AEMC

REVIEW

Australian Energy Market Commission

DRAFT REPORT

Biennial review into liquidity in wholesale gas and pipeline trading markets

26 April 2018

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About the AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

Executive summary

A liquid market is often referred to as one in which market participants have access to a range of products and can reliably make transactions in a timely way, at a cost-reflective price. In a liquid market, changes in supply and demand have a relatively small impact on price.

Liquidity in a market is a multi-faceted concept that is difficult to measure with a single indicator. In the gas market assessing liquidity requires a broader approach than merely assessing the availability of gas volumes, as adding to the supply of gas may not necessarily result in more gas being traded between different parties.

In 2016, Australian Energy Market Commission (AEMC or Commission) completed a review of the gas markets and gas transportation arrangements on the east coast of Australia (the East Coast Gas Review). In our final report on the East Coast Gas Review, the AEMC recommended a number of metrics that would capture the characteristics of a liquid market and allow for the monitoring of liquidity in the Australian wholesale gas and pipeline capacity trading markets.

In the final report on the East Coast Gas Review the AEMC also recommended, that the Council of Australian Governments Energy Council (the COAG Energy Council) task it with reporting to energy ministers on a biennial basis on the growth in trading liquidity in the Australian wholesale gas and pipeline capacity trading markets. This recommendation formed the basis for the COAG Energy Council's direction in December 2017 for the AEMC to conduct such a review. The terms of reference for the review can be found on the AEMC website.

Scope of the review

Broadly, the terms of reference provided by the COAG Energy Council required the AEMC to:

- monitor changes in liquidity in the wholesale gas and pipeline capacity trading markets
- report on the effectiveness of reforms implemented
- identify whether any further reforms to these markets may be required to achieve the Council's Vision or promote the National Gas Objective (NGO).

However, the COAG Energy Council recognised that a number of the reforms set out in the East Coast review will not be in place when the first biennial review is completed. Therefore, the initial review is relatively narrow in scope and focuses primarily on:

- the development of the methodology the AEMC intends to use to monitor the growth in liquidity over time and the information it requires to carry out this monitoring role
- establishing a baseline measure of liquidity that can be used in future reviews to assess the success of the reforms the COAG Energy Council has agreed to implement

- the growth in liquidity that has occurred in the Wallumbilla gas supply hub (GSH) and Moomba GSH and the effect that the introduction of Optional Hub Services at Wallumbilla has had on liquidity in this market.

The Commission's findings

Metrics

The AEMC used both quantitative and qualitative metrics in the analysis of liquidity in the gas market. The metrics used address both wholesale gas and pipeline capacity trading. This first review focuses primarily on the GSHs with some metrics also included on the Short Term Trading Markets (STTMs), the Victorian Declared Wholesale Gas Market (DWGM) and pipeline capacity trading where available. The quantitative metrics do not examine bi-lateral or over-the-counter (OTC) markets and in particular, the long-term gas and transportation contracts that underpins much of the market. As such, this review has not examined or commented on liquidity or trends on these aspects of the market.

The Commission has developed detailed methodology for each of the quantitative metrics. For the qualitative metrics, the Commission conducted a qualitative survey with a range of market participants registered on the GSHs. The purpose was to gather information about market participants' confidence in the GSHs' past and future operations.

Baselines

Using these metrics and methodologies the Commission calculated baseline measures of liquidity.

The quantitative metrics are designed to measure different facets of liquidity and have been calculated for a two year period: 2016 and 2017. This is expected to preserve consistency with subsequent reports in the future that will be conducted every two years.

The Commission has found that almost all quantitative indicators of liquidity on the GSHs have positively changed over the past two years.

While the Commission recognised the focus of the report is on the GSHs, depending on the availability of data and the type of the metric, some baseline numbers were also calculated for the STTMs and DWGM. These baseline figures were more diverse and did not show a positive change across all markets and metrics. It should be noted that unlike the GSHs, these markets are mandatory. The only metric calculated for pipeline capacity trading indicated a positive change of increasing volumes on two of the pipelines.

Two criteria had to be met to calculate the metrics required in the terms of reference:

- information had to be publicly available
- the metric had to be meaningful in relation to the relevant market.

Some of the metrics, for example the bid-offer spread or the range of products, were meaningless for mandatory, auction based, intraday and day ahead markets such as the DWGM or the STTMs. In addition, very limited information is publicly available about pipeline capacity trading. The AEMC, together with the Australian Energy Regulator

(AER) and the Australian Energy Market Operator (AEMO) will continue developing metrics and publishing information on all of the facilitated markets for use by participants and in the next biennial review.

With respect to the operations of the GSHs, the Commission found that the majority of market participants:

- had confidence in the GSHs, and expected that confidence and liquidity to grow further in the next two years
- based their expectations of changing liquidity on a range of factors, including:
  - the availability of more physical supply from additional development of gas fields, new gas pipelines and liquefied natural gas (LNG) terminals
  - the potential for a greater number, diversity and activity of market participants
- held the view that the greatest impediments to trade on the GSHs were:
  - uncertainty related to transporting gas purchased on the GSHs
  - the administrative costs associated with trading on the exchange
  - the inflexibility of exchange products and sporadic availability of necessary volumes on the GSHs.

The Commission recognises that several key reforms are currently being implemented in the wholesale gas and pipeline markets. These reforms include the capacity trading reforms currently being developed by the Gas Market Reform Group (GMRG), the simplification of the STTMs and reforms to the Victorian DWGM.

It will take some time for these significant reforms to be implemented and for the market and market participants to fully understand and incorporate the reforms into their businesses.

Further, although not all issues identified by stakeholders are directly covered by the reforms currently being actioned (for example, the costs associated with trading), it is advisable to see what, if any, indirect effect the reforms may have on the market before determining if further changes are required to address these issues. Therefore, this draft report does not contain any recommendations for any further reforms to the wholesale gas or pipeline capacity markets.

Contents

1 Introduction

1.1 Background

Recognising the ongoing structural changes happening in the Australian gas market, the Council of Australian Governments Energy Council (the COAG Energy Council) established a set of principles in 2014, referred to as the COAG Energy Council's Vision (the Vision) for Australia's future gas market.

The COAG Energy Council's vision is for:

> "…the establishment of a liquid wholesale gas market that provides market signals for investment and supply, where responses to those signals are facilitated by a supportive investment and regulatory environment, where trade is focused at a point that best serves the needs of participants, where an efficient reference price is established, and producers, consumers and trading markets are connected to infrastructure that enables participants the opportunity to readily trade between locations and arbitrage trading opportunities.[1]"

In order to develop a road map for gas market development which will allow the Vision to be met, the COAG Energy Council directed the Australian Energy Market Commission (AEMC or Commission) to conduct a review of the gas markets and gas transportation arrangements on the east coast of Australia (the East Coast Gas Review). In addition, the Victorian Government, with the agreement of the COAG Energy Council asked the AEMC to conduct a review of the Victorian Declared Wholesale Gas Market (the Victorian DWGM Review).

1.2 Recommended reforms to the gas markets

On 28 July 2016, the Commission released the Stage 2 Final Report for the East Coast Gas Review. The Final Report contained 15 recommendations to improve the efficiency of gas trading and access to pipeline transportation. This package of recommendations set out key reforms to the east coast gas market including:

1. **Changes to the wholesale gas trading markets**: concentration of gas trading at a Northern Hub located at Wallumbilla with existing physical trading limitations addressed through the implementation of optional hub services and a Southern Hub to be transitioned from the existing Victorian Declared Wholesale Market (DWGM). At this time, reforms for the DWGM are being considered that do not involve a transition to a Southern Hub, although this may be considered at a later time. In addition, the Short Term Trading Markets (STTMs) are to be simplified so as to become a balancing mechanism.
2. **Improvements to pipeline capacity frameworks**: there are four aspects to these reforms including:

1 COAG Energy Council, *Australian Gas Market Vision*, December 2014

- introduction of a day-ahead auction of contracted but un-nominated pipeline capacity
- standardisation of provisions in capacity agreements to make capacity more fungible
- development of capacity trading platform(s) to facilities sales
- publication of information on secondary trades.

3. **Additional information to support the market**: a detailed package of recommendations to enhance the information provided to the market, including expanding the coverage of the existing bulletin board.[2]

In the East Coast Gas Review, the Commission also recommended that a gas reform group (GMRG) be created to facilitate some of the reforms. The GMRG was created by the COAG Energy Council and is currently undergoing a process to develop the required changes to the National Gas Law (NGL) and National Gas Rule (NGR) to implement the capacity trading reforms. It is expected that these reforms will be in place in 2019.

On 14 July 2017, the Commission published its final report and recommendations for the Review of the Victorian DWGM The Commission made three recommendations:

1. provide a cleaner wholesale market price by including the costs currently recovered by common and congestion uplift into the market price, while retaining separate pricing of temporal constraints
2. establish a forward trading exchange, over the Victorian Declared Transmission System (DTS) while retaining the existing daily DWGM
3. improve pipeline capacity allocation and introduce capacity rights trading by:
    - introducing separate, tradable entry AMDQ[3] rights and exit AMDQ rights
    - introducing an exchange to improve secondary trading of AMDQ rights (permanent transfer) and benefits (temporary transfer)
    - making AMDQ available for a range of different tenures.[4]

The Victorian government is currently considering these recommendations, and where appropriate, developing rule change requests to be submitted to the AEMC.

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2 For information on the review and recommendations see the project page on the AEMC website at: https://www.aemc.gov.au/markets-reviews-advice/east-coast-wholesale-gas-market-and-pipelin e-frame

3 Authorised Maximum Daily Quantity (Authorised MDQ) and Authorised Maximum Daily Quantity Credit Certificate (AMDQ CC) are transportation rights in the Victorian DTS. These are collectively known as AMDQ.

4 For information on the review and recommendations see the project page on the AEMC website at: https://www.aemc.gov.au/markets-reviews-advice/review-of-the-victorian-declared-wholesale-g as-mar

1.3 Biennial liquidity review

In the East Coast Gas Review the AEMC also recommended that the COAG Energy Council task it with reporting to Energy Ministers on a biennial basis on the growth in trading liquidity in the Australian wholesale gas and pipeline capacity trading markets.[5]

On 20 December 2017, the COAG Energy Council provided the AEMC with terms of reference to conduct that biennial review (the review).[6]

1.4 Scope of the review

The terms of reference provided by the COAG Energy Council required the AEMC to:

- monitor changes in liquidity in the wholesale gas and pipeline capacity trading markets
- report on the effectiveness of reforms implemented
- identify the need for any further reforms, if appropriate.

The terms of reference also set out the relevant markets for the review to consider. These markets covered the wholesale gas and pipeline capacity trading markets on the east coast of Australia.[7]

The COAG Energy Council recognised that a number of the reforms to the trading markets (both in relation to recommendations from the East Coast Gas Review and the Victorian DWGM Review) will not be in place when the first biennial review is completed. Therefore, the initial review was expected to be relatively narrow in scope and to focus primarily on:

- the development of the methodology the AEMC intends to use to monitor the growth in liquidity over time and the information it requires to carry out this monitoring role
- establishing a baseline measure of liquidity that can be used in future reviews to assess the success of the reforms the Energy Council has agreed to implement
- the growth in liquidity that has occurred in the Wallumbilla gas supply hub (GSH) and Moomba GSH and the effect that the introduction of Optional Hub Services at Wallumbilla has had on liquidity in this market.

The terms of reference included a more detailed description of the scope of the review.

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5 See recommendation 12, in AEMC, *East Coast Wholesale Gas Markets and Pipeline Frameworks Review*, Stage 2 Final Report, 23 May 2016, p. 15

6 The terms of reference are available at the AEMC's website on: http://www.aemc.gov.au/Markets-Reviews-Advice/Biennial-review-into-liquidity-in-wholesalegas-an

7 The terms of reference states that in subsequent reviews, the AEMC will be expected to monitor developments in the Northern Territory and Western Australia, where and when it is relevant to do so.

1.5 Review process

In accordance with the terms of reference, the AEMC was required to publish three reports as part of this review:

- A scoping paper outlining the approach proposed to be used by the Commission for the review, including the liquidity metrics and the methodology for determining those metrics. The Commission published the scoping paper on 13 February 2018. Three submissions were received to the scoping paper. They are available at the AEMC's website.[8]
- A draft report containing draft results and draft recommendations on any further reforms that may be required, if appropriate.
- A final report containing the final liquidity metrics and if appropriate, recommendations.

The AEMC is required to provide the final report to the COAG Energy Council six weeks prior to the Council's mid-year meeting. Unless determined otherwise, the final report is due to be published on the same day it is considered by the COAG Energy Council.

1.6 Responding to this paper

The AEMC welcomes submissions on any issues related to this draft report, or more broadly, to the review. The closing date for submissions is **24 May 2018**.

Submissions should quote project number "GPR0005" and may be lodged:

- online at www.aemc.gov.au
- by mail to: Australian Energy Market Commission, PO Box A2449 , Sydney South, NSW, 1235

8 See: https://www.aemc.gov.au/markets-reviews-advice/biennial-review-into-liquidity-in-wholesale-gas-an

2 Methodology and metrics

A liquid market is often referred to as one in which market participants have access to a range of products and can reliably make transactions in a timely way, at a cost-reflective price. In a liquid market, changes in supply and demand have a relatively small impact on price.

Liquidity in a market is a multi-faceted concept that is difficult to measure with a single indicator. In the gas market assessing liquidity requires a broader approach than merely assessing the availability of gas volumes, as adding to the supply of gas may not necessarily result in more gas being traded between different parties.

In determining if liquidity exists in a market, four inter-related characteristics are often examined:[9]

- **Market depth**: where no single buy or sell order is likely to move the market price excessively
- **Market breadth**: where a large number of bids to purchase gas and offers to sell gas are present in the market
- **Immediacy**: the ability to trade large volumes in a short period of time
- **Resilience**: the ability of the market to recover towards its natural equilibrium after being exposed to a shock.

This review measures liquidity based on these characteristics.[10]

For each of these characteristics, metrics are chosen that can accurately measure whether that characteristic of liquidity is present on the east coast of Australia, in the wholesale gas and pipeline capacity trading markets (gas markets). In particular, the terms of reference requires the AEMC to look at the facilitated markets, including the GSHs, STTMs, DWGM and secondary capacity trading. However, this review is focused primarily on the GSH with some information, where available on the STTMs, DWGM and capacity trading.

Table 2.1 provides an overview of the metrics the AEMC included in the analysis of liquidity in the gas markets.

The table includes both quantitative and qualitative metrics. It provides information on which of the above four inter-related characteristic each metric addresses, how the metric was constructed, and the expected trend in these metrics associated with an increase in liquidity over time. Quantitative metrics are expected to be objectively measured and quantified. Qualitative metrics relate to concepts that are difficult to quantify, such as confidence in the market or the perception of its current operation.

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9 IEA, *Development of competitive gas trading in continental Europe – How to achieve workable competition in European gas markets?*, IEA Information Paper, May 2008, p. 46

10 Resilience is not measured separately. Metrics used to assess the first three characteristics (market depth and breadth and immediacy) can also be used to evaluate resilience. However, it is difficult to evaluate on an ex ante basis when the market has not been subject to a shock.

Where appropriate, indicative threshold values are also provided along with the underlying data in the table.

In its submission to the scoping paper, the Australian Energy Regulator (AER) recognised the importance of publishing information related to the liquidity metrics (including underlying data) on its website and was of the view that publication improves the transparency of the competitive markets.[11]

Section 2.1 and 2.2 of the Scoping paper[12] contains a detailed description of the methodology of the metrics in Table 2.1.

Table 2.1 Metrics to monitor liquidity in the gas markets

Metric	Characteristic	Description	Trend and/threshold	Underlying data
Traded volumes	Market breadth	Volume of trades in each market over the measurement period	Should be increasing	• traded volumes
Churn rate	Immediacy	Ratio of all traded volumes to demand for the underlying physical product	Around 10 in a liquid market but likely to be much lower as the market develops. Trend should be increasing	• traded volumes • throughput of the underlying physical product
Bid-offer spreads	Immediacy	The difference between prices on the bid and offer side of the market	Should be narrowing	• bid prices • offer prices
Number of active participants	Market depth, market breadth	The number of participants that have actively traded in the markets and the breakdown of the types of participants (e.g. producers, retailers, industrial customers, physical or financial participants)	Increasing to a state where all market participants are actively trading on the facilitated markets	• number of actively trading participants • number of active participants in each registered category
Concentration of trades amongst active participants	Market depth	The proportion of trades accounted for by individual participants	Should be decreasing	• traded volumes by participant[13] • all traded volumes

11 AER submission, 5 March 2018, p. 1

12 See AEMC, *Biennial review into liquidity in wholesale gas and pipeline trading markets*, Scoping Paper, 13 February 2018.

13 The Commission understands that this set of underlying data may include confidential information. Therefore, the appropriate level of aggregation will be considered, so that individual participants are not identifiable from this metric.

Metric	Characteristic	Description	Trend and/threshold	Underlying data
Number of trades per product	Market breadth	The number of traded transactions per product	Should be increasing	• number of trades by product category
Range of products traded	Market breadth	The types of products available to trade, including bilateral products, over the counter products and exchange traded products	Should be increasing	• types of bilateral or over-the-counter products available • types of exchange traded products available
Trades conducted through the facilitated markets vs bilateral and OTC trades	Immediacy	The proportion of trades conducted through the facilitated markets versus trades conducted bilaterally or OTC (to the extent this information is publicly available)	An increasing share of trades through the facilitated markets	A survey based estimation of the share of trades through the facilitated markets.
Confidence of market participants	All characteristics	Survey-based measure of market participants' confidence in the trading market and any perceived impediments or barriers to using the markets vis-à-vis entering into bilateral trades	Participants should have increasing confidence and be more willing to engage in hub-based trading	Survey (qualitative)
Market participants' perception of future market developments	All characteristics	Survey-based measure of market participants' perceptions of the future state of the market and the potential for further growth in liquidity	Participants should expect more hub-based trading to occur	Survey (qualitative)

3 Assessment of the metrics

Of the ten metrics listed in Table 2.1 of chapter 2, the first seven are quantitative indicators.[14] That is they can be objectively measured and quantified.

The last three metrics in table 2.1 allowed for obtaining valuable information on the non-quantifiable aspects of the development of liquidity to be incorporated into the analysis. These qualitative metrics capture all four characteristics of liquidity and therefore provide a wider view that supports the quantitative ones.

3.1 Traded volumes

3.1.1 The Gas Supply Hubs

The GSHs are a voluntary exchange for the wholesale trading of natural gas. GSH participants can trade, through an electronic platform, standardised, short-term physical products.

The Wallumbilla location of the GSHs has been in operation since March 2014. In June 2016, a new trading location at Moomba was established. The two trading locations share a similar market framework in which market participants trade voluntarily.

The Commission considers that since the GSHs are voluntary hubs they do not represent the overall market in those regions. This was noted by AGL in their submission to the scoping paper.[15]

Figure 3.1 shows that in its six months of operation in 2016, no trades were registered at the Moomba location, while in 2017, two trades constituted the total sold volume of 12 TJ.

14 The terms of reference set out eight quantitative metrics, however, it also stated that one of the metrics (Trades conducted through the facilitated markets versus bilateral and OTC trades) should be calculated to the extent the underlying information is publicly available. The AEMC considered that due to the limited availability of information on bilateral and OTC trades, at this time this metric can only be assessed qualitatively. Further explanation about the metric and reasoning for this consideration is provided in section 3.8.1

15 AGL submission, 13 March 2018, p. 1

Figure 3.1 Traded volumes on the Wallumbilla GSH

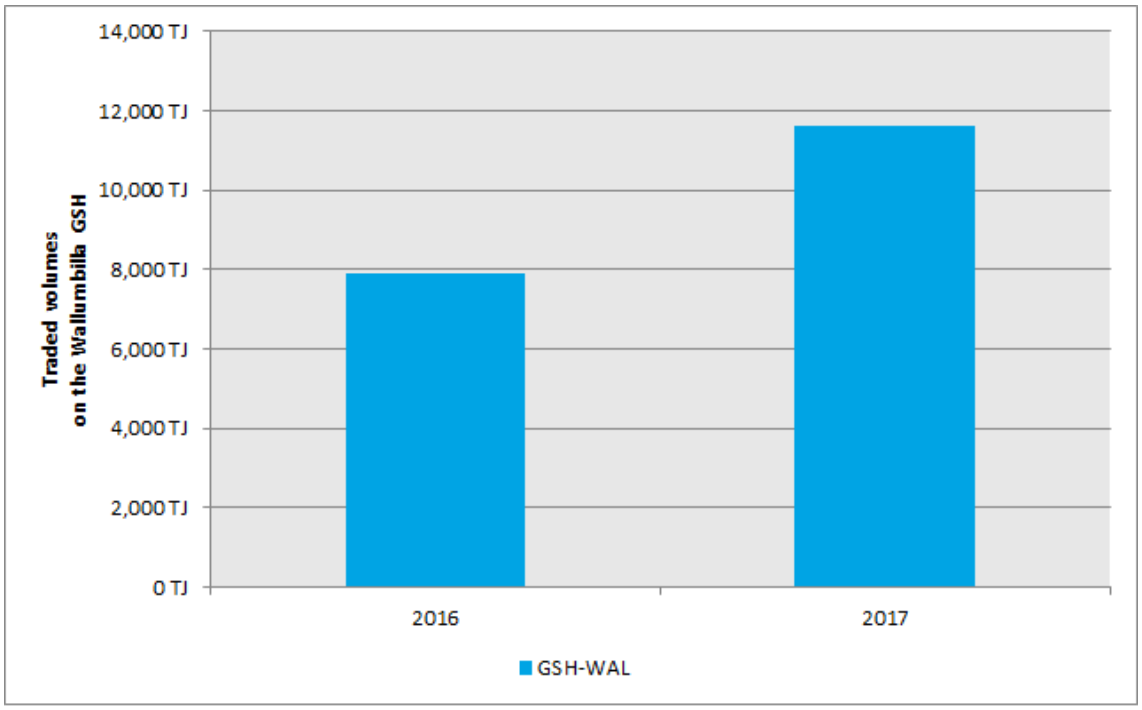
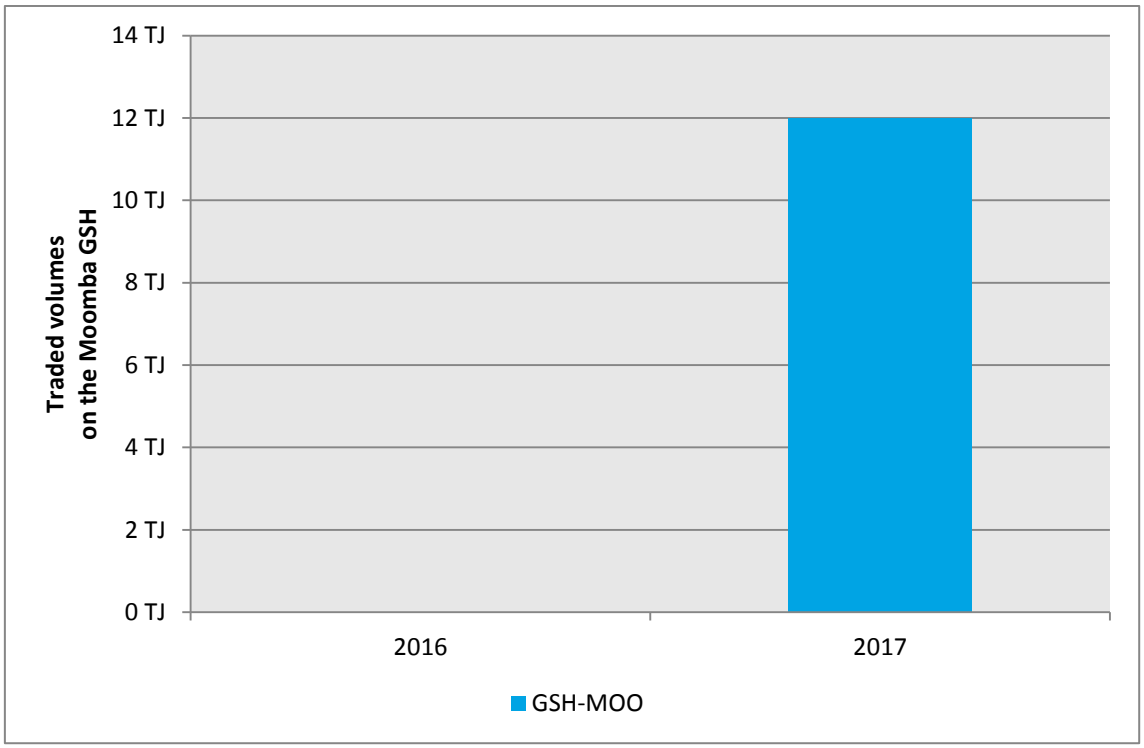


Figure 3.2 shows that traded volumes sold at Wallumbilla GSH in 2016, its second year of operation, reached 7,918 TJ. In 2017, the volume of trades increased by 47 per cent, reaching 11,605 TJ. Although there has been an increase in the volume of trades on the GSH, 267,430 TJ of gas flowed through Wallumbilla, indicating that GSH trades are a small fraction of the total gas transacted through that location.

Figure 3.2 Traded volumes on the Moomba GSH



These increasing volumes, especially at the Wallumbilla hub, align with the expectations of stakeholders expressed through the qualitative survey. The majority of

survey participants indicated that they have confidence in the Wallumbilla hub and expected that confidence will increase over time together with liquidity. This confidence was partially based on more supply coming on line in the next two years and additional participants entering this market. More supply being available is expected to lead to increased traded volumes on the GSHs in the next two years.

3.1.2 The Short Term Trading Markets

The Sydney and Adelaide STTMs have been in operation since 2010 and the Brisbane STTM since the end of 2011.

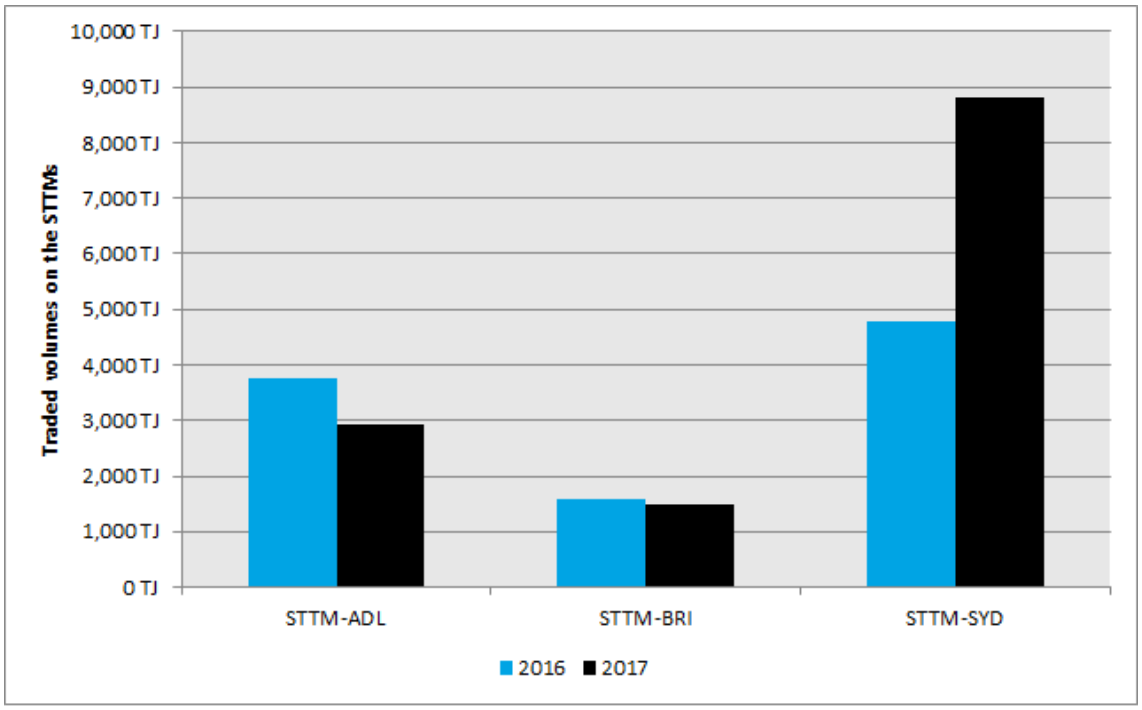
Traded volumes for the STTMs are calculated separately for the Brisbane, Sydney and Adelaide locations. The Commission understands that a significant proportion of the volumes that are scheduled through the STTMs are "self-trades". That is, participants place bids and offers in the STTM auction at the price cap and price floor in order to accommodate previously arranged bilateral trades. Therefore, to measure the volume of trades that are conducted on the STTMs, these self-trades are omitted from the data set.

This metric (traded volumes) also uses ex-ante (day ahead) volumes as they represent volumes that are intended to be traded, and do not include deviations from schedules. Finally, the traded volume for the STTMs is calculated as a sum of the seller net positions (after subtracting the self-trade volumes) market participants hold after the ex-ante auction is run.

The Commission found that traded volumes have decreased on the Adelaide and the Brisbane STTMs from 2016 to 2017 by 22 and 5 per cent respectively. Figure 3.3 illustrates that volumes on the Adelaide and Brisbane STTMs dropped from 3,776 TJ to 2,931 TJ and 1,569 TJ to 1,491 TJ, respectively.

In contrast, the Sydney STTM saw an 84 per cent increase in volumes from 2016 to 2017, reaching 8,796 TJ in 2017 compared to 4,776 TJ in 2016.

Figure 3.3 Traded volumes on the STTMs



Stakeholders that participated in the qualitative survey held differing views in relation to whether the STTMs and the GSHs play competing or complementary roles in the market. Some stakeholders were of the view that the STTMs and the GSHs all have different purposes and, therefore, the increase of liquidity on one should not lead to decrease in liquidity on the other. Others suggested that, from the perspective of taking on daily spot exposures, market participants may choose between trading on the GSHs or the STTMs.

Similar to stakeholder expectations in relation to the GSHs, stakeholders expect that an increase in the supply of gas will lead to increased traded volumes on the STTMs in the next two years. Stakeholders indicated that new sources of gas supply could potentially include new gas field developments, new pipelines and import liquefied natural gas (LNG) terminals.

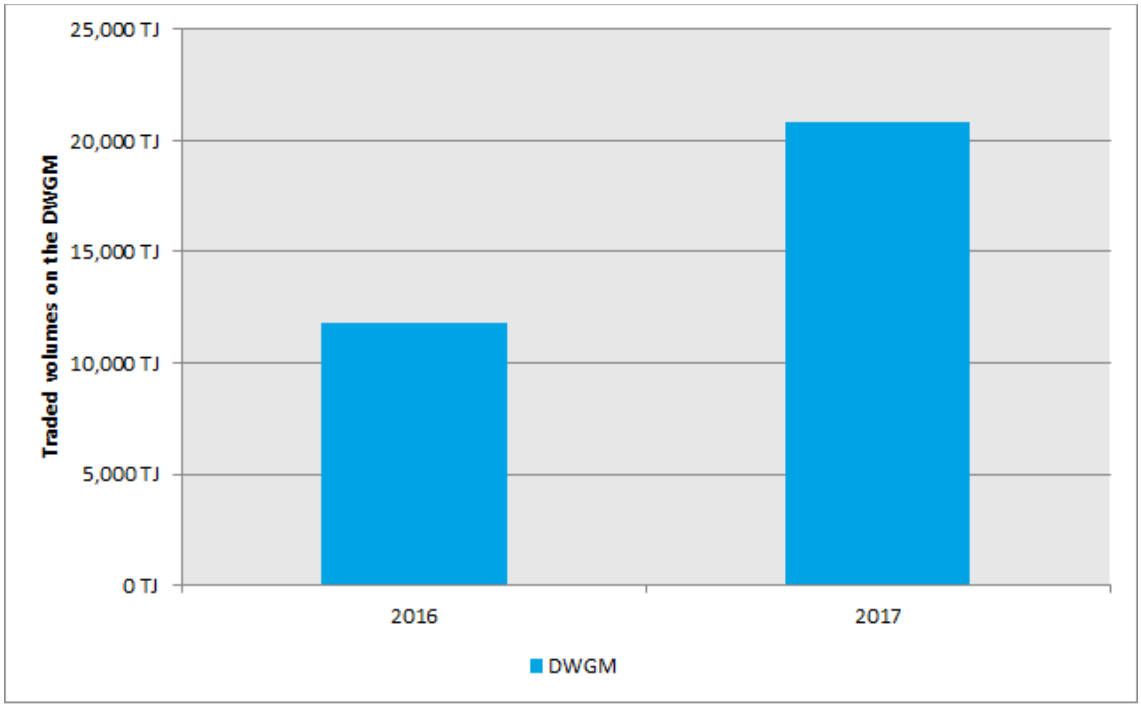
3.1.3 The Victorian Declared Wholesale Gas Market

Similar to the methodology described in the previous section in relation to the STTMs, traded volumes for the DWGM are also calculated as a sum of net seller positions of market participants after the first auction run at 6am, every morning. The Commission is of the view that this provides the best approximation of traded volumes that are comparable across all centralised wholesale gas markets in Australia.

In addition, the Commission agrees with AGL's view expressed through its submission, that both the STTMs and the DWGM are more than just balancing markets.[16] Therefore, we have included traded volumes calculated according to the methodology above in our analysis.

16 Ibid., p. 1

Figure 3.4 Traded volumes on the DWGM



As shown in Figure 3.4, traded volumes on the DWGM increased considerably, by 60 per cent from 2016 to 2017, from 11,786 TJ in 2016 to 20,805 TJ in 2017.

Some stakeholders indicated that smaller retailers and new entrants to the gas market tend to purchase gas only from the spot market in Victoria. The reason for this is the transaction costs of bilateral contracting are considered too high in comparison to trading on the spot market. They were also of the view that depending on the type of the business, the potential savings achieved by procuring gas only from the spot market, may be higher than the risks associated with taking spot exposure.

Therefore, if new participants enter the market, it could be expected that there would be an increase in traded volumes on the DWGM in the next two years.

3.1.4 Pipeline capacity trading

Traded volumes for pipeline capacity are reported for the purposes of this review as the sum of the traded capacity in a particular year that is publicly reported by the pipeline operators. These volumes only cover a portion of the total pipeline capacity that is traded in the Australian market. The Commission expects that more information will be available after the capacity trading reforms are implemented.

Pipeline capacity volumes are grouped by pipeline and expressed in TJ.

Some primary and secondary pipeline capacity is offered for sale on some pipeline operators' websites and listed on the GSH. Primary capacity is defined as capacity that is directly marketed by the pipeline operator, while secondary capacity is offered for sale by a market participant that has previously purchased capacity from another party.

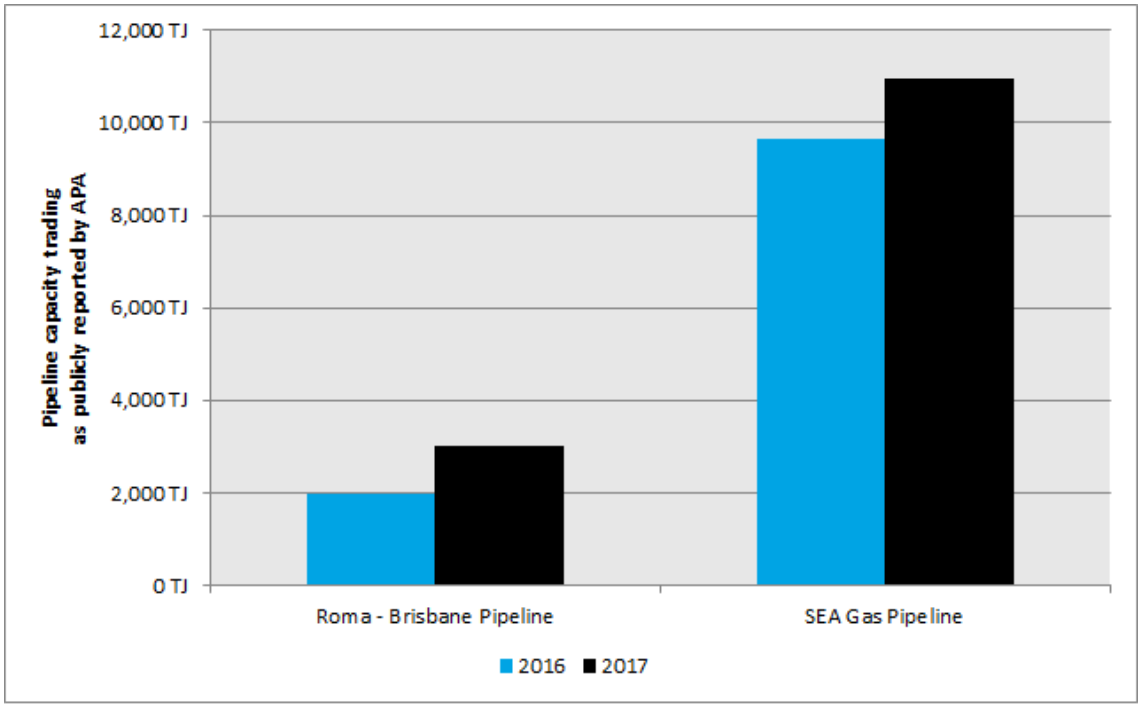
Primary and secondary capacities offered for sale in 2016 and 2017 included:

- the Eastern Gas Pipeline and the Queensland Gas Pipeline operated by Jemena (primary and secondary capacity)
- the Carpentaria Pipeline, the Moomba to Sydney Pipeline, the Roma to Brisbane Pipeline, the South West Queensland Pipeline and the South East Australia Gas Pipeline (SEA Gas Pipeline) operated by the APA group (secondary capacity only).

Trades only occurred on the Roma to Brisbane Pipeline and the SEA Gas Pipeline (both operated by APA) in 2016 and 2017.

Figure 3.5 illustrates that traded volumes of daily firm secondary capacity on the Roma to Brisbane Pipeline increased by 51 per cent, from 1,993 TJ to 3,009 TJ from 2016 to 2017. There was also a 13 per cent increase in secondary trading volumes on the SEA Gas Pipeline from 9,660 TJ to 10,950 TJ.

Figure 3.5 Pipeline capacity trading as publicly reported by APA



Source: APA's capacity trading website, http://capacitytrading.apa.com.au

The majority of pipeline capacity was traded outside APA's platform, via bilateral agreements and average traded volumes of daily firm secondary capacity that were publicly reported constituted only a fraction of the nameplate capacity of those pipelines.

Table 3.1 below shows how average traded daily volumes compare to the total volume the pipeline could transport. Percentages are expressed as a ratio of the average traded volumes of daily firm secondary capacity and the nameplate capacity of the pipelines in each year. The AEMC has no visibility on those bilateral agreements at this time.

Table 3.1 Yearly average ratio of daily traded capacity as a percentage of nominal capacity of the pipeline

Pipeline	Nameplate capacity (TJ)	Average ratio of daily capacity (2016)	Average ratio of daily capacity (2017)
Roma - Brisbane Pipeline	233	2.3%	3.5%
SEA Gas Pipeline	314	8.4%	9.6%

Some stakeholders indicated that although the capacity trading reforms have not yet been implemented, the proximity of its implementation deadline is already affecting pipeline capacity trading. Therefore, greater volumes of secondary trading are expected to occur in the next two years.

3.2 Churn rate on the Gas Supply Hubs

Churn rate is defined as the ratio of all traded volumes to the throughput of the underlying physical product, whether that is gas or pipeline capacity. The churn rate is commonly used in commodity and financial markets to assess maturity and liquidity of a given market.

AGL, in its submission to the scoping paper, contended that the churn rate (defined as the ratio of trades to the physical market) at the gas supply hubs will not be comparable to the measure used in futures and forward markets.[17] The Commission understands that the definition of churn rate requires it to be calculated as a ratio of trades to physical throughput.

Churn rate is only calculated in relation to the GSHs as a ratio between the total traded volumes and the total physical throughput delivered through the trading locations of the GSHs. Due to the availability of data, churn rate calculations start from the fourth calendar quarter of 2016. Due to a lack of trades in 2016, and the first two quarters of 2017, no churn rate could be calculated for the Moomba location for those quarters.

Physical flows varied significantly across quarters from October 2016 to December 2017. Table 3.2 below shows exported volumes out of these locations in TJ by quarter.

In 2017, a total of 267,430 TJ flowed from Wallumbilla, and 117,818 TJ left Moomba.

17 AGL submission, 13 March 2018, p. 2

Table 3.2 Quarterly net flows through the Wallumbilla and Moomba locations (TJ)

year	quarter	Wallumbilla	Moomba
2016	Oct-Dec	73,179	30,009
2017	Jan-Mar	68,737	30,590
2017	Apr-Jun	58,384	26,060
2017	Jul-Sept	69,140	30,814
2017	Oct-Dec	71,169	30,355

Traded volumes on the GSHs have increased across quarters October 2016 to December 2017. Table 3.3 below shows those volumes in TJ by a quarterly breakdown.

In 2017, the total of 11,602 TJ was traded at Wallumbilla, and 12 TJ at Moomba.

Table 3.3 Quarterly traded volumes at Wallumbilla and Moomba (TJ)

year	quarter	Wallumbilla	Moomba
2016	Oct-Dec	1,180	0
2017	Jan-Mar	1,344	0
2017	Apr-Jun	2,582	0
2017	Jul-Sept	3,681	2
2017	Oct-Dec	3,995	10

As previously discussed, the churn rate for a location is a mathematical fraction created by dividing the traded volumes by the total physical throughput of gas during a given period. For example the quarterly churn rate for Wallumbilla for the last quarter of 2016 is calculated by dividing its 1,180 TJ traded volumes by 73,179 TJ of gas that was transported through the relevant pipelines.

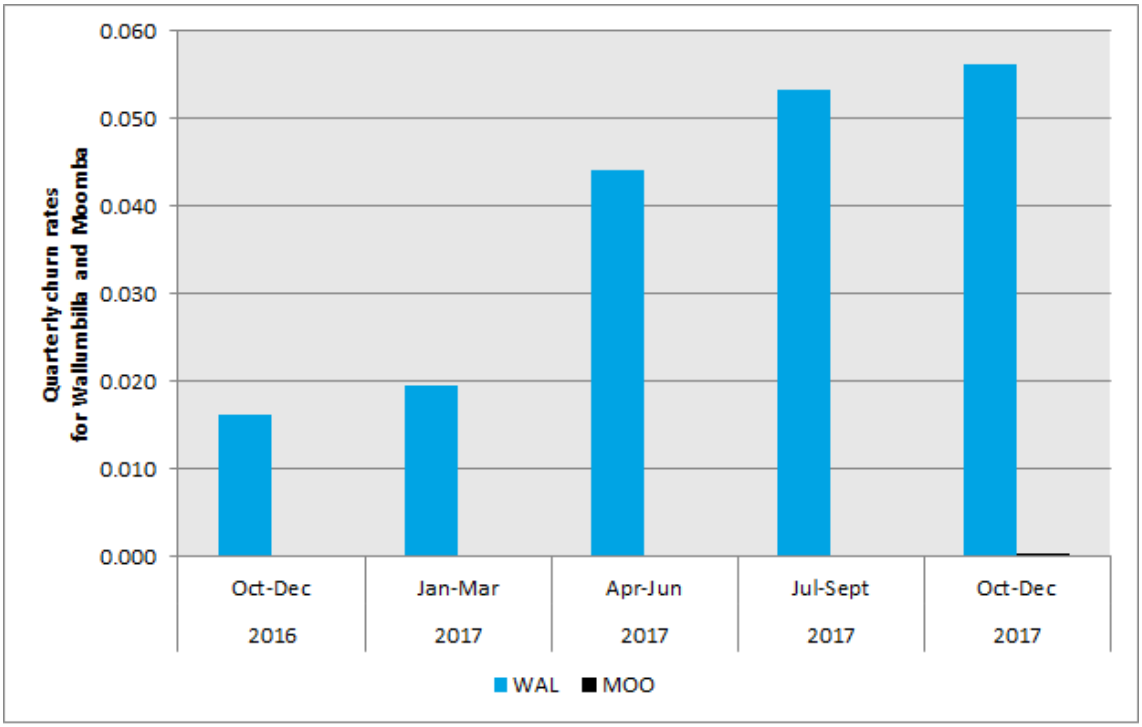
As shown in Table 3.4, churn rates remained below 0.1 across all quarters and locations. However, there appeared to be an upward trend at Wallumbilla. The churn rate for Moomba remained below 0.001 in the third and fourth quarters of 2017. Table 3.2 and Figure 3.6 below shows churn rates by quarter.

In 2017, the yearly churn rate for Wallumbilla was 0.043 and remained below 0.001 for Moomba.

Table 3.4 Quarterly churn rates for Wallumbilla and Moomba

year	quarter	Wallumbilla	Moomba
2016	Oct-Dec	0.016	N/A
2017	Jan-Mar	0.020	N/A
2017	Apr-Jun	0.044	N/A
2017	Jul-Sept	0.053	<0.000
2017	Oct-Dec	0.056	<0.000

Figure 3.6 Quarterly churn rates for Wallumbilla and Moomba



The Commission expects that as more gas supply becomes available, more participants will enter the market, churn rates would increase as well.

3.3 Bid-offer spreads on the GSHs

The Commission recognises the importance of providing usable metrics to the industry.

During the qualitative survey process, a GSH market participant suggested that individual bid-offer spreads would provide more meaningful information, if this metric was calculated as a dollar value of the price difference between the best bid and offer in the order book.

That stakeholder noted that the industry in general is more used to understanding and using absolute dollar spreads than percentages. It added that a percentage value may be misleading if calculated at different times when the price of the underlying commodity

changes significantly. For example, a one dollar spread between an offer price of $6 and a bid price of $5 would equal to a 20 per cent spread. While the same one dollar spread on a $11-$10 bid-offer pair would represent just a 10 per cent spread.

The Commission notes that the absolute value of spreads occurring at lower priced commodities contains different information to those occurring at higher priced commodities. In other words, a one dollar spread carries a different message to market participants on a commodity that is usually priced between one to ten dollars per unit, than a one dollar spread on a commodity that is traded in the hundreds of dollars per unit.

In the Commission's view, both the absolute dollar and the relative percentage value of the bid-offer spread contain different and useful information, and as such both metrics will be included in the report.

AGL, in its submission to the scoping paper, suggested that the bid-offer spread may not be accurate as some prices can be out of date.[18] The Commission is of the view that bid-offer spreads reflect market participants' ability to trade in the market. Out of date prices, if left in the order book intentionally, form part of that ability or inability to trade.

At this time, the Commission is continuing to work with both the AER and the Australian Energy Market Operator (AEMO) to collect accurate and usable bid-offer data. As such, the bid-ask metric is not available at the time of publication of this report.

Stakeholders, as part of the qualitative survey, indicated that the bid-offer spread is expected to narrow in the future, as liquidity and confidence in the hub increases. This is consistent with the Commission's expectation for this metric over time.

3.4 Number of active participants

AGL in its submission to the scoping paper stressed the importance of the number of parties prepared and able to trade as a measure of liquidity.[19] The Commission shares this view and uses the methodology outlined in the scoping paper and below to provide a useful metric of liquidity.

For the metric listed in Table 2.1 it is necessary to define an "active" participant in the market. An active participant is defined, for the purposes of this review, as one that has been engaged in trading on the market at least once in any given month. Further, being engaged in a market is understood as submitting a valid bid or an offer. This definition allows for a comparison across all centralised wholesale gas markets in Australia.

This metric is designed to measure participation in the markets at the early stages of market development. As part of the qualitative survey process, a GSH market participant suggested that the timeframe at which the activity of a participant is looked at could be reduced to a week, instead of a month. The AEMC notes that as liquidity in the market increases over time, consideration may be given to the development of more

18 Ibid., p. 2

19 Ibid., p. 1

sophisticated measures of market depth or measuring activity over shorter (weekly or daily) timeframes.

This liquidity metric is expressed through calculating the average yearly activity of registered participants belonging to certain categories, based on the arithmetic average of monthly activity. These categories include exporters, retailers, generators, industrial customers and traders, wherever possible. For example if only one retailer was active in a market in six out of the total twelve months in a year, the activity metric for retailers would be calculated by dividing the number of active retailers in each month (6 x 1) by the number of total months in a year (12). In this instance the metric would equal to (6 x 1) / 12 = 0.5.

3.4.1 The Gas Supply Hubs

The number of active participants on the GSHs has increased for almost every participant category from 2016 to 2017.

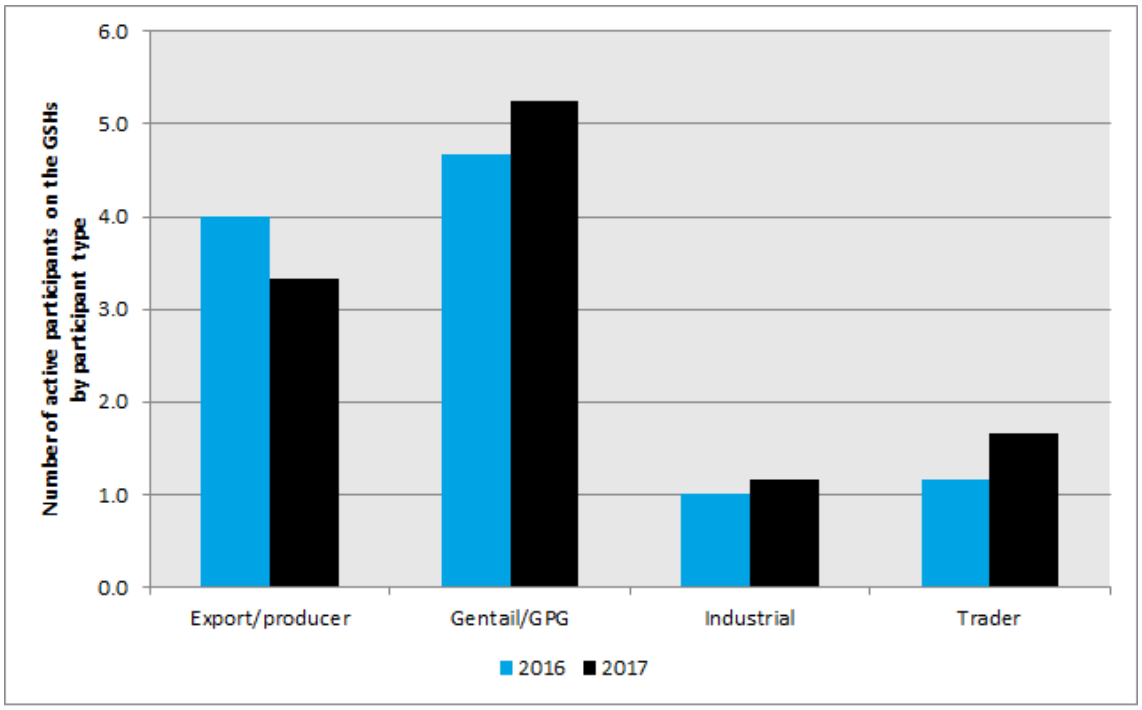
This metric shows the average yearly involvement of participants by participant type, based on their monthly activity. Table 3.5 and Figure 3.7 below show this activity at Moomba and Wallumbilla, combined. This is because there is only one single membership available for both Moomba and Wallumbilla, via registration on the GSHs.

The average number of all active participants was 10.8 in 2016 and 11.4 in 2017.

Table 3.5 Yearly average trading activity on the GSHs by participant type

Type of participant	2016	2017
Exporter/producer	4.0	3.3
Gentailer/Gas Power Generator	4.7	5.3
Industrial	1.0	1.2
Trader	1.2	1.7

Figure 3.7 Yearly average trading activity on the GSHs by participant type



As new participants enter the GSH market, greater activity is expected on the hubs. Currently, Gentailers and gas fired generators appear to be the most active participant category, however, stakeholders indicated that further involvement of traders[20] is likely to occur in the next two years. This expectation is based on the observation by a stakeholder that the increasing activity of brokers and financial intermediaries indicates "there is money to be made on these markets". In terms of industrial participants, it is necessary to wait and see if and when they enter the market, and what, if anything, is preventing their participation in the GSHs.

3.4.2 The Short Term Trading Markets

The number of active participants on the STTMs has increased for every participant category from 2016 to 2017.

Due to the differences in market design, the participant categories in the STTMs are somewhat different from the other markets. Within the pre-defined areas around the demand centres of Adelaide, Sydney and Brisbane, participation on the STTMs is mandatory.

This metric shows the average yearly involvement of participants by participant type, based on their monthly activity.

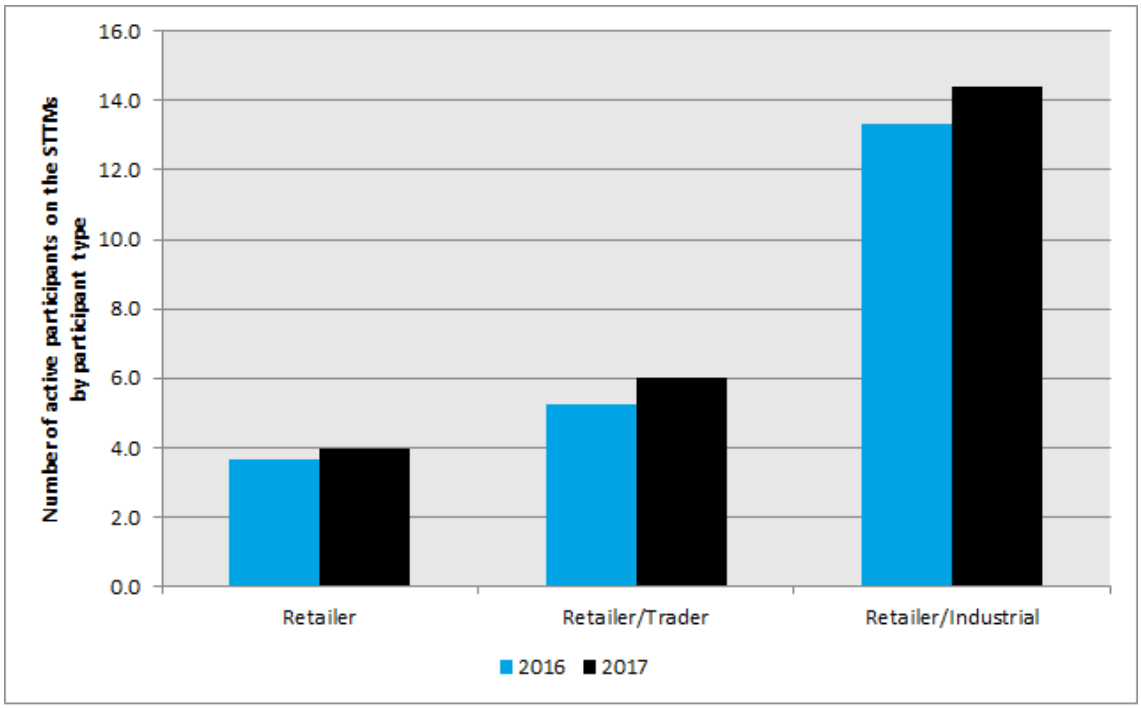
Table 3.6 and Figure 3.8 summarise the outcomes in 2016 and 2017. The average number of all active participants across all STTMs was 22.2 in 2016 and 24.4 in 2017.

20 In this context, traders are defined as companies that do not have a "natural position" in the market, i.e. they do not have a significant physical portfolio such as a retailer's load or a producer's production assets.

Table 3.6 Yearly average trading activity on the STTMs by participant type

Type of participant	2016	2017
Retailer	3.7	4.0
Retailer/Trader	5.2	6.0
Retailer/Industrial	13.3	14.4

Figure 3.8 Yearly average trading activity on the STTMs by participant type



Trends across the three STTMs were similar, with two exceptions:

1. The activity of retailers compared to other types of participants was greater on the Adelaide STTM than at the others.
2. While the number of active participants on the STTMs has increased for every participant category from 2016 to 2017, participant activity in the Retailer/Industrial participant category on the Brisbane STTM has decreased from 2016 to 2017.

Table 3.7 and Figures 3.9, 3.10 and 3.11 provide an overview of participant activity at the Adelaide, Brisbane and Sydney STTMs.

Table 3.7 Yearly average trading activity on the ADL, BRI and SYD STTMs by participant type

STTM	Participant category	2016	2017
ADL	Retailer	2.4	3
	Retailer/Trader	0.1	0.3
	Retailer/Industrial	3.0	4.1
BRI	Retailer	1.1	1.2
	Retailer/Trader	0.9	1.0
	Retailer/Industrial	5.2	4.3
SYD	Retailer	3.6	4
	Retailer/Trader	5	6
	Retailer/Industrial	8.4	11.7

Figure 3.9 Yearly average trading activity on the ADL STTM by participant type

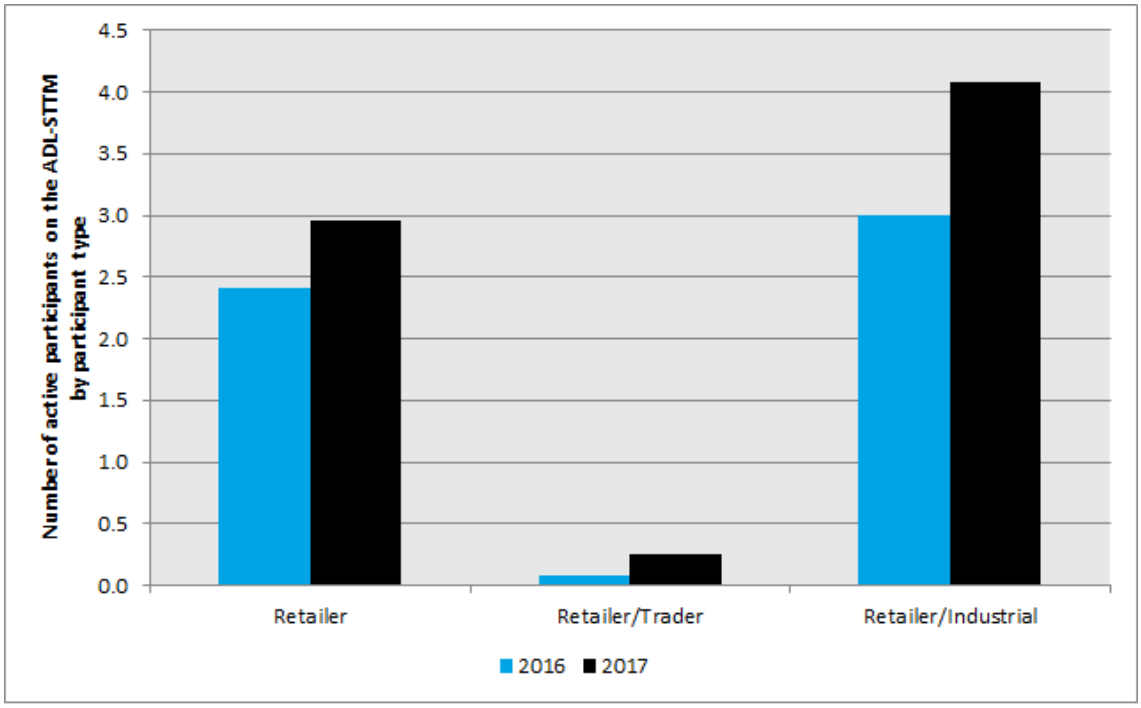


Figure 3.10 Yearly average trading activity on the BRI STTM by participant type

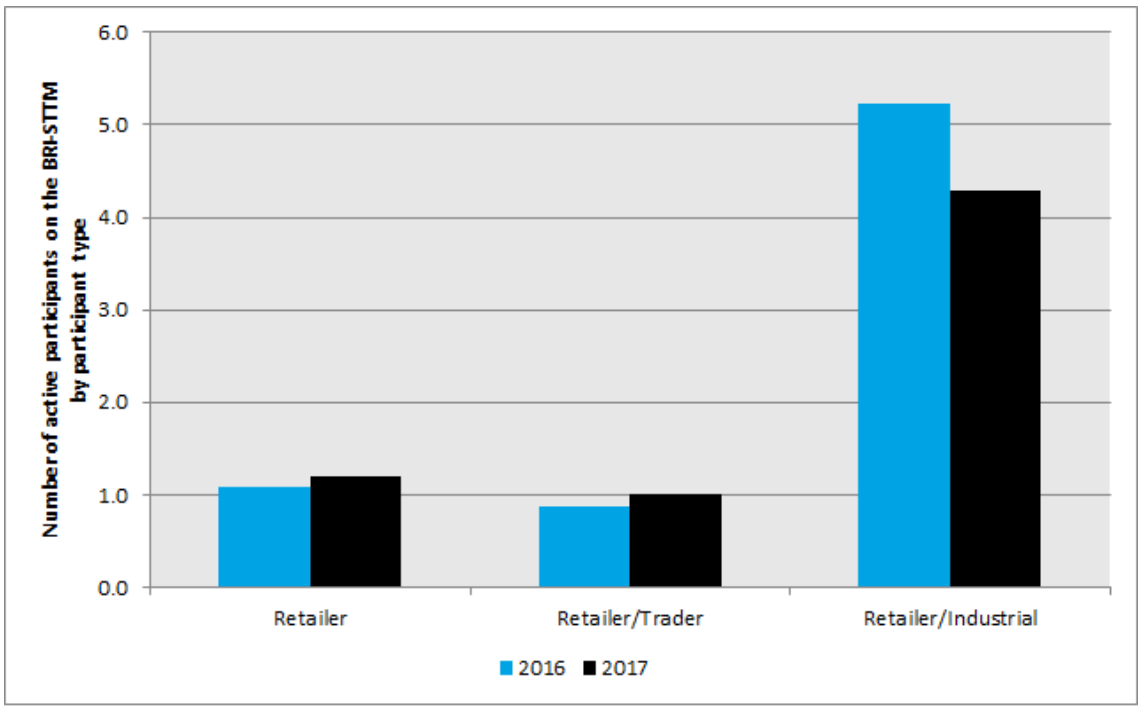
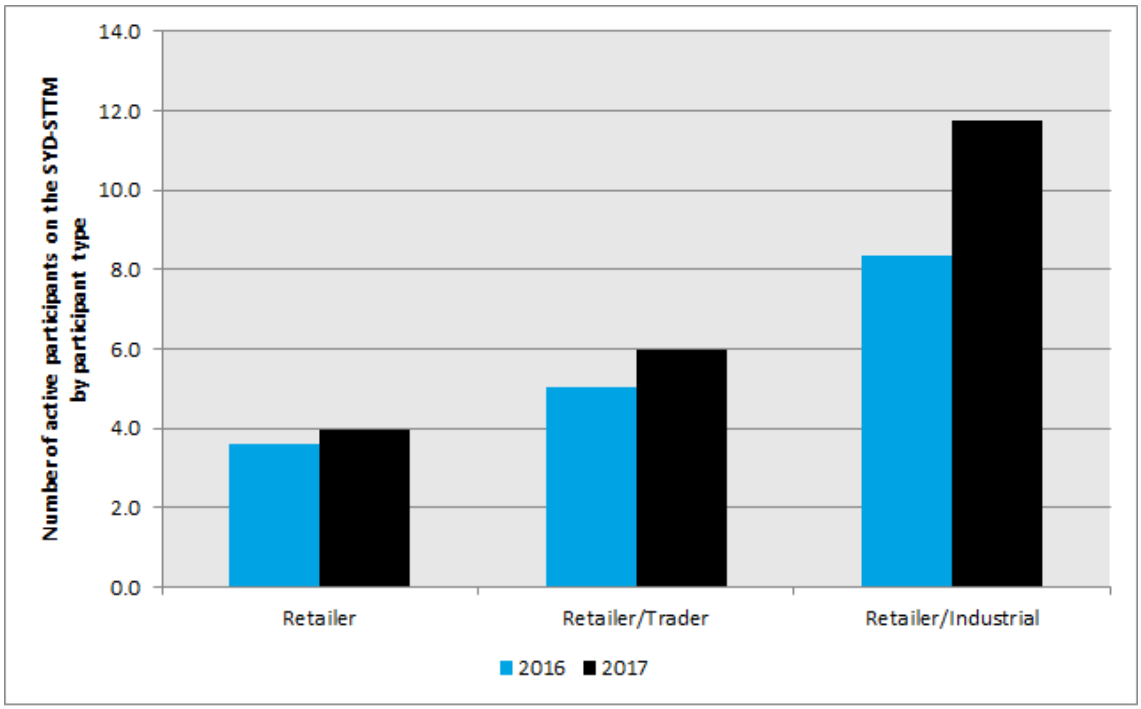


Figure 3.11 Yearly average trading activity on the SYD STTM by participant type



Trading activity on the STTMs is expected to further increase as long term gas supply contracts expire and more market participants become more confident in using a range of contracting and spot market acquisitions to manage their gas demand and pricing. This may become an alternative to purchasing gas via third parties, such as retailers.

3.4.3 The Victorian Declared Wholesale Gas Market

The number of active DWGM participants has increased in almost every participant category from 2016 to 2017.

Due to the differences in market design, the participant categories in the DWGM are somewhat different from the other markets. The DWGM is also a mandatory market, where gas on the wholesale level can only be purchased and sold through the market.

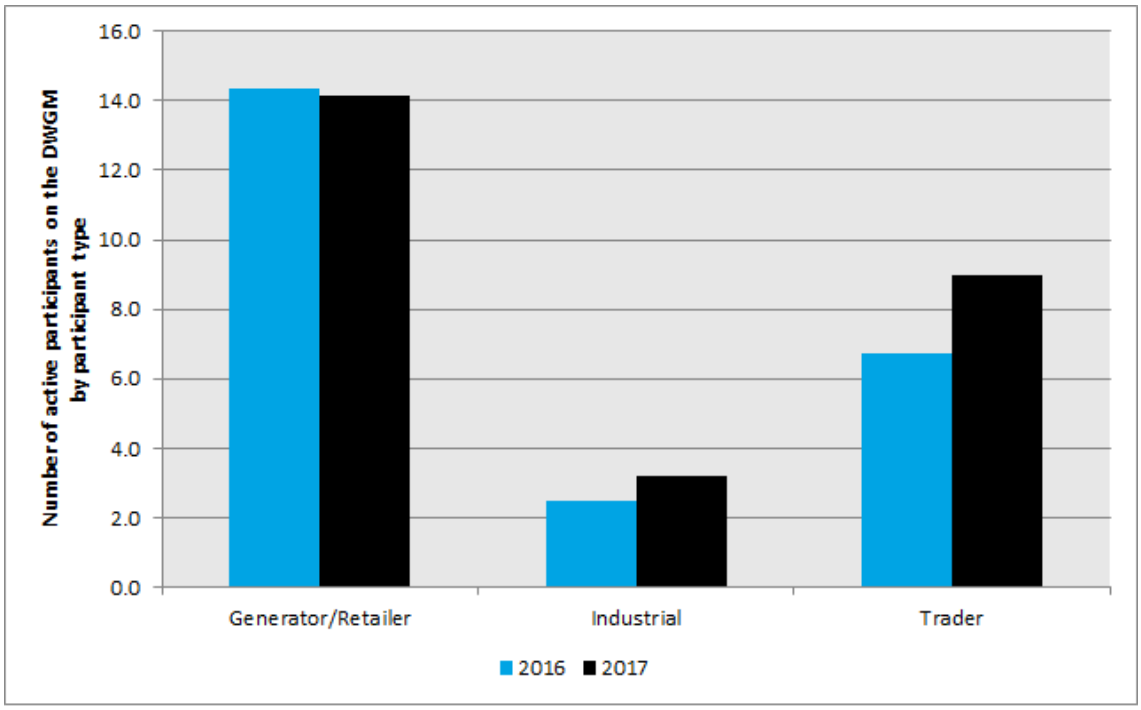
This metric shows the average yearly involvement of participants by participant type, based on their monthly activity. Table 3.8 and the Figure 3.12 below show this activity in greater detail.

The average number of all active participants was 23.6 in 2016 and 26.3 in 2017.

Table 3.8 Yearly average trading activity on the DWGM by participant type

Type of participant	2016	2017
Generator/Retailer	14.4	14.1
Industrial	2.5	3.2
Trader	6.7	9.0

Figure 3.12 Yearly average trading activity on the DWGM by participant type



Industrial users and traders showed the greatest increase in activity on the DWGM. This aligns with some of the stakeholder feedback that indicated market participants' increased confidence in being able to independently trade on the market. Higher prices offered for longer term contracts was seen as an incentive for market participants to build out trading capabilities and be involved in spot trading.

3.5 Concentration of trades amongst active participants

The Herfindahl-Hirschman index (HHI) is commonly accepted measure of market concentration that is based on market share. The HHI measures the size of firms in relation to the industry.

Higher HHI scores close to 10,000 indicate a highly concentrated, non-competitive market environment, while those closer to zero indicate a much more competitive market. The Australian Competition and Consumer Commission's (ACCC) Merger Guideline document indicates that HHI levels above 2,000 are indicative of a concentrated market. A more detailed description of the methodology of the calculation of the HHI was included in the scoping paper.

In addition, the Commission considered that market concentration on centralised markets such as the GSHs, the STTMs and the DWGM may be different on the buy and the sell sides. For this reason separate HHI values were calculated for each side of the markets.

Origin, in its submission to the scoping paper contended that due to the fundamental differences between the European and the Australian markets, measuring market concentration, particularly the HHI, does not provide a valid point of reference at this time.[21]

The Commission recognises the differences between the Australian and European markets and is also aware that current levels of market concentration may continue to apply to Australian markets in the longer term. However, the Commission considers that there is value in of showing the dynamics of the HHI and how concentration changes in the market over time.

Origin also submitted that publication of information about market concentration should be carefully considered, so that it does not compromise the anonymous nature of the trading platform.[22] The Commission shares this view and, therefore, measures concentration in this draft report by the HHI.

3.5.1 The Gas Supply Hubs

Sell side market concentration has increased somewhat from 2016 to 2017 in the Wallumbilla location. The HHI value was 1,424 in 2016 and 1,462 in 2017. This shows a small increasing trend and increasing concentration.

Buy side concentration has decreased at Wallumbilla from 1,840 to 1,331.

HHI could not be calculated for Moomba in 2016, due to the lack of trades. Given the two trades that occurred in 2017 with different buyers and sellers in both cases, the value was 7,222 for both sides. The Commission notes that this number is not very informative given the low number of trades.

21 Origin submission, 14 March 2018, p. 1

22 Ibid., p .1

Despite the relatively low number of active participants at Wallumbilla, both sell and buy side market concentration remained below 2,000. This indicates a not highly concentrated market.

3.5.2 The Short Term Trading Markets

Figure 3.13 and Table 3.9 below show market concentration on all STTMs from a sell and buy side perspective. Concentration on the sell side has decreased on the Adelaide and the Brisbane STTMs, but the HHI value remained above 2,000 in both cases, indicating a high concentration. There was a small increase in concentration on the sell side on the Sydney STTM, however, the HHI value remained below 2,000 in 2016 and 2017.

Figure 3.13 Sell side HHI on the STTMs

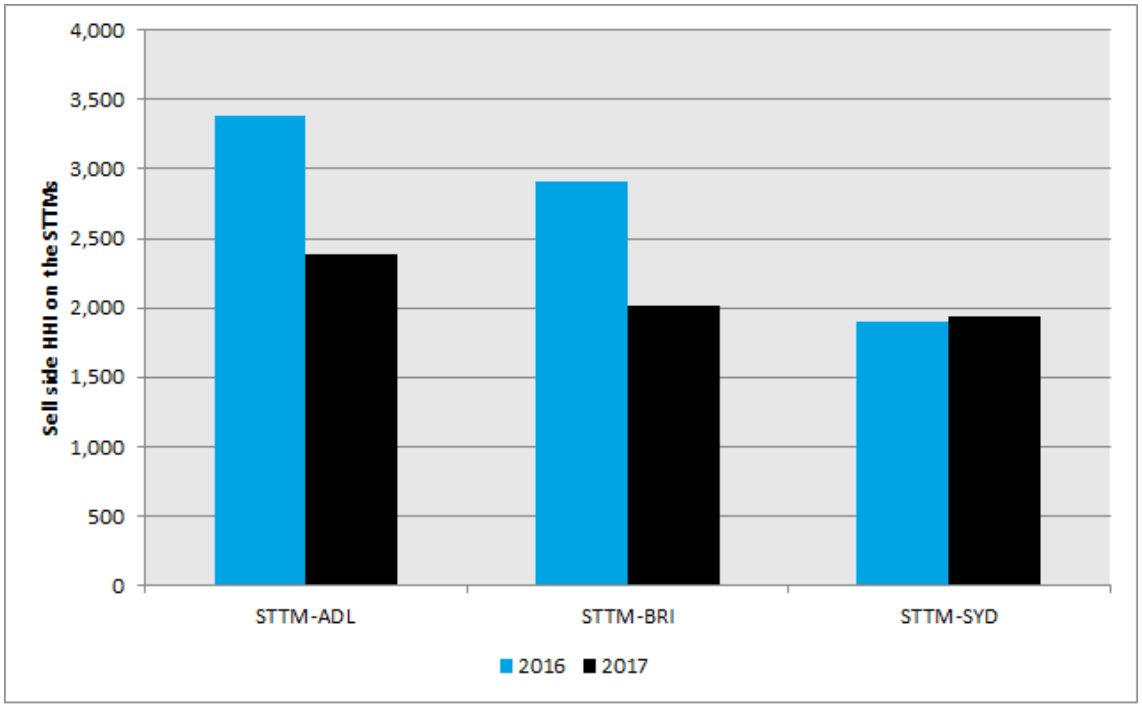


Table 3.9 Sell side HHI on the STTMs

STTM	2016	2017
ADL	3,388	2,388
BRI	2,911	2,020
SYD	1,904	1,934

Figure 3.14 and Table 3.10 show a reverse of the sell side trend was observable on the buy side, whereby concentration decreased on the Adelaide and the Brisbane STTMs below an HHI of 2,000. The buy side HHI of the Sydney STTM, increased from 2016 to 2017, but remained below 2,000.

Figure 3.14 Buy side HHI on the STTMs

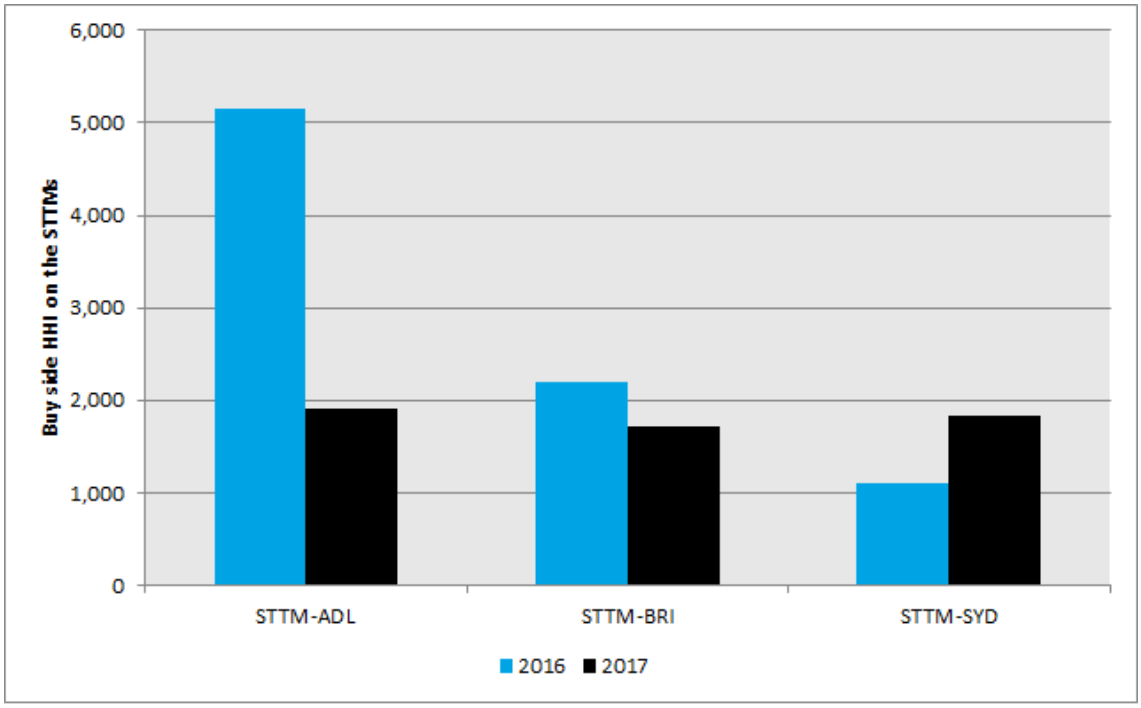


Table 3.10 Buy side HHI on the STTMs

STTM	2016	2017
ADL	5144	1904
BRI	2193	1722
SYD	1109	1835

Market concentration levels appeared to decrease both on the sell and a buy side in the two STTMs (Adelaide and Brisbane) that also had the lowest traded volumes. This decrease in concentration occurred while traded volumes decreased, but participant activity increased.

The Sydney STTM, the least concentrated amongst all three STTMs, did see an increase in concentration. However, its HHI values on both the sell and the buy side remained below 2,000, indicating a not highly concentrated market.

3.5.3 The Victorian Declared Wholesale Gas Market

Market concentration increased on the DWGM on both the sell and the buy sides.

Figure 3.15 and Table 3.11 illustrate that there was a significant increase on the sell side from 1,529 to 3,044 from 2016 to 2017. A smaller increase on the buy side pushed the HHI from its 1,189 level in 2016 to 1,310 in 2017.

Figure 3.15 Sell and buy side HHI on the DWGM

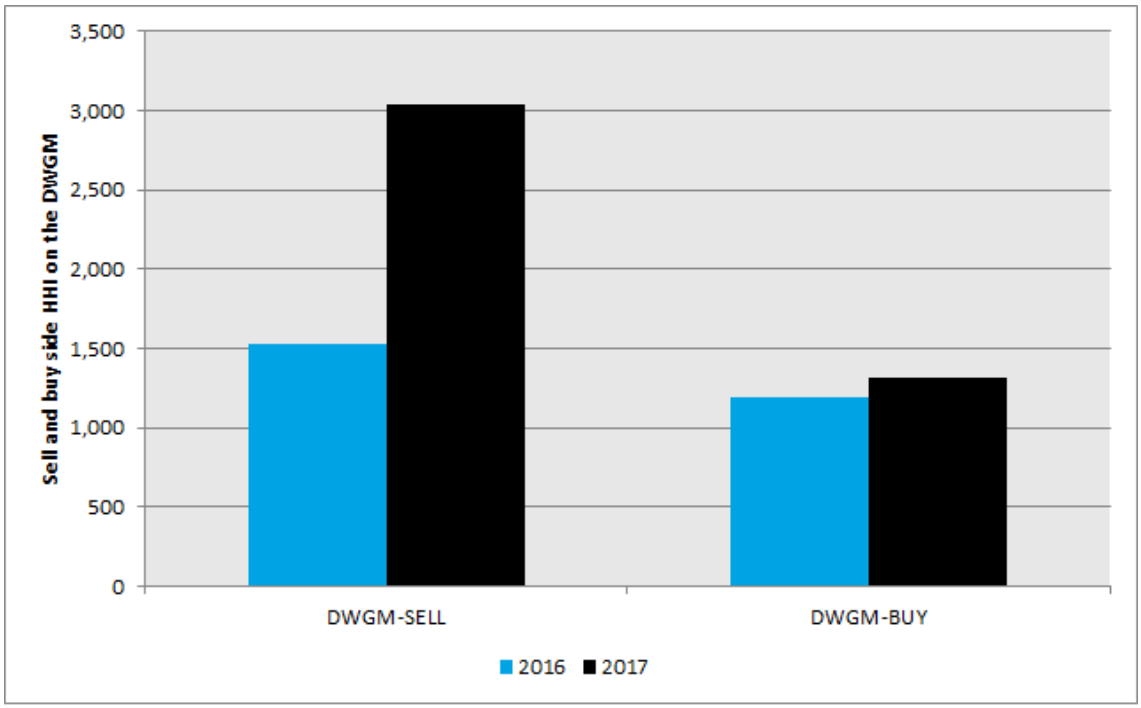


Table 3.11 Sell and buy side HHI on the DWGM

HHI side	2016	2017
SELL	1529	3044
BUY	1189	1310

With the exception of the high sell side concentration for 2017, the DWGM remains one of the least concentrated wholesale gas markets on the East Coast of Australia. The DWGM is also the market that has been in operation the longest, compared to the STTMs and the GSHs. This, and the mandatory nature of the DWGM, may be factors leading to the lower levels of concentration in this market.

With the exception of the Adelaide STTM in 2016, buy side market concentration, with HHI values below 2,000, appeared to be lower than sell side market concentration across all markets and periods. In other words, in almost all markets a lower number of sellers offered greater volumes for sale, while a higher number of buyers purchased smaller volumes. By 2017, buy side HHI value in all markets was below 2,000, indicating a relatively low market concentration.

With the exception of the DWGM, there were either small increases or considerable decreases across all markets in the sell side market concentration from 2016 to 2017. This means that in most markets, during this time period, the average volume offered by sellers either decreased or did not increase significantly.

3.6 Number of trades per product

The Commission considers that showing the number of trades per product as a sum of the number of trades relating to products with the same tenor length as the best way of calculating this metric. For example if a daily product was traded 365 times in a year, showing the metric as this number can be easily interpreted and compared with other products that may have longer delivery periods.

This metric was only calculated for the GSHs, as the STTMs and the DWGM are intraday and day ahead markets with mandatory participation and a limited set of tradeable products.

There were no trades in 2016 at the Moomba location. Further, no compression product has been traded at the Wallumbilla GSH since its introduction to the market in March 2017.

Table 3.12 below shows the number of trades that occurred in each year, at Wallumbilla by product category.

Table 3.12 Number of trades per product at Wallumbilla

Type of product	2016	2017	Percentage change from 2016 to 2017
Balance of Day	225	288	28%
Day Ahead	363	471	30%
Daily	186	767	312%
Weekly	21	97	362%
Monthly	3	14	367%

The number of trades at Wallumbilla has increased significantly from 2016 to 2017, especially in the longer term daily, weekly and monthly product categories.

There was one balance of day and one daily trade at the Moomba location in 2017.

3.7 Range of products traded

The traded curve on the GSH stretches out to a maximum of three months into the future.

Feedback from the qualitative survey suggests that OTC traded products, i.e. products not traded on the GSH, may offer one or two years delivery into the future. While longer term bilateral contracts that go out as far as three to five years or longer are occasionally agreed upon, they are not typical to the gas market at this time, mainly due to prevailing gas prices.

3.8 Qualitative survey

The AEMC consulted with a total of 14 participants registered on the GSHs, as well as two pipeline operators and four large industrial loads that are not currently registered on the GSHs. Appendix A provides a list of stakeholders that participated in the survey.

This section below provides an anonymised summary of the feedback provided during those consultations and an overview of the three public submissions received in response to the scoping paper.

3.8.1 Trades conducted through the facilitated markets versus bilateral and OTC trades

Formal submissions

AGL in its submission contended that bilateral trades are typically traded under a master agreement that has already been negotiated between two parties, and they allow for a range of flexible options, that the GSH does not offer. It was of the view, that, therefore, exchange-based trading is not easier to execute quickly relative to bilateral trades.[23]

The Commission acknowledges that in some cases the ease of execution for bilateral trades may be equal, or even greater than for exchange based trading. However, a range of conditions would need to be met for this to eventuate. This includes, but is not limited to the counterparties having an already negotiated a master agreement, and internal approval procedures and sufficient credits limit being in place.

The Commission understands that the exchange agreement is a standardised document, while negotiating master agreements can be a difficult, lengthy and costly process for some companies. During the qualitative survey process, a GSH market participant suggested that because of the transparent operation and calculable risk levels of trading on the GSH, the internal approval procedures in place made it easier to conduct trades on the exchange than trading under a master agreement. In addition, stakeholders noted that achieving a sufficient credit limit with counterparties can also be challenging for certain companies, especially for new entrants and for firms that have a credit rating below investment grade.

Origin Energy in its submission to the scoping paper noted that caution must be exercised in comparing outcomes to more mature European markets and the generally higher level of existing bilateral contracting that preceded the introduction of hub-based trading. Origin was also of the view that a broader assessment of wholesale market conditions would appropriately acknowledge the role of bilateral contracting, which it says is necessary before any additional market reforms (outside of those set out in the East Coast Gas Review and the Victorian DWGM Review) are contemplated.[24]

The Commission agrees with this statement and continues to hold the view that the purpose of this first review, as per the terms of reference, did not include recommendations for additional market reforms. Further, the Commission

23 AGL submission, 13 March 2018, p. 1

24 Origin submission, 14 March 2018, p. 1

acknowledges the role of bilateral trades in the market, but is limited in determining the extent of that role, as bilateral contracts are generally commercial-in-confidence. Therefore, at this time, the Commission must rely on information that is voluntarily provided by market participants.

The Commission considered that a qualitative assessment based on the approximate percentage values provided via the surveys is better suited to provide the information required in the terms of reference. The Commission notes that the terms of reference only required the AEMC to calculate the metric "to the extent this information is publicly available". Because one of the underlying data sets (the volume of bilateral trades) is not publicly available, publishing a quantitative metric would not have been possible.

Survey

Out of the 14 registered participants that took part in the survey, seven provided an estimate for the proportion of trading that is typical to their operation on the organised markets including the GSHs, the STTMs and DWGM, versus their trading OTC or bilaterally. To be able to focus on recent trends, participants were asked to exclude their long term "legacy" gas contracts from their OTC volumes, while providing an estimate for the metric.

Answers varied greatly between trading only on the organised markets with no bilateral trading, and trading up to 95 per cent of volumes bilaterally and leaving only 5 per cent to the hubs.

The factors contributing to this wide range of percentages included:

- **Differences in the operation of the businesses:** different businesses have different needs for exchange based trading in their operation. Trader companies without considerable physical portfolios are likely to have different OTC to GSH trading ratios in their books than those looking to cover the "overs and unders" associated with short term fluctuations in the gas consumption or gas production of their assets.
- **Seasonal effects on businesses' portfolios:** retailers' loads may follow a relatively predictable seasonal pattern throughout the year that can be covered by both OTC or on the exchange.
- **Other external factors such as events in the National Electricity Market (NEM):** gas fired power generation is likely to require greater volumes of gas on short notice when electricity demand is highest and/or when interconnectors or other generators trip and additional supply is needed in the NEM.

One participant indicated that while it conducts a greater number of trades on the GSHs compared to trading OTC, the majority of its traded volume is still traded OTC. This indicates that participants may trade frequently on the GSH but that the volumes of gas that they are trading are small.

A clear trend could not be established with regards to which participant categories were more engaged in hub trading. However, gas fired power generators, traders with no

significant physical portfolio, some retailers and some industrials tended to have a higher proportion of their volumes[25] go through the GSH than others.

3.8.2 Confidence and market liquidity

The majority of stakeholders indicated that they have confidence in the market and expected that confidence will increase over time together with liquidity. However, in their view, this confidence and increased liquidity only applied to shorter term products, tradeable at Wallumbilla and not to Moomba locations or longer term, weekly and monthly products.

Price signals

The importance of price signals coming from prices seen at the GSH is an indicator of confidence in the market. This is because if registered participants trust those signals, they are more likely to take those signals into account while making various business decisions.

Surveyed participants agreed that the trustworthiness of price signals for making investment decisions or hedging is not sufficient. Stakeholders were generally of the view that the longer the term of the decision, the less likely that the GSH price would be used as an index given the short-term nature of the products traded on the GSH. Some stakeholders indicated that reference to hub prices would be used in trading in some cases, but the majority of views rather highlighted the importance of prices on the GSH for short term portfolio optimisation purposes.

Number of participants and their involvement in the market

A number of participants surveyed by the AEMC were of the view that further increase in liquidity and confidence would be dependent on the registration of new participants, including industrial users, and their greater involvement in the market including the hubs. This could mean for example that for an industrial user, the baseload equivalent of its long term demand would be covered by a bilateral contract, but daily variations of surpluses or shortages would be sold or purchased on a facilitated market. Some expressed views that the diversity of new participants was also an important factor and the greater involvement of banks, financial intermediaries and brokers usually indicates that a market is entering a more mature phase.

Others, however, pointed out that if a market participant's portfolio mainly consists of a flat load that can be covered accurately by a baseload OTC contract, any fluctuation in its daily volumes could provide only marginal additions to traded volumes on the GSH. In such cases the only time it may make economic sense for the business to participate on the hub was in the case of a force majeure, but those exceptional cases alone do not warrant a registration on the GSH.

Another stakeholder added that many industrial users are fully contracted until the 2030s. Therefore, significant changes in liquidity should not be expected in the next two years from these users.

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25 This includes off-screen trades that are previously negotiated bilaterally to be only settled through the GSH, and on-screen trades that are traded anonymously.

The role of additional supply

Stakeholders pointed to the importance of the availability of more supply. Such additional supply could potentially enter the market if:

- LNG producers offered greater volumes to the domestic market
- moratoria on gas exploration were lifted
- the new APLNG pipeline, the new Northern Gas Pipeline connecting the Northern Territory and Queensland, and the proposed import LNG terminals was built
- the possibility of government intervention in case of a domestic gas shortage remained credible.

Almost all survey participants recognised that LNG producers are the largest suppliers of gas into the GSH. One stakeholder noted that maintaining the competitive tension that is building up between two of the exporters would likely lead to the appearance of more trades on the hubs.

Some participants suggested that there are numerous factors that influence the trading practices of LNG producers and these serve as an incentive to trade bilaterally, rather than through the GSHs. One such factor is the existing physical interconnection between LNG facilities allowing them to trade quickly and easily among themselves. The second being the fact that sudden surpluses or shortages in their operations constitute volumes that are orders of magnitude greater than what the GSH could currently absorb.

Additional sources of supply may also appear if conventional and unconventional gas fields could be developed. Gas originating from these new fields could either partially be directly traded on the GSH or free up supply elsewhere and increase volumes on the GSH as part of location swaps. New pipelines were also mentioned to provide access to supply and, therefore, contribute positively to increased liquidity.

One survey participant raised the importance of the proposed LNG import terminals. In its view, Australian gas prices are only linked to global gas prices in a one-sided way, via LNG export terminals. LNG import terminals would complete this international linkage, as they would allow for a better integration of global gas prices into the pricing of both domestic sales and purchases of gas. This participant suggested that better integration into the global gas market would contribute to the possibility of building out a longer term future curve and, therefore, having more certainty about the long term price of gas. Having such certainty would have a range of positive effects on the Australian market, including, but not limited to an increase in confidence to trade gas and also the willingness of market participants to underwrite investment in new pipeline capacity.

Some participants were concerned that while government intervention may increase liquidity in the short term, in the long term it may reflect that there are issues in the market. In particular, a lack of confidence that participants can get the gas they need to where they need it at a reasonable price. It was further expressed, that intervention is likely to damage investment certainty in the market and may lead to decreasing

liquidity in the long term. This observation was also made in relation to policy uncertainty in a general sense.

Other matters

A number of participants suggested that the implementation of pipeline capacity reforms, especially the day ahead capacity auctions that are expected to start from March 2019, may have an effect on liquidity on the GSHs. Feedback on the interrelationship of transportation and liquidity is further elaborated in section 3.8.3.

Other factors that may potentially impact liquidity on the GSH were also mentioned by some stakeholders, however, some of these are at odds with one another. These included:

- rapidly decreasing costs associated with new gas field development
- increasing oil prices
- the appearance of more standardised contracts
- the inclusion of new, longer term products and new delivery points, including, but not limited to the Culcairn notional point
- limiting the number of products available to trade to further concentrate liquidity
- the development of derivative, longer term forward financial markets that would support physical trading
- the implementation of G20 reforms that would lead to increased collateral requirements in OTC trading for companies below investment grade
- the publication of LNG netback price index
- the expiry of long term legacy contracts.

3.8.3 Impediments to trading on the GSH

Transportation

The majority of stakeholders were of the view that transportation, and operational issues linked to transportation were barriers to trade on the GSHs. This view was especially expressed in relation to Moomba, where the lack of trading since June 2016 was explained as a result of the uncertainty about where the injection and delivery points would be and how gas could be transported, should a market participant successfully conduct a trade there. More generally, the costs and availability of firm capacity was raised as an impediment, because the market framework of the GSH requires the physical haulage of gas. That is to say, all gas to be traded on the GSH has to be shipped to one of the GSH locations.

Almost all participants had the expectation that the day-ahead capacity auction being implemented from March 2019 is likely to contribute toward overcoming this barrier to trade. This is because capacity from the auctions will allow for physically moving the gas after a successful trade on the GSHs. However, some participants expressed their concerns about the priority of acquired auction rights as the firmness of the capacity won by successful auction participants may be jeopardised by upward renominations made by long term capacity holders. They were of the view that if the firmness of

capacity won on the day-ahead auction is not guaranteed, participants may be reluctant to make trading decisions on the GSH on the back of that capacity.

Costs

Many participants were of the view that costs on the GSH were impeding trade, especially if greater volumes were to be settled through the hub. These costs included fixed yearly membership and license fees and variable transaction fees that were associated with the volume that was cleared through the exchange. The magnitude of upfront prudential requirements and the $100,000 cap on accepting cash as collateral were also said to cause problems for smaller market players. In addition, bigger and/or investment grade companies that have master agreements and credit limits in place with other market players can trade OTC freely, without having to provide collateral. It was, however, recognised, that for relatively new companies that do not have sufficient credit limits with their counterparties, OTC trading can be as big of a challenge as the prudential requirements associated with trading on the GSH.

Flexibility and availability

A number of participants suggested that the flexibility to be able to agree on a selection of various delivery points including other pipelines, storage and supply fields was missing from the GSH, but could be achieved in a bilateral trade. In general, stakeholders were of the view that the possibility to cater for bespoke needs including, but not limited to, optionality of delivery, force majeure clauses and the customizable length of tenors (especially longer term ones), was not present on the GSH. Two stakeholders, however, stressed the importance of keeping exchange traded products as simple as possible. They were of the view that the sole purpose of the hub is to provide trading opportunities for trading simple, basic products. If that goal is achieved, OTC trading can "wrap around" those products and fill in the gaps that are created by bespoke, individual needs.

Some participants also thought that the necessary volume of bids and offers were not present at the GSH at times when they were most needed by the market (i.e. in tight supply conditions), which directed trade to the OTC market.

3.8.4 Optional hub services

All stakeholders shared the view that the introduction of optional hub services (compression products at Wallumbilla) had no effect on liquidity, or it was too early to assess such an effect. Some stakeholders noted that some products on the GSH (including the compression and spread products) "got ahead of the market", are too complex and are of limited use at this time. This limited use stemmed from the notion that it is difficult to manage compression separately from haulage. Others were of the view, that the capacity reforms may assist in utilising the trade of compression products and the need for these products might change in the future.

Most stakeholders were satisfied with the reduction of delivery points from three to two at Wallumbilla, but did not attribute any significant change in liquidity to it.

3.8.5 General comments

The majority of survey participants agreed with the proposed metrics and the high level methodology that was put forward by the AEMC in the scoping paper.

Almost all stakeholders agreed that the number and the magnitude of regulatory changes that affect the design of energy markets have been a challenge as of late. They expressed their concerns about not being able to fully participate in industry consultations. It was suggested that sufficient time should be given to observe how the reforms are implemented, as there is a learning curve for businesses that make decisions around how to operate in new regulatory environments.

A number of participants made general comments about the market framework of the GSH and suggested changes to its operation that, in their view, would lead to greater liquidity in the future.

Some stakeholders suggested that the removal of the $100,000 cash collateral limit would be beneficial to the market, as the type of bank guarantees that are required by AEMO are difficult to negotiate with banks. Those stakeholders also argued that prudential requirements could be further decreased, if pre-payment or daily settlement was allowed.

A couple of participants were of the view that liquidity would be boosted on both Moomba and Wallumbilla, if there was a switch from a voluntary to a mandatory market design. Others added that under some conditions, producers could be obligated to provide market making functions and offer additional volumes to the market.

A number of stakeholders suggested that longer trading hours would allow market participants to trade more on the hub. For example unplanned outages of equipment that are happening outside of trading hours could be fully or partially traded on the GSH, instead of resorting to bilateral arrangements. However the costs of longer trading hours would need to be considered alongside any potential benefits.

3.9 Conclusion

The Commission has found that almost all quantitative indicators of liquidity on the Wallumbilla GSH have positively changed over the past two years.

Table 3.13 provides an overview of those changes.

Table 3.13 Trends of liquidity metrics at the Wallumbilla GSH

Metric	Trend from 2016 to 2017
Traded volumes	significant increase
Churn rate	increase
Bid-offer spreads	N/A
Number of active participants	increase
Concentration of trade (buy side)	small increase
Concentration of trade (sell side)	decrease
Number of trades per product	significant increase

There was significant growth in both the total yearly volumes traded on the Wallumbilla GSH and the number of trades in shorter term products. Longer term products were less traded and their range only stretches out to a maximum of three months into the future. The churn rate for Wallumbilla saw a gradual increase together with a greater number of active participants throughout the period that approached a yearly average of 12 in 2017. Market concentration slightly increased on the sell side, but dropped significantly on the buy side. In both cases the HHI value remained below 2,000, which indicates that the market is not highly concentrated, despite the relatively low total number of active participants in absolute terms.

Baseline numbers for the STTMs and the DWGM varied greatly and were not as conclusive as the ones for the Wallumbilla GSH.

The majority of stakeholders that participated in the AEMC's qualitative survey expressed their confidence in the Wallumbilla GSH and were expecting liquidity to grow further in the next two years.

The Commission is of the view that both the qualitative and quantitative metrics that were used in the review indicate that the Wallumbilla GSH is a developing market, where liquidity is expected to grow further in the future. It is recognised that some aspects of liquidity at this early stage of the market are more informative than others. For example, churn rates may take longer to develop to meaningful levels, while traded volumes or the number of trades per product already provide useful information that is easy to interpret.

Because the Moomba GSH has only been in operation since June 2016, the Commission sees less value in its associated metrics. The Commission believes that at the time of concluding this first review, it is too early to assess the operation of that hub and more time should be given for any of the related liquidity metrics to develop.

The Commission considers that in subsequent reviews a more developed market with more historical trends available to examine, will provide an opportunity for more detailed analysis.

Abbreviations

ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Commission	See AEMC
COAG	Council of Australian Governments
DWGM	Victorian Declared Wholesale Gas Market
DTS	Victorian Declared Transmission System
GBB	Gas Bulletin Board
GMRG	Gas Market Reform Group
GSH	gas supply hub
HHI	Herfindahl-Hirschman Index
LNG	liquefied natural gas
MCE	Ministerial Council on Energy
NEM	National Electricity Market
NGL	National Gas Law
NGR	National Gas Rules
NGO	National Gas Objective
OTC	over-the-counter
SEA Gas Pipeline	South East Australia Gas pipeline
STTM	Short Term Trading Market
TJ	terajoules

A List of companies that participated in the survey

Name of stakeholder	Type of stakeholder
APA Group	pipeline operator
AGL Energy	gentailer
Alinta Energy	gentailer
Arrow Energy	gas producer and power generator
Australia Pacific LNG	LNG producer and exporter
EnergyAustralia	gentailer
ERM Power	gentailer
Incitec Pivot	industrial user
Jemena	pipeline operator
Macquarie Bank	trader
Orica	industrial user
Origin	gentailer
Orora	industrial user
Qenos	industrial user
Royal Dutch Shell	LNG producer and exporter
Santos	LNG producer and exporter
SA Water	industrial user
Stanwell	gentailer
Strategic Gas Market Trading	trader
Visy	industrial user