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Dr Paul Grimes  
Review of Victoria's Electricity and Gas Network Safety Framework  
Department of Environment, Land, Water and Planning

Submitted by email: [delwp.secretariat@delwp.vic.gov.au](mailto:delwp.secretariat@delwp.vic.gov.au)

Level 22  
530 Collins Street  
Melbourne VIC 3000

**Postal Address:**  
GPO Box 2008  
Melbourne VIC 3001

T 1300 858724  
F 03 9609 8080

Dear Dr Grimes

### **Review of Victoria's Electricity and Gas Network Safety Framework**

The Australian Energy Market Operator (AEMO) welcomes the opportunity to comment on the Supplementary Issues Paper regarding Victoria's Gas Network Safety Framework. AEMO's submission is attached.

As the operator of the Victorian Declared Transmission System (DTS), AEMO has a strong interest in the outcomes of this consultation process. We support the further development of regulatory frameworks to deliver a safe and reliable supply of gas for Victorian customers in the long term, at an efficient cost.

Should you have any questions or wish to discuss AEMO's submission, please contact Matthew Clemow, Senior Manager, Gas Real Time Operations on (03) 9609 8677 or [matthew.clemow@aemo.com.au](mailto:matthew.clemow@aemo.com.au)

Yours sincerely



Brett Hausler

**Executive General Manager, Regulation and Governance**

Attachment: AEMO Submission on Victorian Gas Network Safety Framework Review

## **AEMO Submission on Victorian Gas Network Safety Framework Review**

### **Executive Summary**

AEMO's submission to the Review focuses on the need for a secure and reliable supply of gas for Victorian consumers and specifically the interaction between economic regulation and gas safety.

The links between economic regulation and efficient planning for demand growth and population expansion are not well-defined in the current National Gas Rules (NGR) or the gas safety legislation. Without clear obligations to maintain specific standards of reliability, prudent investments may not be made in an efficient and timely way.

This issue is highlighted by a number of reliability projects proposed for the Victorian declared transmission system (DTS) that have been not funded or have not been progressed in successive access arrangement periods.

Clarification of the detailed provisions relating to economic and safety regulation should be considered in order to achieve efficient investment outcomes in relation to supply security and reliability - for example by:

- Requiring specific responses by regulated service providers to capital investment needs identified by AEMO's planning reviews for the DTS under the NGR.
- Revising the economic justification criteria for covered pipeline investments to better recognise prudent planning requirements.
- Developing a reliability standard for Victorian gas networks.
- Requiring coordinated planning between the DTS and distribution systems to identify the most efficient location for reliability investments.
- Implementing appropriate easement planning and acquisition, as well as pipeline construction standards and development standards around pipeline easements to account for forecast urban expansion during the pipeline's economic life.

Appropriate requirements should be considered for inclusion in gas safety legislation or the NGR, or both.

In respect of the technical safety and integrity of gas supply and transportation, AEMO considers that the Victorian gas safety legislation and governance structure remains generally fit for purpose. A key area for concern is the apparent increase in the number of pipeline impacts and near-miss incidents on the DTS, which AEMO is keen to ensure that the causes of these incidents are fully reviewed, and prevention and deterrent measures are enhanced.

AEMO will continue working with the Department of Land, Water and Planning (DELWP) and Energy Safe Victoria (ESV) on opportunities to improve and update gas safety and emergency processes within the existing framework.

## 1. Reliability of supply

As indicated in the Supplementary Issues Paper, gas is an essential service in Victoria. Loss of gas supply presents a risk to public safety, particularly due to the purging requirements for equipment before use following an interruption (“relighting”). It is therefore critical to minimise loss of supply risks – whether related to physical pipeline integrity issues, or a shortfall in the capacity of the network to meet gas demand (reliability issues).

In the context of this Review, AEMO considers that the more significant shortcomings of the gas network safety framework relate to maintaining reliability of supply. A reliable gas network is one that is planned, designed and operated to meet reasonable expectations of peak demand, with a prudent level of redundancy (security) to allow continued supply with some elements of the system out of service.

## 2. Current interaction between reliability and economic regulation

Reliability comes at a cost, and a key role of economic regulation is to ensure that user-funded investment in the network is justified and efficient by reference to the outcomes to be achieved.

The importance of reliability and security of supply is recognised in the national gas objective<sup>1</sup>, but the detailed economic regulation principles in the National Gas Law (NGL), and corresponding NGR provisions, do not specifically address these aspects. For example:

- The NGR assessment criteria for capital expenditure (rule 79) make it difficult to ‘justify’ expenditure to accommodate future demand – separately from existing demand - unless it meets a positive net present value test or is required to comply with a regulatory requirement.

In Victorian gas safety legislation and in the declared wholesale gas market rules (Part 19 of the NGR), there are some requirements that indicate the need to plan for and maintain a reliable gas network. However, they are either not explicit enough, or not associated with an obligation to invest in the network to achieve a specified outcome. For example:

- Section 32 of the *Gas Safety Act 1997* requires gas companies to minimise, as far as practicable, the hazards and risks to public and customer safety arising from the interruption or reinstatement of gas supply. This could indicate an obligation to maintain a level of reliability and security of supply, but this is highly uncertain. No standard of reliability is prescribed.
- Rule 323 of the NGR requires AEMO to undertake bi-annual planning reviews of the DTS, with a five-year outlook. This process identifies the need for investment to meet (among other things) anticipated future demand growth in both ‘1 in 2’ and ‘1 in 20’ peak demand scenarios. However, there is no express requirement for the DTS service provider to make pipeline investments consistent with these planning reviews, and AEMO’s recommended DTS investments may not be ‘justified’ under the regulatory test for approved expenditure under an access arrangement. Further, there is no requirement for integrated planning between the DTS and distribution systems, which could promote more efficient investment.

AEMO observes that these disconnects can lead to inefficient outcomes over the long term, and have contributed to a current need for urgent investment to maintain reliability of gas supply.

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<sup>1</sup>Section 23 of the National Gas Law, in the Schedule to the *National Gas (South Australia) Act 2008*.

**Table 1** of the Schedule to this submission provides selected examples of proposed capital expenditure for the DTS that has either not been approved, or has been deferred. Other examples highlight the potential for efficiency improvements through effective long term planning.

Further information about associated gas supply issues is available in AEMO's submission to the Australian Energy Regulator on APA's 2018–2022 access arrangement Proposal can be provided on request.

### 3. Potential improvements to regulatory frameworks

Clear Victorian regulatory requirements can facilitate appropriate prioritisation of reliability considerations, promoting efficient and timely investment to accommodate anticipated demand growth, urban expansion and changes in consumption patterns.

AEMO has suggested below a number of possible changes and areas for further consideration. AEMO also notes that the AEMC has recently commenced a review of the scope of economic regulation for covered pipelines.<sup>2</sup> The DTS is one of the most significant covered transmission pipelines, and this review may provide an opportunity to enhance reliability considerations within a framework that minimises inefficient expenditure.

#### 3.1. Regulatory funding for future capacity growth

The Review could consider clearer requirements for regulated service providers to plan, design and maintain gas networks to minimise the risks associated with a future shortfall of supply capacity. This could be achieved by expanding and clarifying obligations in section 32 of the *Gas Safety Act*, or amending Part 19 of the NGR to specify how the DTS service provider should respond to AEMO planning reviews.

Prudent expenditure to meet specific regulatory requirements could then be clearly justified under rule 79(2)(c)(iii) of the NGR.

AEMO suggests that the Review also consider whether the economic regulatory framework discourages timely investment between access arrangement reviews in response to changing supply and demand conditions.

#### 3.2. A Victorian gas reliability standard

AEMO's Victorian planning reviews examine whether gas supply and transmission pipeline capacity are sufficient to match peak daily and hourly demands under severe weather conditions that would be expected to be exceeded, on average, once every two years and once every 20 years.

Current planning does not consider the reliability of gas supply sources and the transmission system, including the impact of a pipeline or pipeline equipment failure, or a gas supply facility outage.

AEMO considers there would be significant benefit in developing a clear reliability standard within the Victorian gas safety framework. A reliability standard should represent a robust, economically justified level of investment for reliable and secure gas supply.

**Table 2** of the Schedule to this submission outlines reliability standards in the National Electricity Market and for European gas networks, which may be useful in considering a possible Victorian gas reliability standard.

<sup>2</sup> <http://aemc.gov.au/Markets-Reviews-Advice/Review-into-the-scope-of-economic-regulation-appli>

### 3.2.1. Pipeline supply reliability

Currently there is uncertainty about the appropriate level of spare and duplicate equipment to be included in the DTS. The Service Envelope Agreement between AEMO and APA states that spare compressors and gas flow regulators are required to meet “good practice”. This is to reduce the likelihood of supply disruptions, but the question is how much redundancy is needed to provide reasonable security of supply.

AEMO recognises that in some instances the cost of fully duplicating these transmission elements may exceed the reliability benefits, and there may be other ways to manage the reliability risk within acceptable limits.

As an example, the recently installed Winchelsea Compressor Station on the South West Pipeline (SWP) comprised a single (non-spared) compressor. A stand-by compressor would have increased costs to consumers, particularly tariffs paid by market participants for SWP capacity towards Melbourne. AEMO addresses the lack of redundancy by reducing SWP capacity 64 TJ/d (15.5%) when the Winchelsea compressor is unavailable. This translates to a capacity reduction of about 4.9% below 1 in 20 peak day demand.

AEMO suggests that reduced pipeline capacity scenarios, such as the SWP case, should form part of an overall supply reliability assessment.

### 3.2.2. Gas supply source reliability

The majority of the reliability and security of supply discussion to date has focused on pipeline assets being able to supply gas to end use customers. As presented in AEMO’s annual Victorian Gas Winter Outlook Presentation<sup>3</sup>, the DTS is an unusual transmission network in that the gas supply sources (Longford and Port Campbell) are relatively close to the demand centre when compared to Sydney and Adelaide.

The short DTS gas pipelines result in a low level of usable linepack, which is discussed in the Victorian Gas Planning Report<sup>4</sup>. A major gas production facility outage can quickly result in a loss of supply to end use customers due to the low level of linepack (which results in low “survivability time”). This low survivability time is why AEMO utilises the Gas Quality Guidelines to allow short term exceedances of the gas quality specifications.

In light of this low capacity for managing interruptions to gas supply in the DTS, AEMO suggests that a supply reliability assessment should consider the diversity of gas supply sources.

## 3.3. Other enhancements to the planning process

### 3.3.1. Integrated planning process

The proposed Warragul looping project (see Table 2 of the Schedule), and current pressure issues at the Sale connection point, illustrate that changing demand patterns are requiring higher pressures to be delivered to gas distribution networks. Currently, a transmission solution requires expensive investments to increase capacity in the DTS to accommodate peak demand days in distribution networks.

There is no oversight or integrated end-to-end planning process that could be used to identify spare capacity or alternative distribution system investment or operational options that could address the pressure issues more efficiently.

<sup>3</sup> <http://www.aemo.com.au/Gas/Declared-Wholesale-Gas-Market-DWGM/Victorian-gas-operations>

<sup>4</sup> <http://www.aemo.com.au/Gas/National-planning-and-forecasting/Victorian-Gas-Planning-Report>

AEMO suggests the Review should consider whether the introduction of a coordinated planning process to improve the reliable supply of gas to all DTS and distribution network gas customers in an economically efficient manner.

### 3.3.2. Urban encroachment

As the population of Melbourne increases, urban encroachment on pipeline corridors is increasing (**Figure 1**). A consistent approach to development of and around major gas transmission pipeline easements should be considered. **Table 3** in the Schedule to this submission provides examples of well-planned development, and others where urban growth has overtaken pipeline developments, causing safety issues requiring additional investment.

AEMO recommends that the Review consider:

- A consistent approach to development and setbacks around major gas transmission pipeline easements.
- Standards for new pipeline design requiring rupture-proof construction where urban development is reasonably possible during the pipeline’s economic life.

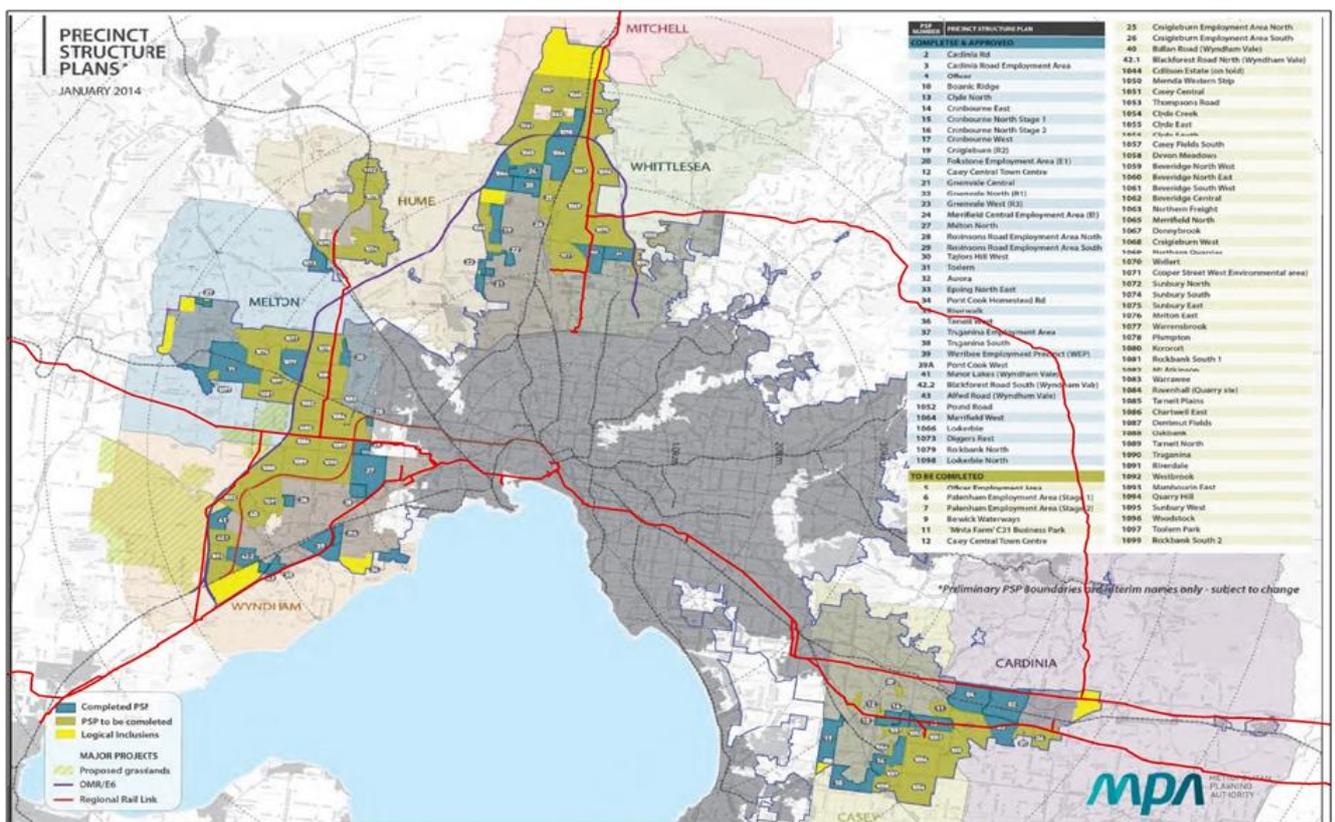


Figure 1 – Melbourne residential growth corridors showing major gas pipelines

## 4. Pipeline impacts

Impacts on buried gas pipelines due to unauthorised excavation or boring presents a high risk to public safety, both in terms of the immediate danger to people in the vicinity of a pipeline rupture and gas customers whose gas supply may be interrupted as a result.

Three transmission pipeline incidents have occurred since 1 September 2014:

- 1 September 2014 – LMP impacted at Pakenham by unauthorised directional drilling equipment. LMP pressure was reduced to 80% of operating pressure (in accordance with Australian Standard AS2885), restricting supplies to Melbourne. AEMO directed a distributor to open Templestowe demarcation valve and curtailment was narrowly avoided.
- 28 September 2016 – Dromana to Rye distributor-owned transmission pipeline pierced by unauthorised directional drilling. Emergency services were mobilised for a significant gas leak. Curtailment was avoided due to lower gas demand during spring and interconnectivity within the distribution system.
- 20 February 2017 – Wollert to Wodonga Pipeline at Glenrowan near miss by unauthorised boring equipment operator. Pipeline pressure was reduced to enable the safe inspection of the pipeline for damage. No curtailment occurred.

Both the *Gas Industry Act 2001* (section 151) and the *Gas Safety Act 1997* (section 79(c)) include penalties for damage to gas transmission pipelines.

AEMO is concerned that the frequency of incidents appears to be increasing. In-depth reviews are needed to determine causal factors for these incidents - including the adequacy of signage, effectiveness of the 'Dial Before You Dig' service, surveillance programs, and the deterrent effect of current penalties.

The Pakenham incident raises the question around what amount and type of signage is appropriate for a high pressure pipeline. It also illustrates the need for better planning for development around pipeline easements.

## **5. Other issues relevant to AEMO's gas safety functions**

AEMO's other major functions in relation to the safe operation of the DTS include:

- Maintenance of the gas emergency protocol and a key participant in the management of large gas industry emergency events.
- Monitoring and reporting on gas quality, and the management of off-specification gas injected into the DTS.

It is worth noting that gas quality management in the DTS could become increasingly challenging as fields that have historically supplied gas become depleted and are replaced by new gas supply sources. These challenges could be compounded if the redundancy in the transmission system decreases as a result of reduced capital expenditure under the economic regulatory regime.

Otherwise, AEMO considers that the regulatory framework and governance around these functions works well, and remains generally fit for purpose. AEMO continues to work with DELWP and ESV on identifying and progressing opportunities to improve and update gas safety and emergency processes within the existing framework.

## Schedule to AEMO Submission

**Table 1 Efficiency and reliability concerns for DTS investment - Examples**

This table presents examples of investments recommended by AEMO in the past ten years that, in AEMO's view, have not proceeded in a timely way – at least in part due to unclear linkage of planning and reliability requirements with the economic regulatory framework. Further information is in AEMO's submission to the AER on APA's 2018–22 access arrangement proposal attached to this submission.

Investment proposal	Outcome and observations
WORM (Western Outer Ring Main) - Initially identified in 2007 for the 2008–12 APA access arrangement review	Acquisition of easements for WORM was considered to be a speculative investment and not funded by the AER in 2008–12 <sup>5</sup> . Funding for the WORM was also declined for 2013–17. Construction of WORM now proposed for 2018–22 access arrangement. The route is expected to be about 10 km (around 20%) longer than could have been achieved if an easement had been acquired earlier.
SWP (South West Pipeline) transportation capacity increase to Port Campbell – Initially presented by AEMO to the Gas Wholesale Consultative Forum in October 2015, and included in updated Victorian Gas Planning Report (VGPR) in February 2016	Market participants and the pipeline owner could not reach commercial agreement on the implementation of an increase to SWP capacity towards Port Campbell. Additional capacity is required to ensure adequate refilling of Iona underground gas storage reservoirs for winter supply reliability.  AEMO's 2017 VGPR identified this as a threat to system security for winter 2018 and beyond.  Although the necessary investment has been proposed for 2018–22, the delay raises questions about whether the access arrangement variation provisions are flexible and practical enough to respond to changing gas supply and demand conditions between five-yearly resets.
BCS (Brooklyn Compressor Station) upgrade – Originally proposed and included in 2008–12 access arrangement	BCS is a critical compressor station in the DTS. The 2008–12 access arrangement included \$49.57m of funding to redevelop BCS with two new and two upgraded Centaur units, and decommission three older units.  Although approved, APA did not proceed with this investment. This project was presented as a shorter term alternative to the WORM, which was also proposed, but not approved in the 2008–12 access arrangement.  Upgrade (rather than replacement) works were proposed by APA for the 2018–22 access arrangement period at a cost of \$25 million, with only a five year investment life. This compares very unfavourably with the works approved for 2008–12, or the construction of the WORM proposed by AEMO.
Warragul Looping Project to increase delivery pressure at	This project received funding in the 2008–12 APA access arrangement and the 2013–2017 APA access arrangement, but

<sup>5</sup> [GasNet Principal Transmission System Review of Proposed New Facilities Investments](#), Sleeman Consulting, 19 September 2007, p35

<p>Warragul connection point – Originally proposed and included in 2008-12 access arrangement</p>	<p>APA did not proceed with this investment. On 22 July 2014 the Warragul connection pressure breached the contractual minimum of 1,400 kPa. AEMO issued a notice of a threat to system security on 10 March 2017 following the publication of AEMO’s 2017 Victorian Gas Planning Report (VGPR).</p>
<p>BLP (Brooklyn to Lara Pipeline) – commissioned in 2008, operating as an extension of the SWP</p>	<p>The BLP runs from Lara, then to the west of Werribee, and north towards Rockbank before running east to the Brooklyn Compressor Station. The BLP was not constructed as a rupture proof pipeline, but is now located within an expanded urban boundary. To mitigate safety risks, APA has proposed funding to construct concrete slabbing over the BLP in the 2018–22 access arrangement period.</p> <p>Better planning requirements accounting for future demand growth and linked to the initial investment approval should reduce the need for additional investment within a relatively short period after commissioning.</p>

**Table 2 Alternative reliability standards**

The table below describes examples of reliability standards that apply in the National Electricity Market, and to European gas networks. These could be useful to draw on in determining an appropriate reliability standard for Victorian gas networks.

<p><b>National Electricity Market</b></p>
<p>In the National Electricity Market (NEM) system there are two reliability standards, one on the supply-demand side and another for the transmission network.</p> <p>The reliability standard for supply is measured in terms of maximum acceptable unserved energy (USE) in a financial, which refers to the amount of energy that is required by customers but cannot be supplied. It is a key indicator to the market of the need to deliver more capacity to meet consumer demand for electricity.</p> <p>The transmission reliability standard has traditionally been an ‘N-1’ standard. This requires a fixed, built-in level of redundancy for supply security to ensure that supply can continue to meet peak demand with the largest element out of service. Victorian electricity planning, however, adopts a ‘probabilistic’ approach to planning in preference to the ‘deterministic’ N-1 standard.</p>
<p><b>European gas networks</b></p>
<p>The EU Council Regulation 994/2010 (20 October 2010) outlines measures to safeguard security of natural gas supply. EU member states must implement standards to ensure gas supply to protected customers<sup>6</sup> in all of the following scenarios:</p> <ul style="list-style-type: none"> <li>• extreme temperatures during a 7-day peak period occurring with a statistical probability of once in 20 years;</li> <li>• any period of at least 30 days of exceptionally high gas demand, occurring with a statistical probability of once in 20 years; and</li> <li>• for a period of at least 30 days in case of the disruption of the single largest gas infrastructure under average winter conditions.</li> </ul>

<sup>6</sup> EU Regulation 994/2010 article 2(1) ‘protected customers’ refers to all household customers, connected to a gas distribution network; and may also include small and medium-sized enterprises.

**Table 3 Urban Encroachment**

The examples in the table below illustrate the impact of urban development and how the associated gas safety issues can be addressed through improved planning going forward.

Pipeline	Outcome and observations
Brooklyn to Lara	See <b>Table 1</b> . Additional costs incurred as urban encroachment not accounted for in the design of the pipeline.
Longford to Melbourne	<b>Photo 1</b> shows a new residential development along the LMP easement in Pakenham. This major pipeline runs along a residential street with houses built up against the easement. Pipeline warning signage appears to be difficult to install. The LMP was impacted at this location on 1 September 2014 by unauthorised directional drilling while laying a large electrical cable (shown in the photo). Although it is no longer accepted practice to locate DTS pipelines within residential property boundaries, AEMO considers consistent development and setback standards should be developed.
Outer Ring Main (Pakenham to Wollert)	<b>Photo 2</b> shows a pipeline easement in Doreen. New housing developments usually have a requirement to provide open space. Combining this with increased set back from major gas transmission pipelines would appear to be a “win-win” scenario.



*Photo 1– Residential development along LMP easement in Pakenham (source: Google)*



*Photo 2 - Easement development along Outer Ring Main in Doreen (source: Google)*