



Australian Energy Market Commission

DWGM OPERATING SCHEDULES

National Gas Amendment (DWGM operating schedules) Rule 2015

Rule Proponent
AEMO

10 September 2015

**RULE
CHANGE**

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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.

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1 Introduction

On 27 March 2015, the Australian Energy Market Operator (AEMO) submitted a rule change request to the Australian Energy Market Commission (AEMC or Commission) relating to AEMO's obligations under the National Gas Rules (NGR or Rules) to produce and publish operating schedules for the Victorian Declared Wholesale Gas Market.¹

The rule change request proposes to:

- amend rule 215(2) to provide greater flexibility in terms of the modelling approach that AEMO is required to utilise to produce operating schedules; and
- insert a new rule 215A to define the process that AEMO would be required to follow to produce and publish a feasible operating schedule in circumstances where it has been unable to do so in accordance with rule 215.

This paper has been prepared to facilitate public consultation on the rule change proposal and to seek stakeholder submissions. The paper:

- provides a summary of, and background to, the rule change request;
- identifies a number of questions and issues to facilitate consultation on the rule change request; and
- outlines the process for making submissions.

1.1 Background

The Victorian Declared Wholesale Gas Market (DWGM)

The DWGM is a wholesale market for the supply and purchase of gas in Victoria and some parts of New South Wales. It is compulsory for any Market Participant in Victoria wanting to either supply gas into Victoria, or export gas via the Declared Transmission System (DTS), to use the DWGM.

AEMO has a unique role in the DWGM as both the operator of the market and the DTS. This means that AEMO is responsible for balancing gas supply and demand and transportation capacity through a centrally co-ordinated scheduling process.

The scheduling process for the DWGM

AEMO produces and publishes scheduling instructions to Market Participants in the DWGM for each gas day. These instructions are prepared and published in the form of operating schedules and pricing schedules in accordance with rules 215 and 221 of the NGR, respectively.

The pricing schedule determines the ex ante market price based on Market Participants' bids for the gas supply and gas demand forecasts, using a bid stack to achieve the lowest price.²

This compares to the operating schedule, which determines the physically achievable (ie, feasible) hourly gas injections and withdrawals at each injection and withdrawal point for each Market Participant over the gas day, taking into account transmission pipeline constraints, linepack distribution, system limits on pressure and gas flows.

The rule change proposal relates to rule 215 and the operating schedule only, as outlined below.

Requirements under rule 215 of the NGR

Rule 215 sets out the process that AEMO must follow to produce and publish the DWGM operating schedules. There are three key components to rule 215. In summary:

- rule 215(1) specifies the inputs and assumptions that AEMO must use to produce the operating schedules;³
- rule 215(2) requires AEMO to apply the inputs and assumptions specified in rule 215(1) in an *optimisation program*⁴ (ie, a software application), in which a representation of the DTS and valid demand forecasts and bids submitted by Market Participants, are used to produce the operating schedules which specify gas injections and withdrawals for each hour of the gas day in a way that minimises the cost of satisfying expected demand for that gas day; and
- rule 215(3) requires AEMO to publish the operating schedules (and pricing schedules) by certain times throughout the gas day as well as for the next two gas days, as depicted in Figure 1.1.

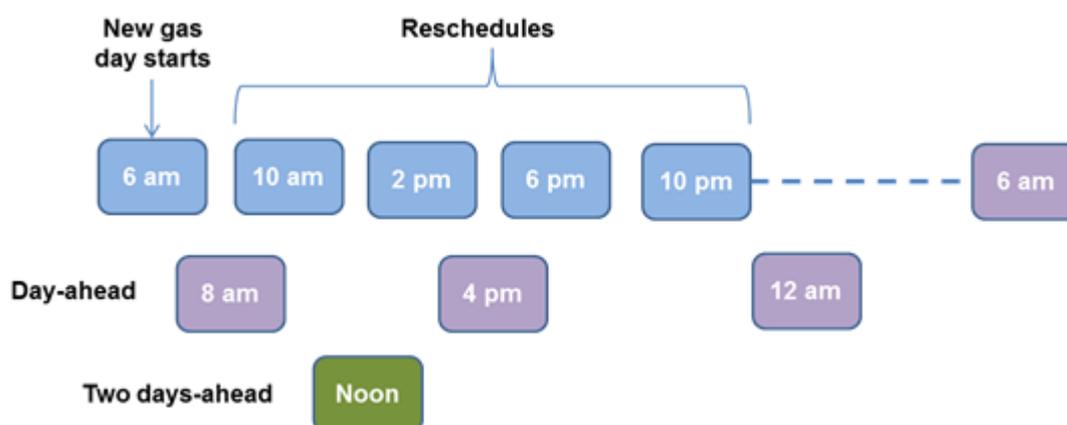
1 A copy of AEMO's rule change, which also contains a proposed rule, has been published on the AEMC's website, www.aemc.gov.au.

2 The market price is determined by the marginal price of the cumulative injection bid quantities that are required to meet the total Market Participant demand forecasts and controllable withdrawal bids (AEMC, East Coast Wholesale Gas Market and Pipeline Frameworks Review, Stage 1, Final Report, 23 July 2015, p. 251).

3 Rule 215(1) sets out the inputs and assumptions to be used by AEMO, including: the demand forecasts and bids submitted by Market Participants for the gas day; any conditions or constraints applicable to the bids of Market Participants and the delivery or receipt of gas; AEMO's demand forecast override; the linepack target for the end of the gas day; and any equations of constraints relating to the flow of gas in the DTS. Refer to rule 215(1) for the comprehensive list of inputs and assumptions.

4 The Market Clearing Engine (MCE) is an *optimisation program* (software application) that determines the daily operating and pricing schedules. The model combines non-linear pressure/flow equations, equations related to pipeline infrastructure (such as compressors and pressure regulation stations), and participant bids for gas deliveries and receipts, within an optimisation framework to determine optimal hourly receipts and deliveries of gas at least cost based on the bids and physical constraints within the system (AEMO, National Gas Rule Change Proposal - DWGM Operating Schedules, 27 March 2015, p. 8).

Figure 1.1 Daily preparation of DWGM schedules by AEMO



1.2 Issues raised in the rule change request

In its rule change request, AEMO raises two issues with the rules relating to production of operating schedules in the DWGM:

1. there is uncertainty regarding which modelling tools can be used by AEMO in representing the DTS to produce operating schedules; and
2. the NGR do not specify what AEMO is to do if it is unable to produce an operating schedule in accordance with rules 215(1) and 215(2) by the times specified in rule 215(3).

AEMO is concerned that a strict interpretation of rule 215 would require it to suspend the DWGM on "a fairly regular basis."⁵

Both of these issues are outlined below.

Issue 1: Uncertainty regarding modelling tools to produce operating schedules

Rule 215(2) requires AEMO to apply the inputs and assumptions set out in rule 215(1) in an "*optimisation program*."

However, situations can arise where the pipeline representation in AEMO's *optimisation program*⁶ lacks sufficient accuracy to produce a feasible operating schedule. These situations include occurrences of severe transients, such as unanticipated peaks of uncontrollable demand (eg, peaks in household demand which typically occur in extreme cold weather).

In its rule change request, AEMO suggests the NGR is unclear about whether it may draw on additional tools, such as a real-time engineering model that may more

⁵ AEMO, National Gas Rule Change Proposal - DWGM Operating Schedules, 27 March 2015, p. 2.

⁶ The optimisation program used by AEMO is known as the Market Clearing Engine (MCE). See footnote 4 for more information on the MCE.

accurately simulate DTS constraints,⁷ to validate and, where necessary, modify the *optimisation program's* inputs so that DTS constraints are accurately reflected in the operating schedule. In the event that all constraints are not applied or accurately reflected, the operating schedule may be infeasible. AEMO claims that in extreme circumstances, publication of infeasible operating schedules may result in risks to system security (eg, where uncontrolled withdrawals are higher than forecast injections).

Issue 2: NGR do not specify what AEMO is to do if it is unable to produce an operating schedule

Rule 215(3) requires AEMO to publish operating schedules by specified times throughout the gas day and for the next two gas days. However, AEMO claims the NGR do not specify the course of action that AEMO should take in the event that the production and publication of operating schedules do not meet the specified times.⁸

AEMO considers that in the absence of clarity in the Rules on this issue, it may be implied that AEMO is required to suspend the DWGM under rule 347(d)(1) as it cannot operate the Market in accordance with rule 215.⁹

1.3 Proposed solution

In order to address the issues that have been identified by AEMO in section 1.2, AEMO has proposed a rule change to:

- remove the requirement for AEMO to use an *optimisation program* to produce the DWGM operating schedules, and instead require AEMO to produce the operating schedules in a way that minimises the cost of satisfying demand for gas on that gas day, taking account of any transmission constraints in the DTS (ie, by amending rule 215(2)); and
- clarify the process that AEMO would be required to follow if unable to produce feasible operating schedules in accordance with rule 215 (ie, by inserting a new rule 215A).

⁷ AEMO's engineering model (the Gregg Model) is a purpose-built pipeline simulation model of the DTS, which is used in real-time to determine constraints and confirm the operating strategies required to maintain system security. The model is used to determine pipeline capacity constraints, compression requirements and how much peak shaving gas is required to maintain minimum system pressures. The Gregg Model is used as the "Common Model," shared between APA Group (the owner of the DTS) and AEMO to agree on the capacity of transmission pipelines and compressors in the DTS. The agreed pipeline capacities are published in the Victorian Gas Planning Report which provides Market Participants with information on the pipeline capacities used when determining constraints in the operating schedule. The Gregg Model is not an optimisation model. (AEMO, National Gas Rule Change Proposal - DWGM Operating Schedules, 27 March 2015, p. 8).

⁸ Delays can be caused by failures of IT hardware or software, data error or human error.

⁹ Rule 347 of the NGR describes conditions for suspension of the DWGM. Under rule 347(d)(1) AEMO may declare the Market to be suspended when it determines that it is necessary to suspend the Market because it has become impossible to operate the Market in accordance with the provisions of Part 19 (DWGM) of the NGR.

A copy of AEMO's rule change request, which also contains a proposed rule, has been published on the AEMC's website.¹⁰

In the rule change request, AEMO advises that it raised the issue and proposed solution at its Gas Wholesale Consultative Forum meeting on 10 February 2015 and that meeting participants did not object to a rule change being proposed to the AEMC.

The Australian Energy Regulator (AER) has commented on this matter in a recent Quarterly Compliance Report:¹¹

“Given that AEMO’s current method appears not to be having any adverse market impacts and it has lodged a rule change proposal with the AEMC to clarify the issues, we propose not taking any action at this stage.”

1.4 Expected costs and benefits of the proposed rule change

In its rule change request, AEMO claims there would be minor administrative costs as a result of making the proposed rule. AEMO claims that these expected costs will be absorbed into ongoing operational costs and will have no impact on market fees.

AEMO has not identified any costs to Market Participants.

AEMO has identified the following benefits for it and Market Participants as a result of making the proposed rule:

- certainty that the physical characteristics of the DTS have been accurately reflected in the operating schedules; and
- clarity of NGR and AEMO processes should avoid operational and administrative costs in the event of market suspension resulting from the production and publication of infeasible operating schedules.

1.5 Assessment framework

The Commission's assessment of this rule change must consider whether the proposed rule promotes the National Gas Objective (NGO):¹²

“The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.”

¹⁰ <http://www.aemc.gov.au/Rule-Changes/DWGM-operating-schedules>.

¹¹ Australian Energy Regulator, Quarterly Compliance Report, Quarter 1, 2015, p. 15, www.aer.gov.au.

¹² NGL, s.23.

The Objective captures the three dimensions of efficiency: productive (efficient operation), allocative (efficient use of) and dynamic efficiency (efficient investment).¹³

Based on a preliminary assessment of this rule change request, the most relevant aspect of the NGO for the purpose of assessing this rule change request is productive efficiency. That is: "the efficient operation of natural gas services for the long term interests of consumers of natural gas with respect to price, reliability and security of supply of natural gas." The AEMC considers this aspect of the NGO to be most relevant as the rule change request seeks to clarify the processes AEMO must follow in its role as the operator of the DWGM, to produce and publish the operating schedules.

To determine whether the proposed rule, if made, is likely to promote the NGO, the following principles may be considered by the AEMC when assessing the rule change request:

- **Regulatory certainty:** Market and regulatory frameworks should be flexible and provide firms with a clear and consistent set of rules that allow them to independently develop business strategies/ models and to adjust to changes in the market. Frameworks should be resilient to changing supply and demand conditions, and patterns of flow, over the long-term.

In the context of this rule change request, the AEMC may consider whether the proposed rule change will, or is likely to:

- clarify the objective of rule 215(2), in terms of whether the proposed amendment would provide certainty to AEMO and Market Participants about the process AEMO will follow to produce and publish feasible operating schedules;¹⁴ and
- minimise the risk of AEMO unnecessarily suspending the Market,¹⁵ given that a consequence of doing so is that it would trigger an administered

¹³ Productive efficiency means goods and services should be provided at the lowest possible costs to consumers; allocative efficiency means that the price of goods and services should reflect the cost of providing them, and that only those products and services that consumers desire should be provided; dynamic efficiency means arrangements should promote investment and innovation in the production of goods and services so that allocative and productive efficiency can be sustained over time, taking into account changes in technologies and the needs and preferences of consumers.

¹⁴ The AEMC notes that the Wholesale Market Gas Scheduling Procedures (Victoria) set out the processes and practices currently employed by AEMO in the event that it is unable to comply with rule 215. The AEMC also notes AEMO's advice that these Procedures are "well-established" and "deliver operational and market outcomes consistent with the intended outcomes of rule 215 and the NGO."

¹⁵ Under rule 347(1)(d) of the NGR, AEMO may declare the Market to be suspended when it determines that it is necessary to suspend the Market because it has become impossible to operate the Market in accordance with the provisions of Part 19 (DWGM) of the NGR.

pricing period (with a price cap of \$40/GJ)¹⁶ that may cause disruption to the normal operation of the DWGM.¹⁷

- **Transparency:** Information that is, or could be, market sensitive should be publicly disclosed to all interested parties at the same time. Information should be published in a consistent format that allows ease of interpretation by others.

In the context of this rule change request, the AEMC may consider whether the proposed rule change will, or is likely to, provide Market Participants with information about how operating schedules have been produced.

1.6 Issues for consultation

Taking into consideration the assessment framework and potential requirements to implement the proposed rule change, a number of issues have been identified for consultation that appear to be relevant to this rule change request.

The issues, outlined below, are provided for guidance. Stakeholders are encouraged to comment on these issues, as well as any other aspect of the rule change request or this paper.

1.6.1 Objective of rule 215(2)

As discussed in section 1.2, rule 215 describes the inputs, assumptions and processes that AEMO must follow to produce and publish DWGM operating schedules. In particular, rule 215(2) sets out an objective that operating schedules should be produced in a way that minimises the cost of satisfying expected demand for gas over the gas day:

“The inputs and assumptions set out in subrule (1) must be applied in an *optimisation program* in which a representation of the DTS and valid demand forecasts and bids are used to produce operating schedules which specify injections and withdrawals for each hour of the gas day in a way that *minimises the cost of satisfying expected demand for gas over the gas day.*”
[emphasis added]

¹⁶ Under rule 224, AEMO must determine an administered price cap and make Procedures that specify that cap. The administered price cap of \$40/GJ is set out in Chapter 2 of AEMO’s Wholesale Market Administered Pricing Procedures (4 May 2015, p. 7).

¹⁷ Market suspension can limit a Market Participant’s flexibility to adjust their position (forecast injections and withdrawals) over the gas day and could result in imbalance and deviation charges.

AEMO's proposed amendment to rule 215(2)

AEMO proposes that two key changes are made to rule 215(2):

- the requirement that AEMO produce an operating schedule using an *optimisation program* which includes a representation of the DTS would be removed; and
- AEMO would be specifically required to take into account any transmission constraints affecting the transportation of gas in the DTS during the gas day when producing operating schedules.

Importantly, the requirement for AEMO to use valid demand forecasts and bids to produce operating schedules which specify injections and withdrawals for each hour of the gas day in a way that *minimises the cost of satisfying expected demand for gas over the gas day* would be retained.

AEMO's proposed amendment to rule 215(2) is provided at Appendix A.

An alternative approach to AEMO's proposed rule 215(2)

In Appendix B, the AEMC has presented some indicative alternative drafting for rule 215(2) that it considers address the issues raised by AEMO in its rule change request in a way that focuses the provision on AEMO's objective in producing operating schedules (ie, minimising the cost of expected demand for gas over the gas day taking into account transmission constraints).

The AEMC has also prepared an indicative change to rule 221(4) to replace the reference to a "representation of the DTS" with "transmission constraints affecting the transportation of gas in the DTS," being the words AEMO proposes are used to describe transmission constraints in the proposed changes to rule 215(2). Such a change is a desirable consequential change to make to the Rules as it will retain consistent language between rule 215(2) and rule 221(4).

Question 1

(a) Would emphasising the cost minimisation objective inherent in rule 215(2) provide AEMO with sufficient flexibility in terms of modelling approach for producing DWGM operating schedules?

(b) Alternatively, if AEMO's drafting of proposed rule 215(2) is likely to achieve a different or preferred outcome compared to 1(a) above, please give reasons why this is the case.

1.6.2 Transparency in production and publication of DWGM operating schedules

To the extent that discretion is afforded to AEMO in the Rules about the processes it may use to produce and publish DWGM operating schedules, the Rules should promote transparency - either by inclusion of a rules provision, or reference to the Wholesale Market Gas Scheduling Procedures - in terms of how that discretion is to be applied by AEMO.

AEMO's proposed new rule 215A

In the event that AEMO cannot produce and publish operating schedules by the times specified in rule 215(3), AEMO's proposed rule 215A(2)(b) seeks to permit AEMO to act in accordance with rule 215 to the extent it considers reasonably possible and, to the extent it is not possible to act in accordance with rule 215, "act on the basis of knowledge and information AEMO considers to be relevant and reasonable."¹⁸ This wording is consistent with the wording of rule 222 which relates to AEMO's obligation to produce pricing schedules under rule 221.

AEMO's proposed new rule 215A is provided at Appendix A.

Transparency in the Wholesale Market Gas Scheduling Procedures

The AEMC understands that clause 5.4 of AEMO's Wholesale Market Gas Scheduling Procedures¹⁹ specifies the process AEMO must follow in producing and publishing operating schedules in the event of (eight) abnormal conditions (ie, when AEMO cannot produce or publish feasible operating schedules in accordance with rule 215).^{20 21}

In the event that the abnormal conditions arise, AEMO is required to issue a system-wide notice advising Market Participants of the action taken to produce and publish operating schedules, except where modification has been made to the original output of the *optimisation program* in order to produce a feasible operating schedule (ie, Condition 3). In this situation, if the pricing schedule is physically achievable within the system operating limits, AEMO will create the operating schedule from the pricing schedule (ie, it will use the pricing schedule as the operating schedule) for the

¹⁸ AEMO's proposed rule 215A(2)(b) states: "In determining an operating schedule under this rule, AEMO must: to the extent it is not possible to act in accordance with rule 215 - act on the basis of knowledge and information AEMO considers relevant and reasonable."

¹⁹ Rule 206(4) of the NGR sets out that AEMO must make Procedures (gas scheduling procedures), including the algorithm that will be used by AEMO, for the purpose of scheduling in accordance with Subdivision and pricing in accordance with Subdivision 3.

²⁰ AEMO, Wholesale Market Gas Scheduling Procedures (Victoria), 1 February 2015, clause 5.4, pp. 29-40.

²¹ The process for amending these Procedures is clearly established under rule 135EE of the NGR, which requires AEMO to give notice of the intention to make Procedures, provide an impact and implementation report, and give interested parties at least 20 business days to submit written comments to AEMO on the proposed Procedures.

scheduling horizon.²² As there may not be any impact on Market Participants in this situation (ie, using the pricing schedule as the operating schedule), AEMO does not issue a system-wide notice.

Question 2 **(a) Would Market Participants benefit from being advised (via a system-wide notice) that AEMO has used the pricing schedule as the operating schedule?**
(b) If so, are there any costs involved in including the requirement to notify Market Participants in the National Gas Rules?

1.6.3 Other issues

As set out in section 1.4, AEMO has identified no cost impacts on Market Participants as a result of the proposed amendment to rule 215(2) and insertion of rule 215A.

Question 3 **Are there any additional costs or benefits to Market Participants associated with making AEMO's proposed rule change, beyond those identified by AEMO in section 1.4?**

²² Clause 5.4, Condition 3, Wholesale Market Gas Scheduling Procedures (Victoria), 1 February 2015, p. 33).

2 Process for this rule change

2.1 Treatment as a non-controversial rule change

The Commission considers that the rule change request is a request for a non-controversial rule because it is unlikely to have a significant impact on a market for gas or the regulation of pipeline services.²³

Rule changes that are considered to be non-controversial may be processed under an expedited (faster) process under which there is only one round of consultation and the AEMC must publish its final rule determination within six weeks of commencing the rule change process.²⁴

The Commission proposes to use this expedited process to consider the rule change request provided that it does not receive any valid requests not to use the expedited process by 24 September 2015. To be valid, an objection should set out the reasons why the rule change request will have a significant impact on a market for gas or the regulation of pipeline services.

If valid requests not to proceed with the expedited process are received, the AEMC will consider the rule change request in accordance with the standard rule making process under the NGL.

2.2 Key dates

The **key dates** for stakeholders in this process are as follows:

- Commencement of this rule change process: 10 September 2015.
- Objections to an expedited process to be received by: 24 September 2015.
- Submissions to the proposal to be received by: 8 October 2015.
- Final decision to be published under an expedited process by: 22 October 2015.

²³ Section 290 of the National Gas Law.

²⁴ The AEMC has published a notice under sections 303 and 304 of the National Gas Law to commence and assess this rule change request as a non-controversial rule.

3 How to lodge a submission

The Commission invites requests not to make a rule under the expedited process and written submissions on this rule change request.

All enquiries on this project should be addressed to Leah Ross on (02) 8296 7835.

3.1 Lodging a request not to make a rule under an expedited process

Written requests not to make a rule under the expedited process under section 304 of the National Gas Law must include reasons for the request, and must be lodged with the Commission by 24 September 2015, either online or by mail, in accordance with the requirements specified below.

3.2 Lodging a submission to this rule change request

Written submissions on the rule change request must be lodged with Commission by 8 October 2015, either online or by mail, in accordance with the requirements specified below.

Where practicable, submissions should be prepared in accordance with the Commission's guidelines for making written submissions on rule change requests.²⁵ Please note that the Commission publishes all submissions on its website, subject to a claim of confidentiality.

3.3 Lodging a submission electronically

Electronic submissions, or requests not to make a rule under the expedited process, must be lodged online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code: GRC0034.

The request or submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Upon receipt of the electronic request or submission, the Commission will issue a confirmation email. If this confirmation email is not received within three business days, it is the submitter's responsibility to ensure the request or submission has been delivered successfully.

²⁵ This guideline is available on the Commission's website.

3.4 Lodging a submission by mail or fax

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated. The request or submission should be sent by mail to:

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

The envelope must be clearly marked with the project reference code: GRC0034.

Alternatively, the submission may be sent by fax to (02) 8296 7899.

Except in circumstances where the submission has been received electronically, upon receipt of the hardcopy submission the Commission will issue a confirmation letter.

If this confirmation letter is not received within 3 business days, it is the submitter's responsibility to ensure successful delivery of the submission has occurred.

Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Commission	See AEMC
DTS	Declared Transmission System
DWGM	Declared Wholesale Gas Market
MCE	Market Clearing Engine (AEMO's optimisation program)
NGO	National Gas Objective
NGR	National Gas Rules

A AEMO's proposed rule

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(2) The inputs and assumptions set out in subrule (1) must be applied by AEMO using in an optimisation program in which a representation of the declared transmission system and valid demand forecasts and bids submitted by Market Participants to produce operation schedules which specify injections and withdrawals for each hour of the gas day in a way that minimises the cost of satisfying expected demand for gas over that gas day, taking account of any transmission constraints affecting the transportation of gas in the declared transmission system during that gas day.

215A Failure to publish operating schedules

(1) If AEMO is unable to produce an operating schedule in accordance with rule 215, AEMO must nevertheless determine the operating schedule.

(2) In determining an operating schedule under this rule, AEMO must:

(a) act in accordance with rule 215 to the extent AEMO considers it reasonably possible to do so; and

(b) to the extent it is not possible to act in accordance with rule 215 - act on the basis of knowledge and information AEMO considers to be relevant and reasonable.

B AEMC alternative drafting for consultation purposes

215 Operating Schedules

(2) The inputs and assumptions set out in subrule (1) must be applied by AEMO ~~in an optimisation program in which a representation of the declared transmission system and valid demand forecasts and bids submitted by Market Participants are used to~~ produce operating schedules which specify injections and withdrawals for each hour of the gas day in a way that minimises the cost of satisfying expected demand for gas over that gas day based on valid demand forecasts and bids submitted by Market Participants and taking into account any transmission constraints affecting the transportation of gas in the declared transmission system during that gas day.

221 Pricing Schedule

(4) The inputs and assumptions set out in subrule (3) must be applied by AEMO in an optimisation program in which valid bids submitted by Market Participants are used to produce pricing schedules that specify injections and withdrawals of gas to be made in each gas day in a way that minimises the cost of satisfying the expected demand for gas in that gas day and for the purpose of doing so, AEMO must not take into account any transmission constraints affecting the transportation of gas in the declared transmission system during that gas day. ~~include a representation of the declared transmission system.~~