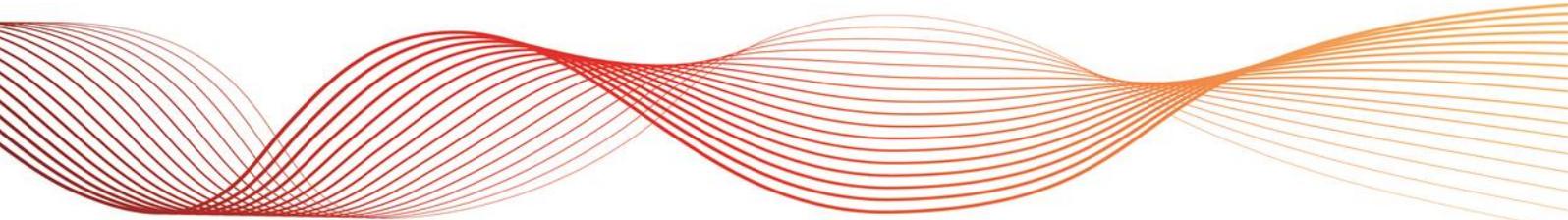




GAS MARKET PARAMETER REVIEW 2018

FINAL REPORT

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EXECUTIVE SUMMARY

Rule 492 of the National Gas Rules (NGR) requires AEMO to conduct a review of market parameter settings in the Short Term Trading Market (STTM). While there is no mandated review of the market parameters in the Declared Wholesale Gas Market (DWGM), AEMO is taking the opportunity to also review the DWGM market parameters in conjunction with the STTM parameter review.

AEMO is required to review the STTM market parameters in accordance with the extended consultative procedure set out in rule 9A of the NGR and produce a final report setting out the outcomes of its review by 30 April 2018.

Parameters covered by the review

Market parameters should remain in force for long enough for market participants to establish their forward contracting strategy, but should change when they could be more effective in some aspect, or when they are subject to changes in cost structure.

Table 1 Market Parameters subject to review

Parameter	STTM	DWGM
Market Price Cap (STTM) VoLL (DWGM)	\$400/GJ	\$800/GJ
Administered Price Cap	\$40/GJ	\$40/GJ
Cumulative Price Threshold	\$440/GJ (110 percent of the MPC)	\$1,800/GJ
CPT horizon (STTM) Cumulative price period (DWGM)	7 consecutive gas days	35 consecutive scheduling intervals (7 gas days)
Minimum Market Price (MMP)	\$0/GJ	\$0/GJ

AEMO has split this review into modelled parameters (where the parameter could be more effective, or could be subject to changes in cost structure) and reviewed parameters (where the parameter is unlikely to become more effective, or were not subject to significant changes in cost structure).

Modelling approach

Modelled parameters were the market price caps, the administered price caps, and the cumulative price threshold. The main driver for modelling is that there has been sustained increases to underlying market prices in both the STTM and the DWGM.

AEMO appointed Market Reform Pty Ltd to carry out the modelling work for this review. Their modelling approach is a scenario based analysis of each market's economic efficiency for a range of scenarios, market parameter values and market participant types. The scenarios cover extreme events in each market, and input data is modified for different years within the study period. Each scenario includes a sensitivity analysis to check the outcome for variations in input data.

The modelling allowed identification of sets of well performing and robust market parameters that informed the need for change and provided the basis for recommendations for change.

Review approach

The parameters that have been reviewed but not modelled are the cumulative price horizon/period and the minimum market price. These parameters are well established, and were considered unlikely to require change.

AEMO sought submissions from interested parties to confirm that these parameters were unlikely to become more effective or be subject to significant changes in cost structure in any way.



AEMO's final determinations

AEMO's final determination for gas market parameters are:

Parameter	STTM	DWGM
Market Price Cap (STTM) VoLL (DWGM)	Unchanged \$400/GJ	Unchanged \$800/GJ
Administered Price Cap	Unchanged \$40/GJ	Unchanged \$40/GJ
Cumulative Price Threshold	Unchanged \$440/GJ (110 percent of the MPC)	Changed \$1,400/GJ
CPT horizon (STTM) Cumulative price period (DWGM)	Unchanged 7 consecutive gas days	Unchanged 35 consecutive scheduling intervals (7 gas days)
Minimum Market Price (MMP)	Unchanged \$0/GJ	Unchanged \$0/GJ

Modelling showed that the current STTM parameter set were sufficient to allow revenue recovery for new investments, and provided adequate protection in the STTM.

The tightening supply and demand conditions over the studied period showed that the current DWGM market parameter set fails to provide adequate risk protection to market participants buying gas. The proposed reduction in the CPT value together with unchanged VoLL and APC allows the revised parameter set to provide adequate protection while minimising the impact on market efficiency and allowing adequate revenue recovery for new investments.

Further details are included in sections 4 and 5 below.

Consultation process

AEMO briefed the Gas Wholesale Consultative Forum (GWCF) in June 2017 on the impact of high prices on market parameters and AEMO's proposed approach to the review. A GWCF workshop in November 2017 provided interested parties with more details of the modelling approach.

A consultation paper published in December 2017 sought submissions on the approach to the gas Market Parameter Review 2018. Two submissions were received from interested parties, and are available on the review's page on AEMO's website¹.

A GWCF workshop in February 2018 presented more detail on the modelling methodology and preliminary modelling outputs.

A Draft Report published in March 2018 sought submissions on AEMO's draft recommendations and any other aspect of the draft report. Three submissions were received from interested parties, and are available on the review's page on AEMO's website² together with AEMO's comments on the submissions.

Next steps

It is AEMO's final determination to reduce the DWGM cumulative price threshold from \$1,800/GJ to \$1,400/GJ.

AEMO will conduct a formal consultation under Part 15B of the National Gas Rules in time to implement the changes with effect from 1 July 2020.

¹ <http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Gas-Market-Parameter-Review-2018>

² <http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Gas-Market-Parameter-Review-2018>



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1. INTRODUCTION

The Short Term Trading Market (STTM) and Declared Wholesale Gas Market (DWGM) feature a number of price cap parameters that manage participant risk, and convey economic price signals. These parameters have previously been derived based on extensive modelling and review. The STTM parameters were first set in 2009, based on modelling performed by McLennan Magasanik Associates (MMA) and a peer review by Creative Energy Consulting. The DWGM parameters were first set over 1997 and 1998, and were reviewed in 2008 based on modelling performed by MMA, with peer review by Market Reform. No changes resulted from this review. The DWGM cumulative price threshold was reviewed in 2013 and changed from \$3,700 per GJ to \$1,800 per GJ with effect from 1 April 2014.

Rule 492 of the National Gas Rules (NGR) requires AEMO to undertake a review of the STTM market parameters by 30 April 2018. AEMO is also taking the opportunity to review the DWGM market parameters in conjunction with the STTM parameter review.

This document outlines the approach to the review together with AEMO's initial analysis and considerations for stakeholder feedback.

2. PARAMETERS COVERED BY THE REVIEW

2.1 STTM market parameters

Clause 492 of the NGR mandates a review of the following STTM market parameters:

Table 2 STTM Market Parameters

Parameter	Description	Documented In	Value
Market Price Cap (MPC)	The maximum market price to apply for a gas day. The MPC provides an upper limit on market clearing prices while not suppressing or distorting economic incentives for capacity investment, and providing market compensation for involuntary curtailment.	National Gas Rules	\$400/GJ
Administered Price Cap (APC)	The cap applicable when an administered price cap state is in place. The APC mitigates the risk of high prices in circumstances where exposure to extreme pricing is unlikely to promote a reasonable market response or market outcome.	National Gas Rules	\$40/GJ
Cumulative Price Threshold (CPT)	The threshold for automatic imposition of an administered price cap state. The CPT mitigates the risk of extended periods of high prices.	National Gas Rules	\$440/GJ (110 percent of the MPC)
CPT horizon (CPTH)	The period over which hub prices are summed to determine whether the cumulative price threshold has been exceeded.	National Gas Rules	7 consecutive gas days
Minimum Market Price (MMP)	The minimum market price to apply for a gas day.	National Gas Rules	\$0/GJ

There are two other parameters that currently operate in the STTM:

- **Market operator service (MOS) Cost Cap**—currently set at \$50/GJ, the MOS cost cap is the maximum price for MOS increase and decrease offers covering the MOS service component of market settlements. The MOS cost cap must be sufficient to cover the cost of holding capacity, while limiting MOS costs on the market.



- Settlement Surplus Cap—currently set at \$0.14/GJ, the settlement surplus cap is the maximum settlement surplus payment rate to be allocated based on deviations.

Neither the MOS cost cap nor the settlement surplus cap were within the scope of this review. The STTM operational review completed on 30 March 2012³ considered both parameters.

2.2 DWGM market parameters

This review included the following DWGM parameters:

Table 3 DWGM Market Parameters

Parameter	Description	Documented In	Value
Value of Lost Load (VoLL)	The maximum market price. VoLL provides an upper limit on market clearing prices while not suppressing or distorting economic incentives for capacity investment, and providing market compensation for involuntary curtailment.	National Gas Rules	\$800/GJ
Administered Price Cap (APC)	The cap applicable when an administered price cap state is in place. The APC mitigates the risk of high prices in circumstances where exposure to extreme pricing is unlikely to promote a reasonable market response or market outcome.	Wholesale Market Administered Pricing Procedures (Victoria)	\$40/GJ
Cumulative Price Threshold (CPT)	The threshold for imposition of an administered price period. The CPT mitigates the risk of extended periods of high prices.	Wholesale Market Administered Pricing Procedures (Victoria)	\$1,800/GJ
Cumulative Price Period (CPP)	The period over which marginal clearing prices are summed to determine whether the cumulative price threshold has been exceeded.	Wholesale Market Administered Pricing Procedures (Victoria)	35 consecutive scheduling intervals (7 gas days)
Minimum bid price (MBP)	The minimum price for a bid	National Gas Rules	\$0/GJ

The Value of Customer Reliability (VCR) was not within the scope of this review.

3. REVIEW APPROACH AND TIMETABLE

3.1 Review approach

Once set, market parameters should remain in force for long enough for market participants to establish their forward contracting strategy, but should change when they could be more effective in some aspect, or when they are subject to changes in cost structures. Accordingly, AEMO has split the market parameters being into two review categories:

- **Modelled parameters** – where the parameters may be more effective or could be subject to changes in cost structure; and
- **Reviewed parameters** – where the parameters were unlikely to become more effective or were not subject to significant changes in cost structure.

Each is discussed in more detail below.

³ STTM Operational Review and Demand Hubs Review—Final Report, AEMO, 30 March 2012.



Modelled parameters

Modelled Parameters were:

- Market Price Cap (MPC) / VoLL
- Administered Price Cap (APC)
- Cumulative Price Threshold (CPT)

AEMO retained consultants Market Reform Pty Ltd to develop a modelling approach, model the parameters and make recommendations for the values of market parameters to be applied from 1 July 2020.

Reviewed parameters

Where parameters were unlikely to become more effective or subject to significant changes in cost structure, AEMO consulted with interested parties to confirm that these parameters should remain unchanged. Parameters included in this category were:

- CPT Horizon (CPTH) / Cumulative price period (CPP)
- Minimum Market Price (MMP) / Minimum bid price (MBP)

These market parameters are reviewed in section 4 below.

3.2 Modelling approach

Based on a Scope of Work developed in consultation with the Gas Wholesale Consultative Forum (GWCF), AEMO sought proposals from consultants to carry out the modelling work. Three submissions were received. After evaluation of the proposals, AEMO appointed Market Reform Pty Ltd as the modelling consultant.

Summary of Market Reform's modelling approach

Market Reform's approach was to model the market's economic efficiency for a range of market parameter values across a number of scenarios. Each scenario included base and extreme event cases, so that the loss of economic efficiency for the modelled market parameter values can be determined for the scenario. The market outcomes for the scenario are then applied to a number of typical market participants to assess their varying degree of risk exposures resulting from the scenario.

The market context for scenarios reflected either the DWGM or the STTM, with the supply and demand modified to reflect conditions for a particular year within the study period and extreme events relevant to the particular market. Each scenario included an extreme pricing event and subsequent days during which the CPT may be reached, triggering APC. This allows assessment of each market's economic performance for the modelled market parameter values.

A scenario designed to reflect interactions between markets will include sets of STTM data and DWGM data suited to the scenario, but the market modelling for each was run separately. Each simulation included a sensitivity analysis to test the robustness of the market parameters for outcomes resulting from changes to the uncontrollable demand and offer prices used in the scenario. Where a scenario and set of data inputs would result in curtailment, the outputs were ignored⁴.

The modelling produced sets of results for combinations of gas market parameters, extreme events (in different market contexts) and for different sensitivity factor settings. From these, a set of well performing and robust parameters were identified. This set of parameters was used to inform the need for change for a market parameter, and to inform the recommendation of more appropriate market parameter values.

⁴ General curtailment in the STTM or the DWGM will lead to an APC regardless of other market prices, so the scenario is ineffective.



For more details of Market Reform's approach, please refer to Attachment 1 – Gas Market Parameter Review 2018 – Final Report - Market Reform Pty Ltd.

3.3 Review timetable

AEMO is required to review the STTM market parameters in accordance with the extended consultative procedure as per section 9A of the NGR. AEMO is required to complete this review by producing a final report setting out its final recommendations by 30 April 2018.

The review of the DWGM market parameters will adhere to this timetable.

Table 4 Review timetable

Process	Date
<i>Industry workshop to discuss review approach and scope</i>	<i>3 November 2017 (Completed)</i>
Consultation Paper – Open for Consultation	<i>8 December 2017 (Completed)</i>
Consultation Paper – Closing date for submissions	<i>24 January 2018 (Completed)</i>
Gas Wholesale Consultative Forum – Presentation of modelling and consultation outcomes	<i>13 February 2018 (Completed)</i>
Draft Report – Open for consultation	<i>9 March 2018 (Completed)</i>
Draft Report – Closing date for submissions	<i>26 March 2018 (Completed)</i>
AEMO publishes final report	30 April 2018

4. MODELLED PARAMETERS

Market Reform final report

Market Reform's final report is included in Attachment 1, and is structured as set out in Table 5 below.

Table 5 Market Reform Report Structure

Section	Description
Section 1	Introduction
Section 2	Roles and bounds on the gas market parameters.
Section 3	Methodology and approach.
Section 4	Consultation and other feedback received
Section 5	Data and key assumptions
Section 6	Study findings
Section 7	Market Reform recommendations
Appendix.	Abbreviations
Appendix B	Scenarios
Appendix C	Summary data on market outcomes
Appendix D	Risk exposure levels for the different hypothetical participants



AEMO's final determinations

Market Reform's modelling has shown that the current STTM parameter set were sufficient to allow revenue recovery for new investments, and provided adequate protection in the STTM.

However, the modelling has shown that the tightening supply and demand conditions over the studied period mean that the current DWGM market parameter set fails to provide adequate risk protection to market participants buying gas. The proposed reduction in the CPT value together with unchanged VoLL and APC allows the revised parameter set to provide adequate protection while minimising the impact on market efficiency and allowing adequate revenue recovery for new investments.

AEMO has therefore accepted Market Reform's recommendations for the modelled market parameters and has made final determinations as follows:

Final determination 1 – No change to market price cap / VoLL

The market price cap in the STTM remains at \$400 per GJ

The value of VoLL in the DWGM remains at \$800 per GJ

Final determination 2 – No change to the Administered Price Cap

The administered price cap in the STTM remains at \$40 per GJ

The administered price cap in the DWGM remains at \$40 per GJ

Final determination 3.1 – No change to Cumulative Price Threshold in STTM

The cumulative price threshold in the STTM remains at 110% of market price cap (\$440 per GJ)

Final determination 3.2 – Change to Cumulative Price Threshold in DWGM

The cumulative price threshold in the DWGM be changed from \$1,800 per GJ to \$1,400 per GJ

5. REVIEWED PARAMETERS

5.1 Minimum market price / Minimum bid price

Purpose of minimum market price

Key principles in setting minimum market price are:

- no shipper should want to supply the spot market at a price less than MMP⁵
- MMP set sufficiently low as to not constrain the schedule

Previous reviews

The initial review of the STTM market parameters during the STTM Establishment Project concluded that:

⁵ STTM MARKET SETTINGS ANALYSIS, June 2009, Report to VENCORP by McLennan Magasanik Associates



“...a commercial or operational requirement for a negative minimum market price may not exist. Without a demonstrated need to bid below \$0/GJ there appears little justification for setting a minimum market price below this level.”⁶

Although not specifically modelled in previous reviews of the DWGM, the circumstances applying to the STTM are directly applicable to the DWGM.

Treatment of minimum market price in the NEM

The National Electricity Market (NEM) includes a negative minimum market price to allow negatively priced offers to give greater certainty of dispatch, thus avoiding stopping and starting generators for short periods.

Because injections of gas are treated as being uniform for the balance of the gas day in the DWGM, and for a full gas day in the STTM, the scheduling period in gas is significantly longer than the five minute NEM dispatch interval. It is therefore unlikely that the incentive for generators to offer short periods at negative prices in the NEM is replicated in gas markets.

Are current minimum market prices effective?

From 2013 until the end of Q3 in 2017, there have been 14 instances where the ex-ante market price has cleared at zero dollars per GJ (see Table 6 below for details).

Table 6 Ex Ante market prices of zero dollars per GJ

	DWGM	STTM
2013	1 (10am)	1 (Adelaide)
2014	-	1 (Brisbane)
2015	-	-
2016	2 (10am) 3 (6pm) 6 (10pm)	-
2017	1 (10pm)	-

While it is likely there will be tie breaking at zero dollars due to system point constraints in the DWGM (eg during maintenance), setting a negative MMP is likely to shift the tie breaking to the lower MMP with no change to the ex-ante market price.

Submissions on suitability of current minimum market prices

AEMO’s initial assessment was that the setting for an MMP set at zero dollars per GJ is effective.

AEMO sought submissions from interested parties as to whether the setting for MMP in the DWGM and STTM at \$0 per GJ could be more effective in any way.

No submissions were received in response to the consultation paper or the draft report, and AEMO’s final determination is that there will be no changes to the minimum market price in the STTM or the minimum bid price in the DWGM.

Final determination 4 – No change to minimum market price / minimum bid price

The minimum market price in STTM and minimum bid price in DWGM remain at \$0 per GJ.

⁶ STTM MARKET SETTINGS ANALYSIS, June 2009, Report to VENCORP by McLennan Magasanik Associates



5.2 CPT horizon / Cumulative price period

Purpose of the CPT horizon / Cumulative price period

The primary purpose of the CPT is to cap price risks over a period of time. The CPTH / CPP sets the period of time for which prices are accumulated. It is aligned across the DWGM and STTM at seven gas days (35 consecutive scheduling intervals), which corresponds with the 336 intervals used in the NEM.

Treatment of the CPT horizon in current Reliability Panel review

The Reliability Panel has determined that the current review of reliability standard and settings will not examine the form of the CPT, and will only assess the level of the CPT⁷.

Submissions on suitability of the current CPT horizon

AEMO's initial assessment is that having the settings for CPTH / CPP are effective at seven consecutive gas days in the STTM and 35 consecutive scheduling intervals in the DWGM.

AEMO sought submissions from interested parties as to whether the setting for CPTH at seven consecutive gas days in the STTM and CPP at 35 consecutive scheduling intervals in the DWGM could be more effective in any way.

No submissions were received in response to the consultation paper or the draft report, and AEMO's final determination is that there will be no changes to the CPT horizon in the STTM or the cumulative price period in the DWGM.

Final determination 5 – No change to CPT horizon / cumulative price period

The CPT Horizon in the STTM should remain at 7 days.

The cumulative price period in the DWGM should remain at 35 scheduling intervals.

6. CONSULTATION PROCESS

6.1 GWCF briefing

The GWCF was briefed on the impact of higher prices on market parameters and AEMO's proposed approach to the parameter review, and were given the opportunity to provide input to the scope of work for modelling of market parameters.

Papers for past GWCF meetings are available on AEMO's website.

⁷ Reliability Panel, Review of reliability standard and settings guidelines, final guidelines, 1 December 2016, Sydney (Section 3.4)



6.2 Industry workshop

To initiate consultation on the review process, on 3 November 2017, AEMO held an industry workshop. The purpose of the workshop was to seek industry views on the following:

- The review approach and timetable proposed by AEMO.
- The set of parameters requiring review and/or modelling.
- Presentation from Market Reform Pty Ltd including:
 - Markets and Trends
 - Past Reviews and Proposed Approach
 - Modelling
 - Data Sources

Presentations to the workshop are available on the Gas Market Parameter Review 2018 web page on AEMO's website (<http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Gas-Market-Parameter-Review-2018>)

6.3 Gas Market Parameter Review 2018 – consultation paper

AEMO published a Consultation paper in December 2017, and sought submissions from interested parties as to the proposed modelling approach for market parameters that may be subject to changes in cost structures (market price caps, the administered price caps, and the cumulative price threshold) and review approach for those market parameters thought to be unlikely to become more effective in any way or subject to changes in cost structures (cumulative price horizon/period and the minimum market price).

AEMO received two submission that were generally supportive of approach.

Submissions and AEMO's comments on the submissions are available on the Gas Market Parameter Review 2018 web page (<http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Gas-Market-Parameter-Review-2018>)

6.4 GWCF briefing

AEMO briefed the GWCF on 13 February 2018 on the modelling approach and Market Reform presented and discussed initial model outputs.

AEMO received three submissions after the GWCF briefing.

Presentations and notes from the briefing and submissions received after the briefing are available on the Gas Market Parameter Review 2018 web page on AEMO's website (<http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Gas-Market-Parameter-Review-2018>).

6.5 Submission in response to draft report

AEMO sought submissions from interested parties in response to any aspect of the draft determinations in the draft report and Gas Market Parameter Review 2018 – Draft Report - Market Reform Pty Ltd.

AEMO received three submissions in response to the Draft Report. These are available on the Gas Market Parameter Review 2018 web page on AEMO's website (<http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Gas-Market-Parameter-Review-2018>), together with AEMO's comments on the submissions.



7. NEXT STEPS

7.1 Regulatory changes to implement final determination

Following the Final Report, AEMO will commence the regulatory change process to consult on implementation of final determination 3.2 effective from 1 July 2020.

Changes need to be made to the Wholesale Market Administered Pricing Procedures (Victoria) only. This change will follow the ordinary process for making Procedures set out in Part 15B of the NGR.

8. ATTACHMENTS

1. Gas Market Parameter Review 2018 –Final Report - Market Reform Pty Ltd.



MEASURES, ABBREVIATIONS AND GLOSSARY

Units of measure

Abbreviation	Unit of measure
GJ	Gigajoule
TJ	Terajoule
PJ	Petajoule

Abbreviations

Abbreviation	Expanded name
AEMO	Australian Energy Market Operator
APC	Administered Price Cap (STTM & DWGM)
CPP	Cumulative Price Period (for CPT in DWGM) – equivalent to CPTH in STTM
CPT	Cumulative Price Threshold (STTM & DWGM)
CPTH	CPT Horizon (for CPT in STTM) – equivalent to CPP in DWGM
DWGM	Declared Wholesale Gas Market - Victoria
MBP	Minimum Bid Price (DWGM) - equivalent to MMP in STTM
MMP	Minimum Market Price (STTM) – equivalent to MBP in DWGM
MPC	Market Price Cap (STTM) – equivalent to VoLL in DWGM
NEM	National Electricity Market
NER	National Electricity Rules
NGL	National Gas Law
NGR	National Gas Rules
STTM	Short Term Trading Market – Sydney, Adelaide and Brisbane hubs
VoLL	Value of Lost Load (DWGM) – equivalent to MPC in STTM

Glossary

This document uses many terms that have meanings defined in the National Electricity Rules (NER) or the National Gas Rules (NGR). The NER / NGR meanings are adopted unless otherwise specified.