

# MARKET EVENT REPORT

## Scheduling Error Affecting Dispatch of Mintaro Gas Turbine Station

PREPARED BY: Electricity Market Operations Performance

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## 1 Introduction

A constraint equation was designed to maintain flow on the Mintaro to Waterloo 132kV transmission line in South Australia below its continuous rating. This constraint equation is known as S>NIL\_NIL\_MNWT<sup>1</sup>, and it was not formulated in accordance with AEMO processes for the formulation of co-optimised constraint equations. As a consequence, AEMO has determined that a scheduling error occurred for those dispatch intervals in which this constraint bound during the period from 19 May 2009 to 14 January 2010.

S>NIL\_NIL\_MNWT did not include all relevant terms on the left hand side and affected the dispatch of Mintaro Gas Turbine Station whenever it bound. On 14 January 2010 it was reformulated to include all relevant interconnectors and generating units on the left hand side.

## 2 Background

Figure 1 shows a simplified diagram of the transmission system surrounding the Mintaro Gas Turbine Station. The system connects to the Victorian region through Waterloo to the Murraylink interconnector, and to the main South Australian grid through Para.

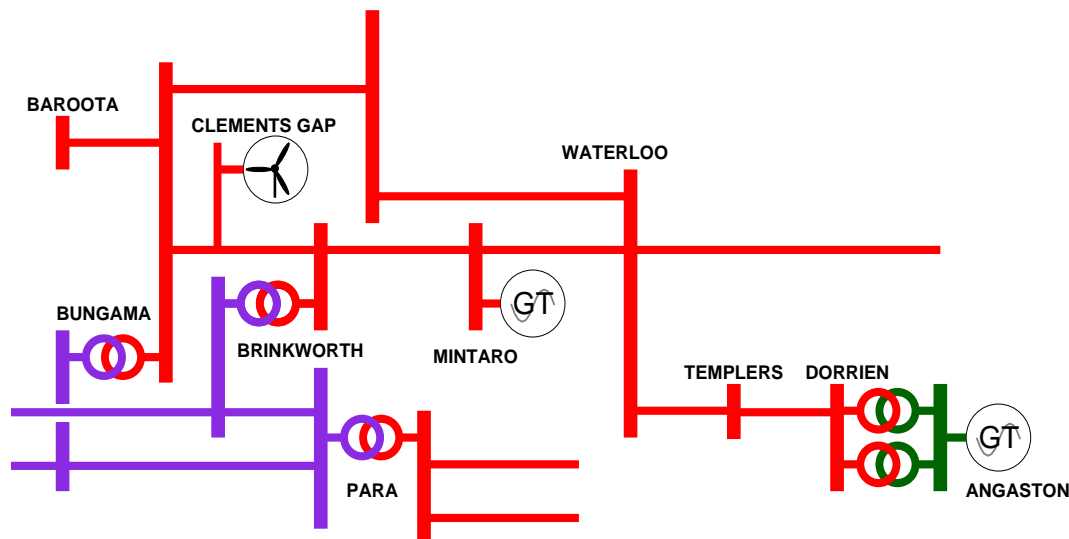


Figure 1 Mintaro Waterloo Single Line Diagram

S>NIL\_NIL\_MNWT was developed because a change in the power system configuration had led to contingency violations on certain transmission lines in South Australia. In order to deal with those violations, several constraint equations were formulated. S>NIL\_NIL\_MNWT was created to ensure that flow on the Mintaro-Waterloo line remained less than the continuous rating in a variety of post-contingent circumstances. While a number of generating units and Murraylink contribute to flow on the line in a number of post-contingent circumstances, only Mintaro was a material contributor to flow in all relevant circumstances. Therefore, only Mintaro was represented in S>NIL\_NIL\_MNWT.

S>NIL\_NIL\_MNWT was initially formulated and invoked on 23 July 2008 coinciding with a prior outage on that day. Constraint equations covering this area were reviewed in May 2009. S>NIL\_NIL\_MNWT was revoked on 14 January 2010.

Also in May 2009, other system normal constraint equations had been formulated for post-contingency circumstances for use following specific contingencies using 15-minute ratings. When S>NIL\_NIL\_MNWT (which covered an array of contingencies) was formulated, it was anticipated it would not bind under system normal conditions however, it bound during January, May and November 2009 and January 2010.

<sup>1</sup> The formulation of the constraint equation is provided in Appendix 5.1

AEMO believes this occurred because of an increase in the 15-minute rating of the line without a corresponding increase in the continuous rating. This increased the likelihood of the flow on the Mintaro-Waterloo line reaching the continuous rating without the occurrence of a contingency.

### 3 Scheduling Error

Under clause 3.8.24(a)(2) of the National Electricity Rules, a scheduling error occurs when AEMO declares that it failed to follow the central dispatch process set out in rule 3.8.

AEMO understands the essence of the scheduling error concept is that it is a failure to follow the central dispatch process rather than a failure to achieve a particular result. In determining when this scheduling error occurred, AEMO’s processes for formulating constraint equations are considered to be part of the central dispatch process.

On 19 May 2009, AEMO completed a review of constraint equations used to manage network flows in the vicinity of Mintaro-Waterloo line in preparation for commissioning of Clements Gap Wind Farm. This review resulted in a change to the constraint equation to manage flows on the Mintaro-Waterloo transmission line for loss of the Brinkworth to Para 132kV line.

However, S>NIL\_NIL\_MNWT was not changed despite its being inconsistent with AEMO’s procedures to formulate a co-optimised constraint formulation, having regard to the fact that the constraint equation had been binding during system normal conditions. AEMO has determined the scheduling error was made at this time.

The use of S>NIL\_NIL\_MNWT was not reviewed until a complaint about its use was made on 13 January 2010. On 14 January 2010, AEMO amended it and renamed it S>>V\_NIL\_NIL\_MNWT<sup>2</sup>. This new constraint equation included terms representing other plant (Angaston Power Station, Clements Gap Wind Farm, and the Murraylink interconnector) on the left hand side.

Figure 2 shows the dispatch intervals affected by S>NIL\_NIL\_MNWT, including the period from when it was originally invoked until the scheduling error was declared. A total of 265 dispatch intervals were affected by it with 142 dispatch intervals affected by the scheduling error (ie after 19 May 2009) and are listed in Appendix 5.3.

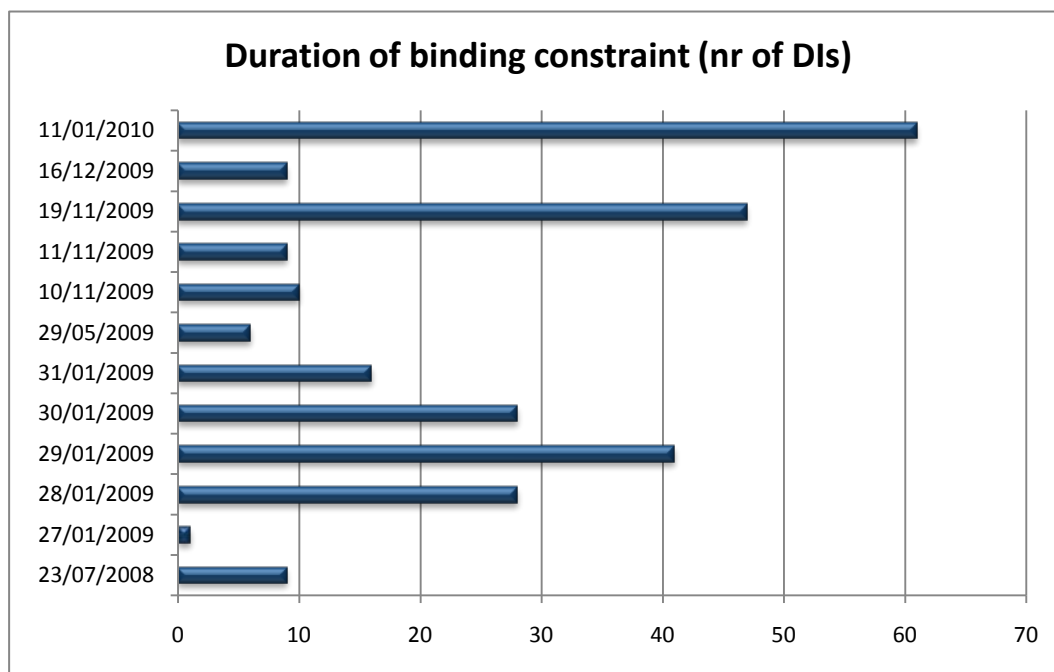


Figure 2 Duration of S>NIL\_NIL\_MNWT binding: 23 July 2008 – 24 January 2010

<sup>2</sup> The formulation of the constraint equation is provided in Appendix 5.2.

## 4 Impact of the Scheduling Error

S>NIL\_NIL\_MNWT affected the dispatch of Mintaro Gas Turbine Station, which was the only term on the left hand side. AEMO does not consider other Generators would have been constrained-on or constrained-off by it.

The scheduling error has impacted on dispatch of Mintaro, generally by constraining Mintaro more than would have been expected with the correct constraint equation. However, in some intervals Mintaro has been constrained less than would have been expected. The range of the impact on Mintaro is 10 MW dispatched higher than expected to 18 MW dispatched lower than expected.

## 5 Appendix

### 5.1 Constraint Equation S>NIL\_NIL\_MNWT

**Effective date:** 23/07/2008

**Constraint description:** Out = Nil; Limit Mintaro generation to avoid Mintaro-Waterloo line OL (continuous rating)

**Impact:** SA Generation + Interconnectors

**Limit type:** Thermal

**Reason:** Maintain Mintaro - Waterloo line flow below the continuous rating

#### LHS

+ Mintaro GT

#### RHS

-1 x [SMVA flow on Mintaro to Waterloo 132kV line at Mintaro]

+ 0.9 x SA: Mintaro - Waterloo 132kV line continuous rating

+ Mintaro GT

### 5.2 Co-optimised Constraint Equation S>>V\_NIL\_NIL\_MNWT

**Effective date:** 14/01/2010

**Constraint description:** Out = Nil; Limit Mintaro generation to avoid Mintaro-Waterloo line OL (continuous rating)

**Impact:** SA Generation + Interconnectors

**Limit type:** Thermal

**Reason:** Maintain Mintaro - Waterloo line flow below the continuous rating

#### LHS

0.314304 x Clements Gap wind farm

-0.191024 x Angaston GT unit 1

-0.191024 x Angaston GT unit 2

+ Mintaro GT

-0.178408 x MW flow west on the Murraylink DC Interconnector

#### RHS

1.594267 x (-1 x [SMVA flow on Mintaro to Waterloo 132kV line at Mintaro])

+ SA: Mintaro - Waterloo 132kV line continuous rating

- 10 {Margin}

+ 0.314304 x [Clements Gap wind farm]

+ Mintaro GT

- 0.191024 x [Angaston GT unit 1]

- 0.191024 x [Angaston GT unit 2]

- 0.178408 x [MW flow west on the Murraylink DC Interconnector]

### **5.3 List of Affected Dispatch Intervals**

29 May 2009: 08:05 to 08:30

10 November 2009: 14:35 to 15:20

11 November 2009: 14:35 to 15:15

19 November 2009: 12:00 to 14:50, 15:35 to 16:15, 16:25, 17:00 to 17:05

16 December 2009: 13:25, 13:35, 13:55 to 14:25

11 January 2010: 12:35 to 17:35