

18 February 2022

Mr Kris Funston
Executive General Manager
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601
Submitted by email: APAVTS2023@aer.gov.au

Dear Mr Funston,

APA VTS Gas Access Arrangement Proposal 2023-2027

The Australian Energy Market Operator (AEMO) welcomes the opportunity to comment on the APA VTS Australia (Operations) Pty Ltd (APA) proposed Gas Access Arrangement Review (GAAR) for the Victorian Declared Transmission System (DTS) to apply from 1 January 2023 to 31 December 2027. AEMO operates the DTS, which is referred to as the "VTS" by APA, and therefore is a key stakeholder in the outcome of APA's 2023-2027 GAAR proposal.

The attached submission is intended to provide the AER with additional context surrounding items in APA's GAAR proposal that is relevant to asset upgrades, security of supply and DTS operability. It assumes that the Western Outer Ring Main (WORM) pipeline is completed and in service. Additional investment in APA's compressors at Brooklyn and Wollert will be required if the WORM will not be available.

This AEMO submission can be made public.

Should you have any questions or require more information, please contact [REDACTED], Manager – Gas System Operations on [REDACTED]

Yours sincerely,

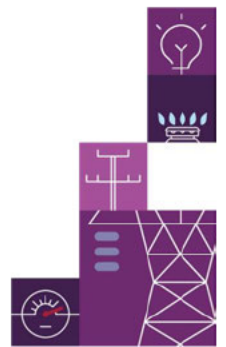
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Attachment: AEMO Submission on APA VTS Gas Access Arrangement Proposal 2023-2027

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AEMO Submission on APA VTS Gas Access Arrangement Proposal 2023-2027

Business Case 200 Hydrogen Safety and Integrity

APA described the potential for hydrogen to enter the transmission network in this business case. Although in most cases it is unlikely that hydrogen blended into a distribution network will flow upstream into a transmission network, or it could occur within the Melbourne inner ring main of the DTS

There appear to be two options for managing hydrogen. The first option would be to conduct engineering studies to assess the risks and determine the feasibility of preventing of hydrogen entering the DTS from distribution networks or the inner ring main. The result of these studies would then require the implementation of engineering controls to prevent this flow.

The second option would be to conduct the hydrogen study APA has proposed in Option 2 of this business case to determine whether it is possible for the DTS pipelines to accept any proportion of hydrogen. Engineering controls would then only be added to the DTS specifically where the study determined they were required. AEMO is supportive of this option, as it appears to be the more efficient option without leaving APA exposed to potentially needing to conduct a hydrogen study even after completing the first option.

Completion of APA's hydrogen study is likely to be on the critical path for any potential hydrogen blending into natural gas distribution networks. The Hydrogen Superpower scenario in AEMO's draft 2022 Integrated System Plan (published in December 2021) and the Victorian Government's Gas Substitution Roadmap Consultation Paper (published in July 2021) both expect some hydrogen blending to occur in distribution networks before the end of this decade. APA would need to have made significant progress towards completion of this study during the upcoming 2023-27 AA period.

Business Case 203 Wollert A Process Safety

Wollert A Compressor Station (CS) is a compressor station that historically has been operated to support demand on the T74 Wollert to Wodonga pipeline, move linepack, and support maintenance operations such as pigging.

AEMO does not operate these compressors often anymore, because they are much lower powered than the Wollert B CS units, less operationally efficient, and can be unavailable due to their age. Compression at Wollert supporting Victorian Northern Interconnect (VNI) withdrawals, northern demand and shifting of linepack is nearly exclusively managed using the Wollert B compressors.

The Wollert A CS units are also wet seal compressors that increase the likelihood of compressor lube oil being introduced into downstream networks. AEMO has run the Wollert A CS less since the completion of the VNI Expansion Phase B project in 2018, with the three 'A station' compressors only run for a combined total of around 19 hours in 2021 (including test runs for maintenance).

On some occasions it is necessary for to run both Wollert B CS compressors, particularly following large winter evening peaks to manage system pressures. The Wollert A CS units provide redundancy if one of the Wollert B compressors was unavailable.

When the WORM project is complete, the Wollert A compressors will effectively be redundant, because the addition of a third Wollert B compressor as part of the project will increase the available capacity and redundancy of Wollert B CS. AEMO would expect minimal future investment would be needed for Wollert A

CS when the WORM is commissioned, and it is AEMO's view that APA should be transparent on the expected remaining life of these compressors, including the forecast timing of their decommissioning.

If the WORM project is not completed and a third compressor is not installed at Wollert B CS, significantly more investment into the Wollert A CS will be required to upgrade these aging machines and ensure they are able to provide a back-up for the two Wollert B CS units when required.

Business Case 204, 205, 242 and 267 Brooklyn CS Upgrades

Brooklyn CS is a critical site that supports demand on the Brooklyn Corio Pipeline (BCP) including the Laverton North Power Station, the Brooklyn Ballan Pipeline (BBP) that supplies Ballarat, and the Brooklyn Lara Pipeline (BLP). The BLP is effectively an extension of the South West Pipeline (SWP) supplying gas to south-west Victoria including the Western Transmission System (WTS), and supporting SWP withdrawals to refilling the Iona underground gas storage (UGS) reservoirs.

Brooklyn CS is essential for supporting demand in southwest Victoria when there is insufficient supply into the SWP at Port Campbell to support demand. AEMO often needs to intervene in the market when the Brooklyn CS is not available (usually due to planned outages that are timed to minimise the market impact). Supply to Ballarat on peak winter days also depends on Brooklyn CS, as high demand at this location cannot be supported any other way. Pressure breaches leading to supply disruption are likely if Brooklyn compression was not available.

All units at Brooklyn CS are run extensively and this will continue into the near future. AEMO provided APA with a report outlining this in 2021. AEMO is supportive of all business cases that will maintain and modernise this site, including:

- Business Case 204 – Brooklyn CS 8,9,10,11 Upgrade.
- Business Case 205 – Compressor Station Vent Upgrade.
- Business Case 242 – BCS Unregulated Bypass.
- Business Case 267 – BCS Unit 12 Inlet Filter Upgrade.

The criticality of the Brooklyn CS site will reduce once the WORM project is completed. With the WORM in service, AEMO expects to be less reliant on the Brooklyn CS as the demand in the south-west can be more efficiently supplied from the Outer Ring Main via Wollert. The Brooklyn Centaurs (compressor units 11 and 12) will still be used to support winter demand, especially Ballarat demand, and contribute to the SWP withdrawal capacity on higher demand days. At least two Centaur units will be required to provide this service to ensure redundancy. AEMO envisages that the remaining Brooklyn Centaur (unit 10) may require some upgrades after the WORM is commissioned, however its future operational purpose needs to be considered along with the issues presented by its wet seals (causing oil to enter the DTS).

AEMO operation of the Brooklyn Saturns (compressor units 8 and 9) is unlikely to be necessary once the WORM is operational, as the WORM will enable higher pressures to be maintained for Geelong under some supply conditions without compression at Brooklyn CS. AEMO therefore believes APA should be transparent on the remaining life of these compressors, including the forecast timing of their decommissioning.

If the WORM is not completed, AEMO will continue to rely on the Brooklyn Saturn units to operate the DTS.

There are also several additional DTS changes that may impact AEMO's operating strategy in the coming years:

- The anticipated increase in Port Campbell production and injection capacity from Iona UGS. Injections from Iona CPP are likely to reduce SWP and BCP compression requirements.
- Proposed LNG import terminals by Viva and Vopak near Geelong and Avalon respectively. Either project will change the supply dynamics for the SWP and reduce Brooklyn CS compression requirements.

Business Case 211 Iona CS Aftercooler Upgrade

APA has noted that the Iona CS Aftercooler Business Case is a resubmission from its previous GAAR proposal and was due to be undertaken during the 2018-22 period but was deferred due to other priorities.

The purpose of the Iona CS is to ensure pressures in the WTS are maintained above minimum required to maintain supply to customers when the SWP pressure at Port Campbell is low. This generally occurs when the Iona UGS facility is withdrawing gas from the SWP and there is insufficient supply from other facilities to maintain pressure.

The two scenarios of concern are:

1. High Iona UGS withdrawals during cold spring conditions in south-west Victoria causing high local heating demand combined with increased seasonal gas demand to supply milk processing facilities around Warrnambool.
2. High UGS withdrawals during hot summer conditions combined with gas demand from the Laverton North Power Station, which results in low pressure at Port Campbell and the Iona CS needing to operate at high ambient temperatures to support demand that is supplied from the WTS.

The first scenario does not require larger aftercoolers.

The second scenario, as APA notes in the Business Case, is the concern AEMO has previously expressed regarding the limitations on the Iona CS operability during summer. This concern is expected to have been addressed through agreeing with APA to increase the minimum operating pressure (MinOP) of the SWP at the Iona injection/withdrawal point in Port Campbell from 3,800 kilopascals (kPa) to 4,500 kPa. This reduces the likelihood of Iona CS needing to operate during the summer months, and when it does need to operate the compressors do not need to increase the gas pressure as much (as the suction pressure is higher) so the cooling requirement is reduced.

The commissioning of the WORM is also expected to result in higher gas supply pressures at Port Campbell than the current system configuration, with the Wollert B CS able to supply gas into the WORM/BLP/SWP, than the large Brooklyn CS “Centaur” compressors. Gas flows to Port Campbell via Wollert CS are also not expected to be impacted as severely by the operation of the Laverton North Power Station as flow via the Brooklyn CS.

The case for an aftercooler upgrade could change in future if supply and demand conditions change, including new connections to the WORM / BLP / SWP.

Business Case 224 Dandenong CG Gas Quality

AEMO sets the standard and limits for the quality of gas injected into the DTS based on information provided by APA on the engineering specifications of APA’s own assets. Operating temperature limits are determined by the grade of the steel and the material used for coating the pipeline for corrosion protection. AEMO is reliant on APA, which holds this information as the DTS asset owner to set the safe operating requirements with regard to gas temperatures at injection points.

AEMO notes that Dandenong City Gate (DCG), although one of the highest flow points of the DTS, is not a DTS injection point. This project may be justified from an engineering integrity perspective; however AEMO does not believe that there is justification for this project on the basis of compliance with temperature limits defined in AEMO's standard for gas quality at DTS injection points.

AEMO does note that while DCG is one of the highest flow points in the DTS, it does not have a working flow meter installed. A working flow meter would greatly assist AEMO to verify and troubleshoot custody metering issues.

Business Case 235 Turbine Overhaul and Minor Upgrades

APA noted in the Business Case that DTS compressors have a higher number of stops and starts than the average according to the compressor vendor because of the way AEMO operates the DTS.

DTS compressors often cannot remain online continuously due to the large fluctuations in hourly system demand. Demand can be from as high as 90 terajoules (TJ)/hr to as low as 10 TJ/hr, and part of AEMO's role in the DTS is to balance compressor operations with system capacity. This necessitates more stop/start operation than would be seen in typical long distance point to point transmission pipelines.

While this required mode of operation saves on operational fuel gas costs, it adds wear and tear on the compressors which necessitates more frequent maintenance than the average according to the compressor vendor.

AEMO continues to work with APA on compressor optimisation; however, AEMO supports the more frequent preventative maintenance proposed in this business case.

Business Cases 258 Pipeline Integrity, 259 VTS Unpiggables

AEMO as the DTS system operator understands and supports the importance of maintaining pipeline integrity. AEMO supports APA's Integrity Management program and the "VTS Unpiggables" program to convert previously unpiggable pipelines to piggable pipelines. Energy Safe Victoria (ESV) requires pipeline owners to conduct pipeline integrity inspections to assess the integrity of their pipelines. This is most commonly conducted via inline inspection (pigging) programs to identify pipeline defects.

The timing of pigging operations can be impacted by gas demand and DTS flow requirements. AEMO will continue to operationally support and facilitate APA's pigging programs.

Business Case 317 Station Control Logic Review and Rectification

Continuing from the existing AA period, APA is replacing the station control system hardware and reviewing fail safe logic at DTS compressor stations. AEMO supports this program, as it ensures that compressor stations operated by AEMO remain reliable and safe, and reduces the likelihood of station control failures.

APA will need to coordinate works closely with AEMO to ensure the Wollert CS and Gooding CS works occur at the most suitable period of the year to minimise impacts to system security.

Business Case 260 Liquids Management

In the DTS, compressors 8, 9 and 10 at Brooklyn CS and compressors 1, 2 and 3 at Wollert A CS are wet seal compressors, which means they utilise oil in the compressor seals, some of which passes into the gas stream as part of normal compressor operations. APA has obligations to ensure that the quality of the gas being transported through the DTS meets the prescribed gas quality specifications. The maximum limit for oil entering natural gas pipelines is 20 millilitres (mL)/TJ. Excessive amounts of liquid in pipelines can lead to customers experiencing supply issues or outages in downstream gas distribution networks.

In 2016, AEMO requested that APA submit Gas Quality Monitoring Plans (GQMPs) per National Gas Rules (NGR) 288(1)(a) for the Brooklyn CS and Wollert CS, detailing a calculation methodology to estimate quantity of oil entering the gas being compressed through these compressor stations. This includes reporting this value to AEMO on a monthly basis. After approval of the GQMPs in 2021, APA notified AEMO that the equipment installed at Brooklyn CS is inadequate to enable any estimation of liquid loss into the downstream pipeline to be made.

It is unclear, based on APA's submitted Business Case 260 *Liquids Management*, whether the completion of this proposed project would enable an accurate calculation of oil loss from Brooklyn wet seal compressors into the downstream pipelines, and this does not seem to form part of APA's justification to receive funding for this project, nor does compliance with APA's GQMP. There is also no indication of how this project will demonstrate APA's conformance with AS 4564. AEMO would support a capital project which enables APA to capture, accurately measure and report the volume of liquid lost into downstream pipelines.

APA included a similar Business Case in its 2018-22 AA submission, proposing to upgrade oil removal equipment at Brooklyn and Pakenham. It is unclear whether the *Liquids Management* Business Case for the upcoming 2023-27 AA period includes work proposed to have been completed in the current 2018-22 AA period.

The submission includes a letter from ESV dated 27 March 2006, in which ESV highlights the requirement for APA to comply with the Victorian Gas Safety (Gas Quality) Regulations with respect to oil concentrations in natural gas. In this letter, ESV proposed that APA undertake new capital expenditure to add filters or coalescers to the compressors or to use only dry seal compressors. The *Liquids Management* Business Case proposal is silent on the installation of filter or coalescer equipment at Brooklyn CS, and only includes the upgrade of existing liquid management equipment.

There have been at least four separate discoveries of liquids in the DTS and in downstream distribution networks. AEMO is not suggesting that these liquids originated exclusively from Brooklyn and/or Wollert wet seal compressors, however the recent discoveries of liquids indicate that there is a potential issue with liquids management somewhere in the DTS. As stated in AEMO's response to Brooklyn CS and Wollert A CS Business Cases, if the wet seal compressors are decommissioned when the WORM is commissioned, this will eliminate the requirement for liquids management at these sites.

Business Case 314 Critical Spares

The availability of spare parts that are not subject to long delivery time will assist with reduced repair times when recovering from unplanned equipment failures. AEMO, as the DTS operator and ultimately responsible for system security, sees merit in allocation of funds for maintaining an appropriate inventory of critical parts. As assets age parts may be more difficult to source, so additional spares may need to be held.

It was noted in the business case that APA currently holds spare equipment in inventory at different DTS compressor station sites as well as at a central warehouse in Dandenong. AEMO understands that APA also sources spares from APA inventory held in other states.

Information Technology – Information Paper/SoCI

The total VTS expenditure for Information Technology (capital and operational) is \$19.3 million over the AA period. AEMO does not contest the funding quantum, but would like to understand whether the Cost Allocation Methodology adequately accounts for VTS functions and/or other APA functions.

The APA Grid system refresh appears to be mostly satisfying requirements outside the DTS, which APA propose to be funded by the Victorian Declared Wholesale Gas Market (DWGM). The APA submission states:

“APA Grid is critical for ensuring that APA meets its regulatory reporting requirements, such as providing capacity information to the Gas Bulletin Board, the Short-Term Trading Market, and to provide the Capacity Trading & Auction platforms to the market.”

This stated system requirement predominantly refers to APA's obligations outside of Victoria and is not related to being the asset owner of the DTS. Considering the APA Grid system replacement and the system's functions for markets outside of the DWGM, this funding request may require further review to determine an appropriation cost allocation to APA's ownership of the DTS.

AEMO's Supervisory Control and Data Acquisition (SCADA) system is used to operate the DTS/VTS, assign heating values to custody meters and collect metering data for settlements and prudential assessment, and monitor gas quality.

AEMO's SCADA independently communicates with the DTS field equipment and depends on technology currency and reliable communications channels. Upgrading telecommunications infrastructure due to obsolescence is necessary and is fully supported by AEMO. Operationally, AEMO may require some sites have a higher data reliability requirement and service level, which APA acknowledges.

AEMO supports the communications upgrade flagged under the Lifecycle Management (\$1,243,815) in APA's Capital Expenditure.

AEMO is not able to provide specific comment on APA's AA proposal “Security Legislation Amendment (Critical Infrastructure) Bill 2020”, due to it being a commercial-in-confidence submission. However, AEMO does note that APA's SoCI VTS business case needs to include the security and reliability of DTS operating data that APA transmits to AEMO for its operation of the DTS, including remote equipment controls and field measurement data.

AEMO is supportive of the projects outlined, which are necessary for APA to meet its service obligations and AEMO fulfil its DTS operating obligations.

Capital Expenditure Program – Western Outer Ring Main

Initial capital expenditure for the WORM was approved by the AER as part of APA's Access Arrangement 2018-2022. AEMO has classified the WORM augmentation as a committed project since the 2018 VGPR and has included the project in all planning analysis since that report.

AEMO's 2017 submission to the AER in response to APA's original WORM proposal was supportive of the project and outlined how the WORM would help resolve a forecast tight gas supply-demand balance in Victoria, primarily by aiding the refill of Iona UGS. AEMO outlined a number of benefits of the WORM including:

- Increased SWP transportation capacity towards Port Campbell.
- Reduced risk of supply disruption during a Longford Gas Plant outage.
- Increased linepack to support residential and gas generation demand.
- Increased SWP transportation capacity towards Melbourne.

AEMO continues its support of the WORM project and remains confident that completion of the WORM will provide all benefits listed above. While SWP transportation capacity towards Port Campbell is no longer an immediate priority, the remaining benefits outlined have only become more critical since AEMO's submission in 2017. The depletion of key legacy Esso gas fields in Gippsland, identified in AEMO's 2021 Victorian Gas Planning Report (VGPR) is contributing to increased supply uncertainty in Victoria and across New South

Wales, Tasmania and the Australian Capital Territory. An update to the forecast supply-demand balance will be provided in the 2022 VGPR Update and 2022 Gas Statement of Opportunities (GSOO).

AEMO additionally identifies the following benefits of the WORM:

- Reduced dependency on Brooklyn CS.
- Provide capacity for future growth in Melbourne's west and north, to facilitate new offtakes into distribution systems, or new gas-fired generation sites along the WORM.

Furthermore, a number of potential projects on the SWP assume the WORM to be complete and utilise the additional SWP transportation capacity to Melbourne with the WORM:

- APA's proposed SWP570 augmentations.
- Viva or Vopak's proposed projects connecting a liquified natural gas (LNG) receiving terminal to the SWP at Lara or Avalon.
- APA's proposed Rule 80 submission augmentations.

Without the WORM, an LNG receiving terminal is unlikely to materially increase the SWP injection capacity and would back off more of the Port Campbell injection capacity. The other additional SWP augmentations rely on the completion of the WORM as the first step of SWP augmentation. Significantly more work would need to be undertaken to understand the full capacity impacts of VTS augmentations without the WORM.

AEMO has provided additional supporting information to the AER in confidence ahead of the publication of the 2022 VGPR Update.

Potential for change within Access Period (2023-2027)

Within the upcoming access period there are many significant changes expected in the energy sector which could significantly impact the DTS/VTS.

The Victorian Gas Substitution Roadmap

- The roadmap (expected to be published during 2022 with policy implementation to follow) is exploring biogas, hydrogen and the electrification of gas loads over the next several decades. How quickly any of these components takes off could see the need for urgent investment, or deter investment.

Review into extending the regulatory frameworks to hydrogen and renewable gases

- The Australian Energy Market Commission (AEMC), AEMO and the AER have been tasked with examining the regulatory frameworks to support the blending of hydrogen into low pressure gas networks. This could result in substantial changes to the regulatory framework going forward, particularly in the medium term, if this extends to higher pressure networks. AEMO is aware of significant interest that already exists to inject hydrogen into transmission class pipelines.

Potential shortfalls

- As legacy gas fields decline, it can be difficult to determine the exact date when fields will cease to produce and what remaining production is available. This, combined with demand uncertainty, is creating investment uncertainty and a potential for supply shortfalls. As the supply-demand balance tightens, any unforeseen events could trigger shortfalls which will be extremely difficult to resolve without new infrastructure.

New sources of gas supply

- If shortfalls do occur, either through supply deteriorating faster than anticipated, or through demand not declining as fast as some forecasts, new sources of gas supply will be required. Within this access period

this appears to be either via LNG import facilities, or from developing prospective gas fields, particularly within the Port Campbell region.

Coal generation closures

- As recently as two years ago, most of the coal fleet within Australia was forecast to continue to operate through to the end of their technical lives and most well into the 2040s. Now many closure dates have been brought forward, most significantly Yallourn to 2028 and Eraring to 2025, both closures starting within this access period. It is entirely possible that new gas generation could be constructed within this access period, or that peak day gas supply capacity could need to increase to meet peak winter demands when renewables are low.

This uncertainty requires a flexible investment framework to exist. The SWP expansion APA is proposing per Business Case 601 - SWP Expansion 570 TJ would have been particularly useful to provide additional capacity in 2023 had it been proposed in the last period with a rule 80 application.

While AEMO has not completed detailed analysis on the proposed Rule 80 augmentation, AEMO is very supportive of the use of Rule 80 to allow flexibility within this access period to ensure impacts from these uncertainties can be managed.

With regards to the existing Rule 80 proposal, the LNG receiving terminals would increase the SWP injection capacity but, due to the supply point being at a high pressure and closer to Melbourne, it would back out a large portion of the Port Campbell supply including Iona UGS. AEMO notes the upgrades of BCP CG and BBP CG proposed in the Rule 80 submission are an important first step in reducing the back-off effect of LNG injections on Port Campbell supply. AEMO cannot confirm the capacity impact of this augmentation alone as this analysis has not been complete. However, additional augmentations would be required to enable simultaneous injections of Port Campbell supply at the current SWP pipeline capacity and LNG injections at maximum rate. Additional augmentations could include pipeline looping of the SWP/BLP from Lara to the start of the WORM and additional compression.