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AUSTRALIAN ENERGY MARKET OPERATOR

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Mr John Pierce
Chairman
Australian Energy Market Commission
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Dear Mr Pierce

National Gas Rule Change Request – DWGM Operating Schedules

AEMO requests that the Australian Energy Market Commission (AEMC) considers changing the National Gas Rules (NGR) to formally authorise the processes followed by AEMO in producing Operating Schedules for the Victorian Declared Wholesale Gas Market (DWGM) where it is unable to comply with NGR rule 215.

AEMO considers that the proposed rule will address an oversight in the NGR, and contribute to the National Gas Objective (NGO) by:

- authorising processes that enable AEMO to produce operationally feasible operating schedules and instructions under all circumstances, that:
  - minimise the cost of satisfying gas demand, taking account of physical system constraints; and
  - contribute to the safety, reliability, and security of supply of natural gas to customers and
- reducing market participants' trading risk and disruption to normal market operation by removing the potential need to suspend the market in circumstances where it was not otherwise contemplated that the market should be suspended.

AEMO requests that AEMC reviews this rule change request in accordance with section 304 of the NGL on the basis that this is a request for a non-controversial rule.

A description of the proposed rule, a statement of the issues concerning the NGR, the basis for the proposed rule to be considered by AEMC as a non-controversial rule, and how the proposed rule contributes to the NGO is provided in Attachment A.

AEMO would appreciate these matters being considered by the AEMC.

For further details, please contact Andrew Mann, Group Manager Market Enhancement on (03) 9609 8520

Yours sincerely

Peter Geers
Executive General Manager, Markets

Attachment A: Rule Change Proposal

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NEW SOUTH WALES QUEENSLAND SOUTH AUSTRALIA VICTORIA AUSTRALIAN CAPITAL TERRITORY TASMANIA

Attachment A: National Gas Rule Change Proposal – DWGM Operating Schedules

This Rule Change Proposal is structured as follows:

1. Introduction

AEMO is proposing changes to rule 215 of the National Gas Rules (NGR) that specifies the process AEMO is to follow in producing operating schedules in the Victorian declared wholesale gas market (DWGM).

The proposed changes address an omission in the NGR and clarify ambiguity regarding the process and modelling tools that AEMO can use to represent the declared gas transmission system (DTS) in producing operating schedules.

AEMO considers the proposed changes to be non-controversial. The changes would validate existing well-established Gas Scheduling Procedures and current practices that deliver operational and market outcomes consistent with the intended outcomes of rule 215 and the National Gas Objective (NGO). Conversely, strict adherence to rule 215 without change may require AEMO to suspend the market under circumstances where this is not necessary for efficient market and system operation, and inhibit AEMO's ability to produce operationally feasible operating schedules.

2. Statement of Issues

Each day, AEMO issues scheduling instructions to Market Participants in the DWGM to inject and withdraw gas in each hour for the gas day. Scheduling instructions are the final output in a process that includes the development of pricing schedules and operating schedules for the gas day by AEMO in accordance with the NGR.

A pricing schedule determines the market price, and an operating schedule determines the least cost, physically achievable schedule of gas for the gas day, taking account of transmission constraints.

2.1 Current Rules

The production of operating schedules is governed by rule 215.

Rule 206 also requires AEMO to make and comply with Gas Scheduling Procedures (GSP) and to operate within the system security procedures when scheduling gas injections and withdrawals in accordance with the NGR.

Rule 215 requires AEMO to use a number of inputs that are detailed in rule 215(1). Rule 215(2) describes how those inputs are to be applied, along with a representation of the DTS, demand forecasts and market participant bids and offers to produce operating schedules. Rule 215(3) specifies times by which AEMO must publish operating schedules and pricing schedules each day.

2.2 Issues with Current Rules

Rule 215 presents two issues:

2.2.1 The NGR does 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 believes this to be an unintended omission from the NGR.

To ensure the safe and secure operation of the DTS, AEMO must be able to issue operating instructions under all circumstances.

However, there will always be a possibility that AEMO is unable to produce an operating schedule by the time specified in 215(3), with potential causes including IT hardware or software failure, data error, or human error.

Failure of the NGR to provide for an alternative means of producing an operating schedule in these circumstances leads to the implication that AEMO may be required to suspend the market under rule 347(d)(1), on the basis it is not possible to operate the market in accordance with the NGR. Operational experience is that strict adherence to rule 347(d)(1) would result in market suspension on a fairly regular basis. Suspension would be disruptive and inefficient, leading to the unnecessary triggering of administered pricing periods, and would offer no assistance to AEMO in the safe and secure operation of the DTS.

In recognition of this, section 5.4 of the GSP specifies processes to be followed by AEMO where it is unable to produce pricing and operating schedules in accordance with the NGR. AEMO has followed the GSP under such circumstances on regular occasions since the DWGM commenced, producing operating schedules that have met market expectations. As the processes prescribed in the GSP are not contemplated by the NGR and the GSP cannot override the NGR, AEMO's use of such processes may be seen as inconsistent with the NGR.

In contrast with the rules regarding the production of operating schedules, rule 222 of the NGR specifies how AEMO can determine market prices and the pricing schedule if it is unable to comply with rule 221. A similar provision would be expected with regard to the production of operating schedules.

AEMO is unable to offer evidence as to why a similar provision was not included in the NGR[1] with respect to the operating schedule, despite the existence of equivalent provisions in the GSP from market commencement.

There is no parallel provision in the Part 20 of the NGR (Short Term Trading Market Rules), since AEMO does not produce operating schedules in the Short Term Trading Market.

2.2.2 Uncertainty regarding which modelling tools can be used by AEMO in representing the DTS to produce operating schedules

Rule 215(2) states:

> 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. (emphasis added)

AEMO uses a linear programming optimisation algorithm, known as the Market Clearing Engine (**MCE**), to generate pricing schedules and operating schedules for the DWGM, however, the MCE does not include a full engineering model of the DTS. The linear programming representation is an approximation of the actual gas flow dynamics and constraints that can exist on a gas transmission system. Situations can arise where the MCE's representation lacks sufficient accuracy to produce an operationally feasible solution. AEMO, therefore, uses the Gregg Model[2], which is such an engineering model, to validate and, if necessary, modify the MCE inputs to produce a feasible operating schedule.

This process is documented in section 4.1.2 of the GSP. AEMO considers this achieves the required outcomes specified in rule 215(2), namely that the inputs specified in rule 215(1) are used, along with "a representation of the DTS and valid demand forecasts and bids submitted by market participants...to produce operating schedules which specify injections and

1 Nor included in the original Victorian Gas Industry Market and System Operations Rules.
2 Gregg Engineering WinTran Model - This model evaluates the time varying pressure-flow relationship for any pipe network and is capable of simulating simple and complex network systems that have either smooth or severe transients. Further explanation of the MCE and the Gregg Model and their use is provided in Appendix B.

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."

Nevertheless, rule 215(2) only refers to the use of an optimisation program. This presents some potential ambiguity as to whether use of the Gregg Model and the process set out in the GSP is consistent with this rule. It is AEMO's considered view that the ability to use an engineering model to represent the DTS, in addition to an optimisation program, is essential under some circumstances to ensure that an optimal dispatch solution is implemented in accordance with the NGR and NGO.

AEMO is therefore proposing changes to rule 215(2) to clarify the use of such processes, in accordance with the GSP, as being consistent with the NGR.

3. Proposed Solution and Description of Proposed Rule

AEMO's proposed solution to the issues discussed in sections 2.1 and 2.2, is:

(a) to include a new provision authorising the use of the processes set out in the GSP if AEMO is otherwise unable to produce feasible operating schedules in accordance with rule 215; and

(b) to authorise AEMO's ability to use the modelling tools and processes specified in the GSP to produce operating schedules.

AEMO's proposed changes would provide flexibility to produce operationally feasible operating schedules under all circumstances, but still leave clear, and substantially unchanged, AEMO's obligation to follow the requirements of rule 215 and the GSP in producing operating schedules.

3.1 Draft of Proposed Rule

A draft of the proposed rule has been included in Appendix A.

3.2 Request for Non-controversial Rule change

AEMO requests that the AEMC reviews this Rule change proposal in accordance with section 304 of the NGL on the basis that this is a request for a non-controversial Rule.

AEMO considers that section 304 applies to this proposal because the proposed Rule would:

- Not change the intended objectives or outcomes of rule 215. The essential requirements of existing rule 215(2) would remain, namely that:

  "The inputs and assumptions set out in subrule (1) must be applied by AEMO...(using) a representation of the declared transmission system and valid demand forecasts and bids submitted by Market Participants.... 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."

- AEMO's obligations would remain clearly specified in the NGR and GSP, with no resultant change to the current practices as set out in the GSP for producing operating schedules

As such, the proposed Rule would have an insignificant effect on the operation of the DWGM.

The proposed rule would have no impact on market participants. There would be no change to any requirements of participants under the NGR or market procedures, and no change to market outcomes. AEMO would incur no additional costs and no change to operational practices in order to comply with the proposed rule.

AEMO has consulted with AER staff on these matters, verbally and in writing, explaining the current issues under the NGR and the proposed solution. AEMO has also informed market participants of the issues and AEMO's proposed solution in a paper distributed via the Gas Wholesale Consultative Forum (GWCF) and presented at the GWCF meeting on 10 February 2015. No objections to the proposed solution have been raised.

4. How the Proposed Rule Contributes to the National Gas Objective

Section 23 of the NGL defines the NGO as follows:

> … 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.

The proposed Rule contributes to the NGO by:

- Enabling AEMO to produce operationally feasible operating schedules and instructions under all circumstances in accordance with the NGR, contributing to the safety, reliability, and security of supply of natural gas to customers.
- Removing the uncertainty under the NGR regarding the modelling tools that AEMO can use to produce feasible operating schedules that achieve efficient operation of the DTS to supply gas to customers, taking account of transmission constraints.
- Reducing market participants' trading risk and disruption to normal market operation by removing the need to suspend the market unnecessarily.
- Maintaining the well-established GSP, which have been followed to produce operating scheduling outcomes consistent with the NGO and the intended outcomes of rule 215(2).

5. Expected Benefits and Costs of the Proposed Rule

1. The expected benefits and costs of the proposed change

The main benefit of the proposed change is that it will formally authorise well-established procedures for the production of operating schedules that are consistent with the NGO and the intended market outcomes under the NGR and enable AEMO to accurately represent the physical characteristics of the DTS and produce operationally feasible operating schedules.

In the absence of the proposed change, there will be:

- no alternative means of producing operating schedules prescribed by the NGR if AEMO is unable to comply fully with rule 215. This is an essential requirement for the safe and secure operation of the DTS; and
- uncertainty over AEMO's use of all available modelling tools to ensure that the physical characteristics of the DTS are represented with sufficient accuracy to deliver feasible operating schedules consistent with the NGO and the intended outcomes of rule 215.

There will be no costs incurred by AEMO or market participants in effecting the proposed change. The proposed change will avoid AEMO and market participants incurring additional operational and administrative costs should the lack of clarity in the NGR result in market suspension or infeasible operating schedules.

AEMO's costs of developing this rule change request are minor and will be absorbed into its operational costs with no impact on its market fees.

2. The potential impacts of the change on those likely to be affected

Other than providing greater clarity in the rules, AEMO does not anticipate any operational or market impacts from the proposed change, when compared against current outcomes. The change will formally authorise the current procedures, and is consistent with the intended market outcomes and NGO. Participants will not be required to take any action if the proposed rule is made, and there would be no additional requirements or obligations imposed on them as a result.

Appendix A: Draft Rule

This draft is based on version 25 of the National Gas Rules.

215 Operating schedules

(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 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, 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.

Appendix B: Further details on MCE and Gregg Model

The “Gregg Model” is a purpose built pipeline simulation engineering model that uses the Gregg Engineering WinTran software. It is able to quickly and accurately model the time varying pressure-flow relationship for any piping network. WinTran is capable of simulating simple and complex network systems that have either smooth or severe transients.

The Gregg Model is used as the “Common Model” between AEMO and APA GasNet to agree on the capacity of transmission pipelines and compressors in the DTS. The agreed pipeline capacities as a function of demand are published in the Victorian Gas Planning Report (VGPR) which provides Market Participants with an understanding of what pipeline capacities are used when determining constraints that are to apply in the operating schedule.

AEMO also relies on the Gregg Model 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 MCE Operational Schedule Solver is a complex model that is intended to optimise the scheduling and flow of gas in the transmission system based on daily bids. It contains a network model which represents the transmission system including compressors and pressure limiters. The linear programming representation is an approximation of the actual gas flow dynamics and constraints that can exist on the gas transmission system. Situations can arise where the MCE’s representation lacks sufficient accuracy to produce an operationally feasible solution. AEMO, therefore, uses the Gregg Model to validate and, if necessary, modify the MCE inputs to produce a feasible operating schedule.

Glossary

Term or Abbreviation	Explanation
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
DTS	Declared Transmission System, as defined in section 2 of the NEL
DWGM	Declared Wholesale Gas Market
GSP	Gas Scheduling Procedures
GWCF	Gas Wholesale Consultative Forum
MCE	Market Clearing Engine
NGL	National Gas Law
NGO	The national gas objective as defined in section 23 of the NGL
NGR	National Gas Rules