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Mr Sebastian Roberts
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2018–2022 Victorian Gas Access Arrangement Review
Australian Energy Regulator

Submitted by email: VicGAAR2018-22@aer.gov.au

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Dear Mr Roberts

APA VTS Access Arrangement 2018–2022 – Western Outer Ring Main

The Australian Energy Market Operator (AEMO) welcomes the opportunity to comment on the APA VTS Australia (Operations) Pty Ltd (APA) business case for the construction of the Western Outer Ring Main (WORM) during the 1 January 2018 to 31 December 2022 Access Arrangement period for the Victorian Declared Transmission System (DTS).

As outlined in our initial submission dated 3 March 2017, AEMO is currently forecasting a tight gas supply-demand balance in Victoria, including the inability to refill the Iona underground gas storage (Iona UGS) storage reservoirs for winter 2018 and subsequent years. The supporting information for this forecast was set out in the AEMO 2017 Victorian Gas Planning Report (VGPR).

The 2017 VGPR also highlighted changes in gas demand profiles, including steady industrial demand being replaced by variable residential and commercial demand. Increased gas powered generation (GPG) demand has also been forecast. This forecast increase in variable gas demand will require additional linepack to be available close to Melbourne. The WORM will provide this increased linepack along with enabling increased gas supply from Iona UGS.

The attached submission along with a presentation from the AEMO 2017 Victorian Winter Outlook Presentation supports the case for construction of the WORM. Should you have any questions or wish to discuss this information further, please contact Luke Garland (Manager, Gas System Operations) on (03) 9609 8012 or luke.garland@aemo.com.au

Yours sincerely

Matthew Clemow

Senior Manager, Gas Real Time Operations

Attachments: 1. AEMO Submission on the APA VTS Western Outer Ring Main Proposal
2. AEMO VGPR Presentation including the WORM

AEMO SUBMISSION ON THE APA VTS WESTERN OUTER RING MAIN PROPOSAL

1. BACKGROUND

The Australian Energy Market Operator (AEMO) identified and issued a threat to system security on 10 March 2017 following the publication of the 2017 Victorian Gas Planning Report (VGPR). The notice states that the South West Pipeline (SWP) to Port Campbell transportation constraint is a threat to the refilling of the Iona Underground Gas Storage (Iona UGS) reservoirs prior to winter 2018 and subsequent years.

Gas from Iona UGS is required to support increased Victorian residential and commercial gas demand for heating during the winter peak period (1 May to 30 September). If Iona UGS is not sufficiently refilled then emptied prior to the end of winter, a gas supply shortfall resulting in gas load curtailment would occur on a peak demand day.

2. PRODUCTION DECLINE

Based on information provided by registered participants in September 2016, *Figure 1* shows annual production by region. As production declines in Victoria, supply to interconnected pipelines will reduce as gas is retained in Victoria to support DTS demand. As stated in the 2017 VGPR, during the 2017 to 2021 period:

- Gippsland annual production is forecast to reduce by 34%, returning production to pre-2016 levels.
- Port Campbell annual production is forecast to reduce by 81%, due to some offshore fields ceasing production.

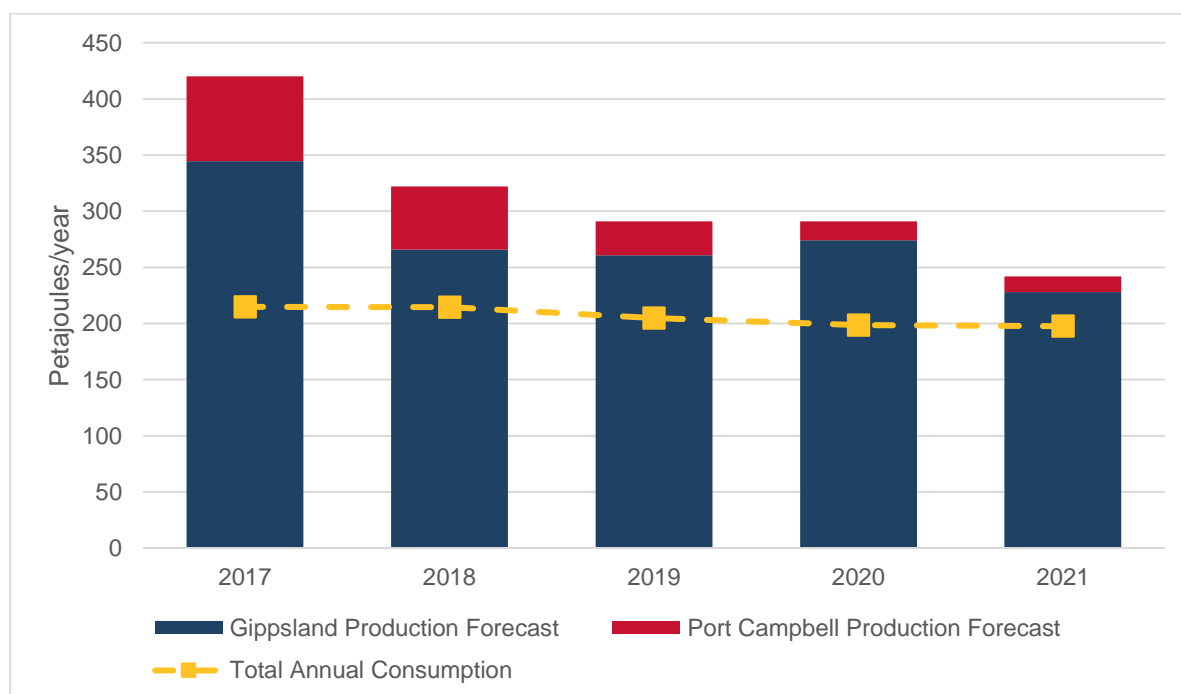


Figure 1 Victorian annual gas production by region.

Supply on peak demand days in Victoria will also tighten. As shown in *Figure 2*, the maximum daily supply quantity (MDQ) decreases as production declines.

- Gippsland maximum daily production capacity is forecast to reduce by 27%.
- Port Campbell maximum daily production capacity is forecast to reduce by 81%.

Gippsland production includes:

- Longford Gas Plant (nameplate capacity of 1,150 TJ/d).
- Lang Lang Gas Plant (nameplate capacity of 70 TJ/d).

Port Campbell production includes:

- Otway Gas Plant (nameplate capacity of 205 TJ/d)
- Minerva Gas Plant (nameplate capacity of 43 TJ/d)
- Casino gas via the Iona Gas Plant (nameplate capacity of 45 TJ/d, excluding Iona UGS capacity)

Figure 2 also shows that winter peak demand will be more reliant on Iona UGS supply (shown in orange) as Gippsland and Port Campbell production continues to decline.

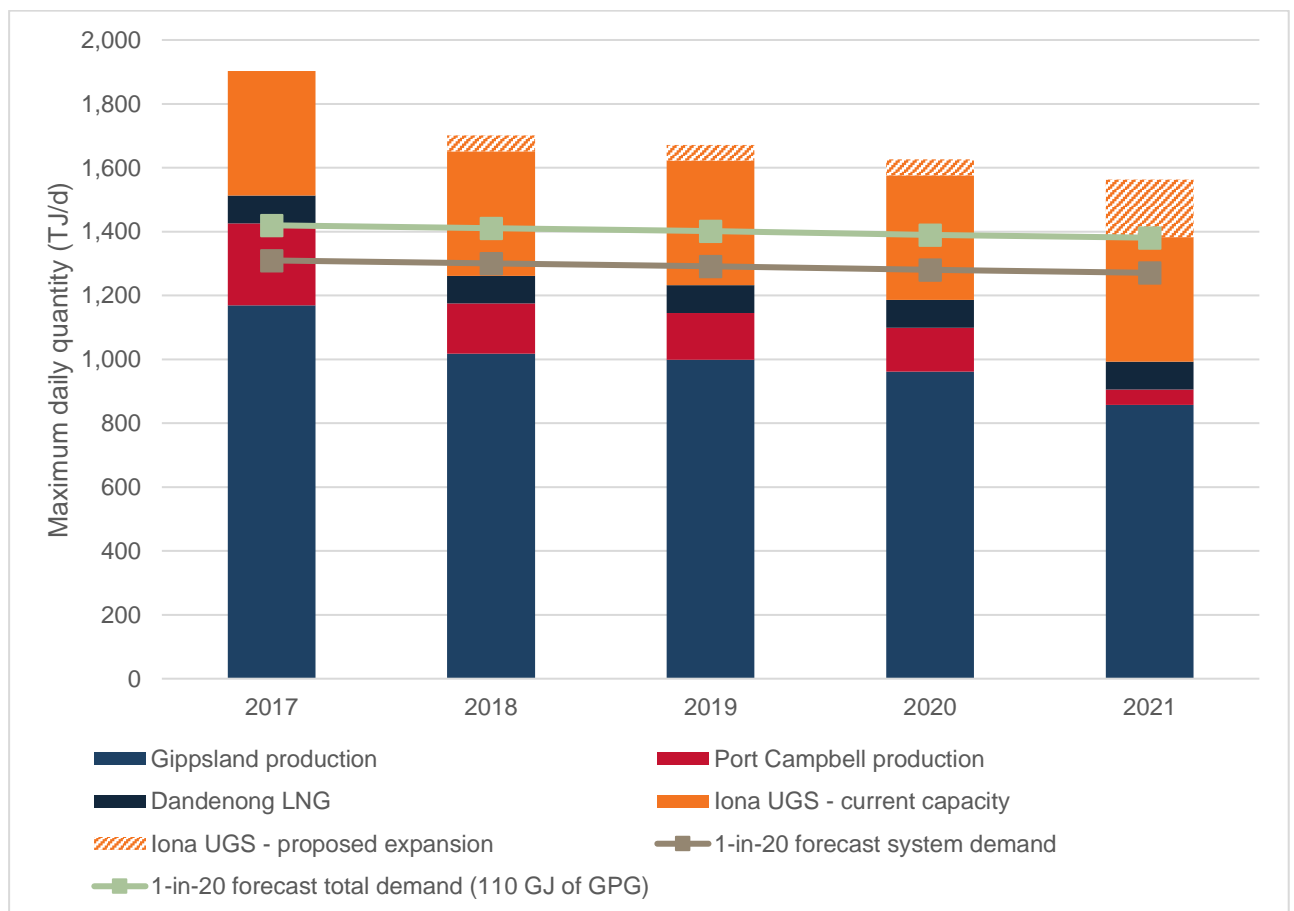


Figure 2 Victorian maximum daily supply and 1-in-20 forecast system demand.

Assuming all Gippsland and Port Campbell prospective gas production capacity is developed and contracted by 2021, there is only 162 TJ of gas supply available to support Victorian Gas Powered Generation (GPG) and interconnected pipeline flows on a 1-in-20 peak demand day. Forecast peak day GPG demand is 110 TJ/d. This issue is presented in section 3.2 and table 14 of the 2017 VGPR.

Increased gas supply to Victoria and interconnected pipelines to other states would be enabled through the expansion of the Iona UGS facility and the SWP.

3. REFILLING IONA UNDERGROUND STORAGE

3.1. 2017–21 VGPR OUTLOOK PERIOD

As shown in *Figure 3*, the current Melbourne to Port Campbell SWP transportation capacity cannot support the annual net withdrawal quantities required by participants to refill the Iona UGS reservoirs.

The works proposed in APA’s 2018–22 Access Arrangement, to reconfigure the Brooklyn Compressor Station (BCS) and add bi-directional flow capability to the Winchelsea compressor, will sufficiently increase the SWP transportation capacity towards Port Campbell to support average forecast withdrawals up to 2020 for refilling Iona UGS.

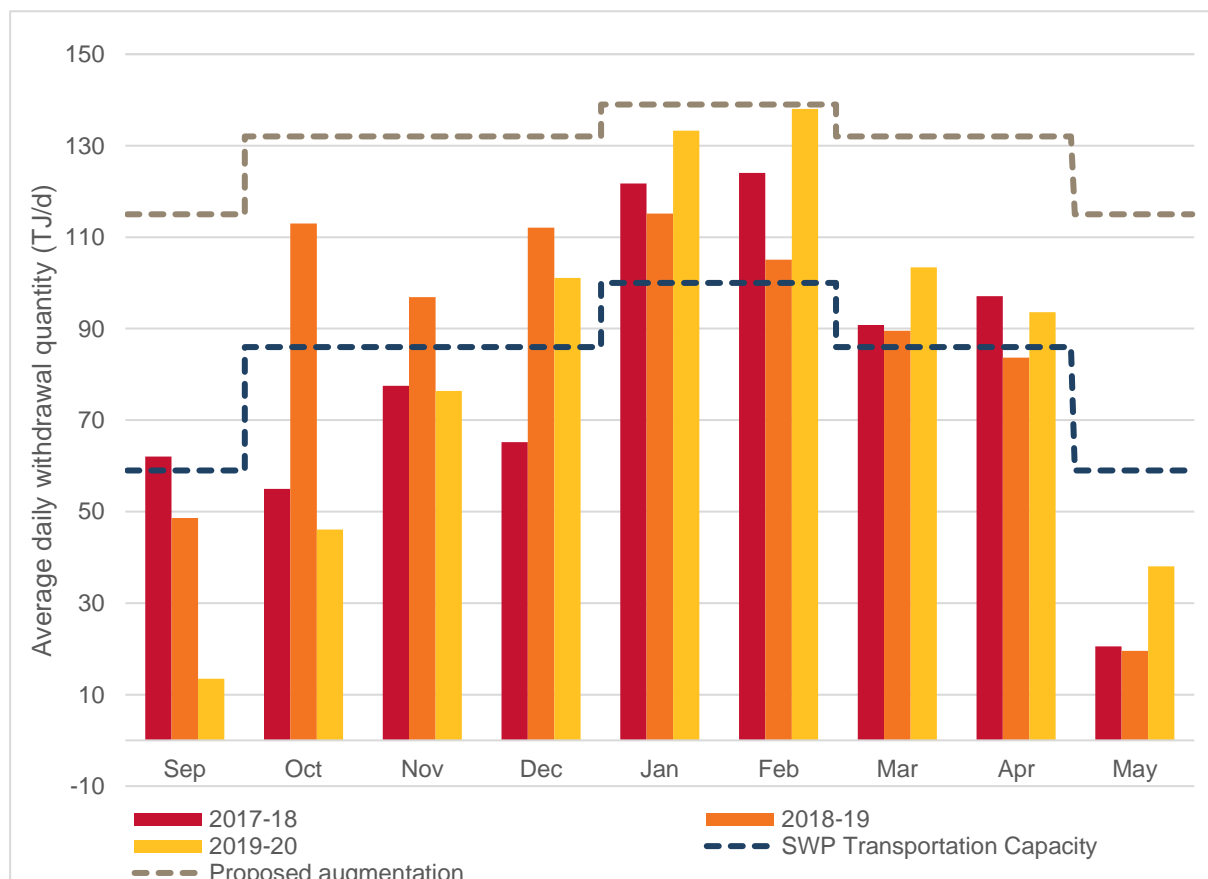


Figure 3 Average daily SWP to Port Campbell net withdrawal flow

3.2. STORAGE REFILLING BEYOND 2021

Due to the Port Campbell production decline discussed in Section 2, Iona UGS refilling will rely on Gippsland gas transported along the SWP to Port Campbell during summer and shoulder periods.

SWP transportation capacity towards Port Campbell is reduced by the operation of Laverton North GPG. Laverton North generation is forecast to increase following the closure of the Hazelwood Power Station and as electricity generation from renewable energy projects increases.

Increased operation of Mortlake GPG, which is supplied from Port Campbell, is also forecast to reduce the capability to refill Iona UGS. This is discussed in section 5.2 of the 2017 VGPR.

As shown in *Figure 4*, the combination of reduced gas production and forecast increases Mortlake generation will significantly increase the forecast SWP to Port Campbell flows after 2020. The AEMO flow forecast analysis is based on:

- AEMO modelling of Iona UGS minimum storage levels from AEMO Gas Statement of Opportunities modelling.
- AEMO forecast GPG demand for:
 - GPG demand from the SWP and Port Campbell region (Mortlake and Laverton North).
 - The portion of South Australia’s GPG demand that needs to be supported by gas supplied from Port Campbell due to capacity constraints on the Moomba to Adelaide Pipeline.

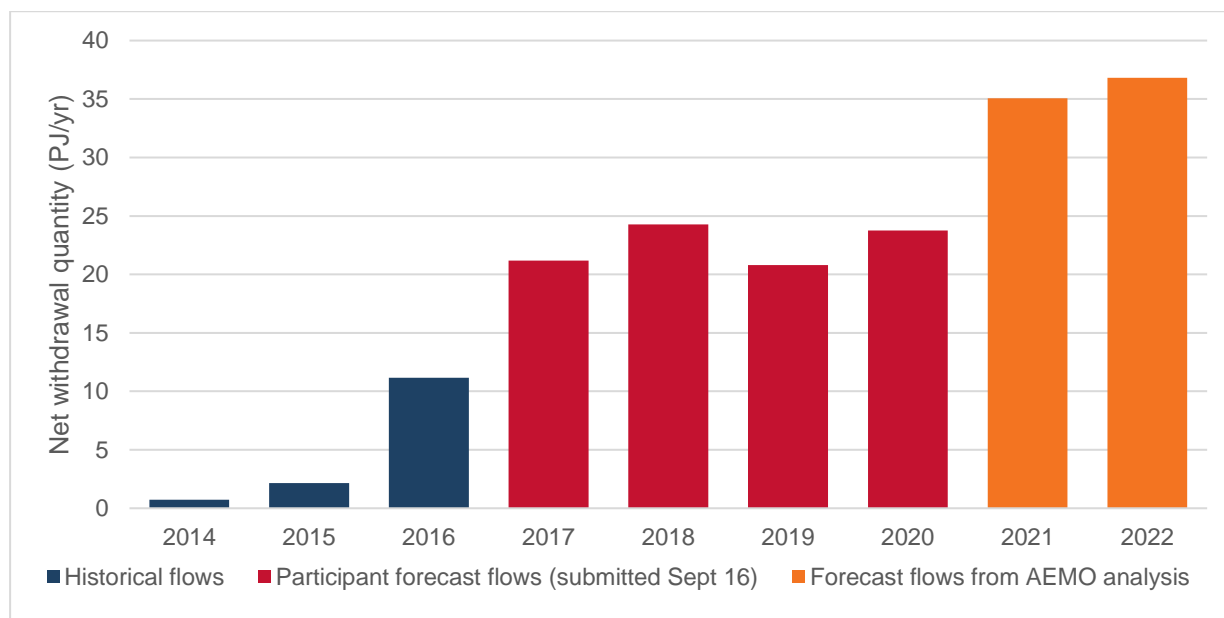


Figure 4 Historical and forecast SWP to Port Campbell net withdrawal flows

Based on this analysis, and as shown in *Figure 4*, annual SWP flows to Port Campbell are forecast to almost double. Estimated peak flows during summer months (December – February) of between 200 and 250 TJ/d are required to support the forecast annual SWP

withdrawal flows from 2021 onwards. These flows cannot be supported by the proposed Brooklyn and Winchelsea augmentation projects.

4. THE WESTERN OUTER RING MAIN

The proposed Western Outer Ring Main (WORM) would connect the current ‘(Eastern) Outer Ring Main’ from Pakenham to Wollert, to the Plumpton Lateral off the Brooklyn to Lara Pipeline and the SWP. The schematic showing the location of the WORM is provided in *Figure 6*

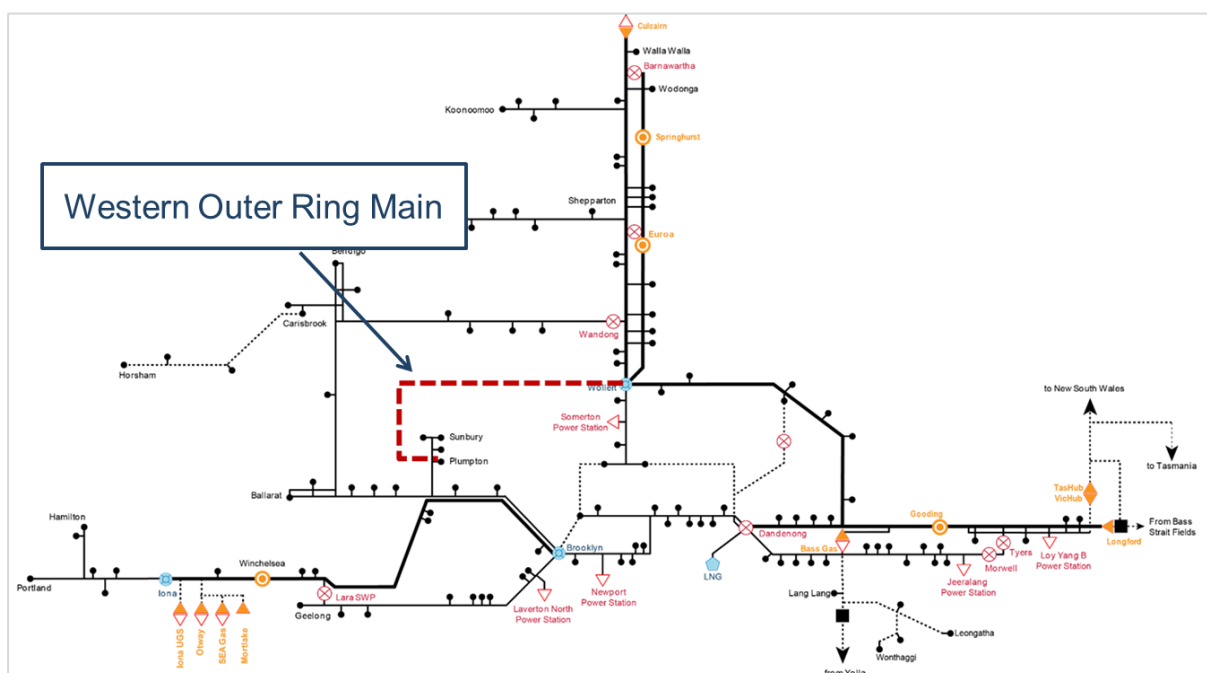


Figure 5 Proposed Western Outer Ring Main in the DTS

The WORM provides a direct flow path from Longford to Port Campbell, and from Port Campbell back to Longford, bypassing the low pressure Melbourne Inner Ring Main. This will address two major operational issues in the DTS:

1. Gas from Longford will no longer need to flow through the low pressure network to Port Campbell, resulting in increased capacity, and significant fuel gas and compressor operating cost savings.
2. Gas from Port Campbell will be able to supply northern and eastern Victoria, which will increase system security.

4.1. INCREASED SWP TRANSPORTATION CAPACITY TO PORT CAMPBELL

As set out in the previous section, SWP flows of between 200 and 250 TJ/d towards Port Campbell are forecast to be required from 2021 to refill Iona UGS. As shown in **Error! Reference source not found.**, the construction of the WORM is required to achieve at least 200 TJ/d of net withdrawals at Port Campbell.

This increased capacity is realised by not having to reduce the pressure of the Longford gas at Dandenong City Gate, then recompress this gas at Brooklyn to flow to Port Campbell.

As stated in AEMO’s initial response to the APA Access Arrangement Proposal, this is estimated to save at least \$3 million per year in fuel gas costs as well as reduce compressor maintenance costs due to lower operating hours.

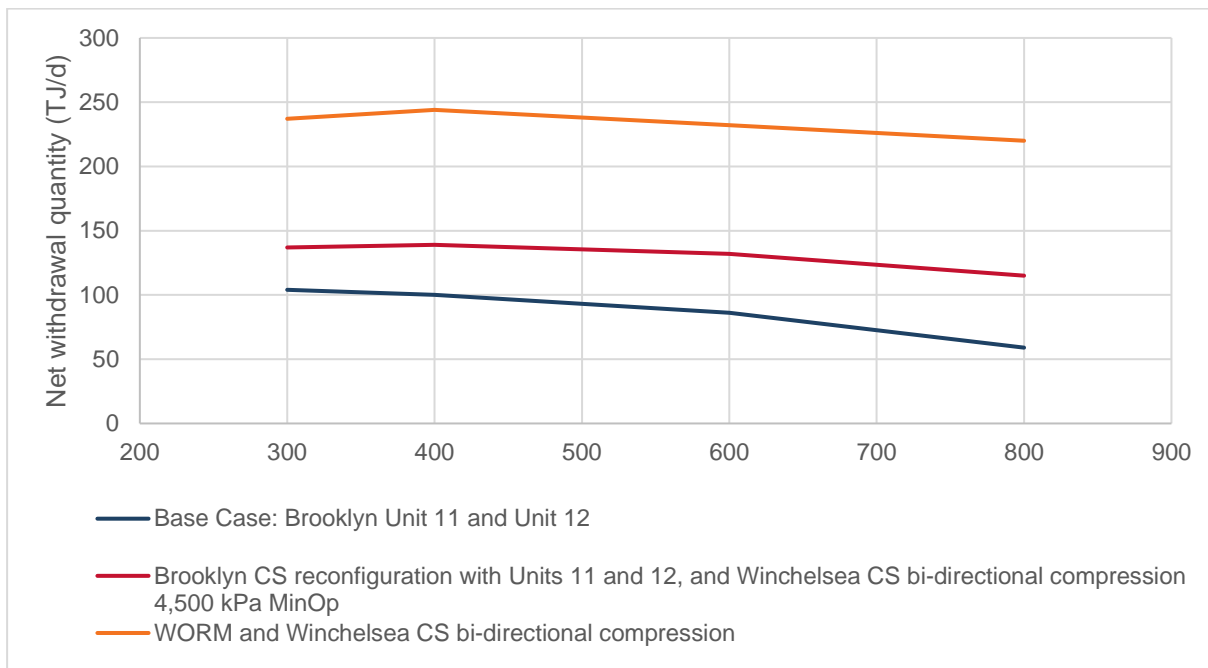


Figure 6 SWP net withdrawal capacity with the proposed augmentations

Following the construction of the WORM, the SWP transportation capacity towards Port Campbell could be further increased, if required, with additional compression at Wollert and at Lara.

4.2. REDUCED RISK OF SUPPLY DISRUPTION DURING A LONGFORD OUTAGE

All gas supplied from Port Campbell via the SWP to Melbourne currently passes through the Brooklyn City Gate in western Melbourne. Gas pressure is reduced to the lower operating pressure of the Melbourne Inner Ring Main.

Gas from the low pressure Melbourne Inner Ring Main cannot flow back into the higher pressure Longford to Melbourne Pipeline, the Outer Ring Main, or the Victorian Northern Interconnect. This means that options for supplying eastern and northern Victoria are limited during a major outage of the Longford Gas Plant.

On 1 October 2016 there was a six hour unplanned complete outage (i.e. no production) of the Longford Gas Plant. AEMO responded by issuing a notice of a threat to system security and intervening in the Victorian Declared Wholesale Gas Market to increase gas supply at a cost of approximately \$3 million. Had the outage continued for a longer period, curtailment of gas users (excluding critical and essential gas users) in eastern and northern Victoria would have been required.

4.3. INCREASED LINEPACK TO SUPPORT RESIDENTIAL AND GPG DEMAND

AEMO has observed changes in gas demand profiles due to steadier industrial demand being replaced by more variable residential and commercial demand. Energy saving

technologies such as instant flow gas hot water heaters further increases the variability of residential demand. This is covered in section 5.4 of the 2017 VGPR.

Gas production and storage facilities and interconnected pipelines supply gas into the DTS at a constant rate. Demand variations throughout the day are managed using “linepack”, which is gas stored in the DTS pipelines.

The gas storage capability of the DTS is limited due to Victoria’s relatively short supply pipelines and high gas demand (compared to Sydney and Adelaide). Increased linepack is required to support increasing residential demand due to population growth. Further discussion of this is included in 5.5 of the 2017 VGPR.

Increased GPG demand has also been forecast due to the closure of the Hazelwood Power Station in March 2017 and the forecast increase in renewable electricity generation due to the Victorian Renewable Energy Target. AEMO has forecast that as renewable electricity generation increases, GPG utilisation will also increase to cover days when generation of electricity from renewable sources is low, e.g. overcast days with no wind.

DTS-connected GPG units also have highly variable gas usage profiles, as electricity is generated to follow peaks in residential electricity demand. Further information about the capacity of the DTS to support for GPG demand is in section 5.3 of the 2017 VGPR.

The WORM will provide increased linepack close to Melbourne to support peak residential gas demand, as well as support gas fired electricity generation during periods of high residential electricity demand.

4.4. INCREASED SWP TRANSPORTATION CAPACITY TOWARDS MELBOURNE

AEMO modelling demonstrates that the WORM will also increase the SWP transportation capacity towards Melbourne. This will enable higher flows from the proposed expansion of the Iona UGS facility (shown in *Figure 2*) to support Victorian peak winter gas demand.

The increased SWP capacity is achieved by enabling gas from Port Campbell to be supplied into the Melbourne Inner Ring Main via the Wollert City Gate in northern Melbourne. Further information is in section 5.1.4 of the 2017 VGPR.

A further increase in SWP transportation capacity towards Melbourne could be achieved through the addition of a compressor at Lara when the WORM has been constructed. The increased capacity is shown in figure 25 of the 2017 VGPR. AEMO supports additional SWP capacity, including the Lara compressor, as it will increase supply options for the DTS.

While AEMO supports the Lara compressor, this project should not proceed without the WORM being constructed as it will deliver little in additional SWP transportation capacity towards Melbourne on its own. This is because the Brooklyn City Gate is the only point that Port Campbell gas can enter the Melbourne Inner Ring Main. Brooklyn City Gate is near its capacity limit on a peak demand day, so additional SWP compression without the WORM will cause Brooklyn City Gate to be constrained by this capacity limit.