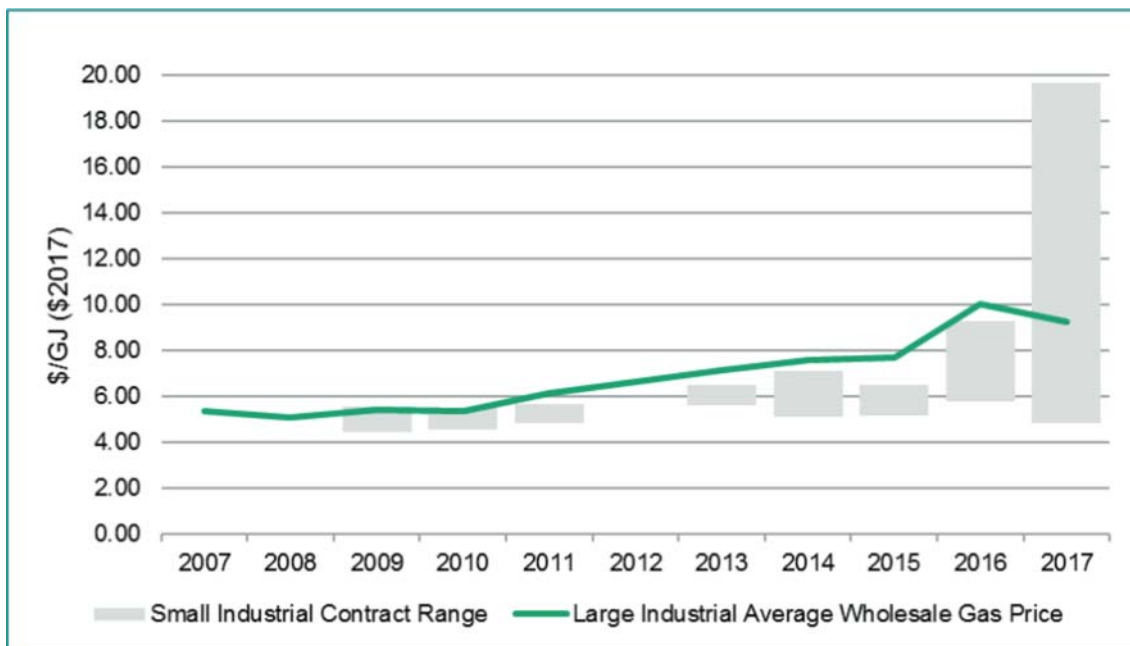
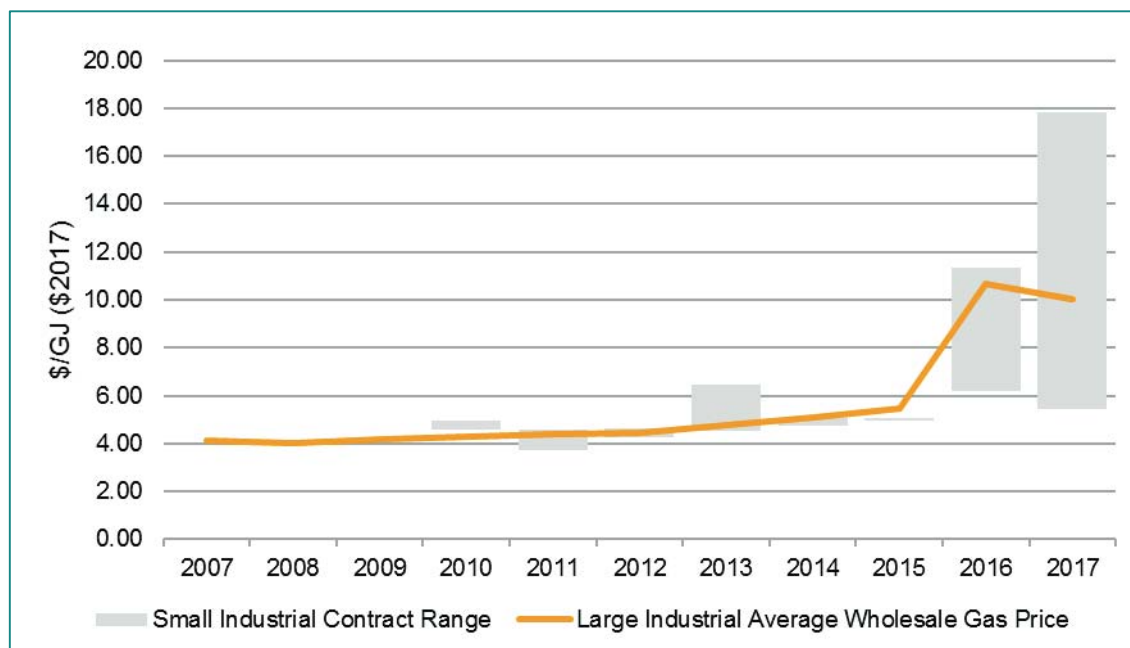


Figure 5: Small industrial price scatter, Victoria. Average wholesale gas price is the delivered large industrial wholesale gas price in Victoria.



- Looking at the VIC and NSW data (as it can be compared with the local STTM prices) it does become apparent that the timing of entering into contracts was an important factor for the price secured by the customer as the prices rose and fell.
- There is some correlation with the STTM prices. Generally, when prices offered have been high for small industrials on the contract market, there has been some higher levels of price in the STTM, with less correlation when prices are of a higher volatility, but it is

not a consistent pattern (as expected due to the nature of STTM trades being a day before, unders/overs balancing market).

- But, it is noticeable that from the start of 2017 prices started to climb in this market sector for wholesale gas (including the retail component) and seem to have peaked at about the start of July 2017 – and since then have declined – and the 2018 data sees it smoothing off.

Figure 6: Small industrial contract signing timing, New South Wales (\$ nominal)

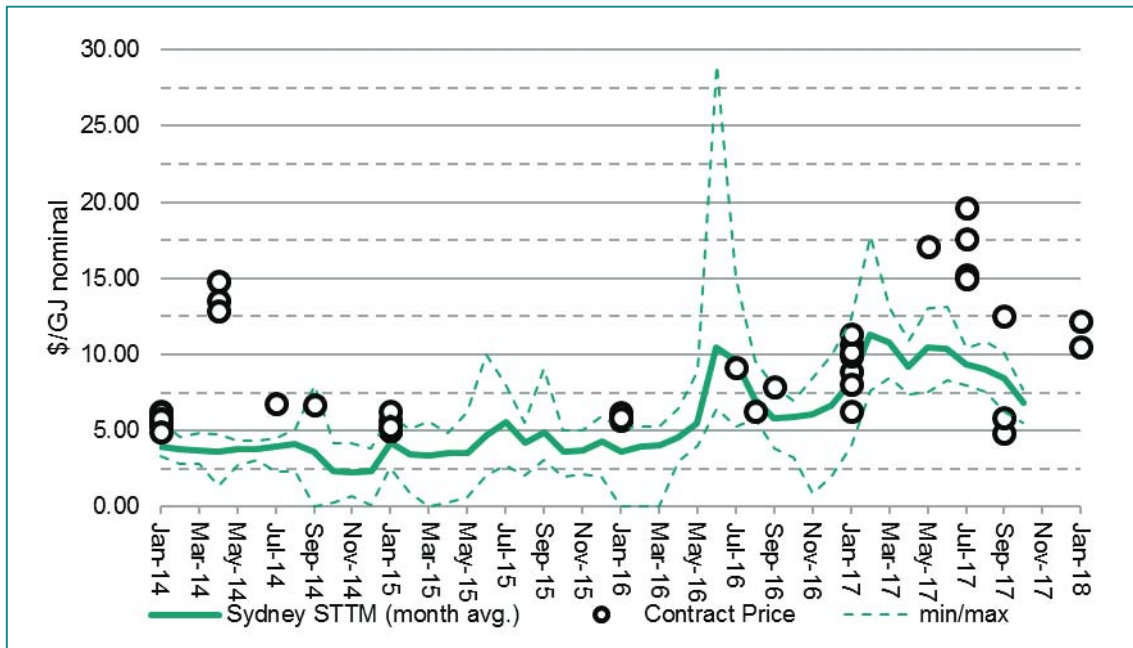
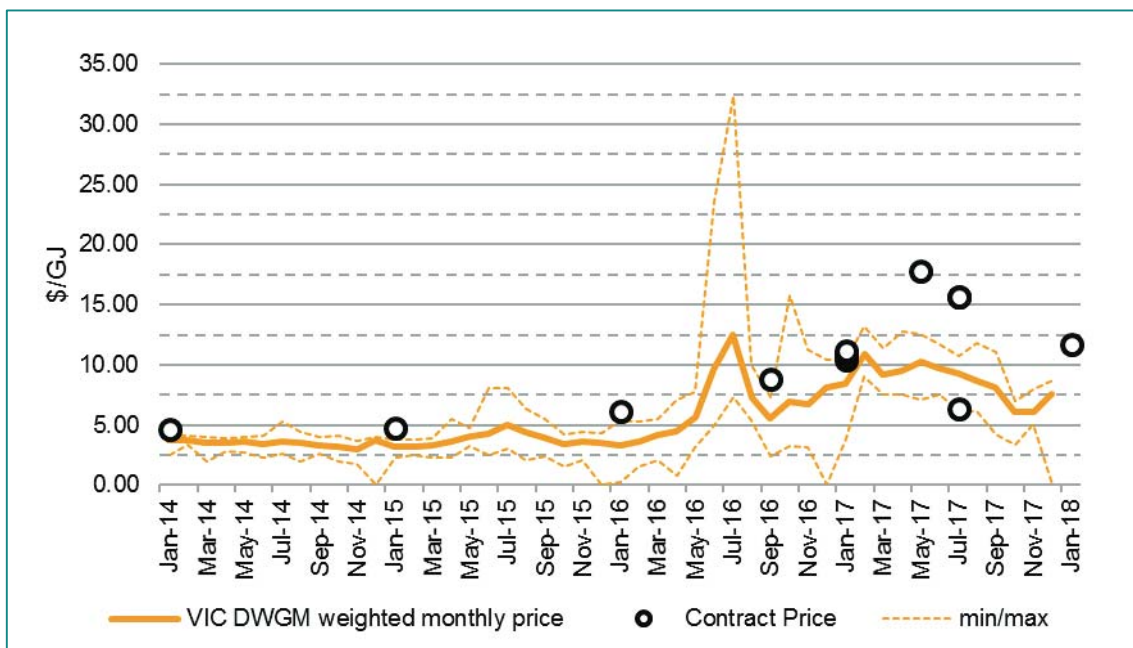


Figure 7: Small industrial contract signing timing, Victoria (\$ nominal)

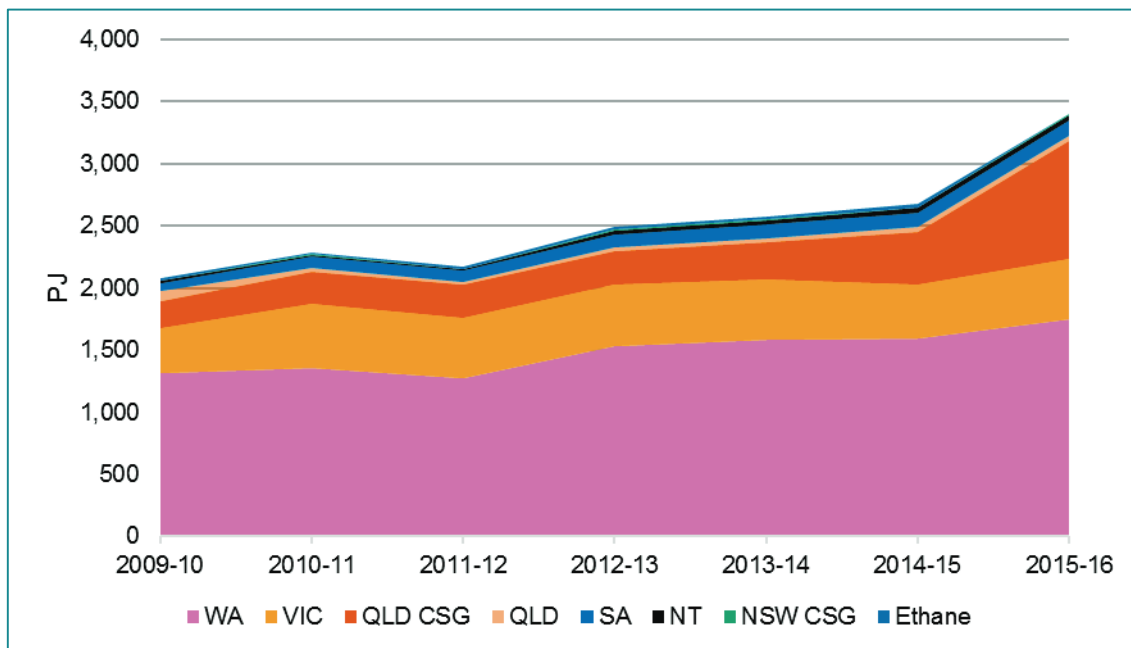


2.2 Gas supply and demand

2.2.1 Gas supply

- The largest gas producers are now Western Australia and Queensland. Western Australia is predominantly an offshore producer and Queensland is an onshore producer of predominantly coal seam gas.
- The offshore Gippsland, Otway and Bass Basins supply into Victoria's onshore infrastructure gas processing plants, 80% of which is produced from the Gippsland Basin Joint Venture⁸ (GBJV). Victoria is the third major source of supply into the Australian gas market. New South Wales is the second largest consumer of gas and produces a negligible amount of gas from coal seams hence it must 'import' its gas from Queensland or South Australia Cooper Basin producers through Moomba via the Moomba to Sydney Pipeline (MSP) or from Victoria the Eastern Gas Pipeline (EGP).
- Figure 8 illustrates the state by state gas production identifying the coal seam gas sectors (CSG) for Queensland (QLD) and New South Wales (NSW).

Figure 8: Australian historic production identifying gas source. Where gas type is not mentioned it is conventional gas.



Source: Department of the Environment and Energy, Australian Energy Statistics, Table R, August 2017

- Demand for gas for LNG export is the key driver for increasing supply. Australia exported some 52 million tons (Mt) of LNG in the 2016/2017 financial year⁹ which is equivalent to

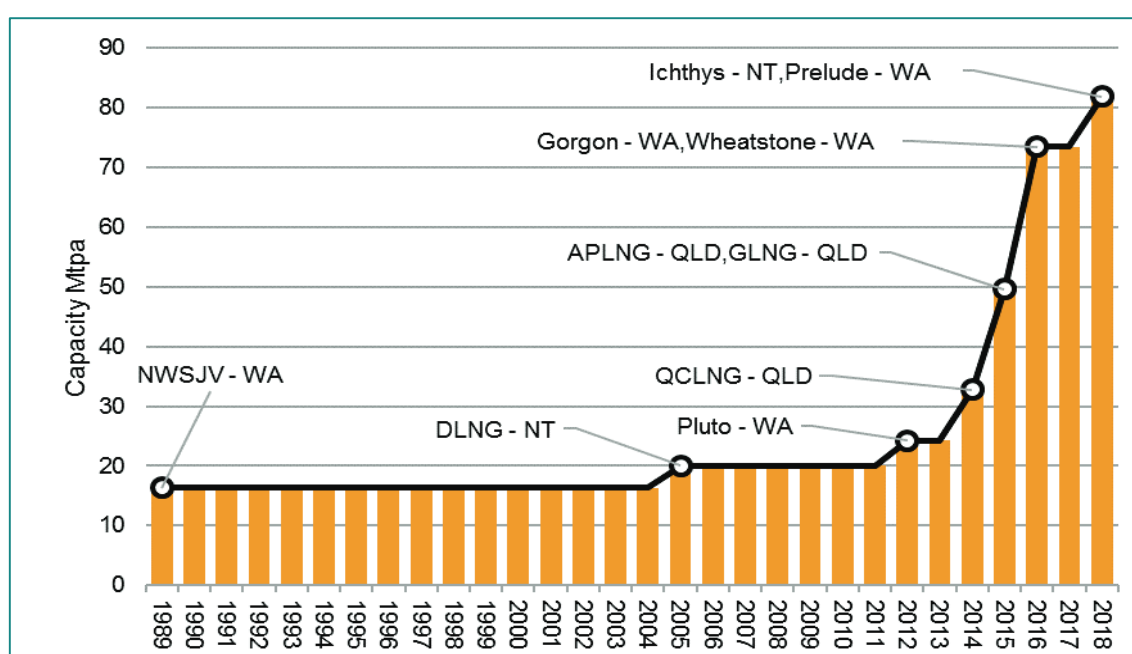
⁸ Department of Innovation, Industry and Science (November 2017) Offshore South East Australia Future Gas Supply Study.

⁹ DEE (2017) Australian Petroleum Statistics LNG exports by rural 2016-17.

approximately 2,830 PJ, more than doubling the export volumes in the 2014/2015 financial year of 25 Mt or approximately 1,360 PJ¹⁰. Export LNG is from three main production zones - North West Shelf in WA (56% production), Gladstone in QLD (30% production) and Darwin in the NT (14% production).

- Figure 9 shows Australia's LNG development since the North West Shelf Joint Venture in WA started operations in 1989. In the period from 2014 to 2016, there has been rapid investment and commencement of operations of LNG plants in Queensland and Western Australia increasing output capacity by 200% in three years on top of the previous three decades of development. This increase will be further augmented by the completion of Ichthys in the Northern Territory and Prelude in Western Australia, both in 2018.

Figure 9: Australia's LNG capacity development from 1989 to 2018



Source: [APPEA](http://www.appea.com.au) website, Australian LNG Projects.

2.2.2 Gas demand

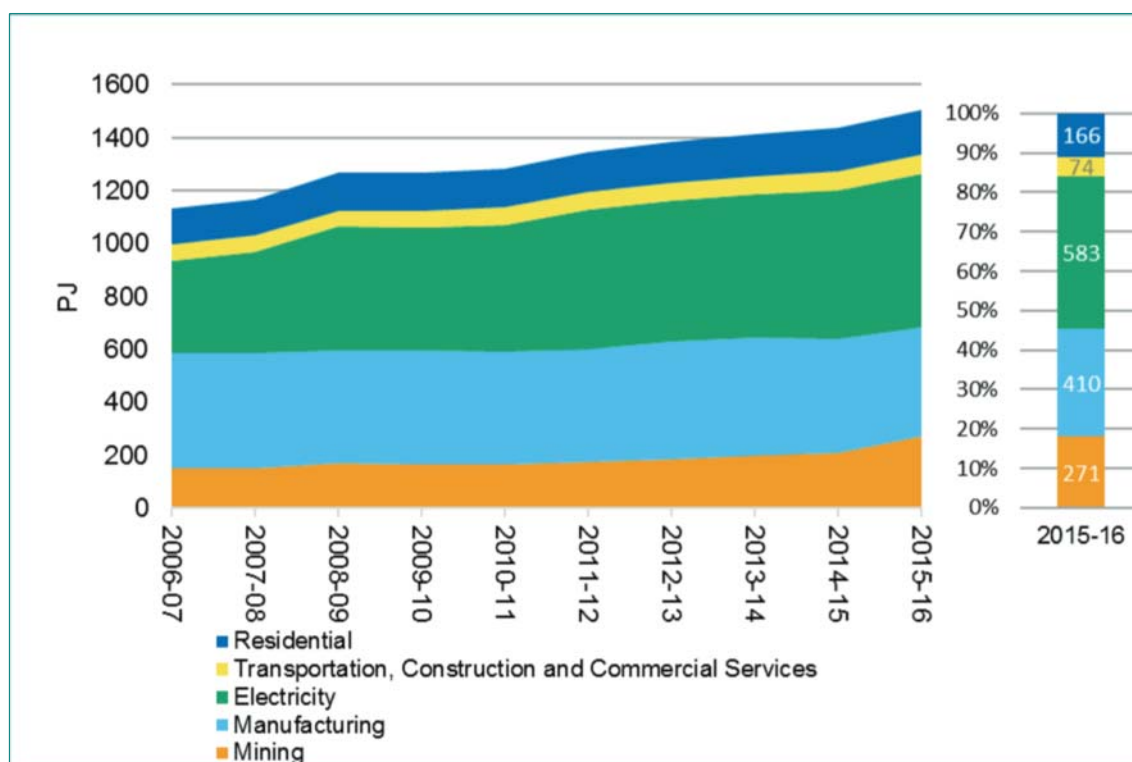
- Total Australian domestic gas consumption, which excludes LNG exports but not gas used for LNG production, was approximately 1,506 petajoules¹¹ (PJ) in 2015-16, an increase of 6% from the 1,416¹² petajoules (PJ) in 2013-2014.
- Natural gas is consumed in every state and territory and is used by various sectors including industry, power generation and residential and commercial customers as shown in Figure 10.

¹⁰ Department of Industry, Innovation and Science - Office of the Chief Economist, Resources and Energy Quarterly, September 2015. PJ values have been converted from Mt using 1 Mt = 54.4 PJ.

¹¹ Department of the Environment and Energy, Australian Energy Statistics, Table F, August 2017.

¹² Consumption updated from Gas Price Trends Review 2015 (1,402 PJ) using latest data available.

Figure 10: Annual gas consumption in Australia by sector for financial year 2006-2016. Mining includes gas consumption for LNG production.



Source: Department of the Environment and Energy, Australian Energy Statistics, Table F, August 2017.

- LNG increases in overall gas demand in the domestic market dominate the recent trends on the east coast with growth from virtually zero to 1,292 PJ in 2017, some 68% of total east coast demand – a huge uplift in demand.
- The most notable trend in gas consumption, that seems to demonstrate some of the marginal demand price elasticity issues with gas, was in the gas power generation (GPG) sector on the east coast:
 - It had been declining until 2016 as gas prices escalated (and supply tightened) and electricity prices reduced, when it seems to have bottomed out at 196 PJ/a, but
 - In 2017 there was some recovery to 223 PJ based on actual AEMO data: This means GPG is competing for new wholesale gas supplies as these power stations come back on-line.
- The combined residential and industrial loads on the east coast have overall been decreasing. This has been driven largely by the industrial load consistently reducing annually (some 13% over the last 5 years, 45 PJ/a reduction) as manufacturing is declining.
- The residential load has flattened off over the last 3 years – any organic growth is being undermined by lost load as average consumption across the jurisdictions per households decrease. The number of connections is generally increasing across different distribution zones, but new connections are in general lower consumption due to better building

standards and better energy efficient appliances. Also with the installation of efficient reverse cycle air conditioners in most homes, electricity is being used more and more as a source of heating.

2.3 Gas transmission industry trends

- The development of the new gas fields has led to significant changes in the gas pipeline industry, initially through the development of new pipelines, in particular in Queensland, and then in the services that pipeline owners are now offering.
- The network of pipelines on the east coast has changed significantly from a model of point to point pipelines connecting gas fields with a single demand centre. From 2018 there will be an interconnected grid across the Northern Territory (NT) and the east coast allowing the potential for gas to flow between the extremities of the grid being gas fields in the NT, Gladstone, Brisbane, Mt Isa, Adelaide, Melbourne, Sydney and Hobart. The growth of the coal seam gas industry in Queensland has also led to the investment in the development of almost 3,000 kilometres of new pipelines.

2.3.1 Transmission and gas supply innovations

- There has been innovation in some areas with services being offered by pipeline owners that do not of themselves generate significant additional revenue, but do support the development of the gas market as it evolves. These services include:
 - The In-Pipe Trade service on APA Group’s pipelines and similar services offered by Epic Energy and AGIG (Dampier to Bunbury Pipeline) have been identified by shippers as services that are contributing to the development of the gas market – stakeholder comments received included, for example, “a huge step forward”. Services that facilitate secondary pipeline capacity trading are offered by some pipeline companies, although trading activity has been limited.
 - The AEMO gas trading platform offered with the Gas Supply Hub(s) appears to have had some success with participants, but maybe somewhat limited with the offers on the platform appearing to be pro-forma with tariffs at a substantial premium to tariffs published by the owners of the pipeline. However, the platforms created by the pipeline companies to facilitate Operational Capacity Transfers, and the support for them by participants interviewed in this analysis, may well point to the way forward for implementing capacity transfers once the Day-Ahead Auction being developed by the COAG Energy Council’s Gas Market Reform Group is implemented.
- One of the most marked findings from our extensive stakeholder discussions was that the changing gas market is leading to innovation in how market participants manage their gas portfolios, with transmission a key positive or negative factor.
 - Contractual constraints on some pipelines limits access to contracted but unutilised capacity other than through development of new capacity. This has led to the use of

gas trading instruments such as gas location swaps to overcome some of these barriers and create more flexibility for a wider range of participants to supply gas to the market beyond points directly connected via pipelines to their gas fields.

- Some gas buyers (traders) are operating gas power stations without any long (or even short) term gas supply and transmission arrangements. They are largely depending on their ability to buy spot gas and contract non-firm transmission capacity to be able to run their power stations when opportune, and it was noticeable that these gas “traders” often were electricity traders. Some also expressed the desire for more compulsory gas trading arrangements (not voluntary hubs) as this would be more efficient, transparent and lower costs for trades. The parties who put forward this position did not suggest a preferred alternative approach.
- This group of “traders” is almost a club or group that know each other and because of this can execute off market trades, especially when supply is tight, resulting in the prices becoming very opaque publicly (trading platforms at the Gas Hubs are not used so openly then).
- A growing level of sophistication in gas trading and support for further market reforms and products would increase efficiency in these processes. It also points to the short-term contracting market being predominant for some period of time while the current level of uncertainty of the direction of the gas market remains, due to moratoria or bans on onshore gas development in some states.

2.3.2 Transmission Tariffs

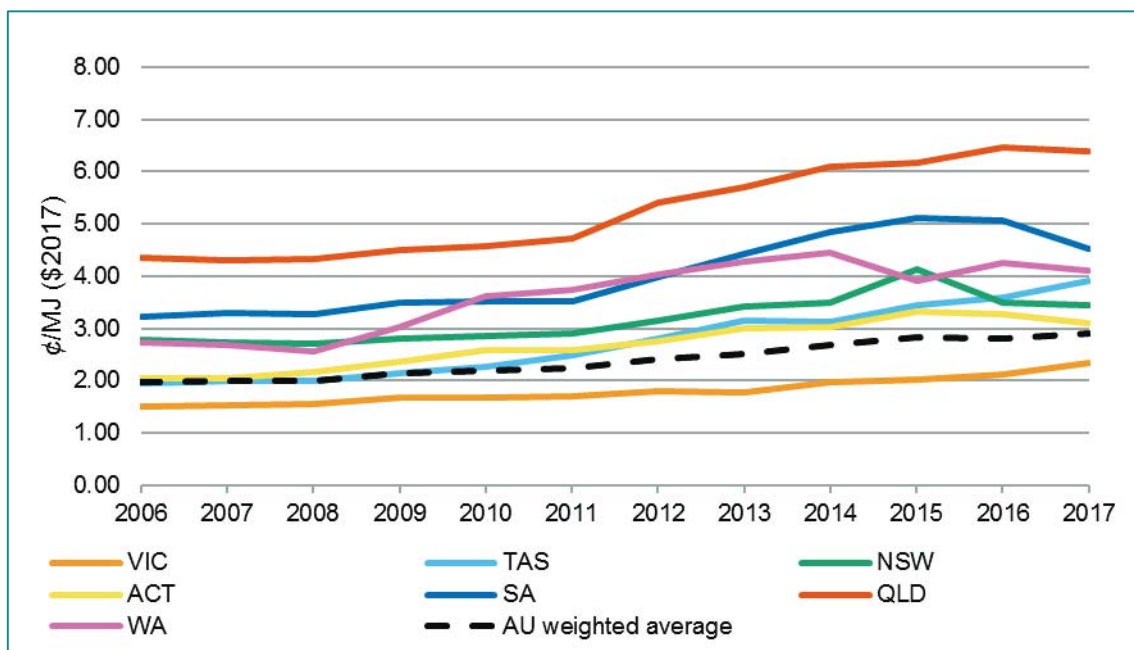
- Not all tariff information has been made available for this report; however, tariffs under existing services typically escalate with CPI. In some cases, tariffs have dropped slightly due to the implementation of new Access Arrangements. There have been in the last 12 months reductions in the published indicative tariffs for some services, most notably tariffs for compression services offered by APA Group at Wallumbilla and Moomba.
- A key outlier for tariffs has been the 23 percent increase from \$1.32/GJ to 1.62/GJ from 2016 to 2017 in APA Group’s Carpentaria Gas Pipeline tariff.
- APA Group unsuccessfully attempted to gain approval in the 2017-2022 Roma to Brisbane Pipeline Access Arrangement process, from the Australian Energy Regulator for charging a premium for short term Reference Services (less than a three-year term) relative to long term services. There might be some merit to this price premium as a short-term service may prevent long term contracting of capacity. However, this may not be a durable position given gas market dynamics. Recent gas supply arrangements have been for terms that are generally less than three years as the gas market has evolved. Given this trend, APA Group’s proposal for a premium for terms of less than 3 years for an existing pipeline would have had the potential to effectively escalate prices where parties attempt to align the term of the transport agreement with the term of their gas supply agreement.

- With the recent gas pricing and debate over lack of supply there has also been renewed focus on the costs and charges for each component of the gas value chain including transmission. Comparison of total gas transmission costs to deliver gas from Karratha to Perth and to deliver gas from the Surat Basin to major south-eastern coast demand centres, could be interpreted that the charges on the east coast are double that on the west coast. A simple comparison of transmission costs does not reflect the fact that gas is transported from the Surat Basin west to Moomba and then either south to Adelaide or south east to Sydney, over significantly longer distances using multiple pipelines than a direct single pipeline from Karratha to Perth. It also does not take account of the fact that what were originally developed as point to point pipelines on the east coast are now being utilised for a different purpose to when they were first commissioned.

2.4 Residential trends

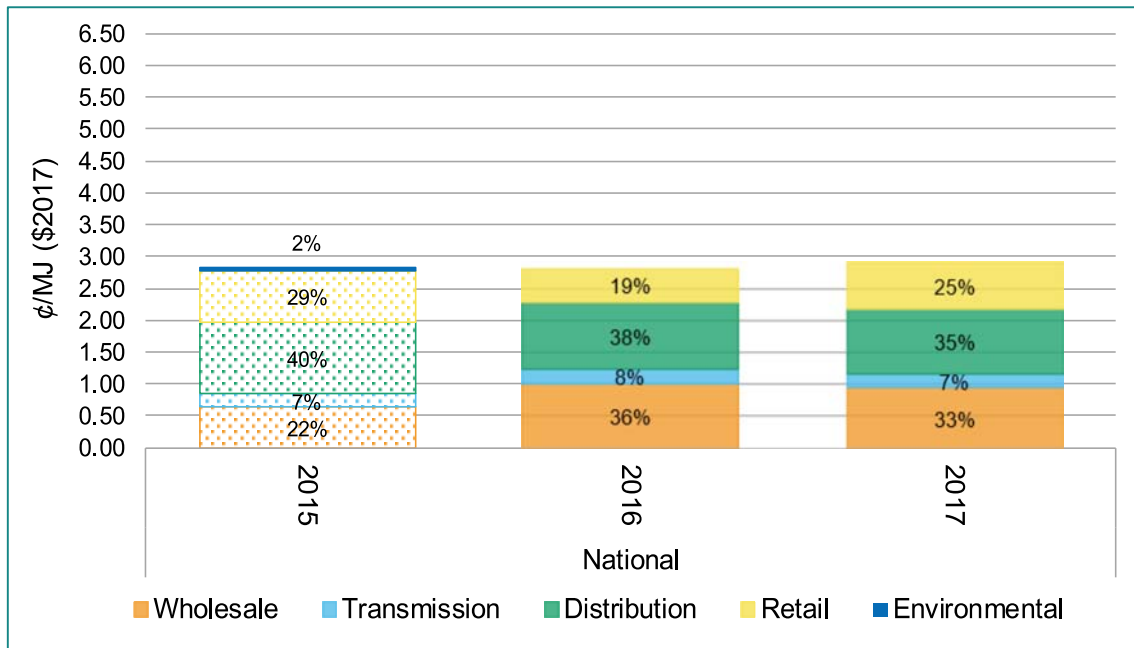
The chart in Figure 11 is the summary of the total retail residential gas prices on a ϕ /MJ basis.

Figure 11: Residential retail gas price 2006 - 2017 in ϕ /MJ (\$2017)



2.4.1 National

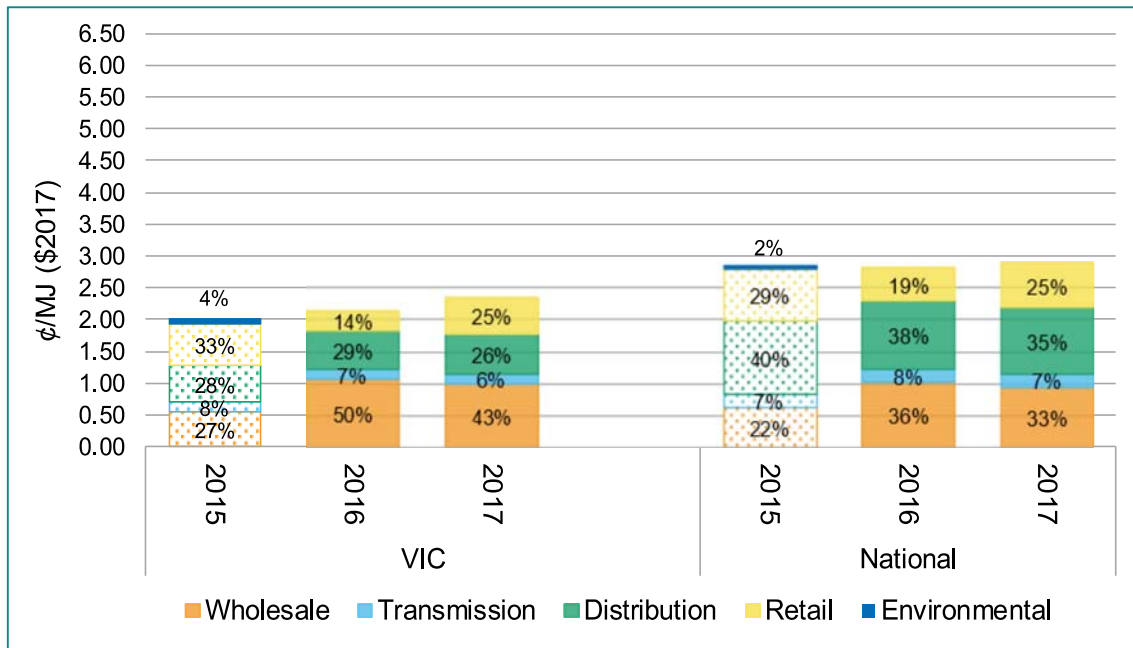
Figure 12: National average residential gas price trend 2015 to 2017



- The national average residential retail gas price has increased by some 2% since 2015. The largest component shift is in the wholesale gas component, increasing approximately 50% over the 2015 to 2017 period, and retail costs/margins seem to have moved to smooth prices to the end consumer.
- While this trend is consistent in the east coast markets, the opposite is reflected in the Western Australia market where the wholesale gas component of the average delivered residential retail price has declined by approximately 40% over the 2015 to 2017 period, and is not fully reflected in the prices.

2.4.2 Victoria

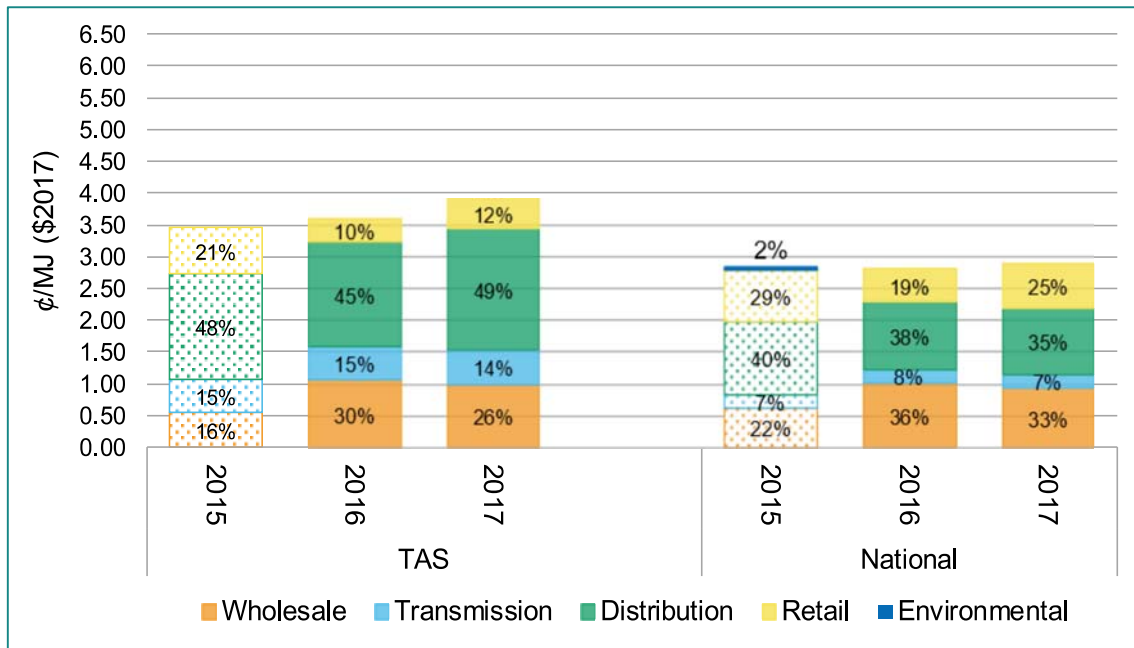
Figure 13: Victoria residential gas price trend 2015 to 2017



- Victoria is the largest residential gas market by volume, and delivered residential retail gas prices have increased some 16% from 2015 to 2017 but remain the cheapest in Australia by quite a margin due to the high volume and connection penetration. The apparent Retailer cost component dipped in 2016 as wholesale gas prices rose and were not fully reflected in retail prices but has since recovered somewhat as overall retail prices increased. There may have been a lag effect between wholesale gas prices increasing and being more fully passed through to residential customer delivered prices.
- The overall price increase has though been influenced mainly by the increase in wholesale gas prices being experienced in Victoria (from 27% in 2015 to 50% and 43% in 2016 and 2017 respectively) and combined with a moderate increase over the period in distribution charges (per GJ).
- The environmental costs of the Victorian Energy Efficiency Target (VEET) is estimated to be 0.003 ϕ /GJ in 2017 and is a result of the traded price of the certificates with a price of approximately \$11 in 2017.

2.4.3 Tasmania

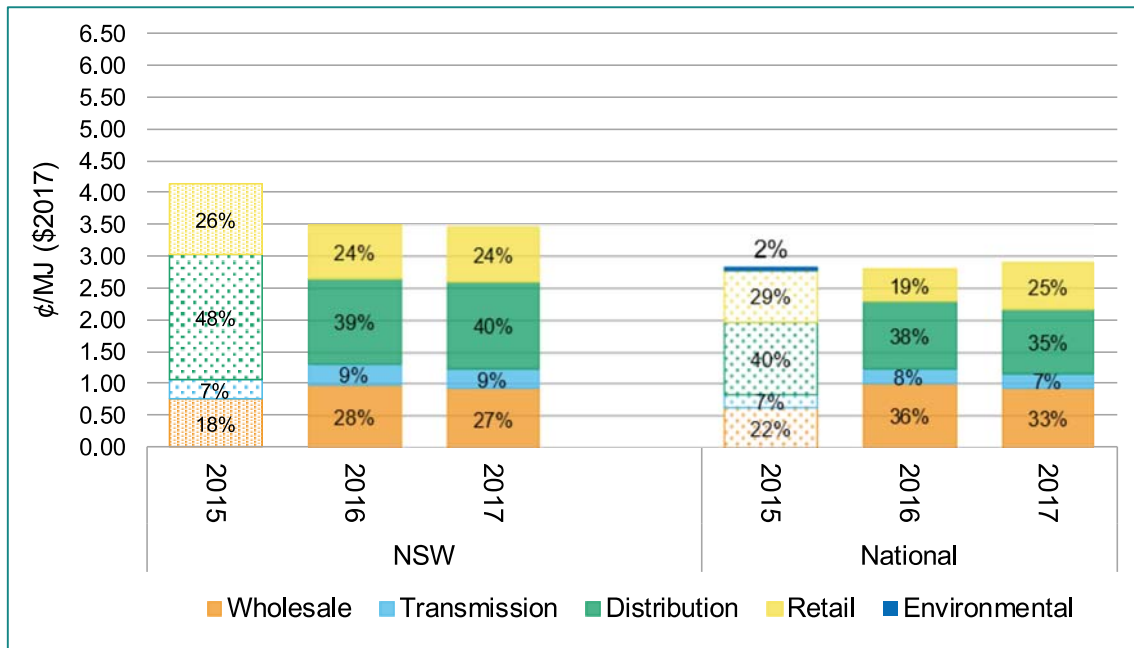
Figure 14: Tasmania residential gas price trend 2015 to 2017



- The cost component analysis is difficult due to there being only two retailers, a relatively very small residential demand base and an unregulated gas distribution system with opaque charges. The application of the standard methodology for determining the cost components used for the other states would yield extraneous results. Therefore, for Tasmania, the wholesale gas component of the residential gas price analysis references the Victoria wholesale gas price providing a more consistent underlying wholesale gas component and a more likely reflection of actual retail procurement positions.
- Delivered residential retail gas prices have increased since 2015 by 13%. This appears to be a combination of realised increases in distribution charges of 13% and increased wholesale gas prices of 83% - and as a result tempering the retail component significantly to adjust.
- The challenge for Tasmania is the relatively large infrastructure investment to supply a small load but its delivered gas cost is quite competitive on a national scale e.g. similar delivered prices to NSW.

2.4.4 New South Wales

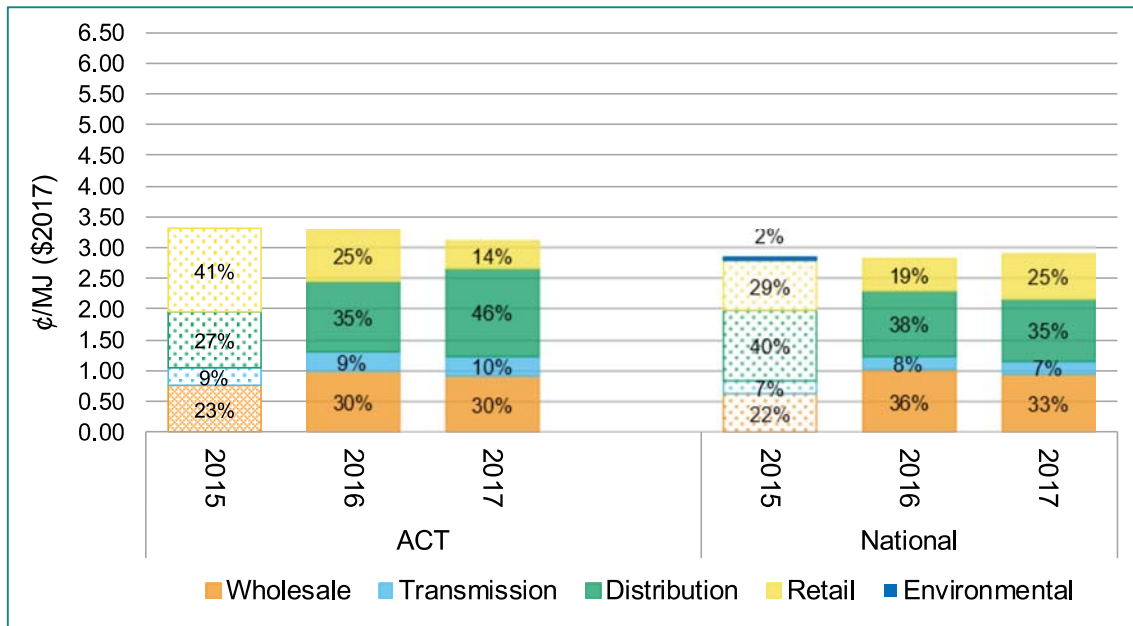
Figure 15: New South Wales residential gas price trend 2015 to 2017



- New South Wales data in this report includes both the rural and metropolitan gas pricing. More than 95% of gas in the state is supplied to Sydney but those in rural areas have double the consumption per connection.
- The average delivered residential gas price in NSW has eased somewhat since 2015, by around 17%. A relatively significant decrease in the distribution charges of 32% and a squeeze on the retail component of some 23% has largely offset an increase in the wholesale gas price of some 23% (or 0.83 ¢/MJ) delivering this overall reduction.
- Natural gas has now become eligible for the NSW Energy Savings Scheme in 2016. However, no certificates have been generated for the calendar year 2016.

2.4.5 Australian Capital Territory

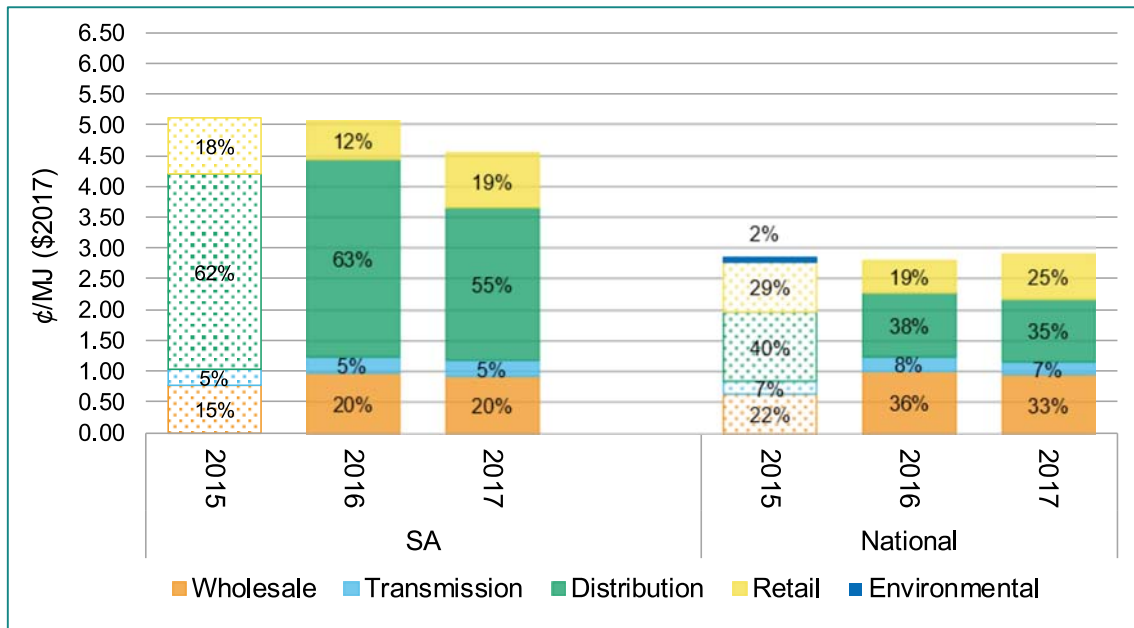
Figure 16: Australian Capital Territory residential gas price trend 2015 to 2017



- The Australian Capital Territory (ACT) delivered average residential gas price has had a moderate decrease from 2015 to 2017 of 7%. This is interesting as there has actually been an increase in the distribution charges component from 27% to 46% and an increase in the wholesale gas price component from 23% to 30%.
- Additional competition has entered into the ACT space with Origin and Energy Australia providing market offers with better discounts compared to the incumbent ActewAGL. This seems to have reduced the retail component which was very high in 2015 (41%) and is now lower than the national average at 14%.
- The ACT has also seen a rapid decline in average residential consumption, compared to the other jurisdictions, from an average of 45 GJ p/a per connection to 39 GJ p/a per connection – some 20%. This seems to coincide with a rapid shift from gas to electricity for heating, which is a big household load in the ACT due to cold temperatures over winter.

2.4.6 South Australia

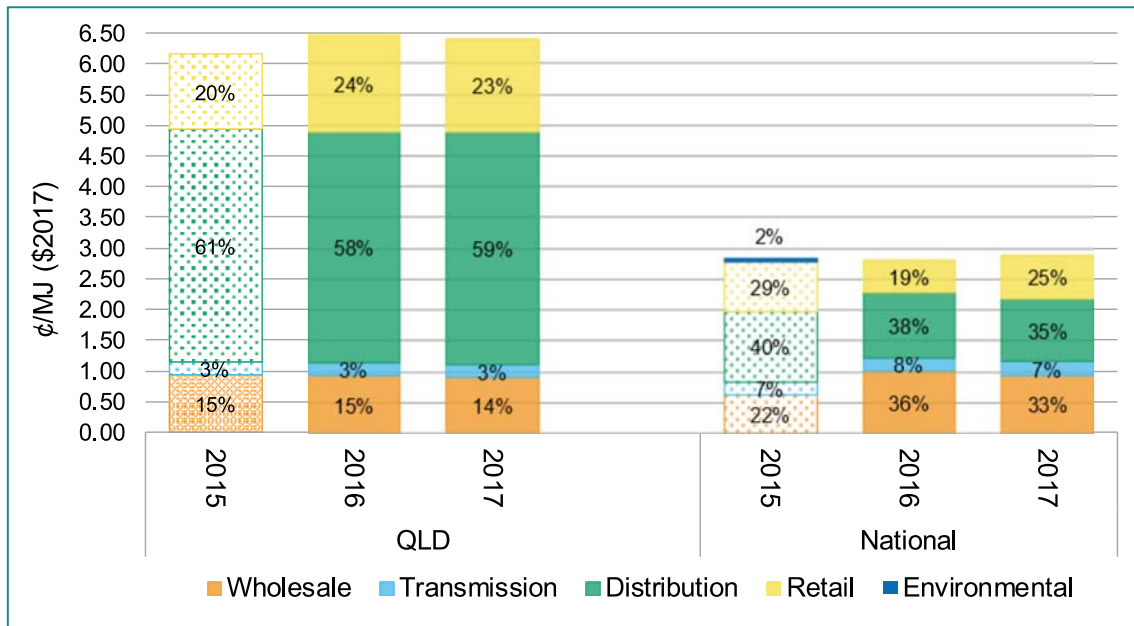
Figure 17: South Australia residential gas price trend 2015 to 2017



- The average delivered residential gas price rose in 2016 and has moved downward in 2017, with an overall reduction in residential delivered prices of some 12% from 2015.
- An increase in the retail component of costs (23%) and an underlying increase in wholesale gas costs (19%) has been more than offset by a significant drop in distribution costs driven by regulatory determinations in 2016.
- South Australia's consumption per household has been consistently declining, again as the use of electricity for space heating has been increasing (and gas decreasing).

2.4.7 Queensland

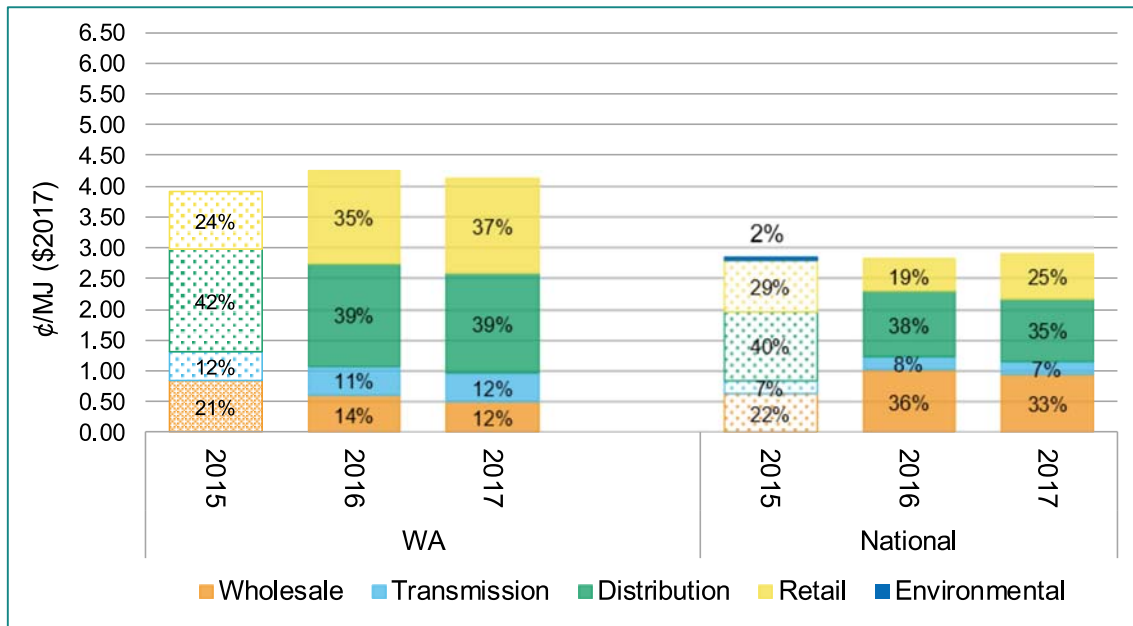
Figure 18: Queensland residential gas price trend 2015 to 2017



- Queensland has the lowest average gas consumption per household and low penetration resulting in the highest gas prices (driven by the highest average distribution prices).
- The average residential gas price rose in 2016 (4%) and is consistent from 2016 to 2017. The movement from 2015 to 2016 is mainly in the retail component, the other components remained fairly flat with a small decrease in wholesale gas costs and increase in transmission charges.

2.4.8 Western Australia

Figure 19: Western Australia residential gas price trend 2015 to 2017



- The retail residential gas price is a capped price regime with retailers offering various discount packages pegged to that published price.
- Western Australia's delivered residential gas price average edged upward in 2016 and dropped in 2017 to still be some 5% higher than 2015. There appears to be a combination of slightly easing of distribution charges and a major drop in wholesale gas price, offset by a major increase in the retail cost component (61% since 2015).
- It is feasible this apparent head room seems to have been an impetus for increased competition entering the market at the retail level in recent times - AGL and recently Origin have announced their intentions to enter the WA retail gas market. The market-offer discounts applied (e.g. AGL) are influencing the total price to trend downward a little from 2016 to 2017, but the wholesale gas price decreases seem to have not been fully passed through to the market yet and there may be timing issues with these wholesale price reductions in retailer portfolios.

2.5 Future price drivers

The key issue in nearly all the jurisdictional markets that will impact future wholesale gas prices is the supply and demand balance. This has been a consistent and well proven pattern in the Australian wholesale gas market – as we reported in 2015. Therefore, price drivers are heavily related to the supply of gas that is available to a market and the relative demand for it at the prices being charged.

It is also arguable that the wholesale price of electricity in the (east coast) NEM has also been heavily influenced in recent times by the price of gas as structural changes occur in the electricity generation market that start to see the underlying value of dispatchable gas plant being realised and used more. This is a complete reversal from 2015 when gas plant was not required for its dispatch capabilities except in extreme circumstances and could not compete on price in the NEM for any appreciable dispatch.

These structural changes in the electricity sector are also being heavily influenced by changing Government policy on reliability (and emissions) and therefore the major changes that could occur (and have been occurring) is greater demand for GPG gas supplies.

This comes on top of new policies and regulation related to the supply of gas back into the domestic gas market rather than being dedicated solely to LNG export, and various other changes that have seen more gas flow to the domestic market (such as excess supply and removal of joint venture sale arrangements) and clearly mitigate pricing.

If this continues and the electricity sector demand increases the relevant balance of the two (supply and GPG demand) will be critical and a serious consideration for policy makers and regulators. The current outcome of relatively high gas prices and electricity prices is not sustainable and yet is likely to continue if gas becomes the main marginal generation plant in the NEM for example.

This report does not seek to comment on state or federal government policy but it is clear that energy policy is a major issue related to the potential supply and demand for gas in the east coast market.

The marginal cost of gas on the east coast (supplying the NEM generators) is driven largely by the costs of supply of coal seam gas and already the cost at Gladstone may well be representative of that price. It is hard to see where cheap(er) gas can be sourced and delivered to the main NEM markets on the east coast.

There is some movement still to come on gas price reductions on the east coast, but they are likely to be marginal and not sufficient to lower GPG costs into the NEM.

This competition for domestic gas supply by the GPG market also creates problems for the other gas users – particularly industrial and manufacturing users. When GPG comes back on line the movements in demand can be very high as they are major consumers – they are effectively the “swinging” demand in the domestic market. It is also likely GPG will be looking for short term supply and transport agreements or buying on market/trading – again a trend we have seen in this report.

If the GPG market once again recedes within the NEM dispatch reducing demand for gas and also gas supply remains robust, the gas prices should recede to be more reflective of the cost of CSG production (as the marginal gas available) delivered to the various hubs – continuing the price reversal we have seen on the east coast.

The opportunity for gas price relief beyond the marginal cost of CSG production will come if there is more competition from reservoir based gas production (such as from Bass Strait, NT) or more localised CSG in NSW and Victoria that would bypass the effective transmission cost mark-ups.

Other options that might assist to reduce delivered gas costs, or potentially curb major gas price rises in the future include:

- Removal of transmission constraints to move gas, or new transmission pipelines that may haul gas at lower costs (e.g. Wallumbilla to Sydney).
 - The Gas Market Reform Group (GMRG) as part of the COAG Energy Council are undertaking a number of activities for reforms for pipeline commercial arbitration framework, number of transportation capacity trading reforms and wholesale gas market related reforms to develop greater transparency on pricing and markets.
- Maturing spot markets and gas trading platforms and arrangements with an improved level of price discovery and increased volumes and liquidity – a participant trading market may assist on the east coast as well.
- Lower cost of production for CSG fields – technical focus has been strong on this issue in the sector and it is reported to be improving.
- Floating LNG facilities at ports like Sydney and Melbourne (or even Adelaide and Hobart)
 - While LNG regasification may not reduce prices directly, the effect of storage at peak times being available may mitigate peak domestic gas pricing and deliver longer term domestic gas pricing caps.
- More exploration activity focused on domestic supply.

A high oil price may also have a major impact on supply as there is a correlation with gas developments for LNG – so if international demand (and price) for LNG was to escalate we may see once again major exploration programs. This may lead to some gas flow into the domestic market at attractive prices. However, if this is not well managed, LNG netback pricing may once again dominate the domestic market.