AEMC

RULE

Australian Energy Market Commission

CONSULTATION PAPER

NATIONAL GAS AMENDMENT (DWGM DISTRIBUTION CONNECTED FACILITIES) RULE 2022

PROPONENT

Victorian Minister for Energy, Environment and Climate Change

21 OCTOBER 2021

INQUIRIES

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ABOUT THE AEMC

The AEMC reports to the Energy Ministers' Meeting (formerly the Council of Australian Governments Energy Council). We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the Energy Ministers' Meeting.

CONTENTS

1 INTRODUCTION

On 8 September 2021, the Victorian Minister for Energy, Environment and Climate Change (the proponent) submitted a rule change request to the Australian Energy Market Commission (AEMC or Commission) seeking to amend the National Gas Rules (NGR).

This request aims to allow the participation of distribution connected production and storage facilities in the Victorian Declared Wholesale Gas Market (DWGM). The proponent's intent is that these changes collectively aim to promote the transparent and effective trade of gas within Victoria as the state transitions to a renewable, sustainable energy system which can include distribution connected facilities. These facilities may include, but are not limited to, hydrogen, biomethane and other renewable gases. [1]

Under the current arrangements, only facilities connected to the declared transmission system (DTS) are allowed to participate in the DWGM. The proponent is of the view that enabling the participation of distribution connected facilities in the DWGM, where supply and demand are scheduled regardless of its location in the system, would maintain the fundamentals of the current market design.

The rule change request proposed changes to a wide range of rules in the NGR to account for gas distribution connected facilities, which can be broadly categorised under three areas:

- Market operations including registrations, scheduling, bidding and constraints
- Market settlements including title, custody and risk, allocations, and default notices
- System operation and planning, including connections, metering, gas quality, and powers of direction.

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

The paper sets out a summary of, and background to, the rule change request and seeks stakeholder feedback on:

- the assessment framework
- the proponent's preferred solution and the associated changes required
- alternative solutions presented in the request
- the benefits and costs of the proposed changes.

Submissions on this consultation paper are due by 2 December 2021. Details on how to lodge a submission are contained in chapter 10 of this consultation paper. A template is available to help stakeholders provide their views on the issues raised in this paper.[2]

1 Victorian Minister for Energy, Environment and Climate Change, *DWGM distribution connected facilities*, rule change request (rule change request), p. 2.

2 Available at https://www.aemc.gov.au/rule-changes/dwgm-distribution-connected-facilities

1.1 Consultation with the Hydrogen review

On 21 October 2021, the AEMC also published a consultation paper for the *Review into extending the regulatory frameworks to hydrogen and renewable gases* (the Review). The Review was initiated by Energy Ministers and will review the potential need for amendments to the NGR and the National Energy Retail Rules (NERR) to accommodate low-level hydrogen blends and renewable gases.[3]

The request for the Review stems from gaps identified in the current gas and retail frameworks in accounting for gas blends. [4] The Review will address the gaps identified and include framework elements covering the economic regulatory framework that applies to gas pipelines, the facilitated and regulated gas markets, consumer protections and the regulatory sandbox.

The Review will be conducted in parallel to reviews by the Australian Energy Market Operator (AEMO), the Australian Energy Regulator (AER) and Energy Regulatory Authority (ERA) to facilitate information sharing, findings and resources.[5]

The AEMC is progressing this rule change concurrently to the Review as they share commonalities in their consideration of hydrogen blend injections to the declared distribution system. The consultation period for the rule change and the Review will run in parallel.

3 Energy Ministers, *Review of the national gas and retail regulatory frameworks for the introduction of hydrogen and renewable gas*, Terms of reference, p. 2.

4 Ibid, p. 3.

5 Ibid, p. 4.

2 BACKGROUND

This section provides background information on:

- overview of the current arrangements
- work currently underway in Victoria to assess the future roles of gas substitutes and gas infrastructure
- information on the Review and its linkages to the rule change.

2.1 Current arrangements

The DWGM was established by the Victorian Government in March 1999. It is a facilitated wholesale gas market that operates on an intraday basis and uses participant injection and withdrawal bids to manage supply, demand and linepack on the declared transmission system (DTS) in Victoria.

The DWGM is a 'gross pool' market, which means that it is compulsory for market participants wanting to inject gas to, or withdraw gas from, the DTS to trade through the DWGM.

The DTS is subject to an open access regime, instead of the contract carriage arrangements used elsewhere. Under this model, the pipeline owner makes its pipeline system available to AEMO, with pipeline access being allocated in line with market outcomes.

From an operational perspective, the physical characteristics of the DTS (i.e. it is essentially a meshed network, the amount of gas it can store is small and the capacity is such that it cannot be relied upon to manage significant deviations between demand and supply) mean it must be closely managed to ensure that gas flows in the manner required and system integrity is maintained.

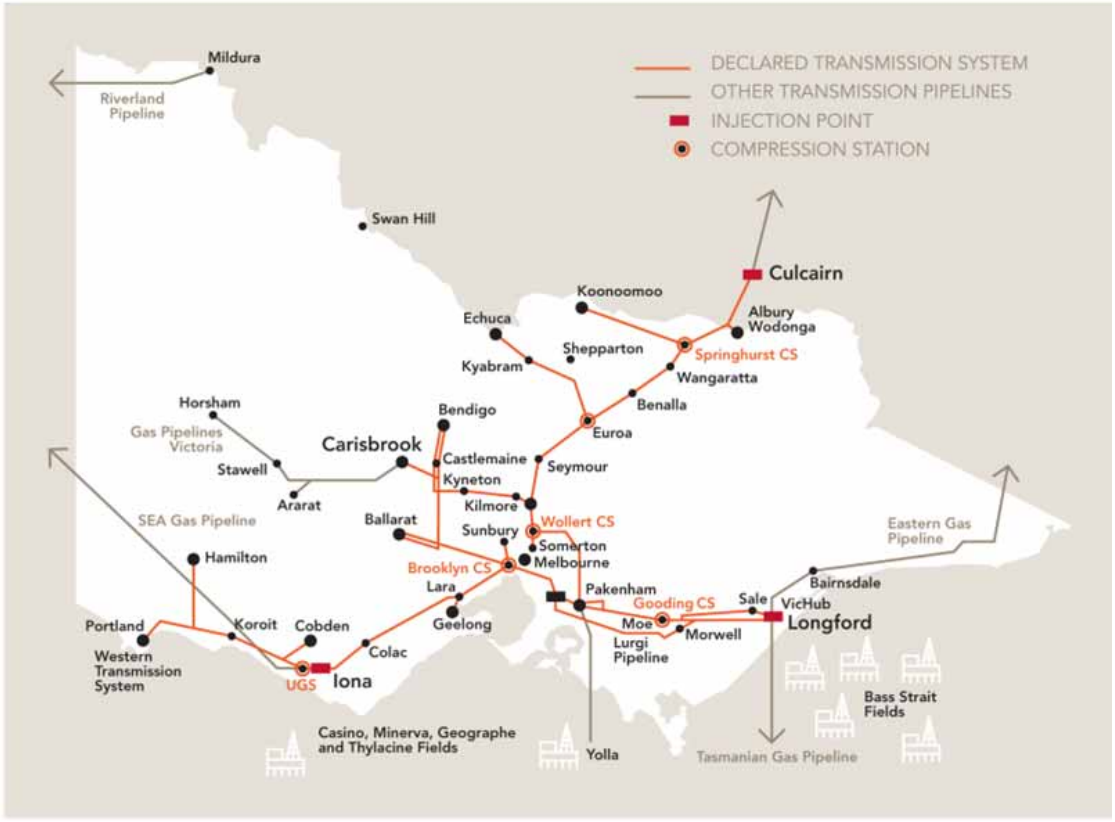
The objectives of the DWGM include:

- providing participants with a transparent and efficient market-based mechanism to trade imbalances, purchase gas on a short-term basis and efficiently allocate gas during system constraints and emergencies
- supporting full retail contestability by reducing the barriers to entry by new retailers (i.e. through open access to the DTS and the market mechanisms)
- encouraging diversity of supply and upstream competition (i.e. through DWGM pricing transparency and open access to the DTS).

2.1.1 DWGM trading locations and participants

The area serviced by the DTS is shown in the figure below.

Figure 2.1: Victoria's DWGM transmission system pipelines



Source: AEMO, *Guide to Victoria's Declared Wholesale Gas Market*, February 2012, p. 6.

The DTS transports gas from Longford in the east[6] to and from Culcairn in the north[7] and Iona in the west.[8]

There are over 120 system withdrawal points in the DTS that allow gas to flow from the DTS into the Victorian distribution networks, to large gas customers, into storage facilities, or to other transmission pipelines. These are supplied by system injection points that allow gas to flow from production fields and plants, storage facilities, and other transmission pipelines into the DTS.

The DWGM can be described as a 'virtual trading hub', in that the point at which title is transferred is a notional point covering the whole DTS rather than being at a specific physical point. Formally, custody of gas passes from market participants to AEMO at system injection

6 Historically, Longford has been the major Victorian production centre.
7 Which connects to the Moomba to Sydney pipeline in NSW.
8 Which connects to South Australia, Otway gas production and underground gas storage facilities.

points — the connection points where gas flows into the DTS — and back to market participants at system withdrawal points, where gas flows out of the DTS.

In the DWGM, AEMO manages the market, being responsible for determining market schedules and undertaking settlement. AEMO is also responsible for the operation of the physical transmission pipeline system (in this case, the DTS).

2.1.2 Market participants

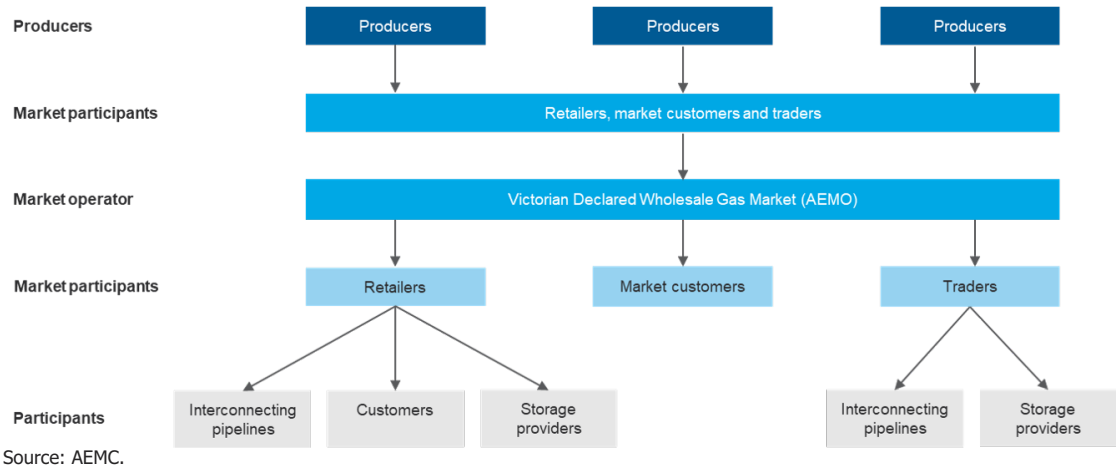
Market participants are parties that trade directly in the DWGM and are made up of:

- retailers — who purchase gas from gas producers, offer it into the DWGM and then on-sell it to consumers
- market customers — large commercial and industrial customers who elect to trade directly in the DWGM
- traders — who bid gas from, and sell gas to, gas producers and other market participants.

Gas producers and storage providers may also be market participants if they choose to directly bid gas into the DWGM.

Non-market participants include the declared transmission system service provider (DTS SP), interconnected transmission pipeline service providers (which have pipelines connected to the DTS), distributors and end consumers (who purchase gas from a retailer).

Figure 2.2: DWGM participants



Source: AEMC.

2.1.3 Pipeline arrangements and the role of AEMO

In the DWGM, the DTS SP, APA, owns and maintains the DTS and makes the transmission pipeline available to AEMO under a contract known as the Service Envelope Agreement (SEA). AEMO manages receipt, transportation and delivery of gas.

The SEA determines, among other things, the transportation capacity of the DTS and the obligations of APA and AEMO in relation to the delivery of the agreed capacity. With respect to transportation capacity, AEMO and APA are required to maintain an agreed common system model that is used, among other things, to determine system capacities.

AEMO also has a key role in operating and administering the gas market in the DWGM. As a gross pool, the market arrangements require market participants to bid their injections and withdrawals into the market, and forecast their uncontrollable withdrawals in order to access the DTS. It is AEMO's role to manage this bidding and matching process to determine the market clearing price and a schedule of gas flows for each market participant during the gas day (that is, the gas expected to be injected or withdrawn by each market participant at the various points on the system).

AEMO also manages the settlement process, which is conducted ex-post, including calculating charges associated with imbalance (caused by differences in a participant's daily gas injections and withdrawals), deviations (caused by differences between a participant's scheduled and actual behaviour), and ancillary and uplift payments (primarily generated by actions taken to manage constraints at particular locations on the system).

Gas distribution networks

There are three gas distribution networks in Victoria. Each is responsible for a separate geographic region of Victoria.

- Australian Gas Networks
- Multinet Gas
- AusNet Services

Gas distribution networks are regulated by the AER, and they are not a direct market participant in the DWGM.

Figure 2.3: Gas distribution networks in Victoria

Source: Australian Gas Networks

2.1.4 Scheduling, bidding and market price determination

Scheduling

It is compulsory for market participants to trade all gas through the DWGM, including for participants who already own the gas that they intend to withdraw. Market participants offer gas to inject to, and bid to withdraw gas from, the market.

These offers and bids are inputs to AEMO's market clearing engine which schedules injections and withdrawals of gas by minimising the total cost of supplying gas demand.

In order to be scheduled each gas day, market participants are required to submit to AEMO:

- hourly demand forecasts for non-price sensitive load ('uncontrollable withdrawals')
- daily bids for price sensitive load ('controllable withdrawals') and daily offers for both price and non-price sensitive injections
  - separate offers and bids must be made for each of the injections and withdrawals for each injection and withdrawal point
  - each bid can include up to ten price/quantity pairs (bid steps)
- bid constraints which reflect both the ability of the participant to respond to AEMO's changes to scheduling instructions, and the physical or contractual limitations on the participant at the specific injection and withdrawal point. These bid constraints need to be accredited by AEMO before they are applied to injection and withdrawal points in the DTS.

Based on the above information, AEMO will:

- declare a market price (using the 'pricing schedule') — the price of the marginal unit of gas that would have been scheduled absent any transmission constraints on the DTS
- subject to the pipeline system security limits, schedule each market participant's injections and withdrawals with the objective of minimising the cost of supplying demand (using the 'operating schedule').

The scheduling process occurs regularly at five predefined times within the gas day. For the first schedule of the day, at 6:00am, gas is scheduled and a market price is determined for the entirety of the upcoming gas day.

Each subsequent scheduling process then revises scheduling instructions and the market price for the balance of the gas day. AEMO will reschedule for the current gas day by revising or updating the schedules at intervals of four hours, with a larger eight-hour interval applying overnight (i.e. 10 am, 2 pm, 6 pm, and 10 pm).

The reschedules determine prices and quantities for all the remaining hours in the gas day following the time of that schedule. A reschedule can include updated demand forecasts, updated bids and offers, as well as any changes to parameters under the control of AEMO.

AEMO provides a schedule a number of times each gas day to provide hourly injection schedules for each market participant, and schedules for any controllable withdrawals, using market participants' submitted bids and demand forecast as primary inputs.

AEMO uses this information to produce and publish pricing and operating schedules at each scheduling time:

- Pricing schedules:
  - determine the ex-ante market prices based on the bids and demand forecasts (i.e. using a 'bid stack') for all locations on the network (discussed in more detail below)
- Operating schedules:
  - determine individual market participants' scheduled hourly injections and withdrawals at each injection/withdrawal point
  - take into account physical constraints, linepack distribution, system limits on pressure and gas flows and demand and supply applicable to each node
  - are optimised using a market clearing algorithm which minimises the cost of supplying the forecast gas demand within the pipeline system security limits
  - determine quantities and direct the operation of the gas system and injections into the system over the gas day.

On any given gas day, AEMO prepares and issues at least nine pricing and operating schedules:

- five standard schedules for the current gas day at four-hour intervals at 6:00 am, 10:00 am, 2:00 pm, 6:00 pm and 10:00 pm
- three gas schedules for the next gas day at 8:00 am, 4:00 pm and 12:00 am
- one schedule for two days ahead at 12:00 pm
- ad hoc schedules(s) between standard schedules on the current gas day, but only if there are impending or imminent threats to system security requiring urgent action. These ad-hoc schedules do not alter the market prices but rather the operating schedule quantities only.

The 6:00 am schedule, known as the beginning-of-day (BoD) schedule, covers the 24-hour period from 6:00 am to 6:00 am the following day. Information used and issued in the BoD schedule is updated in subsequent schedules which provide for any changes in the remaining hours in the gas day.

The period between scheduling times is called the 'scheduling interval', and the period from any point in a day to the end of the gas day is referred to as the 'scheduling horizon'. The scheduled quantities are for the whole gas day but only the part of the gas day that remains (i.e. the scheduling horizon) can be changed in subsequent schedules.

Each of the current day schedules overrides the existing schedule for the remainder of the gas day. For example, the 2 pm schedule will replace the 10 am schedule for the interval 2 pm to 6 am the following day.

After the scheduling process, each market participant receives the key output of the operating schedule — an individual market information bulletin board report detailing what quantity of gas and where they are committed to inject or withdraw for each hour of the gas day.

Bidding procedure

There are three concepts of supply and demand in the DWGM which are important for understanding the operation of the market:

1. Controllable withdrawals (demand):
    a. Market participants can make offers to withdraw gas from the market with a defined gas quantity and price.
    b. This type of withdrawal can respond to the wholesale price and follow schedules and so is terms 'controllable withdrawal'.
2. Uncontrollable withdrawals (demand):
    a. Most of the gas demand in the DWGM is retail load that varies with temperature, seasons, day of week, weather conditions and various other external factors, for instance:
        i. withdrawals include gas demand from households (for heating, cooking and hot water) which are typically winter peaking, small business and large business/industry
        ii. gas-powered generation, which typically peaks in summer to meet high electricity demand.
    b. Since these withdrawals do not easily respond to the wholesale price and are not capable of following a schedule, they are termed 'uncontrollable withdrawals'.
3. Injections (supply):
    a. Market participants need to have contracts with producers, storage providers, or an interconnecting transmission pipeline to be able to inject.
    b. Similar to controllable withdrawals, market participants can make offers to inject gas to the market with a defined gas quantity and price.
    c. Injections are termed 'controllable' because they can respond to the wholesale price and follow schedules.

Market participants who intend to inject gas to the DTS must submit offers to the DWGM. Similarly, market participants who intend to withdraw gas from the DTS must submit bids to the DWGM.

Market participants can specify up to ten bid steps of prices and daily quantities in each offer or bid for each injection and controllable withdrawal point:

- For offers, bid steps are provided in increasing order of price with increasing cumulative quantities.
- For bids, bid steps are provided in decreasing price order with increasing cumulative quantities.

Bid prices can vary between $0/GJ and the market price cap which is currently set at $800/GJ.

Market participants may revise price and quantity offers and bids at least nine times for each gas day. However, the revised total offer and bid quantities must not be less that that already

scheduled in any previous scheduling interval on that gas day. All offer and bid quantities, including rebids, are for the 24-hour gas day.

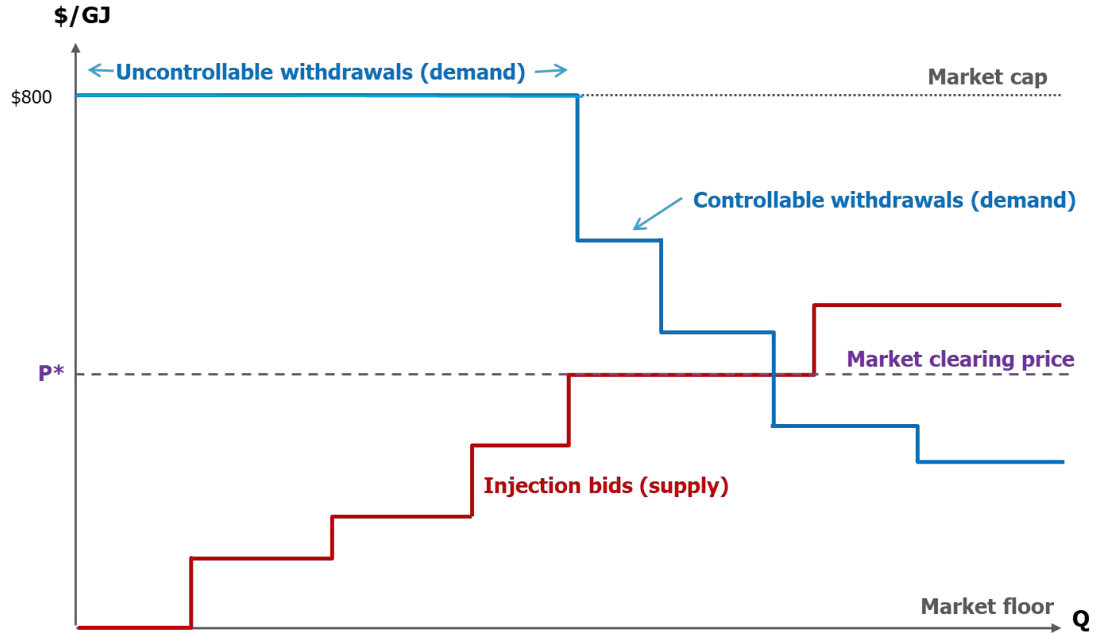
Determining the market price

The market price is determined in the pricing schedule as follows:

- Gas withdrawals (controlled and uncontrolled withdrawals) are met by the cheapest gas offers in the system, i.e. through a 'bid stack' process.
- The optimisation process takes into account any transmission constraints within the DTS affecting withdrawals.
- The market price is determined by the marginal price of the cumulative offer quantities that are required to meet the aggregate of all market participants' demand forecasts and controllable withdrawal bids, i.e. the price of the most expensive unit of gas needed to satisfy demand.

The price is set at the level at which supply and demand are equal. This is demonstrated in Figure 2.4. Demand is represented in blue, with uncontrollable withdrawals bid at the market price cap and controllable withdrawals making up the remaining curve in descending order of price. The supply curve, shown in red, represents the offer stack in order of price. The market clearing price, P*, is the price at which supply intersects demand.

Figure 2.4: Price determination in the DWGM



Source: AEMC

2.2 Context

This section provides context on the work currently underway in Victoria for the State to reach its emission reduction targets and facilitate a transition to low emission sustainable fuels. Emissions reduction targets are set out according to the Victorian *Climate Change Act 2017*, which is described in section 2.2.1 below.

Victoria is working to meet the targets, with the following reports currently underway:

- *Gas substitution roadmap* by the Victorian Department of Environment, Land, Water and Planning
- *Towards 2050: gas infrastructure in a zero emissions economy* by Infrastructure Victoria
- *Renewable hydrogen industry development plan* by the Victorian Department of Environment, Land, Water and Planning

These reports include pathways, scenarios and blueprints where hydrogen and other sustainable fuels may be used to substitute natural gas.

Currently, the rules exclusively considers injections to the transmission system. This rule change looks to amend the NGR to allow the participation of distribution connected facilities in the DWGM.

2.2.1 The Victorian Climate Change Act 2017

The Victorian *Climate Change Act 2017* established a statewide long-term target of net-zero by 2050 and requires the Victorian Premier and the Minister for Environment, Energy and Climate Change to set interim emission reduction targets every five years as a pathway to meet net-zero by 2050.

In May 2021, the interim emission reduction targets for 2025 and 2030 were set. The interim target aims to reduce Victoria's greenhouse gas emissions from 2005 levels by 28-33 per cent by 2025 and 45-50 per cent by 2030. [9]

2.2.2 Victorian Gas Substitution Roadmap

In June 2021, the Victorian Department of Environment, Land, Water and Planning released a consultation paper for the *Gas substitution roadmap* (the Roadmap). The Roadmap will identify an action plan and milestones to promote decarbonisation in the Victorian gas sector to help the state reach its interim and long-term emission reduction targets. [10]

The consultation paper explored six possible pathways for Victoria to achieve its emissions reduction targets:[11]

1. improving energy efficiency within households and businesses
2. electrification by substituting gas appliances for electric appliances and equipment
3. substituting natural gas with hydrogen or renewable methane produced from hydrogen

9 Infrastructure Victoria, *Towards 2050: Gas infrastructure in a zero emissions economy*, interim report, 19 July 2021, p. 12.

10 Victorian Department of Environment, Land, Water and Planning, *Victoria's Gas Substitution Roadmap,* consultation paper, 26 June 2021, p. 6.

11 Ibid, p. 26.

4. substituting natural gas with biogas from the anaerobic digestion of organic material
5. emerging technologies such as concentrated solar thermal, carbon capture and storage and geothermal technologies
6. addressing fugitive emissions such as leaks, venting and flaring gases.

The 'substituting natural gas with hydrogen' pathway detailed the role hydrogen can play in decarbonising the gas sector in Victoria. The Roadmap states that hydrogen must be produced from low-emissions sources such as renewable electricity. Alternatively, if hydrogen is produced from fossil fuels, the carbon dioxide generated must be captured and stored.[12]

According to this pathway, hydrogen can be used to substitute natural gas at low blends in the gas distribution pipelines without the need to replace pipelines, appliances or meters.[13] However, the current NGR framework does not consider the participation of production or storage facilities connected to the gas distribution pipelines. This rule change request addresses this issue by proposing amendments to the NGR to allow the participation of distribution connected facilities.

Public submissions to the consultation paper closed in August 2021. The Roadmap is scheduled to be released later this year. It will be informed by Infrastructure Victoria's *Towards 2050: Gas infrastructure in a zero emissions economy* report, an analysis on how Victoria's current and planned gas infrastructure can be used to meet the state's emissions targets, which is explored in section 2.2.3 below.[14]

2.2.3 Towards 2050: Gas infrastructure in a zero emissions economy

In December 2020, the Victorian Treasurer tasked Infrastructure Victoria with providing advice on the future of Victoria's gas networks under a range of scenarios where Victoria achieves net-zero emissions by 2050.[15] Advice will be delivered as part of the *Towards 2050: Gas infrastructure in a zero emissions economy* final report.

In June 2021, Infrastructure Victoria released the *Towards 2050: Gas infrastructure in a zero emissions economy* interim report. It noted that significant changes are needed in the gas infrastructure to achieve the Victorian *Climate Change Act 2017* emission reduction targets.

Four scenarios were used to assess the changes needed in the Victorian gas infrastructure to achieve net-zero emissions for gas use by 2050. The four scenarios used were:

- scenario A: full electrification, no natural gas, no carbon capture and storage (CCS)[16]
- scenario B: partial electrification, limited natural gas use, limited CCS
- scenario C: green and blue hydrogen with carbon offsets, electrification, no natural gas, no CCS
- scenario D: large-scale brown hydrogen, large-scale CCS, no natural gas

12 Ibid, p. 31.
13 Ibid, p. 31.
14 Ibid, p. 7.
15 Infrastructure Victoria, *Towards 2050: Gas infrastructure in a zero emissions economy,* interim report, 19 July 2021, p. 6.
16 CCS is a process that catches carbon dioxide before it is released into the atmosphere, transports it and stores it underground permanently.

The scenarios test key variables including the technologies used to reach net-zero emissions: electrification, natural gas, hydrogen and biogas.[17] Early findings based on scenario analysis and a literature review found that using a combination of technologies is the most promising pathway to decarbonise the gas sector in Victoria. However, not all technologies are ready to be used on a large scale.[18]

Scenario C and scenario D were characterised by the take up of hydrogen as a low carbon substitute for natural gas, but the way hydrogen is produced is different in each scenario. Under scenario C, gas demand is primarily met by green hydrogen which is produced using renewable electricity such as wind or solar generation. Under scenario D, gas demand is primarily met by brown hydrogen which is produced using brown coal through the process of gasification.[19]

The interim report explored the long-term role of hydrogen as a substitute for natural gas and outlined the possibility to offset the need for purpose-built hydrogen infrastructure by using the existing gas infrastructure for low hydrogen blends.

However, a major risk for the use of hydrogen in the gas network is embrittlement when hydrogen is injected into high-pressure steel transmission pipelines. To mitigate the risk of embrittlement, hydrogen can be used safely in plastic distribution pipelines.[20] However, injections into the distribution system are not accounted for in the NGR. This rule change request looks to amend the current framework to allow the participation of production and storage facilities in the distribution system.

The final report is expected for release in December 2021. It will detail the role of gas in the future of Victoria's energy mix and identify potential timings for optimal gas infrastructure decisions.

2.2.4 Renewable Hydrogen Industry Development Plan

In February 2021, the Victorian Department of Environment, Water, Land and Planning released the *Victorian Renewable Hydrogen Industry Development Plan* (the Plan).

The Plan set out a blueprint for Victoria to develop the renewable hydrogen industry and reach legislated net-zero emissions targets by 2050. It recognises the role hydrogen can play in the future of Victoria's energy transition, with a focus on opportunities for hydrogen produced using renewable energy. [21]

The Plan is divided into three focus areas consisting of 18 outcomes. The three focus areas are:

1. the foundation for renewable hydrogen
2. connecting the economy

17 Ibid, p. 27.
18 Ibid, p. 34.
19 Ibid, p. 28.
20 Ibid, p. 21.
21 Victorian Department of Environment, Land, Water and Planning, Vic*torian Renewable Hydrogen Industry Development Plan*, February 2021, p. 5.

3. leading the way

The 'connecting the economy' focus area includes the 'gas networks have a pathway to renewable hydrogen' outcome. The basis of this outcome is on the potential to use the existing gas distribution network as a pathway for the substitution of natural gas for hydrogen. Direct injections of hydrogen to the gas distribution network can deliver hydrogen to residential, commercial and industrial users while supporting decarbonisation. [22]

Currently, direct injections to the gas distribution system are not recognised in the NGR. This rule change request aims to amend the current regulatory framework to allow the participation of distribution connected facilities.

A review of the Plan is scheduled for 2025 to align with the setting of Victoria's next emission reduction targets.[23]

2.2.5 Energy Legislation Amendment Bill 2021

While this rule change request will be progressed in parallel to the Hydrogen review, the Victorian Government put forward a bill to change the *National Gas (Victoria) Act 2008* to allow hydrogen natural gas blends to be considered natural gas in Victoria as a temporary measure if the NGL changes are not progressed within the Victorian Government's expected timeframe.

On 9 September 2021, the Energy Legislation Amendment Bill 2021 was passed by the Victorian Parliament and received Royal Assent on 14 September 2021. Among other things, the legislation included an amendment to section 9A of the *National Gas (Victoria) Act 2008* to modify the meaning of natural gas.

The amendment provides that the Minister may declare either of the following to be natural gas for the purposes of the *National Gas (Victoria) Law* and the National Gas Rules:

1. a substance consisting of a mixture of natural gas and another gas (e.g. hydrogen)
2. a gas other than natural gas (e.g. hydrogen)

Before making a declaration, the Minister must consult with the Premier, the Treasurer, Energy Safe Victoria and AEMO.

22 Ibid, p. 44.

23 According to the Victorian *Climate Change Act 2017.*

3 DETAILS OF THE RULE CHANGE REQUEST

This chapter provides a brief overview of some issues and the proposed solution included in the rule change request.

A copy of the rule change request can be found on the AEMC website, www.aemc.gov.au.

3.1 Issues

The proponent identified three key categories which appear to require updates to facilitate and integrate distribution connected facilities into the DWGM. The three areas are:

- market operations including registration categories, bidding, demand forecast and scheduling
- market outcomes including title, custody and risk, participant compensation funding, and settlements
- system operation including connection requirements, metering and gas quality management.

The issues identified in the rule change request focus predominately on Part 19 of the NGR. Part 19 sets out the rules that govern the operation of the DTS and the declared distribution system (DDS) as well as the administration of the DWGM.

3.1.1 Market operations

This category covers sections of the current framework relating to the operation of the DWGM and details the following issues:

- DWGM participant categories do not provide a registration category for distribution connected facilities.[24]
- market participants intending to inject to the DTS are required to submit bids to AEMO.[25] Participants intending to inject gas into the DDS are not covered.
- scheduling of injections and withdrawals from the DWGM exclusively mention the DTS[26]
- demand forecasts and injection and withdrawal bids from market participants exclusively mention withdrawals or injections to the DTS.[27]
- confirmations of injections and withdrawals from the DWGM exclusively mention the DTS[28]
- AEMO is required to publish details for the relevant gas day in respect to the DTS exclusively.[29]

24 See rule 135A of the NGR.
25 See rule 207 of the NGR.
26 See rule 206 of the NGR.
27 See rule 213 of the NGR.
28 See rule 219 of the NGR.
29 See rule 320 of the NGR.

- market participants are required to submit a demand forecast for the amount of gas expected to be withdrawn from the DTS only.[30] Distribution injections will offset DTS demand.
- the determination of the market price takes into account any transmission constraints affecting withdrawals in the DTS, while not taking into account any injection constraints on the DTS. It is unclear how DDS injections would be covered[31]
- only supply-side transmissions constraints are required to be included within the production of operating schedules[32]
- the new capacity certificates, which will commence in 2023, can be allocated to injection facilities for tie-breaking rights, but the rules do not contemplate this for distribution connected facilities.[33]

3.1.2 Market outcomes

This category covers issues identified in the current framework relating to market outcomes and includes the following issues:

- market participants authorise AEMO to effect the transfer of title of gas injected to the DTS and determine the time, place and quantities of gas transferred.[34] The proponent pointed to uncertainty in the recognition of gas-blending at the DDS under the current framework
- market participant contributions to the Participant Compensation Fund are calculated according to the quantity of gas withdrawn from the DTS.[35] The proponent identified that injections from the DDS can alter this quantity
- allocation and reconciliation of quantities of gas injected and withdrawn by a market participant are only considered at the DTS level[36]
- default notices and market participant suspensions only cover restrictions for DTS connected facilities.[37]

30 See rules 207 and 208 of the NGR.
31 See rule 221 of the NGR.
32 See rule 215 of the NGR.
33 Rule change request, p. 7.
34 See rule 220 of the NGR.
35 See rule 225 of the NGR.
36 See rules 228, 229 and 230 of the NGR.
37 See rules 259 and 260 of the NGR.

3.1.3 System operation

The proponent identified a number of issues relating to the management of the physical system in the DWGM:

- the current framework includes connections to the DTS for agreements made after 1999.[38] Connections of supply facilities to the DDS are not covered
- the DTS service provider obligations in the connection process are limited to connections to the DTS.[39] The current framework does not consider connections to the DDS
- AEMO's role in the approval of connection applications[40] and agreements[41] is limited to connections to the DTS
- the obligations of connected parties, applications and the finalisation of connection agreements in the current frameworks are limited to the DTS.[42]
- gas quality systems, plans and agreements mention only injections to the DTS.[43]
- metering obligations exclusively considers distribution system injections and withdrawals for tariff D customers.[44]
- metering obligations are exclusively placed on DTS service providers or DDS service providers. Connected parties looking to provide their own compliant metering must reach an agreement to do so with their DTS service provider or DDS service provider. [45]
- AEMO's system security threat interventions exclusively mention transmission connected participants.[46]

3.2 Proposed solution

In order to address the issues relating to the participation of distribution connected facilities in the DWGM, the rule change request proposed three potential solutions. The proponent's preferred option:

1. includes distribution connected facilities in the scheduling of supply and demand from declared networks
2. includes new injection points for distribution supply facilities to offer gas into the market
3. changes the definition of demand in the DWGM to incorporate all gas usage from the transmission or distribution system and reflect the combined volumes from transmission connected customers and distribution demand within the gas retail market.

Each issue and proposed solution is discussed in chapters 6, 7 and 8. A summary of each proposed solution can be found in appendix C.

38 See rule 267 of the NGR.
39 See rules 268 and 273 of the NGR.
40 See rule 272 of the NGR.
41 See rule 275 of the NGR.
42 See rules 270, 271, 274 of the NGR.
43 See rules 287, 288, 289 of the NGR.
44 See rule 290 of the NGR.
45 See rules 290 and 292 of the NGR.
46 See rules 343, 344 and 350 of the NGR.

3.3 Alternative solutions

In addition to the proposed solution above, the proponent identified two other options for how distribution connected facilities may participate in the Victorian gas market.

1. supply from distribution connected facilities is managed contractually to retail customers outside of the DWGM[47]
2. supply from distribution connected facilities is managed as a negative demand within the DWGM to offset supply from the DTS.[48]

These options are further explored in section 9.1, however the proponent considers that the proposed solution will maintain the fundamentals of the DWGM design, which in turn should reduce the cost and complexity of implementation and maintain the existing benefits of transparency and market liquidity.

47 Rule change request, p. 13.
48 Rule change request, pp. 13-14.

4 ASSESSMENT FRAMEWORK

This chapter outlines the:

- decision-making framework the Commission must apply to determine whether the rule change request contributes to the NGO
- proposed assessment framework
- Commission's options to make a more preferable rule.

4.1 Achieving the NGO

The Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national gas objective (NGO).[49] This is the decision-making framework that the Commission must apply.

The NGO is:[50]

> 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.

4.2 Proposed assessment framework

To determine whether the proposed rule change would likely promote the NGO, the Commission will assess the rule change request against an assessment framework. The framework may be refined during the rule change process.

The Commission is seeking stakeholder views on its proposed assessment framework, which includes the following criteria:

- **Market efficiency:** which consists of allocative, productive and dynamic efficiency.
  - **Allocative efficiency:** whether the rule change enables market prices that facilitate the allocation of gas to their highest-valued uses.
  - **Productive efficiency:** whether the rule change enables operational signals to facilitate dispatch of the least-cost mix of gas supply to meet demand. This will involve considering whether production or storage facilities would be treated consistently in dispatch independent of whether they are directly connected to the distribution network or the transmission network.
  - **Dynamic efficiency:** whether the rule change minimises barriers to entry and promotes efficiency in Victorian gas services, including investment in production or storage facilities as well as investment in the distribution and transmission systems to meet gas demand over time.

49 Section 291(1) of the NGL.
50 Section 23 of the NGL.

- **Innovation:** Do the proposed changes facilitate innovation in the development of gas production, storage, transmission and distribution facilities and the provision of gas services to end-users.
- **Implementation consideration**: Are the proposed changes targeted, fit for purpose and proportionate to the issues they are intended to address. Do the proposed changes provide the stability and transparency in regulatory arrangements to enable consumers, market participants and investors, to make efficient decisions. This will involve considering whether and how distribution-connected facilities can be incorporated into the existing market design without introducing excessive complexity.
- **Safety, reliability and security of supply:** Whether the rule change promotes efficient investment in, and efficient use of, natural and renewable gas services with respect to the safety, reliability and security of gas supply.
- **Decarbonisation:** Whether market arrangements will enable the decarbonisation of the energy market.

QUESTION 1: ASSESSMENT FRAMEWORK

1. Is the proposed assessment framework appropriate for considering the proponent's rule change request?
2. Are there any other relevant considerations that should be included in the assessment framework?

4.3 Making a more preferable rule

Under s. 296 of the NGL, the Commission may make a rule that is different (including materially different) to a proposed rule (a more preferable rule) if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule will or is likely to better contribute to the achievement of the NGO.

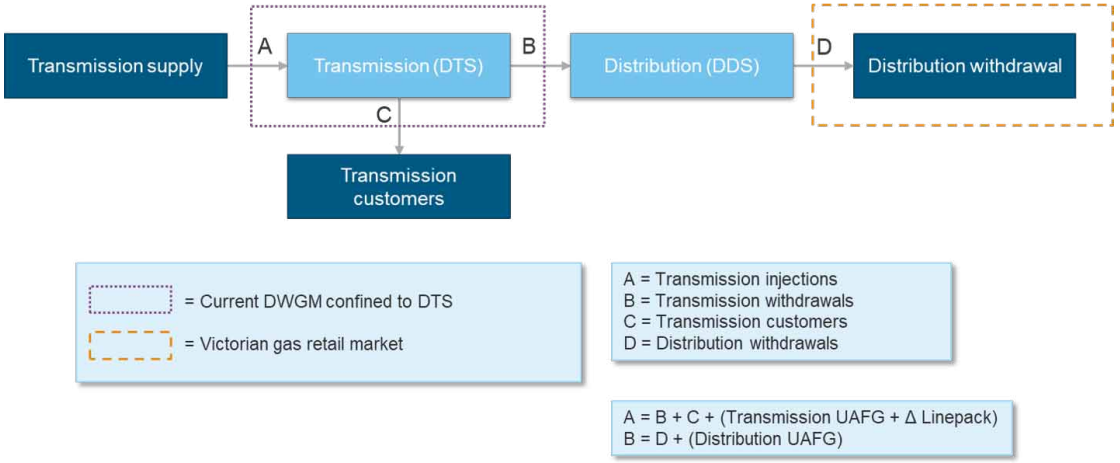
5 BARRIER TO INJECTIONS INTO THE VICTORIAN DISTRIBUTION SYSTEM

As noted in section 2.1, the DWGM is a gross pool market, which means that it is compulsory for market participants wanting to inject gas to, or withdraw gas from, the DTS to trade through the DWGM.

The Victorian gas retail market allows licensed retailers to sell natural gas to residential and business customers who are connected to a DDS which is supplied from the DTS and DWGM.

Currently, the gas withdrawn from the DDS is considered equal to the gas withdrawn from the DTS and is managed through balancing processes in AEMO's gas market systems.

Figure 5.1: Gas flows in the Victorian market

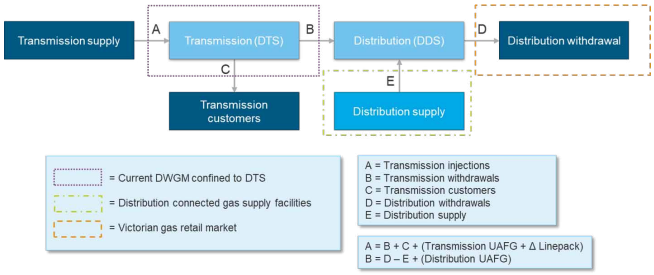


Source: AEMC.

The rule change aims to allow any supply or storage facility to connect into the DDS and participate within the DWGM, which is not currently contemplated within the NGR. This change could also provide more certainty to proposed facilities that would inject low-level hydrogen blends or other renewable gasses into the DDS.

Injecting gas into the DDS will cause the gas that is withdrawn from the DDS not to equal the gas withdrawn from the DTS, creating gas market complexities.

Figure 5.2: Future gas flows in the Victorian market



Source: Rule change request, p. 3.

5.1 Why is it essential for this to be addressed now?

At the inception of the DWGM in 1999, it was not envisaged that there could be production or storage facilities connected at the distribution system during its inception. Given the provisions within the STTM that allow for distribution connected facilities, the proponent considered it necessary for similar arrangements to be consulted for the DWGM.

As mentioned above in section 2.2, the work currently underway in Victoria on its emissions reduction target and the facilitation to low emission sustainable fuels will include pathways for hydrogen and other sustainable fuels to substitute for existing natural gas.

The Hydrogen Park Murray Valley project, a joint venture between AGIG and ENGIE, aims to inject renewable hydrogen into Australian Gas Networks' (AGN) existing network in Wodonga.[51] This supply facility will be connected at the DDS level for which the current DWGM design and NGR do not contemplate the selling or trading of this supply.

The proposed changes will remove the existing regulatory barriers within the DWGM for distribution connected facilities.[52] This would align the DWGM with the STTM elsewhere in Australia and ensure that the Victorian government does not face barriers to its emissions reduction targets.

In contrast to the DWGM, the STTMs in Adelaide, Brisbane and Sydney do contemplate distribution connected facilities and allow for the trading of gas from these facilities within the market. The proponent aims to maintain the high level of transparency and liquidity that exists in the DWGM that includes all supply facilities in the market, similar to the STTM.

51 More details about this project can be found in appendix A.3.1.

52 Currently, facilities cannot directly participate in the market but may use contractual arrangements outside of the market to inject gas to the distribution system. This option is explored in section 9.1.1.

6 ISSUES FOR CONSULTATION: MARKET OPERATIONS

Taking into consideration the assessment framework set out in section 4.2, a number of issues have been identified for the initial consultation.

Stakeholders are encouraged to comment on these issues as well as any other aspect of the rule change request or this paper, including the proposed assessment framework.

The proponent identified three broad areas in the NGR that would require changes to enable distribution connected facilities to inject gas into the DDS and participate in the DWGM:

1. **Market operations**, which cover issues surrounding the registration categories, offering and bidding gas in the market, demand forecasting, scheduling application of constraints and the allocation of capacity certificates used for tie-breaking.[53]
2. **Market outcomes**, which include the issues associated with settlements, allocations and funding.
3. **System operations**, which encapsulates the issues identified with connection requirements, gas metering, gas quality management and system security with regards to directions.

Each of these issues is explored in more detail throughout this chapter and the other associated chapters.

The Commission notes that no draft proposed rule was provided with the rule change request. However, the associated rules that are likely to need amending to implement the proposed changes, for each of the issues are outlined in their respective sections.

The Commission is seeking stakeholder feedback on any rules surrounding the market operation, not identified below that may require amendments to facilitate the proposed changes.

6.1 Facility registration

Rule 135A of the NGR covers all the categories of registered participants that participate in the DWGM, which includes the following:

Table 6.1: Registration categories

REGISTRABLE CAPACITY	DESCRIPTION	RULE
Declared transmission service provider	The service provider for the declared transmission system	135A(a)
Distributor	The service provider for a declared distribution system	135A(b)

53 Capacity certificates come into effect from 1 January 2023.

REGISTRABLE CAPACITY	DESCRIPTION	RULE
Producer	A producer that injects natural gas into the declared transmission system	135A(c)
Market Participant — Producer	A producer that buys or sells natural gas in the declared wholesale gas market	135A(d)
Storage provider	A storage provider whose storage facility is connected to the declared transmission system	135A(e)
Market Participant — storage provider	A storage provider who buys or sells natural gas in the declared wholesale gas market	135A(f)
Interconnected transmission pipeline service provider	A service provider for a transmission pipeline that is connected to the declared transmission pipeline	135A(g)
Transmission customer	An end-user that withdraws natural gas from the declared transmission system	135A(h)
Market Participant — transmission customer	An end-user that: • buys natural gas in the declared wholesale gas market; and • withdraws natural gas from the declared transmission system	135A(i)
Market Participant — distribution customer	An end-user that: • buys natural gas in the declared wholesale gas market; and • withdraws natural gas from a declared distribution system	135A(j)
Market Participant — Retailer	A retailer that sells natural gas that has been transported through the declared transmission system	135A(k)
Market Participant — Trader	Any other person that buys or sells natural gas in the declared wholesale gas market	135A(l)

Source: See rule 135A of the NGR.

For a facility to be able to participate within the DWGM they must be a registered participant under the NGR.[54]

The NGR does not provide a registration category for a distribution connected facility.

Two possible solutions could solve this problem:

1. Introduce new facility types for distribution connected facilities.

54 See rule 135A of the NGR.

2. Expand the existing definitions for the facility types (producer, storage provider, market participant producer and market participant storage provider) to include distribution connected facilities.

The proponent indicated that the existing definitions should be expanded to include any distribution connected facility and that it considers this option would automatically flow through the rules. In its view, this would reduce the number of updates required when compared to creating an entirely new participant category.[55]

Registration categories are also being consulted on as part of the Review, with consideration being given to amending the NGR to refer specifically to blending facilities. This is due to the characteristics of blending facilities being different to typical production facilities in that they also require the withdrawal of gas in order to produce the blend.[56]

QUESTION 2: FACILITY REGISTRATION

1. Should the existing definitions be expanded to include distribution connected facilities?
2. Alternatively, should a new participant category be introduced to account for distribution connected facilities?

6.2 Requirement to submit bids and gas scheduling

Each market participant that intends to inject gas into the DTS must submit their nominated quantity and price to AEMO for up to ten price and quality steps.[57] In accordance with these bids, AEMO must schedule the injection and withdrawal of gas, ensuring compliance with the gas scheduling procedures and operating within system security procedures. See section 2.1.4 for a detailed explanation of the bidding and scheduling process.

The NGR currently does not contemplate injections of gas into the DDS and as such, there is no corresponding provision for the bidding and scheduling of such injections.

The proponent suggested that all the relevant bidding and scheduling rules be updated to include the ability to bid in gas into the market from a distribution connected facility, with the same process used for the relevant scheduling rules to allow injections into the DDS to be scheduled.

55 Rule change request, p. 6.
This approach is similar to that taken in the AEMC's draft decision for *Integrating energy storage system into the NEM*, where a new services-based participant category was introduced. This avoids having to make new asset based categories as new technologies seek to enter the market. AEMC, *Integrating energy storage systems into the NEM*, draft determination, 15 July 2021, p. i.

56 AEMC, *Review into extending the regulatory frameworks to hydrogen and renewable gases*, consultation paper, p. 43.

57 See rules 207 and 209 of the NGR.

QUESTION 3: REQUIREMENT TO SUBMIT BIDS AND GAS SCHEDULING

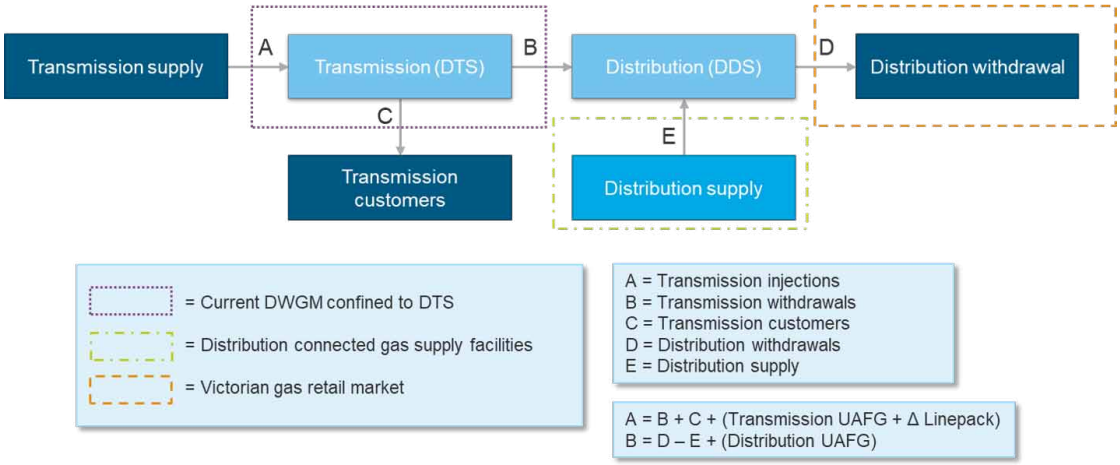
1. Should all bidding rules be updated to allow distribution connected facilities to bid into the market? If not, why?
2. Should all scheduling rules be updated to allow injections into the declared distribution system to be scheduled? If not, why?

6.3 Demand forecasts

Market participants that intend to withdraw gas from the DTS must submit a forecast of this demand for each hour of the day and, if required from AEMO, one or more specified system withdrawal points.[58] The demand forecasts are a key input from market participants into AEMO's scheduling process as mentioned above in section 2.1.4 and section 6.2.

Currently, the demand forecast only accounts for withdrawals from the DTS, assuming there are no injections into the DDS. Distribution injections will offset the demand required from the DTS, causing an imbalance in this forecast meaning supply and demand would not balance.

Figure 6.1: Gas flows in the Victorian market



Source: Rule change request, p. 3.

The proponent suggested altering the existing demand forecast definition such that it is inclusive of all gas consumed from a declared system, that is both distribution and transmission. The proponent expects this change would allow demand and supply to remain equal, maintaining the supply and demand balance in a clear and transparent manner.[59]

58 See rule 208 of the NGR.
59 Rule change request, p. 6.

QUESTION 4: DEMAND FORECASTS

1. Should the demand forecast definition be amended to include all gas consumed from distribution and transmission systems within a declared system?
2. If not, is there an alternative solution that would maintain the existing NGR gas demand forecast definition?

6.4 Determination of market price

As noted in section 2.1.4, the market price is determined by AEMO through its production of pricing schedules that specify injections and withdrawals of gas to be made each day. This must be done in a way that minimises the cost of satisfying the expected demand for gas on that gas day. In producing these schedules AEMO must:[60]

- take into account any transmission constraints affecting withdrawals of gas within the DTS from withdrawal points made during that gas day
- not take into account any transmission constraints affecting the injection of gas within the DTS during that gas day.

Given the current provisions under the NGR only consider DTS connected facilities, it is unclear how distribution connected facilities would best fit into the existing constraint equations. The proponent also questioned whether a distribution connected facility limitation, such as blending constraints, should impact the market price.

Two possible options were identified by the proponent to address this issue:

1. not including the distribution injection constraints and treating the facilities consistently to other network injection constraints
2. include these constraints within the market price and pricing schedule, as this is equivalent to treating the distribution injections as a negative demand where withdrawal constraints are included in the pricing schedule.

The proponent recommended that any distribution network injection constraints should be treated consistently with other injection network constraints, and as such not be included in the pricing schedule.[61]

QUESTION 5: DETERMINATION OF MARKET PRICE

1. Should distribution connected facilities' constraints be treated consistently with transmission injection facilities and excluded from the pricing schedule? If not, why?

60 See clause 221(4) of the NGR.
61 Rule change request, pp. 6-7.

6.5 Operating schedules

Operating schedules set out each market participant's physically achievable hourly gas injections and withdrawals at each injection and withdrawal point, taking account of transmission pipeline constraints, linepack distribution, system limits on pressure and gas flows.[62]

The current operating schedule as produced by AEMO requires that only supply-side transmission constraints are included, such as the physical capacity of the DTS. For further detail on the operating schedule and AEMO's scheduling process, see section 2.1.4.

When gas is injected at the distribution level, this gas may be of a different composition to that already in the system, which may be subject to constraints depending on the blended composition already in the distribution system. If this is to occur, it is unclear whether the blending constraint would be treated as a network constraint or if it should be included in the operating schedule.

Additionally, it is unclear who would be responsible for determining and managing these types of constraints.[63] The AEMC considers that if there is no compliance with the blending constraints, it would be unclear who is liable for any potential damages resulting from this deviation.

The proponent did not indicate a preferred solution, but suggested three potential solutions:[64]

1. Maintain the existing design and have the distribution networks manage the constraint issue outside of the DWGM, which may cause market deviations.
2. Expand the definition to allow distribution network constraints that impact distribution supply sources to be included within the operating schedule.
3. Introduce a new type of constraint for distribution connected facilities that is managed by the Gas Scheduling Process.

QUESTION 6: OPERATING SCHEDULES

1. Should the existing design be maintained with distribution networks managing the constraint issues outside of the DWGM?
2. Should the operating schedules be expanded to allow distribution constraints within the operating schedule?
   a. In this case, what compliance liability considerations need to be made for distribution connected facilities?
3. Should a new constraint type be added for distribution connected facilities that is managed by the gas scheduling process?

62 AEMC, *DWGM operating schedules*, final determination, 22 October 2015.
63 Rule change request, p. 5.
64 Rule change request, p. 7.

6.6 Capacity certificates

On 12 March 2020, the AEMC made a final rule that amends the NGR to replace the current AMDQ regime with a new entry and exit capacity certificates regime. The final rule comes into effect on 1 January 2023.[65]

The new regime introduces:

- entry capacity certificates that provide injection tie-breaking benefits
- exit capacity certificates that provide withdrawal tie-breaking benefits.

The allocation of capacity certificates will primarily occur via the capacity certificates auction, which will be operated by AEMO.

Capacity certificates are for entry or exit within a zone and AEMO is required to determine the capacity certificates zones and publish these in a register. AEMO is also required to conduct system capability modelling at least annually to inform AEMO's determination of the types and amounts of capacity certificates available at each auction.

AEMO is required to amend existing procedures and make new procedures required by the final rule and conduct the first system capability modelling.

However, the new rules commencing in 2023 do not contemplate distribution connected facilities.

The proponent suggested a couple of possible paths:[66]

1. Allow distribution connected facilities to be allocated capacity certificates for tie-breaking rights even though they are not injecting into the transmission network.
2. Leave rules as they are in that only transmission facilities can receive tie-breaking rights.

The proponent's preferred solution is for distribution connected facilities to be allocated capacity certificates for tie-breaking rights to ensure they are not preferentially de-scheduled in some circumstances.

QUESTION 7: CAPACITY CERTIFICATES

1. Should distribution connected facilities be allocated capacity certificates for tie-breaking rights? Why?
2. What would be the implications of modelling the capacity of potentially a high number of new distribution connected injection points?

65 AEMC, *DWGM improvement to AMDQ regime*, final determination, March 2020.
66 Rule change request, p. 7.

7 ISSUES FOR CONSULTATION: MARKET OUTCOMES

Once the gas is scheduled per the market operations item discussed above, this gas must then be allocated to market participants for settlements and billing. Currently, the rules do not contemplate allocations to distribution connected facilities, therefore updates would also be required in line with the market operations changes.

As outlined in the previous chapter, no proposed draft rules was provided by the proponent. Therefore, the Commission invites stakeholder feedback on any rules surrounding market outcomes not identified below that may require amendments to facilitate the proposed changes.

7.1 Title, custody and risk

Once the gas is injected into the DTS, the title is transferred to AEMO with the associated authorisation to determine the time and place to transfer the gas.[67] AEMO additionally has the right to co-mingle the injected gas with other gas in the DTS.

This means that each market participant is taken to accept that the gas delivered to it at a system withdrawal point may not match the specifications of the gas injected, or tendered for injection, into the declared transmission system by that market participant at a system injection point. The title of the gas passes back to the market participant when the withdrawal is made from the DTS.[68] See section 2.1.1 for further detail on the transferal of title in the DWGM.

Distribution connected facilities may inject gas that is a different composition to gas that is already in the DDS. Given this, the proponent has raised that the rules may need to contemplate the co-mingling of gas injected at the distribution level.[69]

The issues above are dependent on how the distribution connected facilities are treated under market operations and the proponent considers that existing rules or legislation may already cover blending, custody and title within distribution networks.

The AEMC will consider the proponent's assessment that existing rules or legislation may already cover blending, custody and title within distribution networks. If this is not the case, the proponent has recommended as the preferred solution that the rules be expanded to recognise blending within a declared distribution network.[70] The AEMC notes that this may require changes to the responsibilities of DDS service providers.

67 See rule 220 of the NGR.
68 Ibid.
69 Rule change request, pp. 5-6.
70 Rule change request, pp. 7-8.

QUESTION 8: TITLE, CUSTODY AND RISK

1. Do the rules need to be changed to manage the title of injections within the distribution system?
2. Do the rules need to contemplate the co-mingling of gas within a distribution system? If not, why?

7.2 Participant compensation fund

The participant compensation fund is managed by AEMO in order to pay compensation to market participants for scheduling errors as determined by the Dispute Resolution Panel.[71] Each market participant who withdraws gas, or whose customers withdraw gas from the DTS is required to pay into this fund.

The requirement for funds from each participant is based on a flat rate of $/GJ for each gigajoule of gas withdrawn from the DTS.

The injection of gas at the distribution level will reduce the amount of gas withdrawn from the DTS and as such will reduce the payments into the participant compensation fund.

The proponent identified two potential avenues to deal with this issue:[72]

1. Keep the existing framework where transmission usage pays for the participant compensation fund.
2. Expand the mechanism to include all users from a declared network, which would capture the gas injected at a distribution level.

The proponent's preferred solution is to ensure that all producers are included as part of the participant compensation fund and as such the cost recovery mechanism should be expanded to include all users from a declared network.

QUESTION 9: PARTICIPANT COMPENSATION FUND

1. Should the participant compensation fund cost recovery mechanism be expanded to include distribution connected facilities? If not, why?

71 AEMO, *Structure of participant fees in AEMO's gas markets*, consultation paper, 2017, pp. 11.

72 Rule change request, p. 8.

7.3 Allocations and the determination of fees payable to AEMO

Allocations within this section refer to the quantities of gas treated as having been injected or withdrawn by a market participant at a point in the system during a gas day. For example, there may be multiple market participants injecting gas through the same meter, in which case AEMO utilises an allocation methodology to apportion the correct amount of metered gas will be allocated to each participant for the purposes of settlement and fees.[73]

Injection and withdrawal allocation quantities are currently only contemplated for gas injected and withdrawn from the DTS by each market participant.[74]

Where a production facility is connected to the DDS and is scheduled as suggested in section 6.5, then the actual gas injected will need to be allocated to market participants.

The proponent explored the feasibility of two solutions for this issue:

1. Expand the definition of what gas is allowed to be allocated to include distribution connected facilities.
2. Treat distribution facilities' injected gas as negative demand. In this case, the withdrawal allocation methodology would have to undergo a significant redesign. The negative demand option is proposed as a potential solution in section 9.1.2.

The proponent preferred solution is to expand the definition of what gas is allowed to be allocated to include distribution connected facilities, as it considers this option would allow AEMO to update their fee allocation methodology with industry consultation.[75]

> QUESTION 10: ALLOCATIONS AND DETERMINATIONS OF FEES PAYABLE
>
> 1. Should the definition of what gas can be allocated be expanded to include gas supplied by distribution connected facilities?
> 2. Are there other alternative solutions that would be more effective?

7.4 Default notices and market suspension

Under the NGR several events can be classified as default events, including where a market participant fails to pay AEMO by the specified due date.[76] Where a default event has occurred AEMO may issue a default notice, immediately suspend the participant or make claim to any credit support held in respect of the market participant. [77]

73 AEMO, *DWGM allocation and sub-allocation establishment guidelines*, 2014, p. 5.
74 See rule 228 of the NGR.
75 Rule change request, p. 8.
76 See clause 251(1) of the NGR for the full list of default events.
77 See rule 251(2) of the NGR.

In issuing a default notice the current rules give flexibility to AEMO in specifying the conditions applied to the market participant, however, they currently make reference to gas withdrawn from or injected into a DTS.[78]

Where AEMO has issued a default notice and the affected market participant has failed to comply with the terms in the notice, AEMO must issue a suspension to the participant.[79] The conditions of suspension that AEMO can place on the market participant relate to the injection and withdrawal of gas from the DTS.[80]

With the introduction of distribution connected facilities injecting gas, it is unclear if injection can be covered under the restrictions for a default notice and whether there are provisions for the suspension of a market participant.

The proponent suggested that the rules around default notices and market suspension be amended to include distribution connected facilities [81]

QUESTION 11: DEFAULT NOTICES AND MARKET SUSPENSION

1. Should the rules be expanded to include distribution connected facilities for default notices? If not, why?
2. Should the rules be expanded to include distribution connected facilities for market suspension? If not, why?

78 See rule 259 of the NGR.
79 See clause 260(1) of the NGR.
80 See clause 260(2)(c) of the NGR.
81 Rule change request, p. 8.

8 ISSUES FOR CONSULTATION: SYSTEM OPERATIONS

The issues surrounding system operations are predominately related to physical system management, with some interlinkages to market operation issues.

The Commission invites stakeholder feedback on the issues outlined below and any additional rules relating to system operations that may require amendment to facilitate the proposed changes.

8.1 Application of the connections framework

Connections under subdivision 1 of the NGR cover participants who connected into the DTS after the commencement of the DWGM on 15 March 1999. This subdivision does not alter the terms of connection agreements, contractual rights or obligations, or relieve the parties of contractual obligations that were made before this date.[82]

This subdivision relates to connections to the DTS and does not contemplate any facilities that would connect to the DDS. Additionally, the proponent noted that there could be legacy issues with different requirements for different facilities.[83] The AEMC will consider the impact any rule change would have on connected facilities, including those before 1999 and invite stakeholder feedback on whether such connection agreements are likely to be impacted.

The proponent considered amending rule 267 of the NGR such that it applies to all connections to the DTS and all injections into a DDS with no time limitations. A concern with this approach is that it may create issues if a connection rule or procedure changes then it needs to retrospectively apply to all connections.[84]

With amending rule 267 of the NGR, the responsible party for assessing and approving connections into the distribution system will need to be considered. This consideration will need to take into account the design of how distribution connected facilities will interact with the DWGM, which is explored throughout this paper.

The proponent's preferred solution is to amend the rules to cover distribution injections with transitional arrangements to acknowledge the potential issues raised above. The transitional arrangements would acknowledge that changes to the connection rule or procedures would have a time frame in which they must comply and would not apply immediately for existing connections. No draft transitional wording was provided with the rule change request.

> QUESTION 12: APPLICATION OF THE CONNECTIONS FRAMEWORK
>
> 1. Should the connections' framework be expanded to cover distribution injections? If not, why?

82 See rule 267 of the NGR.
83 Rule change request, p. 7.
84 Rule change request, p. 9.

2. If so, what considerations should be accounted for in the transitional wording?
3. Who should be the party responsible for assessing and approving connections into the distribution system?
4. Is the separation of connection agreements before 15 March 1999 with those made after still relevant within the NGR?

8.1.1 Obligations of declared system service providers

The declared transmission system service provider has a number of obligations concerning connections under the NGR:[85]

- receive and process applications for connections or modifications to an existing connection and enter into a connection agreement with the connected party
- ensure compliance with the NGR from connected parties
- consult with AEMO regarding the operation of the system and any security requirements of proposed connections into the DTS
- use reasonable endeavours to comply with any and all reasonable requests from connection applicants relating to their connection requirements.

The DTS service provider must also consult with AEMO for proposed connections before the submission of the proposed connection agreement for approval by AEMO. For material changes to any information contained in or relevant to an application to connect that the DTS service provider becomes aware of, it must notify the connection applicant in writing of this change.

Once the proposed connection has been approved in principle by AEMO, the DTS service provider must make an offer to connect the connection applicants pipeline or pipeline equipment to the DTS within 20 business days.[86]

Connections into the DDS are not currently covered under the NGR and as such, it is unclear what the obligations on the DDS service provider are for connecting parties.

The proponent identified two approaches:

1. Expand rule 268 to include injection connections to a DDS
2. Create two separate sub-clauses for clauses 268 and 273 to cover the obligations of a DDS service provider.

The proponent indicated that option two above would be the most appropriate solution, as it would clearly outline roles and responsibilities.[87]

85 See rules 268 and 273 of the NGR.
86 Or such longer period as the DTS service provider and the connection applicant agree. See rule 273 of the NGR.
87 Rule change request, p. 9.

QUESTION 13: OBLIGATIONS OF THE DECLARED SYSTEM SERVICE PROVIDERS

1. Should the rules be amended to include obligations for declared distribution system service providers?
   a. Where should these obligations sit in the rules?
2. If so, are there any additional considerations that are needed for the declared distribution system?

8.1.2 Obligations of AEMO assessing and approving connections

According to the rules, AEMO must review all proposed connections from a system operation and security perspective, establish the system operation and security standards and associated requirements for connections.

In doing this AEMO must use reasonable endeavours to comply with reasonable requirements from the connection applicant and the DTS service provider related to the commissioning of the connection equipment.[88] See section 2.1.3 for further information on AEMO's role.

The DTS service provider must submit details of the proposed connection requirements to AEMO, after which AEMO may accept or reject the connection based on its connection approval procedures.

Currently, AEMO is only required to assess and approve connections to the DTS, with no specified requirement for DDS connections in the NGR or who is the responsible party for administering connections.

To address this issue the proponent considered two possible options:[89]

1. AEMO could have an active role in assessing and accepting distribution injection connections
2. DDS service provider could manage the connections process, in which case AEMO would only be informed as the market operator to manage the registration and scheduling of the connected facilities.

The proponent considered that the DDS service provider is best placed to be the main facilitator of the connection process to their network, with AEMO involved for any market operation issues.

88 See rules 269, 272, 275, 276 and 277 of the NGR.

89 Rule change request, p. 9.

QUESTION 14: AEMO OBLIGATIONS IN ASSESSING AND APPROVING CONNECTIONS

1. Are the declared distribution system service providers the most appropriate party to facilitate connections into the declared distribution system? Why?
2. Should AEMO have an active role in assessing and approving connections for distribution connection facilities? Why?

8.1.3 Obligations of connected parties

Rule 270 of the NGR states that each connected party to the DTS must ensure that all connection equipment complies with the requirements and conditions set out in the connection agreement with the DTS service provider. In addition to this agreement, connection applicants must:

- comply with reasonable requests from the DTS service provider in respect of the design requirements of connected equipment
- not make material modifications or additions to connected equipment without consent from the DTS service provider and AEMO
- provide load forecast information to the DTS service provider and AEMO
- allow the DTS service provider to commission connection equipment to the DTS
- notify the DTS service provider of any material change to the information in or relating to an application to connect.

The obligations for connected and connecting applicants under the rules only cover connections to the DTS and the associated obligations for those parties.

The proponent considered that the rules should be amended such that any connected facility to the DTS and DDS in order to ensure compliance with the requirements within the connection agreement.[90]

QUESTION 15: CONNECTED PARTIES' OBLIGATIONS

1. Should the rules be expanded to enforce compliance from distribution connected facilities regarding their connection agreements?
2. Are there any alternative solutions that would be more effective?

90 Rule change request, p. 9.

8.2 Gas quality

Gas quality is managed by each connected facility through a documented plan that is approved by AEMO. This plan contains details regarding what services and information the connected facility must provide to AEMO for monitoring, and how the accuracy of the equipment will be maintained.

The DTS service provider is responsible for providing gas quality monitoring systems at each injection point and other points deemed necessary by AEMO to monitor the quality of gas.[91] The gas to be injected by each registered participant must use reasonable endeavours to ensure that any gas injected complies with the gas quality specifications for the system injection point.

The existing rules specifying gas quality monitoring systems only specify DTS connected facilities and the associated responsibilities for the DTS service provider, these would need to be updated or changed for DDS facilities.[92]

To address these issues the proponent considered three possible options:

1. Expand AEMO's role to set the standards for which the distribution gas must comply with, approve the monitoring systems and plans, and also actively monitor the distribution gas quality at distribution injection points.
2. Slightly modify AEMO's role to expand the existing standards to include distribution connections to which the connected party must comply with, but allow the agreements around how they comply to be agreed upon between the DDS and the connected party with the DDS service provider conducting the ongoing monitoring.
3. Allow DDS service providers to enter into agreements and have the same powers and abilities as AEMO at a distribution level, to create their own injection standards that they monitor and comply with.

The proponent's preferred approach is to slightly expand AEMO's role to centrally set the standard with which all connected parties must comply. The proponent considered that this is an efficient outcome rather than having every party set their own standard which may create confusion for new parties wishing to connect.[93]

In its view, the DDS service provider, however, should be responsible for the monitoring plans and active monitoring as the distribution network operator with compliance managed by Energy Safe Victoria through the gas safety case provisions.[94]

It is worth noting that, in case a distribution connected facility is injecting a low level hydrogen blend or other renewable gases into the distribution system, the current rules would also need to be amended[95], which will be the object of the Review.

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91 See rule 288 of the NGR.
92 Ibid.
93 Rule change request, pp. 9-10.
94 Ibid.
95 Rule change request, pp. 8-9.

For example, as mentioned above in section 6.5, the AEMC considers that it is unclear who would be liable for any potential damages resulting from any deviation resulting from blending constraints. This issue would also have impacts on the system operation as well as market operation, with consideration required for whom the appropriate party is to manage the gas specification requirement.

QUESTION 16: GAS QUALITY

1. Who should be responsible for the management of the gas specification within the distribution system?
2. What is the most appropriate instrument for the gas quality monitoring requirements:
   a. The rules?
   b. AEMO guidelines or procedures?
   c. Another instrument?
3. Should the declared distribution system service providers and Energy Safe Victoria be the parties responsible for continued monitoring of the network and compliance respectively? If not, why?
4. Should the rules consider alternative gasses, such as hydrogen, within the gas quality monitoring rules?

8.3 Metering

DTS connected facilities must not inject or withdraw gas unless the connection point has an approved metering installation that is registered with AEMO.[96]

The metering rules within the NGR also account for market participants injecting and withdrawing gas from a DDS, provided that the market participant has an approved metering installation that is registered with AEMO.[97]

While the NGR does account for metering injections and withdrawals for DDS connections the rules place the obligation for metering on the DDS service provider. This does not allow connected parties to install their own compliant equipment without prior agreement from the service provider.

Metering data is directly related to settlements and billing as these items rely on the metering data. This interrelation will need to be considered for any proposed metering changes.

The proponent suggested two possible approaches for dealing with this issue:[98]

1. Minor updates in the wording on metering accuracy and calibration requirements to ensure distribution supply is included in the rules.

96 See rule 290 of the NGR.
97 See rule 290(3) of the NGR.
98 Rule change request, p. 10.

2. Conduct the minor updates as above but also modify the obligations to allow connected parties to provide their own compliant metering.

The proponent has not indicated a preferred approach.

QUESTION 17: METERING

1. Should the rules be amended to cover metering accuracy requirements for distribution connected facilities?
2. Should the rules be amended to allow distribution connected facilities to provide their own compliant metering?
3. Are there any other distribution connected facilities metering related issues that should be included in the rules?

8.4 Threats and interventions

If conditions arise where AEMO reasonably considers that there is a threat to system security that is unlikely to subside without intervention, it must intervene taking any measures it believes is necessary to overcome the threat.

The rules give AEMO wide powers to maintain system security including requiring market participants to do any reasonable act or thing that AEMO believes necessary in the circumstances.[99] In the event of an intervention where AEMO requires a registered participant to inject gas into the DTS, that participant may claim compensation if it incurs a loss in doing so.[100]

The rules also do specifically mention the powers available to AEMO for DTS facilities to inject off-specification gas into the DTS if required.[101] With the inclusion of DDS connected injection facilities, it is unclear if the same powers for DTS facilities would be applicable. However, it is expected that the power for AEMO to direct a participant to do any reasonable act or thing would cover the injection of off-specification gas at the DDS level as well.

Where injection from a DDS connected facility could be directed by AEMO during an intervention, compensation claims would not be allowed given the current definitions in the NGR.

To address these issues the proponent considered two possible options:

1. Expand existing intervention powers in the NGR to allow AEMO to intervene by directing distribution connected facilities. Note some risks need to be explored here if the over-injection of hydrogen has safety implications.

99 See clause 343(1)(e) of the NGR.
100 See clause 344(1) of the NGR.
101 See clause 343(1)(d) of the NGR.

2. Leave the rules as they are and do not allow AEMO to direct distribution connected supply facilities. Note this may create an inconsistency with 91BC which already contemplates AEMO directing any registered participant with regard to a DTS or DDS.

The proponent also indicated that AEMO's powers under the NGR should be consistent with the NGL, allowing AEMO to direct distribution connected facilities. This change would be in line with the existing powers of direction regarding the curtailment of distribution customers.[102]

The proponent did not specify any specific changes regarding compensation claims for DDS injections during intervention events. It is expected that these changes would need to be made to remain consistent with DTS facilities.

QUESTION 18: THREATS AND INTERVENTIONS

1. Is it necessary to expand AEMO's powers to be consistent with DTS connected facilities given the broad powers currently in the rules?
2. Should distribution connected facilities be able to claim compensation for losses incurred for injections required during an intervention?

102 Rule change request, p. 10.

9 ISSUES FOR CONSULTATION: OTHERS

This chapter explores

- alternative solutions put forward from the proponent
- expected costs, benefits and impacts of the proposal
- issues not covered in the rule change request that the Commission requests stakeholder feedback on
- barriers to injection into the Victorian distribution system.

9.1 Alternative solutions

The proponent also outlined two alternative solutions that could be used to facilitate gas production and storage facilities within the DWGM. These are discussed further below.

9.1.1 Supply from the distribution connected facilities is managed contractually to retail customers outside of the DWGM

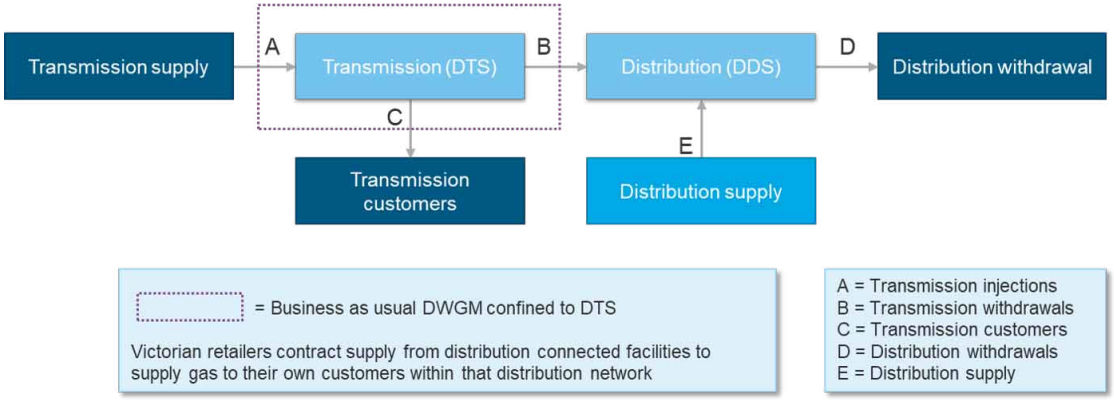
Under this option, Victorian retailers would be required to contract directly from the distribution connected facility to supply their own customers within that distribution network. The DWGM would keep its status quo, that is only covering the flows from the DTS. The proponent sees this solution as effectively the 'do-nothing' option.[103]

The proponent did not consider this solution to be appropriate, for the following reasons:

- **A limited number of possible customers available to each distribution supplier:** customers on a specific distribution network would only be able to contract with facilities connected to the same network.
- **Lack of transparency:** under this approach the distribution supply information would not be published with the DWGM data. This would reduce transparency in the market, as currently all DTS capacity, bidding, supply and demand information is published to the industry.
- **Creates demand uncertainty within the DWGM:** distribution connected facilities would reduce demand from the DWGM. If this supply information is not forecast and made available to AEMO as the operator of the DWGM, this could create uncertainty for what the actual demand of gas from the DWGM is.
- **Potentially increases retail market complexity:** competition within the retail market is facilitated by allowing customers to change retailers. Contractually managing distribution connected facilities in the retail market would require bespoke and complex arrangements.

103 Rule change request, p. 11.

Figure 9.1: Supply from distribution connected facilities managed contractually



Source: Rule change request, p. 13.

The Commission welcomes stakeholder feedback on the viability of this alternative solution and if any components of this solution should be incorporated into the proposed solution.

QUESTION 19: SUPPLY FROM DISTRIBUTION CONNECTED FACILITIES MANAGED CONTRACTUALLY

1. Is there merit in further exploring this proposed solution?
2. Are there any aspects of this solution that should be incorporated into the proposed solution?

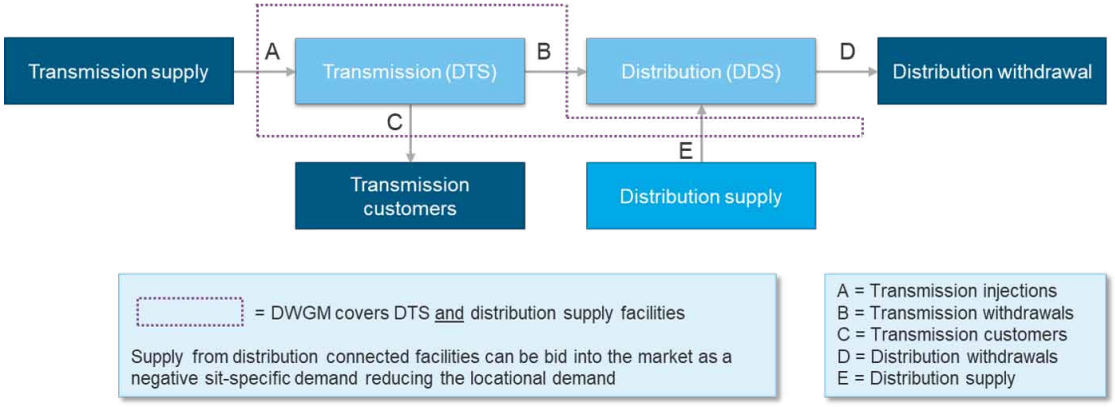
9.1.2 Supply from the distribution connected facilities is managed as a negative demand within the DWGM to offset supply from the DTS

As with the alternative solution above, Victorian retailers would contract the supply from the distribution connection facility to supply their customers on the specific distribution network. Unlike the above option, this supply would then be bid into the market as a negative site-specific demand that reduces the locational demand.[104]

This solution would retain the existing demand forecast as the gas withdrawn from the DTS, with the forecast being effectively treated as a total consumption forecast that is offset by the negative locational demand. This would expand the scope of the DWGM slightly to cover this interaction.

104 Ibid.

Figure 9.2: Supply from distribution connected facilities managed as negative demand



Source: Rule change request, p. 14.

The proponent considered this option to be more transparent and provide greater demand certainty when compared to managing the gas under contractual obligations. However, this solution still limits the number of possible customers, has the potential to increase retail market complexity and adds complexity to the DWGM with the introduction of negative demand.[105]

QUESTION 20: SUPPLY FROM DISTRIBUTION CONNECTED FACILITIES MANAGED AS NEGATIVE DEMAND

1. Is there merit in further exploring this proposed solution?
2. Are there any aspects of this solution that should be incorporated into the proposed solution?

9.2 Materiality considerations for distribution connected facilities

In addition to the bidding requirements set out in section 2.1.4, the rules specify that bids are to be made on a gigajoule (GJ) basis, with these bids required to be in whole gigajoules within AEMO's bidding system.[106] Meaning bids 1 GJ or larger can be bid into the market.

This requirement could be an issue for connecting facilities that produce less than 1 GJ/hour. However, the proponent considered that including a materiality threshold in the rules could create market complexity, uncertainty or, if a large number of small facilities were participating in the market, risks to system security.[107]

105 Ibid.

106 See rule 209(5)(b) of the NGR
AEMO, *Victorian declared wholesale gas market webexchanger user guide, 2020, p. 18.*

107 Rule change request, p. 9.

Given this potential issue, the proponent suggested the AEMC consider whether production facilities that are smaller than what the current bidding rules allow for should be included within the market but have a reduced set of requirements, such as daily bidding and allocation amounts.[108]

QUESTION 21: MATERIALITY THRESHOLD

1. Should this rule change consider including a materiality threshold in the rules?
2. Should a reduced set of bidding requirements be applied to distribution connected facilities that do not meet the current bid size of 1 GJ?
3. Do the rules provide a barrier to bidding quantities of gas smaller than 1 GJ?
4. What are the impacts and costs associated with updating the bidding system to accommodate decimal GJ bids?

9.3 Reduced scheduling intervals

The scheduling process, as outlined in section 2.1.4, occurs at five predefined times within the day, with the first schedule at 6:00 am. In this initial schedule, gas is scheduled and a market price is determined for the entirety of the upcoming gas day. The subsequent schedules occur at intervals of four hours in which the scheduling instructions and market price for the balance of day are revised.[109]

The proponent noted that distribution connected facilities may be more flexible in their operation, ramping up and down based on the NEM price and therefore the current schedules intervals would no longer be fit for purpose.[110]

This flexibility may be better utilised with shorter scheduling horizons to allow for more frequent rebidding, however, the proponent notes that this is not a short-term consideration and may be a longer-term matter.[111]

The Commission welcomes stakeholder feedback on this issue.

QUESTION 22: REDUCED SCHEDULING INTERVALS

1. Should this rule change consider changing the current scheduling intervals or is this an issue that should be addressed in a separate rule change process?

108 Ibid.

109 These schedules occur at 10am, 2pm, 6pm and 10pm with an 8-hour interval applying overnight.

110 Rule change request, p. 9.

111 It was also noted that there may be short term benefits for gas powered generation in Victoria as renewable uptake increases within Victoria.

9.4 Expected costs, benefits and impacts of the proposal

The proponent did not provide a cost estimate to implement the proposed changes required to facilitate the preferred solution. Instead, it noted the benefits of the proposal, which would enable the energy transition as envisioned through the Victorian government's publications.[112]

The proponent noted that there will be costs associated with enabling this change but considered that the long term costs that would be associated with doing nothing would be higher than the costs of the proposed solution. This would be achieved by maintaining the fundamentals of the current DWGM design to incorporate distribution connected facilities, which is reasoned to minimise the cost of implementation.[113]

The Commission welcomes stakeholder feedback on the costs, potential benefits and impacts of the proposed solution and under a "do nothing" approach.

QUESTION 23: EXPECTED COSTS, BENEFITS AND IMPACTS OF THE PROPOSAL

1. What are the expected costs associated with the proposed changes for:
   a. existing market participants?
   b. new market participants, that would fit into the distribution connected facility category?
   c. AEMO?
2. How would these costs be recovered under the existing regulatory framework?
3. What are the impacts both of the proposal and the "do nothing" scenario?
4. Is the proponent's assertion that the long term costs of inaction are greater than the costs associated with the proposed solution correct?

9.5 Additional issues not mentioned in the rule change request

9.5.1 Impact on the contracts market

Within the DWGM sellers offer gas and buyers either forecast their demand (for uncontrollable withdrawals) or bid (for controllable withdrawals).[114] Some market participants have contractual arrangements for gas outside of the DWGM. Consequently, these participants will place some of their bids and offers for gas at the market price cap and

112 Victorian Department of Environment, Land, Water and Planning, *Victoria's Gas Substitution Roadmap,* consultation paper, 26 June 2021
Infrastructure Victoria, Towards 2050: Gas infrastructure in a zero emissions economy, interim report, 19 July 2021
Victorian Department of Environment, Land, Water and Planning, Victorian Renewable Hydrogen Industry Development Plan, February 2021

113 Ibid.

114 Uncontrollable withdrawals (demand) include households, small business, large business/industry and gas powered generation whose demand varies with external factors such as weather, seasons or day of week. Since these withdrawals do not easily respond to the wholesale price and are not capable of following a schedule, they are termed 'uncontrollable withdrawals'. Controllable withdrawals (demand) refers to market participants that can make offers to withdraw gas from the market with a defined gas quantity and price. This type of withdrawal can respond to the wholesale price and follow schedules.
AEMC, *Victorian DWGM background paper*, 14 March 2019, p. 10.

market floor price respectively, seeking to prioritise their offers and bids via the gross pool mechanism.

When this occurs, the participant has a net position of zero (i.e. it is not net buying from or selling to the market). As a result, it is not exposed to the DWGM market price. This contracted part of the market represents around 90 per cent of traded volumes in the DWGM. The remaining 10 per cent of the market is actively traded through the DWGM itself and represents the visible price volatility in the market to participants.[115]

There are several additional tools used by market participants to manage price risk in the DWGM:

- Gas Supply Agreements (GSAs) made between producers and shippers for the physical delivery of gas outside of the DTS/DWGM
- Off-market secondary gas contracts made between participants, for the physical delivery of gas outside of the DTS/DWGM
- Australian Securities Exchange (ASX) futures, which are financial derivatives
- Over-the-counter (OTC) contracts.

Each tool has different characteristics, with GSAs and secondary contracts hedging price risk to create the passive bilaterally contracted part of the market (90 per cent), while future contracts may be used in the active (10 percent) parts of the DWGM.[116]

The effectiveness of these tools may be affected by the other non-price risks that participants face in the market, notably:

- delivery risk—even if a participant has a GSA, they may be unable to inject into the DTS due to tied bids and limited pipeline capacity or other constraints
- uplift and ancillary payments—a participant could fully hedge against the DWGM spot price, but then incur significant uplift charges from a surprise event.

With the introduction of distribution connected facilities, existing contracted positions for off-take from the DTS into the DWGM may be subject to delivery risk. The distribution connected facilities may inject gas of a different composition to that which is contracted, which could have impacts depending on the end-user of the gas. A change to the gas specification under the NGL/NGR framework may trigger a change to the GTA or GSA specifications depending on the terms of the contract. A change to the gas specification under the NGL/NGR may also trigger other contractual provisions such as a change in law or force majeure.

This issue of gas specification will be addressed within the Review of hydrogen and renewable gas blends, which is being conducted by the AEMC concurrently with this rule change.[117]

115 AEMC, *2020 Biennial review into liquidity in wholesale and gas pipeline trading markets*, final report, 17 July 2020, p. 68.
116 AEMC, *DWGM forward trading market,* consultation paper, 2019, p. 2.
117 Available on the AEMC website.

QUESTION 24: IMPACT ON CONTRACTS MARKET

1. What considerations need to be given to the contracts market when integrating distribution connected facilities into the DWGM?

10 LODGING A SUBMISSION

Written submissions on the rule change request must be lodged with Commission by 2 December 2021 online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code **GRC0062**.

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

Where practicable, submissions should be prepared in accordance with the Commission's guidelines for making written submissions on rule change requests.[118] The Commission publishes all submissions on its website, subject to a claim of confidentiality.

If you have any questions about this project, please contact:

- Harrison Gibbs on (02) 8296 0626 or harrison.gibbs@aemc.gov.au
- Daniela Moraes on (02) 8296 0607 or daniela.moraes@aemc.gov.au

118 This guideline is available on the Commission's website www.aemc.gov.au.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AGN	Australian Gas Networks
AGIG	Australian Gas Infrastructure Group
ARENA	Australian Renewable Energy Agency
ASX	Australian Securities Exchange
BOD	beginning of day
CCS	Carbon capture and storage
Commission	See AEMC
DDS	Declared distribution system
DTS	Declared transmission system
DWGM	Declared wholesale gas market
ERA	Energy Regulatory Authority
GJ	gigajoule
GSA	Gas Supply Agreement
MCE	Ministerial Council on Energy
MDQ	Maximum daily quantity
NERL	National Energy Retail Law
NERR	National Energy Retail Rules
NERO	National energy retail objective
NGR	National Gas Rules
NGL	National Gas Law
NGO	National gas objective
SEA	Service Envelope Agreement

A UNDERSTANDING HYDROGEN BLENDS AND RENEWABLE GASES

This section provides a description of renewable gases and how they can be integrated into Australia's gas networks. Hydrogen and biomethane are two key renewable gases which are being commercially progressed by industry to be injected into distribution gas networks.

A.1 Hydrogen

Hydrogen is the most abundant chemical element in the universe and can be used to generate heat and electricity, as a fuel source to power vehicles and as a key ingredient for producing chemicals such as ammonia used in fertilisers, plastics, textiles and other essential manufactured products.[119]

Hydrogen is a clean burning fuel that only produces water as a by-product during combustion. However, it does not occur naturally in pure form and must first be extracted from the substances that contain it. This extraction process may involve a certain level of emissions depending on which production method is used. There are three methods of hydrogen production:

- Electrolysis — extracting hydrogen from water using electricity which can be done using renewable energy.
- Gasification — converting biomass into hydrogen through a process that uses a controlled amount of oxygen and steam to generate carbon monoxide, carbon dioxide and hydrogen without combustion.
- Steam methane reforming — reacting high-temperature steam with a methane source such as natural gas in the presence of a catalyst that produces hydrogen.

A.2 Biomethane

Biomethane is derived from biogas which is produced from the anaerobic digestion of organic matter such as wastewater, landfill, agricultural or forestry waste. While biogas can be converted into heat or electricity for onsite use, it can also be upgraded into biomethane which has a similar chemical composition to natural gas and can be injected into gas networks.

The four key methods for upgrading biogas into biomethane by removing non-methane gases are:[120]

1. Absorption or scrubbing — separating impurities from the biogas based on the different solubilities of gas components in the chosen solvent which may be pressurised water, amines or an organic solvent.

119 Energy Networks Australia, *Gas Vision 2050*, September 2020, https://www.energynetworks.com.au/projects/gas-vision-2050/

120 ENEA Consulting, *Biogas Opportunities for Australia*, March 2019, https://www.enea-consulting.com/en/publication/biogas-opportunities-for-australia/

2. Pressure swing absorption — passing biogas through an adsorbent medium at high pressure which acts as a filter for impurities.
3. Membrane separation — diffusing impurities through membrane separation where larger molecules like methane remain in the main gas stream and smaller molecules like water, carbon dioxide and hydrogen sulphide are diffused.
4. Cryogenics — separating impurities from the biogas through condensation via a series of successive temperature reductions.

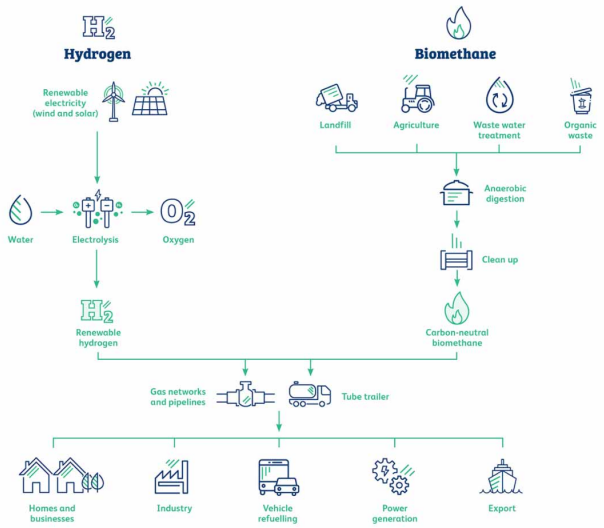
A.3 Integrating renewable gases into the gas network

Hydrogen and biomethane can be transported in tube trailers or injected into existing gas distribution networks for end use which may include residential and industrial heating, fuel for transport, electricity generation or international export (see Figure A.1).

Residential, commercial and industrial consumers may use hydrogen or biomethane in the same way as natural gas. Transport consumers may use hydrogen in fuel cell electric vehicles or biomethane in the form of bio-compressed natural gas or bio-liquified natural gas.

Hydrogen can be used to generate electricity through fuel cells or being burned to drive turbines while biogas is typically used in cogeneration plants that generate both heat and electricity for onsite use. Hydrogen can also be exported as an energy carrier[121] or for use as a chemical feedstock.

Figure A.1: Hydrogen and biomethane



Source: Australian Gas Infrastructure Group, Future of Gas, https://www.agig.com.au/renewable-gas

121 Energy carriers can exist in a variety of forms and can be converted from one form to another, while energy sources are the original resource from which an energy carrier is produced.

Renewable gas injection into gas networks is at a commercially elementary stage. For example:

- The first hydrogen gas injection project in Australia was Australian Gas Infrastructure Group's (AGIG) $14.5 million Hydrogen Park South Australia (HyP SA) which opened in May 2021 and delivers a five per cent hydrogen blend to nearby homes.[122]
- The first planned biomethane injection project is Jemena's $14 million Malabar Biomethane Injection project in partnership with Sydney Water which is expected to open in 2022.[123]

At present, hydrogen and biomethane can be blended up to 10 per cent with natural gas for supply in gas distribution networks with minimal impact on distribution infrastructure, consumer appliances and prices.

This is currently only being contemplated in low-pressure plastic-based distribution pipelines as opposed to high-pressure metal-based transmission pipelines as the latter were constructed before 1970 and are at higher risk of metal embrittlement.[124]

However, there is a significant percentage of unknown material in some distribution pipelines which may be adversely affected by hydrogen or biomethane injection and therefore the entire network must be considered when selecting appropriate injection locations. Until further investigation on the impact of renewable gases on transmission pipeline materials is undertaken, injection is currently limited to distribution pipelines.

A.3.1 Example: Hydrogen Park Murray Valley

The Australian Renewable Energy Agency (ARENA) has announced $32.1 million in funding for AGIG and ENGIE's Hydrogen Park Murray Valley project which involves blending up to 10 per cent renewable hydrogen into Australian Gas Networks' (AGN) existing distribution network in Wodonga, Victoria.

The project consists of a 10 MW electrolyser using water from North East Water's West Wodonga Wastewater Treatment Plant (WWWTP) and renewable electricity from the grid via AGN purchasing large-scale generation certificates.[125]

ARENA awarded the funding from its Renewable Hydrogen Development Fund in Q1 2021 and a final investment decision is expected to be made in Q2 2022 before construction commences in Q4 2022 and operations begin in Q4 2023.

As well as blending hydrogen into the gas distribution network, the facility will provide hydrogen refuelling infrastructure for trucks and buses and supply oxygen from the electrolysis process to the WWWTP to be used in their processes (see Figure A.2).

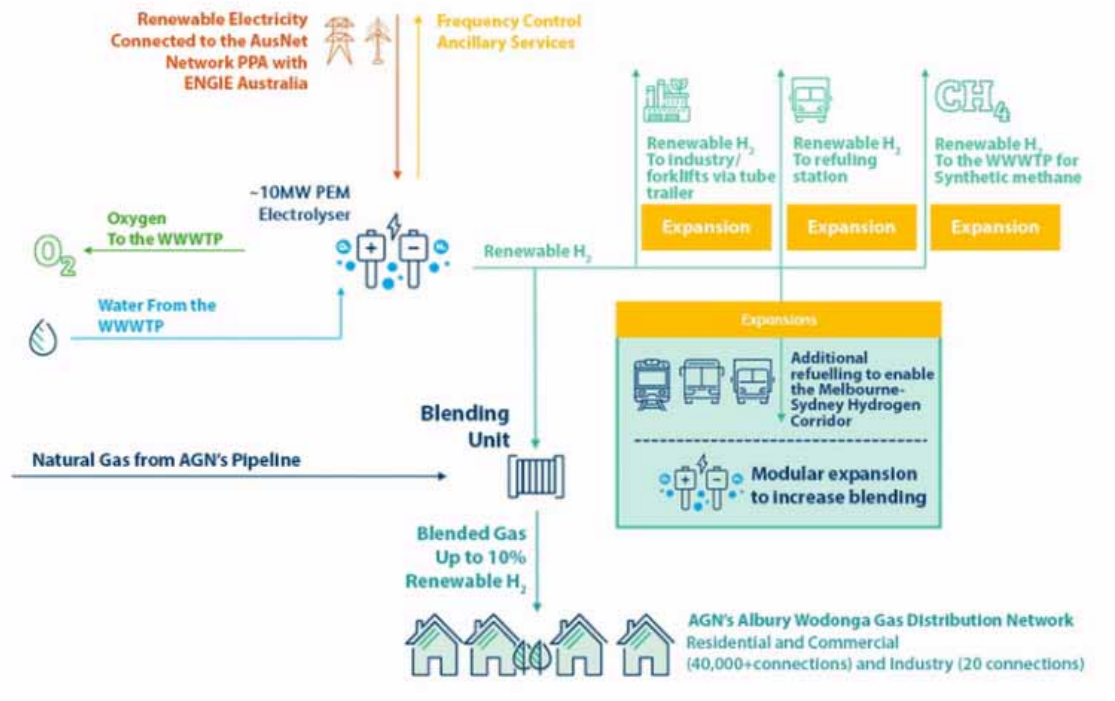
122 AGIG, *Hydrogen Park South Australia*, https://www.agig.com.au/hydrogen-park-south-australia

123 Jemena, *Malabar Biomethane Project*, https://jemena.com.au/about/innovation/malabar-biomethane-project

124 SA Government, GPA Engineering, Fuels CRC, *Hydrogen in the Gas Distribution Networks*, November 2019, https://energyministers.gov.au/sites/prod.energycouncil/files/publications/documents/Hydrogen%20in%20the%20gas%20distribution%20networks%20report%202019.pdf

125 AGIG, *Hydrogen Park Murray Valley*, https://www.agig.com.au/hydrogen-park-murray-valley

Figure A.2: Hydrogen injection process of Hydrogen Park Murray Valley Project



Source: Australian Gas Infrastructure Group, Hydrogen Park Murray Valley fast facts.
Note: https://www.agig.com.au/hydrogen-park-murray-valley

A.3.2 Example: Malabar Biomethane Project

Jemena has signed an agreement with Sydney Water to generate biomethane at its Malabar Waste Water Treatment Plant (WWTP) for injection into the gas distribution network. The $14 million project is jointly funded by Jemena ($8.1 million) and ARENA who will provide up to $5.9 million in grant funding pending conditions being met.

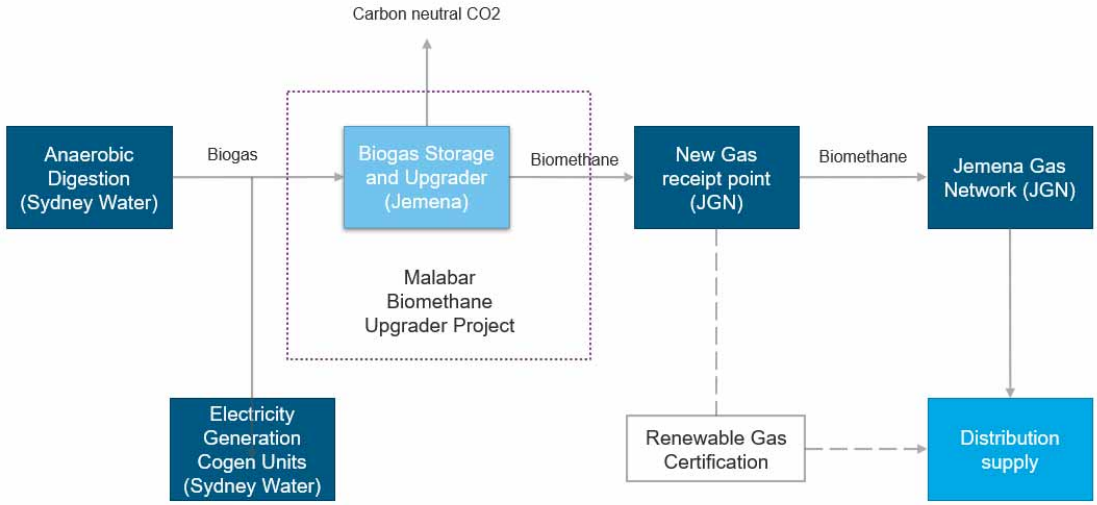
Currently, the Malabar Waste Water Treatment Plant (WWTP) provides feedstock for Sydney Water's Anaerobic Digestion plant to produce biogas that is used by cogeneration units for onsite electricity and heat (see Figure A.3). The cogeneration plant has a capacity of 3.46 MW and accounts for 70 per cent of current electricity used at the WWTP.

The remaining biogas will be stored, pre-treated and upgraded into biomethane using membrane separation technology where the biogas is compressed and methane and carbon dioxide are separated. The biomethane will then be injected into Jemena's existing gas distribution network consisting of non-metallic pipelines.

The facility will have the capacity to produce up to 200 TJ/year of biomethane which is the equivalent of 9,500 residential customers' natural gas use.[126]

Jemena's distribution network is part of the STTM Sydney Hub where injection and receipt points are governed by STTM rules and procedures which allow for distribution connected facilities to participate in the market, unlike Victoria's DWGM. The project will commence construction in Q1 2022 and is anticipated to be completed in Q3 2022.

Figure A.3: Biomethane injection process of Malabar Biomethane Project



Source: Jemena and Sydney Water, *Malabar Biomethane: Review of Environmental Factors*, September 2021.
Note: https://jemena.com.au/about/innovation/malabar-biomethane-project

126 Jemena and Sydney Water, *Malabar Biomethane: Review of Environmental Factors*, September 2021, https://jemena.com.au/about/innovation/malabar-biomethane-project

B REVIEW OF THE NATIONAL GAS REGULATORY FRAMEWORK

On 20 August 2021 Energy Ministers agreed that the national gas regulatory framework should be amended to bring hydrogen and renewable gas blends within its scope.

This will involve reviews by different market and government bodies that are responsible for different parts of the framework.[127] The reviews are considered a priority under the National Hydrogen Strategy as a number of blending trials and projects are expected to commence in the coming years.

BOX 1: NATIONAL HYDROGEN STRATEGY

The National Hydrogen Strategy sets out key government actions to develop a competitive hydrogen industry in Australia, including 'using clean hydrogen in Australian gas networks'.

Action 3.12 of the Strategy identifies the need to amend various elements of the regulatory framework.

Source: COAG Energy Council, *Australia's National Hydrogen Strategy*, November 2019.
Note: https://www.industry.gov.au/data-and-publications/australias-national-hydrogen-strategy

To provide certainty and stability to industry and consumers, Energy Ministers also agreed the reforms should initially focus on gases and blends that can be used in existing natural gas appliances.

To accommodate hydrogen blends and other renewable gases in the national gas regulatory framework, amendments will need to be made to:

- the National Gas Law (NGL), the National Gas Regulations, the National Gas Rules (NGR), Procedures and other subordinate instruments made under the NGL and/or NGR; and
- the National Energy Retail Law (NERL), the National Energy Retail Regulations, and the National Energy Retail Rules (NERR).

Jurisdictional Officials, the AEMC and AEMO have each been tasked with progressing different aspects of the reforms:

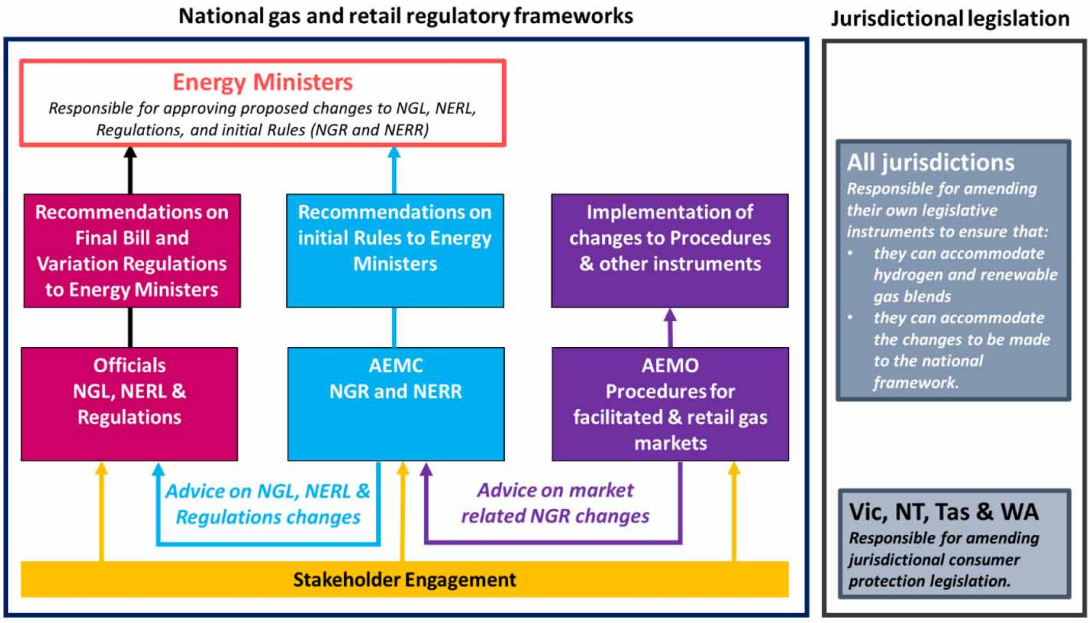
- Officials will identify and develop amendments to the NGL, NERL and Regulations
- the AEMC will identify and develop amendments to the NGR and NERR
- AEMO will identify and develop amendments to the Procedures and other AEMO-made instruments required for settlement and metering in the facilitated and regulated retail gas markets.

In addition, each Jurisdiction will be responsible for reviewing and, if necessary, amending local legislation and regulations.

127 See Energy Ministers website: https://energyministers.gov.au/publications/extending-national-gas-regulatory-framework-hydrogen-blends-and-renewable-gases

The various work streams are illustrated in the diagram below:

Figure B.1: Market body responsibilities in reviewing the national gas regulatory framework



Source: Energy Ministers, *Extending the national gas regulatory framework to hydrogen blends and renewable gases*, information sheet, September 2021,
Note: https://energyministers.gov.au/publications/extending-national-gas-regulatory-framework-hydrogen-blends-and-renewable-gases

A draft legislative package is scheduled to be presented to Energy Ministers for approval by mid-2022 and draft rules in the latter half of 2022.

B.1 AEMC Review

As noted above, the AEMC has been tasked with assessing potential gaps in the NGR and NERR that may need to be addressed as a result of amendments to the legislation on the following matters:[128]

- The economic regulatory framework, including:
  - Connection and access by facilities for the production, injection and blending of hydrogen, biogas and other renewable gases into distribution networks (and other facilities as necessary) to ensure that:
    - access for these facilities is available on reasonable terms
    - these facilities are covered by the dispute resolution provisions and
    - hydrogen blending facilities only connect in parts of the network suitable for the injection of hydrogen.

128 DISER, *AEMC review into extending the regulatory frameworks to hydrogen and renewable gases*, terms of reference, August 2021.

    - Ensure that any cap on the level of blending that may be set by a jurisdiction is implemented consistently in the regulatory framework.
- The facilitated markets and regulated retail markets, including:
    - address any matters that AEMO identifies in its review of the NGR, AEMO made Procedures and other AEMO made subordinate instruments that are required to ensure that settlement and metering in the STTM, the Victorian DWGM and regulated retail markets operate as intended
    - registration categories for the STTM, the DWGM and/or regulated retail markets
    - responsibility for the creation of the blend (as between distributors and retailers) and whether and how that should be accounted for in the regulatory framework.
- The NERR and whether any additional consumer protections may be required, such as the provision of information to customers and any minimum contract terms or bill content requirements.
- The regulatory sandbox provisions in the national gas and retail regulatory frameworks.
- Any other material aspects of the NGR and NERR are necessary to support low-level gas blends under the regulatory framework.

B.2 AEMO Review

AEMO has also been tasked with identifying amendments to the Procedures and other AEMO-made instruments required for settlement and metering in the facilitated and regulated retail gas markets.[129] AEMO will report to the AEMC on its views regarding required changes to the NGR which will be taken into consideration in the AEMC's review.

The Energy Ministers have requested AEMO to:

- Identify any changes to the aforementioned instruments that will be required to:
    - ensure that settlement and metering within the STTM, the DWGM and regulated retail markets operate as intended
    - address any other material gaps in these markets that may be identified through consultation with market participants, other market bodies and government officials.
- In identifying these changes, AEMO should have regard to the same types of matters that it is required to consider when making Procedures (i.e. the NGO and compliance costs for both AEMO and market participants).
- Work with the AEMC on the required changes to the NGR identified through this review.
- Draft the required changes to the Procedures and other AEMO made subordinate instruments and consult on these changes.
- Implement the required changes to the Procedures, other AEMO-made subordinate instruments and, if required, AEMO's systems once the changes to the NGL and NGR are made.

129 DISER, *AEMO review into extending the regulatory frameworks to hydrogen and renewable gases*, terms of reference, August 2021.

C SUMMARY OF ISSUES AND PROPOSED SOLUTIONS

C.1 Market operation issues and proposed solutions

Table C.1 outlines market operation issues identified and the proponent's proposed solution.

Table C.1: Market operation issues and proposed solutions

ISSUE IDENTIFIED	NGR RULE(S)	PROPOSED SOLUTION
DWGM participant categories do not provide a registration category for distribution connected facilities.	135A	Expand the registration categories to include distribution connected facilities.
Market participants intending to inject to the DTS are required to submit bids to AEMO. Participants intending to inject gas into the DDS are not covered.	207	Expand the rules to accommodate bids from distribution connected facilities.
Scheduling of injections and withdrawals from the DWGM exclusively mention the DTS.	206	Update the rules to include the declared distribution system.
Demand forecasts and injection and withdrawal bids from market participants exclusive mention withdrawals or injections to the DTS.	213	Update the rules to include the declared distribution system.
Confirmations of injections and withdrawals from the DWGM exclusively mention the DTS.	219	Update the rules to include the declared distribution system.
AEMO is required to publish details for the relevant gas day in respect to the DTS exclusively.	320	Update the rules to include the declared distribution system.
Market participants are required to submit a demand forecast for the amount of gas expected to be withdrawn from the DTS only. Using the existing demand forecast description,	207 and 208	Two options were proposed. The preferred option updates the demand forecast definition to include all gas consumed in the declared system. This option balances supply and

ISSUE IDENTIFIED	NGR RULE(S)	PROPOSED SOLUTION
distribution injections can lead to inequalities between supply and demand by offsetting DTS demand.		demand.
The determination of the market price takes into account withdrawal side constraints. Injection side network constraints are not included in the pricing schedule. Pricing schedules account for withdrawal side constraints in the DTS only.	221	Two options were proposed. The preferred option treats distribution injection constraints consistently with other network injection constraints.
Only supply-side transmission constraints are required to be included within the production of operating schedules.	215	Three options were proposed: • maintaining the design and points to distribution networks to manage constraints outside the DWGM. This can cause market deviations • expanding the framework to include distribution network constraints in the operating schedule • introducing a new type of constraint for distribution connected facilities. The Gas Scheduling Procedures to manage thee constraints.
The new capacity certificates, which will commence in 2023, can be allocated to injection facilities for tie-breaking rights, but the rules do not contemplate this for distribution connected facilities.	327 to 332	Two options were proposed. The preferred option enables distribution connected facilities to be allocated capacity certificates for injection tie-breaking rights.

Source: Rule change request, pp. 6-7.

C.2 Market outcomes issues and proposed solutions

Table C.2 outlines market outcome issues identified and the proponent's proposed solution.

Table C.2: Market outcomes issues and proposed solutions

ISSUE IDENTIFIED	NGR RULE(S)	PROPOSED SOLUTION
Market participants authorise AEMO to effect the transfer of title of gas injected to the DTS and determine the time, place and quantities of gas transferred. The proponent pointed to uncertainty in the recognition of gas-blending at the DDS under the current framework.	220	The proponent is uncertain if blending and title in the DDS are already covered in the current framework. If they are, no changes are proposed. If they are not, an expansion of the rules to recognise co-mingling in the DDS is proposed as the preferred option.
Market participant contributions to the Participant Compensation Fund are calculated according to the quantity of gas withdrawn from the DTS. The proponent identified that injections from the DTS can alter this quantity.	225	Expand the cost recovery mechanism to include all declared network users to capture gas injected into the DDS.
Allocation and reconciliation of quantities of gas injected and withdrawn by market participants are only considered at the DTS level.	228 229, and 230	Two options were proposed: • Expand the rules to allow the allocation of injections from DDS connected facilities. • Treat distribution injections as negative demand and requires a significant redesign of withdrawal allocation technology.
Default notices and market participant suspensions only cover restrictions for DTS connected facilities.	259 and 260	Expand the affected rules to include distribution connected facilities.

Source: Rule change request, pp. 7-8.

C.3 System operation issues and proposed solutions

Table C.3 outlines system operation issues identified and the proponent's proposed solution.

Table C.3: System operation issues and proposed solutions

ISSUE IDENTIFIED	NGR RULE(S)	PROPOSED SOLUTION
The current framework includes connections to the DTS for agreements made after 1999. Connections of supply facilities to the DDS are not covered.	267	Two options were proposed to address this issue. The preferred option includes distribution supply facilities and transitional arrangements to acknowledge changes in the framework.
The DTS service provider obligations in relation to the connection process are limited to connections to the DTS. The current framework does not consider connections to a DDS.	268 and 273	Two options were proposed to address this issue. The preferred option expands the rules to specify the DDS service provider obligations.
AEMO's role in the approval of connection applications and agreements is limited to connections to the DTS.	269, 272, 275, 276 and 277	Two options were proposed to address this issue. The preferred option points to the DDS service provider as the main facilitation in the connection process to their network.
The obligations of connected parties, applications for new or modified connections and the finalisation of connection agreements in the current frameworks are limited to the DTS.	270, 271 and 274	Amend the rules to include the DDS in the obligations of connected parties and connection agreements.
Gas quality is currently managed through documented plans provided for approval to AEMO by connected facilities. The plans include details on monitoring and the accuracy and maintenance of equipment. The rules regarding gas quality systems, plans and agreements mention only injections to the DTS.	287, 288 and 289	Three options were proposed to address this issue. The preferred option is to: • Expand the role of AEMO to centrally set the gas quality standard for all connected parties • Give DDS service providers the responsibility to monitor the distribution gas quality.
Metering obligations exclusively considers distribution system injections and withdrawals for tariff D customers.	290	Expand the rules to include distribution supply metering.

ISSUE IDENTIFIED	NGR RULE(S)	PROPOSED SOLUTION
The NGR places the obligation for metering on the DTS service provider or the DDS service provider. Connected parties are not able to provide their own compliant metering unless there is an agreement between them and their service provider.	290 and 292	The proponent did not have a clear preference for whether the rules should be amended to allow connected parties to provide their own compliant metering.
AEMO's system security threat interventions exclusively mention transmission connected participants.	343, 344 and 350	Two options were proposed to address this issue. The preferred option expands AEMO's powers to direct distribution connected facilities.

Source: Rule change request, pp. 9-10.