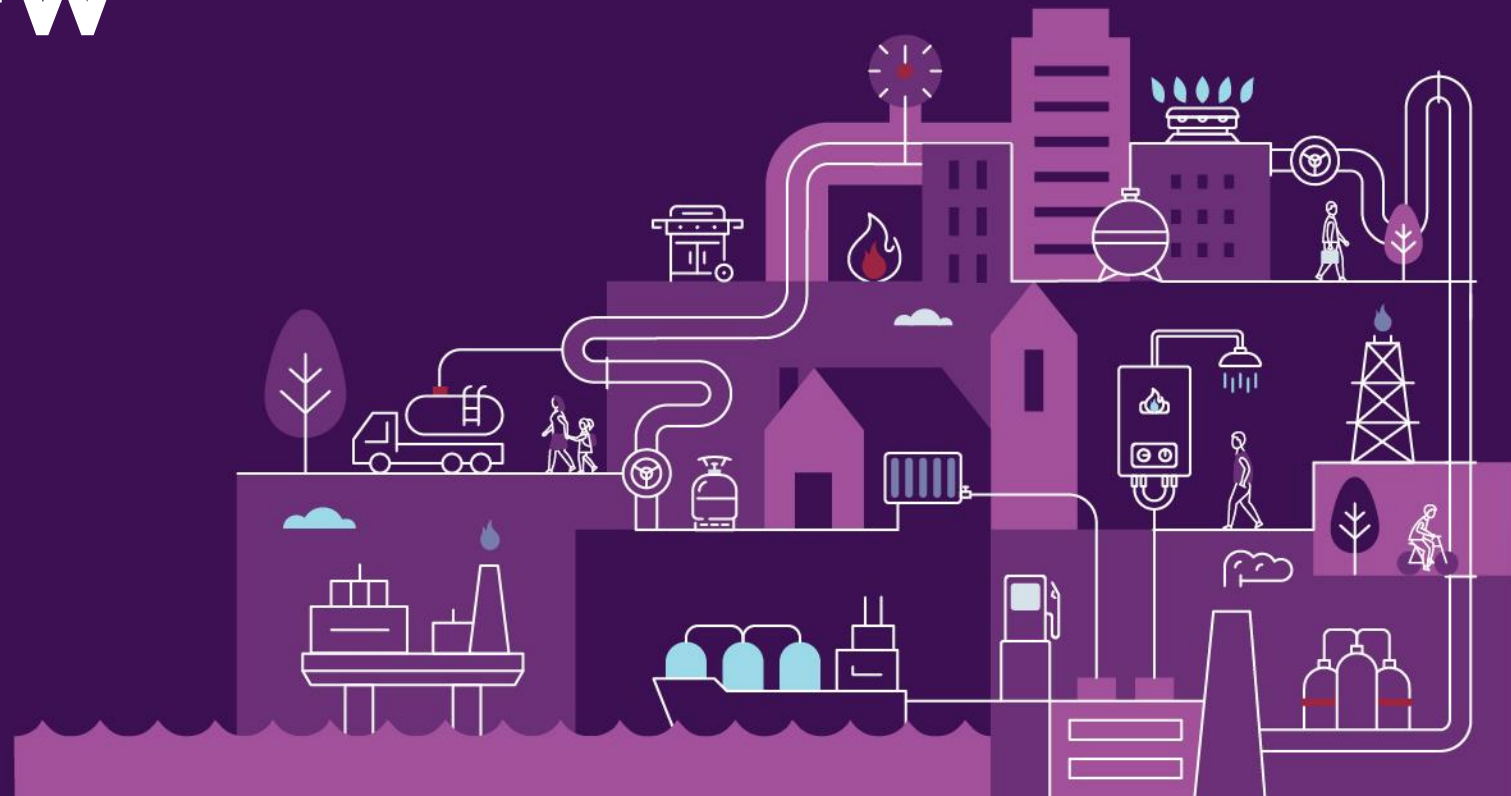


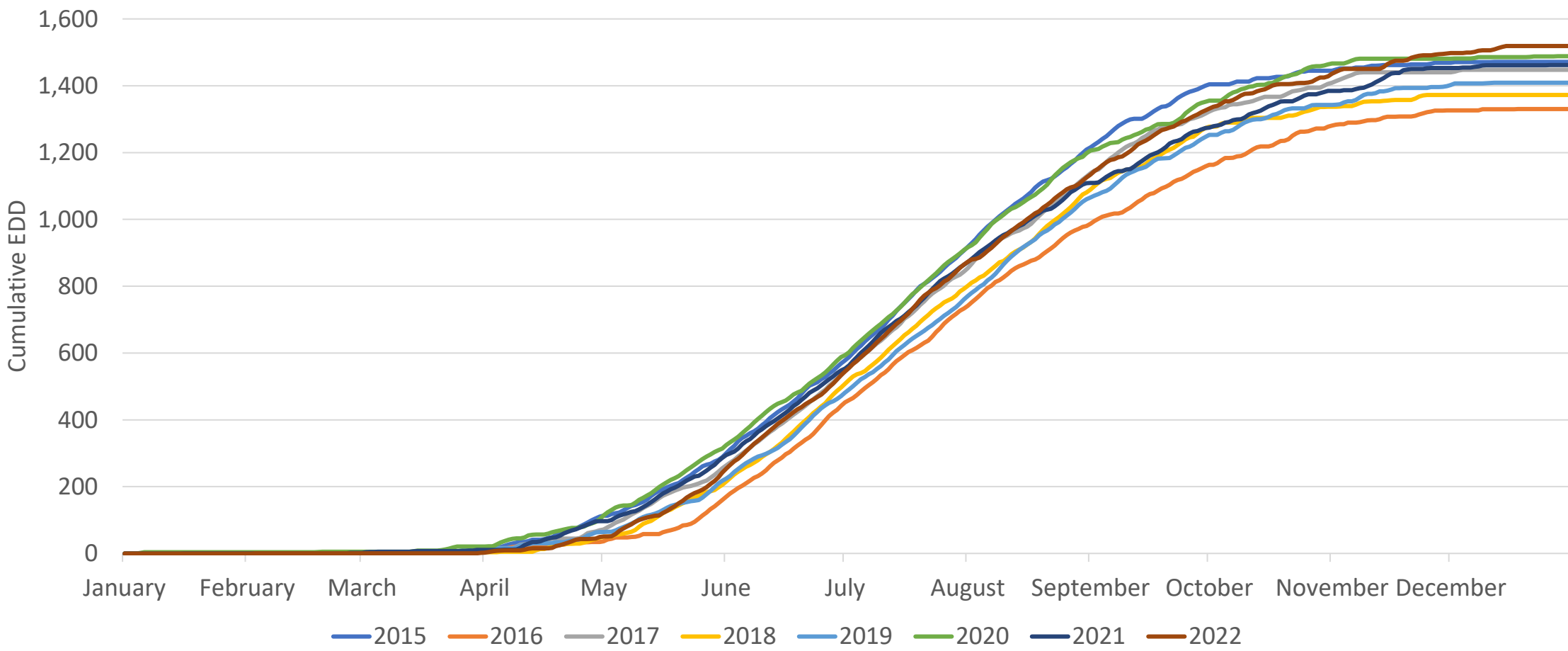
2022 in review



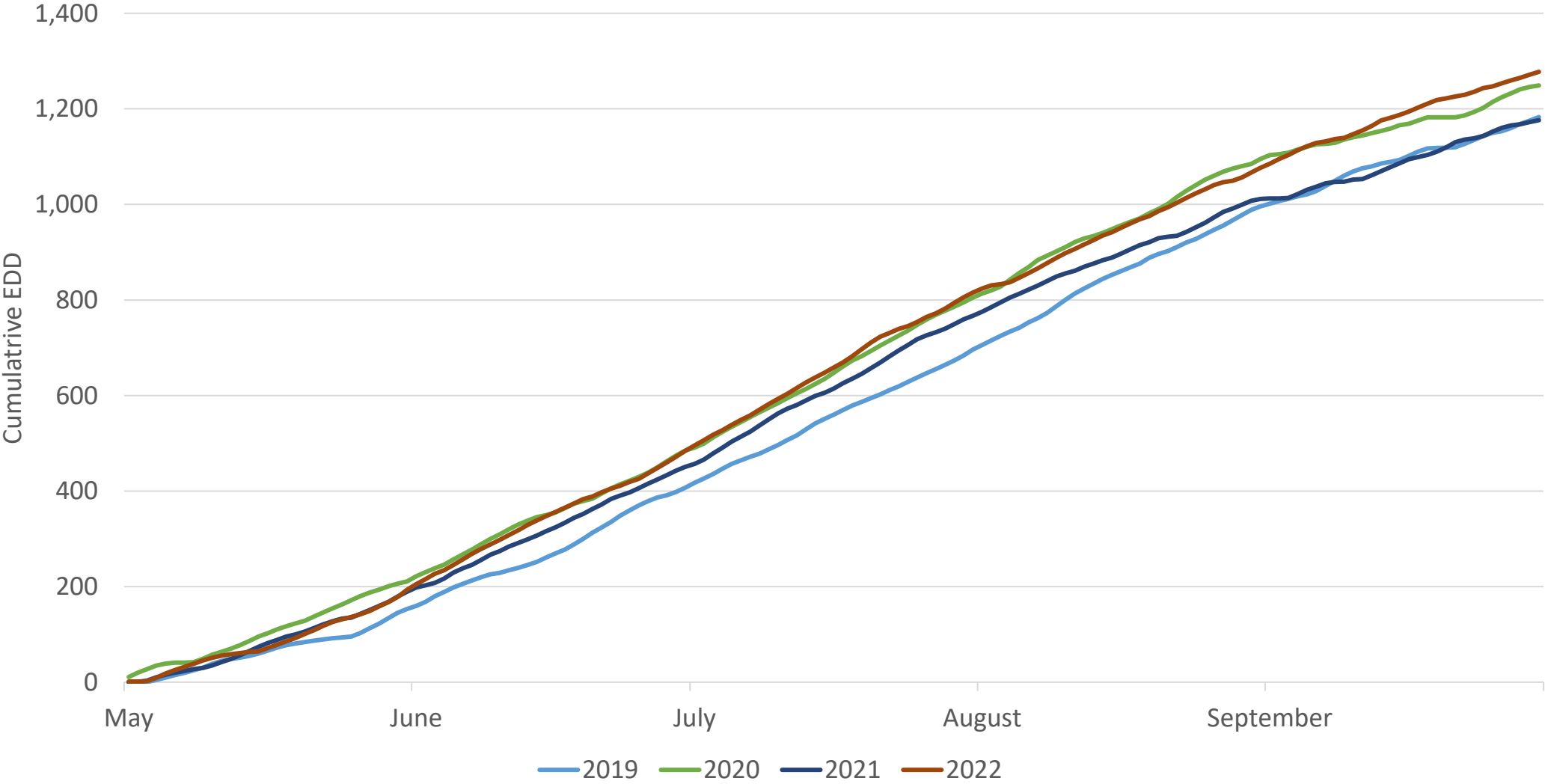
Supply and demand



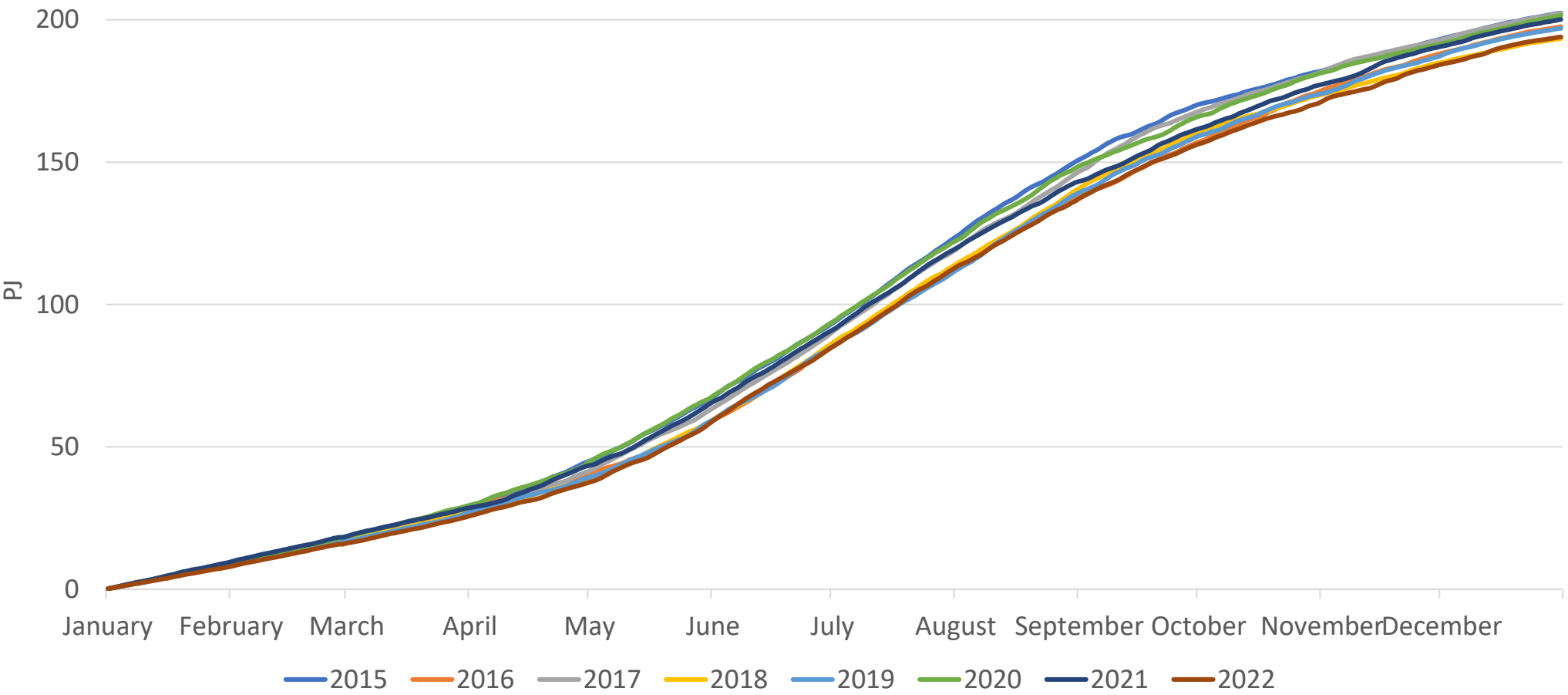
Cumulative DWGM EDD



Winter DWGM EDD



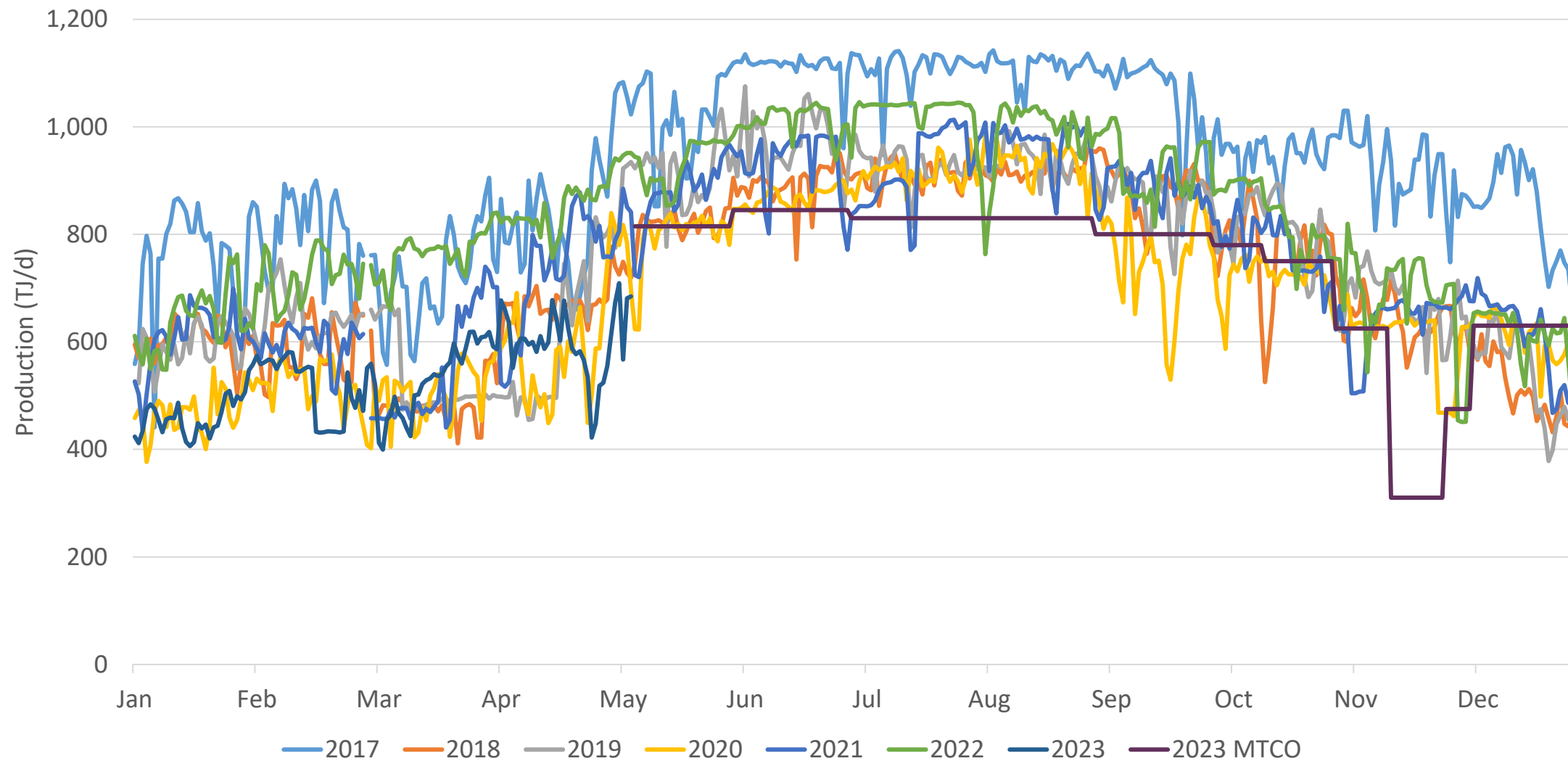
Cumulative DWGM System Demand



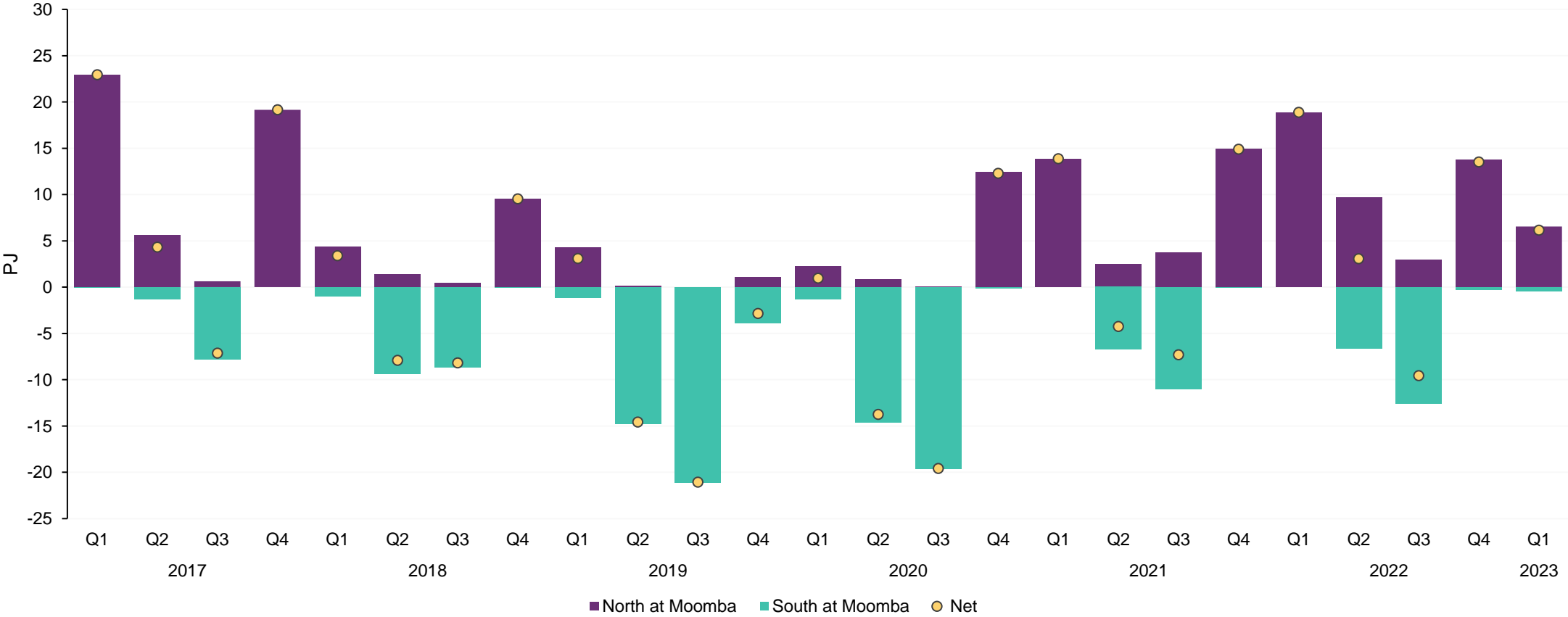
Winter 2022 DTS gas consumption

- Victorian DTS gas consumption was 207 PJ, a small increase on 2021 consumption.
- System consumption (by households and businesses) was 193 PJ:
 - Tariff D (industrial and large commercial) consumption was 65 PJ. The lowest since market start in 1999.
 - Caused by the closure of the Mobil Altona refinery and the mothballing of one plant at Qenos Altona in 2021, and the winding down of Saputo Dairy Australia's facility in Maffra.
 - Tariff V (small commercial and residential) consumption was 128 PJ. The third highest Tariff V consumption since market start (after 2020 and 2017).
 - Higher Tariff V demand driven by cold weather in 2022, particularly in early winter.
- Gas for power generation was 20.7 PJ in 2022, nearly double the 10.5 PJ used in 2021.
 - Driven by higher gas generation demand from late May due to an early winter cold snap coupled with low wind and solar generation
 - Continued high demand due to reduced coal generation in Victoria and New South Wales (including due to severe flooding) coinciding with high system demand for electricity.
 - Gas consumption for generation could have been even higher. Limitations on gas supply led to some generators running on liquid fuels instead.

Longford Gas Plant Production

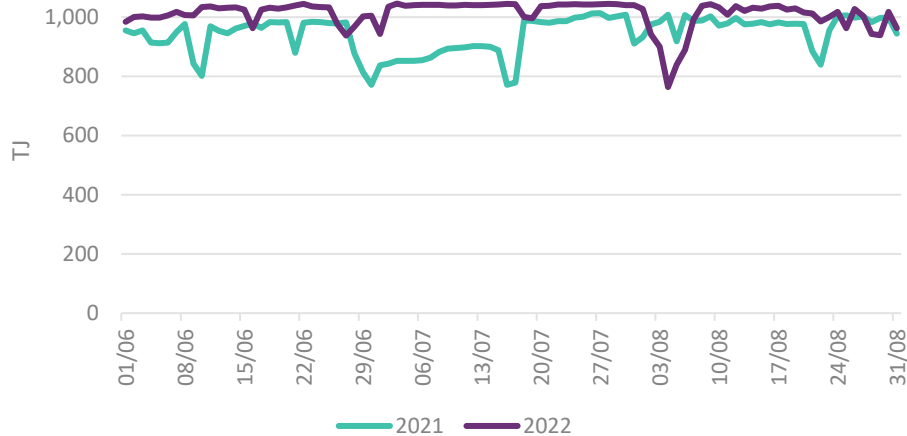


SWQP flows to / from Queensland

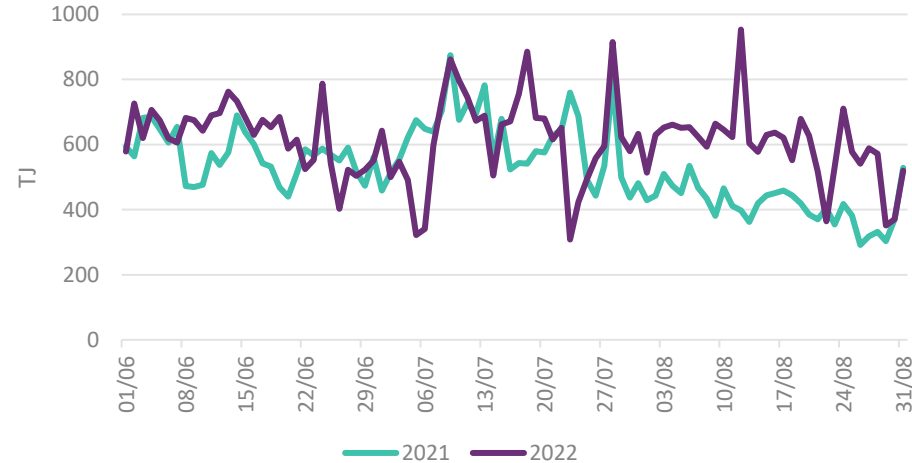


Supply – 2022 vs. 2021

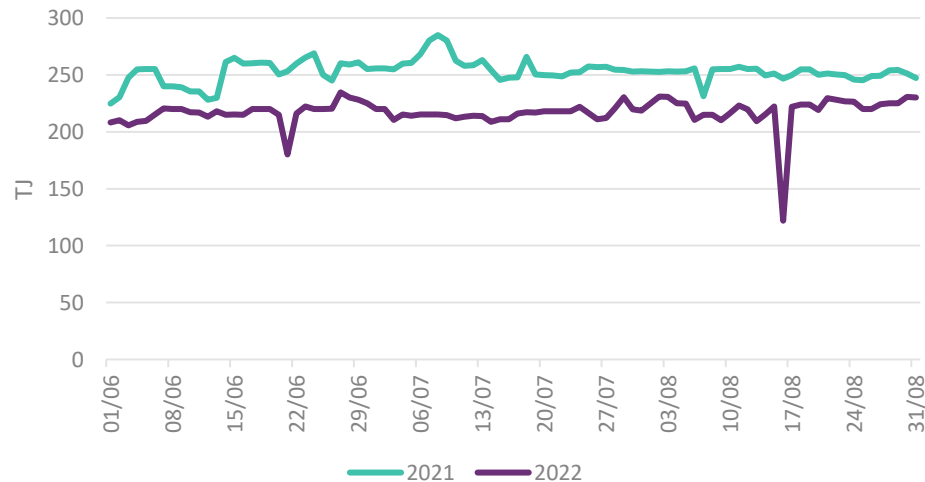
Longford Production



Net QLD Production to Domestic Mkt



Moomba Production



Longford production higher (+6.3 PJ)

Otway production higher (+3.4 PJ)

Bass Gas slightly lower (-0.4 PJ)

Orbost production higher (+0.9 PJ)

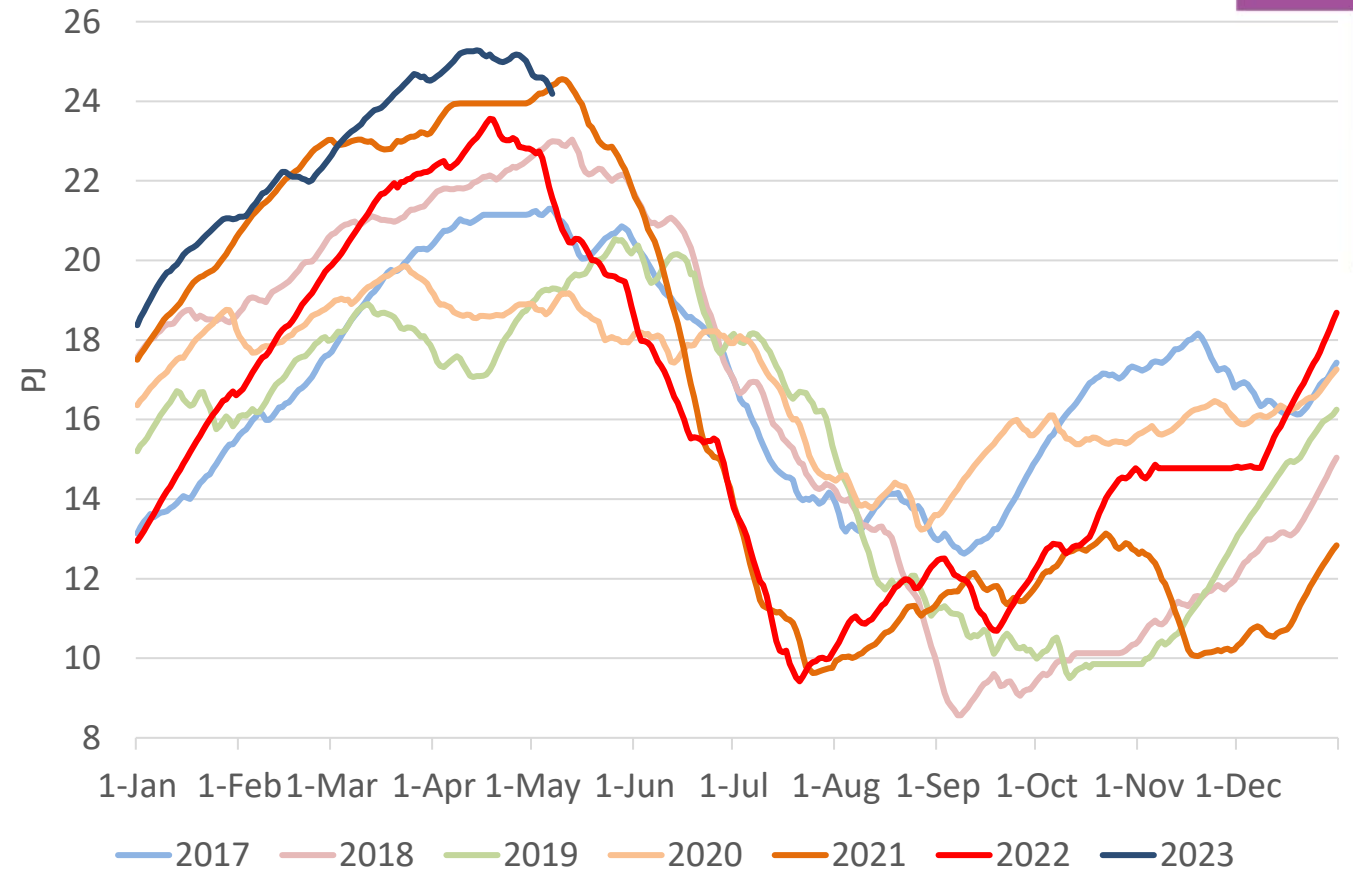
Moomba production lower (-3.3 PJ)

Net QLD production to domestic market higher (+7.7 PJ)

Northern Territory supply to QLD lower (-2.5 PJ)

Iona Gas Storage

- Iona storage followed a similar pattern to winter 2021, with very fast depletion rates in June and July, followed by a recovery in August
- Fast depletion was caused by a cold weather, higher GPG and a tight supply situation in the first half of winter
- August saw a decrease in GPG demand, milder weather and strong flows from QLD (APLNG outage) to the southern markets which enabled storage level to recover
- QCLNG outages also provided for increased supply for Iona refilling



Gas Market Prices

	Average Price (\$/GJ)		Movement
	Winter 2022	Winter 2021	
DWGM	30.86	10.75	187% ▲
ADL STTM	33.27	12.47	167% ▲
SYD STTM	33.59	12.14	177% ▲
BRI STTM	31.49	11.44	175% ▲
GSH	29.78	10.96	172% ▲

- All markets recorded all time high average prices for any season
- Sydney and Brisbane were placed under administered price cap from 24 May to 7 June
- DWGM was capped at \$40/GJ from 30 May to 1 August due to CPT exceedance

System Demand

Demand Region	System Demand (PJ)			Max Demand (TJ)	HDD and EDD			
	2022	2021	Move	2022	2022	2021	Move	
Brisbane STTM	7.8	7.8	0% ▼	95	295	229	28% ▲	
Sydney STTM	28.2	25.2	12% ▲	365	522	524	0% ▼	
Victoria DWGM	78.1	77.9	0.4% ▲	1,179	883	821	8% ▲	
Adelaide STTM	6.3	6.6	- -	83	571	540	6% ▲	
Domestic Market Total	120.4	117.4	3% ▲					
QLD LNG	308.0	329.2	6% ▼	3,741				

- Sydney demand higher due to higher controllable demand bids by Snowy Hydro as well as higher customer load
- Victoria demand only a slight increase despite a much colder winter, due to lower industrial demand
- QLD LNG demand lower due to reduction in flows from all 3 projects, and GLNG and QCLNG in particular

Gas Powered Generation

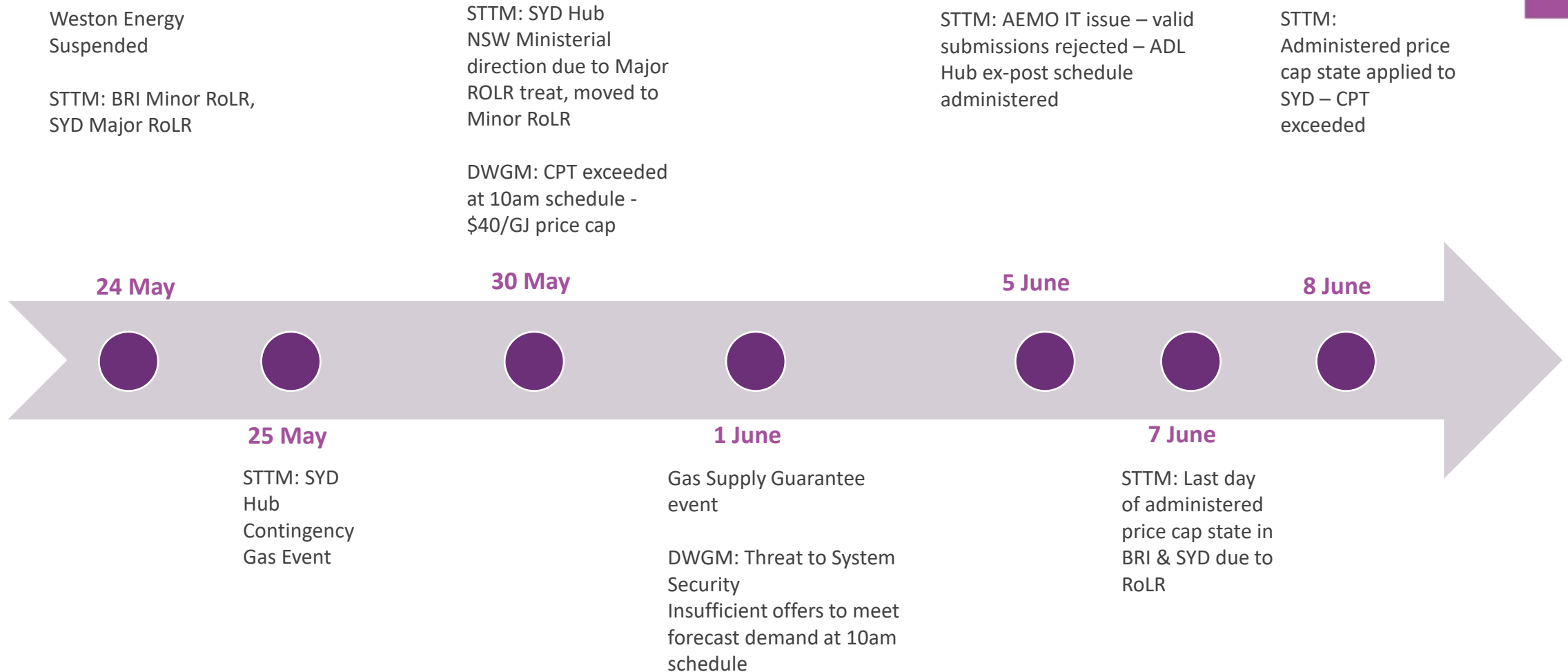
Demand Region	Total State GPG (PJ)			DWGM/STTM GPG (PJ)		
	Winter 2022	Winter 2021	Move	Winter 2022	Winter 2021	Move
QLD	14.8	15.0	2% ▼	0	1.2	100% ▼
NSW	9.0	4.6	93% ▲	-	-	-
VIC	9.2	6.7	36% ▲	5.5	4.0	37% ▲
SA	12.8	14.2	10% ▼	-	-	-
TAS	0.2	0.1	123% ▲	-	-	-
ΣGPG	45.9	40.7	13% ▲	5.5	5.3	5% ▲

- GPG lower in QLD and SA, large increases in NSW and VIC
- Notable changes: QLD – Swanbank E (-1.2 PJ), NSW – Tallawarra (+1.9 PJ), Colongra (+2.4 PJ) SA – Pelican Point (-1 PJ), TIPS (-1.2 PJ), VIC – Laverton (+0.7 PJ), Mortlake (+1.0 PJ)

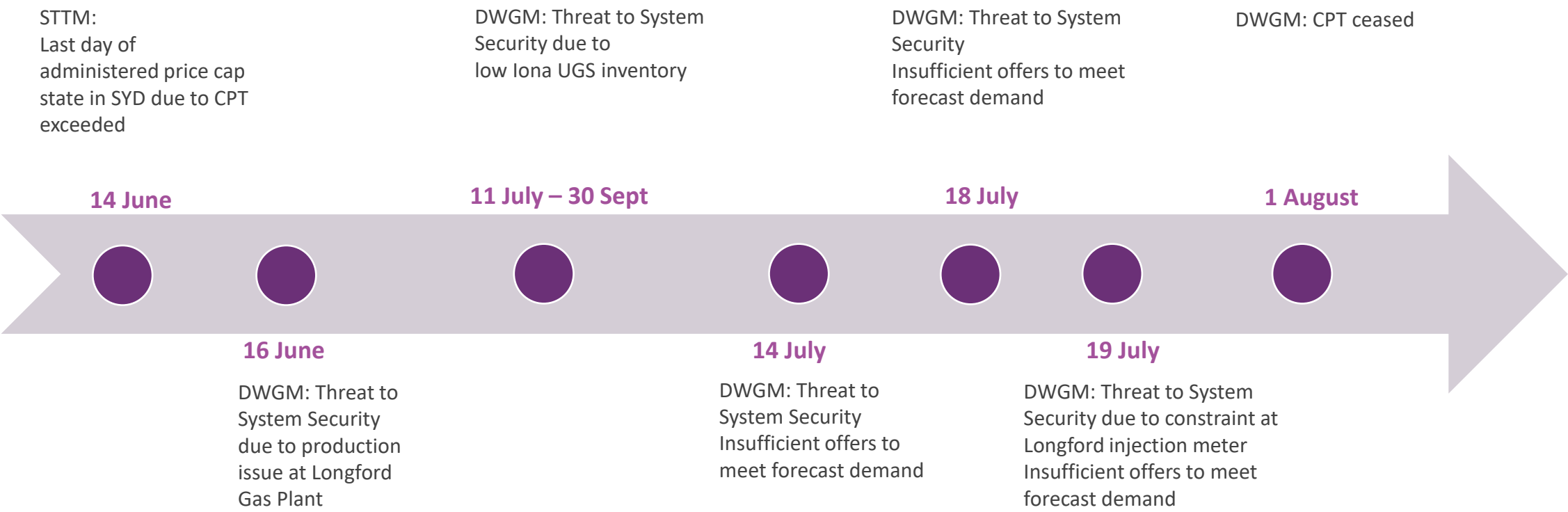
Significant events



Timeline of Significant 2022 Events



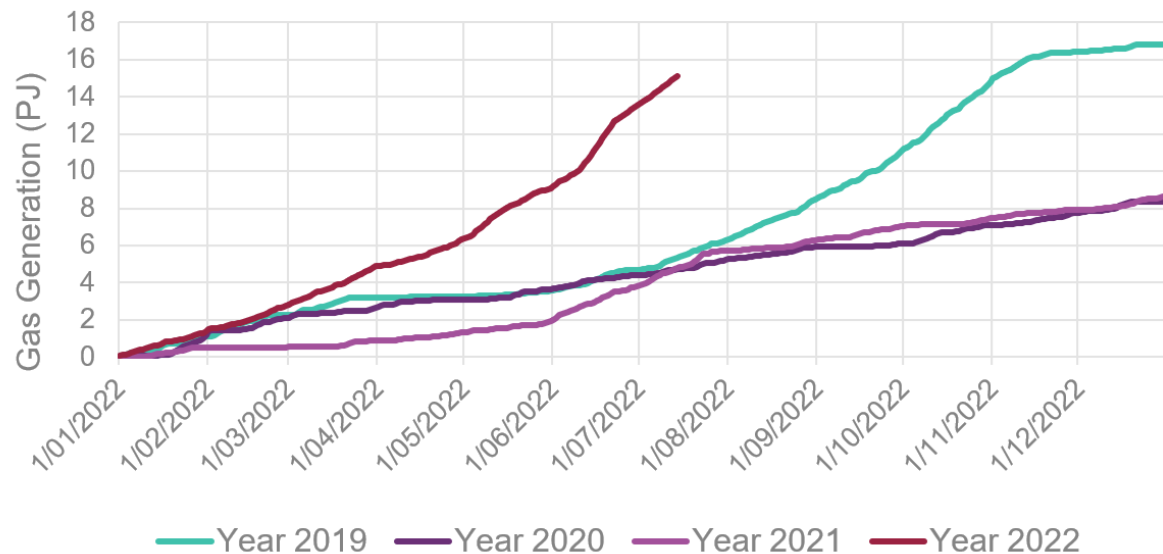
Timeline of Significant 2022 Events



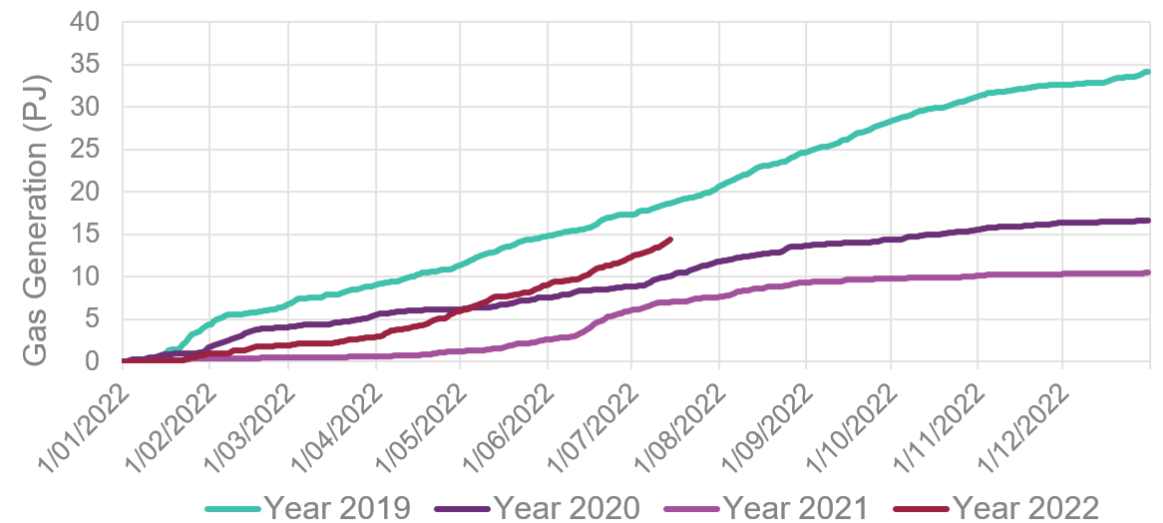
High gas generation demand

- NSW black supply issues, coal generation outages and hydro issues. Year to date NSW gas generation was approx. 15 PJ, three times previous three years (approx. 5 PJ).
- Victoria unplanned coal generation outages and hydro issues. Year to date Victorian gas generation was approx. 14 PJ, twice winter 2021 (7 PJ).
- Gas generation for 2Q 2022 (9 PJ) higher than 2Q 2019 (8 PJ) when Loy Yang A2 last had an extended unplanned outage and Yallourn Power Station last experienced high unplanned unavailability.

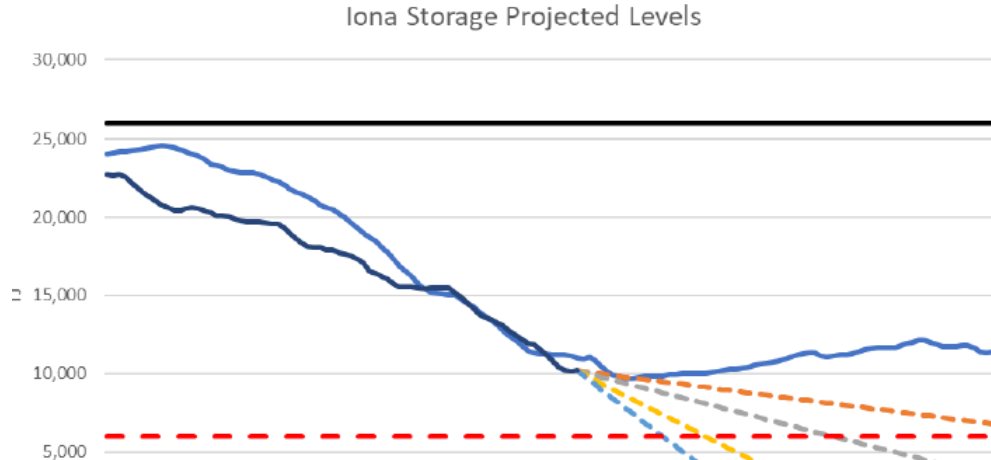
NSW Gas Consumption for Electricity Generation

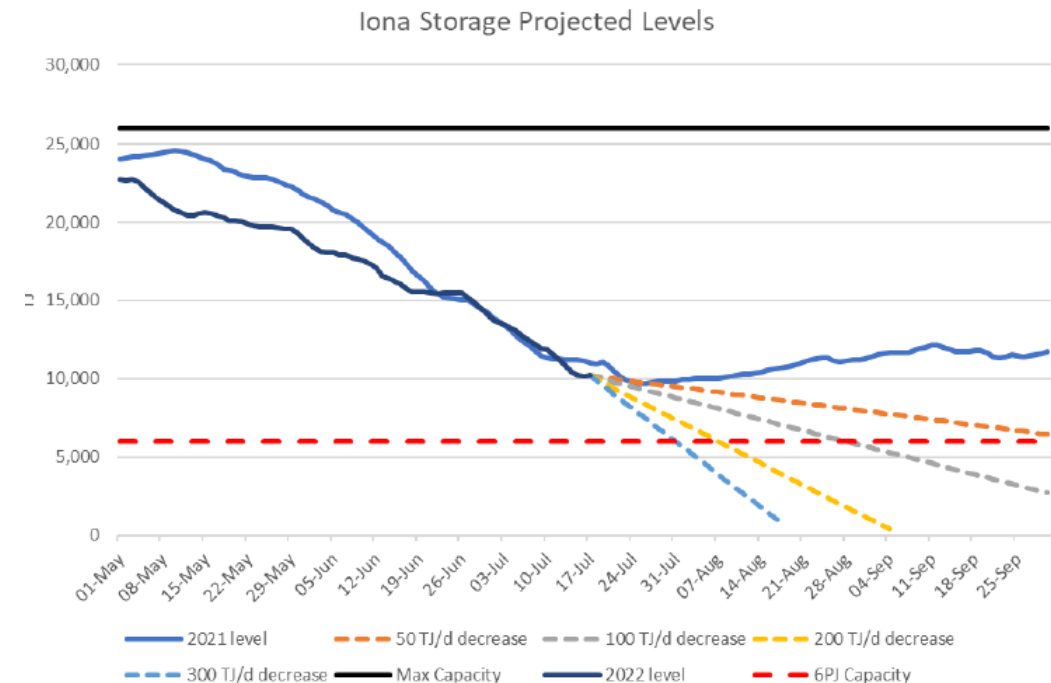


Victorian Gas Consumption for Electricity Generation



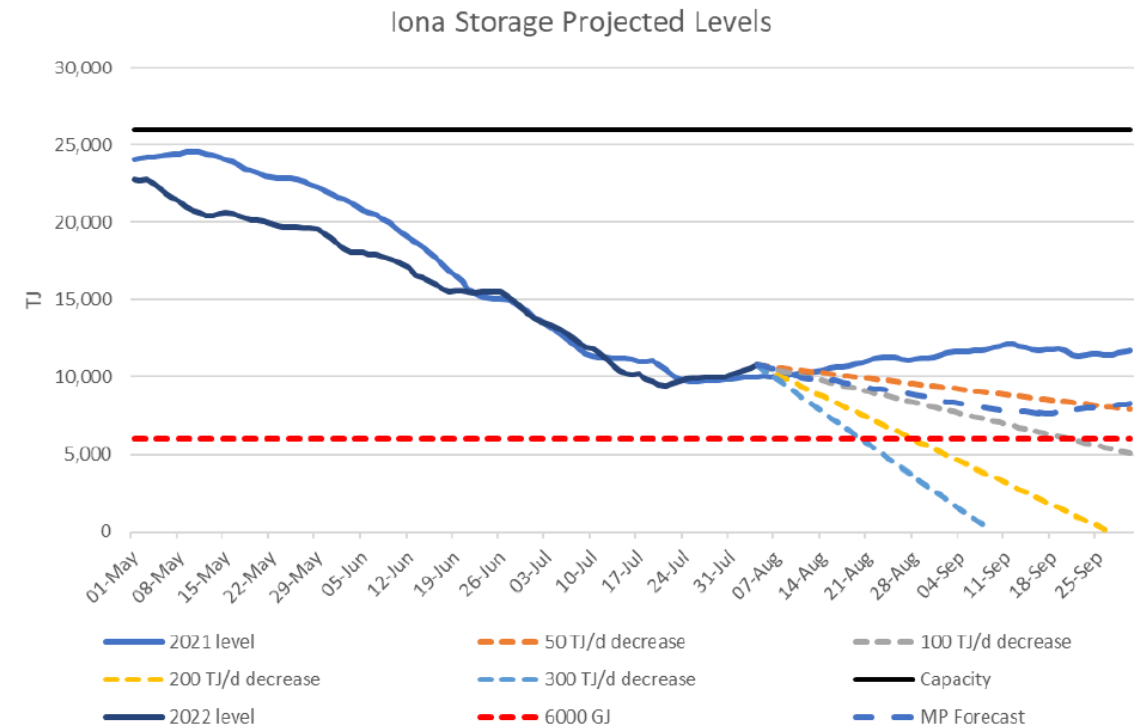
Iona Storage Depletion

- AEMO issued a Notice of a Threat to System Security on 11 July 2022 and published an additional threat notice on 18 July 2022 due to low Iona underground gas storage inventory and the risk of supply shortfalls due to Iona inventory depletion over winter
 - In the threat notice, AEMO requested:
 - Market Participants to cease purchasing gas from the DWGM to ship to other jurisdictions
 - Victorian gas generators connected to the DTS are not to generate using gas without supplying a corresponding quantity of gas into the DTS
 - Iona storage inventory reduced at an average daily rate of approx. 200 TJ/d from 1-11 July
 - If this rate of decline continued, Iona storage inventory would reduce to 6 PJ by 6 August
 - At this inventory level, Iona supply delivery capacity may begin to reduce, with this supply capacity reduction increasing if the Iona inventory continued to decline
- 
- | Date | Actual Inventory (PJ) | Projection 1 (PJ) | Projection 2 (PJ) | Projection 3 (PJ) |
|----------|-----------------------|-------------------|-------------------|-------------------|
| July 1 | 23,000 | | | |
| July 4 | 24,500 | | | |
| July 11 | 15,000 | | | |
| August 6 | 11,000 | 7,000 | 0 | 0 |



Iona Storage Depletion

- On 10 August, AEMO issued an updated notice, noting that since 21 July Iona inventory increased from 9.4 PJ to 11 PJ on 7 August. Based on information provided at the time Iona inventory was expected to stay above 6 PJ
- As such, from 2 August participants were no longer requested to support controllable withdrawals from the DTS into Iona UGS with corresponding supply, and from 11 August allow limited net withdrawals from the DWGM by Victorian gas generators
- Participants were still requested to cease purchasing gas from the GWGM via controllable withdrawals from the DTS, unless withdrawing into Iona UGS
- The threat was in place until 30 September 2022



Winter 2022 summary

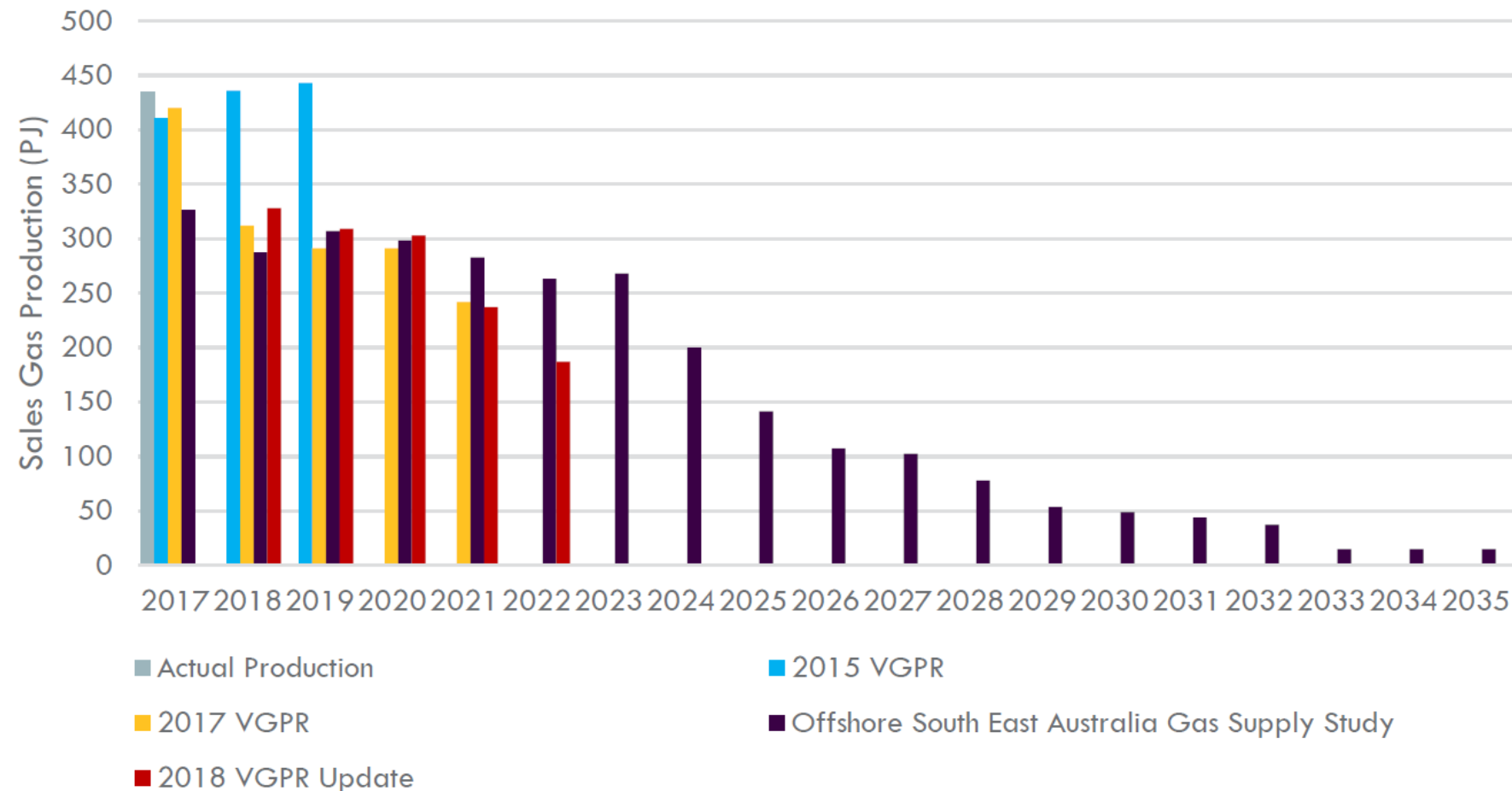
- Gas prices in all regions were at record levels for any time of the year
 - Average \$31.80/GJ compared to \$11.55/GJ in winter 2021
- QLD LNG exports were lower than winter 2021 and significantly lower than autumn 2022, and were the lowest season flows since winter 2020
 - QLD LNG -21.2 PJ due to GLNG (-12.1 PJ), QCLNG (-8.1 PJ), APLNG (-1.0 PJ)
 - GPG demand up 5.3 PJ, mostly due to NSW and VIC
 - Non GPG demand was up 3 PJ, mostly due to higher Sydney demand despite similar HDDs
- Iona Gas Storage levels rapidly decreased at a similar rate to Winter 2021 during June and July
- A record number of significant events affected STTM hubs (particularly Sydney) and DWGM, including five Threats to System Security and the price cap of \$40/GJ was triggered for all of June and July

Longford depletion



Victorian Production decline highlighted in the 2018 VGPR Update

Figure 2 Victorian production forecasts by year (PJ/a)



Notes from the 2018 VGPR Update

- The 2018 VGPR Update noted that Victorian production reached new heights in 2017, with Victorian producers supplying 435 PJ to the east coast gas market (including record Longford Gas Plant production). The report noted that this trend will not be sustained.
- Richard Owens, Esso Australia Chairman, noted that:
 - *“accelerated extraction inevitably means accelerated decline”, and*
 - *“the Gippsland basin is not a magic pudding – we are not sitting on a great big endless gas resource, as some seem to think”. (18 October 2017)*
- The ACCC, 2017-2020 Gas Inquiry: Interim report noted that:
 - *“One of the GBJV’s large original gas fields has depleted earlier than expected, with another two expected to deplete in the early 2020s. The GBJV has accelerated production from its legacy gas fields over the last two years to meet increasing demand, including the drawdown of gas cycled through reservoirs used to increase system capacity during peak winter demand months. However, Esso stated that the GBJV is unable to sustain these production levels as low impurity resources from its legacy fields decline.”*
- The Australian Government, Department of Industry, Innovation and Science, 2017 Offshore South East Australia Future Gas Supply Study, noted that:
 - *“Any forced increases to upstream gas production from producing fields for input into onshore markets will result in a faster erosion of reserves, which, when combined with the mature nature of hydrocarbon exploration and production in the Gippsland Basin and south east Australia in general, will have implications for long-term security of supply.”*

Longford facility retirements

Positioning gas production for the future



	2010	Today	Future
Operating Platforms	8	6	6
Operating Wells	122	68	36
Pipelines	35	26	11

	Today	Future
Crude Stabilization Plant	1	0
Gas Processing Plants	3	2
Gas Conditioning Plant	1	1

	Today	Future
Fractionation Trains	2	1
Crude Storage	1	1
LPG Storage	1	1

Longford – Gas Supply Limited

Esso Commercial Director, David Berman spoke at the ADGO conference:

- Longford gas production was historically onshore facility constrained or market demand constrained.
- If an offshore platform was unavailable, another offshore platform could cover this outage and production from Longford would remain unaffected.
- In 2022 the Snapper field played an important role offsetting reduced production from other fields three times. For example, in November last year, a platform went offline for unexpected repairs. That platform was returned to production over the course of 33 hours and during this time, Snapper production was increased to cover the gap.
- Once Snapper is depleted, likely within the next 12 – 24 months, it will no longer be able to perform that vital role.
- As more legacy fields cease production in the future, we will need to continue to match onshore capacity with reduced offshore capacity.
- In the past, offshore capacity was provided by strong water drive fields. With the continued decline of water drive reservoirs such as Snapper and Barracouta the production system will also become more reliant on offshore compression.
- At this conference in 2014, ExxonMobil called for additional investment in storage.

<https://www.exxonmobil.com.au/news/newsroom/speeches/the-evolving-role-of-gippsland-gas-in-australias-east-coast-gas-market>

Longford Resilience Risks

- Permanent retirement of Longford Gas Plant 1 (GP1) inlet section at the end of 2021.
 - If either the GP2 or GP3 inlet section is unavailable, capacity will fall to approx. 550 to 650 TJ/d.
 - AEMO threat to system security notice due to insufficient Dandenong LNG capacity, with Emergency Reserve capacity contracted from January 2022.
- Full GP1 retirement after winter 2023.
 - Remaining Longford capacity capped at approx. 800 TJ/d.
 - Loss of either GP2 or GP3 reduces Longford capacity by approx. 50%.
 - Unplanned outages: Three weeks June – July 2021, 9-14 September 2022, Five days from 27 April 2023
- Depletion of large legacy gas fields degrades the current high resilience of the Longford production system.
 - Inability to cover equipment trips and unplanned outages, increased reliance on Gas Conditioning Plant
- Periods of reduced or no customer ethane offtake can constrain Longford production
 - Q1 2023 capacity limited to 615 TJ/d during ethane customer outage
 - Hastings Generation Project

Dandenong LNG Contracting

- In response to increasing supply risks the Victorian Government initiated a rule change to make AEMO the buyer and supplier of last resort for Dandenong LNG storage facility
- Rule determination made by the AEMC in December 2022
- Obligations in effect from 1 March 2023 to 31 December 2025
- Increases Dandenong LNG supply availability for responding to threat to system security events even if market participants do not contract LNG capacity themselves
- Rules and Procedures include processes for AEMO to purchase and relinquish LNG stock
- Long term future for Dandenong LNG facility needs to be addressed



Addressing Longford decline

- Gippsland peak day production forecast for winter 2023 is 915 TJ/d, 211 TJ/d lower than actual 2022 peak production of 1,126 TJ/d
- Gippsland production is forecast to reduce further to 771 TJ/d (144 TJ/d lower) prior to winter 2024 with increased risk due to Longford GP1 retirement.
- The only increase in supply capacity to the southern states is the Stage 2 Moomba to Sydney Pipeline (MSP) expansion adding 90 TJ/d of capacity for winter 2024.
- No further expansion of the Victorian South West Pipeline has been proposed (which releases Longford capacity to supply NSW).
- Narrabri, Golden Beach, and Port Kembla (or another import terminal) – online before 2026?



Thank you

- There has been a large amount of gas reform implemented over the last year
- This has been challenging for everyone including AEMO
- We thank you for your patience and for constructively engaging with AEMO

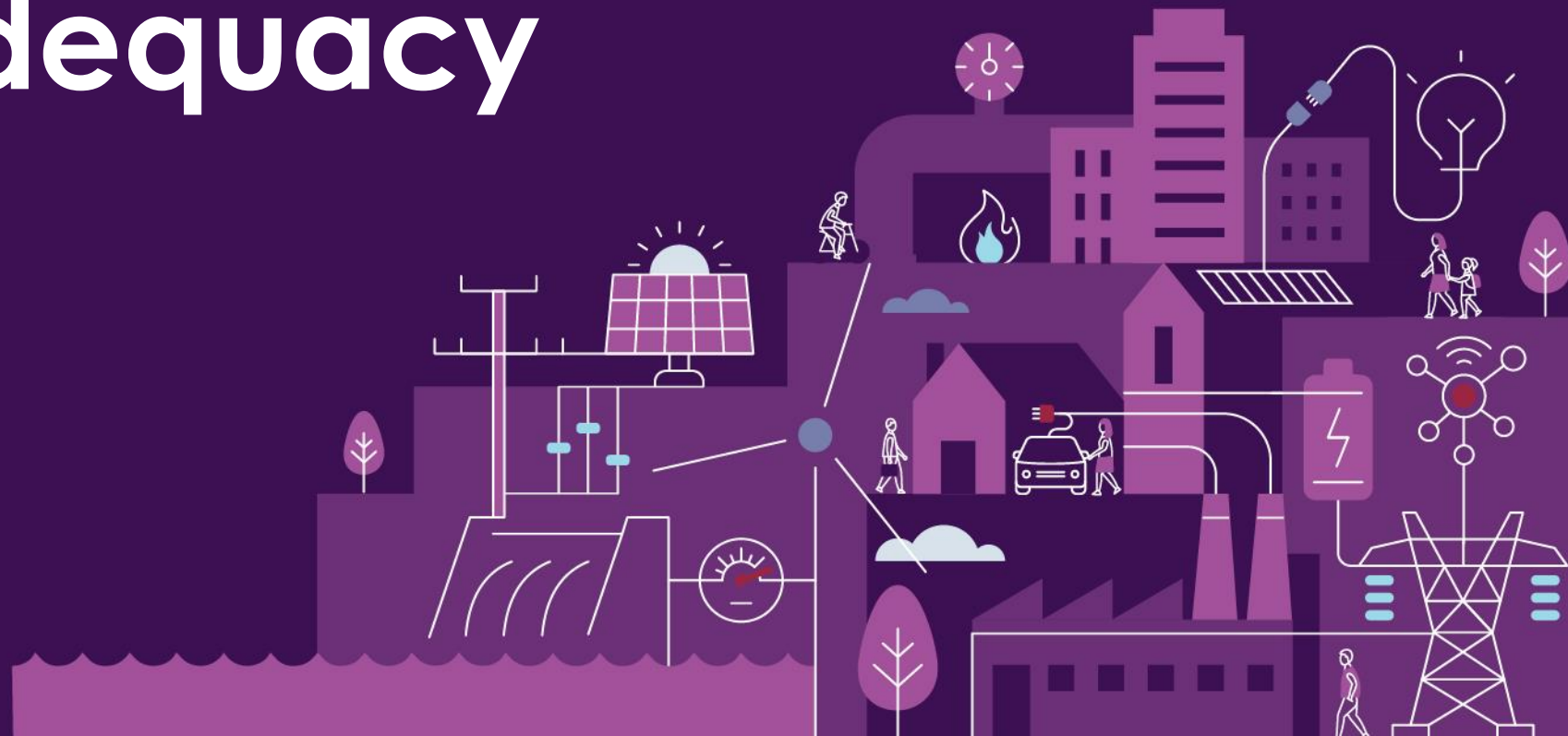




For more information visit

aemo.com.au

Supply adequacy



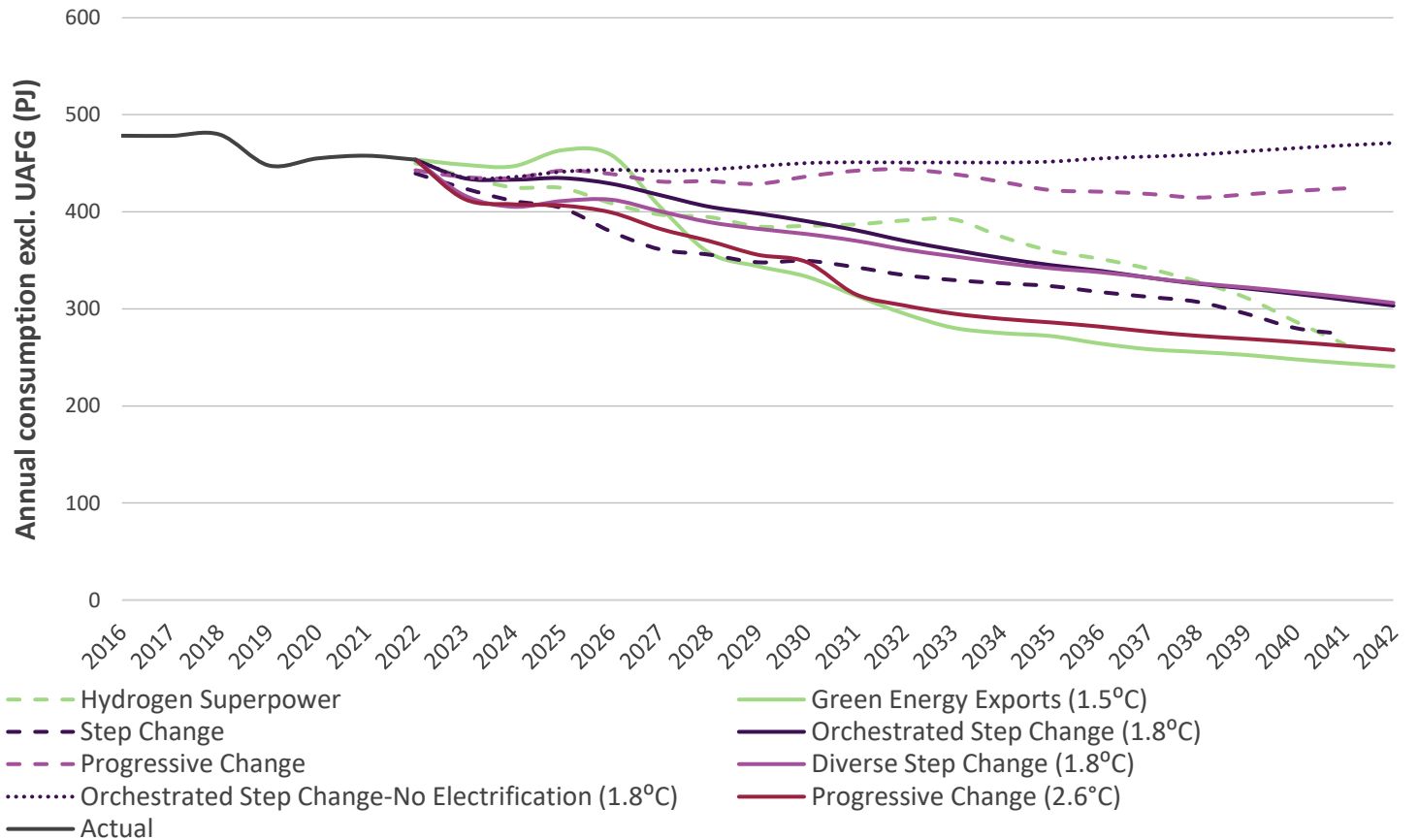
Agenda

1. Demand forecasts
2. Projects
3. Winter 2023 adequacy
4. Longer term adequacy

Demand forecasts

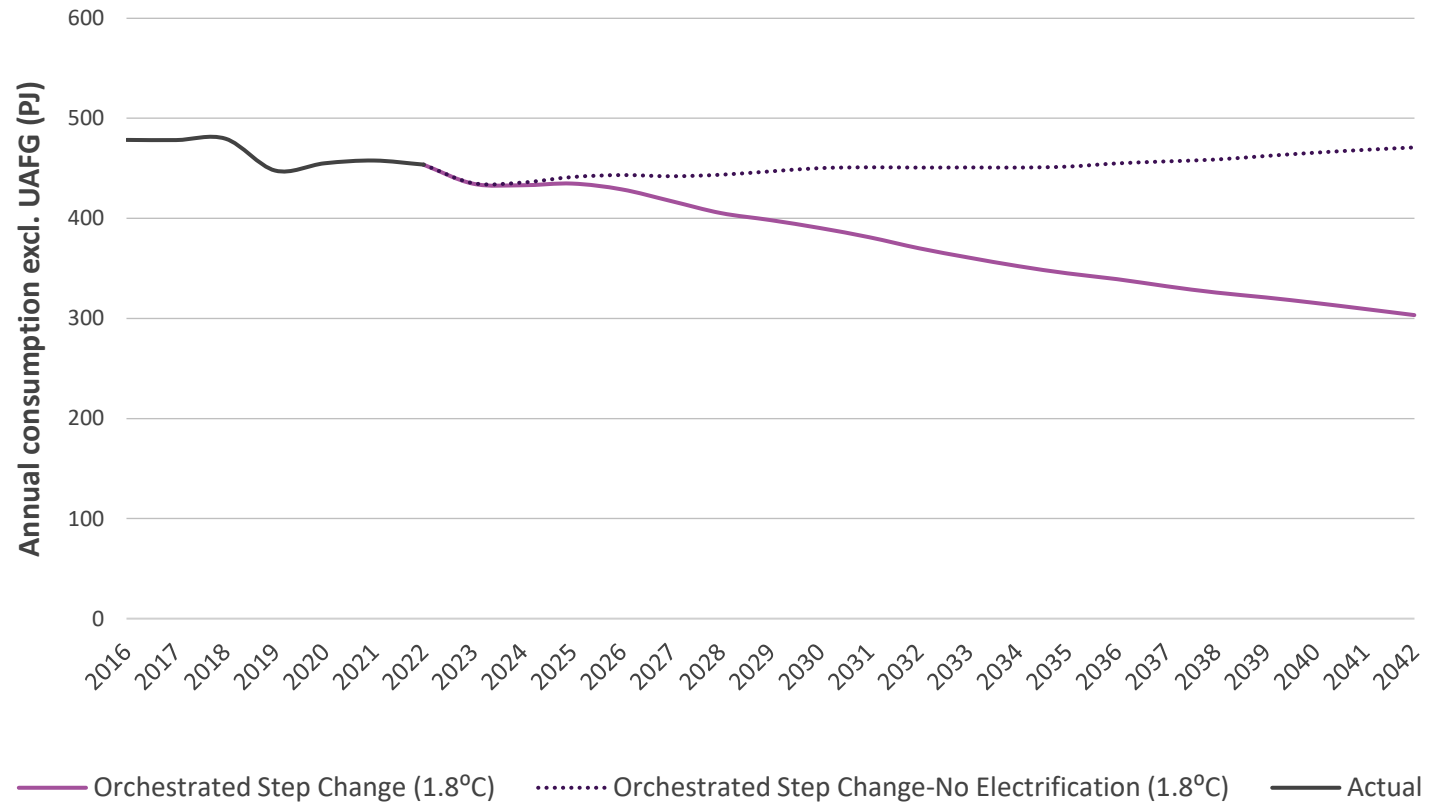
Domestic gas consumption forecast

- AEMO considers a number of future scenarios with varying economic, policy, consumer-driven and technology settings.
- The 2023 GSOO and VGPR focus on the **1.8°C Orchestrated Step Change**.



Domestic gas consumption forecast

- Consumer-driven electrification is the key component in this scenario (for gas).
- Strong policy incentives and industry investment will be required to realise this level of electrification.
- While electrification investments are certain, uncertainty remains over how quickly.

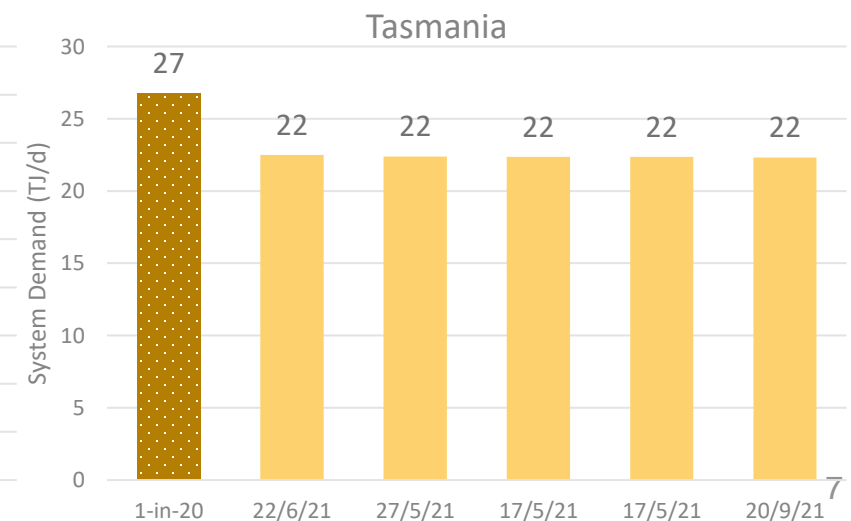
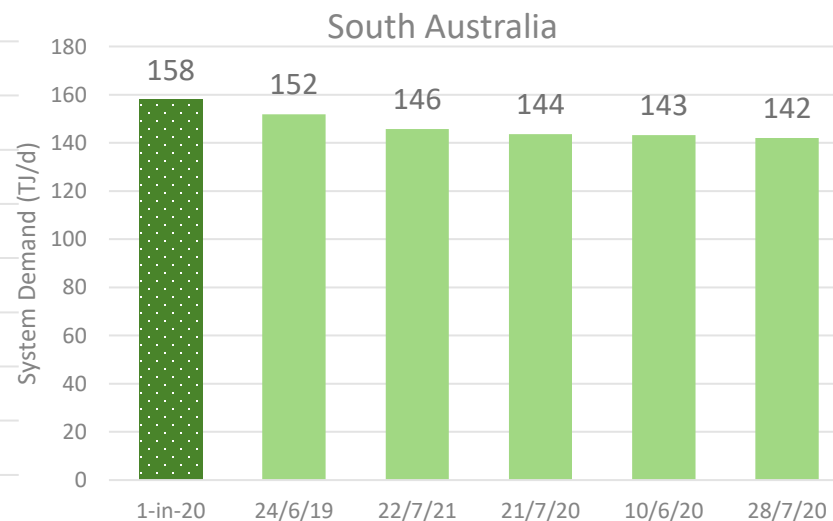
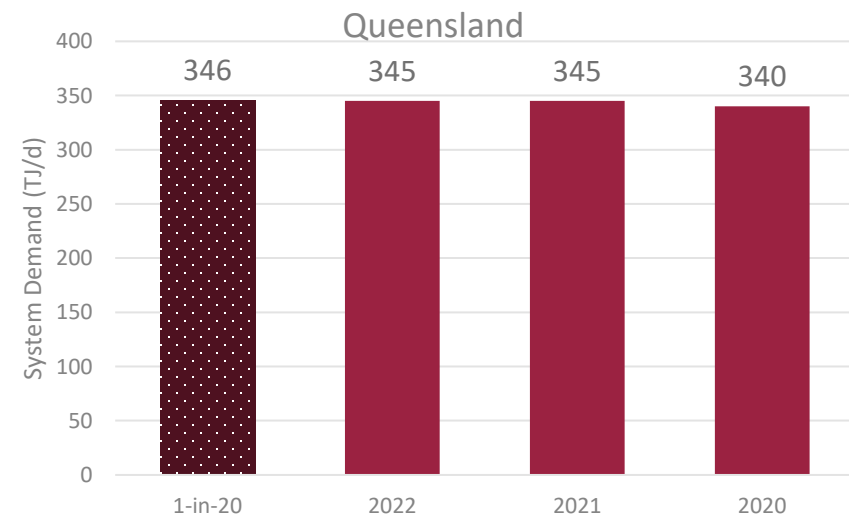
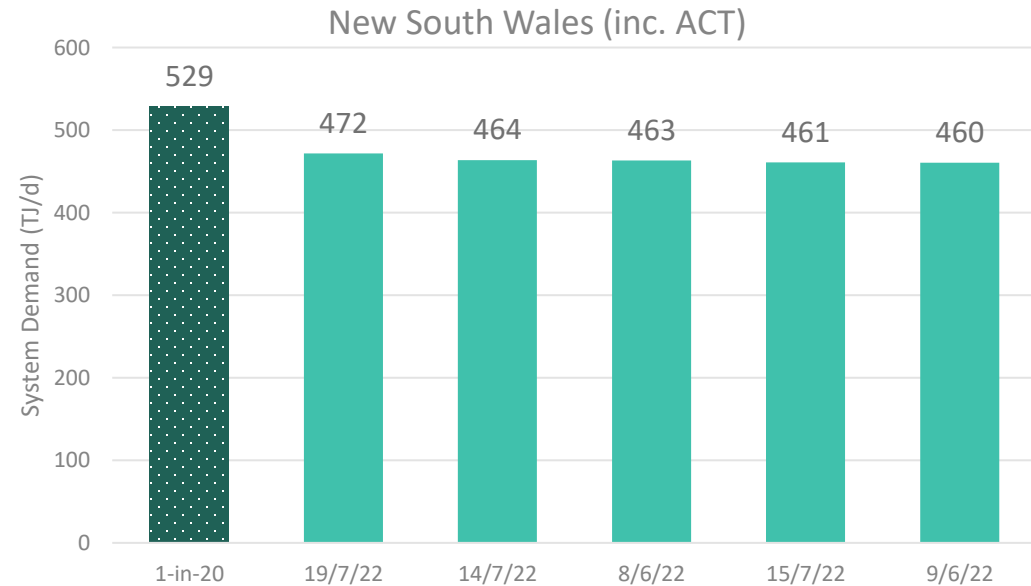
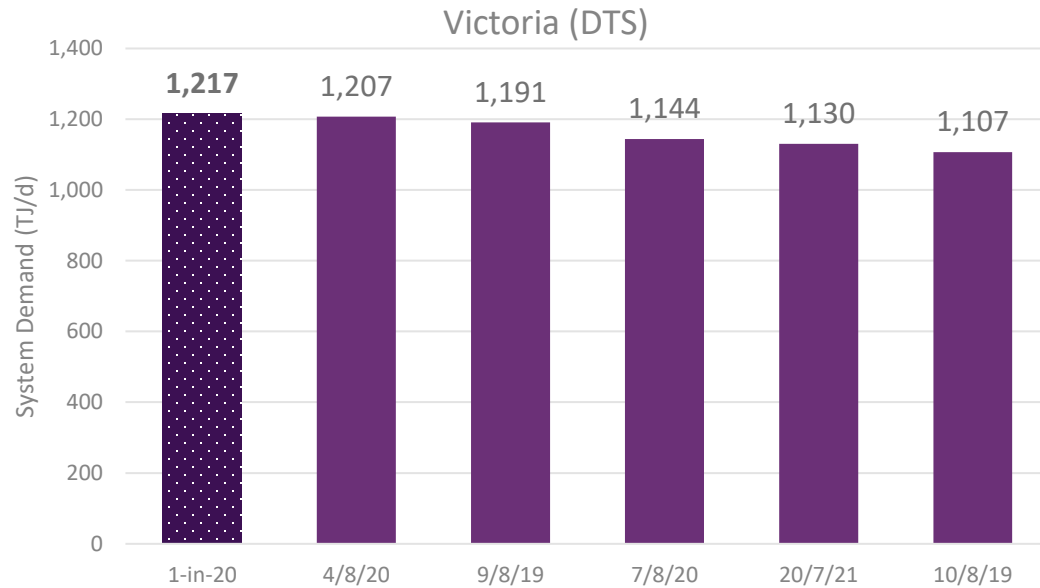


Gas generation forecast

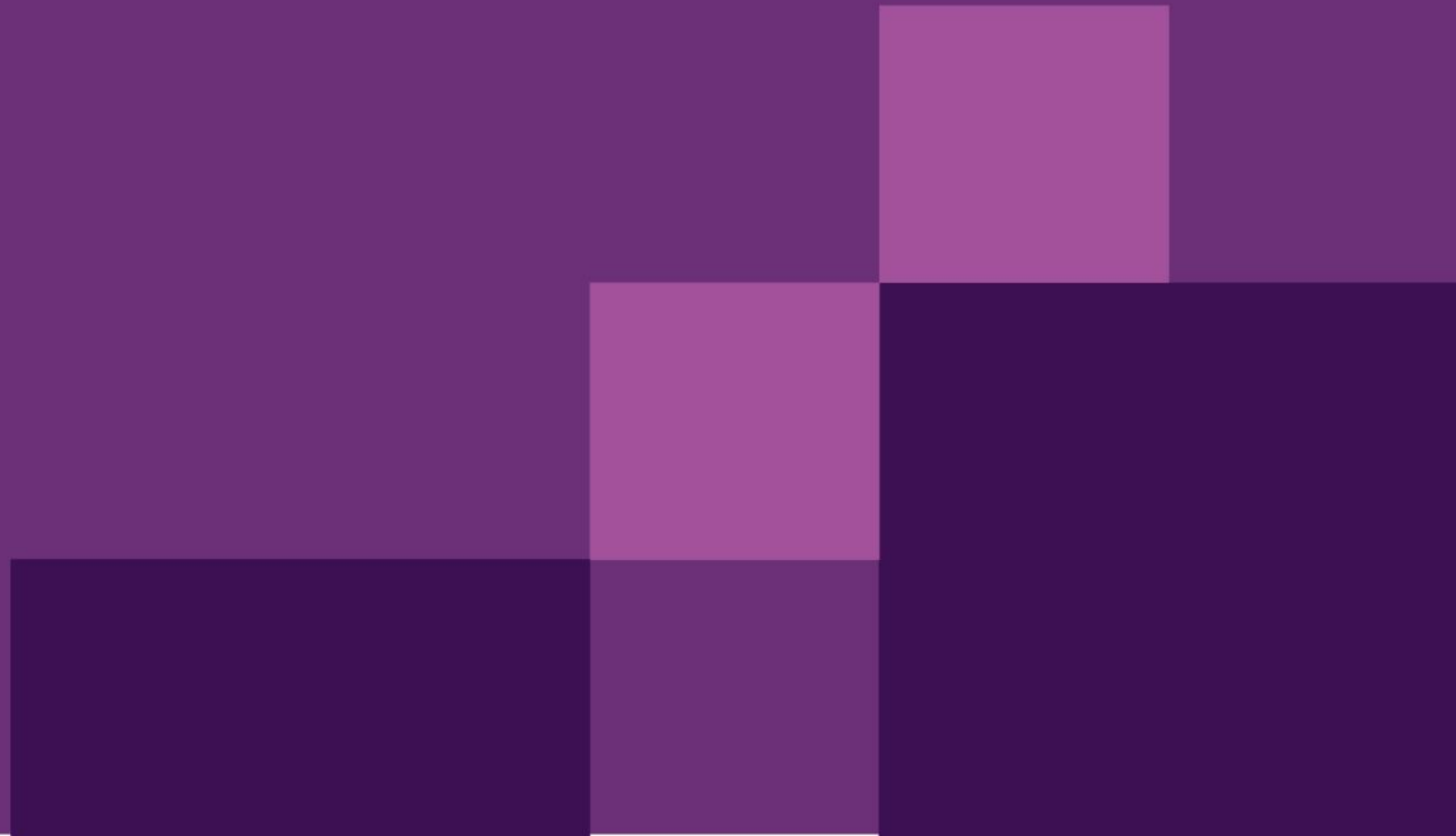
- Despite falling annual consumption, the value of gas generation in firming the NEM remains critical.
- As consumers electrify heating loads, winter gas generation peak demand with increase in magnitude and peakiness.



2023 peak day forecasts



Projects



Winter 2023 projects

Iona Underground Gas Storage (UGS) expansion

Connection of Seamer field increased storage capacity from 23.5 PJ to 24 PJ and injection capacity from 545 TJ/d to 558 TJ/d. Second step from 2024.

Late 2022

Western Outer Ring Main

Western Outer Ring Main (WORM)

51km new pipeline from Wollert to Plumpton, additional compression at Wollert and new path from SWP to LMP.

July 2023

Longford-Melbourne pipeline

Winchelsea Compressor 2

Additional unit at the existing Winchelsea Compressor Station.

June 2023

Thylacine

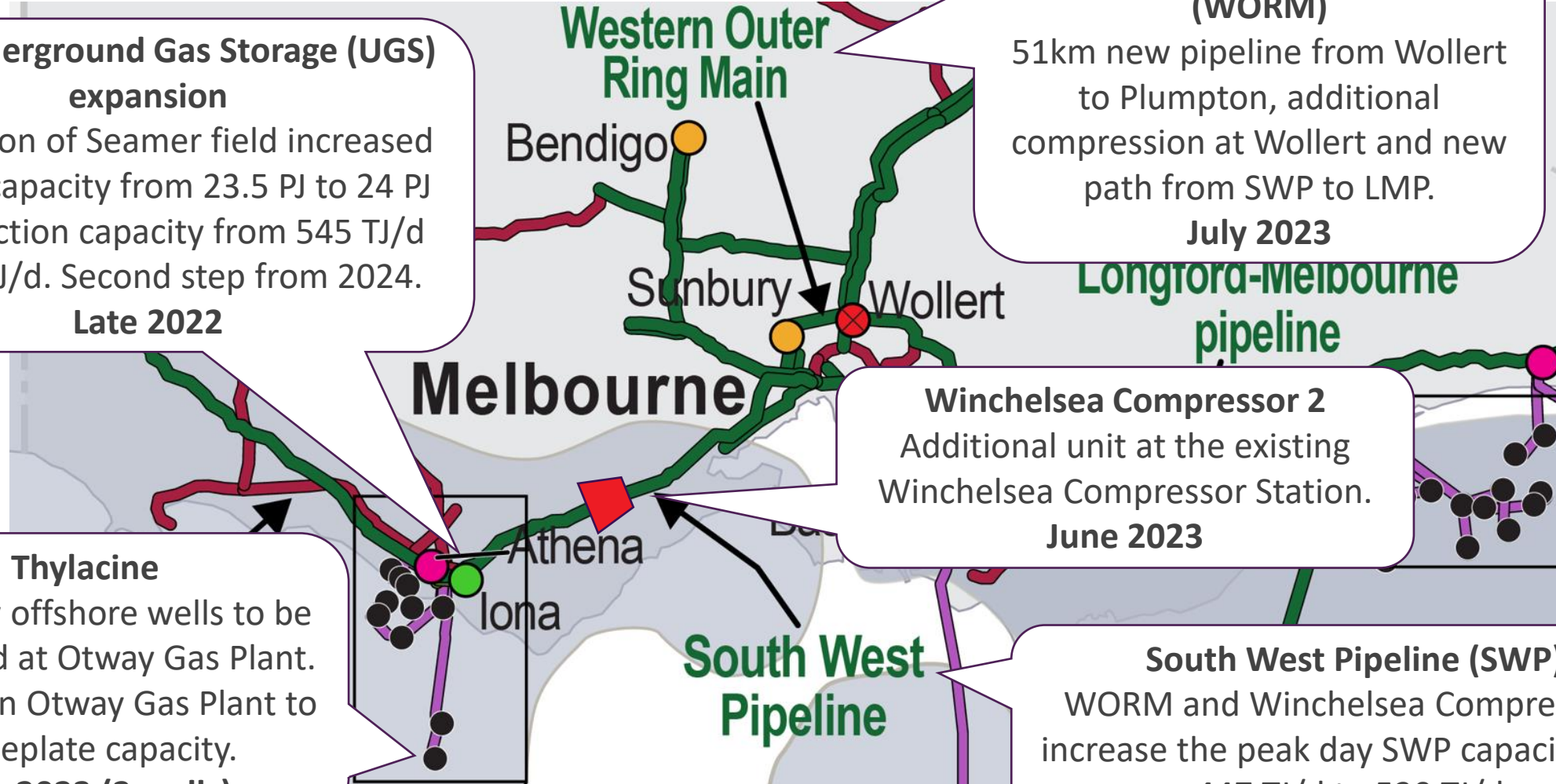
Four new offshore wells to be processed at Otway Gas Plant. Will return Otway Gas Plant to nameplate capacity.

May 2023 (2 wells)

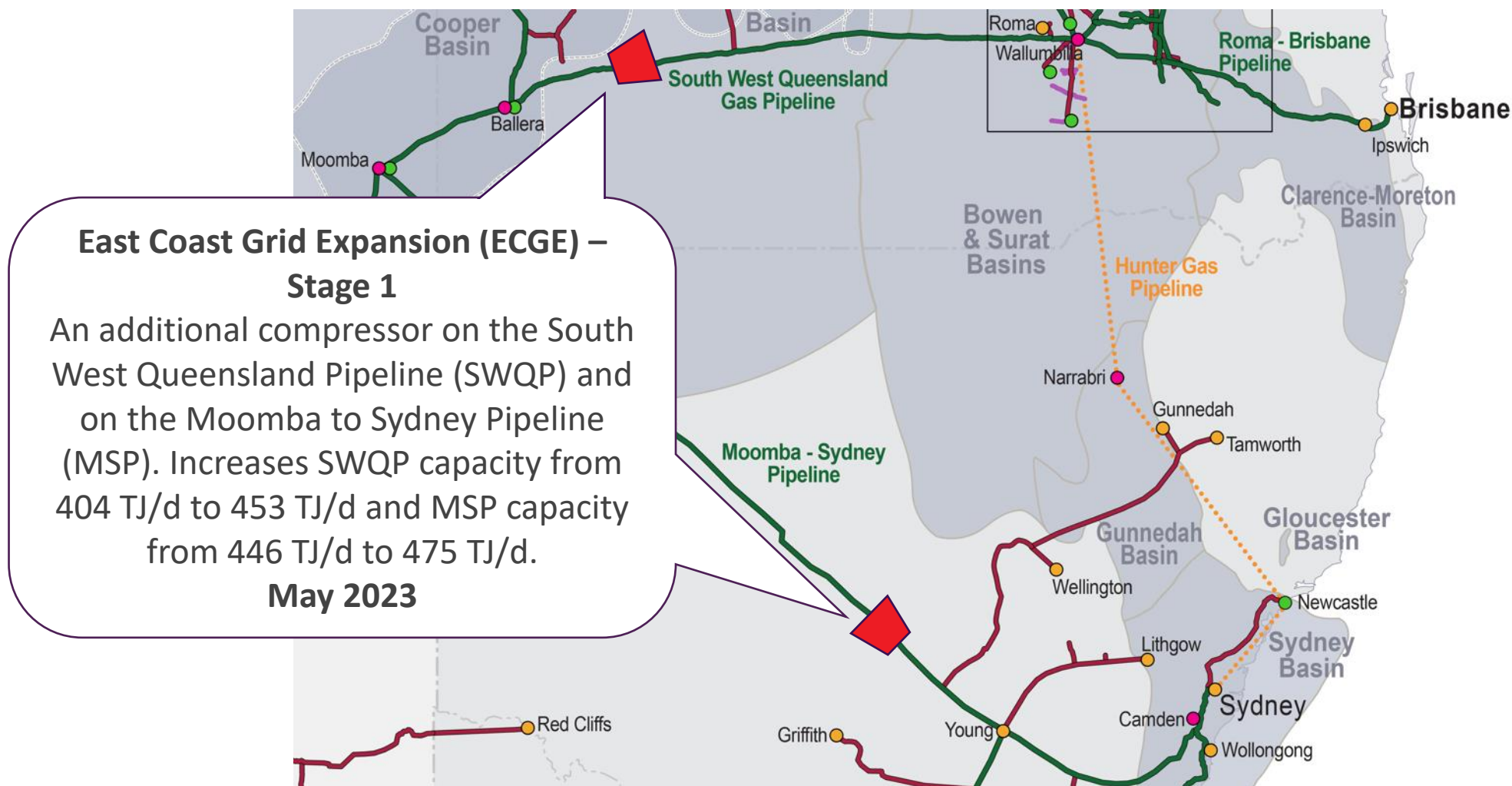
South West Pipeline

South West Pipeline (SWP)

WORM and Winchelsea Compressor 2 increase the peak day SWP capacity from 447 TJ/d to 530 TJ/d.



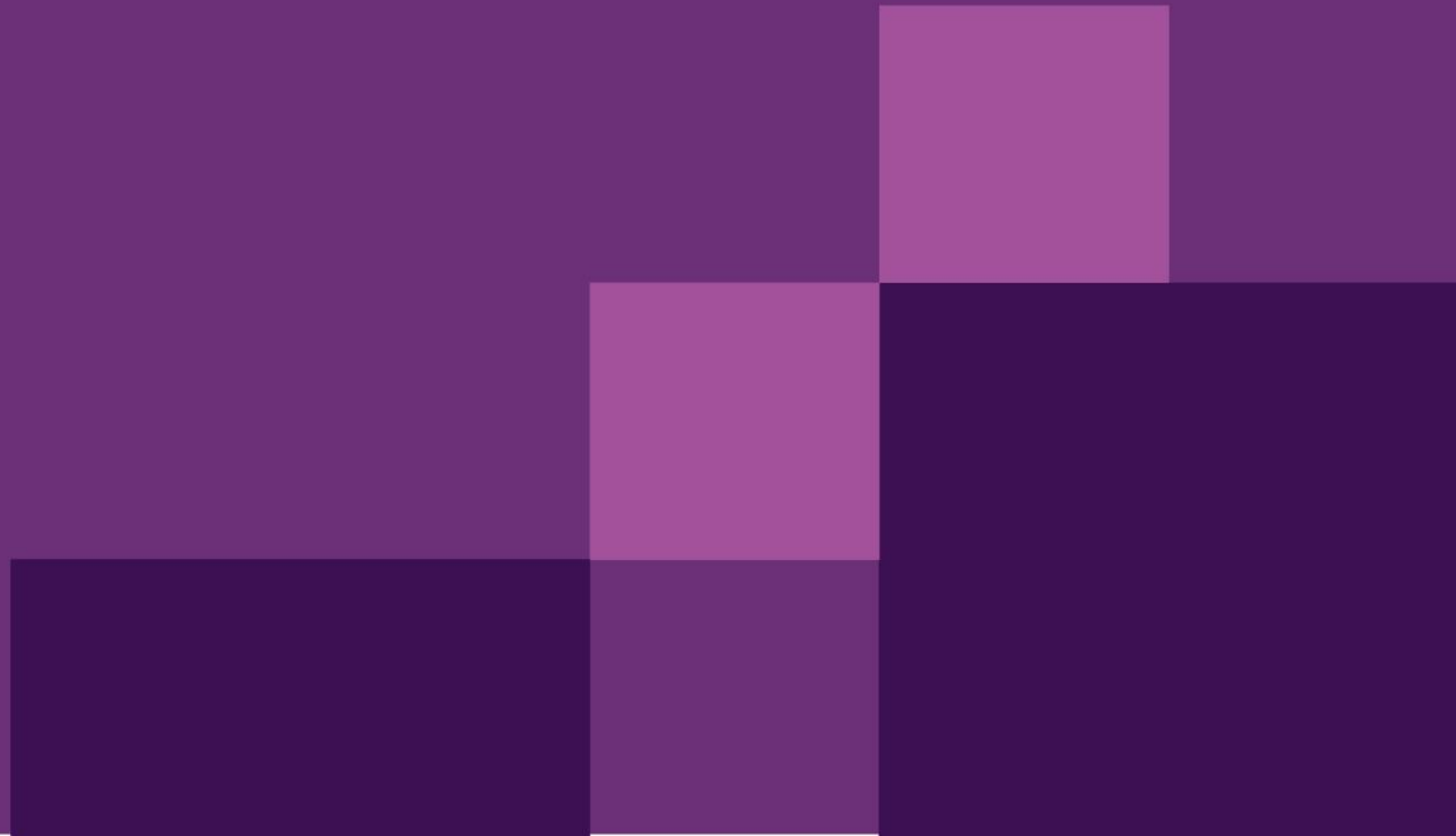
Winter 2023 projects



Longer term project updates

Enterprise	<ul style="list-style-type: none"> • Connection of the nearshore Enterprise-1 well to Otway Gas Plant. • Targeted to come online early 2024, subject to approvals. 	
Kipper projects	<ul style="list-style-type: none"> • Kipper compression expected to commence from early 2024, increasing supply to Longford. • Kipper Stage 1B (one additional well) anticipated to increase supply from 2026. 	
ECGE Stage 2	<ul style="list-style-type: none"> • Additional compressor on each of the SWQP and MSP. • Targeted to come online prior to winter 2024. 	Committed/ Anticipated
Golden Beach	<ul style="list-style-type: none"> • Supply from Golden Beach field for two years then transitioning to storage. • Soon to drill an appraisal well, targeting first gas from 2025. 	Potential/ Uncertain
Port Kembla Energy Terminal	<ul style="list-style-type: none"> • Squadron progressing with wharf, expected 2024, and Jemena with the Eastern Gas Pipeline (EGP) connection, expected by the end of 2023. Supply may not commence until 2026. 	
Victorian LNG import terminals	<ul style="list-style-type: none"> • Viva Energy Gas Terminal Project requested supplementary information ahead of an EES decision. • Vopak Victoria LNG submitted a referral to the Minister for Planning to determine if an EES is required. 	

Winter 2023 adequacy



Production outlook

Gippsland and Bass Basin (Longford, Orbost, Lang Lang)

- Winter 2023 supply: 915 TJ/d.
- Increased from the 2022 GSOO/VGPR production forecast by 191 TJ/d from 724 TJ/d.
- Reduced supply in 2023 due to Gippsland basin legacy field decline. Peak production in 2022 was 1,126 TJ/d.

Otway Basin (Otway, Athena, Iona UGS)

- Winter 2023 supply: 730 TJ/d.
- Increased supply for 2023 from the new Thylacine wells and Iona UGS expansion.
- Not all accessible to DTS due to SWP capacity of 530 TJ/d.

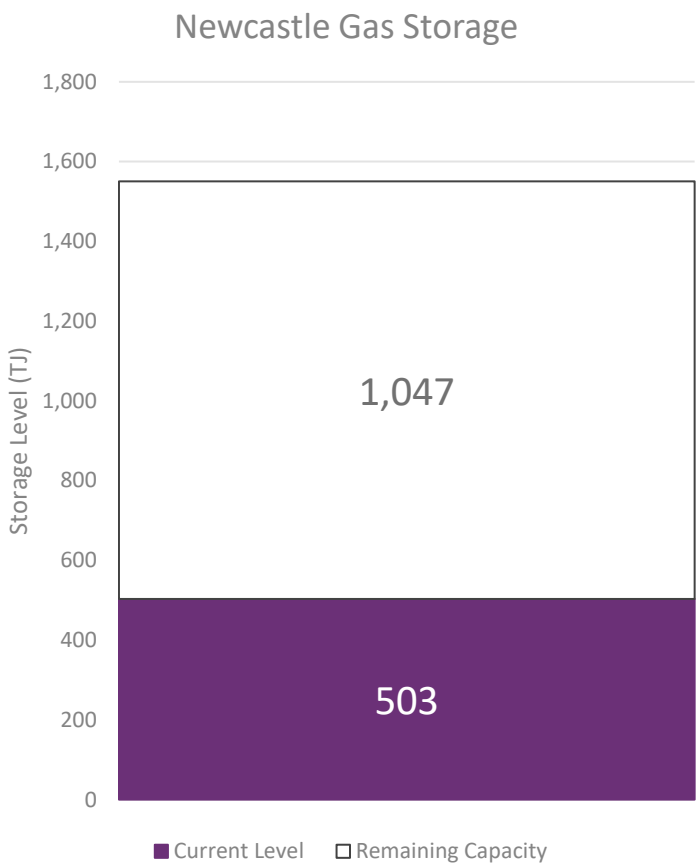
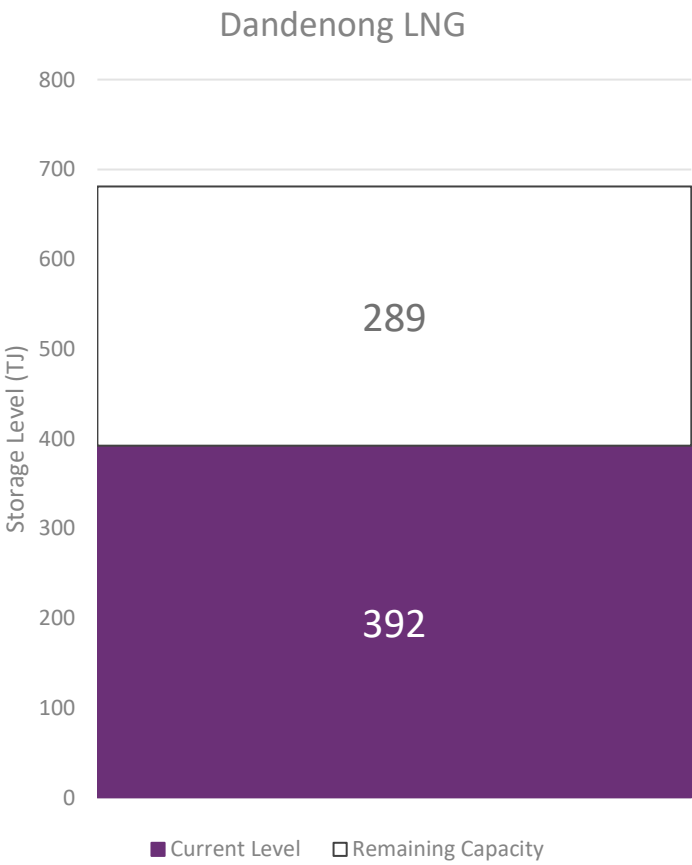
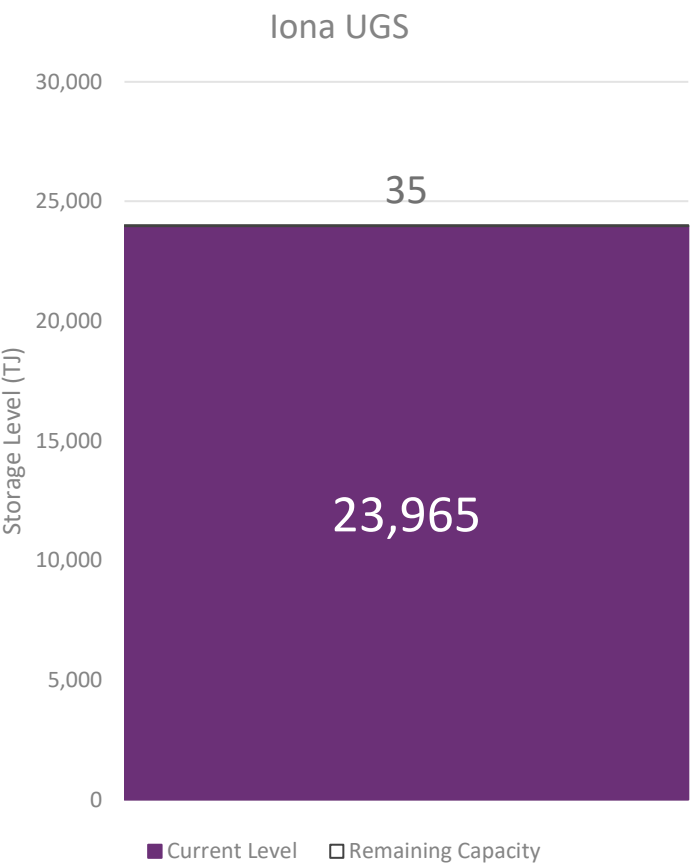
Cooper Eromanga Basin (Moomba)

- Based on Gas Bulletin Board rates and outlook, winter 2023 supply: 210-250 TJ/d.

Northern (Queensland, Northern Territory)

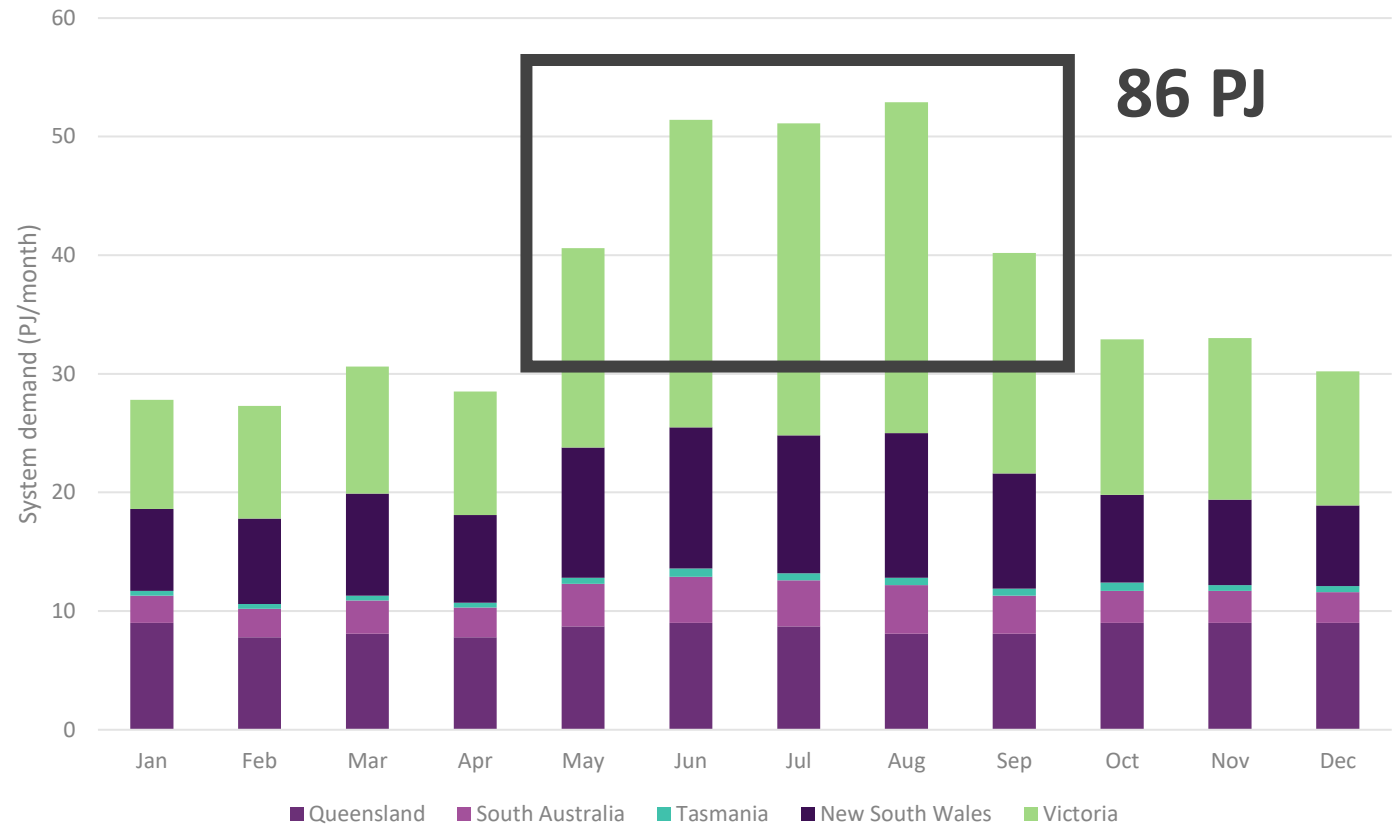
- LNG exporters forecasting, relative to contracted exports, an excess supply of around 10 PJ/month for the winter months of 2023.
- Ongoing supply issues for Blacktip. Supplying Mt Isa from Queensland impacts SWQP capacity.

Storage status



Seasonal adequacy

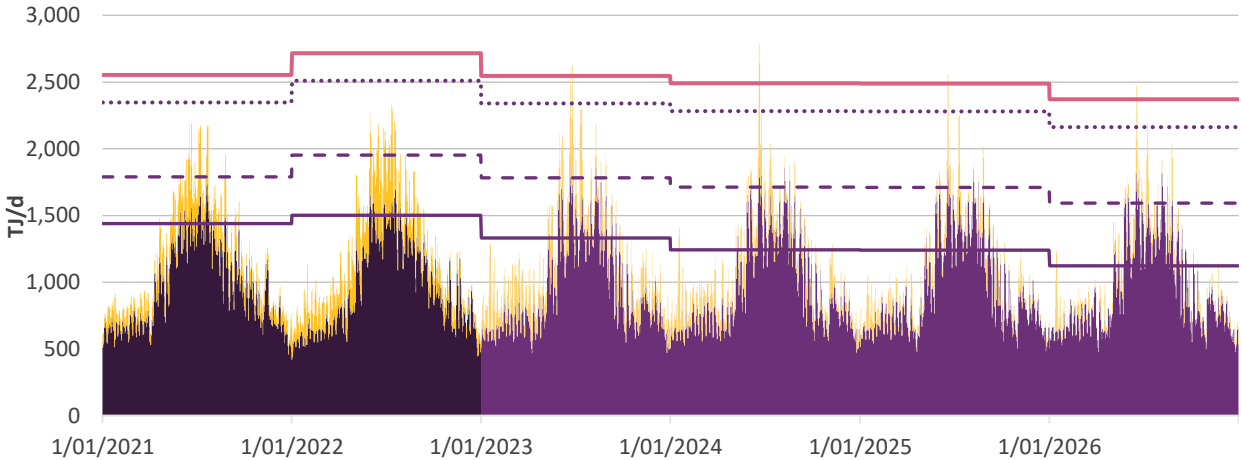
- Heating load in colder states (Victoria, New South Wales, South Australia) drive a large increase in demand during winter months, around 86 PJ of seasonal demand.
- Combined with gas generation, meeting seasonal demand in the southern states can be challenging.



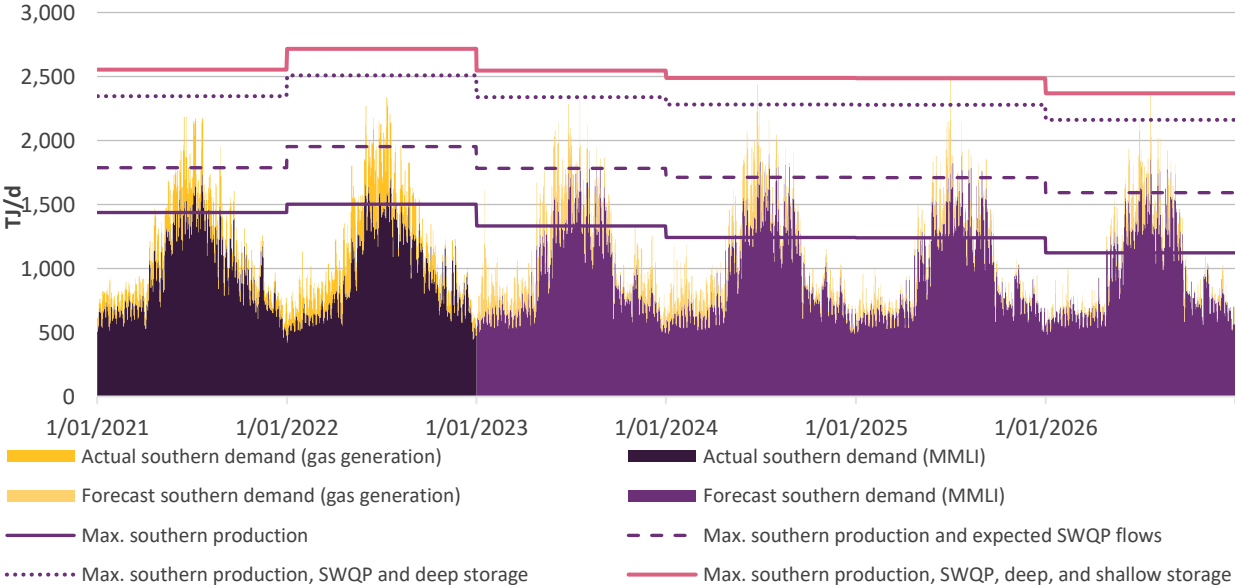
Peak day adequacy

- The 2023 GSOO forecasts peak day shortfalls in all years. These are on extreme days of high coincident demand across the southern states and high GPG.
- For a more average year, supply adequacy is very tight. On peak days only shallow storage remains as contingency.

Reference year 2019 - high coincidence of southern demand and NEM gas consumption

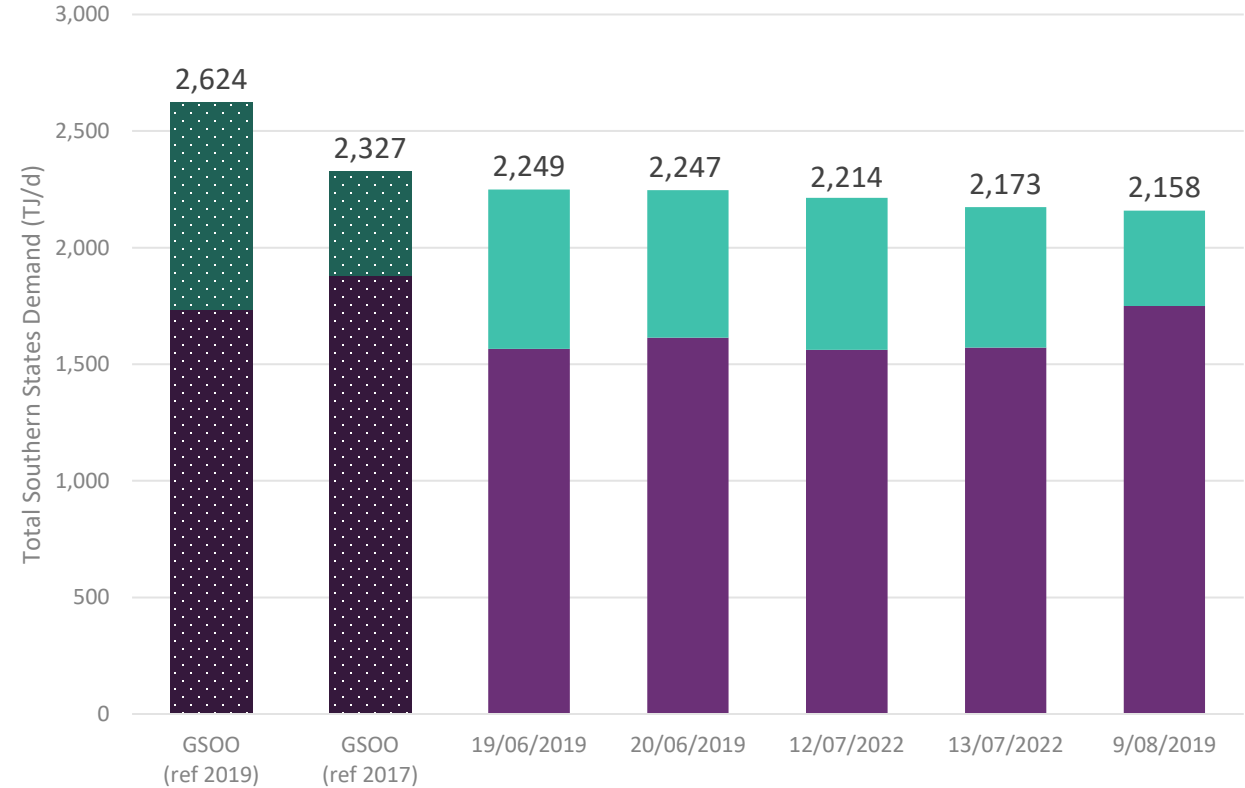


Reference year 2017 - average coincidence of southern demand and NEM gas consumption

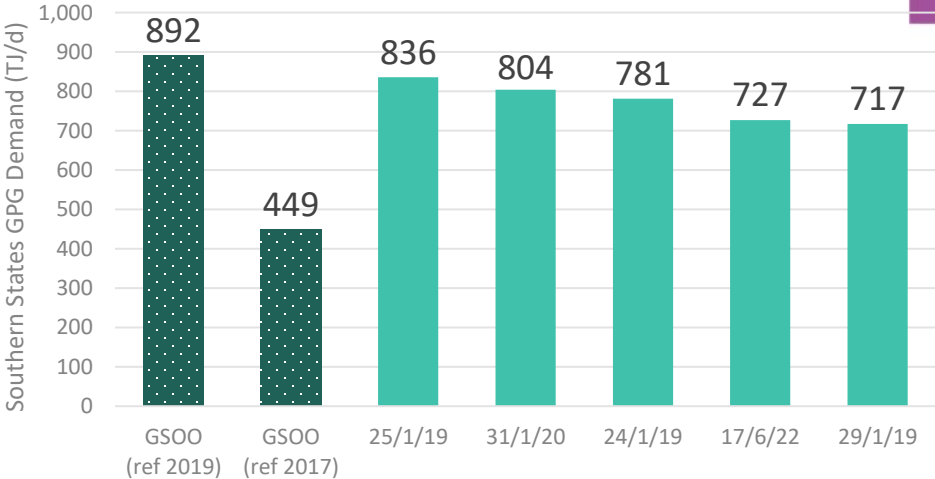


Peak day adequacy

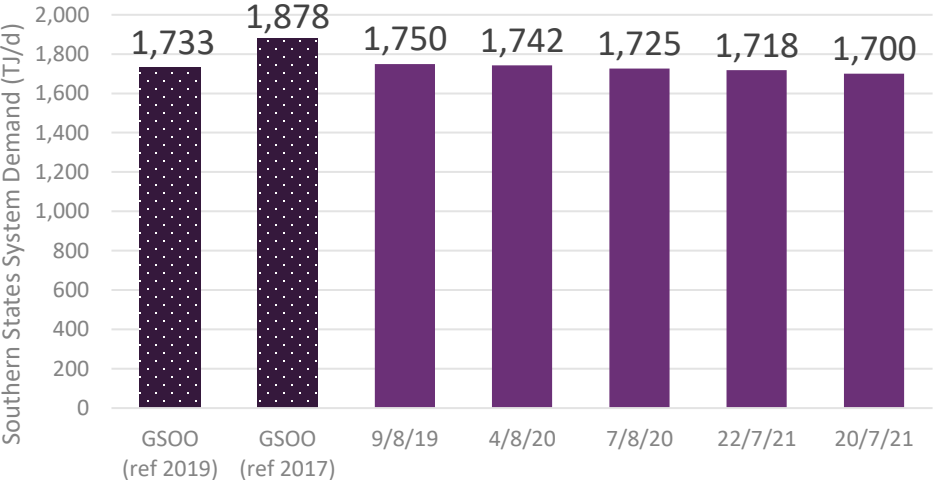
Southern states total demand



Southern states gas generation



Southern states system demand



Peak day adequacy

Delays to
projects

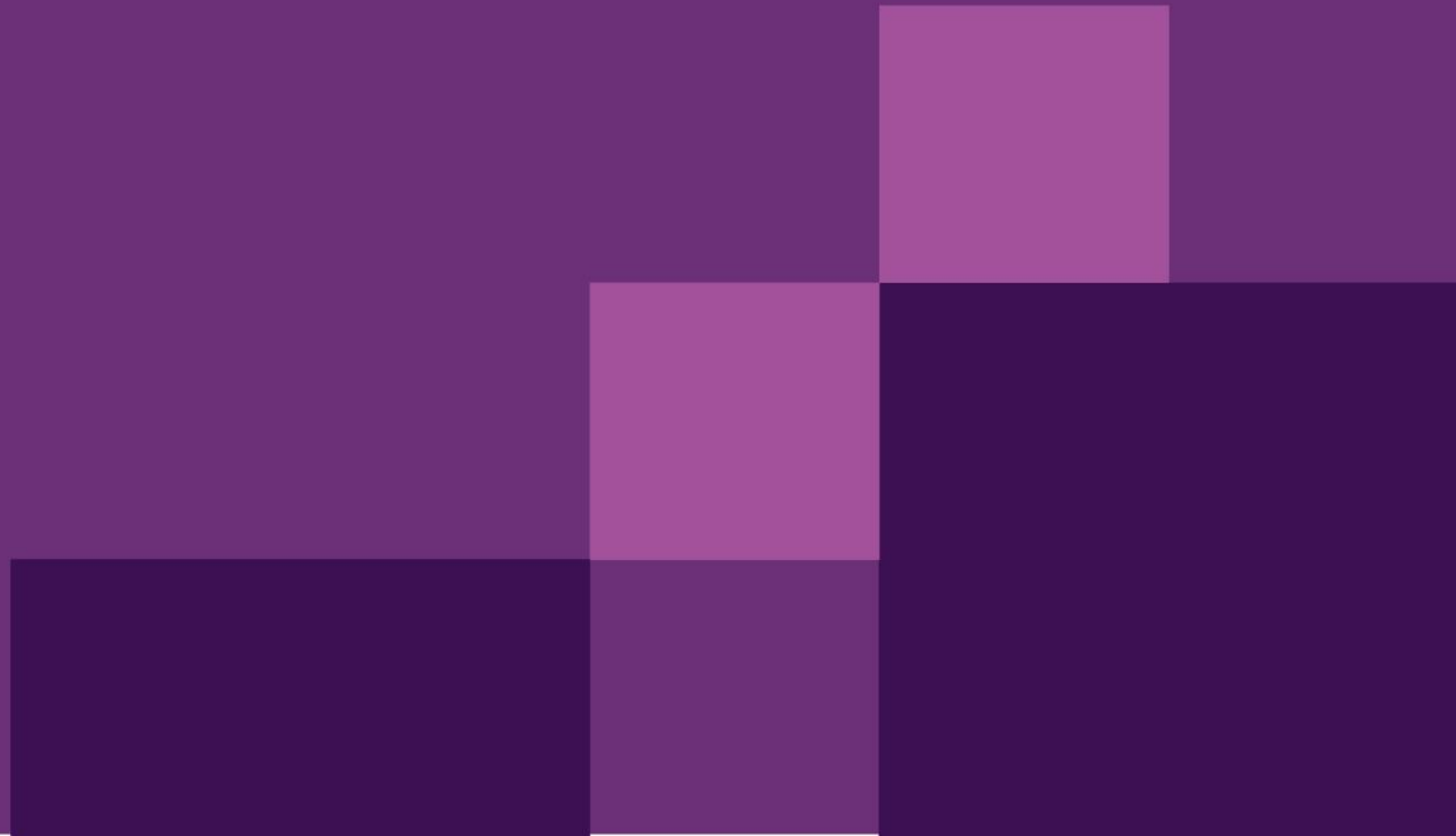
Production
facility outages

Unpredictable
decline of legacy
fields

Depletion of
storage inventory

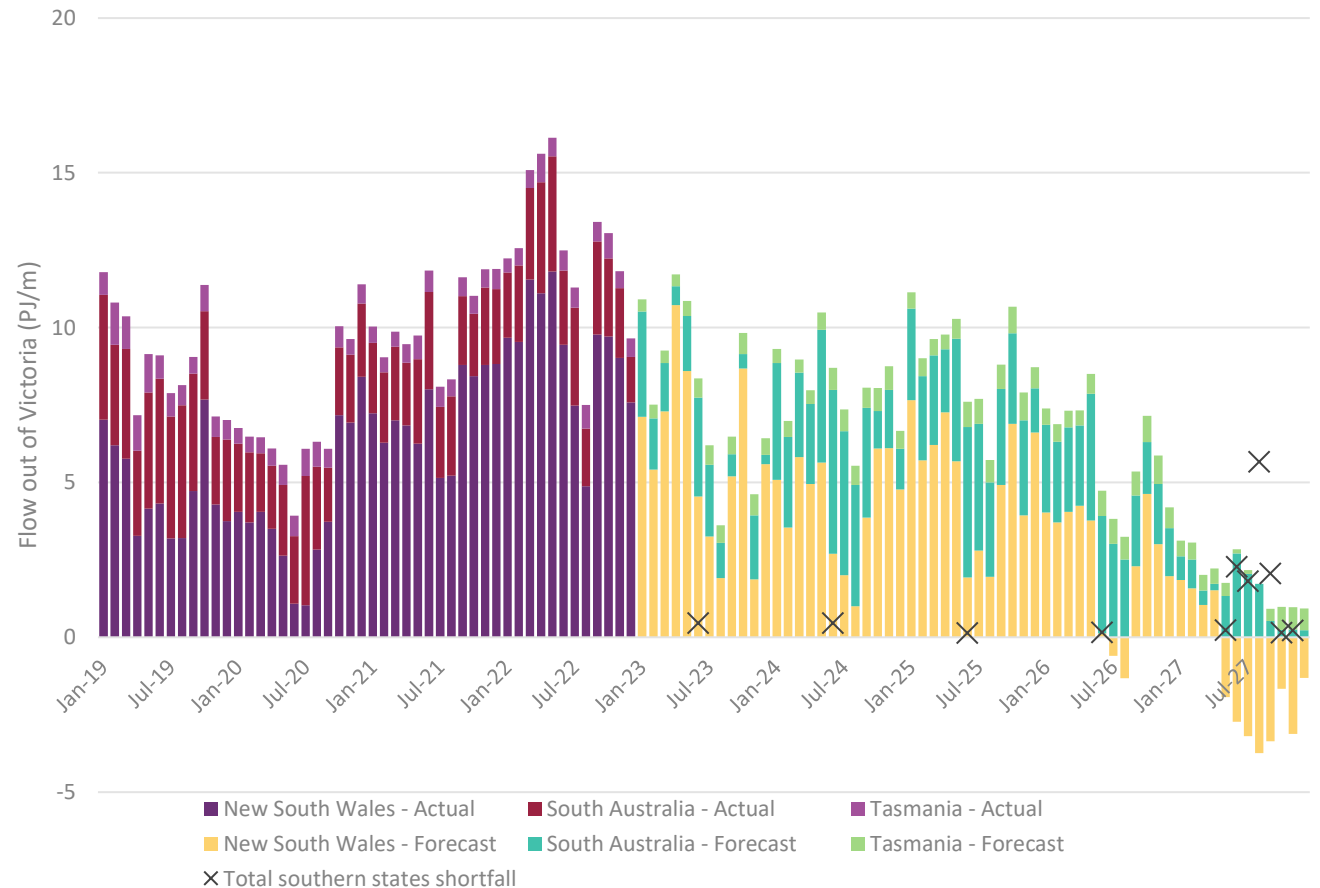
Reduction in gas
made available
from Queensland

Longer term adequacy

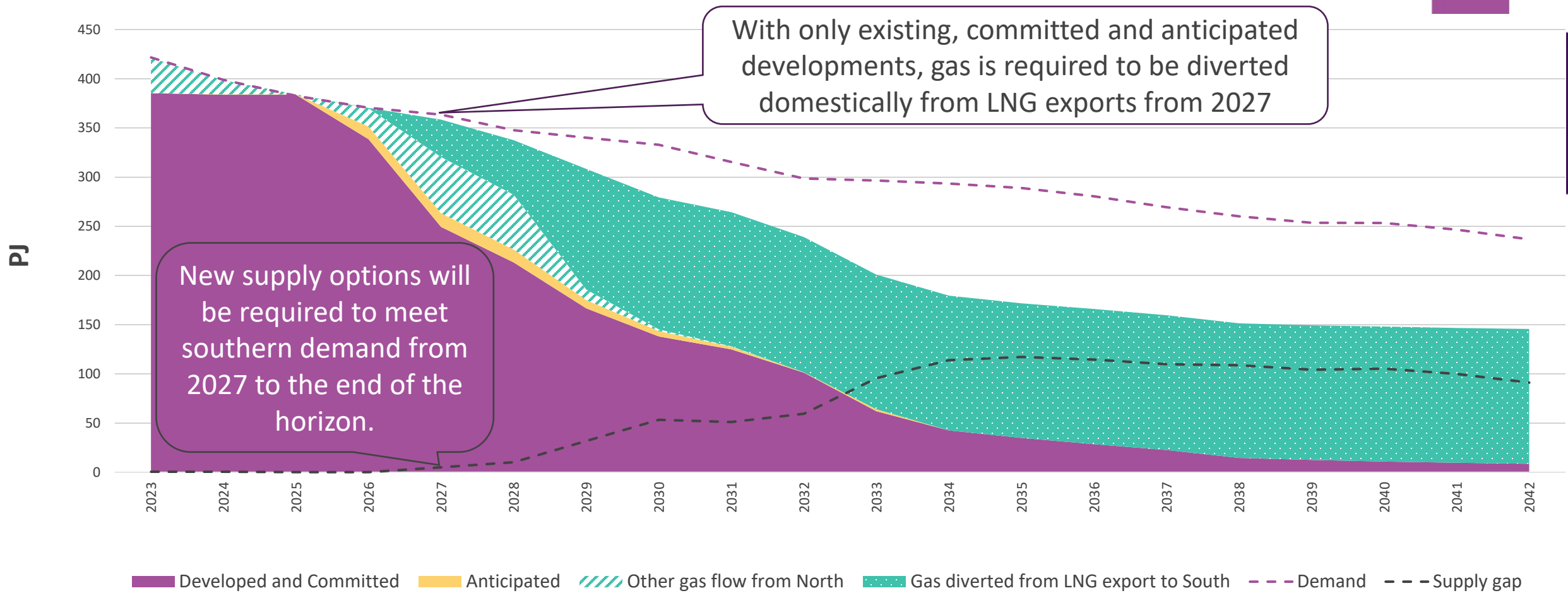


Longer term adequacy

- Victoria to become a net importer from winter 2027.
- Victorian annual shortfall cannot be supplied by other states because there are shortfalls across the east coast.
- Iona UGS and Dandenong LNG are heavily relied upon in all years.

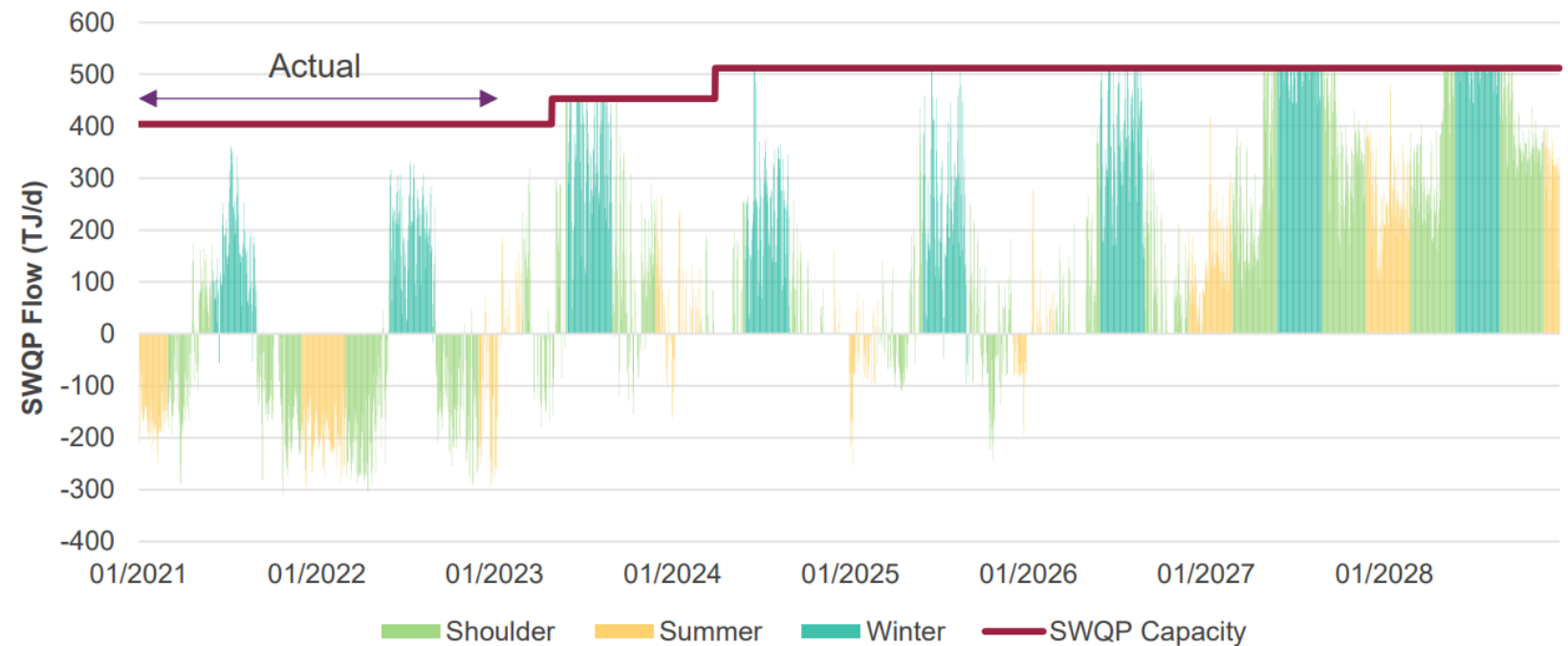


Longer term adequacy



SWQP adequacy

- Excess LNG export quantities are assumed to be sold to the domestic market.
- Modelling indicates that the SWQP will hit capacity more frequently.
- Additional Queensland flow will not resolve shortfalls if SWQP is already flowing at capacity.
- Summer flow is also abnormally high.



Summary

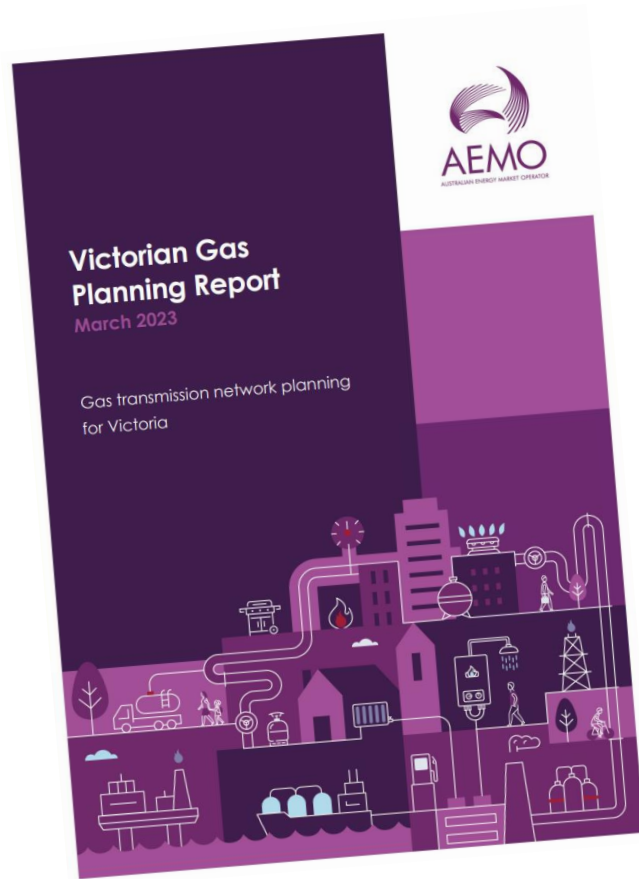
Key risks for winter 2023

High
coincident
demand

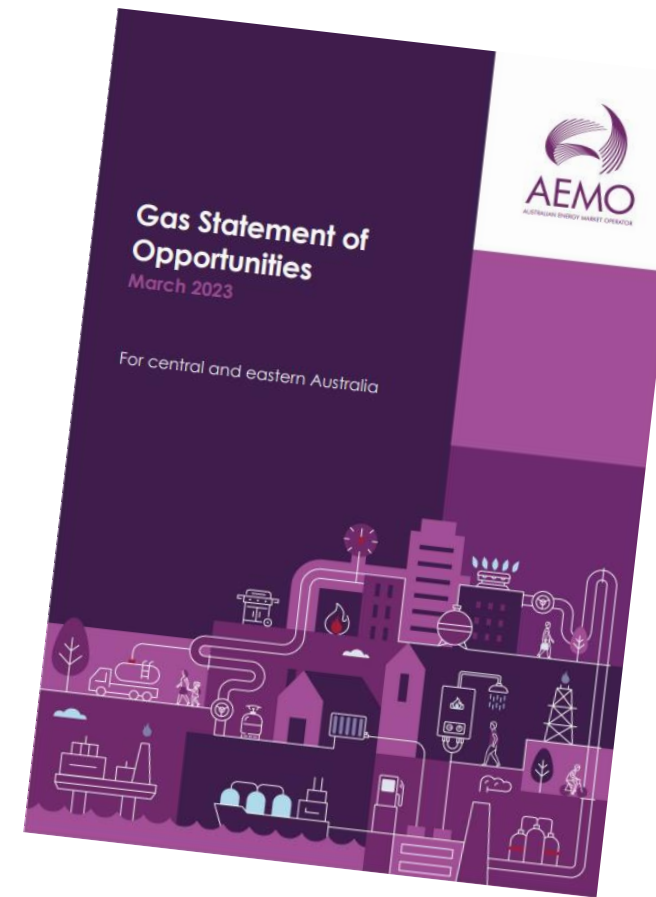
Asset
availability

Project
completion

Storage
depletion



Read the 2023 VGPR at: <https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/victorian-gas-planning-report>



Read the 2023 GSOO at: <https://aemo.com.au/en/energy-systems/gas/gas-forecasting-and-planning/gas-statement-of-opportunities-gsoo>

View the GSOO webinar at: <https://www.youtube.com/watch?v=KV8-8VAt078>

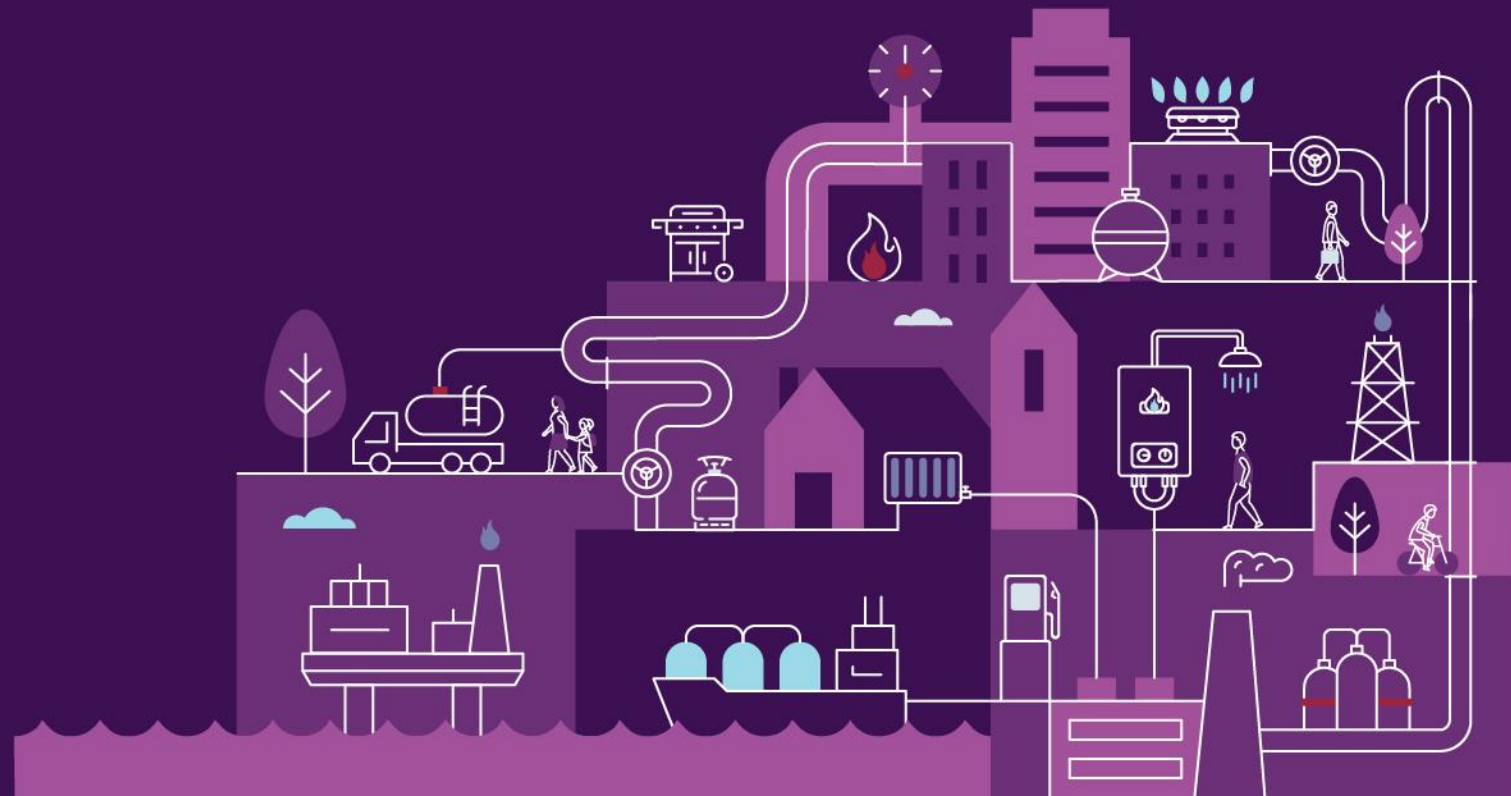
Questions? Contact GasPlanning@aemo.com.au



For more information visit

aemo.com.au

East Coast Gas System Adequacy Functions



East Coast Gas System Adequacy Functions

1. Background
2. Data collection and Assessment
3. Signaling
4. Directions & Trading
5. Reporting

Background

- Challenges were experienced across east coast gas markets in 2022.
- The east coast gas supply-demand balance has been tightening over recent years due to the gradual fall in southern gas reserves and increasing reliance on winter gas supply from Queensland.
- The supply-demand balance is expected to deteriorate further with forecasts of potential supply shortfalls emerging from 2023.
- On 12 August 2022, the Energy Ministers decided that a series of gas reforms should be implemented. These reforms would provide AEMO a range of powers and tools to identify and respond to supply-demand imbalances in the east coast gas market.

Background – Key Dates

- Energy Ministers approved amendments to NGL - October 2022
- Laws (NGL) publication – 27 April 2023
- Rules (NGR) gazetted – 4 May 2023
- AEMO Procedures publication – 11 May 2023
- AEMO Procedures effective date – 1 June 2023
- AEMO Pre-Production Systems for testing – ~1 June 2023
- AEMO Guidelines publication – 13 June 2023
- AEMO Production Systems Go-Live – ~22 June 2023
- Rules (NGR) effective date – 4 July 2023

Data Collection & Assessment

- Relevant entities & Part 27 register
- Data collection
- Identification of threats

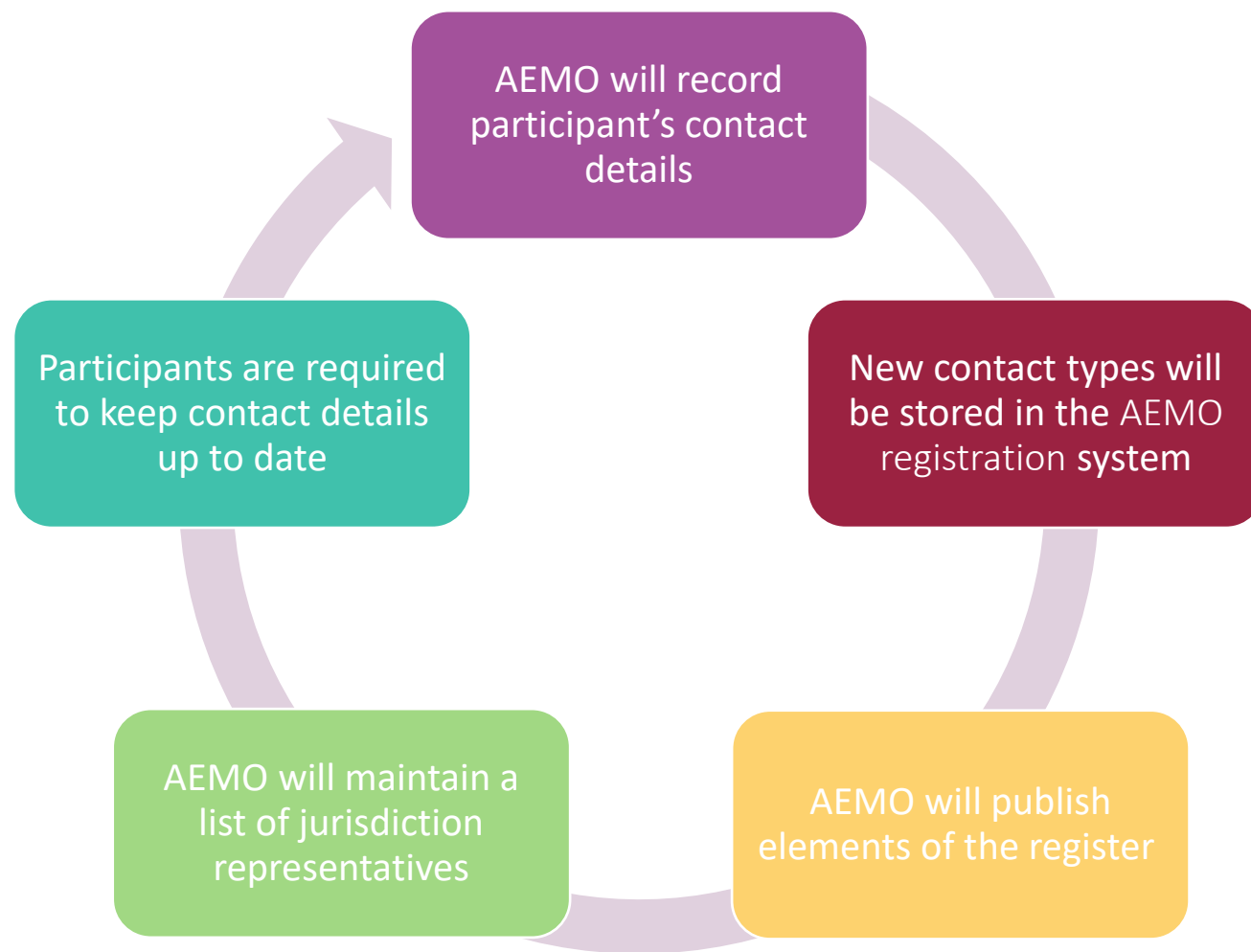
Data Collection Introduction

- Part 27 of the rules requires relevant entities to provide additional data to AEMO to be used for supply adequacy and reliability assessments.
- AEMO will conduct short term (7-day) and medium term (6-month) supply assessments utilising existing GBB data and the new data submissions.

Part 27 register of relevant entities

- Used for contacting relevant entities, and identifying system access
- AEMO has contacted participants to advise them they are in the register
- Part 27 contact details to be stored against existing participant registrations
- There is no Part 27 registration category (process is automatic)
- AEMO is required under Part 27 of the NGR to keep and maintain a register of relevant entities. However, AEMO may give a direction to a relevant entity whether or not it has been included on the Part 27 register.
- The register is used internally to send out automated notifications and to have up to date contact details

Part 27 implementation



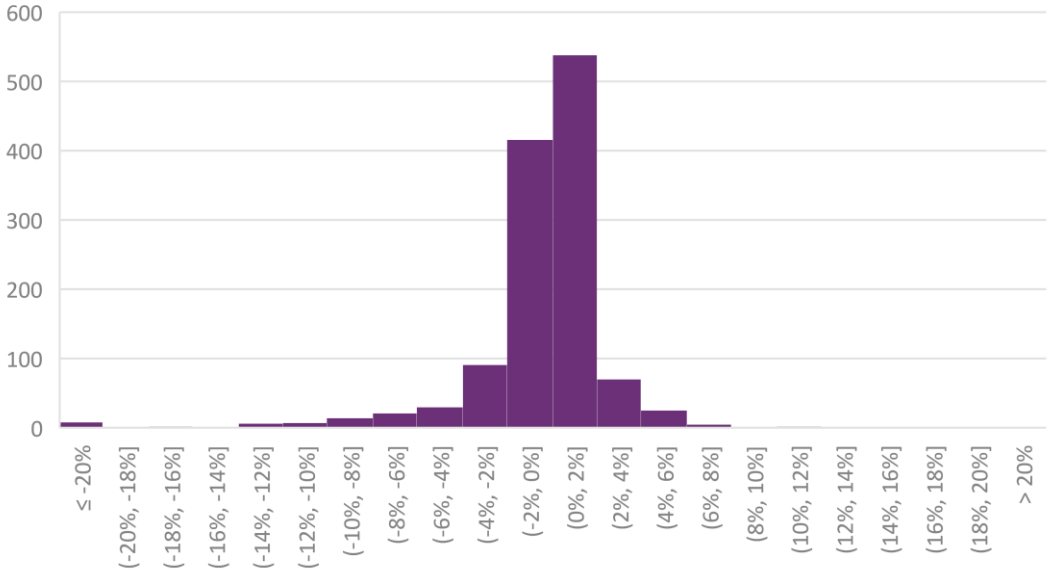
Data collection

- AEMO must have sufficient visibility and transparency of:
 - system demand,
 - projected supply,
 - storage levels,
 - gas flows
 - and other information required to understand and forecast supply and demand balance.
- Collection of additional data from part 27 participants, utilising the Gas Bulletin Board submission screens within the Market Portal
 - **Information:** Demand, projected supply, storage levels, gas flows, capacity outlooks and maintenance, linepack.
 - **Time horizon and granularity:** Daily over next seven days, and monthly over next 24 months. Maintenance information over two-year horizon.

Information that is collected solely for the purposes of Part 27 is confidential information

AEMO assessed existing nom data

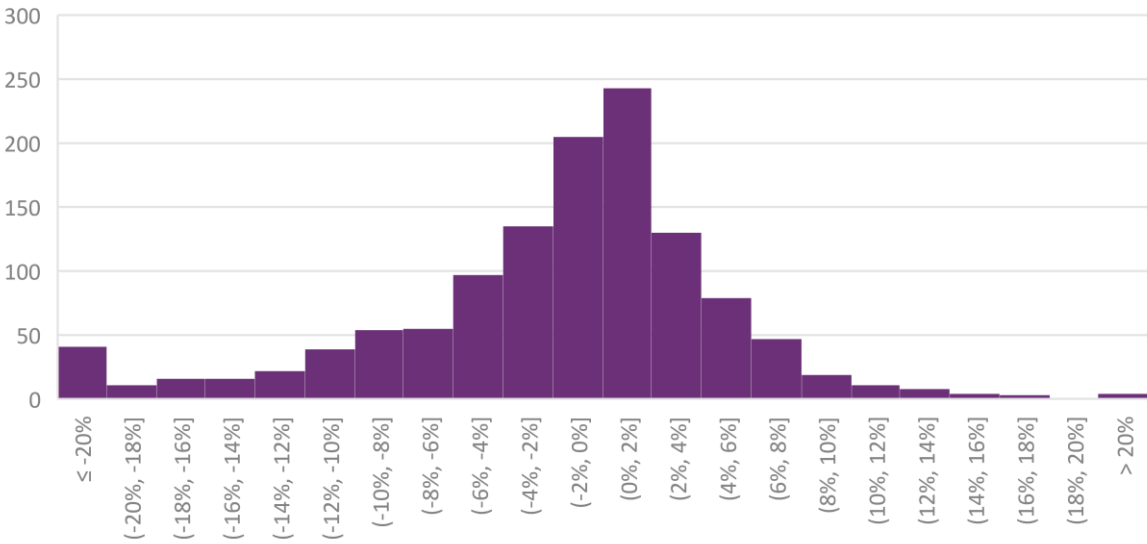
Data variance for D-1 vs actuals in 2022



	D-3	D-1
mean	-2.3%	-0.6%
std dev	9.9%	5.5%

- On any given day, for 1 day ahead, expect an under-forecast of ~13 TJ with a std dev of 116 TJ
- On any given day, for 3 day ahead, expect an under-forecast of ~49 TJ with a std dev of 210 TJ
- For 3 day ahead, there is a 5% likelihood of an under-forecast of >420 TJ

Data variance for D-3 vs actuals in 2022



Data submitters

- Gas Bulletin Board (BB) reporting entities for the following facilities (threshold 10 TJ/day):
 - Production
 - Storage
 - Compression
 - Pipelines
 - Large user facilities
 - LNG export projects
- Part 27 retailers
 - Gas retailers
 - Large users

AEMO's collection of data

Short term
up to 1 week ahead

Existing data

- Short term capacity outlooks
- Facility nominations and forecasts
 - pipeline and facility nominations by connection point

Additional data

- Demand forecasts for retailers/users
- Linepack quantities for pipelines

Medium term
from 7 days to 2 years

Existing data

- Medium term capacity outlook
- Uncontracted capacity outlook

Additional data

- QLD LNG projects forecast (domestic/export supply) out to 6 months ahead
- Medium term capacity outlook enhancements
 - Outlook period extended out to 2 years
 - Recall times
 - Daily granularity out to 6 months ahead
 - Large user facilities

What is a risk or threat?

- A **Threat** is defined as:
 - The supply of gas in all or part of the east coast gas system is inadequate to meet demand;
- A **Risk** to reliability as:
 - The supply of gas in all or part of the east coast gas system cannot be relied upon to meet demand, including in circumstances where:
 - gas supply, including gas storage, may be insufficient to satisfy seasonal demand requirements; or
 - supply capacity is insufficient to respond to an unplanned event

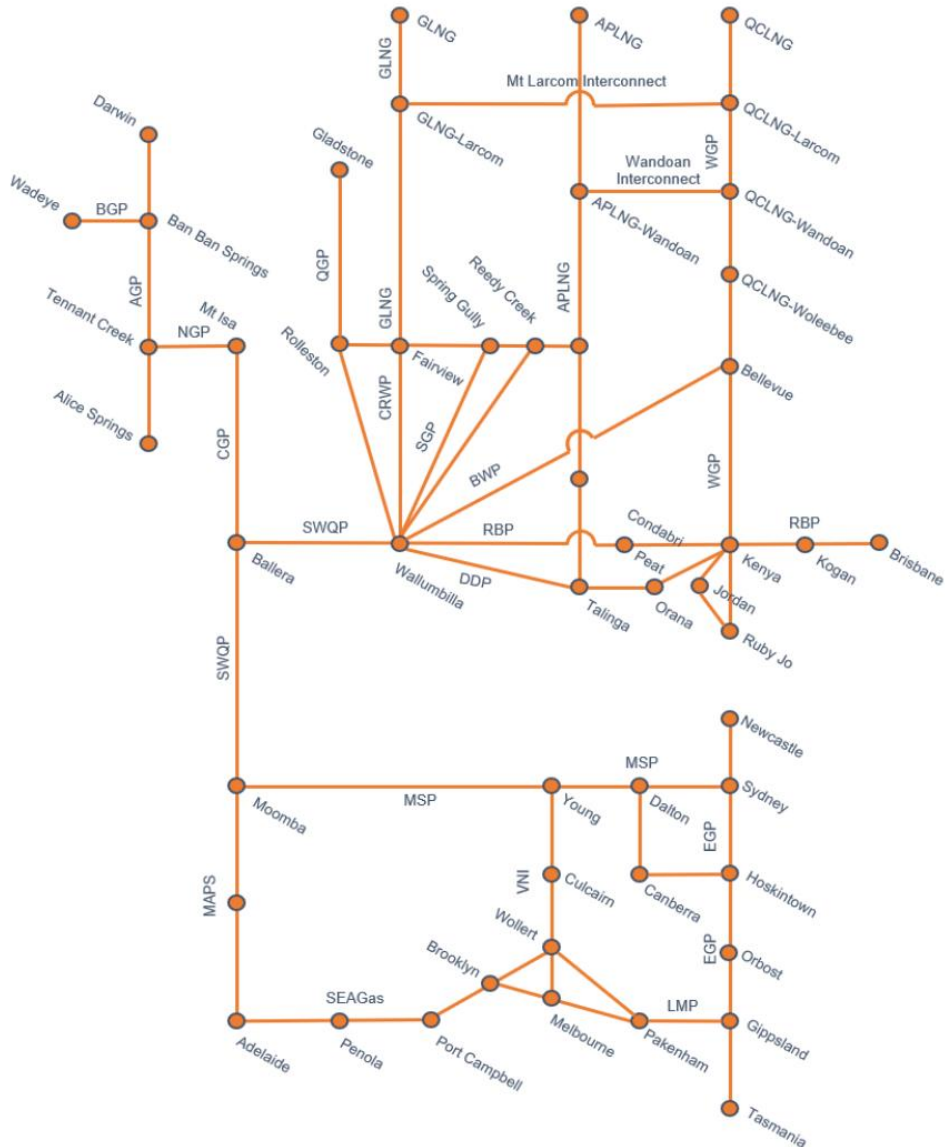
Supply Adequacy & Reliability

- **Supply adequacy:** where supply is equal to or greater than demand.
- **Supply reliability:** where supply can be relied upon to meet demand. Reliable supply may occur when supply is sufficient to satisfy demand during an unplanned outage, or unexpected supply or demand event.
- Examples of unplanned or unexpected events may include:
 - Uncharacteristic gas use;
 - Inaccurate weather resulting in significant change in demand forecasts;
 - Facility problems leading to supply or transportation constraints.

Assessments

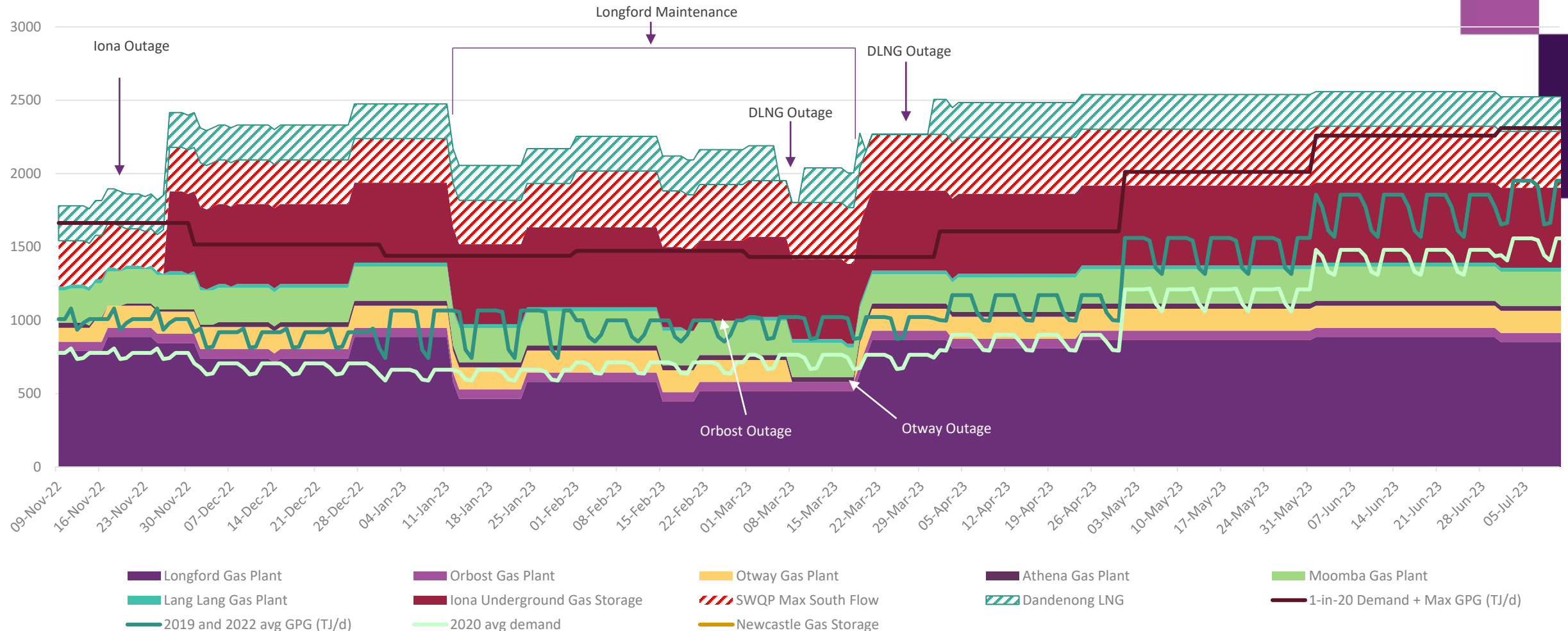
- AEMO's monitoring and assessments of the east coast gas system will assess the likelihood of a threat to the adequacy or reliability of gas supply.
- A relevant entity must also provide AEMO notice of a threat with respect to their asset when identified.
- Data queries to be developed for short-term and medium-term monitoring of:
 - Trends of supply and demand; and
 - Factors that may affect supply adequacy and reliability
- Medium-term monitoring to utilise AEMO monthly demand forecasts and adequacy modelling

Adequacy modelling



- Demand
 - Forecast by zone per retailer/user including GPG
 - Potential linepack depletion
- Supply
 - Pipeline nominations by connection point
 - Capacity available to meet demand including storage availability
 - Potential linepack available to supply demand or replenishment of linepack

Adequacy modelling



Note: Information presented after 31 March 2023 is publicly available on the GBB.

Signalling

- Notices to industry
- Conferences

Signalling Introduction

- Where a risk or threat has been identified AEMO will issue a risk or threat notice.
- Reasonable time will be allowed for industry to respond, during which AEMO may also hold a gas supply adequacy and reliability conference.

The intent of signalling is to provide industry information to be able to respond

Risk or threat notices

- AEMO will communicate notices to industry by SMS and email to relevant entities recorded in the Part 27 register
- AEMO will publish risk or threat notices on AEMO's website
- A notice of a risk or threat must contain:
 - the identified risk or threat;
 - the nature and magnitude of the identified risk or threat;
 - the likely duration of the identified risk or threat;
 - the location of the identified risk or threat;
 - the required industry response to prevent or mitigate the identified risk or threat.

Conference notices

- AEMO will communicate conferences by SMS, email and publishing on AEMO's website
- A conference notice will include:
 - Details of the conference (date, time, method for joining)
 - Details of the purpose of the conference
 - Relevant entities that are required to attend the conference
 - Relevant entities that may attend the conference

Purpose of Conferences

- AEMO may hold conferences for the exchange of information about matters impacting on gas supply and demand conditions as it relates to an identified risk or threat, including AEMO's assessment of
 - the likely duration and location of the risk or threat; and
 - the necessary response from industry to prevent or mitigate the risk or threat
- AEMO may host a conference
 - **Assessment conference:** assess whether there is or is not a potential threat and identify options that may mitigate or resolve a threat.
 - **Industry conference:** inform industry of an identified threat and the options available to mitigate or resolve that threat.
- AEMO will schedule, facilitate and chair.

Directions and Trading

- Directions process
- Directions Compensation
- Trading process
- Trading Compensation
- Trading fund

Directions and Trading Introduction

- If there is no material change in a risk or threat from an industry response, or if an emergency event occurs where there is insufficient time for industry to respond, then AEMO may need to use its direction or trading powers.
- AEMO may decide to give a direction if AEMO assesses that the existing market functions are unsuitable to resolve the issue
- Before issuing a direction notice, AEMO will consult with facility operators and shippers
- Compensation claims may be made by the relevant entities impacted by a direction made by AEMO.

Directions/trading are last resort options available to AEMO

Existing Processes – AEMO's markets

- AEMO has other processes in place that, if relevant, will be utilised prior to the east coast gas system intervention powers to address a potential risk or threat
 - STTM contingency gas - allows AEMO to publish an intraday schedule in response to a supply event that may develop into an identified risk or threat
 - DWGM threat to system security process - allows AEMO to undertake a variety of actions in response to a threat in the DWGM.
- The new processes effectively replace the Gas Supply Guarantee as the guidelines expired on 31 March 2023

Directions

- Directing gas industry participants to resolve a potential or actual risk or threat
- AEMO may only give a direction if AEMO is of the opinion that the giving of the direction is necessary to prevent, reduce or mitigate an actual or potential threat identified by AEMO.
- AEMO can issue directions to any relevant entity, not just those on the Part 27 register
- Directions can relate to:
 - the operation, maintenance or use of equipment;
 - the control of the flow of natural gas;
 - any other matter that may affect the reliability or adequacy of the supply of natural gas within the east coast gas system.
- Relevant entities are required to comply with a direction and must notify AEMO immediately where they are unable to comply.
 - AER required to investigate directions which cannot be complied with
- AEMO cannot direct gas away from long term LNG export contracts

AEMO's response to a threat

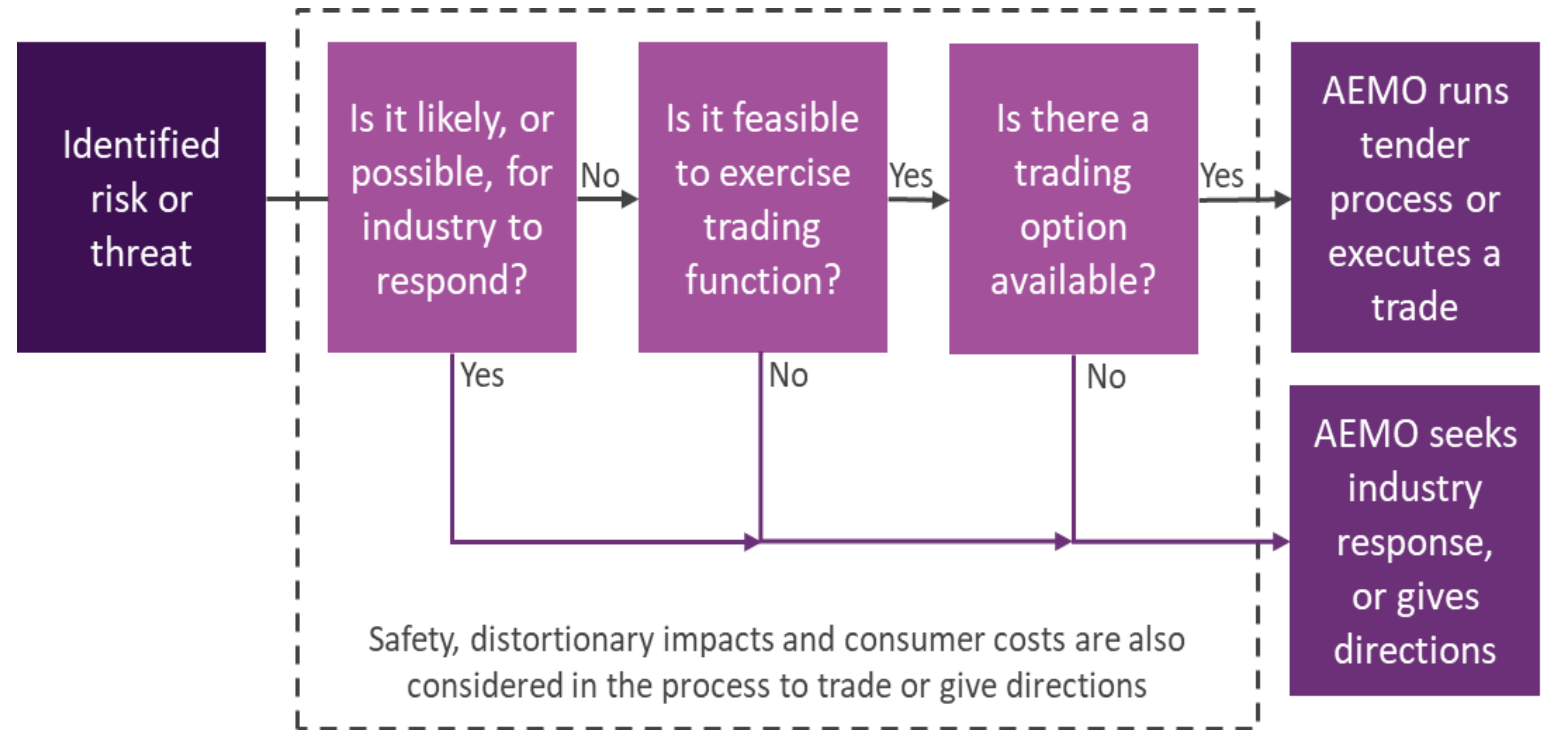
- If AEMO responds to an identified risk or threat, AEMO must:
 - allow industry a reasonable period of time to take action to mitigate the identified risk or threat;
 - engage affected jurisdictions in a timely manner;
 - minimise distortionary impacts on the east coast gas system and industry and consumer costs on which AEMO has available information; and
 - must not compromise safety.

Compensation framework

- Relevant entities may make a claim for direct costs associated with the supply of a natural gas service.
- There is a compensation claim threshold of \$5,000.
- Claims to be made within 20 business days of the last day on which the claimant suffers detriment.
- A dispute resolution panel will work with AEMO and the affected participant to determine the compensation amount
 - Similar to DWGM process

Trading Process

- If AEMO determines that the most effective method to resolve a risk or threat is to trade in natural gas, AEMO will run a tender process.
- AEMO will conduct trades in a transparent manner.
- AEMO will seek to minimise distortionary impacts of a trade.



Directions/trading are last resort options available to AEMO

Trading

- AEMO will have the ability to trade in natural gas to the extent AEMO considers necessary to maintain and improve the reliability or adequacy of the supply of gas in the east coast gas system.
- The approach that AEMO will take when deciding to trade will include:
 - Always seeking an industry response;
 - Trading is to be considered a last resort option where the industry is unable to respond;
 - There must be sufficient time to enter into a trade. Where there is insufficient time, and AEMO is required to intervene, the preference will be to issue directions;
 - AEMO will have a preference for contracting a service, i.e., AEMO will not be actively “trading” in the markets;
 - Where AEMO is seeking to trade, this will be conducted in a transparent manner using AEMO procurement processes.

Trading fund

- To support the trading function the Rules require AEMO to establish a trading fund of \$35 million adjusted annually with CPI (adjusted trading amount).
- This fund must be in place regardless of whether AEMO trades.
- The preferred approach for the trading fund is to have a debt facility where the ongoing costs of the facility will be included in participant fees.
- To the extent that AEMO trades and draws down on the facility, the costs of this trade will be recovered in the following financial year through the contribution rate.

The approach aims to minimise the cost impact to industry

Notices of directions and trading

- After consulting with relevant entities, a notice of direction or trading can be sent to a:
 - Single participant
 - Group of participants based on type, location, or some other factor
 - All members of the Part 27 register
- AEMO will issue a direction or trade via email and/or phone
- AEMO will publish some information of the direction or trade on AEMO's website, the specific details will be confidential
- Throughout the direction and trading process, AEMO will be issuing market notices to keep participants informed

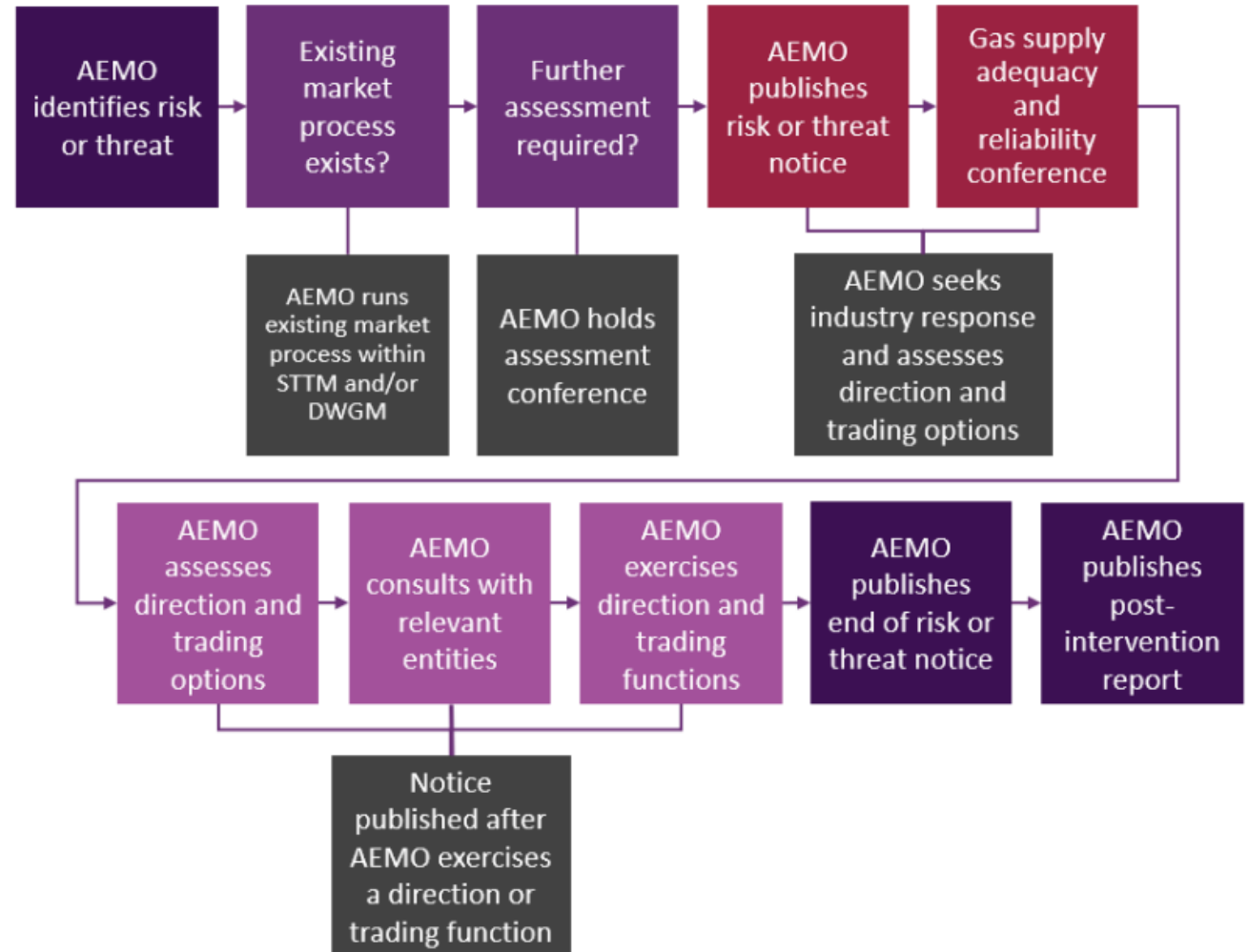
Reporting

- Post-intervention Report



Reporting

- AEMO will publish an end of risk or threat notice when it has been resolved
- AEMO must publish a post intervention report following the exercise of the direction or trade functions.
- AEMO must produce an annual report to the Ministers and an ad-hoc report, when requested.



Reporting

- AEMO will produce a post-intervention report on the exercise of direction or trading functions within 4 months of the end of the exercise, and a preliminary report within 1 month
- The post-intervention report will include:
 - a description of the exercise of the function or functions
 - details of the events occurring before the exercise of the function or functions;
 - the reasons for the exercise of the function or functions;
 - AEMO's estimated expenditure in the exercise of the trading function or functions;
 - AEMO's assessment of the extent to which the exercise of the function or functions mitigated the identified risk or threat.
- AEMO is required to provide an ad-hoc report for the Ministerial Council on Energy (MCE) on the details of performing direction or trade functions
- AEMO must provide an annual report on the performance of functions to the MCE



For more information visit

aemo.com.au

AEMO East Coast Gas System functions

Worked example

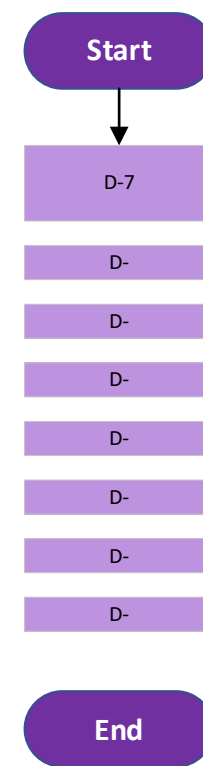


Worked Example Outline

Objective: Provide an overview of considerations and actions that AEMO may take in exercising its East Coast Gas Supply Adequacy functions.

This will include discussion of:

- how AEMO may identify and evaluate a threat or risk.
- how AEMO may Signal threats.
- how AEMO may develop and communicate Directions.
- how may the ECGS functions interface with alternate Market processes.
- how may industry interact with this process.

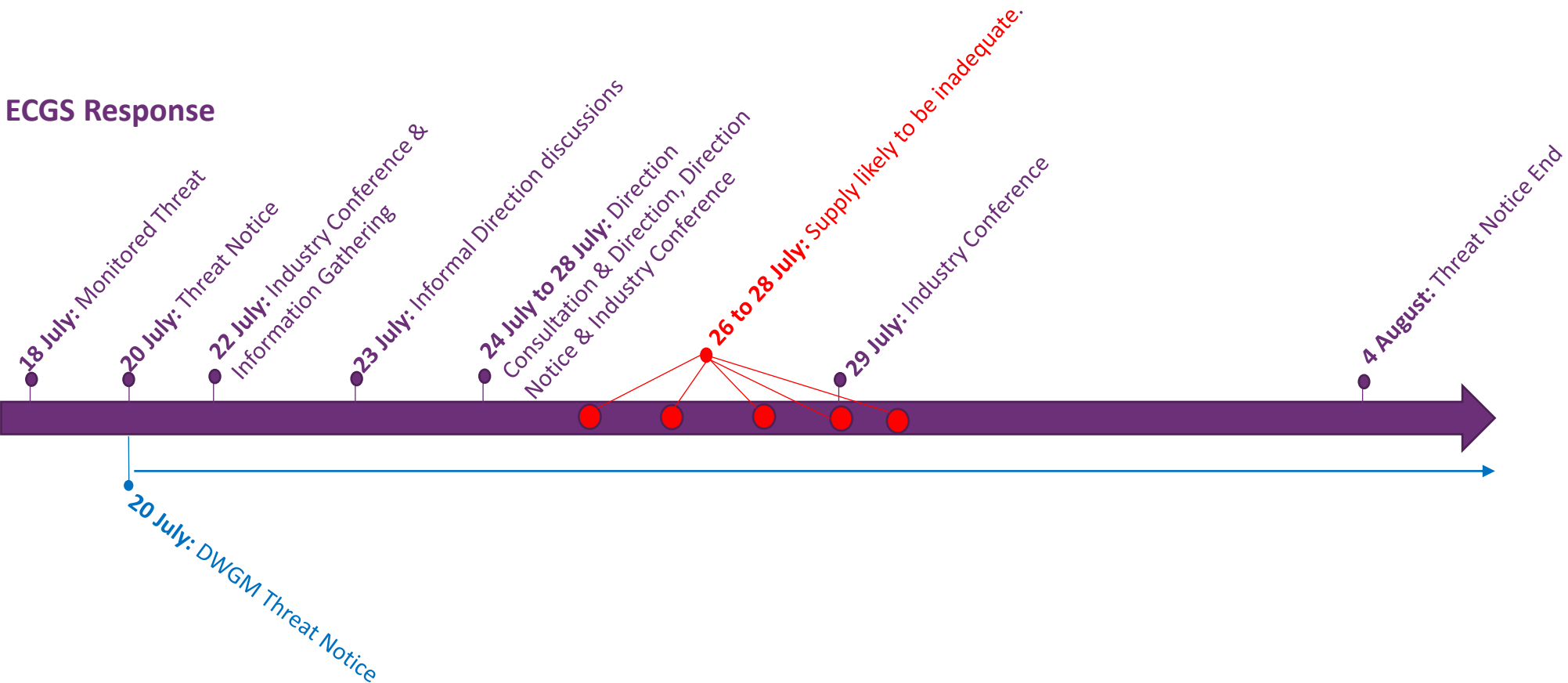


Timeline to help
us keep track

Event Overview

Overview

AEMO ECGS Response



AEMO DWGM Response

AEMO STTM Response

Adequacy Assessment Overview

18 July

Holistic review of all industry reported data to spot threats, assess risk and identify potential risk mitigating options.

1. Direct review and assessment of industry reported data (and other) primarily using PowerBI dashboards.
2. Modelled System flow assessment, identifying supply/demand solutions using PLEXOS.
3. Industry reporting of threats and risks and discussion of controls.

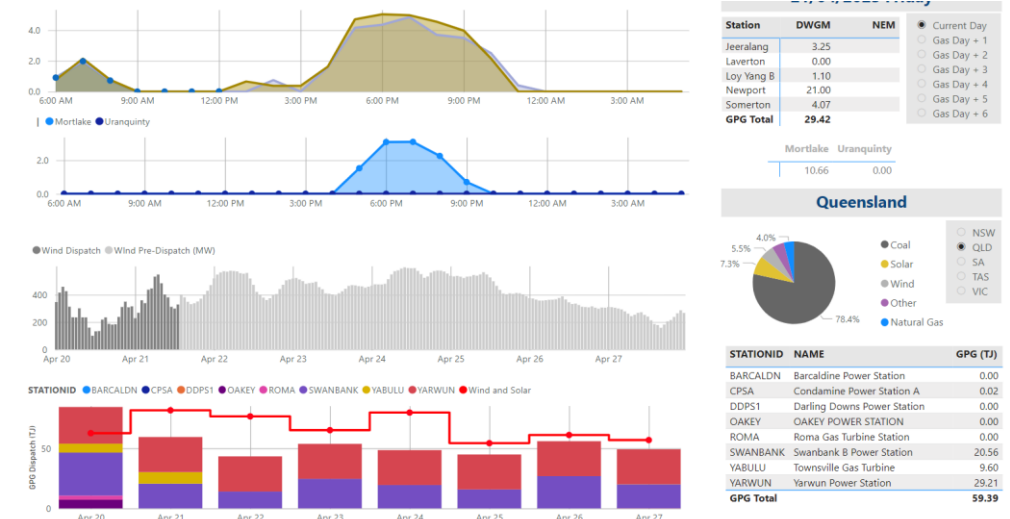
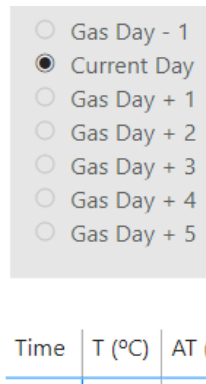
Demand Type Assessments

18 July

Include:

1. Part 27 Demand forecasts by Demand Zone.
2. Part 18 pipeline forecasts.
3. Weather forecast in major population centers (Adelaide, Melbourne, Sydney etc.).
4. NEM 7-day dispatch for GPG forecasts.
5. NEM Lack Of Reserve notifications.

Melbourne		Forecast for Gas Day -						
Gas Day		Min Temp	Max Temp	Wind Sp	Sun Hr	System	GPG	Total
	Tue	11.5	19.0	7	6	445.0	20.9	465.9
	Wed	13.5	17.5	29	4	460.1	0.0	460.1
	Thu	12.0	20.0	14	6	429.7	0.0	429.7
	Fri	12.1	23.0	11	6			
	Sat	15.3	18.4	32	0			
	Sun	12.0	15.1	25	3			
	Mon	10.0	17.4	11	4			

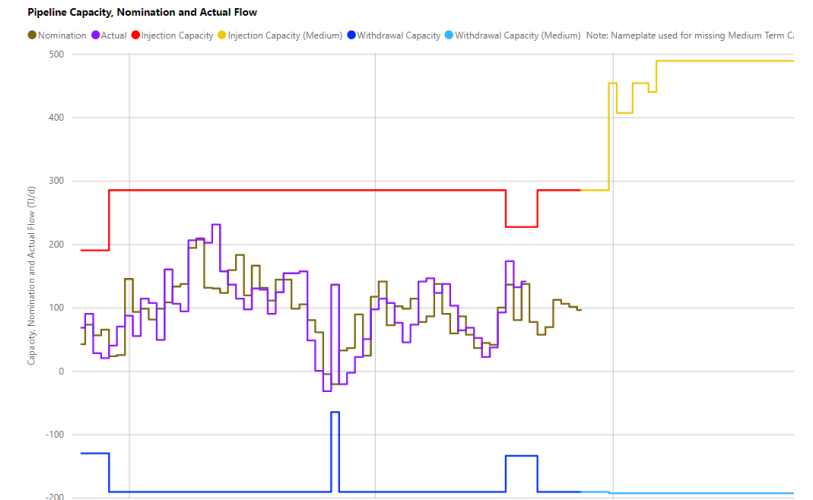


Supply Type Assessments

18 July

Include:

1. Facility Availability (Facility forecast capacity against name plate).
2. Facility Utilisation (nominations against forecast capacities).
3. Operational & contracted linepack, across pipeline zones, pipelines and demand nodes.
4. Storage inventory forecasts

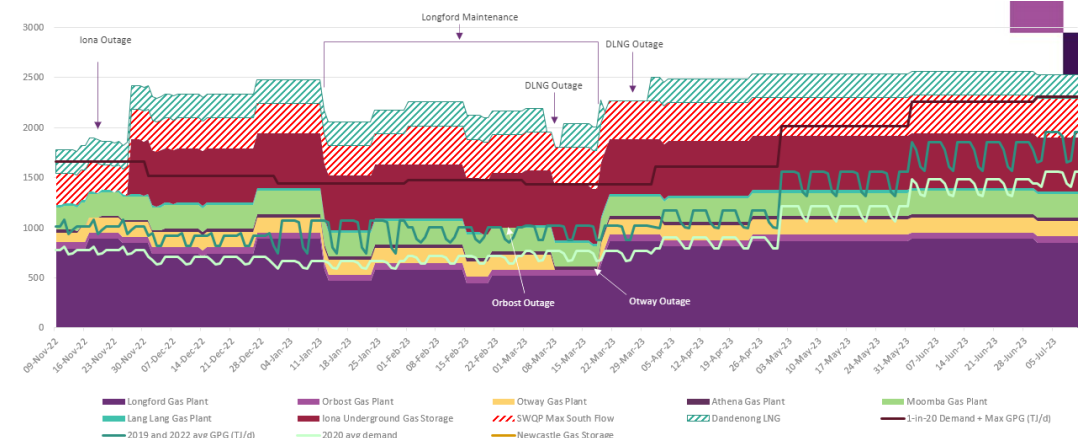


Adequacy & Reliability Assessments

18 July

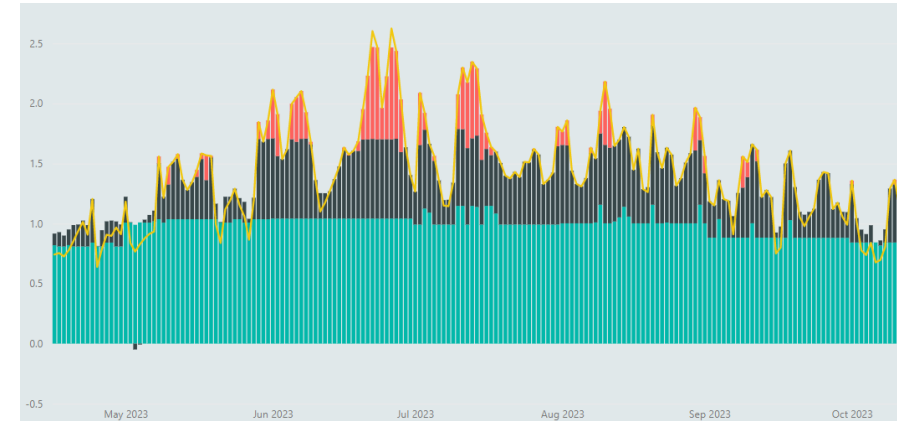
Review of Industry data:

1. Expected flow balance by zone, pipeline, jurisdiction and region.
2. Regional Capacity balance (ability of forecast supply to meet peak forecast demand).



Note: Information presented after 31 March 2023 is publicly available on the GBB.

- Initialise with industry reported data (demand, linepack, capacities etc.)
- Test system adequacy subject to changes in Supply & Demand variables.
- Used to assist identification of threats and risk mitigation options.



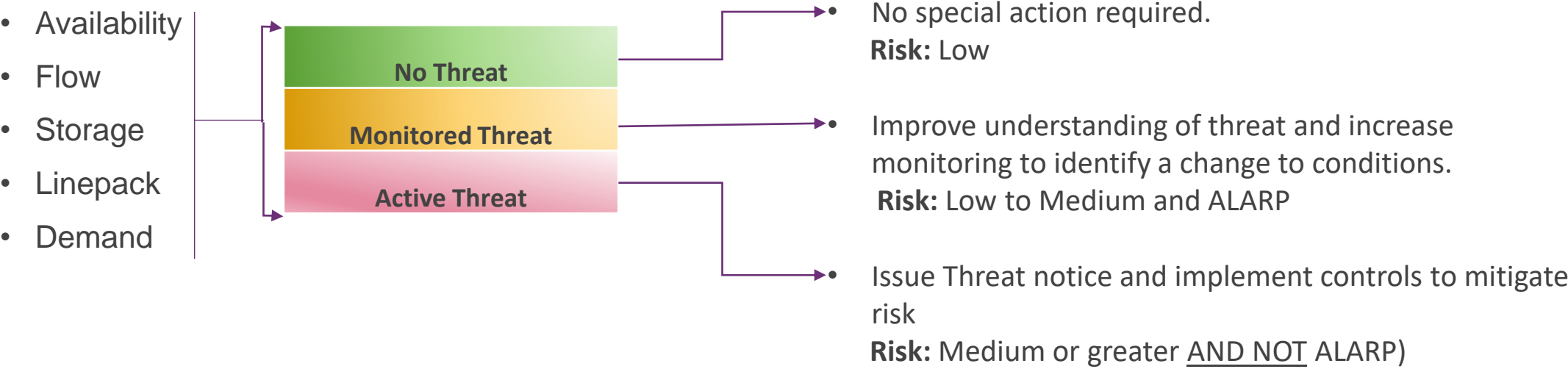
Assessment Outcome

18 July

AEMO will conduct a qualitative Risk Assessment to determine a threat’s potential to impact East Coast Gas Supply Adequacy.

Medium	Medium	High	Critical	Critical
Low	Medium	High	Critical	Critical
Low	Medium	High	High	Critical
Low	Low	Medium	Medium	High
Low	Low	Medium	Medium	High

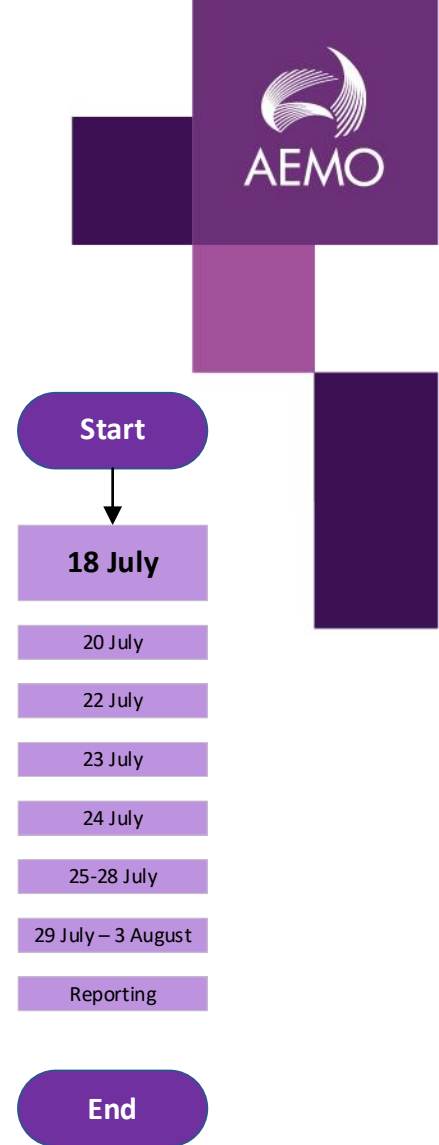
Threat Identification categories



Adequacy Assessment

18 July

- Demand:
 - high GPG related to environmental and NEM conditions
 - high residential and C&I demand. Anticipate an increase to demand from an emerging east coast wide cold front.
- Flow:
 - Demand will exceed supply into Moomba to Sydney Pipeline (MSP) and Eastern Gas Pipeline (EGP) for at least the next two days (and likely beyond).
- Storage:
 - high rate of draw down on IonaUSG. Facility inventory now at the low end of its typical range.



Assessment Outcome

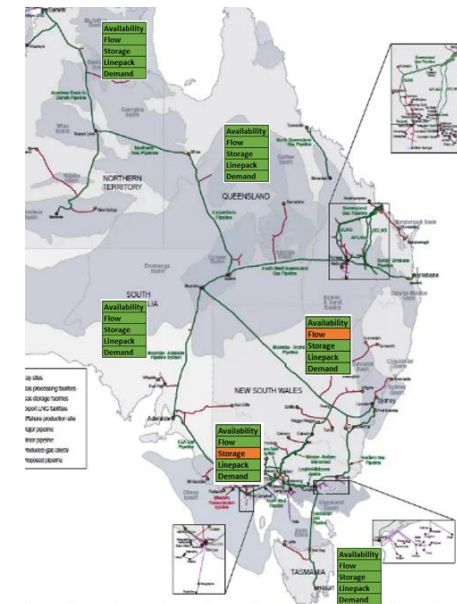
18 July

Threat Description:

1. Potential for very high demand may threaten supply adequacy on a daily basis south of Moomba.
2. Extended high demand period may deplete IonaUGS inventory, such that IonaUGS storage may not deliver at nameplate capacity later in the season.

Risk: Low

Threat status: Monitored Threat (Flow & Storage)



AEMO Response

18 July

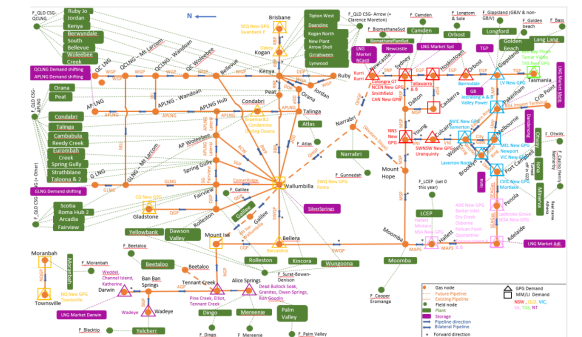
AEMO determine:

1. enhanced monitoring and improved understanding of potential threat is necessary.

Monitored Threat Response

Conduct additional Modelled System Flow runs to test system sensitivity to changes in supply and demand. Sensitivities include:

- Co-incident peak day demand (or series of near co-incident peak days) demand)
- Continued high GPG demand
- Temporary complete or partial reduction in Production/Storage/Pipeline capacity.



Adequacy Assessment

20 July

- Demand:
 - Emergence of east coast wide cold front with high heating load
 - High GPG related to continued NEM event
- Flow:
 - Supply into the MSP and EGP continue to be less than demand.
 - Shortfalls in supply is being met by consumption of linepack. MSP and EGP linepack is expected to draw down quickly.
 - Modelled System Flow (Plexos) indicate a requirement for increased supply from Qld.
 - Modelling also indicates an increased likelihood of early IonaUGS depletion (before end of winter).
- Linepack:
 - Operational & contracted quantities within pipelines south of Moomba are trending lower.
- Storage:
 - Very high demand has reduced IonaUGS inventory below the low end of its typical range.
- Bi-lateral discussions:
 - Pipeline Operator: confirm linepack status and the potential impact if trends continue.
 - Determine if GPG have (or are considering) options to run on alternate fuels.
 - Confirm critical Facility availability over the next 7-days.
 - Confirm IonaUGS inventory and concerns regarding inventory levels.



Assessment Outcome

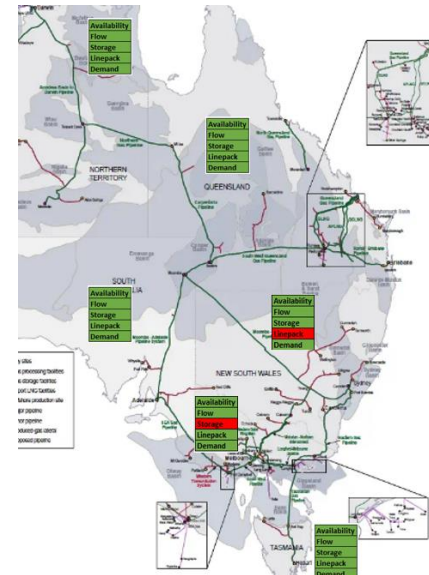
20 July

ECGS Adequacy assessment identifies a potential or actual risk or threat:

1. Linepack: Pipeline linepack in the EGP and MSP.
2. Storage: IonaUGS inventory may be drawn down to a level that impacts supply capacity.

Risk: Medium and not ALARP

Threat Status: Active Threat (Linepack & Storage)



AEMO Response

20 July

AEMO determine:

1. risk to linepack must be Signaled to Industry as a risk to ECGS supply adequacy.
2. risk to IonaUGS inventory is best addressed via the DWGM TTSS mechanism.

East Coast Gas System:

- **Issue ECGS Threat notice & request industry response.**

Declared Wholesale Gas Market (DWGM):

- **Issue a Threat to System Security for IonaUGS inventory.**

Short Term Trading Market (STTM):

- No action.

Threat Notice

20 July

AEMO will issue an ECGS Threat Notice via SMS and email to Part 27 registered entity contacts. AEMO will also publish the Notice on AEMOs website.

[Email content]

- a) the identified risk or threat event summary is:
- Supply nominations into the EGP and MSP are insufficient to meet demand.
 - Shortfalls in supply is being met by consumption of linepack. MSP and EGP linepack is expected to draw down quickly.
 - If trends continue, linepack may become insufficient to offset deviations between supply and demand.
- e) the industry response, if any, to mitigate the threat is to:
- Where possible match Participant forecast demand with nominations.
 - Increase nominations into the MSP with supply from Queensland.
 - Provide accurate and complete 7-day nominations and forecasts where possible to improve supply planning.

Adequacy Assessment

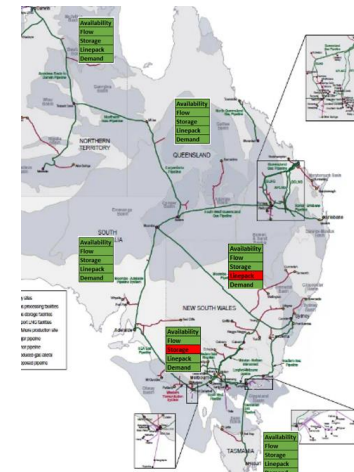
22 July

- Threat likelihood increased.
 - Very high demand.
 - No evidence of increased nominations into EGP and MSP.
 - Continued draw down on MSP and EGP linepack.
- Bi-lateral discussions:
 - Pipeline Operators: on going discussion of risk to supply adequacy from linepack depletion.

Threat Description: as per ECGS Threat Notice

Risk: Medium and not ALARP

Threat Status: Active Threat (Linepack & Storage)



Start

18 July

20 July

22 July

23 July

24 July

25-28 July

29 July – 3 August

Reporting

End

AEMO Response

22 July

AEMO determine:

1. to strengthen communication of the risk to Industry and identify the potential use of ECGS Directions.
2. a need to gather information required by AEMO to perform its ECGS functions

Easy Coast Gas System:

- Threat Notice issued (20 July)
- **Information gathering.**
- **Hold Industry Conference.**

DWGM:

- Threat to System Security (IonaUGS inventory) issued 20 July.

STTM:

- No action.

Other:

- None.

Information Gathering

22 July

AEMO gather information necessary to assess risk and identify control options. This information will be requested under NGL 91F.

- where possible AEMO will consult with a relevant entity before issuing an information request.
- requests will be made in writing and emailed to the reporting entity.

LNG Exporters:

- Provide a 14-day forecast of daily domestic supply quantities.

Self contracting users consuming $< 10\text{TJ/day}$:

- Provide a 14-day forecast of daily demand

Industry Conference

22 July

AEMO will issue an ECGS Industry Conference Notice via SMS and email to registered entity contacts.

[SMS] AEMO will be hosting an East Coast Gas System adequacy and reliability industry conference at 13:00 AEST Saturday 22/07/23. See email for details.

ECGS Industry Conference agenda:

- Overview of the event as outline in the Threat Notice.
- Discussion of the required industry response including observations that it has not been achieved.
- Outline alternative risk control options if the industry response does not resolve risk which may include AEMOs use of Directions under the ECGS functions.

Adequacy Assessment

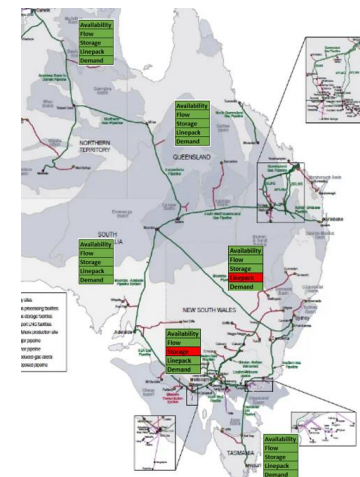
23 July

- As per previous day, risk profile is increasing
 - No evidence of the requested Industry response.
 - Linepack depletion continues threaten supply adequacy on the EGP & MSP.
- Bi-lateral discussions:
 - Pipeline Operators: discussion on the risk of continued linepack depletion. Identify a potential shortfall in supply on the MSP on 26 July.

Threat Description: as per ECGS Threat Notice

Risk: High

Threat Status: Active Threat (Linepack & Storage)



AEMO Response

23 July

AEMO determine:

1. the request for industry response may not be sufficient to mitigate risk to supply adequacy.
2. intervention via the ECGS Direction process may be required to mitigate risk.
3. preparation for the use of ECGS Directions must commence.

East Coast Gas System:

- Threat notice & request for industry response (20 July).
- Industry conference held (22 July).
- **Hold informal Direction discussions.**

DWGM:

- Threat to System Security (IonaUGS) issued 20 July

STTM:

- No action

Other:

- None.

Informal Direction Agenda

23 July

Informal consultation will address:

- how a Direction (or series of Directions) could be structured to achieve the desired outcome, including any alternative to the proposed directions.
- the ability of the participant to comply with the defined Direction.
- safety and technical issues may be relevant to compliance.

Informal Direction Discussions

23 July

Direct gas from Qld where there is available supply, to NSW where there is a risk to supply adequacy.

- Producer to make gas available for purchase.
- Shipper to purchase that gas and offer it into the Sydney STTM.

Pipeline Operators:

- confirm the timing and magnitude of the required supply to mitigate risk.
- identify Shippers with rights to transport gas from a receipt connection to the Sydney STTM.
- to identify supporting Directions to ensure delivery of gas to the Sydney STTM.

Producers:

- identify supply that may be made available for purchase as a designated location.

Shippers:

- requirement to purchase and transport gas into the MSP.
- offer that gas into the Sydney STTM.

Adequacy Assessment

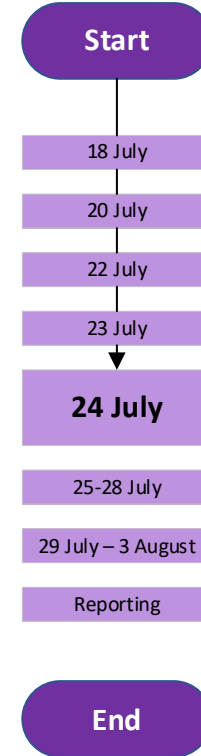
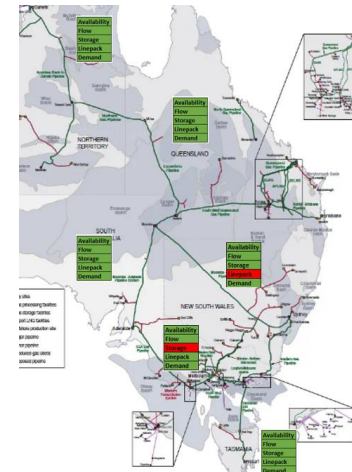
24 July

- As per previous day, increasing risk profile
 - No evidence of the requested Market response.
 - Demand exceeds supply into NSW.
 - Continued linepack depletion in EGP and MSP threatens supply adequacy.
- Bi-lateral discussions:
 - Pipeline Operators: confirm risk to supply adequacy on 26 July.

Threat Description: as per ECGS Threat Notice

Risk: Critical

Threat Status: Active Threat (Linepack & Storage)



AEMO Response

July 24

AEMO determine:

1. the request for industry response is not sufficient to mitigate risk to supply adequacy.
2. intervention via the ECGS Direction process is required to mitigate risk

East Coast Gas Supply:

- Threat notice issued & Industry response requested (20 July).
- Industry conference (22 July).
- **Direction Consultation (Pipeline Operators, Producers, Shippers)**
- **Direction**
- **Direction Notice**
- **Industry Conference**

DWGM:

- Threat to System Security (IonaUGS) issued 20 July

STTM:

- No Action.

Other:

- NGERAC notification that ECGS Directions will be issued to mitigate threat.

Direction summary

24 July

Producer:

- Make gas available for purchase at a connection point on the SWQP.

Shipper:

- Purchase gas from Producer and transport it to the MSP.
- Offer purchased gas into the Sydney STTM for supply on 26 July.

Pipeline Operators:

- Other directions may be required to increase supply and manage the consumption of linepack as determined through Direction discussions/consultations.

Direction Consultation

24 July

AEMO will conduct formal Direction Consultation with identified entities that can provide a required service.

Direction Consultation will include discussion of:

- the proposed direction.
- the ability of the entity to comply.
- safety and technical issues.
- any need for related directions, or as an alternative to the proposed direction.

ECGS Direction

24 July

The Direction will be issued by email and include the following details:

- reference to the Threat for which the direction has been given.
- statement that a request for an industry response is not sufficient to mitigate risk to supply adequacy and that intervention via the ECGS Direction process is required to mitigate risk.
- the authority under which AEMO makes this Direction.
- specifics of the Direction as discussed in formal consultation.
- the intended duration of the Direction.

Direction Notice

24 July

AEMO will issue a Direction Notice to industry via email and SMS in addition to publishing it on AEMOs website:

- AEMO has made directions to relevant entities to prevent, reduce or mitigate the identified risk or threat.
- AEMO has Directed entities to increase supply to the Sydney STTM Hub.
- The Direction will apply to the supply of gas on Gas Day 26 July.

Note: confidential information will be withheld unless prior agreed with the directed party.

Industry Conference

- AEMO will hold an Industry Conference to discuss information contained within the Direction and take feedback from Industry.

Adequacy Assessment

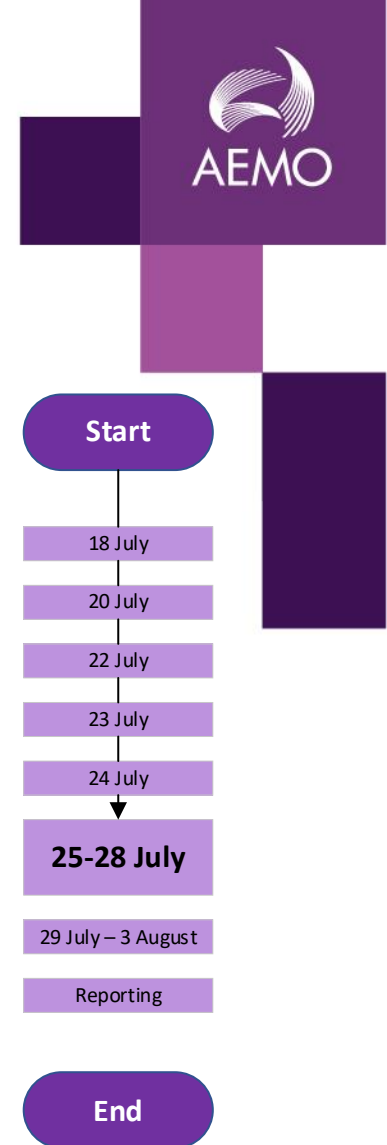
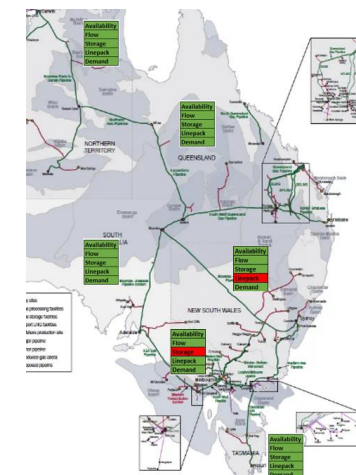
25 July - 28 July

- Like 24 July but with AEMO intervention:
 - No evidence of the requested industry response
 - Demand is expected to exceed supply in NSW without AEMO intervention on 27, 28, 29 and 30 July.
 - With AEMO intervention supply into the MSP and EGP exceed demand on each gas day with small increases to linepack.
- Bi-lateral discussions:
 - Pipeline Operators: provide information required to evaluate the threat to supply adequacy including the magnitude and location of that threat.

Threat Description: as per ECGS Threat Notice

Risk: Critical

Threat Status: Active Threat (Linepack & Storage)



AEMO Response

25 July – 28 July

AEMO determine:

1. ECGS Directions must be issued to increase supply into Sydney STTM on 27, 28, 29 & 30 July.

East Coast Gas Supply:

- Threat notice issued & Industry response requested (20 July).
- Industry conference (22 July).
- **Direction Consultation (Pipeline Operators, Producers, Shippers)**
- **Direction**
- **Direction Notice**

DWGM:

- Threat to System Security (IonaUGS) issued 20 July.

STTM:

- No Action

Direction Consultation & Notification

25 July – 28 July

AEMO conducts the Direction consultation and notification process as performed on 24 July for each day in which AEMO determine intervention via a ECGS Direction is necessary.

Direction 2: issued 25 July

- Make gas available
- Purchase gas
- Offer into Market on 27 July

Processes:

- Direction consultation
- Direction
- Direction Notice

Direction 3: issued 26 July

- Make gas available
- Purchase gas
- Offer into Market on 28 July

Processes:

- Direction consultation
- Direction
- Direction Notice

Direction 4: issued 27 July

- Make gas available
- Purchase gas
- Offer into Market on 29 July

Processes:

- Direction consultation
- Direction
- Direction Notice

Direction 5: issued 28 July

- Make gas available
- Purchase gas
- Offer into Market on 30 July

Processes:

- Direction consultation
- Direction
- Direction Notice

Adequacy Assessment

29 July - 3 August

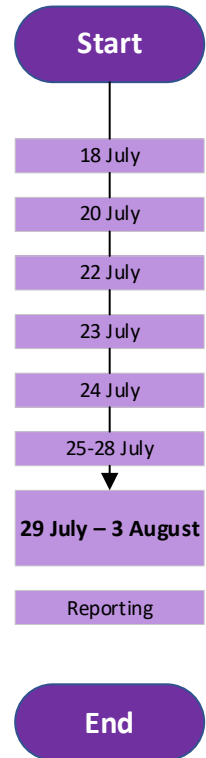
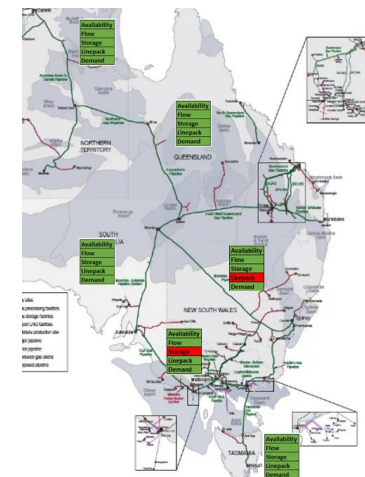
- Demand:
 - Typical winter season demand profile (NEM issues resolved; cold front passed)
- Flow:
 - Nominations indicate supply into the MSP and EGP will exceed demand from 31 July.
- Linepack:
 - Operational & contracted quantities have stabilised or increased across pipelines south of Moomba but remain below typical levels.
- Bi-lateral discussions:
 - Pipeline Operators: to evaluate the threat to supply adequacy and the magnitude and location of that threat.

Threat Description:

Linepack in the MSP has improved but may not be relied upon to support significant deviations in supply and demand.

Risk: High

Threat Status: Active Threat (Linepack & Storage)



AEMO Response

29 July

AEMO determine:

1. an industry response is sufficient to mitigate risk to ECGS supply adequacy.

East Coast Gas System:

- Industry conference.

DWGM:

- Threat to System Security (IonaUGS) issued 20 July

STTM:

- No action.

Industry Conference

29 July

ECGS Industry Conference agenda:

- Overview of the event.
 - Threat to supply adequacy related to very low linepack on MSP and EGP
 - AEMO Directions will increase supply to the Sydney STTM on 30 July.
 - From 31 July supply nominations into pipelines are sufficient to meet demand.
 - AEMO are not currently planning to issue further ECGS Directions but may if the risk to supply adequacy increases.
- Discussion of the required industry response (as detailed in Threat Notice).
 - Where possible match Participant forecast demand with nominations.
 - Increase nominations into the MSP with supply from Queensland.
 - Provide accurate and complete 7-day nominations and forecasts where possible to improve supply planning.

Adequacy Assessment

4 August

ECGS Assessment highlights:

- Demand:
 - Typical winter season demand profile.
- Flow:
 - Nominations indicate supply into the MSP and EGP will exceed demand for the next gas day and subsequent days.
- Linepack:
 - Operational & contracted quantities have rebuilt to the low end of the typical seasonal range.
- Bi-lateral discussions:
 - Pipeline Operator: confirm linepack volumes have been sufficiently restored to downgrade the assessed threat and risk.

Threat Description: Supply and demand are tightly balanced, linepack should be sufficient to maintain supply adequacy and reliability.

Risk: Medium and ALARP

Threat Status: Active Threat (Flow & Storage)

Start

18 July

20 July

22 July

23 July

24 July

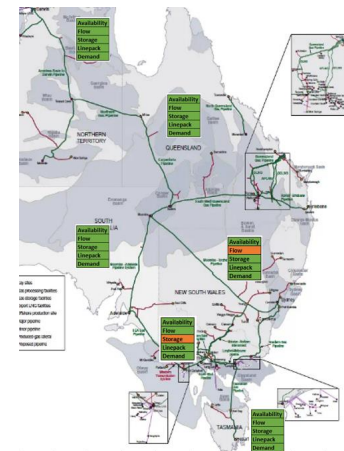
25-28 July

29 July – 3 August

4 August

Reporting

End



AEMO Response

4 August

AEMO determine:

1. the risk to supply adequacy does not meet the Procedures threat/risk criteria.

East Coast Gas System:

- ECGS Threat End Notice.

DWGM:

- Threat to System Security (IonaUGS) issued 20 July

STTM

- No action.

Threat End Notice

4 August

AEMO issue a ECGS Risk or Threat – End Notice via SMS and email:

[SMS] *AEMO has determined the identified risk or threat to adequacy or reliability of supply within the East Coast Gas System for the period 20 July 2023 to 3 August 2023 has ended. See email for details.*

AEMO Event Reporting

AEMO will publish post-intervention reports:

4 September: Preliminary Post Intervention Report

4 December: Final Post Intervention Report



For more information visit

aemo.com.au

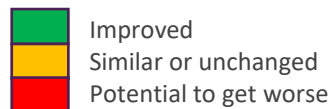
NEM Winter Readiness 2023











Agenda

- Winter outlook
- Weather and climate
- Generation availability
- Operational demand
- Gas supply adequacy
- Network outages and augmentations
- Reliability emergency reserves (RERT)
- Risks / plant issues

Winter Outlook



Impact		Comparison to last winter	
	Extreme cold snaps	●	Drier and warmer conditions expected but potential for extreme cold snaps still exists.
	Widespread flooding	●	Lower than average rainfall expected reducing risk of flooding.
	Extreme peak demand	●	Similar for electricity, historically winter demands are higher in NSW region. Potential for gas shortfalls during coincident peak gas consumption and GPG demands in the NEM.
	Generation availability	●	More VRE/BESS capacity and available scheduled generation expected in the NEM.
	Network outages	●	Less scheduled electricity High Impact Outages (HIOs). No major outages of gas system plant.
	Reliability	●	Similar unserved energy (USE) and loss of load probability (LOLP) forecast. Potential for unplanned plant outages to degrade electricity/gas system reliability.
	Fuel supply	●	Similar. Improved coal stockpiles. Gas storage levels are generally at high levels while Vic gas production capacity has decreased, increasing the amount of gas required from Qld. Operational restrictions for some hydro power stations.
	Health of markets	●	Improved financial position, prudential risks are comparably lower than for winter 2022.

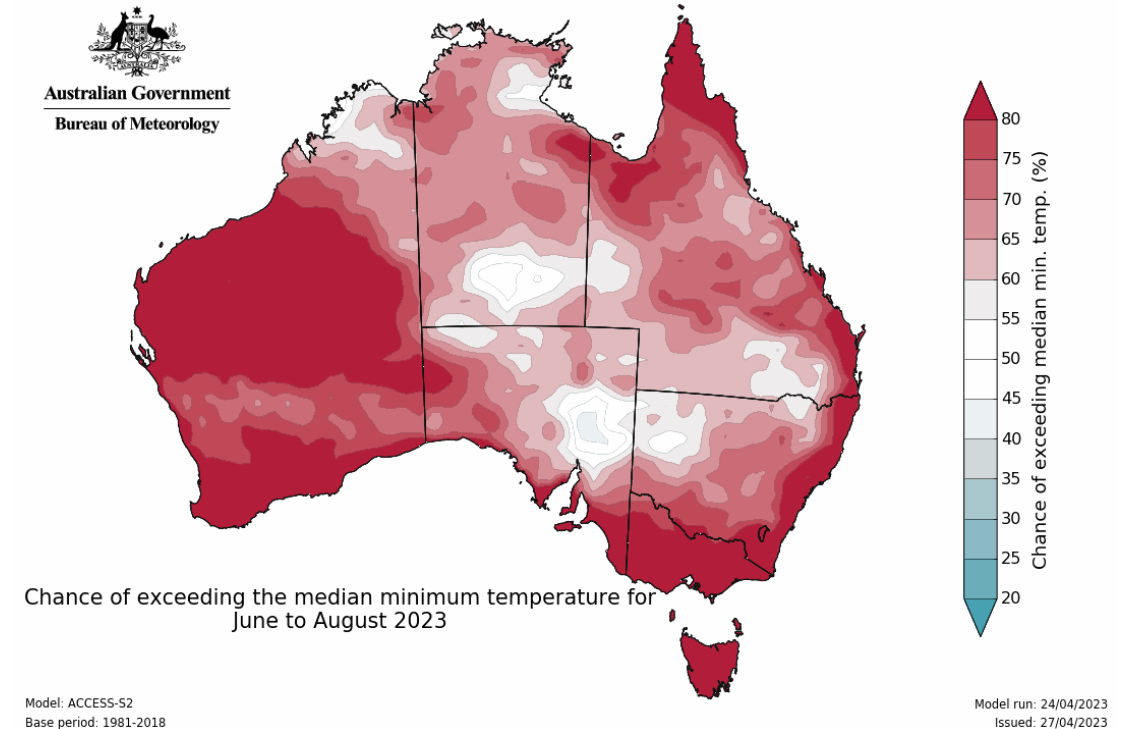
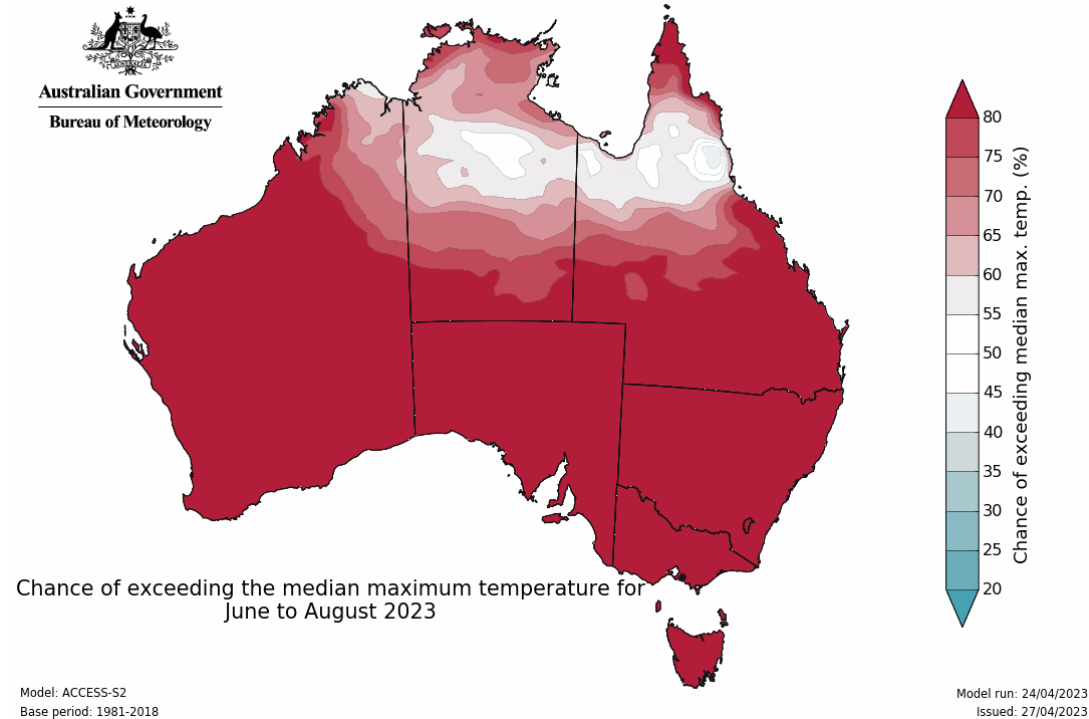
Note: It should be noted that climate model accuracy is typically low at this time of year and scheduled information on generation and transmission is subject to change.

June to August 2023: Climate Outlook

Maximum temperatures

27 April 2023

Minimum temperatures



Maximum temperatures are likely to be above median for majority of the country.

Minimum temperatures are generally likely to be warmer for WA, Vic and Tas and for coastal areas around the country.

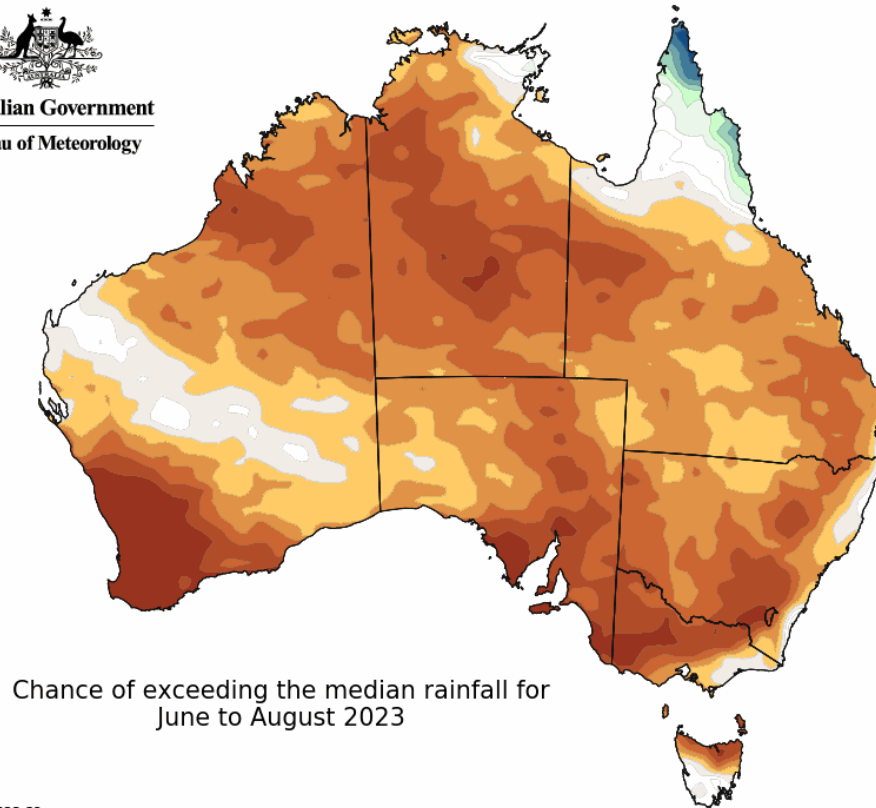
Although maximum temperatures are generally expected to be warmer than average during El Niño year, decreased cloud cover often leads to cooler-than-average night-time temperatures during winter–spring, particularly across eastern Australia. For example, regions of southern New South Wales and northern Victoria can experience 15–30% more frost days during El Niño than the historical average.

June to August 2023: Climate Outlook

Rainfall (27 April 2023)

- Median to above-median rainfall likely for northern Australia, coastal areas of NSW, southern Tas and parts of WA.
- Below-median rainfall likely for majority of the eastern states and south-west WA.


Australian Government
Bureau of Meteorology



Chance of exceeding the median rainfall for
June to August 2023

Model: ACCESS-S2
Base period: 1981-2018

Model run: 24/04/2023
Issued: 27/04/2023

Regional hazards: May – August 2023



Fire danger

- Moving into peak bushfire period for northern Australia
- High fuel loads following good wet season rainfall
- Watchpoints: Top End (NT), N WA, central E QLD



Drought

- Low rainfall recent months
- Dry outlook until at least spring
- Watchpoints: SE QLD, W TAS, SW WA



East Coast Low

- Winter to early spring is peak risk period for East Coast Lows



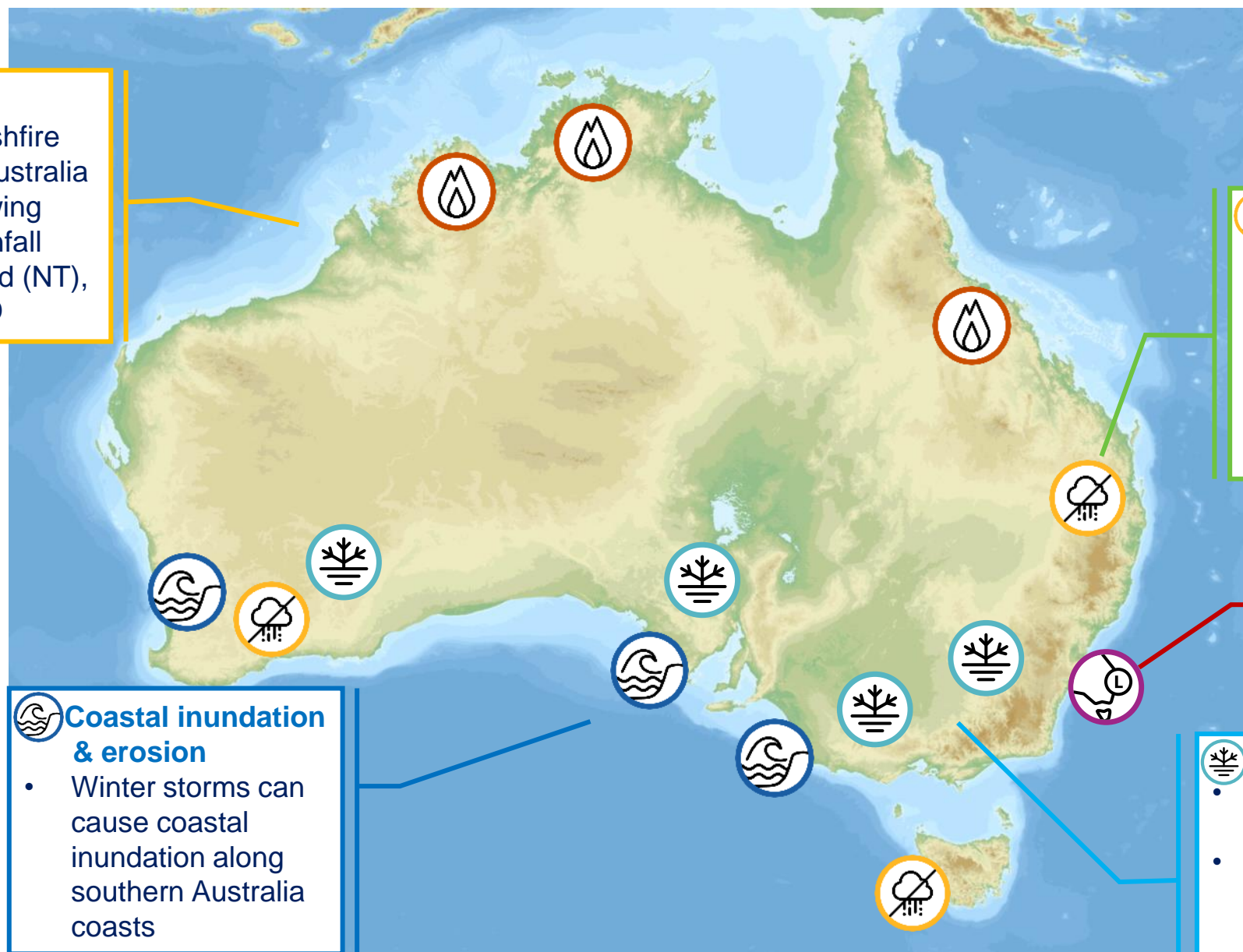
Coastal inundation & erosion

- Winter storms can cause coastal inundation along southern Australia coasts



Frost

- Dry outlook suggests increased frost risk
- Watchpoints: Grain-cropping regions across southern Australia



Generation Availability

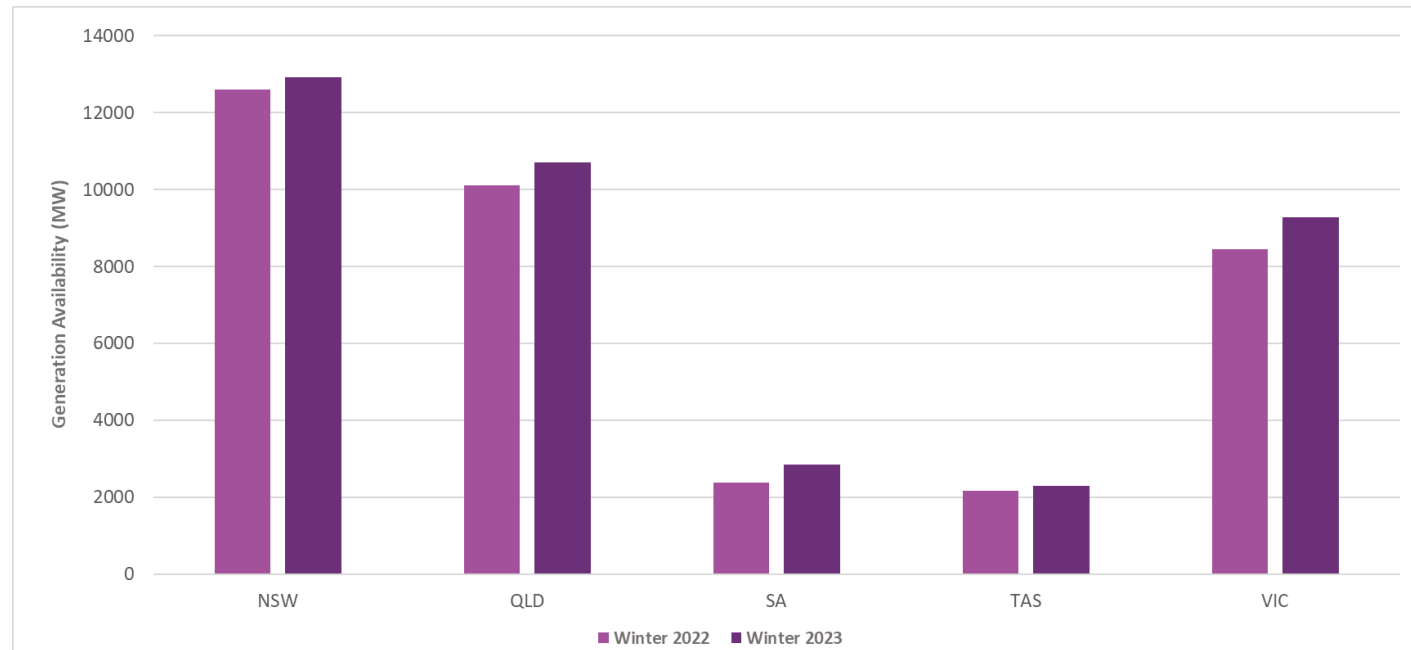
- Approximately 2200 MW of additional VRE / BESS capacity is expected to be operationally available in the NEM compared to winter 2022. Note: solar capacity factor is significantly lower during winter months.
- On average, additional 2300 MW of scheduled generation is PASA available in the NEM compared to winter 2022.
- Hydro generation:
 - Limited by water licence, dam levels, available airspace, and riverbank capacity
- Coal generation:
 - Heavy rainfalls in eastern states have the potential to impact coal quality/deliveries
 - Coal stockpiles have improved as the major generators rebuild stockpile levels.
 - Several major generating units are taking planned outages during winter:
 - QLD, Gladstone 5 and Wivenhoe 2
 - NSW, Bayswater 1
 - VIC, Yallourn 3 and 4
 - SA, Torrens Island B2
- Gas/diesel generation:
 - No constraints on gas usage, potential shortfalls on coincident peak consumption days

Significant generation capacity changes (since winter 2022) are shown in tables below, increase in renewable resources and BESS will help manage overall reduction in dispatchable capacity. On balance additional 971 MW of generation is expected in the NEM.

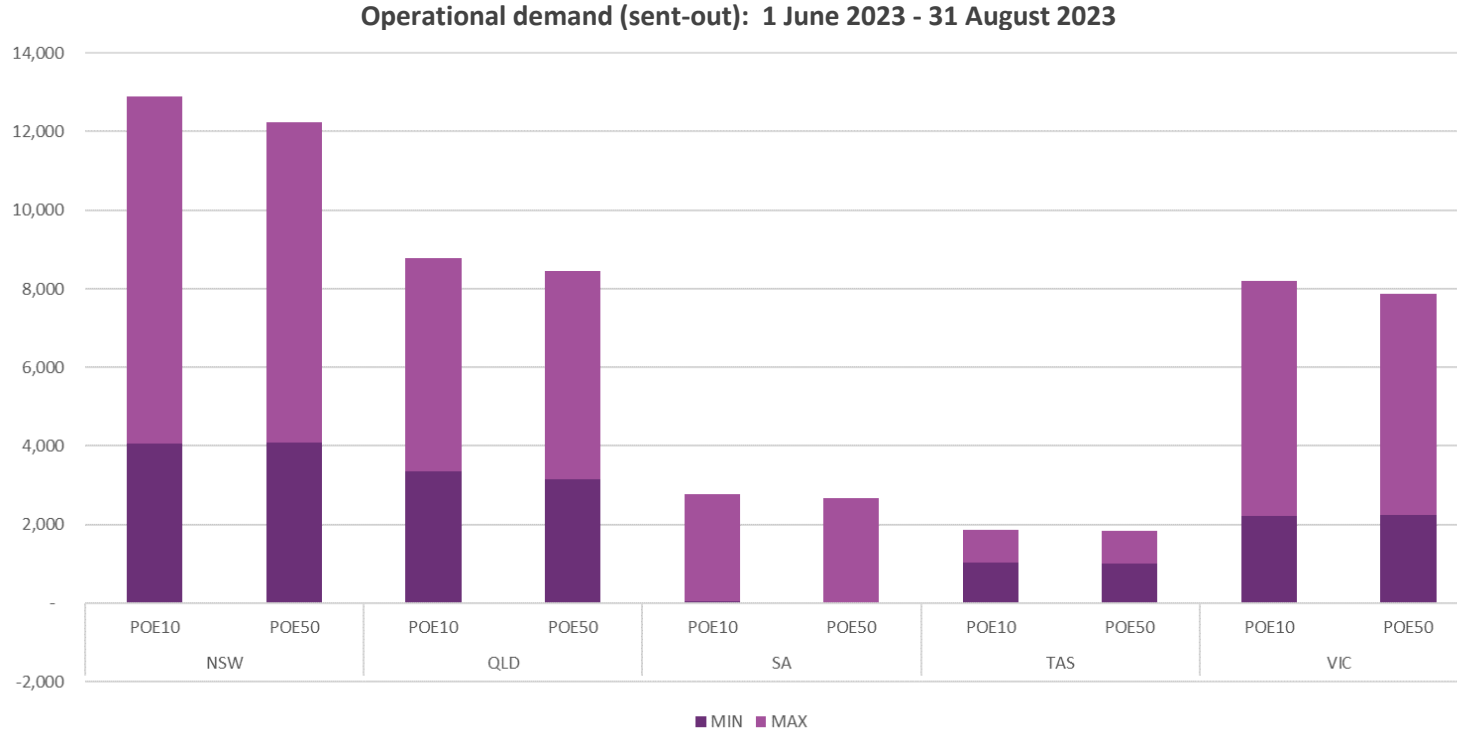
+	
Region	Capacity (MW)
NEM	2200 MW – Wind/Solar/BESS
SA	Bolivar (127 MW), Mintaro (75 MW)
QLD	Swanbank E (365 MW)

-	
Region	Capacity (MW)
NSW	Liddell (1260 MW) – retired
VIC	Jeeralang B1 (70 MW)
QLD	Callide C3 (466 MW)

Scheduled generation availability (MTPASA - 6 April 2023) chart shows increased dispatchable generation availability in the NEM (2300 MW) compared to winter 2022. Generating units impacted by outages / coal supply issues in the NEM during winter 2022 are bidding available with sufficient fuel supplies for winter 2023.



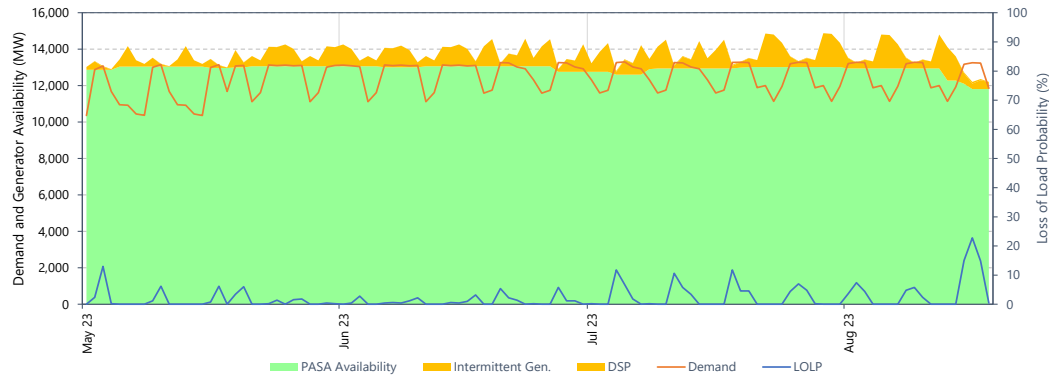
Operational Demand



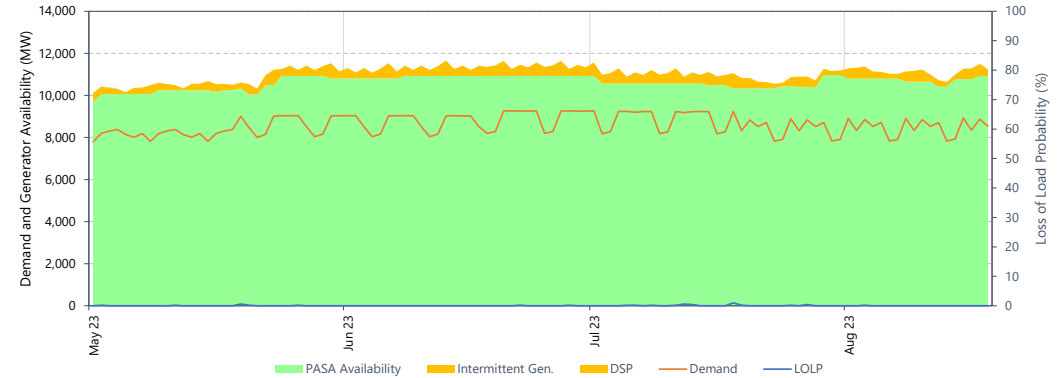
- Forecast USE is within both the interim and reliability standards for all NEM regions during winter 2023. Risk of load shedding remains where high demand days combine with low VRE availability and or scheduled generation and network outages, however risk of load shedding is low as indicated by LOLP studies.
- Historically NSW region recorded high electricity demand during winter months due to high heating load.
- Historically minimum record demands occurred during shoulder seasons. Low demand periods during winter are more likely to occur during weekends and public holidays.

Loss of Load Probability Study

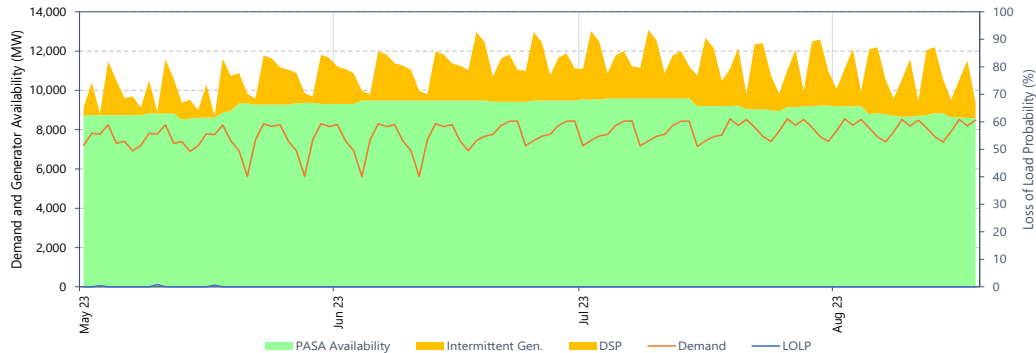
NSW



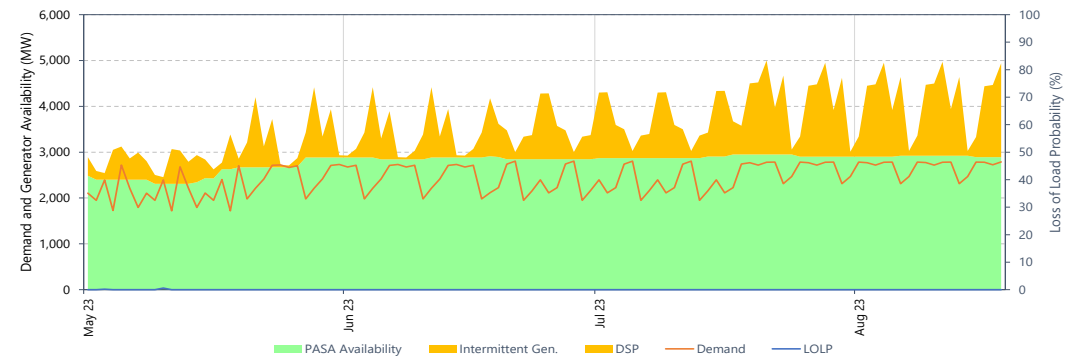
Queensland



Victoria



SA



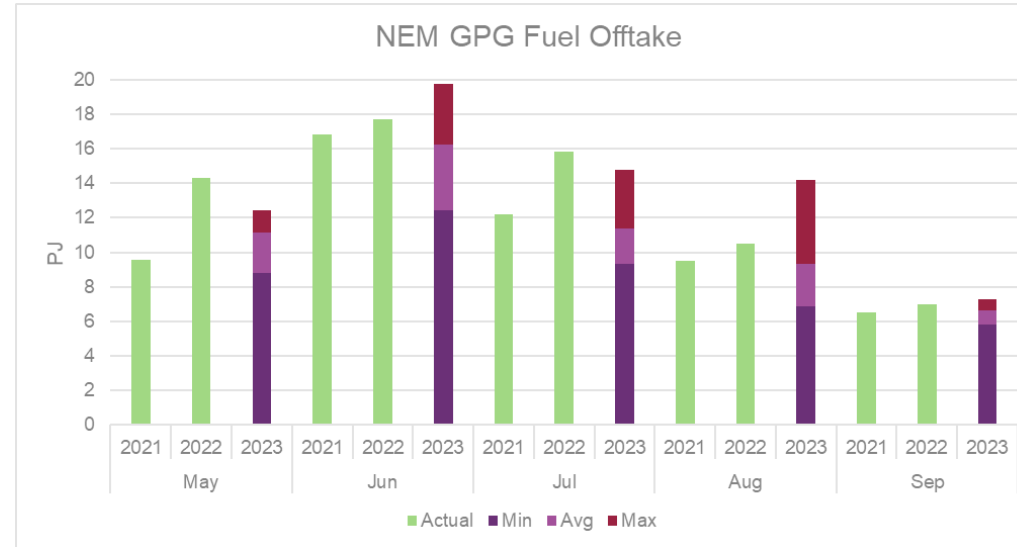
LOLP is low during winter in NSW region. All other regions have very low LOLP. Tasmania has no LOLP periods during winter and for that reason no chart is provided.

Note: MTPASA run 655 (11 April 2023), period shown is 15 May 2023 to 31 August 2023.

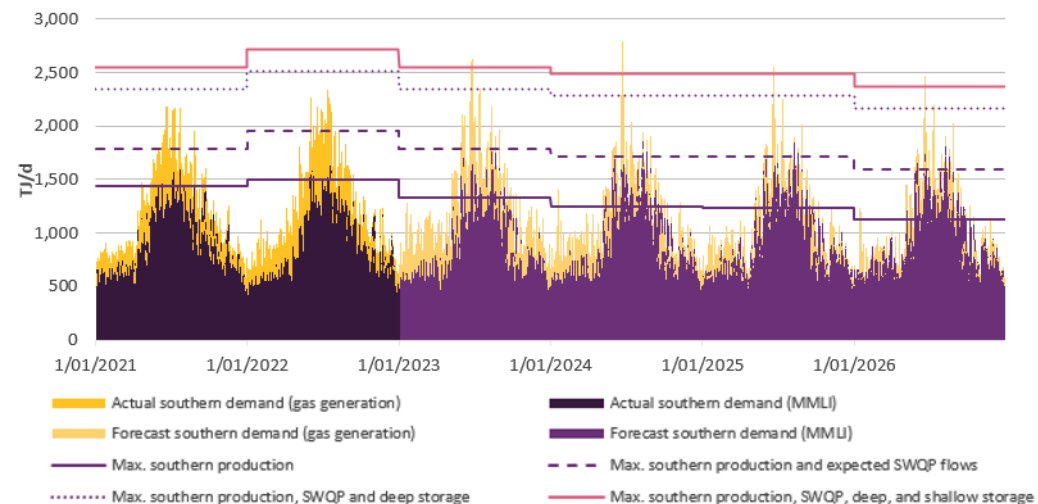
GPG Supply Adequacy – East Coast

- Forecasts show potential for similar or slightly higher NEM Gas-Fired Power Generation (GPG) fuel offtake levels compared to actuals recorded in 2021 and 2022.
- GPG demands during winter months are increasing (traditionally being highest in summer), as consumers electrify heating loads, winter gas generation peak demand will increase in magnitude and peakiness within the next five years.
- Gas storage is currently at high levels. There are no major outages impacting gas production leading into winter however Longford production levels have reduced by 20% from last winter, increasing the reliance on winter gas supply from Queensland.
- Despite falling annual gas consumption, the value of GPG in firming the NEM remains critical.
- Peak day shortfalls are forecast from 2023 under extreme peak days with high regional coincidence (including gas generation needs).
- Deep (Iona) and shallow (Dandenong and Newcastle LNG) storages are critical to meet peak day demand.
- Northern gas (Qld) must be made available to southern consumers (NSW, Vic, SA and Tas) at pipeline capacity to mitigate shortfall risks.

Source: AEMO NEM GPG Forecasts using Step Change scenario with NEM demand & VRE generation following reference years 2014, 2015, 2017 and 2019.



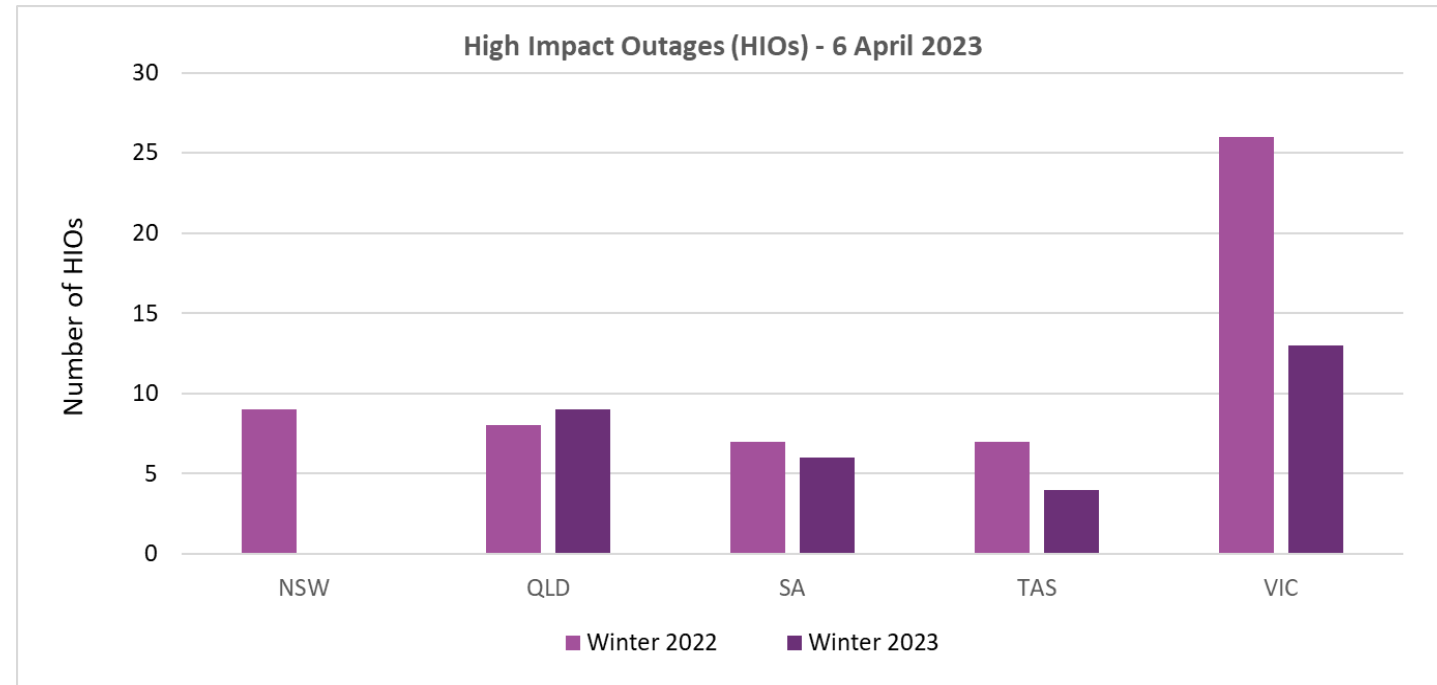
Reference year 2019 - high coincidence of southern demand and NEM gas consumption



High Impact Outages & Augmentations

- Number of planned HIOs have decreased for most regions.
- QLD outages relate to maintenance/commissioning of Ross No. 3 275 kV transformer and 275 kV feeders out of Nebo/Strathmore.
- VIC outages relate to maintenance works on 500 kV lines out of Moorabool.
- Multiple VIC-NSW and VIC-SA interconnector related outages are scheduled in June/July.
- SA outages relate to maintenance activities on South-East to Heywood and Tungkillo to Tailem Bend 275 kV lines.
- TAS outages relate to maintenance on Gordon to Chapel Street 220 kV lines.

Note: HIOs are allowed to proceed if there are no identified system security issues.



Inter-regional augmentations:

- QNI transfer capacity increases:
 - Additional 150 MW NSW to QLD capacity compared to winter 2022.
 - Possible 100 MW QLD to NSW capacity increase during winter 2023.

Note: QNI capacity increases are dependent on completion of the commissioning tests influenced by prevailing market conditions.

Reliability Emergency Reserve Trader (RERT)

- To mitigate any potential reliability risks AEMO maintains a panel of suppliers that can provide / contract reserves at short notice – the short notice RERT panel.
- Short notice RERT costs are only incurred if reserves are pre-activated or activated, as such reserves are not guaranteed to be available.
- Typically, short notice RERT panel agreements were designed to cover the summer months only, however AEMO is now encouraging 12-month panel membership with extension options.
- Last winter the NEM experienced coal and gas limitations which resulted in supply scarcity. AEMO used short notice RERT to manage the supply scarcity and the risk of credible contingencies causing involuntary manual load shedding.

Network and Generation Risks

Risks	Mitigation
Network and generation forced outages exceeding limits historically observed.	<ul style="list-style-type: none"> • Overall scheduled generation availability has improved compared to winter 2022 in the NEM. • AEMO is monitoring generation availability across all regions. • RERT Panel.
Network and generation maintenance / commissioning activities extending beyond target completion dates.	<ul style="list-style-type: none"> • AEMO is working closely with TNSPs and Generators to understand delays/modifications to planned maintenance due to resourcing issues, sourcing of replacement parts or other reasons. • Risk managed through ACCC interim authorisation maintenance co-ordination for QLD, NSW and VIC (expired in April, new application being sought).
Storms and flooding impacting coal supply and transmission in the NEM.	<ul style="list-style-type: none"> • Contracting coal from diverse sources and building up coal stock. • Monitor coal generation availability and stockpile levels. • Monitor risks with asset owners.
Bushfires/grassland fires impacting fuel supplies (coal or gas production), generation or network assets.	<ul style="list-style-type: none"> • Monitor risks with asset owners. • Contingency plans in place.
Unplanned network events including during high/low demand periods.	<ul style="list-style-type: none"> • Minimum Demand Framework and contingency plans in place.

Existing Plant Issues

Issues	Impacted Region(s)	Impact
QNI capacity increase - commissioning tests dependent on market conditions.	Qld, NSW	Potential delays to QNI capacity increases.
Hydro generation environmental constraints.	NSW	NEM reserves.
Callide C units return to service delayed due to technical issues: <ul style="list-style-type: none"> Callide C3 staged return to service commencing 30/09/2023 (300 MW) with full capacity of 466 MW from 31/12/2023. Callide C4 staged return to service commencing 31/10/2023 (300 MW), 350 MW from 30/11/23 and 420 MW from 31/01/2024. 	Qld	NEM reserves.
Jeeralang B1 (70 MW) is on extended outage due to technical issue. There is a possibility of this outage extending into summer due to difficulty in sourcing replacement parts.	Vic	NEM reserves.
Para 2 275 kV SVC is out of service until August 2023.	SA, Vic	Constraint on Heywood interconnector.
Lismore 1 132 kV SVC is out of service until July 2023.	NSW, Qld	Constraint on Terranora interconnector.



For more information visit

aemo.com.au

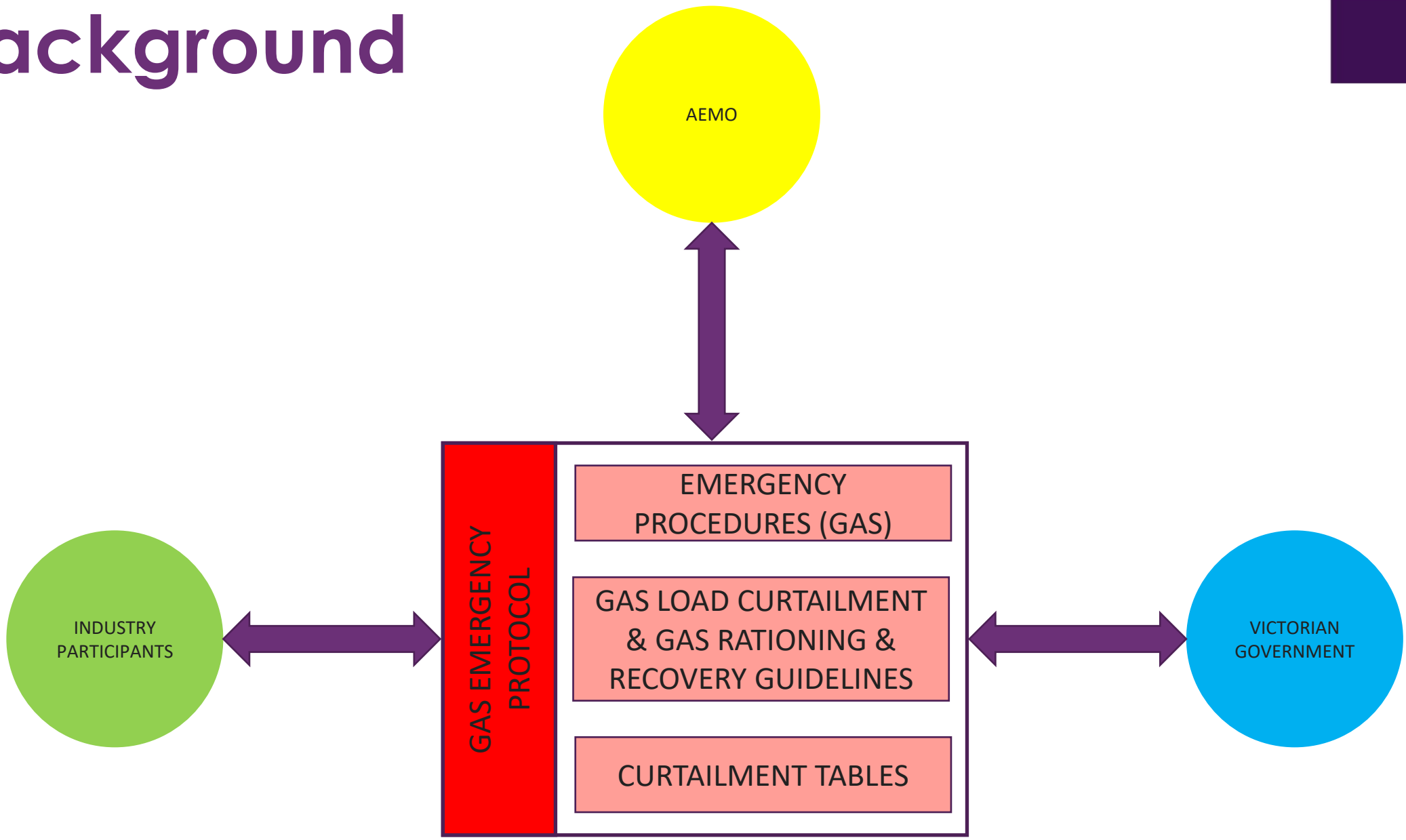
Gas Emergency Protocol



Agenda

1. Background
2. Emergency Procedures (Gas)
 1. Emergency Process
3. Gas Load Curtailment and Gas Rationing and Recovery Guidelines
 1. Phases
4. Curtailment
 1. Curtailment Types
 2. Curtailment Enactment Timings
 3. Curtailment Process
5. Rationing
6. Recovery
7. GEMCF

Background





Emergency procedures (gas)

Prepared by: AEMO Gas Markets and Systems Operations

Version: 9.0

Effective date: 7 December 2022

Status: Published

Approved for publication and use by:

Approved by: Michael Gatt

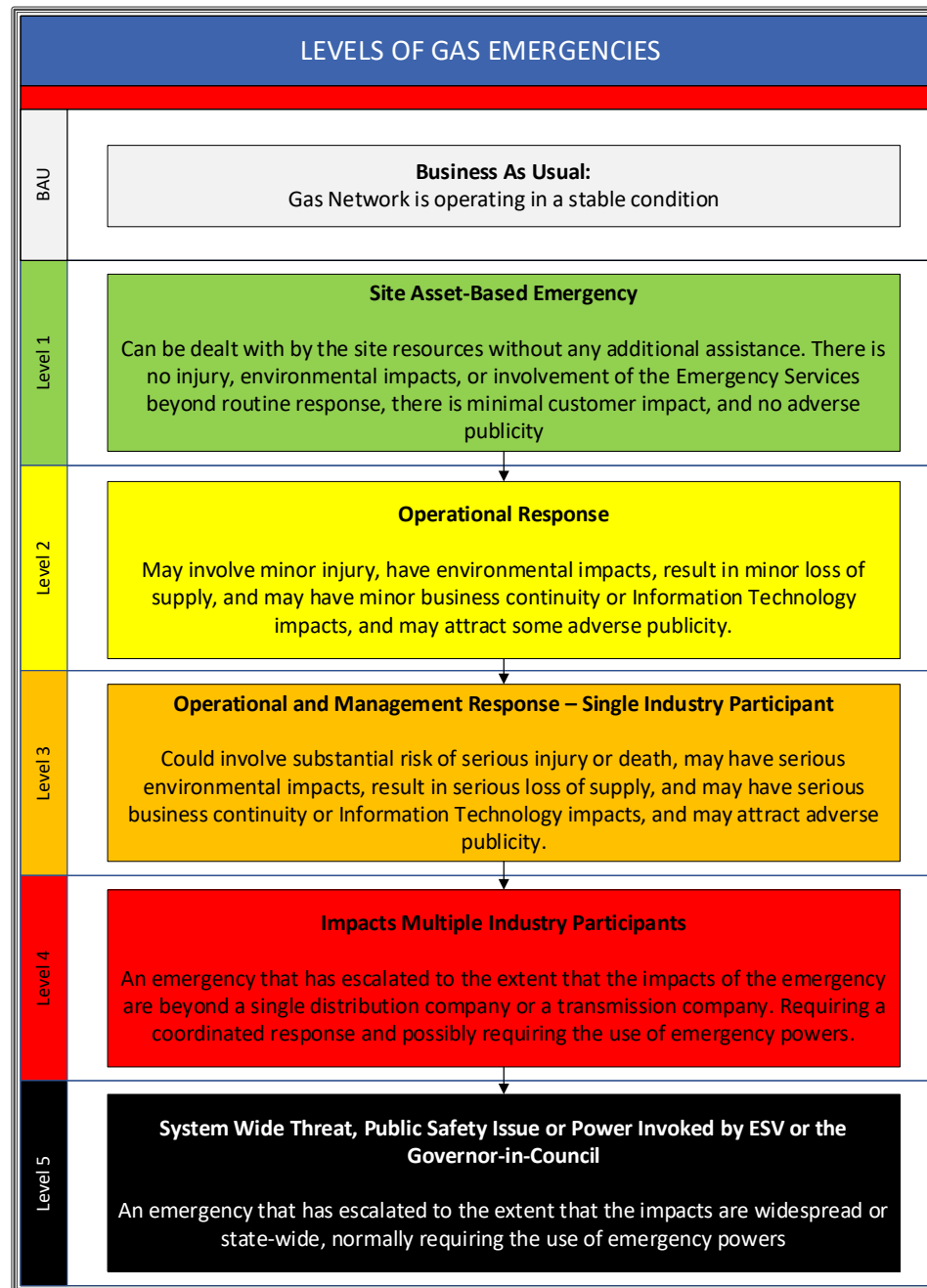
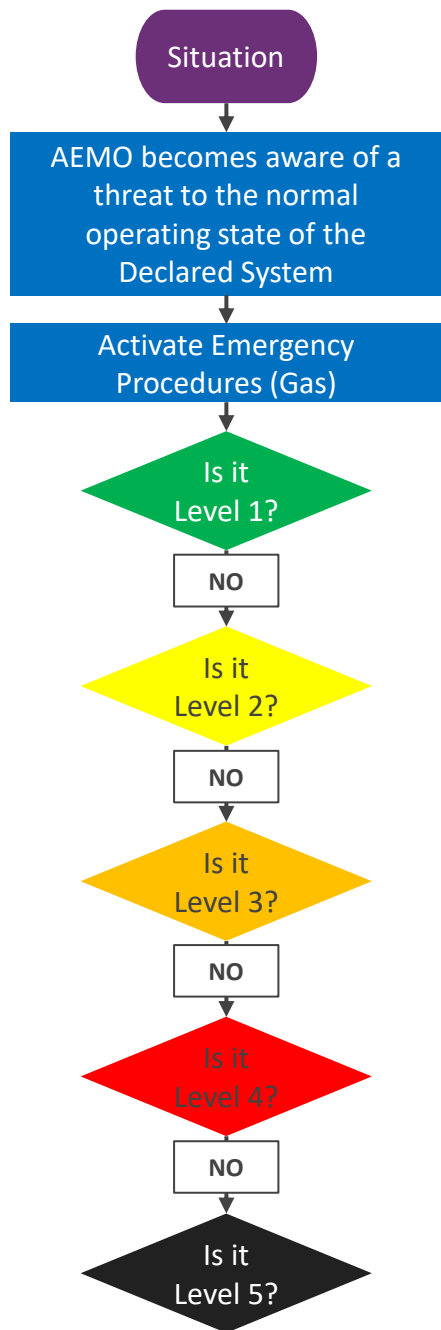
Title: Executive General Manager, Operations

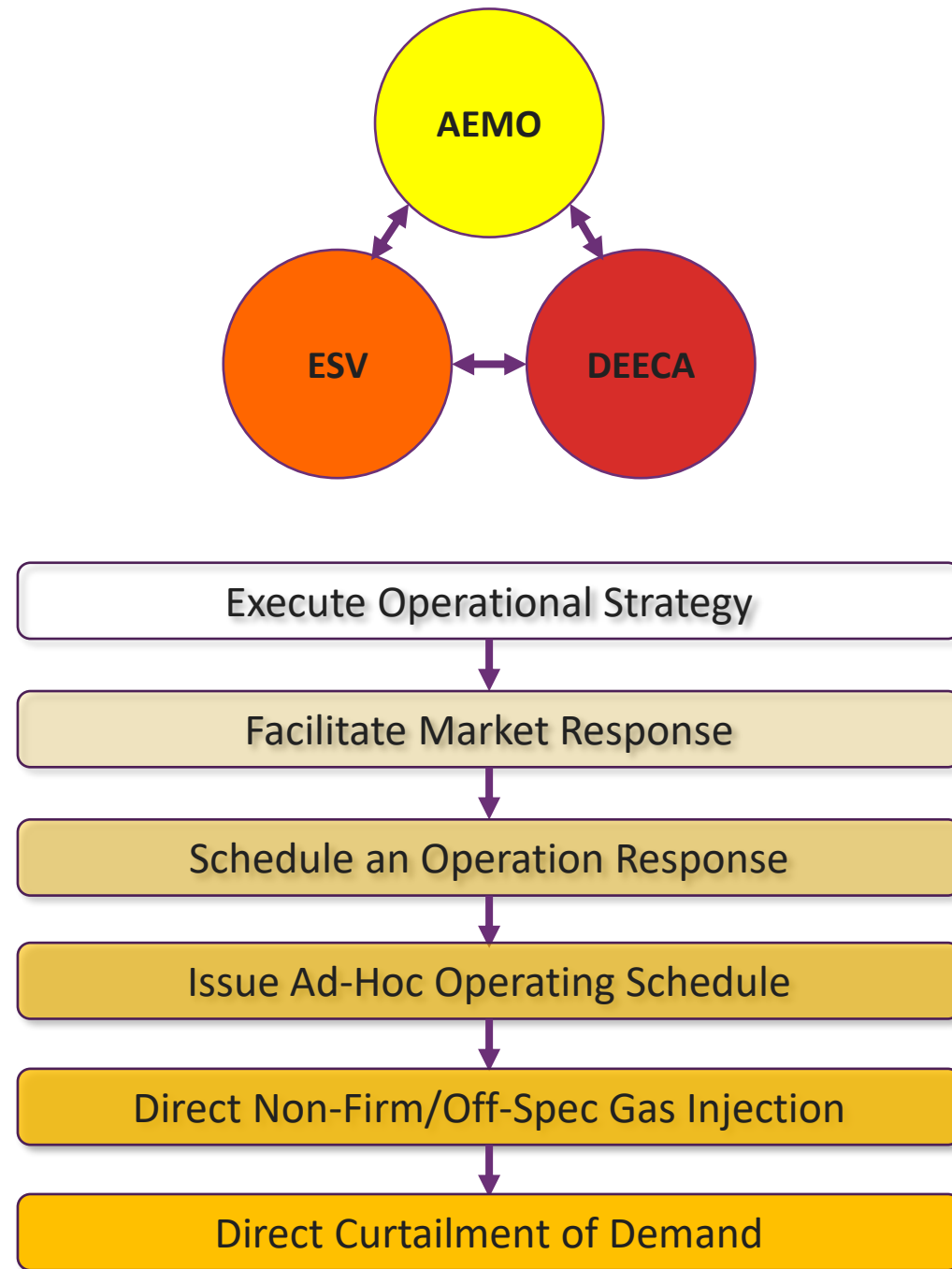
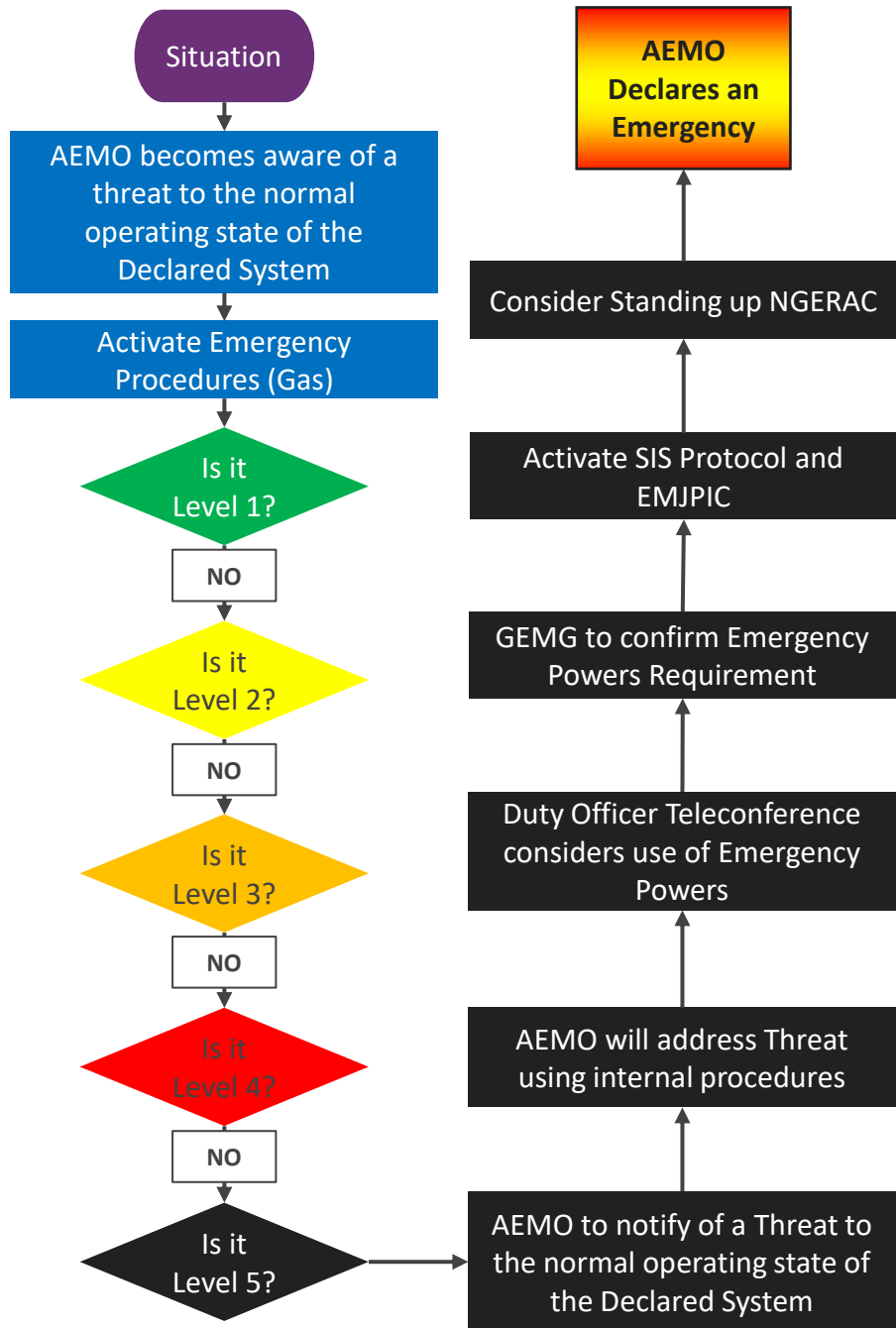
Date: 7 December 2022

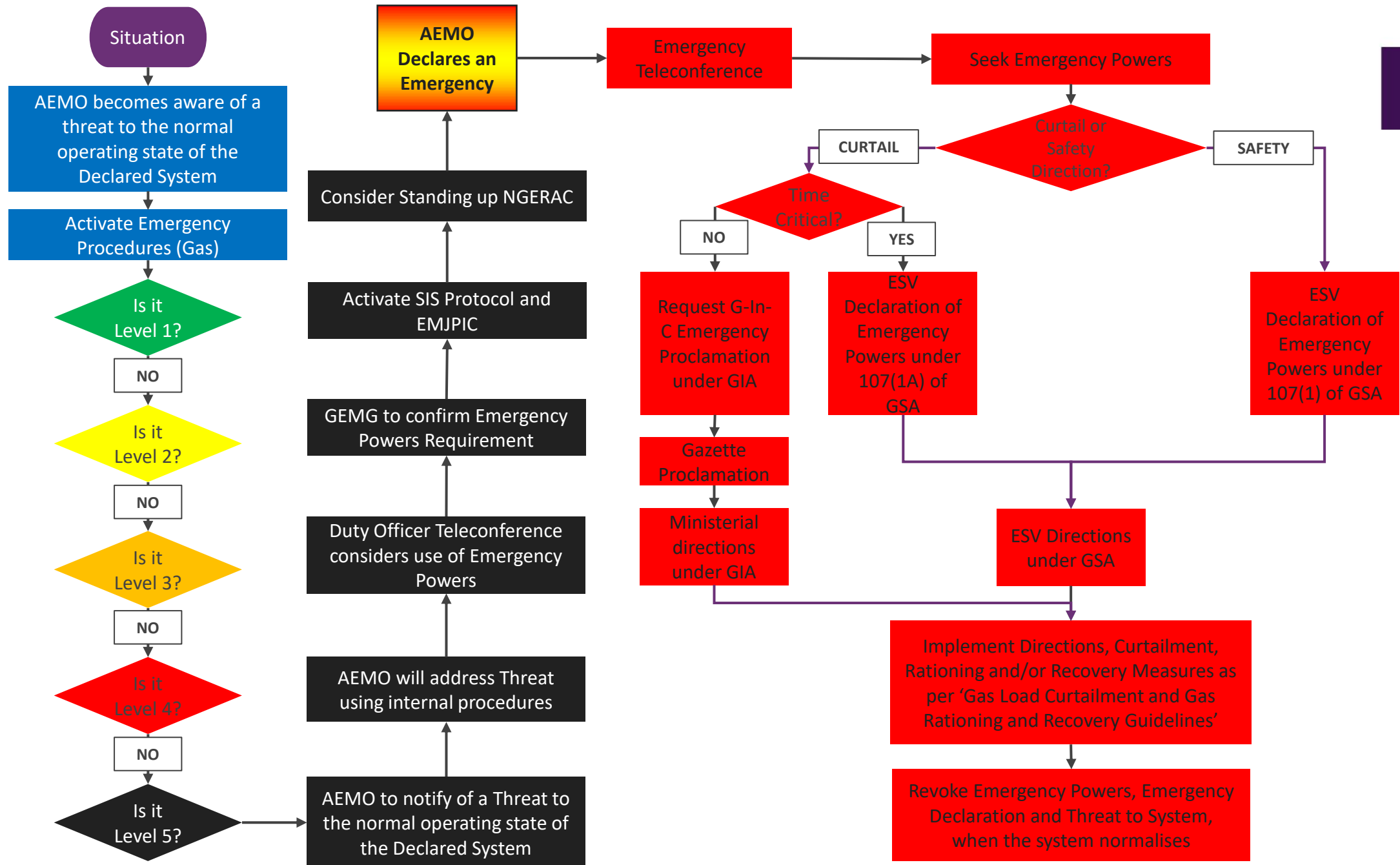
aemo.com.au

New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia

Australian Energy Market Operator Ltd ABN 94 072 010 327









Gas Load Curtailment and Gas Rationing and Recovery Guidelines

Prepared by:	AEMO Gas Markets and Systems Operations
Version:	9.0
Effective date:	7 December 2022
Status:	Published

Approved for publication and use by:

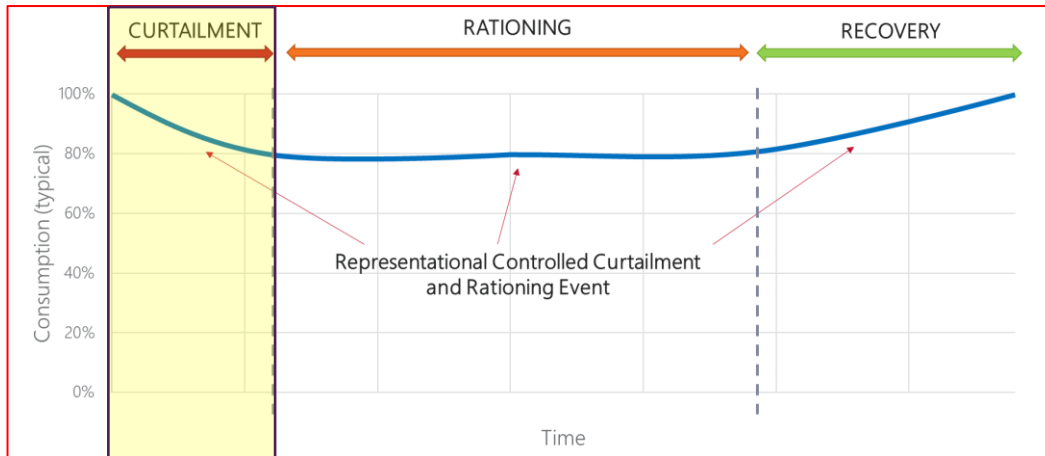
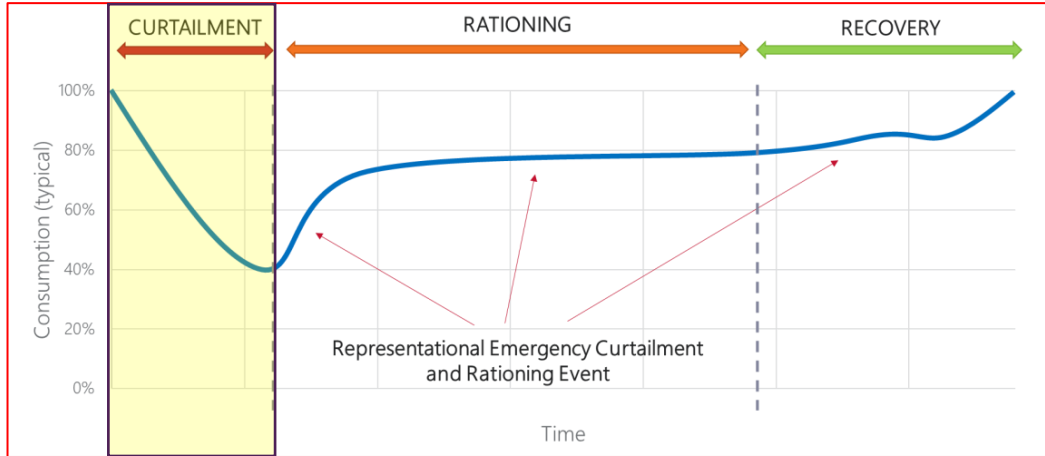
Approved by:	Michael Gatt
Title:	Executive General Manager, Operations
Date:	7 December 2022

aemo.com.au

New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia
Australian Energy Market Operator Ltd ABN 94 072 010 327



Phases



• Curtailment

- Deliberate reduction of gas delivery or gas usage required due to a shortage of supply or because demand exceeds pipeline capacity
- During a catastrophic event, severe and immediate measures used to arrest the fall in pressure to remain above the minimum (nose diving plane)
- In less severe situations (or those with greater lead time) it is used in a more considered manner to bring demand down to a sustainable level (gradual reduction of altitude)

Curtailment Types

- Voluntary Reduction
 - Reduction of demand through community goodwill
 - No obligation or enforcement
 - Unpredictable response
 - Questionable duration
- Directed Restrictions
 - AEMO directions to DTS participants using NGL 91BC
 - Predictable response and reduction
 - Enforceable obligation
 - Limited Audience and becoming less effective in peak season
- Mandatory Restrictions
 - Government Emergency Powers (ESV and/or DEECA)
 - Applicable to anyone/anything in Victoria
 - Enforceable, but limited visibility to facilitate
 - Directed mainly towards domestic customers
 - Ultimately reliant of end user response as limited/no physical control

Curtailment Enactment Timings

- Voluntary Reduction
 - Implementation of Emergency Powers not required
 - Quickest to enact when dealing with Domestic Consumers
 - Limited only by the speed by which the message can be disseminated and the speed by which consumers can implement reductions...if they do
- Directed Restrictions
 - A permanent power maintained by AEMO which is quick to enact, but limited to only Market Participants, not Domestic Consumers
- Mandatory Restrictions
 - Requires enacting Emergency Powers which can take significant time
 - ESV uses Gas Safety Act and doesn't need to be gazetted
 - DEECA use Gas Industry Act and requires G-In-C approval and gazetting
 - Rules of thumb = ESV less than 24 hrs, DEECA more than 24 hrs

Curtailment

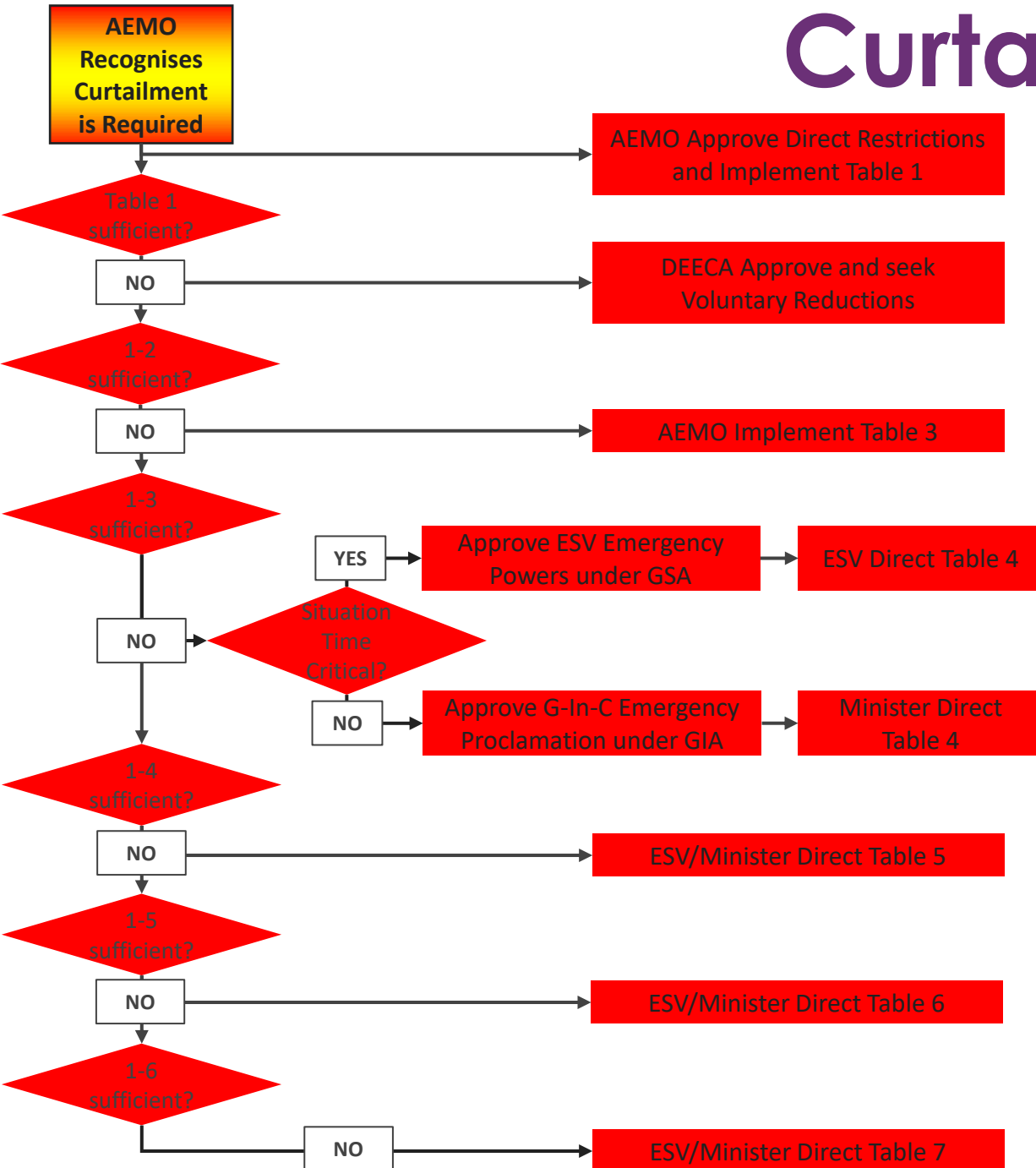


Table 1 Curtailment tables summary

	Table description	Typical measure type
Table 1	Supply for: (a) Withdrawals into storage. (b) GPG subject to specified considerations. (c) Customers with interruptible supply contracts. (d) Controllable withdrawals to interconnected transmission pipelines.	Directed restriction
Table 2	An appeal for a voluntary reduction in gas consumption.	Voluntary reduction
Table 3	<i>Tariff D</i> – Category B Curtailment of high consuming (<i>tariff D</i>) customers that will likely have a negligible to low impact to health, the environment or community financial sustainability.	Directed restriction
Table 4	Residential and small commercial (<i>tariff V</i>) customers.	Mandated restriction
Table 5	<i>Tariff D</i> – Category A Curtailment of high consuming (<i>tariff D</i>) customers that will likely have a low to intermediate impact to health, the environment or community financial sustainability.	Directed restriction
Table 6	Priority services, which is formed from: 1. Critical services. 2. Pre-approved customers with a curtailment allowance.	Mandated restriction
Table 7	In order of priority: 1. Medically required residential gas consumption for customers not registered in the gas Life Support Register. 2. Residential customers that are registered in the gas Life Support Register. 3. Essential services.	Mandated restriction

Example Curtailment – 70TJs – Estimation Only

Curtailment

Solution

137 - 15/03/2023 14:00:00 - 15/03/2023 23:00:00 - Curtailment - GEM...

New

Retrieve

Export To CSV

Curtail Inclusion

Exemptions

Publish

Start Date/Time

15/03/2023 02:00 PM

End Date/Time

15/03/2023 11:00 PM

Comment

Curtailment - GEMCF example for presentation

15/03/2023

Wed 15-Mar-2023

Tables

Pipes

CTMs

Hourly Detail

Table	Table Description	Total Daily Demand (GJ)	Restricted Daily Qty (GJ/d)	Exempt Qty (GJ/d)	Curtailment Yield Qty (GJ/d)	Call Curtailment Table (Yes/No)	Quantity Curtailed (GJ/d)
1a	Controllable exports to Storage Facilities	41,250	24,110		17,140	Yes	17,140
1b	Controllable exports to GPG.	0	0		0	Yes	0
1d	Tariff V - Customer contract allowing an interruption of supply of gas	0	0		0	Yes	0
1e	Controllable withdrawals to interconnected transmission pipelines.	20,331	11,915		8,416	Yes	8,416
2	Tariff V – Voluntary Reduction	0	0		0	Yes	0
3	Tariff D – Category B	30,836	26,209		4,627	Yes	4,627
4a	Tariff V – Reduction residential and small commercial customers.	0	0		0	Yes	0
4b	Tariff V – Residual residential and small commercial customers.	168,777	147,650		21,127	Yes	21,127
5	Tariff D – Category A	55,498	47,188		8,311	Yes	8,311
6a	Tariff D – Customers registered with a curtailment allowance	14,711	11,920		2,791	Yes	2,791
6b	GPG Gas Allowance for Fuel Switching/NEM Security	24,700	24,700		0	Yes	0
6c	Tariff V – Critical Services	1,072	856		216	Yes	216
6d	Tariff D – Critical Services	21,933	17,781		4,152	Yes	4,152
7a	Tariff V – Medically Required Customers	5,721	4,568		1,153	Yes	1,153
7b	Tariff V – Life Support	715	571		144	Yes	144
7c	Tariff D – Essential Service	9,622	8,160		1,462	Yes	1,462
7d	Tariff V – Essential Service	2,503	1,999		504	Yes	504
Total		397,668	327,626	0	70,044		70,044

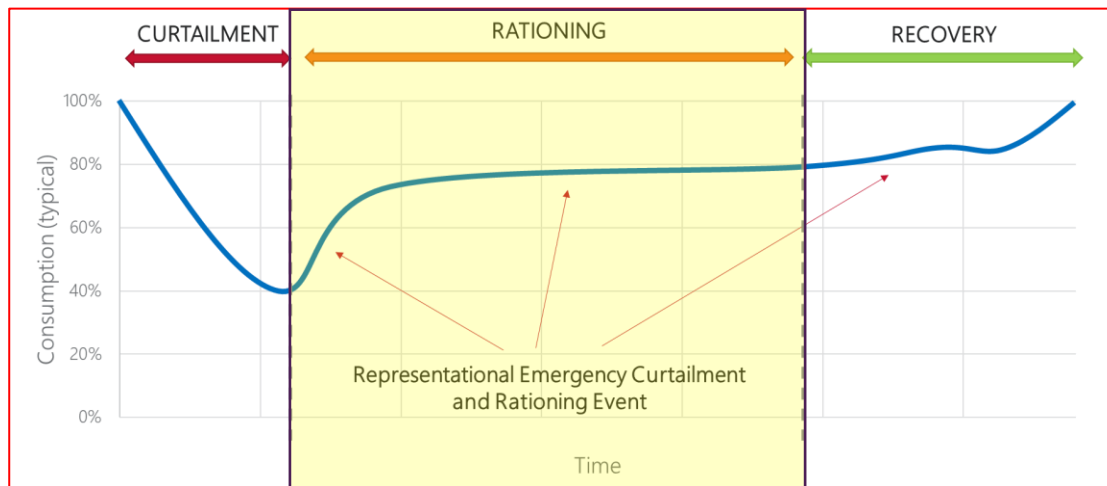
Curtailment Communication

Type	Responsible Party	Communication to Participants	Communication to End User
Voluntary Reduction	DEECA	Emergency Teleconference SISP	EMV Communication Platform Mainstream Media
Directed Restrictions	AEMO	Market Notice VGECP	TBC by Retailer Companies
Mandated Restrictions (Gas Safety Act)	ESV	Emergency Teleconference SISP EMJPIC	EMV Communication Platform Mainstream Media Social Media Websites (Other Methods - Time Dependant)
Mandated Restrictions (Gas Industry Act)	DEECA	Emergency Teleconference SISP EMJPIC	EMV Communication Platform Mainstream Media Social Media Websites (Other Methods - Time Dependant)

Factors Effecting Curtailment Effectiveness

- Incident Type
 - Duration
 - Gas Lost
- Incident Location
 - Less Critical area of DTS
- Seasonal/Temperature Impact
 - Demand
 - Variation of Customer Type and Usage
- Time of Day
 - Communication Difficulties
 - Ability to respond

Rationing



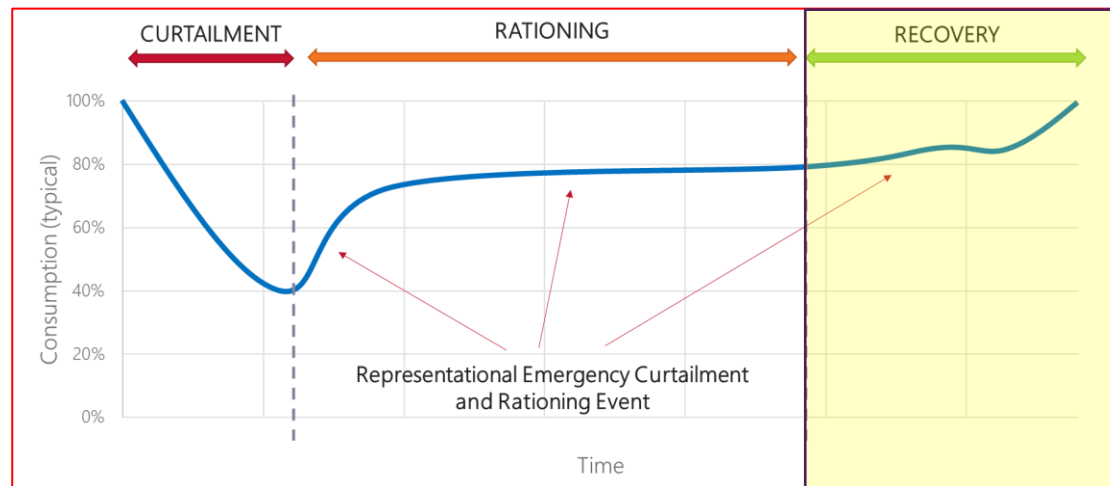
- Implemented if the system has been returned to a stable condition, but is unable to supply the original or desired quantity of Gas to consumers
- Allocation will be dependant on a number of factors but total consumption will need to be sustainable under the new conditions

Rationing

Table 2 Rationing customer prioritisation summary

	Priority description
Priority 1	<ol style="list-style-type: none">1. Essential services2. Residential customers that are registered on the gas Life Support Register.3. Residential customers with a medical requirement to consume gas.
Priority 2	Priority persons and services Priority services is formed from: <ol style="list-style-type: none">1. Critical services.2. Pre-approved customers with a rationing allowance.
Priority 3	<i>Tariff D</i> – category A customers.
Priority 4	Residential and small to medium commercial customers (<i>Tariff V</i>).
Priority 5	<i>Tariff D</i> – category B customers.
Priority 6	Supply for: <ol style="list-style-type: none">(a) withdrawals into storage.(b) GPG subject to specified considerations.(c) customers with an interruptible supply contract.(d) controllable withdrawals into interconnected transmission pipelines.

Recovery



- As remediation works progress, supply will be slowly and sustainably restored
- Allocation will be dependant on a number of factors but will cater to the often erratic nature of this phase, including requiring large demand blocks and intimate communication requirements
- This phase will not always reflect the reverse of the Curtailment tables or the rationing prioritisation

Pre-Approved Allowance

- Curtailment Allowance
 - Prioritises a minimum quantity of gas to mitigate an extreme or high risk to the Victorian public that results from a sudden loss of supply, as might occur during curtailment
- Rationing Allowance
 - Prioritises a minimum quantity of gas to mitigate an extreme or high risk to the Victorian public that results from a prolonged disruption of supply, as might occur during rationing

Gas Emergency Management Consultative Forum

- GEMCF supports Vic Govt and the gas industry in their preparations for a gas emergency.
- GEMCF is a forum to share ideas on good practice emergency management, identify opportunities to enhance existing response frameworks and undertake an annual exercise to test readiness.
- GEMCF exercise held on 28 April. Some comments:
 - Emergency Protocol training provided
 - Communications processes to implement curtailment
 - Timelines for curtailment measures



For more information visit

aemo.com.au

DWGM LNG Reserve



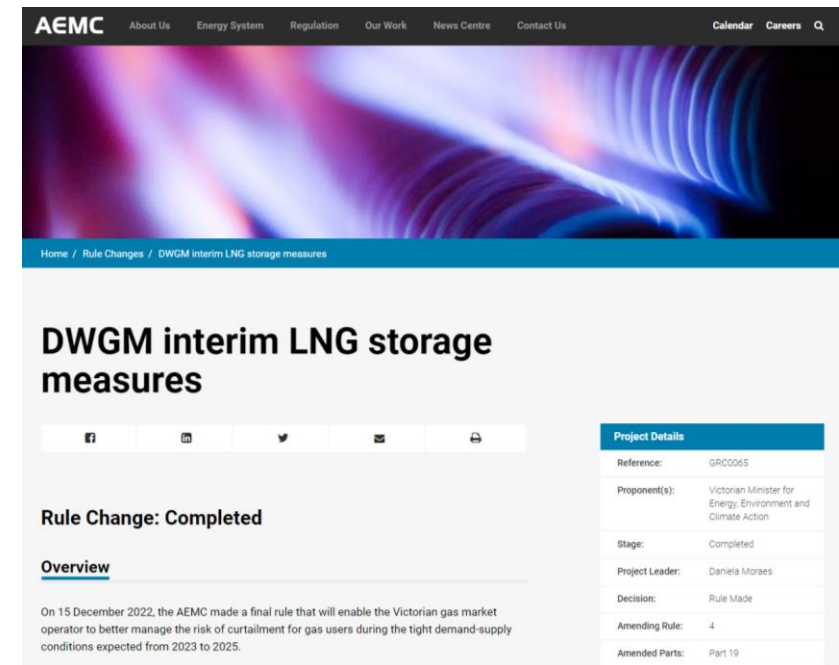
Agenda

1. Overview
2. Contracting LNG storage capacity
3. Acquiring and relinquishing stock
4. Operation of the reserve
5. Examples
6. Information provision



Overview

- Rule determination made by AEMC in December 2022
- AEMO is the buyer and supplier of last resort for Dandenong LNG storage facility
- Obligations in effect from 2023 to 2025
- Ensures that gas is available to more effectively manage threat to system security events even if market participants do not contract themselves



The screenshot shows the AEMC website with a navigation bar at the top containing links for About Us, Energy System, Regulation, Our Work, News Centre, and Contact Us. Below the navigation bar is a large banner image with a blue and purple abstract design. The main heading of the page is "DWGM interim LNG storage measures". Below the heading is a row of social media icons for Facebook, LinkedIn, Twitter, Email, and Print. The page is divided into two main sections: "Rule Change: Completed" and "Overview". The "Overview" section contains a paragraph stating: "On 15 December 2022, the AEMC made a final rule that will enable the Victorian gas market operator to better manage the risk of curtailment for gas users during the tight demand-supply conditions expected from 2023 to 2025." To the right of the main text is a "Project Details" table.

Project Details	
Reference:	GRC0065
Proponent(s):	Victorian Minister for Energy, Environment and Climate Action
Stage:	Completed
Project Leader:	Daniela Moraes
Decision:	Rule Made
Amending Rule:	4
Amended Parts:	Part 19

<https://www.aemc.gov.au/rule-changes/dwgm-interim-lng-storage-measures>

Contracting LNG storage capacity

- AEMO and APA are required to have an LNG Storage Agreement
- Any uncontracted capacity as at 1 March each year must be contracted by AEMO
- Any capacity that becomes available after 1 March may be contracted by AEMO
- AEMO must agree to a refill schedule with the LNG Storage Provider
- Refill schedule and any subsequent material changes are published to the market via System Wide Notice

Dandenong LNG refill schedule

Under rule 286C(1) of the NGR, AEMO is informing Market Participants that the LNG Storage Provider has provided AEMO with an updated refill schedule. Refill is expected to restart from gas day 08 May 2023. The daily refill schedule has been provided by the LNG Storage Provider below. Remaining refill quantity is 4195 tonnes and the hourly profile is expected to be flat.

AEMO	Tonnes
8/05/2023	75
9/05/2023	95
10/05/2023	95
11/05/2023	95
12/05/2023	95
13/05/2023	95
14/05/2023	95
15/05/2023	110
16/05/2023	110
17/05/2023	110

Acquisition of stock

- AEMO must obtain stock to reach the target level
- The target level is:
 - The highest level reasonably possible
 - Such other level determined by AEMO and approved by the Minister*
- AEMO purchases stock from market
- Demand forecast submitted for DTS withdrawals
- AEMO has last priority in refill (market participants and facility operator go first)

* NGR 282(5) – “extraordinary circumstances” needed to warrant lower target level

Relinquishment of stock

- AEMO may relinquish stock for three reasons
 1. LNG Storage Provider requests AEMO to relinquish stock as a market participant has made a request for services
 2. AEMO may also dispose of its LNG stock if the LNG Storage Provider undertakes maintenance that requires the disposal of LNG stock during the maintenance period.
 3. AEMO is not required by the rules to have a contract for use of LNG Storage Capacity and AEMO does not otherwise require capacity
- Process for relinquishment is outlined in the procedures
 - AEMO notifies market of quantity and price and requests offers
 - Offers made and payment required
 - Stock not sold during this process is injected into the DTS (where practical this quantity will be spread over multiple intervals/days to minimise disruption to market)
- AEMO will soon run an expedited consultation on the LNG Reserve Procedure to revise the timelines for relinquishment.

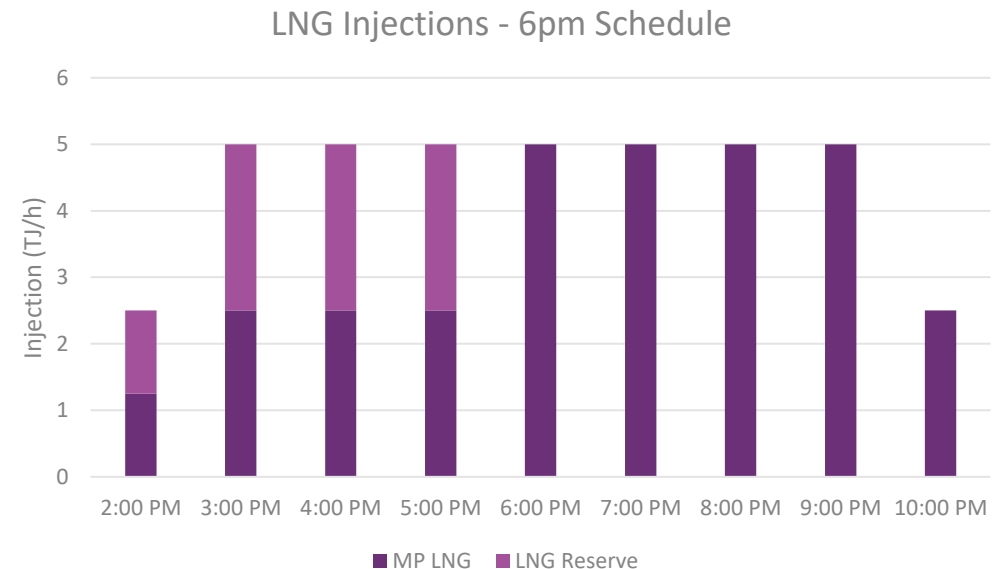
Operation of the LNG Reserve

- AEMO is the supplier of last resort – gas will only be scheduled when there is a threat to system security event, for example:
 - locational or temporal issues requiring gas from the LNG storage facility to be injected
 - insufficient supply to meet withdrawals
- LNG Reserve will only be used when all MP **bids** are exhausted
- Quantities from the LNG Reserve will be priced at VoLL (\$800/GJ)
- A standing accreditation of MHQ 0 GJ will prevent the LNG Reserve being scheduled unintentionally

Example 1

Peak shaving LNG

- 12.00pm Facility trip, demand higher than forecast
- 12.45pm
 - AEMO issues a threat to system security notice calling for a market response – 40 TJ LNG injections at Dandenong required
- 2pm schedule
 - Only 20 TJ of MP offers for LNG – all scheduled
 - 20 TJ scheduled from the LNG reserve
 - Injections scheduled 4pm-10pm hour (inclusive)
- 6pm schedule
 - Additional 20 TJ of MP offers made in respect to LNG (total now 40 TJ)
 - AEMO uses accreditation to constrain LNG Reserve so that only MP offers are scheduled from 6pm.
- AEMO continues to monitor and ends threat notice at EOD



Example 2

Insufficient injections to meet demand

- High demand day – supply constraints in SE Aust mean that the supply-demand balance is tight. Admin market state is in effect.
- 2pm schedule
 - Supply offers insufficient to meet demand (~40 TJ difference)
 - AEMO issues a threat to system security notice calling for a market response
- 6pm schedule
 - No change in market participant offers
 - AEMO schedules 40 TJ of injections from the LNG reserve
- AEMO continues to monitor and ends threat notice at EOD

Cost recovery / return of proceeds

- Injections and withdrawals associate with the LNG Reserve are treated the same as any other
- Imbalance, deviation, ancillary and uplift payments are calculated
- Monthly costs incurred for capacity and other related services
- At the end of every month the balance of the LNG account (positive or negative) is allocated to participants using an allocation factor
- The allocation factor is determined for each relevant year using the withdrawal allocation for the previous financial year

Reporting

- AEMO must publish reports no later than 1 May and 1 November that covers:
 - AEMO's LNG stock holding end of March (for 1 May) and end of Sep (for 1 Nov)
 - The following information about the prior 6-month period*:
 - Amount of LNG capacity procured
 - Amount of LNG stock procured
 - Costs incurred by AEMO in procuring capacity and stock
 - Amounts received by AEMO from selling gas to the market or transferring stock
- The first report has been published and is available via the [DWGM Market Operations page](#)

*October to March/ April to September

Pre-winter readiness

- 417.095 TJ of capacity has been acquired for the LNG Reserve (which includes 140 TJ for safe shutdown of gas network)
- AEMO has so far acquired 46.774 TJ of 277.095 TJ of stock needed to reach the target level
- BOC facility that undertakes liquefaction has experienced unplanned outages
- Refilling recommenced on 8 May, however it is now not expected to be end until mid-June

References and contact

- Rules – Part 19, Division 3, Subdivision 2 LNG Storage
- Wholesale Market LNG Reserve Procedures (Victoria)
- Wholesale Market Gas Scheduling Procedures (Victoria)

Questions

- About this presentation or procedures:
GasMarket.Monitoring@aemo.com.au
- Market outcomes: support.hub@aemo.com.au



For more information visit

aemo.com.au

Future Gas Reforms



AGENDA

1. East Coast Gas System Adequacy

- I. Review of Wallumbilla Gas Supply Hub and pipeline capacity trading framework
- II. Stage 2 reforms

2. Hydrogen and renewable gas reforms

- I. Victorian DWGM distributed facility integration
- II. Victorian Essential Services Commission - Remaking the Gas Distribution System Code of Practice

East Coast Gas System Adequacy

- Stage 2

Background

August 2022 Energy Ministers Meeting outlined three key actions;

- develop and progress a package of priority reforms to support a fit for purpose security and reliability framework to identify and respond to security of supply risks in the east coast gas market;
- develop and submit rule changes to improve the Wallumbilla Gas Supply Hub to increase flexibility and liquidity of gas markets when responding to demand and supply shocks; and
- further investigate options to extend a third party access framework for upstream gas infrastructure and gas storage facilities, as recommended by the ACCC, to ensure gas producers can access critical infrastructure.

East Coast Gas System Adequacy

- Stage 1 – Urgently extend AEMO’s powers and functions to manage supply shortfalls in east coast market prior to winter 2023
- Stage 2 – consider more formal tools to guide how or when AEMO deploys these powers, consultation on the more structured approach to occur beyond winter 2023
 - The EMM minutes, consultation papers, and industry presentations contained a high level outline of what the stage 2 reforms could contain.

East Coast Gas System Adequacy

- a Projected Assessment of System Adequacy (PASA) process and 'lack of reserve' framework, adapted for gas
- a reliability standard for the east coast gas market against which system security concerns and responses can be assessed and calibrated
- a framework to manage issues such as a gas Reliability and Emergency Reserve Trader (RERT) style framework
- Adapting and aligning longer-term gas forecasting and planning frameworks with the new gas security and reliability framework and proposed reliability standard
- mechanisms to improve cost allocation associated with system management actions and compensations

East Coast Gas System Adequacy

- Consideration of obligations on gas retailers and generators to provide information on the arrangements they have in place to meet the expected needs of their customers and actions they may need to take to meet minimum requirements including additional contracting of supply, transport or storage.
- Anonymised delivery in the Gas Supply Hub
- Harmonising prudential arrangements across east coast markets
- Third party access to upstream infrastructure and storage facilities

Hydrogen & Renewable gas reforms



- Law changes
- Market design changes
- Code changes

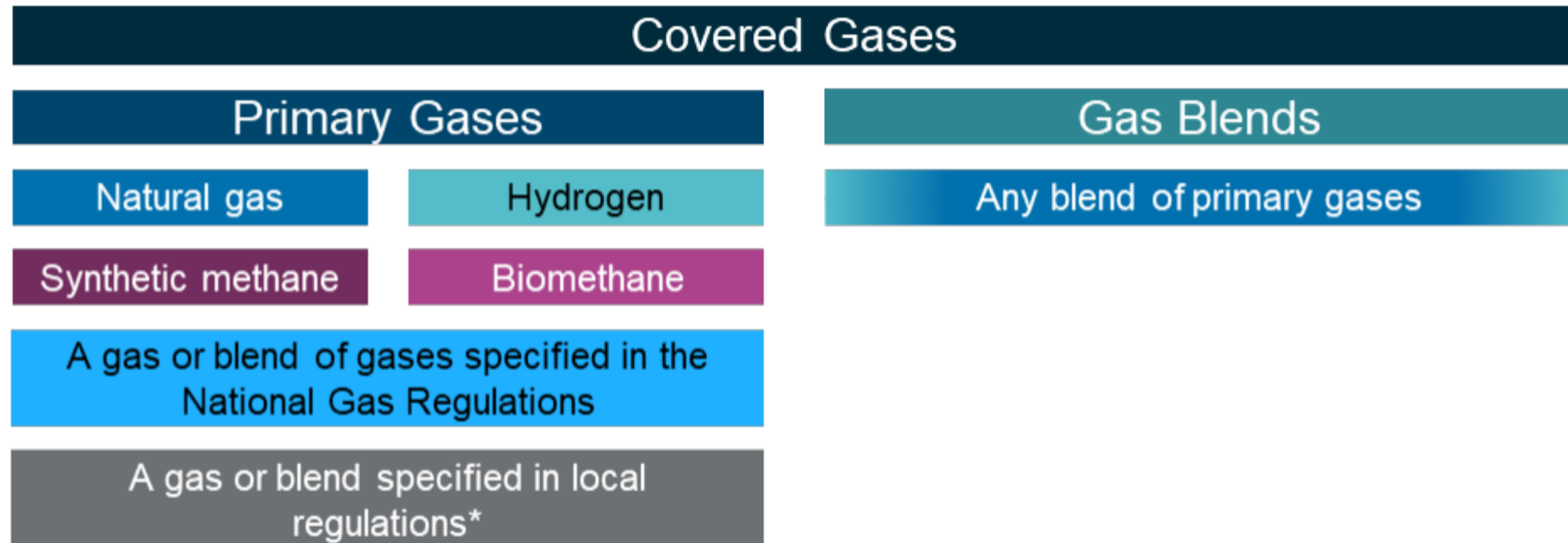
Background – Key Dates

- AEMC review commenced – August 2021
- Review expanded to include DWGM – October 2021
- Review completed – September 2022
 - Changes required to GBB, STTM, DWGM & NERL (Retail)
- Energy Ministers agreed to implement review – October 2022
- DWGM Rules (NGR) effective date – May 2025
- Laws (NGL) effective pending SA parliament – ~early 2025

Law changes

- The National Gas Law (NGL) will be extended from natural gas to 'covered gases', while the National Energy Retail Law (NERL) will be extended to 'natural gas equivalents' (NGEs).
- This will allow the National Gas Rules (NGR) and National Energy Retail Rules (NERR) to be extended to these gases.

What gas's are in scope?



*Applicable in that jurisdiction only

Components of change

- Extend the application of the pipeline access regime to transmission and distribution pipelines involved in the transportation of covered gases
- Extend the minimum ring-fencing requirements
- Allow the AEMC to extend the application of the market transparency mechanisms (i.e. the GSOO, Bulletin Board, VGPR, AER gas price reporting functions, etc)
- Allow all facilitated markets to deal with the wholesale supply of any covered gas

DWGM distribution connected facilities

- Connections
- Scheduling & Constraints
- Gas Quality & Metering

Background – Key Dates

- Rules (NGR) published – 8 Sept 2022
- AEMO Procedures publication – 1 Feb 2024
- AEMO Procedures effective date – 1 May 2024
- AEMO Pre-Production Systems for testing – ~1 Feb 2023
- AEMO Production Systems Go-Live – 1 May 2024
- Rules (NGR) effective date – 1 May 2024

DWGM Distribution Connected Facilities requirements

- Final Rules (NGR) were published on 8 September 2022, with an effective date of 1 May 2024
- AEMO also received a request from the Victorian Government to abolish the state-wide heating value, and move all retail customers to a zonal heating value.
- AEMO put together a project team to address the Distributed Connected Facility (DCF) rule changes, Hydrogen Integration (H2) and Zonal Heating Values (ZHV)

DCF Scheduling

Under the current rules, only facilities connected to the transmission system are allowed to sell gas on the DWGM

The new rules, effective 1 May 2024, will allow for distribution connected facilities to physically inject gas into a declared distribution system, and sell that gas on the DWGM

AEMO is currently developing the scheduling procedures for DCF's to cover the new rule changes

DCF Scheduling - Constraints

- AEMO and the DB's are working together to develop the Wholesale Market Distribution Operational Coordination Procedures.
 - Constraint methodology and limitations
 - Participant interface
 - Improved nodal demand forecasts for DCF's
- Net Bidding Facility Procedure
 - Classification of net bidding facilities
 - Operational requirements for net bidding facilities

Gas Quality implications

- Historically, AEMO has managed gas quality in the DTS through the Gas Quality Guidelines, monitoring plans with facility operators and standards for natural gas
- The new rules require AEMO to publish a Procedure detailing Gas Quality Monitoring requirements, and will encompass all of AEMO's previous gas quality documents
- These include
 - Standard gas quality specification for the DTS
 - Monitoring requirements, including standards and monitoring systems
 - Equipment to be used for monitoring systems, and standards for equipment
 - Gas quality monitoring plans and compliance monitoring
 - Temporary and permanent modifications to monitoring arrangements
 - Testing of monitoring systems

Gas Quality implications

The new guidelines will help AEMO to manage Gas Quality in the DTS by

- Streamlining the current process under one document
- Transparency for any new gas quality installations
- Document clear expectations for Gas Quality Monitoring Plans
- Clearly differentiate between transmission connected and distribution connected facilities



Metering Implications



As we add DCF's and H2 into the system, we must consider how these facilities will be metered

- DCF's will inject into distribution, but trade on the wholesale market
- Net bidding facilities, which are looking to blend their renewable gas with natural gas
- H2 has big impacts to metering by way of Heating values and compressibility impacts

Metering Implications

The new rule changes for DCF's and Hydrogen help to resolve some of these issues

- Expanding connection points to cover DCF's and net bidding facilities, requiring the same standard of metering as current CTMs
- A new procedure, Metering Installation Coordination Procedures to cover
 - Temporary changes and modification of metering installation
 - Metering installation monitoring and data failures
 - Audits and reporting requirements

To further address the metering impacts of DCF's and H2, AEMO is pursuing changes to the way Heating Values are determined and allocated in Victorian gas networks.

Victorian Gas Distribution System Code



- Metering
- Customer heating values

Background – Key Dates

This project is aligned with the DCF and H2 rule changes.

- AEMO Procedures publication – 21 September 2023
- AEMO Procedures effective date – 1 May 2024
- AEMO Pre-Production Systems for testing – ~1 Feb 2024
- AEMO Production Systems Go-Live – 1 May 2024

ZHV requirements

- ESC is updating the Gas Distribution System Code of Practice
 - ESC is investigating the option of removing references to heating values in the code.
 - This document holds the obligation for using state-wide HV's for Tariff V meters. This obligation would need to be added to AEMO's procedures
 - More information is available on their website,
<https://www.esc.vic.gov.au/electricity-and-gas/codes-guidelines-and-policies/gas-distribution-system-code-practice/reviewing-gas-distribution-system-code-practice>
- AEMO received a letter from the Victorian Government to implement Zonal Heating Values for all Victorian retail customers, with the key driver being AGIG's Murray Valley Hydrogen Park

Procedure changes

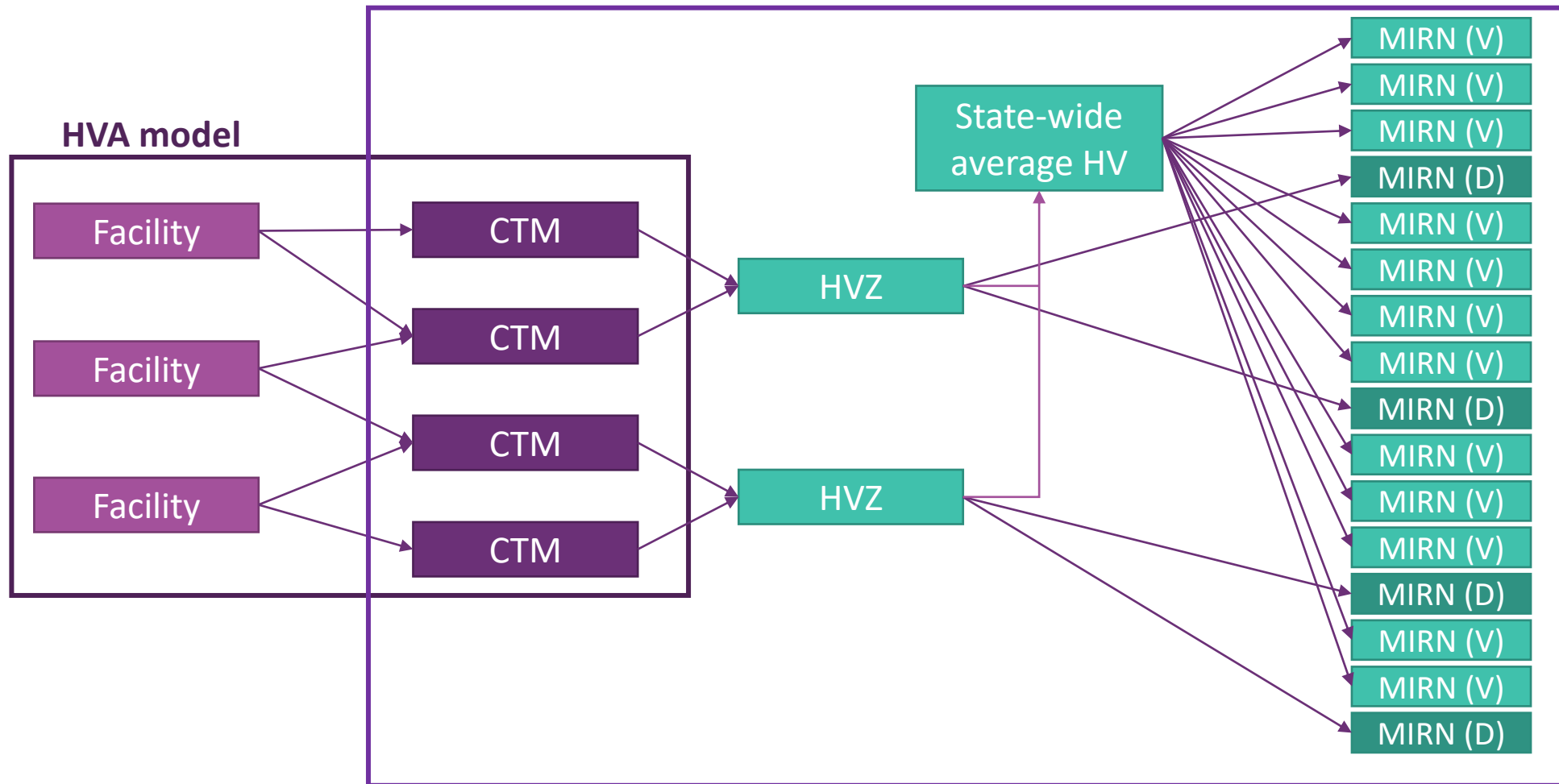
In order to move all customers away from the state-wide heating value, AEMO needs to update its procedures

- Update the Energy Calculation Procedures and Retail Market Procedures to use a zonal heating value
- Define how HVZ/CTM are to be assigned to MIRN's by distributors, and when the mapping is to be reviewed
- Add new MIBB reports for a daily zonal heating value, and a CTM to HVZ mapping report

Distribution Businesses consultation

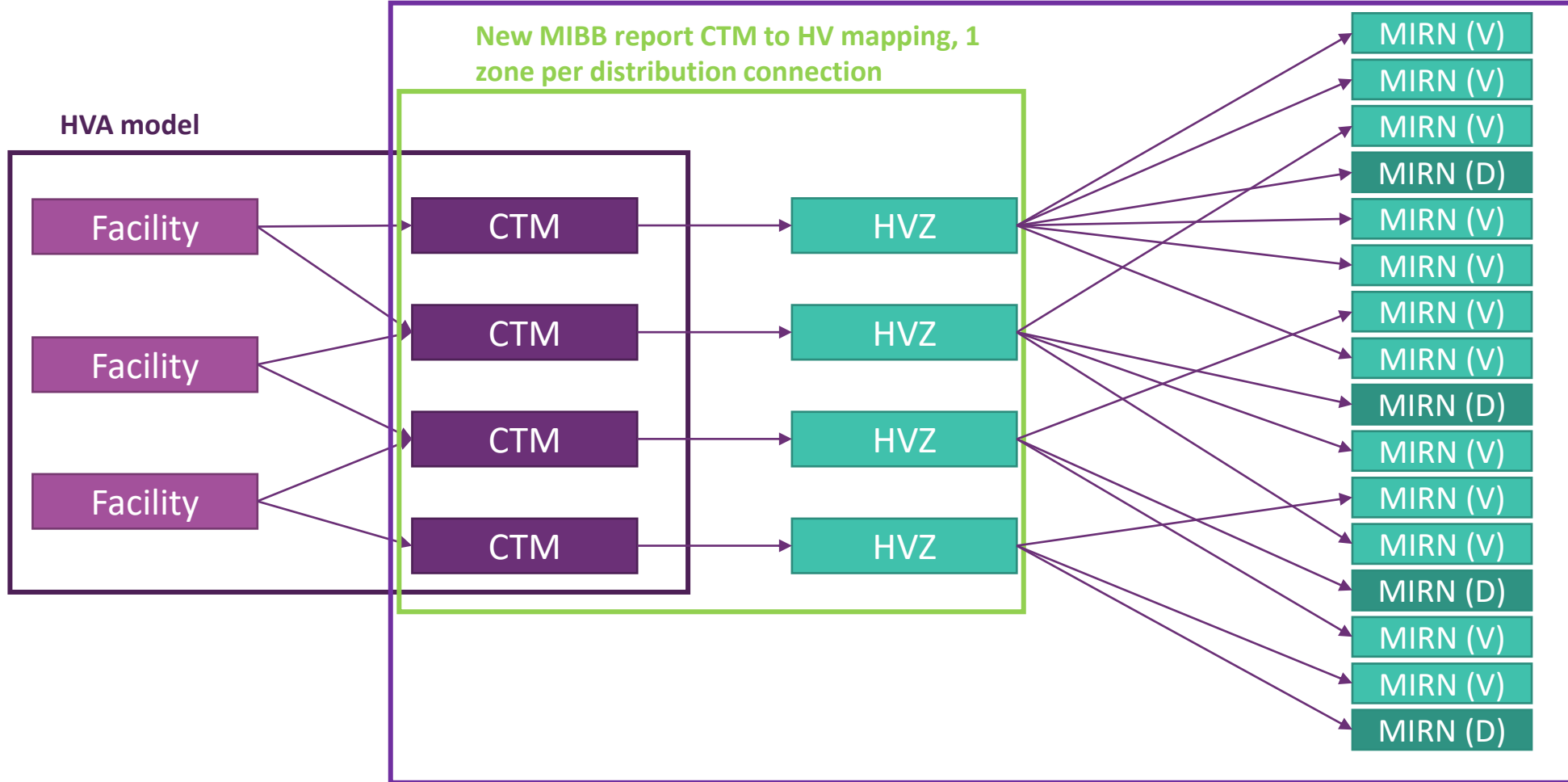
- A key component of the ZHV project will be to calculate the energy for all consumers using a zonal heating value, not the current state-wide heating value
- AEMO has also identified that as DCF's connect to the system, the current mapping of customers to HV zones using postcodes is not fit for purpose
- AEMO and the DB's are working toward a CTM to HV zone mapping, with each CTM having its own HV zone.
 - Moving from 43 zones to ~140 zones

Current HV allocation process (retail)



Tariff V uses state-wide Avg
Tariff D uses current HV zones, which are generally multiple CTM's

Proposed HV allocation process (retail)

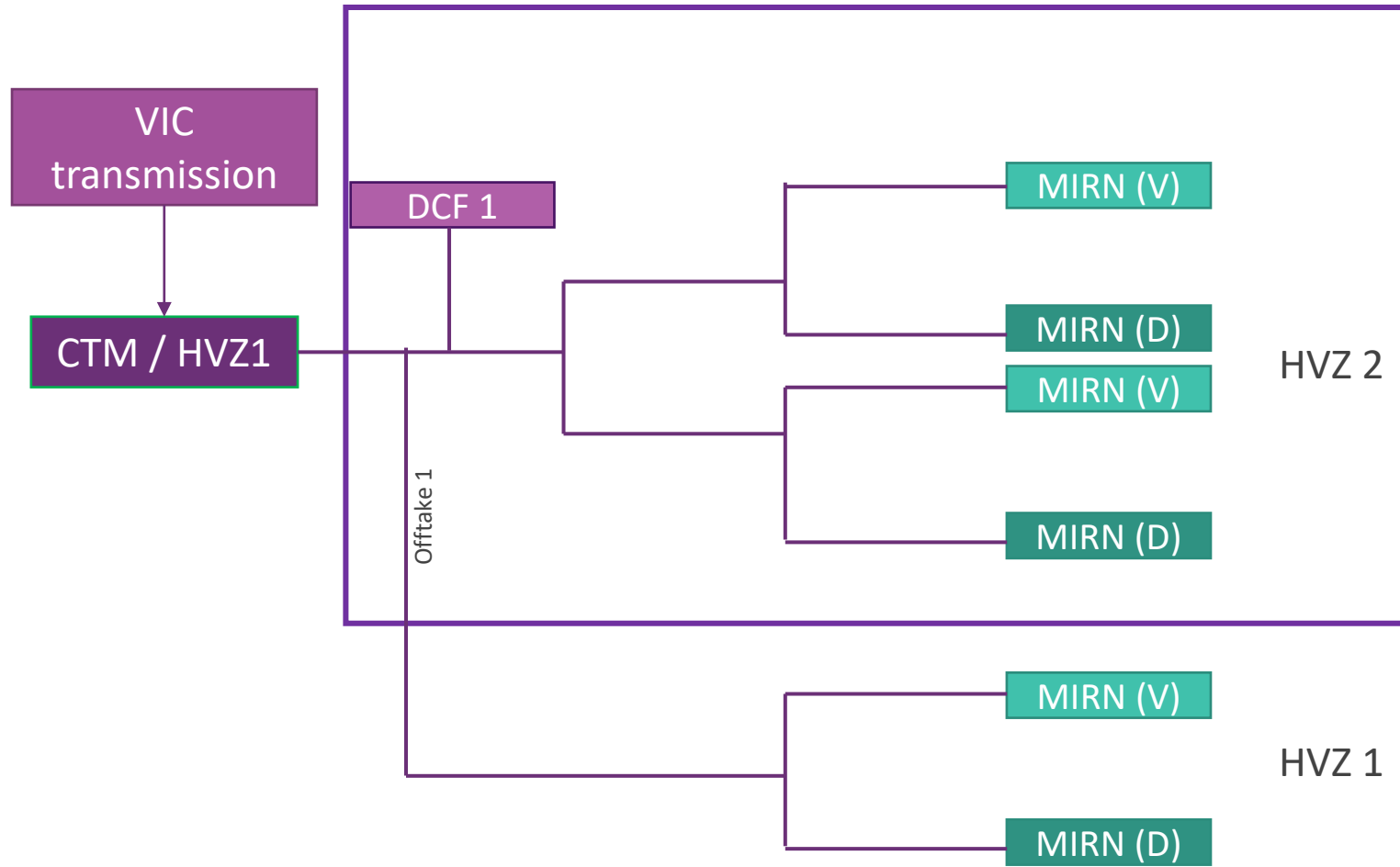


DB to map MIRN's to CTM's, and use new MIBB report to map to HVZ's

Heating Value Zone Allocation

- AEMO will allocate zones to CTM's
- DB's will determine the appropriate CTM to assign each MIRN to, based on predominant flow
- As DCF's are introduced, blended zones will be assigned where required

Blended HV zones



Calculation of blended HVs

- AEMO to work with DB's on a case by case basis
- Where possible, leverage the existing HVA model
- May require additional equipment to be installed for proper calculation of flows for use in the HVA model
 - Flow meters
 - Pressure meters
 - Gas Chromatographs



For more information visit

aemo.com.au