

Australian Energy Market Commission

Draft Rule Determination

National Electricity Amendment (Management of negative settlement residues in the Snowy Region) Rule 2006

Rule Proponents:

Loy Yang Marketing Management Company Pty. Ltd. (LYMMCO), Southern Hydro Pty. Ltd., International Power (Hazelwood, Synergen, Pelican Point, Loy Yang B), TRUenergy Pty. Ltd., NRG Flinders Pty. Ltd., and Hydro Tasmania, and NEMMCO

Date: 6 June 2006

Signed: 

John Tamblyn

Chairman

For and on behalf of:

Australian Energy Market Commission

Commissioners: Tamblyn
Carver
Woodward

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Summary

This Rule proposal, lodged by the Southern Generators and the National Electricity Market Management Company (NEMMCO), seeks to introduce a new process for managing negative settlement residues in the Snowy Region. The proposal is short-term in nature, lasting only as long as the current CSP/CSC trial in the Snowy Region.

The Snowy Region is unique in the National Electricity Market (NEM) in that it contains a network loop, which intersects region boundaries. As a result of these characteristics and the design of the NEM, there are occasions when power will flow from a higher-priced region to a lower-priced region, resulting in negative settlements residues. To address these unfunded negative settlements residues, NEMMCO intervenes in the market by “clamping” flows on the Victoria to Snowy interconnector. However, this clamping can undermine competitive pressures, reduce the effectiveness of inter-regional trading instruments, and distort pricing outcomes.

The Southern Generators’ Rule proposal seeks to address these issues by making a change to the settlement process. Under the proposal, negative residues on the Victoria to Snowy interconnector will be offset by accrued positive residues on the Snowy to NSW interconnector.

On the basis of the analysis outlined in this draft determination and after considering submissions, the Commission has decided to approve the change requested in the Rule proposal. This draft Rule determination sets out the Commission’s reasoning in assessing the Southern Generators’ proposal in accordance with the requirements of the National Electricity Law (NEL).

The Commission is satisfied that the proposal will promote improvements in competition and efficiency in the NEM compared to maintaining the status quo. That is, the proposal will be in the long-term interests of consumers of electricity services. The short-term gains in the market are consistent with the Commission’s long-term view of the appropriate direction for progressive reform of the market.

The Commission’s analytical assessment of the Southern Generators’ proposal has suggested that the proposal should deliver a number of advantages over the status quo. The removal of clamping, an imposed market distortion, would provide:

- a greater level of competition in the wholesale electricity market compared to the status quo. The incentives that this additional competition provides will tend to discipline the ability of participants to raise prices above costs under certain market conditions. More cost reflective wholesale prices should promote economic efficiencies that will ultimately benefit end use customers;
- more efficient dispatch resulting from access to a wider range of generators to meet NSW demand. The Commission’s modelling results suggested that the proposal is likely to result in some generation fuel cost savings in the short-term as result of being able to choose to operate a cheaper combination of plant to meet demand;
- enhanced inter-regional trade, through firmer inter-regional settlement residues, reduced inter-regional price differences, and greater availability of and competition

for contracts. This should increase competition, and promote greater pricing efficiency.

- a simpler, more transparent, and predictable approach to managing negative settlement residues in the Snowy Region. While the proposal may result in the need for some trading adjustments by participants in the market, its greater clarity, predictability, and transparency should enhance the confidence of investors in the NEM and improve dynamic efficiency.
- an improved environment for efficient investment through a number of the elements of the proposal. Improved firmness of inter-regional trade, and likely spot price changes, should enable better use of existing generation capacity, provide more efficient signals for new investment, and reduce the barriers to entry in the NEM.

The Commission supported its analytical assessment of the proposal with quantitative modelling. The results of the modelling supported the Commission's analytical conclusions, and suggested that there would be benefits in implementing the Southern Generators' proposal, as compared to the status quo.

However, the proposal by the Southern Generators is not the only potential solution to these issues. In consultation on this proposal, Snowy Hydro suggested that "re-orientation" of the network constraint to Dederang when negative residues accumulate would also be a legitimate short-term solution. The Commission has carried out preliminary modelling of the re-orientation option as a counterfactual against which to compare its assessment of the Southern Generators' proposal.

The Commission's analysis suggested both alternatives demonstrated the potential for superior competition and market efficiency outcomes compared to the current arrangements. However, the limited analysis undertaken did not identify clear differences between the two Rule proposals in terms of their market impacts.

Snowy Hydro subsequently submitted the Re-orientation proposal to the Commission as a formal Rule proposal which will now be subject to public consultation and full analysis in the formal Rule change process. The Commission proposes to issue a draft Rule determination in relation to the Snowy Hydro proposal at approximately the same time as issuing a final Rule determination in respect of the Southern Generators' proposal.

Concurrent with the publication of this draft determination, the Commission is also publishing a Congestion Management Program - "Statement of Approach". The Statement of Approach will provide interested parties with a view of the Commission's anticipated timetable and directions for its work program on congestion management. The Statement of Approach takes account of the interactions between the short-term projects, including this proposal, and the other inter-related congestion matters currently before the Commission.

Interested stakeholders are invited to make comment on the issues outlined in this draft determination. Submissions should be received by 5 pm on 20 July 2006. Submissions can be sent electronically to submissions@aemc.gov.au or by mail to:

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1. The Southern Generators’/NEMMCO’s Rule Proposal

On 9 November 2005, the Commission received a National Electricity Rule change proposal from a group of six generators (the Southern Generators) and the National Electricity Market Management Company (NEMMCO). The Southern Generators are Loy Yang Marketing Management Company Pty. Ltd. (LYMMCO), Southern Hydro Pty. Ltd., International Power (Hazelwood, Synergen, Pelican Point, Loy Yang B), TRUenergy Pty. Ltd., NRG Flinders Pty. Ltd., and Hydro Tasmania. Their proposal (the Southern Generators’ proposal) seeks to introduce arrangements to fund negative settlement residues that accumulate on the Snowy region interconnectors, as a consequence of the network loop flows and constraints in the Snowy region.

At present, NEMMCO intervenes in the market to manage counter-price flows on interconnectors to avoid the accumulation of negative settlement residues.¹ For example, when there are counter-price flows at times of northward flows on the interconnector between the Victorian and Snowy regions (VIC-Snowy interconnector), NEMMCO intervenes to restrict flows in order to limit negative settlement residues. The Southern Generators argue that this intervention by NEMMCO distorts efficient outcomes in the market, and propose this Rule change to address those inefficiencies (as it reduces the flows that would otherwise pass from the Victoria into the Snowy region, and then into NSW).

In their proposal, the Southern Generators note:

This proposal addresses an issue that arises from the fact that with efficient dispatch, when the Snowy constraint binds, the flow on the Victoria to Snowy interconnector is contrary to the price difference because the constraint is within a network loop...

This “counter price” flow is not of itself a problem and is an economically efficient outcome. However because the [National Electricity] Rules do not provide an adequate means of fund[ing] the resulting “negative residue”, NEMMCO intervenes in the market to prevent the negative residue, by distorting efficient dispatch.²

Snowy Hydro, in its Management of negative settlement residues – Re-orientation Rule change proposal concurs that there is a problem with the status quo as the current intervention:

Reduces dispatch options during high demand periods with northerly flows by placing a constraint on Victorian exports.³

In addition, Snowy Hydro states that the status quo also affects inter-regional trade as:

Victorian participants have a reduced ability to manage inter-regional price risks, as there is little or no settlement residues between Victoria and Snowy when NEMMCO clamps.⁴

The Southern Generators note that:

1 Chapter 8A Part 8 of the National Electricity Rules empowers NEMMCO to intervene in this manner.

2 Southern Generators and NEMMCO, Management of Negative Settlement Residues in the Snowy Region Rule change proposal, 27 October, 2005, p. 4.

3 Snowy Hydro Limited, Management of Negative Settlement Residues by Re-orientation Rule change proposal, 24 May 2006, p. 14.

4 Snowy Hydro, Re-orientation Rule change proposal, p.14.

*The problem is not the negative settlement residue on the interconnector in itself, but the anti-competitive measures that NEMMCO is forced to adopt because of the deficiencies of the settlement process in relation to negative settlement residues.*⁵

In its Re-orientation Rule change proposal, Snowy Hydro agrees with the Southern Generators' argument, stating that:

*the status quo raises concerns about the predictability of the speed with which NEMMCO will respond to negative residues between Victoria and Snowy.*⁶

The Southern Generators further state that:

*It should also be noted that the anti-competitive restriction of flow in spot market dispatch has flow-on consequences in the related derivative markets, where the risk of artificial restrictions on interconnector flow affects both generator's ability to dispatch generation to manage the risk of inter-regional contracts, and also reduces the value of [Settlement Residue Auction] units that are relevant to managing inter-regional price risk.*⁷

The proposal seeks to fund negative residues on the VIC-Snowy interconnector from positive residues on the interconnector between the Snowy and New South Wales (NSW) regions (Snowy-NSW interconnector). Therefore, should negative residues start accruing for northward flows on the VIC-Snowy interconnector, rather than reducing the flow on the interconnector, NEMMCO would offset the accumulating negative residues from positive inter-regional settlement residues (IRSRs) accruing on the Snowy-NSW interconnector.

The proposal is also designed to fund the negative residues from positive residues that can result from southward flows (flows from the Snowy to Victorian regions on the Snowy to Victorian interconnector (Snowy-VIC interconnector)). This would replace NEMMCO's current procedure for managing negative residues for southward flows, which is re-orientation.

The Southern Generators argue their proposal:

*will result in economically efficient pricing signals by eliminating the significant problems created by the action taken by NEMMCO... and improve the efficiency of dispatch for Murray and Victorian generation, and will also increase the reliability of supply to NSW for northward flows and Victoria for southward flows and hence meets the market objective*⁸.

More specifically, the Southern Generators' contend that their proposal is superior to the status quo for both northern and southern flows because it:

retains accurate locational marginal pricing for generation at the Snowy regional reference node as per the intent of clause 3.9.2 [of the Rules];

does not provide incentives for generators receiving the Snowy region price to bid at prices below marginal cost to maximise volume;

5 Southern Generators, Rule change proposal, p. 9.

6 Snowy Hydro, Re-orientation Rule change proposal, p. 4.

7 Southern Generators, Rule change proposal, p. 9.

8 Southern Generators, Rule change proposal, p. 5.

avoids causing market disturbance by NEMMCO intervention, upon prediction of negative residues;

ensures efficient use of the Dederang-Wagga-Tumut-Murray-Dederang transmission loop, maximising the transmission capacity for inter-regional transfers; and

increases interregional trade because the total amount of settlement residues available to support settlement residue instruments will remain greater than either of the NEMMCO intervention mechanisms, despite the depletion of some Snowy to NSW residue.⁹

The Southern Generators' proposal includes an analysis aimed at demonstrating that it is possible to fully fund the accruing negative residues using the proposed mechanism, called the "Negative Settlement Payment".¹⁰

The Southern Generators recognise that this is a "specific response to an acute problem in the National Market implementation." They expect over time a more general measure may replace this specific one.¹¹

Snowy Hydro, in their Re-orientation Rule change proposal, agree that:

until such time that a boundary change, if any, is implemented there is a continuing need to manage the negative settlement residues between Victoria and Snowy.¹²

Implementation of the Southern Generators' proposal would be through an amendment to the NEMMCO derogation in Chapter 8A Part 8 of the Rules – Network Constraint Formulation. The proposal would expire with that derogation. The proponents stated that the issues addressed by the derogation were separate to those addressed as part of the CSP/CSC trial and therefore, "may continue to exist at the sunset". They recognised that some "inconsequential amendments" would be necessary if the proposal were to remain after the derogation's expiry. For this reason, the proponents thought it best to "align the duration of this derogation with the current derogation".¹³

2. Background to the proposal

This Rule change proposal is concerned with the arrangements for the management of negative settlement residues in the vicinity of the Snowy region. This Section discusses the network topology in the vicinity of the Snowy region that results in negative settlement residues and explains NEMMCO's intervention procedures and obligations for managing negative residues under the Rules. This Section also presents an example of the problem the Southern Generators' proposal is trying to address.

Network characteristics that cause negative residues

The transmission network design in the vicinity of the Snowy region contains a physical network loop, depicted in Figure 1. This loop, together with the location of the regional boundaries, location of the Snowy regional reference node, and the location of a constraint

9 Southern Generators, Rule change proposal, p. 5.

10 Southern Generators, Rule change proposal, p. 12.

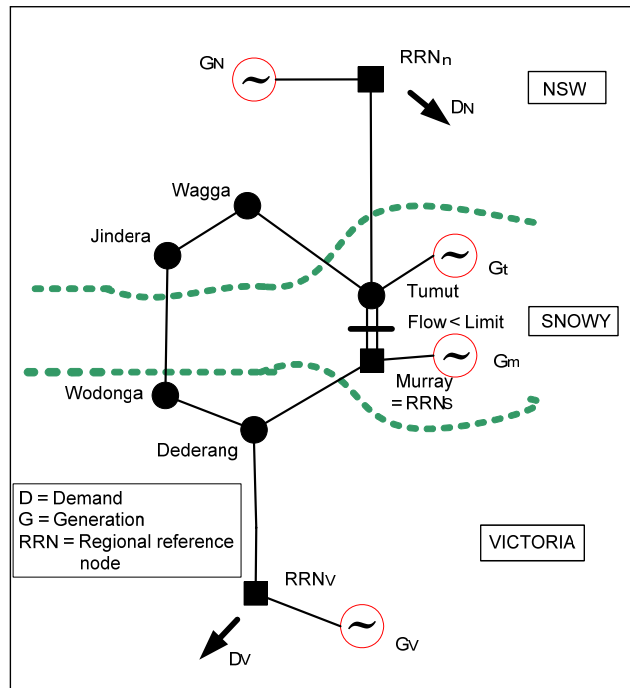
11 Southern Generators, Rule change proposal, p. 5.

12 Snowy Hydro, Re-orientation Rule change proposal, p. 2.

13 Southern Generators, Rule change proposal, p. 6.

in the loop, can result in flows between the Snowy and adjacent regions moving from a higher priced region to a lower priced region, even with generator offers being efficiently dispatched. These counter-price flows result in negative residues.

Figure 1: Snowy region network topology - "the Snowy Constraint"



The transmission line between Murray generation and Tumut generation has a limited capacity. The transmission constraint binds when flows reach their limit (the “Snowy constraint” or “Murray-Tumut constraint”). For northward flows, when that intra-regional constraint binds, the lowest value of generation on the loop is at the Murray node, with locational prices *rising* relative to the price at the Murray node, in a clockwise fashion around the loop so that the highest price is at the Tumut node. This is because the physics of power flows means an increment, say 1MW, increase of output of Murray generation increases the congestion on the constrained line by more than power injected anywhere else on the loop. Since the Murray node is also the location of the Snowy regional reference node, this can result in the Snowy price being lower than the Victorian region price, leading to negative settlement residues on the VIC-Snowy interconnector. This pricing relationship is known as the “spring washer effect”.¹⁴

Negative residues can also result at times of southward flows when the intra-regional constraint binds. At these times, the highest value of generation (or nodal price) on the loop is at the Murray node, with locational prices *falling* relative to the price at Murray, in a clockwise fashion around the loop, so that the lowest is at Tumut (which may also be similar to the NSW price); the Dederang nodal price will be lower than the Murray nodal price. If the Victorian price is also less than the Murray nodal price, and therefore the Snowy regional reference price, counter-price flows arise on the Snowy-VIC interconnector.

¹⁴ B. J. Ring, *Dispatch Based Pricing in Decentralised Power Systems*, PhD Thesis, University of Canterbury, Christchurch, 1995.

Under these conditions, counter-price flows can also result on the Snowy-NSW interconnector. The Tumut generators could face incentives to bid low or negative prices in order to be dispatched and receive the (relatively high) Murray nodal price. This can lead to flows from Tumut into NSW, even though the NSW price is less than the Snowy price. However, implementation of the partial Constraint Support Pricing/Constraint Support Contract (CSP/CSC) trial for the Tumut node (the “Snowy trial”) directly addresses this incentive by settling all but 550MW of Tumut generation at the NSW price when the Snowy region price is higher.¹⁵

While negative residues arise from the normal operation of the network in the vicinity of the Snowy region, the Rules do not provide NEMMCO with a way to financially manage the difference in market settlement. NEMMCO, therefore, intervenes in the market to avoid the accumulation of negative settlement residues.

How NEMMCO intervenes

NEMMCO’s Operating Procedure – Dispatch (SO_OP3705) defines NEMMCO’s procedure and trigger criteria for managing negative settlement residues. From December 2004, if the accumulation of negative residues over a period of counter price flows is forecast to reach \$6,000 then NEMMCO would apply constraints to prevent the further accumulation, provided power system security could be maintained. These constraints would remain in place until they could be revoked without creating counter price flows. This trigger applies to all inter-regional constraints.

Specific procedures also apply to the Murray-Tumut constraint. The procedures differ depending on whether flow is northwards or southwards. For forecast negative residue accumulation between Victoria and Snowy for northward flows, NEMMCO invokes either an interconnector ramping constraint or a fixed level discretionary constraint. These intervention constraints restrict the flow on the interconnector and will be referred to as “clamping”. Negative residue accumulation between Snowy and Victoria for southward flows can result in NEMMCO replacing the normal constraint orientated to Murray (as the Snowy regional reference node) with a special constraint oriented to the Dederang node. This is known as “re-orientation” and results in the Snowy regional price being set as if Dederang was the reference node rather than the Murray node. All these constraints apply in both dispatch and pre-dispatch.¹⁶ This procedure was finalised after consultation with market participants.

The Snowy trial, implemented in November 2005, addresses counter-price flows on the interconnector between the Snowy and NSW regions, eliminating the need for NEMMCO to intervene to manage the accumulation of negative residues. NEMMCO amended its Operating Procedure in November 2005 to implement the Snowy trial.

Incentives created by NEMMCO’s intervention

The Southern Generators argue that NEMMCO’s current intervention approach to manage counter-price flows creates incentives for generators receiving the Snowy region price to bid at prices below marginal cost to maximise volume. Box A shows an historical example of how these incentives can arise in dispatch intervals when NEMMCO intervenes to limit the

¹⁵ The Snowy trial is discussed further in the “History” Section below.

¹⁶ NEMMCO, *Operating Procedure: Dispatch*, SO_OP3705, v29, 3 December 2004, p.27.

accumulation of negative settlement residues. Appendix 1 presents a more comprehensive analysis of historical data.

Box A: Market outcomes with interconnector “clamping”

The incidence of NEMMCO intervention on the VIC-Snowy interconnector is greatest during the summer months (see Appendix 1). At these times, certain market conditions, including the combination of high NSW demand, northward flows on the VIC-Snowy interconnector, and the potential for NEMMCO intervention to restrict flows on that particular interconnector, can create incentives for generators to bid in a way to induce intervention.

The outcomes of 2 February 2006 illustrate such behaviour (see Figure 2). High demand in NSW coupled with insufficient capacity reserves resulted in high NSW prices.¹⁷ During the period of highest NSW prices, the Snowy region price was around \$0/MWh, reflecting generator bids in that region. This, in turn, resulted in counter-price flows on the VIC-Snowy interconnector. As a result, at around 13:45, NEMMCO began reducing flows on the VIC-Snowy directional interconnector to prevent further negative residue accumulation. At 14:25, flows on that interconnector reached less than 100MW.

By 14:30, the Snowy region price increased significantly, from \$0/MWh to over \$7,000/MWh. Snowy prices remained volatile over the next few trading intervals, fluctuating between \$0/MWh and over \$7,000/MWh, depending on the level of interconnector flows. Whenever NEMMCO relaxed its restriction on interconnector flow so flows approached 100MW, the Snowy price would drop near \$0/MWh until the emergence of counter-price flows resulted in NEMMCO intervention to reduce the interconnector flow again.

Murray generation’s bid stack for 2 February 2006 is presented in Figure 3. Between around 11:30 and 20:00, at least half of Murray’s generation was bid in the zero price band. As NEMMCO reduced imports from Victoria by restricting flow on the VIC-Snowy interconnector, to meet the high NSW demand, the National Electricity Market dispatch engine (NEMDE) dispatched Murray generation from the higher price bands. This resulted in the Snowy region price increasing quickly and significantly to approach the NSW price.

¹⁷ Bruce Bertram, “Low Reserves Top Prices”, *Power Industry News*, Edition 447, 8 February 2006.

