Intervention Report – Scheduling out-of-merit-order injections at Iona CPP to avert a threat to system security during Brooklyn Compressor Outage

Introduction

AEMO declared a threat to system security in the Victorian Declared Wholesale Gas Market (DWGM) for gas days between 18 April and 2 May 2016 during a planned outage of the Brooklyn Compressor Station.

Clause 351(1)(b) of the National Gas Rules (Part 19) requires that AEMO investigate and prepare a report following declaration of a threat to system security. Clause 351 also requires that AEMO assess and advise on:

- the adequacy of the provisions of the Rules relevant to the event or events;
- the appropriateness of actions taken by AEMO in relation to the event or events; and
- the costs incurred by AEMO and Registered participants as a consequence of responding to the event or events.

This report addresses each of these requirements.

Background

In December 2014, APA GasNet advised that it would commence planning for a full outage of the Brooklyn Compressor Station (BCS) to replace the station isolation valves to meet safety requirements.

The BCS is primarily used to:

- support gas exports into Iona underground gas storage at Port Campbell (Iona UGS);
- assist in balancing system linepack for efficient operations;
- support system demand in the Brooklyn to Lara Pipeline (BLP), South West Pipeline (SWP) and the Western Transmission System (WTS);
- support gas powered generation at Laverton; and
- maintain pressures above operating limits in the Brooklyn-Corio Pipeline and the Brooklyn-Ballan Pipeline on high demand days.

When the BCS is unavailable, net injections at the Iona close proximity points (Iona CPP) are required to meet demand that is supplied from the BLP, SWP and WTS.

AEMO and APA GasNet considered a number of possible outage alternatives during a series of maintenance coordination meetings in 2015. It was decided that completing this maintenance during a single outage period in April would result in the least disruption to DTS operation[1].

On 6 April 2016, AEMO issued a market notice advising participants of:

- a full outage of the Brooklyn Compressor Station to replace station isolation valves to meet safety requirements starting 18 April, with a planned completion date of 30 April 2016;
- the net injection requirements at the Iona CPP for supplying demand on the BLP, SWP and WTS, including a scheduling process whereby AEMO would:

[1] The consideration includes the impact on supporting the gas powered generation, refilling of the Iona Underground Gas Storage facility and maintaining minimum pressures at key points within the DTS for high demand days.

  - allow controllable withdrawal bids to be scheduled on the condition that there are sufficient physical injections at the Iona CPP to support the withdrawals and system demand on the BLP, SWP and WTS; and
  - restrict controllable withdrawal bids to be scheduled prior to calling on out-of-merit-order injections to avert the threat to system security, if insufficient net injections are likely to be scheduled; and
- notice that AEMO will declare a threat to system security, and schedule out-of-merit-order injections at the Iona CPP, if pressures on the BLP, SWP and WTS are forecast to fall below minimum operating limits.

On 11 April 2016, AEMO provided an overview of the outage to participants at the Gas Wholesale Consultative Forum meeting.

On 13 April 2016, AEMO held an industry conference to inform participants of the:

- scope of BCS work and operational impact on the DTS;
- DWGM scheduling process to be applied during this outage; and
- market notices that AEMO will issue, and the intent of these notices.

On 15 April 2016, AEMO issued a market notice seeking a market response to the threat to system security for the outage period from 18 to the 30 April. AEMO also sent notices seeking a market response, to advise on the threat, quantification of out-of-merit order injections, and to advise when the threat had subsided.

The outage was extended for an additional two days until 2 May 2016. BCS resumed normal operations from 6:00AM the 3 May 2016.

Scheduling outcome

The impact on scheduling outcomes is separated into three sections below:

- lost opportunity to withdraw gas at Iona CPP into the Iona UGS facility;
- scheduling of out-of-merit-order injections (above market price bids); and
- increased ancillary payments and uplift payments as a result of the scheduling out-of-merit-order injections.

Lost opportunity to withdraw gas at Iona CPP

To schedule the required net injections at Iona CPP during the Brooklyn Compressor Station outage, AEMO de-scheduled a total of 208 TJ of controllable withdrawals in the 6AM operating schedules during the period.

This de-scheduling of withdrawals occurred despite some market response during the BCS outage. It is likely that the de-scheduled withdrawal quantity would have been much higher in the absence of a market response. For example, the expected daily controllable withdrawal during the 15 day outage was approximately 100 TJ/d or a total of 1,500 TJ.

The table below lists the de-scheduled withdrawal quantities (in GJ) at the Iona CPP in the operating schedules for the gas days 18 April to 2 May 2016.

Gas Day	6AM Schedule	10AM Schedule	2PM Schedule	6PM Schedule	10PM Schedule
18-Apr-16	28,750	2,873	14,682	13,561	34,681
19-Apr-16	66,250	50,330	46,497	46,443	1,570
20-Apr-16	21,456	17,330	12,330	29,580	16,212
21-Apr-16	22,150	37,416	12,330	11,844	11,212
22-Apr-16	1,250	12,330	12,330	12,239	15,435
23-Apr-16	1,250	1,497	6,434	1,974	9,734

Gas Day	6AM Schedule	10AM Schedule	2PM Schedule	6PM Schedule	10PM Schedule
24-Apr-16	1,250	888	1,127	14,705	18,073
25-Apr-16	9,782	13,646	13,281	16,790	16,015
26-Apr-16	1,250	1,080	1,080	6,099	432
27-Apr-16	8,750	8,580	11,080	11,080	10,432
28-Apr-16	1,250	7,237	4,382	6,648	432
29-Apr-16	1,250	2,080	5,197	3,148	432
30-Apr-16	1,250	1,080	864	648	432
01-May-16	26,250	26,080	25,864	25,648	15,432
02-May-16	16,250	16,080	864	648	0

The changes in the withdrawal quantities between scheduling horizons were mainly due to intra-day re-bidding, which resulted in changes to the market price and therefore controllable withdrawal quantities in the pricing schedules.

Out-of-merit-order injection

In response to the threats to system security, AEMO scheduled the minimum required net injection at the Iona CPP, which included some out-of-merit-order injections (above market price bids). During the 15 day outage, AEMO scheduled a total of 223 TJ of out-of-merit-order injections in the 6AM operating schedules.

The table below lists the out-of-merit-order injections (in GJ) at the Iona CPP in the operating schedules for each gas day from 18 April to 2 May 2016.

Gas Day	6AM Schedule	10AM Schedule	2PM Schedule	6PM Schedule	10PM Schedule
18-Apr-16	13,097	0	0	0	509
19-Apr-16	12,497	7,399	3,919	2,539	0
20-Apr-16	12,572	1,321	0	8,292	1,882
21-Apr-16	14,472	1,464	1,191	1,254	455
22-Apr-16	23,172	8,582	6,865	5,149	3,433
23-Apr-16	21,497	6,000	4,800	3,600	2,400
24-Apr-16	432	0	0	0	5,493
25-Apr-16	15,497	2,914	2,331	248	0
26-Apr-16	16,797	13,998	0	0	0
27-Apr-16	16,597	1,331	1,065	799	532
28-Apr-16	16,197	9,332	7,465	5,598	3,732
29-Apr-16	16,797	18,999	14,827	10,220	5,582
30-Apr-16	9,997	8,331	6,665	2,749	1,833
01-May-16	20,197	16,832	13,465	10,099	6,733
02-May-16	13,022	717	2,818	430	0

The changes in the out-of-merit-order injection quantities between scheduling horizons were mainly due to intra-day re-bidding, which resulted in changes to the merit order bid stacks.

Market impact

The market impact resulting from the threats to system security are in the form of additional Ancillary Payments (AP) and corresponding Uplift Payments (UP).

The table below lists these payments by type for each gas day from 18 April to 2 May 2016.

Gas Day	Ancillary Payments ($)	Congestion Uplift Payments ($)	Surprise Uplift Payments ($)	Common Uplift Payments ($)
18-Apr-16	2,956	2,786	170	0
19-Apr-16	-18,357	-2,138	-16,219	2,539
20-Apr-16	32,996	20,291	9,102	3,603
21-Apr-16	42,796	41,850	946	0
22-Apr-16	27,270	24,474	2,796	0
23-Apr-16	21,892	19,442	2450	0
24-Apr-16	0	0	0	0
25-Apr-16	25,700	2,914	2,331	248
26-Apr-16	20,804	15,896	4908	0
27-Apr-16	15,810	12,399	3411	0
28-Apr-16	5,640	4,551	1,089	0
29-Apr-16	35,127	25,235	9,893	0
30-Apr-16	12,705	9,876	2,829	0
01-May-16	4,544	4,544	0	0
02-May-16	1,346	1,258	88	0

The key results can be summarised as follows:

- The total APs associated with the out-of-merit order injections at Iona CPP during the period 18 April to 2 May 2016 are approximately $231,000.
- The non-positive AP values seen on gas days 19 April[2] and 24 April 2016 were primarily due to some participants nominating their scheduled injections as an uplift hedge, which rendered their out-of-merit-order scheduled injections ineligible for ancillary payments.
- Uplift payments were categorised as approximately 88% congestion uplift, 11% surprise uplift, and 1% common uplift.
    - Congestion uplift is allocated to participants when their daily profiled demand forecasts and scheduled controllable withdrawals exceed their AMIQ (profiled uplift hedge).
    - Surprise uplift is allocated to participants who were deemed to have worsened the constraint at reschedules. For example, when participants under-inject or over-withdraw in the preceding schedule (for positive APs).
    - Common uplift is any remaining uplift that cannot be allocated as congestion or surprise uplift, and is applied across participants in proportion to their actual withdrawal quantities over a gas day.

Adequacy of the NGR

In respect of this event, AEMO has assessed the application and adequacy of NGR provisions relating to maintenance approval, market notices, and this intervention report.

Maintenance approval

NGR 326(1) requires that AEMO coordinate maintenaince to ensure that system security is not threatened, while NGR 326(4) requires AEMO and service providers to cooperate to minimise any threat to system security.

[2] Please refer to the GWCF paper 12-017-01 'Impact of Negative APs on settlement outcome' for further explanation of negative APs

In this case, AEMO determined that completing this maintenance, would result in a potential threat to system security which could not be resolved through coordination. In addition, the proposed maintenance approach would minimise the threat compared with other maintenance options, or deferring maintenance (given that the existing station isolation valves failed to meet critical safety requirements).

AEMO finds that these NGR provisions were applied correctly in this case, though NGR 326(1) could be better clarified to acknowledge that coordination may not be sufficient to remove all threats to system security associated with planned maintenance activities.

Market notice

NGR 342 requires that when AEMO identifies a potential threat to system security, it must notify Registered participants as soon as practicable – including details of the nature and location of potential threat, and AEMO's estimate on whether intervention will be required.

In this case, AEMO issued a market notice on 6 April 2016 advising Registered participants of the planned BCS outage between 18 and 30 May, and its impact on DWGM operations. An industry conference was held on 13 April to explain the scope of maintenance, proposed AEMO scheduling process, and market notification protocol.

On 15 April 2016, AEMO issued a market notice seeking market response to the threat to system security for the outage period from 18 to the 30 April.

In this case, after seeking a market response, and assessing the response provided, AEMO determined that it was necessary to schedule net injections at Iona CPP to balance system demand – by both restricting controllable withdrawals, and calling on out-of-merit-order injections.

AEMO subsequently issued a series of notices seeking market responses when the out-of-merit-order injections were forecast for Iona CPP, when such injections were used due to the declared threat on the current gas day, and when the threat had subsided after publication of the 10PM operating schedule each day.

AEMO finds that these NGR provisions are adequate, and were applied correctly in this case.

Intervention report

NGR 351 requires that AEMO must investigate and prepare a report on the circumstances and impact of a declared threat to system security and subsequent intervention. This report must be prepared within 10 business days after the event concludes.

AEMO finds that these NGR provisions were applied correctly in this case, however believes that a 20 business day timeframe would be more appropriate to ensure adequate analysis – particularly for more complicated market scenarios or significant events.

Conclusions

AEMO declared a threat to system security in the Victorian DWGM for the gas days starting 18 April through to 2 May 2016 during a planned outage of the Brooklyn Compressor Station.

In particular, over the 15 day outage period, AEMO de-scheduled 208 TJ of controllable withdrawals and scheduled a total of 223 TJ of out-of-merit-order injections in the 6AM schedules. This resulted in approximately $231,000 of additional ancillary and uplift payments. This uplift was categorised as approximately 88% congestion uplift, 11% surprise uplift, and 1% common uplift.

Following this event, AEMO has assessed the application and adequacy of associated NGR provisions, and finds that these provisions were applied correctly.