

# 2020 BIENNIAL REVIEW INTO LIQUIDITY IN WHOLESALE AND GAS PIPELINE TRADING MARKETS

SCOPING PAPER

GPR0007  
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**AEMC**



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## 1. INTRODUCTION

### 1.1 Background

Recognising ongoing structural changes 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."*<sup>1</sup>

In order to achieve a road map for gas market development to 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 Review).

In the East Coast Review the AEMC recommended, amongst other things, 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.<sup>2</sup>

On 20 December 2017, the COAG Energy Council provided the AEMC with terms of reference to conduct that biennial review (the review).<sup>3</sup>

## 1.2 Scope of the review

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

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

The markets that should be examined as part of the biennial review include (refer to appendix for more details):

- the facilitated markets, which include the Gas Supply Hub (GSH), the Victorian Declared Wholesale Gas Market (DWGM), the Short Term Trading Market (STTM) and the secondary capacity trading market; and

- any other physical or financial markets that enable participants to trade gas, pipeline capacity or other related services, or to hedge risk, to the extent that information on these markets is publicly available.

These markets cover the wholesale gas and pipeline capacity trading markets on the east coast of Australia.

The AEMC is also expected to monitor developments in the Northern Territory and Western Australia, where it is relevant to do so.

The terms of reference includes a more detailed description of the scope of the review and can be found on the project page.

## 2018 review

The COAG Energy Council recognised that a number of the reforms set out in the East Coast Review would not be in place when the first biennial review had to be completed. Therefore the first review conducted in 2018 was relatively narrow in scope and focused primarily on:

- the development of the methodology the AEMC would 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 and Moomba GSHs and the effect that the introduction of Optional Hub Services at Wallumbilla has had on liquidity in this market.

## Recent developments

Since the publication of the 2018 review, the capacity trading reforms developed by the Gas Market Reform Group (GMRG)<sup>4</sup> started operations in March 2019.

This included two new secondary capacity trading markets: a capacity trading platform (CTP) and the day-ahead auction (DAA).

## Other reports

In addition, from August 2018, the Australian Energy Regulator (AER) started to publish the quantitative indicators developed for the biennial liquidity review on their industry statistics webpage.<sup>5</sup>

We also note that since April 2017 the Australian Competition and Consumer Commission (ACCC) has been directed by the Australian Government to conduct a wide-ranging inquiry into the supply and demand for natural gas in Australia. The ACCC publishes its findings twice a year.<sup>6</sup>

## 2020 Review

In addition to monitoring the growth in liquidity in each market, the terms of reference also requires the AEMC to consider and report on:

- the effectiveness of the reforms that the COAG Energy Council has agreed to make to the trading markets and whether the reforms are achieving their stated objectives
- the progress that is being made toward achieving the COAG Energy Council's Vision
- any further reforms required to achieve the COAG Energy Council's Vision and/or to otherwise promote the national gas objective (NGO).

We note that a number of changes are still too recent to thoroughly assess their effectiveness and that others are yet to be implemented. As such it may also be too early to consider further reforms.

However, the AEMC will provide an update on each of the reforms implemented or that are in the pipeline to be implemented around the gas markets in Australia.

Where possible a preliminary assessment of effectiveness and progress towards objectives will be provided.

### 1.3 Review process

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

- This report, outlining the approach proposed to be used by the Commission for this review, including the liquidity metrics and the methodology for determining those metrics.
- 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 proposes to publish the draft report in April 2020 and provide the final report to the COAG Energy Council by 30 June 2020.

In addition, the AEMC will work collaboratively with other bodies, including the Australian Energy Market Operator (AEMO), the AER and the ACCC.

### 1.4 Responding to this paper

The AEMC welcomes submissions on any issues related to this review including, but not limited to the methodology and metrics proposed to assess liquidity in the wholesale gas and pipeline capacity trading markets.

The closing date for submissions is **20 February 2020**.

Submissions should quote project number "GPR0007" and may be lodged:

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



## 2 . METHODOLOGY AND METRICS

A liquid market is one in which market participants have access to products and can reliably make transactions in a timely way, at a cost-reflective price. We note that liquidity is a broader concept than 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:<sup>7</sup>



- **Market depth:** where there are bids at different price points and no single buy or sell order is likely to move the market price excessively.



- **Market breadth:** where a large number of bids to purchase and offers to sell are present in the market and small orders tend not to result in a change in price.



- **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 will measure liquidity based on these characteristics.<sup>8</sup>

For each of these characteristics, metrics are chosen that can 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).



Table 1 provides an overview of the metrics the AEMC proposes to be included in the analysis of liquidity in the gas market, based on the terms of reference.

The table includes both quantitative and qualitative metrics and provides information on which of the above four inter-related characteristics each metric addresses, how the metric will be constructed, and the expected trend in these metrics over time.

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

The Commission may include further metrics in the draft report if relevant data is identified through stakeholder feedback or in the preparation of the report.

## Western Australia and Northern Territory

As noted earlier, the AEMC is also expected to monitor developments in the Northern Territory and Western Australia, where it is relevant to do so and where information is publicly available.

At this stage, we note that there is very limited publicly available data and therefore limited reporting possible on the quantitative metrics.

However, both jurisdictions will be included in the qualitative survey the AEMC will conduct as part of the review process.

**Table 1: Metrics to monitor liquidity in the gas markets**

METRIC	CHARACTERISTIC	DESCRIPTION	TREND AND/OR THRESHOLD	UNDERLYING DATA
1. Traded volumes	Market breadth	Volume of trades in each market over the measurement period	Should be increasing	<ul style="list-style-type: none"> <li>Traded volumes</li> </ul>
2. Churn rate	Immediacy	Ratio of all traded volumes to demand for the underlying physical product	Should be increasing	<ul style="list-style-type: none"> <li>Traded volumes</li> <li>Throughput of the underlying physical product</li> </ul>
3. Bid-offer spreads	Immediacy	The difference between prices on the bid and offer side of the market	Should be narrowing	<ul style="list-style-type: none"> <li>Bid prices</li> <li>Offer prices</li> </ul>
4. 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	<ul style="list-style-type: none"> <li>Number of actively trading participants</li> <li>Number of participants in each registered category</li> </ul>
5. Concentration of trades amongst active participants	Market depth	The proportion of trades accounted for by individual participants	Should be decreasing	<ul style="list-style-type: none"> <li>Traded volumes by participant<sup>9</sup></li> <li>All traded volumes</li> </ul>

Source: AEMC, *Biennial review into liquidity in wholesale gas and pipeline trading markets*, scoping paper, 13 February 2018.

**Table 1: Metrics to monitor liquidity in the gas markets**

<b>METRIC</b>	<b>CHARACTERISTIC</b>	<b>DESCRIPTION</b>	<b>TREND AND/OR THRESHOLD</b>	<b>UNDERLYING DATA</b>
6. Number of trades per product	Market breadth	The number of traded transactions per product	Should be increasing	<ul style="list-style-type: none"> <li>Number of trades by product category</li> </ul>
7. 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	<ul style="list-style-type: none"> <li>Types of bilateral or over the counter (OTC) products available</li> <li>Traded volumes outside the facilitated markets</li> </ul>
8. 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	<ul style="list-style-type: none"> <li>Traded volumes in the facilitated markets</li> <li>Traded volumes outside the facilitated markets</li> </ul>
9. 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	<ul style="list-style-type: none"> <li>Survey (qualitative)</li> </ul>
10. 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	<ul style="list-style-type: none"> <li>Survey (qualitative)</li> </ul>

## 2.1 QUANTITATIVE METRICS

Table 1 shows ten metrics which will be used to assess liquidity in the gas markets.

Of the ten metrics listed above, the first seven are quantitative indicators. That is, they can be objectively measured and quantified.

Each of the seven metrics is discussed in more detail in the following pages.

We note that even though the terms of reference set out eight quantitative metrics, 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.

In addition, the quantitative metrics will cover a four year period (i.e. the calendar years of 2019 and 2018 plus the two years included in the 2018 review).

As there was very limited information available about pipeline capacity trading in the 2018 review, only one of the seven liquidity metrics included reference to that market.

However, as more information has now become available after two new secondary capacity trading markets (CTP and DAA) were introduced in the East Coast gas market in March 2019, more metrics will be calculated for those markets.

### 2.1.1 Traded volumes and churn rate

Natural gas can be traded multiple times before it reaches its destination where it is consumed.

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.

A high churn rate is indicative of a market that has many participants (and many participant types), trading products in large volumes.

Therefore this metric relates to the immediacy characteristic of liquidity.

In commodity markets, a churn rate of 10 or more is deemed to signify that the market has reached maturity and is liquid.<sup>10</sup>

However, many markets cannot realistically be expected to reach churn rates associated with mature liquid markets.

This would be the expectation with respect to the east coast wholesale gas market in the near to medium term.

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**“The higher the churn rate the more liquid a market is.”**

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## Traded volumes

Traded volumes refer to quantities that are either traded on centrally operated markets such as the GSHs, the STTMs, and the DWGM, pipeline capacity listed on the Gas Bulletin Board (GBB), CTP or the DAA, or wholesale trades in bilateral form.

The delivery period of the contracts behind those volumes may include intraday, daily, weekly, monthly or longer tenures.

Traded volumes, as a standalone metric, will group trades by their trading date and not by their delivery period.

For example the volume from a monthly trade concluded in December 2018 with a delivery for January 2019 will be counted towards the total traded volumes of calendar year 2018.

## Churn rate

For the purposes of calculating the churn rate, for any given period, traded volumes will be calculated differently, grouped by their delivery period and not by their trading date.

Using the previous example, a monthly product traded in December 2018 with a delivery for January 2019 will be counted towards the total traded volumes of calendar year 2019.

Churn rates will be calculated for each gas supply hub, (i.e. Wallumbilla and Moomba) and for the Capacity Trading Platform (if data is available).

However, churn rates will not be calculated for the STTMs and the DWGM.

This is because the STTMs are mandatory markets and the DWGM is a gross pool market, where traded volumes would equal the underlying demand, which means churn rate is not an appropriate metric to measure liquidity in these markets.

Some information is already publicly available in relation to the traded volumes metric.

- The AER already publishes the volumes of trading that takes place on facilitated markets, and AEMO publishes similar information in relation to the STTMs and the DWGM.
- Capacity trading information is also published for some pipelines operated by APA and Jemena.

However, the volumes of bilateral trades remain confidential.

The AEMC will survey market participants about the quantities of gas that is being sold and purchased bilaterally or over-the-counter.

We propose to differentiate between bilateral trade and traded volumes on the exchanges in calculating churn rates.

Churn rate is proposed to be calculated by dividing the traded volumes of all products that refer to the same delivery period by the total throughput of gas that occurred over the same time period.

We propose to calculate only the gross market churn in our analysis.<sup>10</sup> Net market churn is a metric that is best suited for areas where a significant portion of the traded gas is consumed locally.

This does not appear to be case for the GSHs where gas is mainly transited through to other locations.

Total throughput, for the purpose of calculating the gross market churn, will include the sum of all natural gas that could have been traded on the GSHs.

This will be calculated as the sum of all the gas flows (in all directions) on the pipelines that physically deliver natural gas from those locations.

Information about pipeline flows is available at the GBB.



### 2.1.2 Bid-offer spreads

Bid-offer spreads are the difference between the price on the bid side (buy side) of the market and the price on the offer side (sell side) of the market.

As such, bid-offer spreads include transaction costs, amongst other things.

In a liquid market with many well-informed participants, supply and demand should be well aligned and transaction costs should be minimised.

In practice, large bid-offer spreads prevent market participants from trading significant volumes within a reasonably short timeframe.

As a result, a liquid market is characterised by bid-offer spreads that become narrower over time.

However, bid-offer spreads only provide meaningful information if they relate to similar products.

For example daily and monthly deliveries will have separately calculated liquidity metrics. Products traded at the Wallumbilla and Moomba GSH and the Capacity Trading Platform will also be separated.

Bid-offer spreads will not be calculated for the STTMs, the DWGM and the day-ahead auction. This is because these markets have auctions with a single clearing price.

In those cases the calculation of a spread between bids and offers submitted to the auction would not provide meaningful information.

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**“A liquid market is characterised by bid-offer spreads that become narrower over time.”**

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The review is to contain yearly average bid-offer spread values for each relevant product or group of products traded on the GSHs.

More specifically, yearly averages will be constructed from the arithmetic average of daily bid-offer spread values.

These values will originate from those days, where relevant bids and offers for the same product were simultaneously present in the order book.

Further, the daily values will be equal to the arithmetic average of all relevant bid-offer spreads that were present in the order book during trading hours.

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.

### 2.1.3 Number of active participants

Metrics relating to the number of participants that commonly trade are useful to measure the depth and breadth of a market.

A large number of market participants engaged in trading mean that it is less likely the market can be manipulated (i.e. one participant is able to move the market price), and therefore the resulting market price will more accurately represent supply and demand conditions.

It should be noted that there are numerous types of participants in the wholesale gas markets.

For example, a physical participant is one that sells and consumes natural gas and includes producers, shippers, retailers and large users.<sup>12</sup>

Financial participants do not have a physical position in gas but may be active in the markets for financial products for hedging or speculative purposes - this means that they close out positions before being required to deliver or take receipt of the gas.

A liquid market is generally characterised as one with active physical and financial players.

An active participant is defined as one that has been engaged in trading on the market at least once in any given month.

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**“A liquid market is generally characterised as one with active physical and financial players.”**

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This metric is designed to measure participation in the markets at the early stages of market development.

As liquidity in the market increases over time consideration may be given to the development of more sophisticated measures of market depth.

This liquidity metric will be expressed through calculating the average yearly activity of registered participants belonging to certain categories, based on the arithmetic average of monthly activity.

The metric will be published for the GSHs, the STTMs, the DWGM and the DAA separately.

To the extent it is possible to determine from publicly available information, categories of registered participants will be published.

These categories will include exporters, retailers, generators, industrial customers and traders, wherever possible.

In addition, this metric will be published jointly for Wallumbilla and Moomba, as there is no separate membership on the GSHs for those locations.

The AER already publishes monthly trade activity statistics by participant for the facilitated markets, which may be used as one of the underlying datasets for this liquidity metric.

### 2.1.4 Concentration of trades

Closely related to the previous metric (number of active participants), the concentration of trades by individual market participants is also a measure related to market breadth.

Concentration in this context refers to a measure that shows to what extent the market is dominated by just a few players.

A liquid market is characterised by lower concentration of trades.

This is because if the majority of trades were to be conducted by just a few participants, it may both deter those participants from trading in facilitated markets<sup>13</sup> and may also make the markets susceptible to manipulation.

Fewer participants also reduces the benefit to the market from trading through markets such as the GSHs, as the transaction costs associated with bilateral trading are smaller in a market with fewer participants.

We propose no specific threshold for this liquidity measure, however, we expect concentration to decrease over time as gas markets become more mature.

We believe that the concentration of trades can be measured by a commonly accepted measure of market concentration that is based on market share: the Herfindahl-Hirschman index (HHI).<sup>14</sup>

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**“A liquid market is characterised by lower concentration of trades.”**

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## Market share

Market share is going to be calculated for the GSHs, the STTMs and the DWGM. The DAA and the CTP will also be included in this metric, wherever possible.

Market share can be calculated by dividing traded volumes by a participant with the total of traded volumes in the market.

Both of these volumes would ideally include both bilateral and exchange based trading, subject to availability of the former.

However, because the availability of information about bilateral trading volumes may vary over time, we recommend, for the sake of consistency, to separate market shares on the GSHs, the STTMs and the DWGM from market shares that is traded outside of the centrally operated markets.

## HHI

The HHI is then calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers.

In addition, the Commission considers 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 will be calculated for each side of the markets.

The HHI will also be separately calculated for other markets where possible.

### 2.1.5 Number of trades per product

The number of trades completed for a given product provides a measure of liquidity (that relates to market breadth) on a per product basis at the hubs.

A liquid market is characterised by ease of trade and therefore it is expected that the number of trades per product will increase as market liquidity develops.

By examining the number of trades on a per product basis over time, the relative development of the market for different products can be distinguished.<sup>15</sup>

There is no threshold proposed for the absolute number of trades per product, however, it is recognised that the higher the number of trades for a product, the more trustworthy its price signal.

As liquidity in the market develops, the number of trades per product is expected to increase.

This metric is proposed to encompass exchange based products only, traded on the GSHs, due to the non-standard feature of bilaterally traded products in the wholesale and capacity trading markets.

In order to provide meaningful information, all products will have separate figures assigned to them.

For the defined yearly period, the number of trades per product will be calculated as an arithmetic average of the number of trades relating to products with the same tenure length.

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**“As liquidity in the market develops, the number of trades per product is expected to increase.”**

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For example, in the case of monthly products, this number would be the average of the number of times each of the 12 months was traded.

As there are distinct products that are traded with Moomba and Wallumbilla delivery locations, separate metrics will be calculated for each.

The AER currently publishes the aggregate number of trades for all products traded on the facilitated markets and the DAA on a monthly basis, while AEMO reports on individual products on a weekly basis.

### 2.1.6 Range of products traded

In addition to monitoring the number of transactions per product it is necessary to examine the range of products available for trade in the gas markets.

Gas market participants often need different tradeable products to satisfy different needs and this means that a variety of products should be available.

When examining the range of products available on the traded markets, all categories of products should be included; this means that the analysis should include bilateral and exchange trading.

This information is usually not considered to be commercially sensitive information and should be available for bilateral trades.

As liquidity grows in the market it is expected that the range of products available will expand.

However, it is not expected that the market for products will grow in a uniform fashion; some products may take longer to come to market and, even in mature markets, liquidity for products far along the traded curve (i.e. further out into the future) may be quite low.

No specific threshold value for the range of products is proposed, however, the range is expected to increase over time.

In terms of exchange based trading, the range of tradeable products currently stretches three months into the future.<sup>16</sup> The tenures of bilaterally traded products on all relevant markets will be examined via surveys.

A separate metric is proposed to be calculated for bilateral and exchange based products.

## 2.2 QUALITATIVE METRICS

Not all aspects of liquidity are easily measurable. The use of qualitative information to supplement the quantitative indicators provides a complete view of market liquidity.

Survey-based information allows for valuable information on the non-quantifiable aspects of the development of liquidity to be incorporated into the analysis.

These qualitative metrics may capture all four characteristics of liquidity and therefore provide a wider view that supports the less flexible quantitative ones discussed in section 2.1.

Qualitative metrics can be forward-looking and can provide insight into the prospect for liquidity to develop further in the future. Quantitative metrics rely on observed data and therefore cannot be forward-looking.

The survey-based information would focus on two areas: market participants' experience of the market to date and their expectations for the future. The information will be gathered through a survey and informal stakeholder discussions.

In order for market participants to be willing to trade they must have trust that the market price reflects underlying supply and demand.

Over time, it is expected that market participants will have increased confidence to trade on the GSHs, which will result in greater traded volumes and liquidity in the market.

In addition, given the importance of physical supply that was expressed by the majority of survey participants in the 2018 review, the Commission will also consider further metrics about the role of gas producers in this review.

## References and footnotes

1. COAG Energy Council, *Australian Gas Market Vision*, December 2014.
2. See recommendation 12, in AEMC, *East Coast Wholesale Gas Markets and Pipeline Frameworks Review*, stage 2 final report, 23 May 2016, p. 15.
3. 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>
4. The Gas Market Reform Group (GMRG) was established by the COAG Energy Council in the latter half of 2016 to lead the design, development and implementation of a range of reforms set out in the Gas Market Reform Package. Find more at <http://gmrug.coagenergycouncil.gov.au/about-us>
5. This follows the AEMC's recommendation in our East Coast Review that the AER publish the indicators on a regular basis to promote market transparency. The metrics are available at the AER's website on: [https://www.aer.gov.au/industry-information/industry-statistics?f%5B0%5D=field\\_acc\\_aer\\_sector%3A5](https://www.aer.gov.au/industry-information/industry-statistics?f%5B0%5D=field_acc_aer_sector%3A5)
6. The reports are available at the ACCC's website on: <https://www.accc.gov.au/regulated-infrastructure/energy/gas-inquiry-2017-2025>
7. 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.
8. Resilience will not be 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.
9. 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.

## References and footnotes

10. ACER, *Implementation monitoring and managing the impact of the gas networks codes and guidelines on the internal market*, final report, October 2015, pp. 139-141.
11. Net market churn refers to the physical consumption that occurred in a certain market area and it does not include exports to adjacent local markets. Gross market churn also includes exports.
12. Physical participants may not necessarily be active in trading markets, for example they may buy or sell all of their gas through bilateral contracts outside of a trading market.
13. Market participants may be reluctant to trade on facilitated, transparent markets, where their positions and trading strategies could be revealed. For example, if more than half of the volume is traded by just two participants and those volumes are publicly published, it can reveal sensitive information even if the published data is anonymised.
14. The HHI measures the size of firms in relation to the industry. Higher HHI scores close to 10000 indicate a highly concentrated, non-competitive market environment, while those closer to zero indicate a much more competitive market. The ACCC's Merger Guideline document indicates that HHI levels above 2000 are indicative of a concentrated market.
15. An alternative metric to the number of trades for each product is the volume of gas traded per product. However, traded volumes may vary widely across products as the size of trades, in energy terms, will vary significantly. It should be noted that traded volumes will be collected in order to calculate the churn rate. Depending on the granularity of the data collected it may be possible to examine the volume of gas traded per product to supplement the analysis of number of trades per product.
16. The tenure and other technical specifications of products tradeable on the GSHs is set out in AEMO's GSH Trading Timetable document: [https://www.aemo.com.au/-/media/Files/Gas/Gas\\_Supply\\_Hubs/Market\\_Operations/2016/G\\_SH-Trading-Timetable.pdf](https://www.aemo.com.au/-/media/Files/Gas/Gas_Supply_Hubs/Market_Operations/2016/G_SH-Trading-Timetable.pdf)

## 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 EC	Council of Australian Governments Energy Council
CTP	Capacity Trading Platform
DAA	Day Ahead Auction
DWGM	Victorian Declared Wholesale Gas Markets
DTS	Victorian Declared Transmission System
GBB	Gas Bulletin Board
GMRG	Gas Market Reform Group
GSH	gas supply hub
HHI	Herfindahl-Hirschman Index
NGL	National Gas Law
NGR	National Gas Rules
NGO	national gas objective
OTC	over the counter
STTM	short term trading market

# APPENDIX

## GAS MARKETS BACKGROUND AND RECENT REFORMS





## Wholesale gas markets

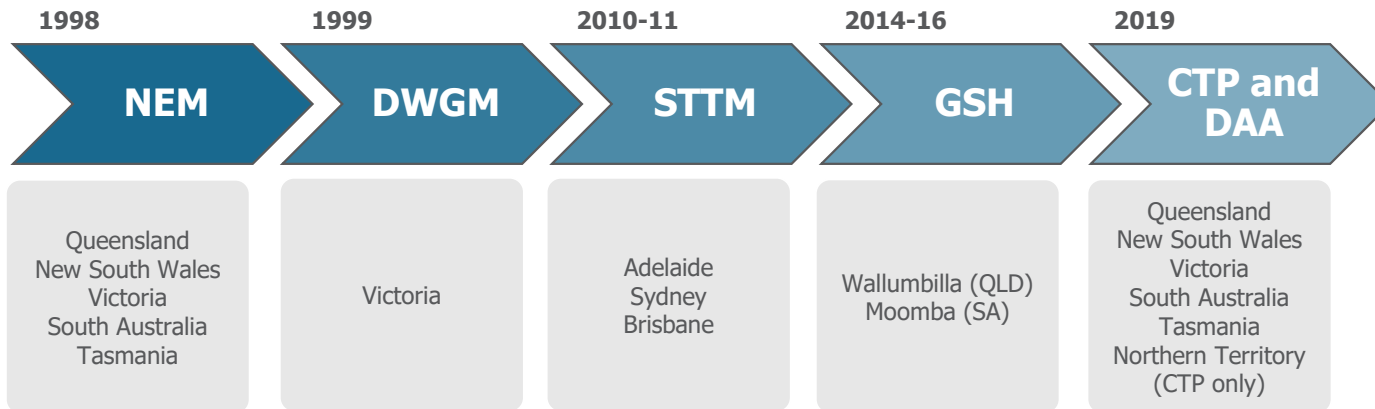
The eastern gas region has a number of wholesale markets for gas, which allow retailers or large customers to purchase gas without entering into long term contracts.

They are mainly used for managing short term imbalances that arise on a day when a large buyer's actual demand differs from its contracted supply.

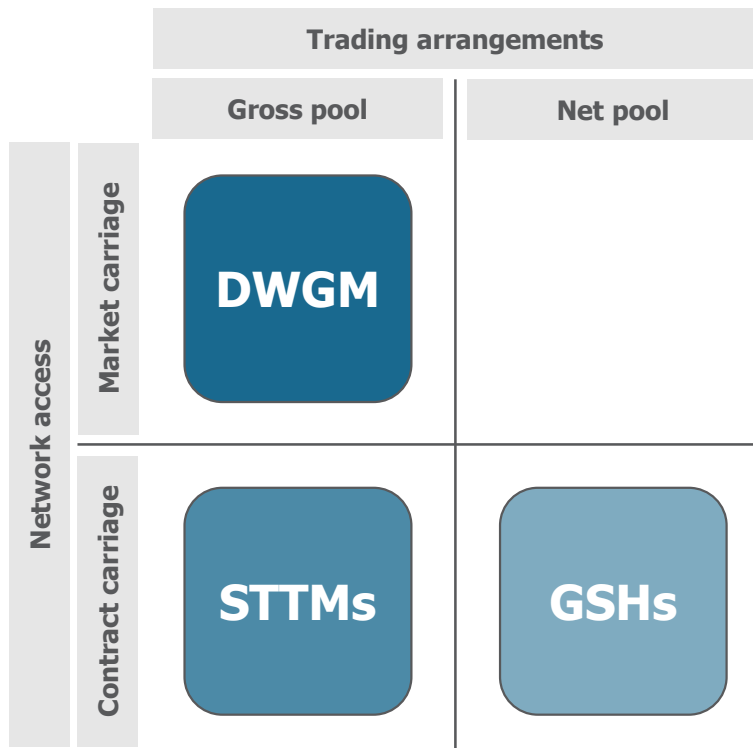
## Pipeline capacity trading markets

There are currently two facilitated secondary capacity trading markets operating in the East Coast:

- the Capacity Trading Platform (CTP), which is a voluntary exchange-based trading and listing service
- the Day-Ahead Auction (DAA) of contracted but un-nominated capacity, which is a very short-term variation of a use-it-or-lose-it mechanism.



## Wholesale gas markets trading arrangements



### TRADING ARRANGEMENTS

#### Gross pool

- All commodity that is dispatched/scheduled is traded through the market.

#### Net pool

- Voluntary participation
- Market participants may trade bilaterally “off market”
- Market participants may choose not to trade at all, meeting their own energy requirements.

### NETWORK ACCESS

#### Market carriage

- Capacity is allocated dynamically through the energy markets

#### Contract carriage

- Capacity allocated on the basis of bilateral contracts between the pipeline owner and the network user
- Capacity can be reallocated between network users on a secondary capacity market.

## Short Term Trading Market (STTM)

The STTM is a market-based wholesale gas balancing mechanism established at defined gas hubs in Sydney, Adelaide and Brisbane.

The market itself runs once a day, on the day ahead, for each hub.

It uses bids, offers, and forecasts submitted by participants, and pipeline capacities, to determine schedules for deliveries from the pipelines which ship gas from producers to transmission users and the hubs.

The market sets a daily market price at each hub and settles each hub based on the schedules and deviations from schedules.

Participants' daily transactions (scheduled trades and unscheduled deviations or variations) are settled at market prices and billed regularly (monthly).

Suitable credit management arrangements have been put in place to manage credit requirements.

AEMO operates the STTM but does not operate the physical pipeline or network assets.

## Gas Supply Hub (GSH)

AEMO implemented a GSH at Wallumbilla (Queensland) in March 2014, at the request of the COAG Energy Council.

The GSH, which is an exchange for the wholesale trading of natural gas, was introduced to enable improved wholesale trading for an east coast gas market affected by significant liquefied natural gas exports in Queensland.

Through an electronic platform, GSH participants can trade standardised, short-term physical gas products at each of the three foundation pipelines (Roma to Brisbane Pipeline, Queensland Gas Pipeline and South West Queensland Pipeline) connecting at Wallumbilla.

AEMO centrally settles transactions, manages prudential requirements and provides reports to assist participants in managing their portfolio and gas delivery obligations.

In June 2016 a trading location at Moomba (South Australia) was established, enabling participants in southern markets to trade under the same market framework and rules as at Wallumbilla.

In March 2017 the three trading locations at Wallumbilla were replaced with a single Wallumbilla location, through what is known as the Optional Hub Services (OHS) model. A single trading location at Wallumbilla improves market liquidity allowing trading participants across different pipelines to more easily trade with each other.

## Declared Wholesale Gas Market (DWGM)

The Victorian DWGM was established in 1999 to enable competitive, dynamic trading based on injections into, and withdrawals from, the transmission system that links multiple producers, major users and retailers.

In 2007, intra-day trading intervals were introduced.

AEMO acts as the market and pipeline operator.

The DWGM uses a gross pool with an open access (known as market carriage) approach to access the transmission pipeline:

- All scheduled gas must be offered to and bid from the market.
  - Otherwise, in the event of a pipeline constraint, the market operator (AEMO) would not have sufficient information to allocate capacity efficiently.

- For each schedule, market participants put in bids/offers to buy/sell gas.
- Based on these bids and offers and subject to pipeline capacity, AEMO's market clearing engines schedules injections and withdrawals of gas by minimising the cost of supplying the quantity of gas demanded and determines a price for gas.
- This in turn provides direction to the operation of the transmission pipeline.

This model is similar to how the National Electricity Market (NEM) operates.

**Table 2: Recent AEMC gas market reviews**

PROPOSED REFORM	CATEGORY	DESCRIPTION
<b>East Coast gas market review</b> (2015-2016)	<ul style="list-style-type: none"> <li>• Wholesale gas markets</li> <li>• Capacity markets</li> <li>• Information provision</li> </ul>	<p>15 recommendations, focused on redesigning wholesale gas markets, improving access to pipeline capacity and increasing transparency, which included:</p> <ol style="list-style-type: none"> <li>1. Continued development of the Wallumbilla GSH to provide a Northern Hub</li> <li>2. Reforming the existing DWGM arrangements to develop a Southern Hub</li> <li>3. Evolution of the Short Term Trading Market hubs and Moomba GSH</li> <li>4. Improvements to the pipeline capacity frameworks</li> <li>5. Information to support the market.</li> </ol>
<b>Victorian Declared Wholesale Gas Market review</b> (2016-2017)	<ul style="list-style-type: none"> <li>• Wholesale gas markets</li> <li>• Capacity markets</li> </ul>	<p>Recommended a staged approach to reforms, with 3 incremental short-term changes to the existing DWGM regime:</p> <ol style="list-style-type: none"> <li>1. A clean and simple wholesale price</li> <li>2. Establish a voluntary forward trading exchange over the DTS</li> <li>3. Improved pipeline capacity allocation and introduce capacity rights trading</li> <li>4. AEMC to assess the southern hub gas market conditions in 2020 as part of the existing biennial liquidity review, and provide recommendations on whether to proceed with implementing the target model.</li> </ol>
<b>Regulation of covered pipelines review</b> (2017-2018)	<ul style="list-style-type: none"> <li>• Pipeline economic regulation</li> <li>• Information provision</li> </ul>	<p>32 recommendations, focused on making it easier to negotiate gas transportation contracts, which covered the following topics:</p> <ol style="list-style-type: none"> <li>1. Framework for pipeline regulation</li> <li>2. Expansions and extensions</li> <li>3. Reference services</li> <li>4. Access arrangements</li> <li>5. Determining efficient costs</li> <li>6. Negotiation and information</li> <li>7. Arbitration</li> </ol>

**Table 3: Other current reform process**

REFORM	MARKET BODY	DESCRIPTION
<p><b>Information disclosure and arbitration framework</b>  <i>NGR Part 23</i>            (2016-2017)</p>	GMRG	<p>The new information disclosure and arbitration framework aims to facilitate access on reasonable terms to services provided by non-scheme pipelines, by:</p> <ul style="list-style-type: none"> <li>• providing for the publication and exchange of information to facilitate timely and effective commercial negotiations</li> <li>• providing an effective and binding process to resolve disputes about proposed terms of access in a cost-effective and efficient manner</li> <li>• setting out principles for determining disputes consistent with the outcomes reasonably to be expected in a workably competitive market.</li> </ul>
<p><b>Pipeline capacity trading</b>  <i>NGR Parts 24 and 25</i>            (2017-2018)</p>	GMRG	<p>Developed and implemented the reforms related to pipeline capacity trading recommended by the AEMC on the East Coast gas review:</p> <ul style="list-style-type: none"> <li>• A capacity trading platform that provides for exchange-based trading of commonly traded transportation products and a listing service for other more bespoke products.</li> <li>• A day-ahead auction of contracted but un-nominated capacity, which will be conducted each day on non-exempt transportation facilities shortly after nomination cut-off time and subject to a reserve price of zero.</li> <li>• A range of measures to facilitate capacity trading and the day-ahead auction, including the development of standard operational transportation service agreements.</li> <li>• A reporting framework for secondary capacity trades and a number of other transparency measures that are designed to facilitate capacity trading and the auction.</li> <li>• A standard market timetable that provides for a common gas day start time and a common nomination cut-off time for transportation facilities subject to the capacity trading reforms and the day-ahead auction.</li> </ul>

**Table 4: Other current reform process**

REFORM	MARKET BODY	DESCRIPTION
<b>Measures to improve transparency in the gas markets – report</b> (2018-2019)	ACCC/GMRG	Recommended 18 measures to improve the transparency of the gas market, many of which would be mandated through the inclusion of new reporting obligations in the National Gas Law (NGL) and National Gas Rules (NGR), covering the following areas: <ol style="list-style-type: none"> <li>1. Upstream activities (reserves and resources; contracted reserves; drilling activities; production cost estimates)</li> <li>2. Infrastructure availability and developments (infrastructure developments; uncontracted capacity outlook; users with contracted capacity)</li> <li>3. Gas and infrastructure prices (long-term GSAs; short-term GSAs; retail gas prices; transportation prices; stand-alone compression and storage facility prices)</li> <li>4. LNG exports and imports</li> </ol>
<b>Regulation impact statement (RIS) Measures to improve transparency in the gas market</b> (2019-2020)	COAG EC	<ul style="list-style-type: none"> <li>• This Consultation RIS covers the package of gas transparency measures identified in recommendations 1-10 and 14-17 of the ACCC-GMRG joint report and the AEMC’s Stage 2 Bulletin Board improvements.</li> <li>• Final report expected by mid-2020.</li> </ul>
<b>Regulation impact statement (RIS) Options to improve gas pipeline regulation</b> (2019-2020)	COAG EC	<ul style="list-style-type: none"> <li>• The purpose of this RIS process is to identify and evaluate options to deliver a more efficient, effective and well-integrated regulatory framework for gas pipelines.</li> </ul>

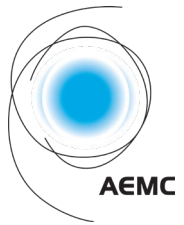
Source: Gas Market Reform Group website and COAG Energy Council website.



**Table 5: Recent AEMC gas market rule changes**

<b>RULE CHANGE</b>	<b>YEAR</b>	<b>CATEGORY</b>	<b>DESCRIPTION</b>
<b>Gas day harmonisation</b>	2017	<ul style="list-style-type: none"> <li>Wholesale markets</li> <li>Capacity markets</li> </ul>	Harmonise the gas day start times of all STTMs with the Victorian DWGM gas day start time of 6.00 am AEST.
<b>Improvements to natural gas bulletin board</b>	2017	<ul style="list-style-type: none"> <li>Information provision</li> </ul>	Enhance the breadth and accuracy of information provided to the market through the Bulletin Board.
<b>DWGM unintended scheduling results – decision timing</b>	2017	<ul style="list-style-type: none"> <li>Wholesale markets</li> </ul>	Amended the time for AEMO to respond to requests for investigations of an unintended scheduling result in the Victorian DWGM.
<b>STTM changes to periodic review of market parameters</b>	2017	<ul style="list-style-type: none"> <li>Wholesale markets</li> </ul>	Aligns the periodic review of market parameters for the STTMs with the NEM reliability standard and settings review.
<b>Regulation of covered pipelines</b>	2019	<ul style="list-style-type: none"> <li>Economic regulation</li> </ul>	Implemented a range of improvements to the regulation of covered transmission and distribution gas pipelines across Australia based on AEMC's review in 2018.
<b>STTM interface protocol</b>	2019	<ul style="list-style-type: none"> <li>Wholesale markets</li> </ul>	Streamlines the process of consultation required to make changes to the Short Term Trading Market Interface Protocol.
<b>DWGM improvement to AMDQ regime</b> (in progress)	2020	<ul style="list-style-type: none"> <li>Capacity markets</li> </ul>	Seeks to introduce separate, tradeable entry and exit capacity rights. Final determination expected by March 2020.
<b>DWGM simpler wholesale price</b> (in progress)	2020	<ul style="list-style-type: none"> <li>Wholesale markets</li> </ul>	Simplifies risk management for market participants and improves wholesale gas prices in the Victorian DWGM. Final determination expected by March 2020.

Source: AEMC website.



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