G Interaction between the Southern Generators Rule and the South Morang Constraint

In two submissions to the Commission, Snowy Hydro argued that the Southern Generators Rule creates market problems and dispatch inefficiencies because of the way it interacts with the South Morang constraint.[499] Snowy Hydro claimed that this was leading to both Murray generation being dis-incentivised to act as a positive gatekeeper for Victoria to New South Wales (NSW) flows, and counter-price flows from Victoria to South Australia and Tasmania. In two separate submissions, the "Southern Generators"[500] disagreed, contending that the problems raised by Snowy Hydro were caused by the underlying physical network, and previously disguised by the National Electricity Market Management Company (NEMMCO) clamping interventions.[501]

This Appendix assesses the arguments made by Snowy Hydro and the Southern Generators on the interaction between the Southern Generators Rule and the incidence of binding of the South Morang constraint, and puts forward the Commission's position on this issue. The purpose of this Appendix is to consider the merits of the arguments made by Snowy Hydro and the Southern Generators. It does not provide an analytical comparison of how each of the different Rule change proposals interacts with the South Morang constraint.

In preparing this Appendix, the Commission has had regard to the submissions prepared by Snowy Hydro and the Southern Generators on this issue. The Commission requested Dr Darryl Biggar to analyse the claims presented by Snowy Hydro and the Southern Generators. This Appendix also incorporates Dr Biggar findings.

This Appendix begins by explaining the South Morang constraint and the Southern Generators Rule. The next Section sets out the arguments presented in the various Southern Generators' and Snowy Hydro submissions. It then explains the pricing relationship between various regions when the constraints under consideration bind, before analysing each of the positions put forward and presenting the Commission's conclusion.

---

499 Snowy Hydro, "Extension of the expiry date for the Snowy CSP/CSC Trial and NEMMCO's power to manage negative residues", 29 January 2007; and Snowy Hydro, "Supplementary Submission to Snowy Region Boundary Change and Southern Generators Rule Extension", 26 March 2007.

500 The Southern Generators group includes: Loy Yang Marketing Management Company Pty. Ltd., AGL Hydro Pty. Ltd., International Power (Hazelwood, Synergen, Pelican Point and Loy Yang B), TRUenergy Pty. Ltd., Flinders Power, and Hydro Tasmania.

501 Southern Generators, "Submission on Draft Rule Determination – Abolition of the Snowy Region: Response to Snowy Hydro Ltd. letter to AEMC dated 29th January 2007", 8 March 2007; and Southern Generators, "Supplementary Submission to Snowy Region Boundary Change and Southern Generators Rule Extension", 24 April 2007.

G.1 The South Morang constraint

Victorian exports to the Snowy region are limited by both transient stability and thermal considerations. The transient stability constraint manages stability for faults on the lines between Hazelwood Terminal Station to South Morang Terminal Station.[502] The thermal limit relates to the thermal ratings of the (1) South Morang to Dederang 300 kV line; and (2) South Morang 500/330 kV (F2) transformer (South Morang F2 transformer).

The South Morang F2 transformer constraint is one of the more frequently binding constraints in the National Electricity Market (NEM) (as discussed below in Section G.1.2). There are currently two constraints that represent this transformer limit.[503] The first is a pre-contingent overload constraint that reflects the normal continuous rating of the F2 transformers. The post-contingent overload constraint reflects a 15 minute rating for the transformers, if required; this rating tends to be higher than that under the pre-contingent constraint form.

The constraint referred to in Snowy Hydro submission is the post-contingent constraint for overloading the South Morang F2 transformer.[504] Snowy Hydro did not refer to the South Morang to Dederang 300 kV line thermal constraint, the transient stability constraint, or the thermal pre-contingency constraint for the South Morang F2 transformer.

The remainder of this Section discusses the terms that form the South Morang constraint, considers the historical experience of the binding of this constraint, and presents evidence on the potential for network investment to relieve the constraint.

G.1.1 Characterising the South Morang F2 transformer constraint

Both the pre-contingent and post-contingent constraint equations have a large number of terms on the left hand side (LHS). In simple terms variables on the LHS of a constraint equation can be optimised or controlled within the dispatch process, such as generation output. In contrast, variables on the right hand side (RHS) of a constraint equation are assumed to remain unchanged from their most recently measured value. Each term in a constraint equation is multiplied by a coefficient that reflects the effect a change in the respective market factor would have on the constraint. For a generation unit, if its coefficient is positive, an increase in that generator's output would increase pressure on the constraint. If the coefficient is

---

502 In the past, the most constraining influence on Victorian exports to the Snowy region was the constraint used to manage the transient stability for a fault on a Hazelwood Terminal Station to South Morang Terminal Station. Constraints relating to this limit bound a total of 597 hours in 2004/05 but did not bind in 2005/06. Instead, this constraint limited flows from Victoria to South Australia during 2005/06.

503 The constraint representing the South Morang F2 transformer has changed several times over the past few years. It was formulated as a fully co-optimised constraint on 17 August 2005, and was subsequently updated on 24 July 2006, and again on 6 March 2007. The pre contingent overload constraint is labelled V>>V_NIL_2_R and the post contingent equation is labelled V>>V_NIL_3_R. In July 2006, each equation was further divided into 2 separate equations.

504 This is the V>>V_NIL_3B_R constraint.

negative, greater output from that generator would help relieve the constraint. The larger the coefficient, the greater the effect the factor has on the constraint, either positive or negative.

The LHS variables in the South Morang thermal constraint equations include the Latrobe Valley generators,[505] northern Victoria hydro generators (e.g. Southern Hydro), and export flows from South Australia and Tasmania. The Latrobe Valley generators and export flows from Tasmania and South Australia all have positive coefficients, indicating increased generation or flows place pressure on the constraint. The coefficients for the South Australian export flows are smaller than those others, meaning while additional flows place pressure on the constraint, they place less pressure relative to increased generation from the Latrobe Valley, for example. The northern Victoria generators have negative coefficients.

When the South Morang constraints bind, generators in Victoria (especially in the Latrobe Valley) can find themselves being constrained-off. As discussed in Appendix A, this means they are missing out on being dispatched even though their offer price is below the (Victorian) regional reference price (RRP). This can give rise to mis-pricing at virtually all the connection points in Victoria (with Valley Power and Yallourn being the only connection points not mis-priced). On the other hand, hydro generation in northern Victoria, like Southern Hydro, can find themselves constrained-on when the constraints bind, meaning they are being dispatched and settled at prices below their offer price.

G.1.2 Incidence of binding of the South Morang constraint

As noted above, the South Morang F2 transformer constraint has been one of the more frequently binding constraints since the commencement of the market start in 1998. Appendix F details the historical data on constraint binding between the Snowy region and the Victorian and NSW regional reference nodes (RRNs) over the four year period from financial year 2003/04 to 2006/07, inclusive. Table F.6 contains the frequency of binding constraints on flows from Victoria to Snowy. Observations from that data relevant to this discussion include:

- Stability constraints overwhelmingly limit export flows from Victoria to Snowy;
- Thermal constraints relating to the South Morang F2 transformer were the second most frequent limitation on Victoria to Snowy flows;
- The thermal constraint for the Dederang to South Morang line does not appear to bind; and
- There has been a significant increase in incidences of binding constraints between Victoria and Snowy over the period over the period 2005/06 to 2006/07, with the number of five-minute dispatch intervals binding increasing from 2,770 to 7,192 (around 259%). The incidence of binding for the South Morang F2 transformer

[505] The Latrobe Valley generators include: Yallourn, Hazelwood TS, Loy Yang A & B, Jerralang, Morwell, and Hazelwood.

constraint increased from 850 to 3,631 (around 428%) while the stability constraints increased from 1,545 to 2,284 intervals (around 148%).

We consider the likely reasons for the frequent binding of the South Morang constraint in Section G.8 below.

G.1.3 Future investment to address the South Morang constraint

VENCorp, the Victorian transmission network operator, has recently committed to an augmentation of the South Morang terminal station. These works at South Morang will improve the Victorian export transfer capability, therefore improving flows between the Victorian and Snowy regions. Work is currently underway at the South Morang Terminal Station, including the establishment of a switchyard and the installation of two transformers. This work will see the transfer of existing load from the Thomastown terminal station to a new connection point at South Morang, and the transfer of the Somerton power station from its existing connection point within the Thomastown network to the new network supplied from South Morang Terminal Station. This augmentation will relieve the thermal rating limit constraints for the South Morang transformer.

In its 2007 Annual Planning Report, VENCorp indicated that there was no justifiable solution to the loading on the Dederang – South Morang line in the short term (i.e. five-year outlook). While there are options available to address this problem, such as the up-rating of the lines or the installation of a third line between Dederang and South Morang, VENCorp does not consider the market benefits associated with these options sufficient enough to justify the augmentation. VENCorp considers that the system normal constraints associated with this line can be economically managed until at least 2011/12.

G.2 Southern Generators Rule

On 14 September 2006, the Commission accepted the Southern Generators' and NEMMCO's Rule proposal (Southern Generators Rule) for an interim mechanism to manage negative residues in the Snowy region.[506] The Rule commenced on 1 November 2006.

The Southern Generators Rule introduces a new process for managing negative settlement residues (negative residues) in the Snowy region. Negative residues in the Snowy region are an issue due to the looped network configuration in that part of the NEM, and the location of the Snowy RRN on that loop. Appendix D describes both the physical properties and the pricing implications of this loop when the line between Murray and Tumut constrains.

In summary, for northward flows, when the Murray-Tumut constraint binds, increased output at Murray places the most pressure on the constraint relative to an increase in power injected anywhere else on the loop (including the Victorian RRN). Accordingly, the value of generation at Murray is less than the value of generation at

[506] AEMC 2006, *Management of Negative Settlement Residues in the Snowy Region*, Final Rule Determination, 14 September 2006, Sydney.

the Victorian RRN. Since Murray is also the location of the RRN for the Snowy region, this results in the Snowy RRP being lower than the Victorian RRP, leading to negative residues on the Victoria-Snowy directional interconnector.

As also discussed in Appendix D, these negative settlement residues were historically managed by intervention by NEMMCO for non-system security reasons. NEMMCO would previously intervene, by imposing an alternative constraint equation to restrict flow on the Victoria–to-Snowy interconnector (or "clamping"), to manage the accumulation of negative residues. Instead, the Southern Generators Rule enables NEMMCO to offset negative settlement residues on the interconnector between the Victoria and Snowy regions using positive residues accumulated on the interconnector between the Snowy and NSW regions. The Southern Generators Rule eliminates the need for NEMMCO intervention in market dispatch by reducing the risk of negative residues arising on the Victoria-Snowy interconnector.

G.3 Snowy Hydro and Southern Generators' arguments

This Section presents the arguments raised by Snowy Hydro and the Southern Generators in relation to the South Morang constraint their submissions.

G.3.1 Snowy Hydro

Snowy Hydro considers that the Southern Generators Rule has led to increased mis-pricing for almost all of the Latrobe Valley generators, resulting in decreased dispatch efficiency. Snowy Hydro claims that this is due to the way the Southern Generators Rule interacts with the South Morang constraint.

In its supplementary submission, Snowy Hydro presents analysis on the pricing relationships between RRPs when either or both the South Morang or Murray-Tumut constraints bind. It states that when the South Morang thermal constraint is binding, there is a relationship between the Victorian price, the Snowy region price, and what they refer to as "generation behind the South Morang constraint". When the Murray-Tumut constraint is also binding, Snowy Hydro also presents a relationship between the Victorian price, the NSW price, the Snowy price, and "generation behind the South Morang constraint." Snowy Hydro indicates that the generation behind the South Morang constraint refers to generation in South Australia and the Latrobe Valley, as well as exports into Victoria from Tasmania.

Snowy Hydro argues that as a result of these pricing relationships, whenever the Murray-Tumut constraint binds the Victorian price is defined by marginal generator offers in NSW and at Murray. It argues that under these conditions the Latrobe Valley generators are unable directly influence the Victorian price. As there is no price/volume trade off facing these generators, Snowy Hydro contends that these generators will seek to maximise volume against the Victorian RRP, which leads to them bidding in a disorderly manner (as low as -$1,000/MW) in order to get dispatched. Snowy Hydro argues that this results in Latrobe Valley generation displacing both South Australian and Tasmanian generation, and an increase in binding of the South Morang constraint.

Snowy Hydro argues that these outcomes have a number of negative implications. First, these outcomes can lead to counter price flows from Victoria to both South Australia and Tasmania. They can also reduce transfers north to the Snowy and NSW regions. This is because South Australian generation places less pressure on the South Morang constraint than Latrobe Valley generation, as discussed in Section G.1. Replacing South Australian generation with Latrobe Valley generation as a result of disorderly bidding therefore increases the likelihood of the South Morang constraint binding, limiting transfers north.

Furthermore, Snowy Hydro argues that in situations when the South Morang constraint binds, the Southern Generator Rule dis-incentivises generation at Murray, which could actually help relieve that constraint. Under the current regional structure, Murray generation is settled at its local price as it is located at the Snowy RRN. When flows are northward, and the Murray-Tumut constraint binds, the Snowy RRP will often be below the Victorian RRN due to the pricing around the loop in the Snowy region. Snowy Hydro reasons therefore that that it is dis-incentivised to increase Murray generation, since doing so may result in the constraint binding, leading to Murray output facing a lower RRP. It states, therefore, that it is not incentivised to act as a positive gatekeeper for Victoria to Snowy flows when both the Murray-Tumut and South Morang constraints bind.

Snowy Hydro also indicated that it believes the Southern Generators Rule had led to an increase in binding of the South Morang constraint. It stated that the incidence of binding constraints for the thermal South Morang post-contingency F2 transformer constraint ("V>>H_NIL_3_R") had increased from a total of 26 dispatch intervals over the financial year 2005/06 to 400 dispatch intervals for the period from 1 January to 26 March 2007. Snowy Hydro also referred to several recent examples of the constraint binding, including 12 January 2007, 30 January 2007, 3 March 2007 and 17 March 2007.

G.3.2 Southern Generators

In their response to Snowy Hydro's arguments, the Southern Generators contended that the dispatch problems cited by Snowy Hydro are not attributable to the Southern Generators Rule but result from the physical characteristics of the network, particularly the effect of a network limitation at South Morang.

In their response, the Southern Generators argued that negative residues can arise on the Victoria-South Australia interconnector even if the Murray-Tumut constraint does not bind for a number of reasons, including that the South Morang transformer constraint is just as likely to give rise to counter-price flows between Victoria to South Australia.

The Southern Generators agreed with Snowy Hydro's statements that it is not uncommon for a RRP to be set by "conditions outside the region", including offers in another region. In fact, they noted that the price in one region may be:

"set by prices in other regions combined algebraically with local offer or bid prices in a relationship defined by the terms of a constraint equation."[507]

The Southern Generators noted, in particular, that the Victorian price at times can be influenced by the network limits of the Murray-Tumut constraint and the South Morang F2 transformer constraint.

Another point the Southern Generators raised related to NEMMCO's clamping intervention before the introduction of the Southern Generators Rule. They state that NEMMCO's clamping on the Victoria-Snowy interconnector acted as a form of artificial congestion in the sense that it did not relate to any limitation in the physical network. The Southern Generators Rule has made the underlying network limitations more transparent. Now that NEMMCO no longer clamps, the Southern Generators argued that the network is now being more fully utilised, which is revealing other underlying network limitations that have been masked to date.[508]

G.3.3 Assessment of issues raised

To assess the arguments raised by the participants, the Commission has considered the following key issues:

- Can the Latrobe Valley generators bid at -$1000/MWh and not influence the Victorian RRN? (Section 0)
- What are the incentives on Murray generation when both the Murray-Tumut and South Morang constraints bind? (Section G.6)
- Can the increase in the incidence of binding constraints at South Morang be explained by the introduction of the Southern Generators Rule? (Section G.7)
- Has the Southern Generators Rule contributed to negative residues occurring on the Victoria to South Australia interconnector (and Basslink)? (Section G.8)

Before considering these questions, however, it is important to understand the pricing relationships between the various regions when either or both the South Morang and Murray-Tumut constraint binds. This is explained in the following Section.

G.4 What is the pricing relationship between the Victorian, Snowy, and NSW regions when either or both South Morang and Murray-Tumut binds?

This Section assesses the accuracy of the pricing relationships presented by Snowy Hydro.

---

[507] Southern Generators, 8 March 2007 submission, p.3.

[508] Snowy Hydro also notes that the impact of the South Morang constraint was largely masked by NEMMCO's intervention prior to the implementation of the Southern Generators Rule and NEMMCO's reformulation of the South Morang constraint to a fully co-optimised form.

The key pricing relationships noted in Snowy Hydro's submission can be replicated using the relevant constraint equations. By definition, when a binding constraint has more than one interconnector term, the price differences across these interconnectors are related to one another by the coefficients in that binding constraint equation.

The South Morang constraint includes terms for both the Victoria-Snowy interconnector and Victoria-South Australia interconnector. The Murray-Tumut constraint[509] includes terms for the Victoria-Snowy interconnector and the Snowy-NSW interconnector. As these constraints contain a common interconnector term, Snowy Hydro is correct to state there will be a relationship in the price differences across the three interconnectors when both these constraints bind simultaneously. The coefficients in these constraints equations define the price relationship between the respective regions when one or both the constraints bind.

Using the constraint equations (and ignoring inter-regional losses), when the South Morang post-contingent thermal constraint (V>>V_NIL_3B_R) binds the following pricing relationships must hold:

$$P_{SA} - P_{VIC} = -0.9699 \times \lambda^1 \text{ and}$$

$$P_{SN} - P_{VIC} = 0.8538 \times \lambda^1$$

where λ^1 is the marginal value of the South Morang post contingent thermal constraint; and where P_{SA}, P_{VIC} and P_{SN} are the RRPs in South Australia, Victoria, and Snowy respectively.

These equations can be solved to show the following relationship between the those regional prices when that particular South Morang constraint binds:

$$P_{VIC} = 0.468 \times P_{SA} + 0.532 \times P_{SN}$$

This result shows that the Victorian price *must* be between the South Australian RRP and the Snowy RRP. Therefore, as long as the South Morang constraint is the only binding constraint, the Snowy RRP will by definition, be greater than the Victorian RRP. This means that Snowy Hydro should face incentives to generate at Murray to help alleviate the South Morang constraint under these circumstances. This confirms the first of pricing relationship presented by Snowy Hydro.

Snowy Hydro claims that if the Murray-Tumut constraint binds at the same time as the South Morang constraint, then there is no incentive on Murray to generate and alleviate the South Morang constraint. When both of these constraints are binding the following relationships between the prices will arise:

$$P_{SA} - P_{VIC} = -0.9699 \times \lambda^1$$
$$P_{SN} - P_{VIC} = 0.8538 \times \lambda^1 - 0.164 \times \lambda^2$$
$$P_{NSW} - P_{SN} = 0.823 \times \lambda^2$$

[509] The relevant constraint name is H>>H-NIL_A.

where λ^1 is the marginal value of the South Morang post-contingent thermal constraint (V>>V_NIL_3B_R) constraint; and λ^2 is the marginal value of the Murray to Tumut (H>>H-NIL_A) constraint.

Rearranging these equations we can find the following relationship between the Victoria price, the NSW price, the South Australia price, and the Snowy price when both of these constraints bind:

$$P_{VIC} = 0.106 \times P_{NSW} + 0.468 \times P_{SA} + 0.426 \times P_{SN}$$

Analysis of the constraint equations confirms that when only the South Morang constraint binds, the Victorian price must lie between the South Australia RRN price and the Snowy RRN price, with the Snowy price above the Victorian price. When both constraints bind, the Victorian price is set by a sum of 10.6% of the NSW price, 46.8% of the SA price, and 42.6% of the Snowy price. This verifies the pricing relationship presented in Snowy Hydro's supplementary submission.

G.5 Can the Latrobe Valley generators bind at -$1000/MWh and not influence the Victorian RRN?

Snowy Hydro stated that:

> "The Southern Generators' rule creates the situation where the Victorian price is defined by NSW and Murray marginal offers whenever the Murray to Tumut constraint binds. Under these conditions the Southern Generators offers do not directly influence the Victorian price (there is no price volume tradeoff). In effect, the Latrobe Valley generators receive the high Victorian price irrespective of what they bid, hence they maximise their dispatch volume by making negative priced offers."[510]

The constraint equation analysis in G.4 above shows that there is a pricing relationship between the Victorian RRP and the RRPs in South Australia, Snowy, and NSW regions. However, in his analysis, Dr Biggar concluded that Snowy Hydro is not correct in its statement that the Latrobe Valley generators cannot influence the Victorian price when the South Morang constraint binds.

The constraint equation analysis shows that when both constraints bind, the RRP in Victoria will be determined by the marginal generators in the other regions. This does not imply that generators in a region have no control over their price, since their bids will determine and influence the marginal–price setting generator. While the Victorian price is determined by the offers of non-Victorian generators, a change in the output of Victoria generators will affect which generators are marginal in neighbouring regions.

[510] Snowy Hydro, March 2007 submission, p.9.

The Southern Generators support Dr Biggar's conclusion, noting that the binding of the relevant constraints did not necessarily mean that Victorian generators did not affect on the Victorian price. For example, the Southern Generators pointed to the outcomes of 12 January 2007. They stated that while the price in Victoria reflected the "underlying physical realities", it was not unaffected by Victorian generator offers, arguing that "an offer need not to set the price to have an influence in the outcome."[511]

The Commission considers that Snowy Hydro is correct in its assessment that the South Morang constraint may lead to significant mis-pricing of generators in the Latrobe Valley. However, even when the mis-pricing occurs and the offer prices from the Latrobe Valley generators do not set the Victorian price, it does not necessarily follow that these Latrobe Valley generators are completely unable to influence the Victorian price. However, whatever the degree of influence, it seems clear that, on occasions, several Latrobe Valley generators had incentives to offer their output at a low price in order to increase the amount for which they were dispatched.

G.6 What are the incentives on Murray generation when both constraints bind?

Snowy Hydro claims that when the Murray-Tumut constraint binds for northward flows, the loop flow effect in the Snowy region means that the nodal price at Murray is lower than the Victorian price. Snowy Hydro contends that this is significant because it does not incentivise Murray generation to increase output to relieve the South Morang constraint, despite being a positive gatekeeper.

The Southern Generators consider that under present arrangements, Murray generation faces efficient incentives to increase generation when it assists in relieving constraints, and to reduce generation when it contributes to constraints. The Southern Generators note that the incentives for Murray generation varies with the production level chosen by Snowy Hydro, and in a way which provides the appropriate incentive in each circumstance. For example, under northward flow, the present arrangements create incentives for Murray to increase its output to relieve the South Morang constraint, until its increased generation causes the Murray-Tumut constraint to bind.

The Commission considers that the actual incentives facing Murray generation are more complicated than those put forward by Snowy Hydro. This is because the incentives facing Murray generation depend on how the South Morang and Murray-Tumut constraints interact.

Snowy Hydro's statement that Murray generation will receive a lower settlement price than the Victoria RRP is correct when the Murray-Tumut constraint is the *only* constraint that binds. In Section G.4 above, the constraint equation analysis shows that Murray generation must receive a *higher* price than the Victoria RRP when the South Morang constraint is the only constraint that binds.

---

[511] Southern Generators, 8 March 2007 submission, p.4.

When both constraints bind there is a relationship between prices in four regions:

$$P_{VIC} = 0.106 \times P_{NSW} + 0.468 \times P_{SA} + 0.426 \times P_{SN}$$

Dr Biggar presented that there is no reason why, given this relationship, the Victorian price *must* be above the Snowy price. In fact, suppose the NSW price is $256, the South Australian price is $18.68, and the Snowy price is $150. Using the relationship above, the Victorian price must be $100.07, which is significantly lower than the Snowy price.[512] On the days raised in Snowy Hydro's submission, further investigation found that:

- On the 12 January 2007, the South Morang constraint was binding for 76 dispatch intervals. For all except 12 of those intervals, the Snowy price was higher than the Victorian price.

- On 30 January 2007, the South Morang constraint was binding for 65 dispatch intervals. In every one of these intervals, the Snowy price was above the Victorian price (including those intervals when the Murray-Tumut constraint was binding).

- On 3 March 2007, the South Morang constraint was binding for 88 dispatch intervals. In every one of these intervals the Snowy price was above the Victorian price (including those intervals when the Murray-Tumut constraint was binding).

From his analysis, Dr Biggar found that when both the South Morang and Murray-Tumut constraints were binding, the relationship between them depends upon which of the two constraints has the most "severe" (or limiting) effect on dispatch efficiency. The most severe constraint would be the one that would yield the most efficient dispatch if it were relaxed.

If the Murray-Tumut constraint is the most severe, then the Victorian price is more likely to be higher than the Snowy price. This is because, for northward flows, generation at Murray places the greatest pressure on the Murray-Tumut constraint. The most effective way to relax that constraint would be to reduce output at Murray. The Snowy RRP would be correspondingly low to reflect this. Therefore, when the Murray-Tumut constraint is the most severe, it is not economically efficient to encourage Murray to generate more to try and relieve the South Morang constraint.

When the South Morang constraint is the most severeconstraint, the Snowy RRP is likely to be higher than the Victorian RRP. Generation at Murray is able to help relieve congestion on the South Morang constraint. The Snowy RRP will reflect this incentive for Murray to increase its output. It is economically efficient, therefore, for Murray to generate more in this circumstance, even though the Murray-Tumut constraint is also binding, because there is a greater benefit for the market from relaxing the South Morang constraint and offsetting Victorian exports on the Victoria-Snowy interconnector with an increase in Murray generation.

---

[512] In fact these were the prices in the NSW, South Australian, and Snowy regions at 3:30 pm on 12 January (the Victorian price at that time was, in fact, $91.44. The difference arises because the analysis here ignores losses).

The Commission therefore considers Snowy Hydro's claim that its Murray generation does not face incentives to relieve the South Morang constraint is not always true. The above analysis shows that during these periods when the South Morang constraint was binding, the settlement price for Murray generation can actually be higher than the Victorian price, depending on whether it is economically efficient for Snowy Hydro to increase its Murray output.

G.7 Can the increase in the incidence of binding constraints at South Morang be explained by the introduction of the Southern Generators Rule?

As discussed in Section G.3.1, Snowy Hydro contended that the Southern Generators Rule had led to an increase in binding of the South Morang constraint. Snowy Hydro argued that this increase was because Murray generation was no longer incentivised to generate to relieve the South Morang constraint when it was binding under the Southern Generators Rule. As discussed above, however, the Commission does not consider that it is always economically efficient for Murray generation to increase when the South Morang constraint binds.

Snowy Hydro also presented data on the trend in the incidence of binding for the South Morang constraint over the past year. It stated that the thermal South Morang post-contingency F2 transformer constraint ("V>>H_NIL_3_R") only bound for a total of 26 dispatch intervals over the financial year 2005/06. It noted, however, that the incidence of binding for this constraint increased to 400 dispatch intervals for the period from 1 January to 26 March 2007.

The Commission notes that Snowy Hydro did not consider the South Morang pre-contingency F2 transformer constraint ("V>>H_NIL_2_R"), which during the financial year 2005/06, bound for a total of 964 dispatch intervals. The Commission considers this to be a major oversight in the Snowy Hydro analysis.

The Commission considers that Snowy Hydro submission does not give a complete picture of the pattern of binding for the South Morang constraint before and after the introduction of the Southern Generators Rule because it only referenced the incidence of binding of the post-contingency F2 transformer constraint and not the pre-contingency constraint.

In addition, the Commission considers that there is some ambiguity as to what may be driving this increased incidence of binding, and whether it is solely attributable to implementation of the Southern Generators Rule. Binding levels may have changed due to:

- the reformulation of the relevant constraints to the fully co-optimised form;
- the severe drought conditions that developed over that period; and/or
- the introduction of the Southern Generators Rule.

While the reformulation of constraints to the fully co-optimised form does provide NEMMCO with a greater ability to maintain power system security, it may affect some generators' bidding incentives. To the extent this is true for the reformulation

of the South Morang constraints, this may contribute to the increased incidence of binding of these constraints. As discussed above, when the South Morang constraint binds, almost all the Latrobe Valley generators can be mis-priced, introducing some perverse bidding incentives. However, these bidding incentives are independent to the Southern Generators Rule.

The severe drought conditions have also affected Snowy Hydro's bidding incentives. Under normal energy constrained conditions, when the South Morang constraint binds, Snowy Hydro's Murray generation would normally face pricing incentives to generate and help alleviate the constraint. Given its limited water supply, Snowy Hydro may not face those same incentives to generate, unless the Snowy RRP is sufficiently high enough to warrant use of its scarce fuel. The water constraints have also affected Southern Hydro's generating ability. Output at Southern Hydro also helps alleviate the South Morang constraint. However, its limited access to water restricts ability to generate when the South Morang constraint binds. This may also be a contributing reason for the higher incidence of binding for that constraint.

Given the changes to bidding incentives resulting from these first two conditions, it is unlikely that the Southern Generators Rule is solely responsible for an increased incidence of binding of the South Morang constraints. The Commission considers that the changes in the incidence of the South Morang constraint binding were most likely driven by the interaction of all these factors along with other dynamic market processes.

G.8 Has the Southern Generators Rule contributed to negative residues occurring on Victoria-South Australia and Victoria-Tasmania interconnectors?

Snowy Hydro claims that the incentives facing the Latrobe Valley generators to offer negative bids when the South Morang constraint binds is contributing to counter-price flows on the interconnectors to both South Australia and Tasmania. This, it says, has led to NEMMCO having to intervene to minimise negative residues accumulating on the Victoria to South Australia interconnectors. With Basslink being a merchant network service provider, settlement residues do not accrue.

As shown in the constraint equation analysis in Section G.4, when the South Morang constraint binds, the Victoria RRP is higher than the South Australia price. However, if the Latrobe Valley generators have relatively lower offers compared to South Australia generation, the dispatch process could result in flows from Victoria to South Australia even though Victoria has a higher RRP. This point was raised in the Southern Generators supplementary submission.[513]

Between 1 April 2006 and 31 March 2007, there were 381 occurrences of negative residues on the Victoria-South Australia directional interconnector, totalling $584,412. Around 84% of this (or $492,919) accrued on 16 January 2007 when bushfires in Victoria caused a multiple contingency event resulting in South

[513] Southern Generators, 8 March 2007 submission, p.2.

Australia separating from Victoria. In the previous year, there were 238 occurrences with a total value of $47,640.[514]

Since the Southern Generators Rule took effect on 1 November 2006, NEMMCO has clamped flows between Victoria and South Australia due to counter-price flows four times: 30 January 2007, 3 February 2007, and twice on 4 February 2007. Over the period 1 January 2005 to the start of the Southern Generators Rule on 1 November 2006, NEMMCO did not intervene to clamp Victoria to South Australia flows.[515] During these clamping incidences, the South Morang constraint was binding and there was significant negative bidding by Latrobe Valley generators.

The evidence suggests that the Southern Generators Rule may have contributed to the incidences of clamping on the Victoria-South Australia interconnector, as suggested in the Snowy Hydro submission. However, as discussed above, there are a number of factors such as the increasingly severe drought conditions over this same period which may have increased the incidence of the South Morang constraint binding, resulting in an increased level of counter-price flows on the Victoria-South Australia interconnector.

It is important to note that the negative residues that arose on 16 January 2007 were not under system normal conditions. Bushfires in Victoria on that day resulted in system separation and load shedding in Victoria. NEMMCO invoked the value of lost load (VoLL) override, setting the Victorian RRP to $10,000/MWh for dispatch intervals 16:25 to 18:20.[516] NEMMCO's action to restore power system security and the generator bidding incentives triggered by the VoLL override swamped any possible incentives driven by the Southern Generators Rule. No conclusions can therefore be drawn from this day on what possible bidding incentives for the Latrobe Valley generators result from implementation of the Southern Generators Rule.

G.9 Conclusion

In two submissions to the Commission, Snowy Hydro argued that the Southern Generators Rule created market problems and dispatch inefficiency as a result of its interaction with the South Morang constraint. In their submission, the Southern Generators disagreed with this conclusion and argued that the problems raised by Snowy Hydro were actually caused by the underlying physical network.

The Commission has assessed both participants' arguments and the associated implications of the pricing relationships between regions when the Murray-Tumut and South Morang constraints bind. The Commission considers the negative bidding by the Latrobe Valley generators has the potential to sometimes result in inefficient dispatch, but that this is ultimately driven by the risk of those generators being constrained off due to the South Morang constraint binding. There are a number of factors other than the introduction of the Southern Generators Rule that

---

514 NEMMCO, Settlement Residue Auction Information Memorandum, 3 July 2006 version and 2 July 2007 version.

515 Based upon a review of Market Notices issued by NEMMCO.

516 NEMMCO, System Separation and Load Shedding, Market Event Report, 16 January 2007.

may have affected the incidence of binding of the South Morang constraints, including for example the reformulation of constraints to a fully optimised form, or the reduced ability of Murray and Southern Hydro to generate due to water constraints. The Commission considers it is unlikely that the Southern Generators Rule is solely responsible for an increased incidence of binding of the South Morang constraints.

In addition, VENCorp has identified the thermal South Morang constraint as a problem in the Victorian transmission network and has committed resources to addressing the problems associated with the transformer in the next year. This suggests VENCorp had identified a problem with the underlying network well before implementation of the Southern Generators Rule or the prevalence of the severe drought conditions. While it is possible that those two conditions increased the incidence of binding for the South Morang constraint over the past year, they do not appear to be the sole triggers for the problem.

This page has been intentionally left blank