

A Assessment of related Rule change proposals

This Appendix presents the Australian Energy Market Commission's (the AEMC's or Commission's) assessment and reasoning of the three Rule change proposals seeking to address congestion in the Snowy region. These proposals are: Snowy Hydro's Abolition of the Snowy Region proposal (Abolition alternative)³⁹; Macquarie Generation's Split Snowy Region proposal (Split Snowy Region proposal); and the Southern Generators' Congestion Pricing and Negative Residue Management Arrangements for the Snowy Region proposal (Southern Generators' Congestion Pricing proposal). These proposals are described fully in Section 1 of the respective determinations.

This Appendix briefly outlines the Commission's approach to assessing the proposals, before discussing the Commission's processes and procedures. It then presents the Commission's analysis for each of these proposals against the assessment criteria.

A.1 Approach to assessment

The Commission has assessed each of the proposals against the following criteria:

- Economic efficiency of dispatch;
- Inter-regional trading and risk management;
- Pricing outcomes and participant responses;
- Power system security, supply reliability, and technical issues;
- Good regulatory practice;
- Long term implications and consistency with public policy settings; and
- Implementation.

All three proposals are evaluated against a base case. This provides a common reference point for comparison. The base case chosen represents the market under a "do nothing" approach. It retains the existing Snowy region boundaries, with interconnectors just south of Murray and just north of Tumut. It retains the Snowy regional reference node (RRN) at Murray and allows the expiry of the interim arrangements currently managing congestion in the Snowy region; i.e. the Tumut Constraint Support Pricing/Constraint Support Contract Trial (Tumut CSP/CSC

³⁹ The Commission made its final Rule determination to accept the Abolition of Snowy Region Rule change proposal on 30 August 2007. For the purposes of this Rule determination, the Abolition proposal is referred to as the "Abolition alternative" to reflect that at the time of the comparison of these alternatives, the Abolition proposal was an alternative, whereas now the Commission has made and commenced the *National Electricity Amendment (Abolition of Snowy Region) Rule 2007 No 7* to implement the abolition of the Snowy region. For more information see "AEMC 2007, *Abolition of Snowy Region*, Rule Determination, 30 August 2007, Sydney", available on the AEMC website.

Trial) and the Southern Generators Rule. It reinstates NEMMCO's intervention power to manage negative settlement residues on the Victoria-Snowy and Snowy-New South Wales (NSW) interconnectors through "clamping" or "re-orientation".⁴⁰ The Commission's quantitative modelling also uses this base case (see Appendix B).

The three Rule change proposals all seek to price the congestion across the Murray-Tumut cutset. They do so using different approaches:

- The Abolition alternative prices congestion by introducing a region boundary across the Murray-Tumut cutset, meaning that this congestion will be reflected in price differences between the Victoria and NSW regions. It also removes the existing Snowy region boundaries north of Tumut and south of Murray as Snowy Hydro argues these region boundaries do not fall across major "pinch-points" of congestion. The removal of the Snowy region relocates Snowy Hydro's Murray generation into Victoria, to be settled at the Victorian regional reference price (RRP) and relocates its Tumut generation into NSW, to be settled at the NSW RRP.
- The Split Snowy Region proposal also prices the congestion across the Murray-Tumut cutset using a new region boundary. However, unlike the Abolition alternative, it retains the existing region boundaries north of Tumut and south of Murray. This proposal replaces the existing Snowy region with two new regions, Murray and Tumut, and the existing two interconnectors between Victoria and NSW with three: Victoria-Murray, Murray-Tumut, and Tumut-NSW. To address the issues of negative settlement residues on the new Victoria-Murray interconnector Dederang is relocated from the Victorian region into the Murray region, and selected as the RRN for the Murray region. The RRN in the Tumut region is located at Lower Tumut, the largest generation node in that new region.
- The Southern Generators' Congestion Pricing proposal prices the congestion between Murray and Tumut, but only when the Murray-Tumut constraint binds. It does this using a congestion pricing mechanism, the Tumut CSP/CSC Trial. Under this proposal when the Murray-Tumut constraint binds Tumut generation is settled at the Tumut node, rather than the Snowy RRP. The Southern Generators Rule component of this proposal replaces National Energy Market Management Company's (NEMMCO's) clamping intervention to manage the accumulation of negative residues between the Victorian and Snowy regions with an alternative funding mechanism.

The Commission presents its analysis for each of these proposals against the specified criteria below. For each criterion, the three Rule change proposals are assessed against the base case and each other.

This assessment enables the Commission to identify the option that the Commission considers best promotes the National Electricity Market Objective (NEM Objective):

⁴⁰ NEMMCO's power to manage the accumulation of negative settlement residues is set out in clause (c) of Part 8 of Chapter 8A of the National Electricity Rules (Rules). NEMMCO's procedure for managing negative residues is set out in its Operating Procedure - Dispatch: SO_OP3705.

“Efficient investment in, and efficient use of, electricity services for the long term interests of consumers of electricity with respect to price, quality, reliability and security of supply of electricity and the reliability, safety and security of the national electricity system.”⁴¹

The Commission’s conclusions in this regard are presented in Section 5 of the Rule determination.

A.2 Commission processes and procedures

Since 1 July 2005, the Commission has received six Rule change proposals relating to the management of congestion in the Snowy region. Each of these proposals required consideration by the Commission under the Rule making test. A key issue for the Commission was the approach to evaluating each of these proposals, given constraints on timing and resources. This Section sets out the Commission’s processes and procedures in assessing these Rule change proposals.

The Commission considered it logical and reasonable to consider the shorter term proposals, concerned with the management of negative settlement residues, prior to evaluating the longer term options, like region boundary change proposals. The Commission considered analysis, assessment, and implementation of a region boundary change would take time. An interim arrangement, however, could be implemented over a shorter timeframe and could operate in the period leading up to implementation of a more comprehensive solution to the congestion issues in the Snowy region. This approach was consistent with views expressed in the majority of submissions received on the various Rule change proposals.⁴²

The Commission published its final Rule determinations on the two short term proposals on:

- 14 September 2006 – on the “Management of Negative Settlement Residues in the Snowy Region”.⁴³ This decision implemented the Southern Generators Rule, which commenced on 1 November 2006; and
- 9 November 2006 – on the “Management of Negative Settlement Residues by Reorientation” alternative proposed by Snowy Hydro and NEMMCO in May 2006.

During that period, the Commission received two of the longer term Rule change proposals, both seeking to change the Snowy region boundaries. Snowy Hydro

⁴¹ Section 7, National Electricity Law (NEL).

⁴² These views are discussed in AEMC 2006, *Management of Negative Settlement Residues in the Snowy Region*, Final Rule Determination, 14 September 2006, Sydney; and AEMC 2006, *Management of Negative Settlement Residues by Reorientation*, Final Rule Determination, 9 November 2006, Sydney.

⁴³ The “Management of negative settlement residues in the Snowy region” Rule change proposal was proposed by NEMMCO and the “Southern Generators (Loy Yang Marketing Management Company (LYMMCO), Southern Hydro, International Power, TRUenergy, NRG Flinders, Hydro Tasmania). The Commission assumed responsibility for this Rule change proposal from the National Electricity Code Administrator on 1 July 2005.

submitted its Abolition proposal in November 2005, seeking the permanent abolition of the Snowy region. Macquarie Generation's Rule change proposal followed in February 2006. This proposal sought to replace the existing Snowy region with two new load-bearing regions, one in northern Victoria and one in south-west NSW. Following its final decisions on the two interim proposals, the Commission turned its focus to these longer term options.

In December 2006, the Commission decided to release separate draft Rule determinations on the Abolition and Macquarie Generation proposals because the Commission's analysis of the Abolition proposal was well advanced and could be ready for decision earlier than the more analytically complex Macquarie Generation proposal. The Commission considered it would be beneficial to undertake early consultation on the Abolition proposal, pending release of the Macquarie Generation draft decision.

In January 2007, the Commission proceeded to publish its draft Rule determination on the Abolition proposal. In this decision, the Commission stated it would prepare a draft Rule determination on the Macquarie Generation proposal prior to its final Rule determination on the Abolition proposal. This would ensure that the Commission did not make a decision on one option without giving careful consideration to the relevant alternative.

Subsequent to the Commission's draft Rule determination on the Abolition proposal, the Commission received two additional alternative Rule change proposals – the Split Snowy Region proposal on 5 March 2007 and the Southern Generators' Congestion Pricing proposal on 15 March 2007. The former proposal was submitted by Macquarie Generation to replace its earlier February 2006 proposal.

In light of these changed circumstances, the Commission considered it appropriate to provide stakeholders with the opportunity to consider these three competing Rule change proposals simultaneously. Accordingly, it extended consultation on the Abolition draft Rule determination to align with first round consultation on the two new alternatives.

Hydro Tasmania proposed in a submission that the Commission should consider a counter-factual version of the Split Snowy Region where Murray remained the RRN for the Murray region, but proposed the inclusion of a Southern Generators Rule offset type arrangement to manage the negative residues on the Victoria-Murray interconnector.⁴⁴ The Commission did not consider this option further for two reasons.

The first was that it was not put forward to the Commission as a formal Rule change proposal. While the Commission considered counter-factuals in its draft Rule determination on the Abolition proposal, the Commission made clear that it considered it was unable to implement a counter-factual without a formal Rule change proposal. As noted above the Commission received two additional Rule change proposals following the Consultation Forum on the Abolition proposal draft

⁴⁴ Hydro Tasmania, s.99 submission, Abolition of Snowy Region, Draft Rule Determination (Abolition), p.2-3.

Rule determination. Because these were submitted as formal Rule change proposals the Commission was able to assess them as implementable alternatives to the Abolition proposal. It did not consider it good regulatory practice to undertake the costly and time-intensive process of considering an additional counter-factual that it would not be able to implement in practice.

The second reason was the negative residue management mechanism put forward by Hydro Tasmania did not include any detail on structure of implementation, including specifics such as what interconnector the offsetting residues would come from, or how the mechanism would work. The Commission viewed the purpose and role of such mechanisms in the National Energy Market (NEM) was better undertaken in the context of the Congestion Management Review (CMR), rather than as an additional counter-factual to managing congestion in the Snowy region.

Stakeholder submissions on the Abolition draft Rule determination and the Split Snowy Region and Southern Generators' Congestion Pricing proposals that were critical of the Commission's process focused on its decision to consider long term solutions for the Snowy region prior to finalising the CMR and region boundary process put forward in the Ministerial Council on Energy (MCE) Region Boundary Rule proposal.⁴⁵ Other submissions were supportive of the Commission's process, arguing that the Snowy region boundary required an urgent decision to resolve the negative impacts of the current uncertainty.⁴⁶ They argued the Commission's approach represented an efficient use of resources, noting that further work was required to develop alternatives to the proposals assessed by the Commission in its draft Abolition determination.⁴⁷

The Commission's timing was informed not only by earlier submissions to these projects, but also the unanimous agreement at the October 2006 Senior Industry Leaders Forum that the Snowy region was unique and required immediate attention prior to finalising the CMR and MCE Region boundary decisions.⁴⁸ Moreover, as a consequence of several formal extensions to the process for assessing the various Snowy region boundary proposals, the Commission has been able to have regard to its ongoing work under the CMR in coming to these determinations.

⁴⁵ Electricity Supply Industry Planning Council (ESIPC), s.99 Abolition submission, p.1; Southern Generators, s.99 Abolition submission; s.95 submission, Congestion Pricing and Negative Residue Management Arrangements for the Snowy Region proposal (Southern Generators' Congestion Pricing), p.4, 22-23; Hydro Tasmania, s.99 Abolition submission, p.1-2; ERM Power, s.99 Abolition submission, p.1; and International Power Australia, s.99 Abolition submission, p.2.

⁴⁶ Origin Energy, s.99 Abolition submission, p.1; EnergyAustralia, s.99 Abolition submission, p.2; Snowy Hydro, letter to the AEMC chairman, 15 March 2007, p.3; and Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region proposal (Split Snowy Region) submission, p.8.

⁴⁷ Origin Energy, s.99 Abolition submission, p.1-2; EnergyAustralia, s.99 Abolition submission, p.3; Eraring Energy, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.1; Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.8.

⁴⁸ AEMC 2006, "Industry Leaders Strategy Forum - Summary of Discussion", Congestion Management Review, 17 October 2006. Available: www.aemc.gov.au.

In this Rule determination, the Commission's assessment on the proposed solutions for addressing the issues associated with constraints in the Snowy region has included a comparison of the Southern Generators' Congestion Pricing proposal with the Abolition alternative and Split Snowy Region proposal, thereby addressing concerns raised in several submissions.⁴⁹

For these reasons, the Commission considers that in undertaking its assessment of these Rule change proposals, it has followed appropriate processes to the extent its information and resources permitted.

A.3 Economic efficiency of dispatch

An important component of the overall economic welfare implications of a Rule change proposal is the extent to which it produces efficient dispatch of generation to meet demand, within the constraints of network and system conditions.

All three Rule change proposals change the pricing and settlement arrangements of generators in the NEM. This directly affects generator bidding incentives. If that change in settlement price means that a generator has incentives to bid more cost-reflectively, then the change may well improve on an enduring basis the efficiency of dispatch in the NEM. In its assessment of these Rule change proposals, the Commission has considered which of the different pricing and settlement structures proposed in the three Rule change proposals provides the strongest incentives for generators to bid in a cost-reflective manner, thereby promoting dispatch efficiency.

In assessing the proposals under this criterion, the Commission has considered views put forward in submissions, conceptual analysis prepared by Dr. Darryl Biggar⁵⁰, quantitative analysis undertaken by Frontier Economics, and its own analysis.

A.3.1 Congestion and dispatch efficiency

Before considering the impact of a change to the NEM design on the economic efficiency of dispatch it is important to understand the operation of the NEM dispatch engine (NEMDE). The objective of the NEMDE is to minimise the cost of dispatch based on the bids and offers submitted by participants. If the bids and offers submitted are cost reflective, dispatch will be economically efficient within the constraints of network and system conditions. However, there are several situations in which participants' bids and offers may not reflect their resource costs (being, in the case of a generator, the marginal value of its output under competitive market conditions).

First, congestion between a generator and its RRN can result in "mis-pricing". NEMDE effectively determines dispatch by comparing a generator's offer price and

⁴⁹ Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing , p.8-12; and ESIPC, s.99 Abolition submission, p.2-3.

⁵⁰ Dr Daryl Biggar, "Snowy Region Boundary Change Proposals - Analytical Assessment of the Options", 1 December 2006; Dr Daryl Biggar, "Snowy Region Boundary Change Proposals - Further Assessment of the Options", 12 December 2006.

its hypothetical (or “shadow”) nodal price, which reflects the local demand and supply conditions. Congestion can cause a generator’s nodal shadow price (which determines whether a generator is dispatched) and its RRP (which the generator receives for its output) to diverge. This mis-pricing creates dispatch (volume) risk for generators because it can leave a generator at risk of:

- Being dispatched due to its offer price being less than its nodal shadow price but being settled at a RRP that is less than its offer price (i.e. it is “constrained-on”); or
- Not being dispatched even though its offer price is below the RRP (i.e. it is “constrained-off”).

As a result of these risks, mis-pricing can distort participant decision-making in both the short- and long-run.

In the short-run, mis-pricing can provide an incentive for generators to engage in non-cost-reflective “disorderly” bidding, such as:

- Bidding “below cost” (down to -\$1,000/MWh) or “inflexible”⁵¹ in order to increase its dispatched output, if the price that it expects to receive at settlement is above its resource costs; or
- Bidding “above cost” (up to \$10,000/MWh) or inflexible in order to avoid being dispatched, if the price that it expects to receive at settlement is below its resource costs.

This behaviour, which does not rely on generators having any market power, can increase the underlying resource costs of supply if it leads to plant with lower resource costs being displaced by plant with higher resource costs. For example, a generator bidding -\$1,000/MWh may be dispatched because it appears to be low cost, when clearly its bid does not reflect underlying resource costs.

Since it is likely to be inefficient to “build out” all constraints, some degree of mis-pricing is inherent in a regional market like the NEM.

Second, to the extent that participants exercise transient market power, their bids and offers will (by definition) not reflect their resource costs. For example, a coal-fired generator may offer its output at \$50/MWh when its resource costs are only \$15/MWh. Alternatively, it may only offer a proportion of its plant to the market at \$15/MWh. This type of behaviour may lead to inefficient dispatch if it also alters the dispatch merit order away from the least-cost order.

Third, market intervention in the dispatch process by NEMMCO is another condition that may incentivise non-cost-reflective bidding by participants. In the NEM, when electricity flows between two regions, settlement residues accrue. These inter-regional settlement residues (IRSRs) equal the price difference between the regions multiplied by the flow between them. When electricity flows from a higher-priced

⁵¹ In respect of a scheduled generating unit, bidding inflexible means that the scheduled generating unit is only able to be dispatched in the trading interval at a fixed loading level specified in accordance with clause 3.8.19(a) of the Rules.

region to a lower-priced region, these settlement residues are negative. Negative settlement residues can accrue on the Victoria-Snowy interconnector when the constraint between Murray and Tumut binds, due to the pricing relationships resulting from the “looped” network configuration around the Snowy region.⁵² Until the implementation of the Southern Generators Rule on 1 November 2006, to limit these counter-price flows, and the associated accumulation of negative settlement residues, NEMMCO was able to intervene in market dispatch by:

- Restricting (“clamping”) power flows on the Victoria to Snowy interconnector when it expects northward counter-price flows; and
- “Re-orientating” network constraints to Dederang, Victoria when it expects southward counter-price flows between Snowy and Victoria, thereby effectively moving the Snowy RRN to Dederang for that period.

NEMMCO retains its power to clamp power flows on any other interconnectors should flows from a higher-priced region to a lower-priced region arise.⁵³

Prior to implementation of the Southern Generators Rule, when NEMMCO clamped Victoria-Snowy interconnector, it provided Snowy Hydro with incentives in some instances to bid in a way that induced clamping. This can affect the efficiency of dispatch.

Having considered the way congestion could affect generator incentives to bid in a cost reflective way, and therefore economic dispatch, the following Sections present the Commission’s assessment of the performance of each of the three Rule change proposals against this criterion.

A.3.2 Base case

Under the base case, Snowy Hydro may have incentives to bid in a non-cost-reflective manner.

A.3.2.1 Northward flows

Northward flows between Murray and Tumut would typically occur when demand and prices are relatively high in NSW and/or Queensland. For northward flows, when the Murray-Tumut constraint binds, an increase in Murray generation places the most pressure on the constraint – more pressure than generation from Victoria or the other southern NEM states – due to the positions of the various plant in the network. Under these conditions, Murray generation’s nodal shadow price will fall below the Victorian RRP, reflecting the impact that Murray’s increased output would have on the constraint. As the Snowy RRN is located at the Murray node, the Snowy RRP will also fall below the Victorian RRP at these times. As the Snowy RRP falls

⁵² See Appendix D for further information on this pricing relationship.

⁵³ Clause (c) of Part 8 of Chapter 8A of the Rules.

below the Victorian RRP, counter-price flows occur on the Victoria-to-Snowy interconnector. This gives rise to negative settlement residues.

To limit the accumulation of negative residues in the base case, NEMMCO restricts (i.e. clamps) flows on the Victoria-Snowy interconnector to a sufficient extent to prevent the continuation of counter-price flows. Once NEMMCO implements clamping, the Murray-Tumut constraint is relieved and the Snowy RRP should rise. If there are no transmission constraints binding north of Tumut, the Snowy RRP will rise towards the NSW RRP. Therefore, Snowy Hydro may be able to effectively earn the (relatively high) NSW RRP on the output of both its Murray and Tumut plant (ignoring losses). This outcome may encourage Snowy Hydro to bid in a way to trigger “clamping”. Such bidding is likely to harm dispatch efficiency, because (the energy-constrained) Murray plant will tend to “over-generate” compared to its efficient level at these times.

Even where Snowy Hydro does not bid below its resource costs to instigate clamping, the implementation of clamping may still have a detrimental impact on dispatch efficiency. This is because, as the Commission found in its final Rule determination on the Management of Negative Settlement Residues in the Snowy Region⁵⁴, clamping prevents generation from south of Murray from supplying demand north of Murray, even where the southern generation can supply northern demand at a lower cost.

Since southern generation places less pressure on the Murray-Tumut constraint than generation at Murray, more power could potentially enter NSW if it came from the southern regions than if it came from Murray. For this reason, in the absence of clamping, NEMDE would favour southern generation dispatch over Murray generation if both make identically-priced offers (or even if Murray made offers at a somewhat lower price than the southern region generators). There is, therefore, a wider dispatch efficiency impact from Murray “over-generating”.

One consequence of clamping southern generation and dispatching Murray instead is that NEMDE may need to dispatch higher merit order generation in NSW or Queensland to compensate for the reduction in flows from the southern regions. To the extent that plant bids and offers reflect their resource costs, clamping may lead to less efficient dispatch than would be the case if the counter-price flows on the Victoria-to-Snowy interconnector had simply been allowed to continue.

Another issue with clamping is the predictability of NEMMCO’s intervention. It is difficult for market participants to accurately predict when counter-price flows may arise on the Victoria-Snowy interconnector, and therefore, when NEMMCO may intervene. This is because participants would need to predict how Snowy Hydro will bid. While this is an issue for efficient dispatch, it is more significant when considering risk management implications for inter-regional trading (see Section A.4) and the requirements of good regulatory practice (see Section A.7).

⁵⁴ AEMC 2006, *Management of Negative Settlement Residues in the Snowy Region*, Final Rule Determination, 14 September 2006, Sydney.

Tumut generation, on the other hand, helps relieve the Murray-Tumut constraint when it binds. However, in the base case, its output is settled at the Snowy RRP, which is low relative to its nodal shadow price when the Murray-Tumut constraint binds. This low settlement price does not reflect the economic value of Tumut's generation when the Murray-Tumut constraint binds. This mis-pricing of Tumut generation tends to discourage Tumut from generating, even when it may be able to meet NSW demand at relatively low cost.

A.3.2.2 Southward flows

Southward flows between Murray and Tumut typically occur at times of high Victorian and South Australian demand. The bidding incentives for Snowy Hydro under the base case differ for southward flows compared to the incentives at times of northward flows discussed above. When the Murray-Tumut constraint binds, Murray generation is the most effective at alleviating the constraint. Its nodal price, and therefore the Snowy RRP, reflects the value of Murray generation to NEMDE's cost-minimising objective function. In fact, Murray generation has a greater value than even generation in Victoria. This means that the Snowy RRP is above the Victorian RRP, generating counter-price flows on the Snowy-Victoria interconnector. Under the base case to manage these counter-price flows, NEMMCO does not clamp flows; rather, it intervenes by "re-orienting" the binding constraints, effectively relocating the Snowy RRN to the Dederang node, located in Victoria. This effectively aligns the Snowy RRN with the Victorian RRP, which has the effect of slightly mis-pricing (i.e. under-pricing) Murray generation.

For southward flows, Tumut generation places the same pressure on the Murray-Tumut constraint as NSW and Queensland generation. However, Tumut generation is settled at the (relatively) high Snowy RRP, implying that Tumut generation is over-priced. This encourages it to generate even though it provides no greater benefit than NSW or Queensland plant, which receive the relatively lower NSW RRP. Furthermore, Tumut's available generation is greater than the Murray-Tumut line capacity of 1,350 MW. When the Murray-Tumut constraint binds, Tumut's bids cannot affect the Snowy RRP. Therefore, it is constrained-off and incentivised to bid its output below its resource costs, potentially resulting in counter-price flows pushing back into NSW. These counter-price flows can trigger NEMMCO's clamping intervention on the Snowy-to-NSW interconnector, allowing Snowy Hydro to increase Tumut's output and continue to receive a relatively high price on that output. In doing so, once again, Snowy Hydro is incentivised to bid its plant in a manner than is non-cost-reflective. Therefore, dispatch efficiency can once again be compromised by NEMMCO's clamping intervention.

A.3.2.3 Conclusions on base case

The bidding incentives present under the base case do not appear to promote economically efficient dispatch. The Commission's quantitative analysis supports this position, demonstrating that on average over the three years considered all three Rule change proposals would improve dispatch efficiency relative to the base case. These results are discussed further below and in Appendix B.

No submission actively promoted the base case as the preferred market structure going forward. This position was reiterated at the Commission's October 2006 Industry Leaders Strategy Forum. There was general agreement among Forum participants that the material and significant network congestion in the Snowy region required immediate attention.⁵⁵ The analysis of the base case suggests returning to this arrangement would be suboptimal and would not promote the NEM Objective.

The Commission considers, therefore, that there is a strong case to take action to address congestion issues in the Snowy region. The question then becomes whether any or all of the three Rule change proposals currently before the Commission represent an improvement on the base case and if so, which is likely to better contribute to the achievement of the NEM Objective.

A.3.3 Rule change proposals

As discussed above, there is no debate that the congestion between Murray and Tumut is material and enduring, and requires a solution. The Commission considers there is a case for change, and presents its considerations on the three formal Rule change proposals put forward to address that congestion.

A.3.3.1 The Abolition alternative

The Abolition alternative prices the material congestion between Murray and Tumut by locating a region boundary across the Murray-Tumut cutset. When these lines constrain, the price separation between NSW and Victoria reflects to the market the cost of that congestion. This proposal also changes the settlement prices for Snowy Hydro's output at its Murray, Tumut and Guthega power stations. This will directly affect Snowy Hydro's bidding incentives for those generators and this will consequently affect dispatch outcomes and the level of congestion around these generators.⁵⁶

Under this proposal, Murray generation will be settled at the Victorian RRN and Tumut generation at the NSW RRN. When the Murray-Tumut constraint binds, and there are no constraints between Tumut and the NSW RRN or Murray and the Victorian RRN, the Abolition alternative will remove the perverse bidding incentives for Snowy Hydro present under the base case. This would in turn be expected to improve the efficiency of dispatch.

However, when constraints bind between Tumut and the NSW RRN or Murray and the Victorian RRN, Tumut or Murray generation, respectively, will be mis-priced. That is, they will be settled at a price that differs from their shadow nodal price. For example, if flows are northward and a constraint binds between Tumut and the NSW RRN at Sydney West, Tumut generation will continue to be settled at the NSW RRP

⁵⁵ Industry Leaders Strategy Forum, "Industry Leaders Strategy Forum Summary Of Discussion", 17 October 2006, available online: <http://www.aemc.gov.au/electricity.php?r=20070416.114313>.

⁵⁶ Guthega power station is such a small percentage of Snowy Hydro's total portfolio that the focus on bidding incentives will be on its Murray and Lower and Upper Tumut power stations.

even though its shadow nodal price will be lower than the NSW RRP. Conversely, if flows are southward and constraints bind between Sydney West and Tumut, Tumut generation will continue to be settled at the NSW RRP even though its shadow nodal price will be higher than the NSW RRP.

Similarly, if flows are southward and a constraint binds between Murray and the Victorian RRN at Thomastown (near Melbourne), Murray generation will continue to be settled at the Victorian RRP even though its shadow nodal price will be lower than the Victorian RRP. Conversely, if flows are northward and constraints bind between Thomastown and Murray, Murray generation will continue to be settled at the Victorian RRP even though its nodal shadow price will be higher than the Victorian RRP.

Such mis-pricing can, in turn, affect Snowy Hydro's bidding incentives. In particular, Snowy Hydro does not face incentives to limit its output in order to avoid constraints on the lines to the south of Murray (when flows are southward) or to the north of Tumut (when flows are northward). In fact, to the extent Snowy Hydro finds itself constrained-off at such times, it may have incentives to bid in a disorderly manner. For example, it may offer its capacity as low as -\$1,000/MWh to get dispatched.

Some submissions did not support the Abolition alternative on the grounds that the mis-pricing of Snowy Hydro generation could possibly displace lower cost generation.⁵⁷ Others supported these competition benefits and considered they improved Snowy Hydro's incentives to maximise dispatch at its generators' new RRNs.⁵⁸

As discussed below, the other Rule change proposals also introduce non-cost-reflective bidding incentives for Snowy Hydro in particular circumstances. In these proposals, however, Snowy Hydro has a strong incentive to maintain "headroom" on those lines. In other words, Snowy Hydro has incentives to withhold its output to some degree to avoid constraining lines that would cause its settlement price to fall.

As both disorderly bidding and withholding output involve bidding in a non-cost-reflective manner, it is unclear from a conceptual analysis whether the Abolition alternative would lead to more efficient dispatch outcomes than the other options. This is an empirical question that may be informed by quantitative modelling.

The Southern Generators' modelling found that Snowy Hydro's dominant strategy was to withdraw its capacity, particularly its Tumut output. It suggested Abolition would result in higher NEM costs of around \$0.7 million per annum.⁵⁹

⁵⁷ Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.2.

⁵⁸ Country Energy, s.99 submission, Abolition, p.2; EnergyAustralia, s.99 Abolition submission, p.1; Origin Energy, s.99 Abolition submission, p.1; Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.24.

⁵⁹ ROAM Consulting, Analysis of the AEMC Draft Rule Determination to Abolish Snowy Region - Appendix A Modelling, Report to Southern Generators' Coalition, 3 April 2007 (ROAM report), p.II and 30.

Conversely, the Commission's quantitative modelling showed production cost savings under the Abolition alternative. This was primarily driven by an increased level of competition, with sustainable bidding patterns involving participants offering almost all their capacity into the market. By pricing Murray and Tumut generation at the Victorian and NSW RRNs, respectively, the Abolition scenario creates incentives for Snowy Hydro to maximise its production by bidding competitively. This suggests Snowy Hydro may not have the incentives to exhibit market power to control flows across the Victoria-NSW interconnector, as suggested in some submissions.⁶⁰

The modelling indicated greater levels of dispatch for Murray, Tumut, Victorian brown coal, and cheaper NSW black coal generators, which displaced more expensive NSW and Queensland black coal and some mid merit gas plant across the NEM. Productive cost savings for the Abolition scenario peaked around \$1.5 million per annum (in the 2009 contracted low case).⁶¹

Under the Abolition alternative, static loss factors for Murray and Tumut generation would replace the existing marginal loss factor equations. Submissions noted that this may introduce inefficiencies.⁶² The quantitative modelling accounted for this difference. The consistently positive results described above suggest the overall competition benefits outweigh any potential cost of moving to static loss factors.

Conclusions on the Abolition alternative

The conceptual assessment is unclear on what effect the degree of mis-pricing and non-cost-reflective bidding may have on efficient dispatch. However, the quantitative assessment demonstrates that the Abolition alternative would lead to more competitive bidding, which would improve the economic efficiency dispatch relative to the base case.

A.3.3.2 Split Snowy Region proposal

The Split Snowy Region proposal prices the material congestion between Murray and Tumut, and any congestion that arises on the cutsets just north of Tumut and just south of Dederang. In contrast to the Abolition alternative, this proposal removes most of Snowy Hydro's incentives to engage in the disorderly bidding of Murray and Tumut generation. This is because it removes much of the risk of those plants being mis-priced. All other things being equal, this is likely to improve dispatch efficiency.

However, the Split Snowy Region proposal does introduce strong incentives for Snowy Hydro to maintain "headroom" on all transmission lines between its plant and the Victorian or NSW RRN, depending on the direction of flows.

⁶⁰ Delta Electricity, s.99 Abolition submission, p.4; and ERM Power, s.99 Abolition submission, p.2.

⁶¹ See Appendix B.

⁶² Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.15.

For northward flows, if there is a constraint between Lower Tumut and the NSW RRN at Sydney West, the price at the Tumut RRN will fall below to the NSW RRP. All Tumut generation will be settled at this relatively low price. If there are no constraints between the Murray RRN at Dederang and the Tumut RRN, Murray generation will be settled at this similarly low price. If there are constraints between the Murray and Tumut RRNs, the price at which Murray is settled at will fall below the Tumut RRP.

For these reasons, Snowy Hydro is incentivised to withhold output at both Tumut and Murray. Withholding output at Tumut may reduce the risk of constraints binding between the Tumut RRN and NSW RRN during northward flows. This withholding could therefore lead to a higher Tumut RRP than would be the case in the absence of this behaviour. Similarly, Snowy Hydro may be incentivised to withhold some output at Murray to ensure the lines between Murray and Tumut do not bind.

The incentive for Snowy Hydro to withhold some output is also present for southward flows. When the Victorian RRP is high, a constraint between the Victorian RRN and Murray RRN will result in Murray generation being settled at a comparably lower RRP. This means that Snowy Hydro is incentivised to withhold its Murray generation to maintain headroom between the Murray RRN and Victorian RRN.

Similarly, if constraints bind between Murray and Tumut, Tumut output will be settled at a lower price than Murray. Snowy Hydro has a similar incentive to withhold some Tumut output to prevent the Murray-Tumut interconnector from constraining. This behaviour would allow Tumut to import the (higher) Murray RRP. Snowy Hydro stated that the Split Snowy Region proposal did not remove incentives for Tumut and Murray to withhold generation, meaning that it would have the effect of reducing competition and driving up contract prices.⁶³

Submissions supportive of this proposal considered that the incentives on Snowy Hydro to maintain headroom in this manner were less detrimental to efficiency than its incentives under the Abolition alternative to engage in disorderly bidding to avoid being constrained-off. Submissions considered that minimising the scope for Snowy Hydro generators to take advantage of those intra-regional constraints would increase dispatch efficiency and avoid counter-price flows.⁶⁴ Some submissions commented that the Commission places too much emphasis on the withholding capacity/maintaining headroom argument and its significance on the degree of competition in NSW.⁶⁵

⁶³ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.25.

⁶⁴ Delta Electricity, s.99 Abolition submission, p.1-3; Eraring Energy, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.1-2; Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.3.

⁶⁵ Eraring Energy, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.1-2.; Macquarie Generation, joint s.99 Abolition, s.95 Southern

The Commission considers, however, that while the increment of output at Murray or Tumut being withheld may be minimal, it may result in more expensive generation being dispatched north or south to meet any incremental increase of demand in NSW/Queensland or Victoria/South Australia/Tasmania, respectively. This may have a material effect on dispatch efficiency, depending on what generator is dispatched to meet any the incremental increase in demand. If the marginal generator dispatched to meet that incremental increase in demand is more expensive than the cost of generation at Murray or Tumut, this is a less efficient outcome than if Murray or Tumut increased their generation by one unit.

Conceptually, it is again unclear whether the Split Snowy Region proposal would lead to more efficient dispatch outcomes compared to the alternative proposals. This is an empirical question, informed by quantitative modelling.

Like the quantitative modelling on the Abolition alternative the production cost savings under the Split Snowy Region proposal were generally positive, peaking at \$1.2 million per annum (in the 2008, contracted low case).⁶⁶ These savings arise due to the increased likelihood of more competitive bidding by Snowy Hydro and other participants due to reduced system constraints. This effect is not as great compared to the Abolition alternative, and was offset at certain demand levels by production losses. During those times, Snowy Hydro faces incentives that promote high strategic bidding strategies, which are not sustainable in either the base case or Abolition scenarios.

The Southern Generators suggested that the modelling approach used by both themselves and the Commission meant that the increase in dispatch efficiency associated with the use of dynamic inter-regional loss factors rather than static loss factors was unlikely to be observable in the results, meaning the efficiency gains of the Snowy Split Region proposal found in the modelling were likely to be understated.⁶⁷ The modelling analysis included in this determination has been updated from earlier analysis to reflect a number of changes, including the incorporation of dynamic inter-regional loss factors for the Split Snowy Region proposal (see Appendix B). Any efficiency gains associated with the use of dynamic loss factors in the Split Snowy Region proposal will therefore be accurately reflected in the quantitative analysis included in this determination.

Conclusions on the Split Snowy Region proposal

The Split Snowy Region proposal virtually removes all mis-pricing for Tumut generation, with Murray generation being potentially mispriced if constraints bind between Murray and the RRN at Dederang. It does, however, introduce incentives for Snowy Hydro to withhold capacity at Murray and Tumut in order to import the high prices from Victoria and NSW, when flows are southward or northward,

Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.6; and Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.27.

⁶⁶ See Appendix B.

⁶⁷ Southern Generators, joint s.99 Abolition and Southern Generators' Congestion Pricing submission, p.15.

respectively. Conceptually, it is difficult to determine what the net impact on dispatch efficiency would be under these circumstances. The quantitative analysis indicates that the Split Snowy Region proposal is likely to yield less economically efficient dispatch outcomes than those under the Abolition alternative.

A.3.3.3 Southern Generators' Congestion Pricing proposal

The Tumut CSP/CSC Trial component of the Southern Generators' Congestion Pricing proposal focuses on ensuring Tumut generation is settled at its nodal shadow price when the Murray-Tumut constraint binds, as opposed to the Snowy RRP. This produces a similar (but not identical) set of incentives for Snowy Hydro in relation to its Tumut generation as those under the Split Snowy Region proposal, both of which differ substantially from Snowy Hydro's incentives under the base case.

For northward flows, when the Murray-Tumut constraint binds, Tumut generation is no longer mispriced. This is because it receives a price that reflects its own position in the network, rather than the Snowy RRP at the Murray node. Subject to the absence of constraints between Tumut and Sydney West, Tumut effectively receives the NSW RRP. This is consistent with the fact that Tumut generation (like generation in NSW or Queensland, but unlike generation at Murray) relieves the Murray-Tumut constraint. However, as under the Split Snowy Region proposal, if there is a constraint between Tumut and the NSW RRN, the nodal shadow price at Tumut will fall relative to the NSW RRP. This could incentivise Tumut to withhold some output to maintain sufficient headroom to import the higher NSW RRP to its own node.

For southward flows, the Tumut CSP/CSC Trial mechanism operates in the following way. If the Murray-Tumut constraint is not binding, Tumut generation is settled at the Snowy RRP. When it does bind, the Trial provides incentives for Snowy Hydro to prevent it over-generating at Tumut. For its first 550MW of output, Tumut generation is settled at the Snowy RRP. Each additional megawatt from Tumut is settled at its lower nodal shadow price. This prices additional Tumut generation on a similar basis as NSW generation as an additional megawatt from either plant will place similar pressure on the Murray-Tumut constraint. These incentives make Snowy Hydro consider carefully whether it is worth generating more than 550MW at Tumut under these circumstances.

This contrasts sharply with the situation under the base case, in which Snowy Hydro can have incentives to offer Tumut generation below cost to secure the (high) Snowy RRP on all its output and to instigate clamping on the Snowy-NSW interconnector. It also contrasts slightly with the situation under the Split Snowy Region proposal, in which Snowy Hydro risks having its entire Tumut output (rather than just that portion of 550 MW) effectively settled at the (low) NSW RRP if the Murray-Tumut constraint binds. This means that Snowy Hydro may have fewer incentives to withhold Tumut output and leave headroom on the Murray-Tumut lines than it might have under the Split Snowy Region proposal.

The Tumut CSP/CSC Trial component of the Southern Generators' Congestion Pricing proposal therefore reduces the inefficiencies associated with mis-pricing at Tumut as, like the Split Snowy Region proposal, mis-pricing is virtually non-existent when the Murray-Tumut constraint binds. Nevertheless, to the extent that Snowy

Hydro exercises transient market power by withholding output at Tumut, the Southern Generators' Congestion Pricing proposal may not ensure completely efficient Tumut dispatch.

The Southern Generators Rule component of the Southern Generators' Congestion Pricing proposal addresses NEMMCO's intervention on the Victoria-Snowy interconnector to manage negative settlement residues. For northward flows, by eliminating clamping, Snowy Hydro's bidding incentives for Murray generation change, relative to those under the base case. Snowy Hydro no longer has the incentive to bid in a disorderly fashion to instigate clamping. Murray generation no longer has the payoff incentive to "over-generate" compared to its efficient level, relative to the base case.

On the other hand, if the Murray-Tumut constraint does bind, the Snowy RRP (set at the Snowy RRN at Murray) falls below the Victorian RRP, in line with Murray generation's physical position in the network. This provides Snowy Hydro with the strong incentive to withhold some Murray generation to prevent that constraint from binding or from remaining binding.

For southward flows, Murray generation is no longer mis-priced as NEMMCO does not re-orient the Murray-Tumut constraints to the Dederang node to manage negative settlement residues. All other things being equal, these incentives encourage Snowy Hydro to generate more at Murray compared to incentives under the base case or the Snowy Split Region proposal. Under either of the other proposals, Murray generation is effectively settled at the (lower) Victorian RRP instead of its local nodal price, the Snowy RRN.

Due to the multitude of incentives facing Snowy Hydro under all of the proposals, it is not possible to make strong conceptually-based predictions of the relative efficiency of the Southern Generators' Congestion Pricing proposal compared to the other proposals. The Commission has therefore undertaken quantitative modelling to further inform its assessment.

The Southern Generators modelling and submissions commented that there would be dispatch efficiency improvements from the Southern Generators' Congestion Pricing proposal relative to the base case.⁶⁸ They stated that their proposal was the least cost option, assuming strategic bidding for Snowy Hydro. In its submission, however, Snowy Hydro commented that its incentive to maintain headroom on the interconnectors would reduce the efficiency of this proposal relative to its Abolition alternative.⁶⁹

The Commission's quantitative modelling produced somewhat different outcomes to those forecast under the Southern Generators' modelling. The production cost savings in the Southern Generators' Congestion Pricing proposal were either positive or very slightly negative. The largest saving of \$450,000 per annum was observed in

⁶⁸ See Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing; submission, p.15.

⁶⁹ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.14-15.

2008, contracted high case. The production cost savings and losses were due to different bidding incentives being more profitable at various times. However, there does not appear to be a consistent bidding incentive for Snowy Hydro under the Southern Generators' Congestion Pricing proposal like the incentives for more competitive bidding under the Abolition alternative and the Split Snowy Region proposal. Importantly, the magnitude of the production cost savings indicates that on balance the Southern Generators' Congestion Pricing proposal resulted in fewer incentives for cost reflective bidding than under the Abolition alternative and the Split Snowy region proposal.

Conclusions on the Southern Generators' Congestion Pricing proposal

The Southern Generators' Congestion Pricing proposal promotes similar (but not identical) incentives for Snowy Hydro as those under the Split Snowy Region proposal. There appear to be efficiency benefits over the base case. However, the incentives faced by Snowy Hydro to withhold capacity appear to result in less economically efficient dispatch outcomes when compared to the outcomes under the Abolition alternative. The incentives to bid competitively are weaker than either the Split Snowy Region or the Abolition alternative, resulting in a smaller improvements in dispatch efficiency compared to the base case.

A.3.4 Commission's considerations

The Commission considers this to be a case to "do something" rather than supporting a position of "do nothing" and implementing the base case. However, since the Rule change proposals are alternatives, the Commission must consider which proposal will better contribute to the achievement of the NEM Objective. The question then becomes which of the proposals provides the most efficient bidding incentives, and therefore maximises the efficiency of dispatch.

None of the proposals can ensure fully cost-reflective bidding by both Murray and Tumut generation. In each case, it is difficult to conceptually predict the likely net effect on dispatch efficiency of Snowy Hydro's incentives to both: (1) engage in disorderly bidding resulting from mis-pricing; and (2) withhold capacity in order to earn higher settlement prices. The quantitative modelling demonstrates that while all the proposals result in dispatch efficiency improvements relative to the base case, the Abolition alternative produces the most efficient dispatch outcome. Compared to the base case and the alternatives, the Abolition alternative resulted in an increased level of competition, with sustainable bidding patterns involving participants offering almost all their capacity into the market, maximising dispatch efficiency.

Having regard to conceptual and quantitative analysis and submissions, the Commission concludes that the economic efficiency of dispatch benefits resulting from the more competitive environment under the Abolition alternative are greater than those under the Split Snowy Region or Southern Generators' Congestion Pricing proposals.

A.4 Inter-regional trading and risk management

The effect on inter-regional trading and risk management of a change to the region pricing structure in the NEM depends on a number of factors. One key factor is the ability of participants to manage basis (price) risk relative to their ability to manage dispatch (volume) risk. Dispatch risk refers to the uncertainty about whether a participant's plant will be selected to generate, while basis risk refers to the uncertainty about the price a participant will be paid for its output.

Generators typically enter contracts with counter-parties in other locations. Where these counter-parties are located in other regions, generators may face basis risk arising from differences in the price they are paid for their output (their RRN) and the price at which the contract is settled (the counter-party's RRN). Transmission congestion (or losses) can lead to regional price separation.

The three Rule change proposals being assessed all seek to price the material and enduring congestion between Murray and Tumut using different degrees of granular pricing. This can have implications on the ability participants have to manage the basis risk associated with the various proposed pricing structures.

The effect of more granular pricing (either by increasing the number of regions or using congestion pricing mechanisms like CSP/CSCs) on the basis risk of market participants is not straightforward. On one hand, more granular pricing may reduce the basis risk for some participants by providing greater consistency between a generator's offer and the price it receives for its output, reducing the incidence of mis-pricing. Conversely, more granular pricing can increase the level of basis risk for participants to manage.

While generators may use disorderly bidding to manage dispatch risk, this is not an effective strategy to manage basis risk. Generators require access to risk management tools that enable them to hedge for differences between the spot market price at which their output is settled and the strike price at which their contracts are settled.

In the NEM, IRSR units are one tool to help participants manage price separation between regions. These units provide participants with access to a portion of the transmission rentals arising on a particular directional interconnector.⁷⁰ IRSR units are sold as non-firm instruments in that they provide a right only to the residues that accrue to physical flows on an interconnector. If flows are reduced for any reason (e.g. transmission constraints or intervention like NEMMCO's clamping), prices can still separate but the holders of the units have a reduced hedge, or no hedge, against those price differences.

Participants have informed the Commission that to manage an inter-regional position, they do not solely rely on IRSR units to manage their basis risk. Some use them as purely a speculative tool, while others stated they may use them as one

⁷⁰ A directional interconnector is a reference to a particular direction of flow on an interconnector. For example, the Snowy-to-NSW interconnector comprises of the SN-NSW directional interconnector (for northward flows) and the NSW-SN directional interconnector (for southward flows) (see clause 3.18.1(c) of the Rules).

component of their financial products portfolio to manage their basis risk.⁷¹ Clearly, generators will have less need for basis risk management tools if they have a wide choice of contract counterparties who are located in their region, allowing them to avoid basis risk altogether.

This criterion evaluates which Rule change proposal best supports the efficient management of risk for market participants who wish to trade with parties in other locations. For each proposal the Commission considers the extent to which the proposal reduces basis risk, and the implications for the firmness of IRSR units used to hedge inter-regional price differences. The Commission has considered views put forward in submissions, conceptual analysis prepared by Darryl Biggar, quantitative analysis undertaken by Frontier Economics, and its own analysis.

A.4.1 Base case

Under the base case, IRSR units between NSW and Victoria for both directions are not firm. As discussed above, when the Murray-Tumut interconnector binds at times of northward flows, negative residues result on the Victoria-Snowy interconnector. This has two effects: (1) NEMMCO intervenes by restricting flows between Victoria and Snowy, also reducing the firmness of those IRSR units - irrespective of the price difference, if the flow is zero across the interconnector, there will be no residues; and (2) the mis-pricing of Tumut means it does not have the incentives to generate, potentially reducing flows on the Snowy-NSW interconnector, reducing the value of those IRSR units. At the extreme, if Tumut does not generate at all due to its low settlement price, only the 1,350MW flowing across the Murray-Tumut cutset will make its way into NSW, compared to around 3,200MW if Tumut were generating at maximum capacity.⁷²

For southward flows, when the Murray-Tumut interconnector binds: (1) the pricing incentives on Tumut generation may result in counter-price flows on the Snowy-NSW interconnector, initiating NEMMCO clamping, which reduces the value of those IRSR units; and (2) NEMMCO re-orientes the settlement price for Murray generation, and therefore effectively the Snowy RRN so that there is no price difference between the Snowy and Victorian RRs, therefore reducing the value of IRSR units on the Snowy-Victoria interconnector.

Darryl Biggar's analysis supports the position that under the base case, settlement residues are never firm when the Murray-Tumut constraint (and other relevant constraints limiting flows north or south) bind.⁷³

⁷¹ As part of its work on the Congestion Management Review, the Commission met with a range of market participants to discuss whether they (a) traded inter-regionally, and if they did (b) what approaches and products did they use to manage their basis risk. For confidentiality reasons, the Commission is unable to explicitly list those participants it met with; however, whether participants did or did not trade inter-regionally, not one participant stated that they would manage an inter-regional position using solely IRSR units due to their lack of firmness.

⁷² NEMMCO Communication No. 2356, "Change in SNOWY1 Interconnector Transfer Limit", Friday, 5 January 2007, E-mail.

⁷³ Biggar, 1 December 2006, paras. 73-75.

Snowy Hydro's ability to influence the value of IRSRs on directional interconnectors into the Snowy region (i.e. on the NSW-Snowy and Victoria-Snowy interconnectors) is restricted. Clause 3.18.2(h) of the National Electricity Rules (Rules) places historical restrictions on Snowy Hydro's acquisition of IRSR units for those interconnectors. These restrictions were imposed by the Australian Competition and Consumer Commission (ACCC) because of its concerns about Snowy Hydro's ability to increase the Snowy RRP by exercising market power – given that it is the monopoly generator in the region with no load. Such price increases would increase the value of the IRSR units on directional interconnectors into the Snowy region (i.e. import flows into Snowy) and provide a strong benefits to Snowy Hydro at the expense of other NEM participants and ultimately, end-use customers.

The Rules to permit Snowy Hydro to bid for units on these interconnectors on the condition that it provides NEMMCO with an independent auditor's report that contains a certified statement that sets out the approximate total megawatts of settlement residues required by Snowy Hydro for the relevant period for: (1) its demonstrated pumping needs; and (2) its demonstrated contractual exposures.⁷⁴

A.4.2 Abolition alternative

Snowy Hydro faces lower basis risk under the Abolition alternative relative to the base case. The removal of the existing Snowy region boundaries means Snowy Hydro no longer has to manage price separation between its Murray and Tumut generation settlement price and its contracted volume settled at the Victorian and NSW RRNs, respectively. The reduction in Snowy Hydro's basis risk under the Abolition alternative, combined with the incentives for more competitive bidding discussed in Section A.3, is likely to result in it making more competitive offers for contracts at the NSW and Victorian RRNs compared to the alternatives. This, in turn, will place pressure on other parties to be similarly competitive.

Several submissions agreed that the increased competition from the Abolition alternative would reduce contract prices relative to the base case. They argued that the absence of basis risk for Snowy Hydro would encourage it to lower prices for its contracts, with flow-on benefits for the liquidity of the contract market, inter-regional trade and competition.⁷⁵ The Firecone report, commissioned by Snowy Hydro, found that inter-regional trading risk is high and that the instruments available to hedge it are weak, concluding that Abolition would facilitate an increase in contract market competition.⁷⁶ Only one submission concluded the Abolition alternative would materially degrade the ability to hedge inter-regionally.⁷⁷

⁷⁴ NEMMCO, "Settlement Residue Auction Information Memorandum", 2 July 2007, p.41-42, available: www.nemmco.com.au.⁰

⁷⁵ Origin Energy, s.99 Abolition submission, p.4; and EnergyAustralia, s.99 Abolition submission, p.1; and Country Energy, s.99 Abolition submission, p.2.

⁷⁶ Firecone Ventures, Impacts of changes to the Snowy Region on the Contract Market, April 2007 (Firecone report), p.ii and p.24-26. See also Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.2.

⁷⁷ Westpac, s.99 Abolition submission, p.3.

The effect of the Abolition alternative on the firmness of IRSR units is less clear. While the Abolition alternative explicitly prices the material congestion between Murray and Tumut, it reduces the granularity of pricing in the NEM. This may introduce incentives for Snowy Hydro to bid in a disorderly manner to manage its dispatch risk, making it more difficult for other participants to predict Snowy Hydro's bidding behaviour.

In analysis undertaken for the Commission, Darryl Biggar identified that the new constraint equations representing inter-regional flows between the new Victoria and NSW regions contain terms for both Snowy Hydro generation levels and interconnector flows.⁷⁸ Biggar stated this meant that participants would need to predict both Snowy Hydro generation and interconnector flows to determine the value of IRSR units. The difficulty in predicting Snowy Hydro's behaviour may reduce the perceived firmness of IRSRs as an inter-regional hedging instrument relative to the base case.

For example, the nominal limit on the Victoria-NSW interconnector under the Abolition alternative would be equivalent to the current limit between Murray and Tumut of 1,350MW. However, price separation between Victoria and NSW could still occur at times of northward flows if Tumut generation bid in such a way that constraints between Tumut and Sydney West (the location of the NSW RRN) bound before flows on the Victoria-NSW interconnector reached 1,350MW. This analysis suggests that the IRSR units for the proposed Victoria-NSW interconnector may not be the "firmest" in the NEM, as suggested by Snowy Hydro.⁷⁹ Westpac agreed, noting in its submission that it considered reducing the number of regions under the current market design would introduce significant mis-pricing of both spot and forward markets, and in absence of a firmer inter-regional hedging instrument, would be detrimental to the NEM.⁸⁰

That being said, the Commission's analysis on binding constraints north of Tumut and south of Murray suggests that while it may occur, it does not appear to be a material problem (see Appendix B).

More particularly, unless it is known which constraints will bind and how often, it is not possible to make definitive statements regarding the effect the Abolition alternative will have on the firmness of IRSR units between Victoria and NSW. It therefore makes it difficult to also make statements regarding the willingness of participants to enter into inter-regional hedges.

The Abolition alternative does address the pricing arrangements that triggered negative residues on the Victoria-Snowy interconnector when the Murray-Tumut constraint bound. It eliminates the problem of negative residues due to loop flows.⁸¹ This greatly reduces the risk of NEMMCO intervention to manage negative residues

⁷⁸ Biggar, 1 December 2006, paras. 97-106.

⁷⁹ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.40-41.

⁸⁰ Westpac, s.99 submission, Abolition draft Rule determination, 30 April 2007, p.1, 3.

⁸¹ Biggar, 1 December 2006, paras. 100-101.

accumulation when the Murray-Tumut constraint binds and, therefore, also reduces the effect that clamping and “re-orientation” under the base case would have on the value of IRSR units.

The Commission expects that the reduction in basis risk for Snowy Hydro under the Abolition alternative will promote incentives for Snowy Hydro to offer more competitively priced contracts at the NSW and Victorian RRNs, introducing greater competitive pressure in the contract markets at those RRNs, and providing competitive benefit for the wider contract market. However, it is not possible to be conclusive on the net effect Abolition would have on the firmness of IRSRs between Victoria and NSW, and the resulting impact that would have on participants’ willingness to trade between those regions.

A.4.3 Split Snowy Region proposal

It is possible that increasing the number of regions will increase the basis risk for participants wishing to trade inter-regionally. Several submissions expressed concern about the increase in risk and trading complexity associated with inter-regional contracts.⁸²

Under the Split Snowy Region proposal, Snowy Hydro faces greater basis risk than under the Abolition alternative, since its Murray and Tumut generation is located in generation only regions. Every contract it strikes against its Murray and Tumut generation is exposed to price risk between the Murray or Tumut RRN, and the RRN where it strikes the contract. The incentives to manage this basis risk may lead Snowy Hydro to adopt its withholding strategy to reduce the probability of price separation between the Victorian, Murray, Tumut, and NSW regions. It may affect Snowy Hydro’s willingness to offer contracts at the NSW and Victorian RRNs. It may also affect the competitiveness of those contracts, given Snowy Hydro would need to price its basis risk accordingly. Snowy Hydro argued in its submission that the more granular pricing, either through more regions or a CSP/CSC arrangement, would reduce contract volume and liquidity and drive up contract prices.⁸³

However, participants under the Split Snowy Region proposal may be in a better position to secure a firmer inter-regional hedge than under the base case or the Abolition alternative, since there are fewer unpriced constraints between the Victorian RRN and the NSW RRN. While a participant would need to obtain IRSR units across three interconnectors to hedge a position between NSW and Victoria, as pointed out in several submissions, the Settlement Residue Auction (SRA) linked bid facility may reduce the perceived difficulty or risk of trying to obtain multiple IRSRs across the three interconnectors.⁸⁴ The Split Snowy Region proposal also eliminates

⁸² Origin Energy, s.99 Abolition submission, p.2-3; EnergyAustralia, s.99 Abolition submission, p.3.

⁸³ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators’ Congestion Pricing, and s.95 Split Snowy Region submission, p.39.

⁸⁴ Southern Generators, joint s.99 Abolition and s.95 Southern Generators’ Congestion Pricing submission, p.30; Delta Electricity, s.99 Abolition submission, p.5; Eraring Energy, joint s.99 Abolition, s.95 Southern Generators’ Congestion Pricing, and s.95 Split Snowy Region submission, p.2; Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators’ Congestion Pricing, and s.95 Split Snowy Region submission, p.4; Hydro Tasmania s.95 submission, Split Snowy Region, p.3.

the problem of negative residues due to loop flows in the existing Snowy region.⁸⁵ One submission argued that the increased data and transparency of the Split Snowy Region proposal would lead to better pricing and risk management.⁸⁶

That being said, the firmness of those IRSR units also depends on the ability of unit holders to predict the incentives for Snowy Hydro's bidding behaviour. As discussed earlier, under the Split Snowy Region proposal, Snowy Hydro has incentives to withhold capacity to maintain headroom to import the higher prices from neighbouring regions. Since IRSRs are a function of both price separation and interconnector flow, the extent to which Snowy Hydro withholds capacity can have a direct affect on the value of IRSRs on those interconnectors. As for the Abolition alternative, the conceptual analysis is inconclusive on what the overall likely affect on participants' ability and willingness to trade inter-regionally would be under the Split Snowy Region proposal. While the combined IRSR units on the three new interconnectors may provide a "firmer" financial hedge than the corresponding units under the Abolition alternative, the incentives Snowy Hydro faces to withhold capacity to manage its own basis risk may offset that firmness.

Snowy Hydro would face greater basis risk under the Split Snowy Region proposal compared to the Abolition alternative, however, and to the extent that this influences the volume and competitiveness of its contracts in the NEM-load bearing regions, it may result in less efficient contract prices relative to the Abolition alternative.

A.4.4 Southern Generators' Congestion Pricing proposal

Under the Southern Generators' Congestion Pricing proposal, when the Murray-Tumut constraint binds, the Tumut CSP/CSC Trial ensures that Tumut output receives its own nodal shadow price, similar to the Split Snowy Region proposal. When the constraint does not bind, Tumut generation is settled at the Snowy RRP, just as it would be under the base case.

The incentives for Snowy Hydro to manage its basis risk under the Southern Generators' Congestion Pricing proposal are fairly similar to those under the Split Snowy Region proposal. While there may be an improvement for Snowy Hydro relative to the base case, its basis risk is more significant under this proposal compared to the Abolition alternative.

Snowy Hydro is likely to have a greater willingness to contract its Tumut generation in NSW under the Southern Generators' Congestion Pricing proposal than under the base case because of its pricing incentives under this proposal. This is because its settlement price is closer to the NSW RRP than under the base case. It may still use its withholding strategy though, to manage any congestion that may arise between it and the NSW RRN. Just as in the Split Snowy Region proposal, any such congestion would lower the Tumut settlement price.

⁸⁵ Biggar, 1 December 2006, para. 122.

⁸⁶ Eraring Energy, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.5.

Also, as under the Split Snowy Region proposal, Murray generation would still face basis risk on any contracts struck at the NSW RRN. When flows are northward, it would have incentives to withhold capacity to alleviate the constraint to help import the higher NSW RRP. This helps Snowy Hydro manage its exposure from any price difference between its Murray settlement price and the NSW RRP, should it have any contracts there. For southward flows, Murray generation is incentivised to generate to alleviate the Murray-Tumut constraint, therefore assisting Snowy Hydro in meeting its contract position in Victoria using both its Tumut and Murray generation.

The likely effects of these incentives on the IRSR units under the Southern Generators' Congestion Pricing proposal are likely to be a combination of those under the Split Snowy Region proposal and the base case. Accordingly, when the Murray-Tumut constraint binds, the firmness of the Snowy-NSW directional interconnector IRSR units is dependent on the extent to which Snowy Hydro seeks to maintain headroom on that interconnector. Those units are therefore likely to be firmer than under the base case, but inconclusive relative to the Split Snowy Region proposal. For southward flows, should Snowy Hydro's bidding of its Tumut generation result in counter-price flows on the NSW-Snowy directional interconnector, Tumut generation settlements are used to offset the negative residues. This improves the firmness of those units relative to the base case, but it is unclear relative to the Split Snowy Region proposal what the relative firmness may be.

The Southern Generators Rule component of the Southern Generators' Congestion Pricing proposal has its own effect on the IRSR units between Victoria and NSW. As presented in its final Rule determination on the Southern Generators Rule, the Commission considered that the Rule improved the net firmness of IRSR units between Victoria and NSW relative to the base case.⁸⁷ This was because the combination of the Victoria-Snowy and Snowy-NSW IRSR units for northward flows was likely to improve the hedging instrument's ability to manage the price difference between the Victorian RRN and NSW RRN relative to the base case. The same was considered true for the combined units for southward flows also. While the Commission considers these IRSR units are more firm than under the base case, it is again unclear what the relative firmness is to those under the Split Snowy Region proposal, or indeed the single IRSR units under the Abolition alternative. It is also unclear what effect the relative firmness of these IRSR units would have on participants' ability to manage any inter-regional basis risk between Victoria and NSW.

Submissions were divided on the likely effect of the Southern Generators' Congestion Pricing proposal on inter-regional trade. Snowy Hydro contended that the Southern Generators' Congestion Pricing proposal was likely to increase transaction costs in the contract market and reduce inter-regional trade.⁸⁸ On the other hand, the Southern Generators argued that risks under their Congestion

⁸⁷ AEMC 2006, *Management of Negative Settlement Residues in the Snowy Region*, Final Rule Determination, 14 September 2006, Sydney, p.27.

⁸⁸ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.24.

Pricing proposal would be lower than the Base Case due to the “firming up” of interconnector residues.⁸⁹

A.4.5 Commission’s considerations

The Abolition alternative results in the lowest basis risk for Snowy Hydro, compared to the alternatives of the Split Snowy Region and the Southern Generators’ Congestion Pricing proposals. The Commission expects that the reduction in basis risk for Snowy Hydro under the Abolition alternative will promote incentives for Snowy Hydro to offer more competitively priced contracts at the NSW and Victorian RRNs, introducing greater competitive pressure in the contract markets at those RRNs, providing competitive benefit for the wider contract market.

The positive benefits on IRSR firmness from removing NEMMCO’s unpredictable intervention to manage negative residues supports a case for change away from the base case under this criterion. However, the analysis was unable to identify which Rule change proposal promoted IRSR firmness in a way that substantially enhanced market participants’ ability to manage basis risk between Victoria and NSW.

The quantitative analysis of risk is also inconclusive on which of the three Rule change proposals better enables participants to manage the risk of trading inter-regionally between Victoria and NSW (both directions) using only IRSR units. Presented in Appendix B, the results suggest the Abolition alternative marginally produced the lowest level of risk for inter-regional positions from NSW into Victoria for all but the 2010 contracted high case. It did not perform as well for trading from Victoria into NSW. There was no risk for Snowy Hydro’s Murray and Tumut generation under the Abolition alternative. The base case and Southern Generators’ Congestion Pricing proposal produced similar levels of risk for participants trading from NSW into Victoria, with the Split Snowy Region producing marginally higher levels on average. The Split Snowy Region results fell between those of the Abolition alternative and the Southern Generators’ Congestion Pricing proposal, but appeared to produce the lowest level of risk in 2010 (contracted high). The results are similarly marginal and inconclusive when considering trading from Victoria into NSW.

That being said, market participants noted in interviews with the Commission that they did not rely solely on IRSRs for managing an inter-regional risk. Some used it as a speculative tool while others used it as part of their portfolio approach for managing inter-regional risk. To the extent participants can access other tools to supplement cover for their inter-regional basis risk, then the overall effect of IRSR firmness is not a strong differentiating factor between the proposals.

The Commission’s conclusion that there is likely to be increased competition in the contract market under the Abolition alternative was supported by submissions from a number of parties. As discussed above, they argued that the absence of basis risk for Snowy Hydro would encourage it to lower prices for its contracts, with flow-on

⁸⁹ Southern Generators, joint s.99 Abolition and s.95 Southern Generators’ Congestion Pricing submission, p.17.

benefits for the liquidity of the contract market, inter-regional trade and competition.⁹⁰

The Commission therefore concludes that the Abolition alternative will result in a material improvement in inter-regional trade and risk management compared to the alternatives.

A.5 Pricing outcomes and participant responses

Although favourable wholesale price impacts are not a distinct component of the Commission's considerations, a greater alignment between costs and prices has desirable efficiency implications. Price outcomes and the related participant responses are informed by the effects the proposals have on dispatch efficiency and inter-regional trading and risk management. More competitive bidding, leading to more efficient dispatch, should lead to more cost-reflective spot prices. If a proposal promotes greater competition in a wholesale market, this may also increase competition in the contract market. This in turn has implications for outcomes and responses in both the short and the long term.

In the short term more cost-reflective prices will enable consumers to make more informed decisions about the timing and level of their consumption, to the extent effective retail competition ensures that end consumers see these more cost-reflective prices. In assessing this criterion the Commission has considered which proposal is most likely to result in wholesale prices that accurately reflect the efficient costs of production, and therefore, promote allocative efficiency. Short term competition improvements can therefore have longer term implications, particularly relating to participant responses to those competitive improvements.

In the longer term, Rule change proposals that change production and pricing (spot and contract) outcomes are likely to affect the timing, location, and type of new investment in load and generation plant. Investors in new plant typically rely on long term contracts to help underwrite their investments. To the extent the changes to region boundaries result in more competitive and, hence, predictable behaviour this is likely to ease entry conditions for investors. In turn, a more predictable market is likely to reduce the risk of ill-timed investment and the costs associated with capacity shortages in the market. The Commission has considered, therefore, which proposal generates the most accurate and reliable long term price signals to inform decisions by existing and prospective generators, loads, and network providers.

This criterion evaluates which of the three Rule change proposals best promotes allocative efficiency in the short term and efficient investment in the longer term. The Commission has considered views put forward in submissions, quantitative analysis undertaken by Frontier Economics, and its own analysis.

⁹⁰ Origin Energy, s.99 Abolition submission, p.4.; and EnergyAustralia, s.99 Abolition submission, p.1; and Country Energy, s.99 Abolition submission, p.2.

A.5.1 Short term

NEM spot price outcomes are dependent upon a number of factors, including the level of demand, the availability of generation, network limitations and participant bids and offers. In most circumstances, these factors are inter-related. For example, under the base case, Snowy Hydro's bidding incentives for its Tumut generation can be very different when the Murray-Tumut constraint is binding compared to when it is not binding. As discussed above, these bidding incentives drive dispatch and therefore price outcomes. By considering the effects these Rule change proposals are likely to have on dispatch, the Commission can draw conclusions in relation to the likely short term pricing outcomes.

Unpredictable bidding behaviours and the use of market interventions creates a high risk environment for participants. The dispatch efficiency benefits determined under the three Rule change proposals over those in the base case suggest the market would be better off with any of the proposals compared to the base case. This suggests that the pricing outcomes under the base case would be the least cost-reflective compared to the outcomes under the Rule change proposals. The Commission's modelling supports this assessment (see Appendix B).

The analysis of dispatch efficiency above concluded that the Abolition alternative is most likely to result in efficient dispatch relative to the alternatives, because it encourages the most cost-reflective bidding by participants. Moreover, the Commission's analysis of risk indicated that it expected increased competitive pressure in the contract market under the Abolition alternative as a result of the reduction in Snowy Hydro's basis risk.

The dispatch efficiency benefits from the Abolition alternative stem from a change in bidding incentives for Snowy Hydro's Murray and Tumut generation, in particular, which result in a more competitive set of bidding outcomes. The modelling identified that the more efficient dispatch was driven by Snowy Hydro offering more generation during peak periods at competitive bids. The price results reflect this offsetting behaviour, showing lower average annual prices in NSW over the three years for both the high and low contracted cases.⁹¹ Prices in Victoria also trended downwards over the three years modelled for both the high and low contracted cases; the downward trend was not as substantial as in NSW.⁹² The stronger incentives for competitive bidding under the Abolition alternative therefore result in more competitive prices than those in the base case.

Many submissions stated they believed the Abolition alternative would require generators in NSW and Victoria to adopt more competitive strategies, which would lead to more competitive spot, contract, and retail prices.⁹³ These same stakeholders

⁹¹ As explained in Appendix B, the higher prices in contracted high and low cases 2008 were directly related to the substantial binding of the South Morang constraint in Victoria. This constraint binds substantially less in 2009 and 2010.

⁹² See Appendix B.

⁹³ EnergyAustralia, s.99 Abolition submission, p.2.; Origin Energy, s.99 Abolition submission, p.3-4; Country Energy, s.99 Abolition submission, p.2; and Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.15.

commented on the Split Snowy Region proposal stating it was likely to reduce competition, and possibly increase price volatility.⁹⁴ The Southern Generators commented that previous modelling by the Commission showed that the Split Snowy Region actually led to substantially lower prices in NSW compared to the Abolition alternative.⁹⁵

As discussed above, the Split Snowy Region and Southern Generators' Congestion Pricing proposals introduce similar bidding incentives for Snowy Hydro's Murray and Tumut generation. These incentives encourage Snowy Hydro to withhold capacity to maintain headroom. Analytically, it is difficult to determine the comparative effect of withholding capacity under these proposals compared to the disorderly bidding incentives under the Abolition alternative. That being said, if more competitive behaviour leads to more competitive pricing (in both the wholesale and contract markets), this suggests prices under the Split Snowy Region and Southern Generators' Congestion Pricing proposals may be less cost-reflective than under the Abolition alternative.

The quantitative modelling results present similar downward pricing trends for the Split Snowy Region proposal, Southern Generators' Congestion Pricing proposal, and base case for both NSW and Victoria annual average prices.⁹⁶ In Victoria, all the proposals led to marginally lower prices relative to the results under the base case. In NSW, while the proposed highest prices in 2008 are under the Abolition alternative, in the latter years, the other proposals and base case present fairly similar results. The downward trend in prices over the three years modelled for all the proposals, including the base case, suggests a common change in the underlying assumptions may be driving this trend. The difference in magnitude, however, may be attributed to the different behavioural incentives in each of the proposals compared to the base case. However, the Abolition alternative results in more consistently lower spot prices than the alternatives.

The Commission considers that the improvement in competition in the spot and contract markets under the Abolition alternative is most likely to encourage cost-reflective pricing. The Commission therefore considers that the Abolition alternative promotes wholesale prices that more accurately reflect the efficient costs of production, and therefore, promotes allocative efficiency relative to the base case, Split Snowy Region, and Southern Generators' Congestion Pricing proposal.

A.5.2 Longer term

Contract and wholesale prices provide signals for future generation, load, and network investment. They inform not only location decisions but also the timing of those decisions and best-fit technology, e.g. peak or base load generations. Future

⁹⁴ See for example, EnergyAustralia, s.99 Abolition submission, p.3.

⁹⁵ Southern Generators, joint s.99 Abolition submission and s.95 Southern Generators' Congestion Pricing submission, p.28. See Appendix B for an explanation of what is driving the differences between the modelling presented in the Abolition draft Rule determination and the modelling presented in this Rule determination.

⁹⁶ See Appendix B.

investors require a level of certainty prior to committing to an investment. Since the beginning of the NEM, there has been considerable uncertainty surrounding the management of congestion in the Snowy region. Such uncertainty can affect investment incentives and decisions. The implementation of one of these three Rule change proposals to address congestion in the Snowy region will not only address concerns about dispatch and pricing efficiency, but will provide greater certainty to potential investors.

Greater price granularity can improve investment location signals. The more prices in a market, the more information investors can obtain about potential network congestion points. Price separation between region prices reflects congestion between those nodes. The Split Snowy Region proposal provides the most explicit pricing signals of the three proposals. In principle, this proposal should provide investors with improved investment signals in and around the Murray and Tumut regions relative to the other proposals.

In practice, it is unlikely that this will improve future investment signals in those pricing regions. The Murray and Tumut regions are still physically located in national park. Regardless of how explicit the pricing signals may be under the Split Snowy Region proposal, environmental restrictions make investment in the area highly unlikely. From the perspective of informing future investment, the increased price granularity in the Split Snowy Region proposal is therefore not a differentiating characteristic between it and the Abolition alternative and the Southern Generators' Congestion Pricing proposals.

Investment decisions also require information on the competitive environment and likely trends in participant behaviour. The assessments above indicate that the Abolition alternative is most likely to promote cost-reflective pricing compared to the alternatives. While the Commission's modelling only considers a three-year outlook, it indicates a positive trend in more cost-reflective pricing over time relative to the base case and alternatives. ESPIC noted in its submission that while that the productivity gains from a region boundary change were likely to be modest, efficient prices were likely to emerge in the longer term.⁹⁷

A.5.3 Commission's considerations

More efficient dispatch as a result of more cost-reflective bidding by participants is likely to be reflected in more cost-reflective spot prices. Similarly, a reduction in basis risk in the contract market is likely to increase competitive pressure, with benefits for allocative efficiency in the short term and dynamic efficiency in the long term. Discussion in previous Sections noted the Commission's conclusion that the Abolition alternative is most likely to improve economic dispatch efficiency and inter-regional trading risk management when compared to the Split Snowy Region and Southern Generators' Congestion Pricing proposals. This should in turn result in more cost-reflective prices.

⁹⁷ ESIPC, s.99 Abolition submission, p.2.

The Commission considers that because the Abolition alternative is more likely to promote cost-reflective pricing compared to the alternatives, it is therefore more likely to promote allocative efficiency in the short term and the signals for efficient investment in the longer term.

A.6 Power system security, supply reliability, and technical issues

This assessment criterion considers whether any of the Rule change proposals detract from NEMMCO's ability to operate a secure and reliable network in the short or longer term. Conceptually, it is unlikely that a Rule change proposal that adversely affects supply reliability or NEMMCO's ability to maintain power system security would promote the NEM Objective. The Commission's evidence base for the assessment of the proposals against this criterion includes information put forward in submissions and advice from NEMMCO.

A.6.1 Assessment of relevant issues

The Commission's starting point for its assessment of the proposals against this criterion is that a change to region boundaries should only affect pricing and settlement, and the associated changes to bidding incentives, rather than the mechanics of the dispatch process. NEMMCO will continue to have an overriding responsibility to maintain power system security and the power to make directions if necessary. This responsibility would also apply under the Southern Generators' Congestion Pricing proposal.

The Commission forwarded stakeholder comments on this criterion to NEMMCO as the market and system operator. In response to Hydro Tasmania's concern regarding adequate resources to manage operational changes⁹⁸, NEMMCO set out its intended approach to demonstrate that it could deal with operational changes during the implementation period. NEMMCO confirmed that an implementation date of July 2008 for the Abolition alternative provided sufficient time to both implement the proposal and meet operational requirements.

NEMMCO stated that constraint equations and other measures are designed to manage the technical issues of the power system. Although a region boundary change would require changes to manage the power system under the new region structure, NEMMCO did not consider that either the Abolition alternative or the Split Snowy Region proposal would increase the risks to power system security. In the Commission's view, this statement addressed the Southern Generators' suggestion that any region change would create some risk to system security from unforeseen behavioural outcomes, implementation errors, or manual, operator errors.⁹⁹

⁹⁸ Hydro Tasmania, s.99 Abolition submission, p.3.

⁹⁹ Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.18.

NEMMCO also commented that it had not identified any circumstances where intervention to manage power system security had been necessary as a result of the operation of the Southern Generators Rule. To this extent, NEMMCO concluded that power system security has not been compromised. In the Commission's view, this conclusion addressed Snowy Hydro's concerns on potential system security problems arising from operation of the Southern Generators Rule and indicated that no such problem would arise if the Southern Generators' Congestion Pricing proposal were implemented.¹⁰⁰

A.6.2 Commission's considerations

The Commission has taken into account issues raised by submissions, advice from NEMMCO, and its own analysis in making its assessment of the likely power system security and supply reliability implications of these three Rule change proposals. The Commission considers that none of the proposals will have significant direct impacts on system security, supply reliability or the technical functioning of the NEM. The application of this criterion, therefore, does not provide a basis for distinguishing between the Abolition alternative, the Split Snowy Region, and the Southern Generators' Congestion Pricing proposals.

A.7 Good regulatory practice

The Commission considers that good regulatory practice is a key criterion when considering whether a Rule change proposal is likely to promote the long term interests of consumers. Good regulatory practice refers to the transparency and predictability of regulatory action.

The Commission's understanding and application of good regulatory practice has been informed by a review of relevant Australian and international standards as well as consideration of views put forward by stakeholders in submissions. The Commission has consulted the Australian Government's Office of Best Practice Regulation, "Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard-Setting Bodies",¹⁰¹ APEC's "Good Regulatory Practice Guidelines",¹⁰² and the New Zealand's Ministry of Economic Development, "Code of Good Regulatory Practice"¹⁰³.

¹⁰⁰ Snowy Hydro, Supplementary Submission, 26 March 2007, p.13.

¹⁰¹ Council of Australian Governments, "Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard-Setting Bodies", June 2004.

¹⁰² APEC, "Information Notes on Good Regulatory Practice for Technical Regulation", September 2000, available: http://www.apec.org/apec/documents_reports/sub-committee_standards_conformance/2006.html.

¹⁰³ Ministry of Economic Development, "Code of Good Regulatory Practice", 15 November 1997, available: http://www.med.govt.nz/templates/MultipageDocumentTOC_22149.aspx.

A.7.1 Assessment of the Rule change proposals

The application of the good regulatory practice criterion to Rule change proposals requires consideration of whether their implementation would promote the transparent and predictable operation of the market. On this basis, Rule change proposals ought to:

- Promote transparency in the operation of the NEM;
- Promote regulatory benefits that outweigh costs;
- Promote a proportionate response to an identified problem; and
- Promote changes that are robust in the longer term.

The three Rule change proposals are assessed below against each of these good regulatory practice principles.

A.7.2 Transparency in the operation of the NEM

To promote transparency, a Rule change proposal may seek to improve aspects of NEM operation like cost-reflective pricing, non-power system security interventions, predictability, and risk management mechanisms.

As set out above, all three Rule change proposals improve transparency in NEM operations compared to the base case by pricing the congestion between the Murray and Tumut power stations. One potential point of difference, however, is that the Abolition alternative and the Split Snowy Region proposals are less complicated and therefore more transparent in their operation compared to the Southern Generators' Congestion Pricing proposal.

All the proposals reduce the need for regular NEMMCO non-system security intervention to manage negative residue accumulation on the existing Victoria-Snowy interconnector compared to the base case. Snowy Hydro argue in their submission that the Southern Generators' Congestion Pricing proposal would result in a requirement for continued NEMMCO intervention to manage negative residues on the South Australia to Victoria interconnector.¹⁰⁴ The Southern Generators contended that the Abolition alternative represents an operational intervention by the Commission.¹⁰⁵

In its Rule change proposal, Snowy Hydro suggested that the Abolition alternative would improve transparency because it removes Snowy Hydro's incentives to maintain headroom on the lines north of Tumut at times of northward flows,

¹⁰⁴ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.28.

¹⁰⁵ Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.24.

revealing the full extent of potential congestion on those lines.¹⁰⁶ This would give Transmission Network Service Providers (TNSPs) clearer incentives to assess whether action to relieve these constraints is warranted under the Regulatory Test. However, the Commission does not find this argument convincing, since it is possible that region boundary change may introduce other incentives for distorted bidding, as discussed in Section A.2, which would not necessarily lead to efficient augmentation. Moreover, market modelling using strategic bidding strategies provides TNSPs with the tools to determine the extent of benefit from augmenting the lines north of Tumut, whether they can observe substantial constraints binding north of Tumut or not.

A.7.3 Regulatory benefits that outweigh costs

The market has been seeking for a solution to the congestion problems in the Snowy region for many years. As discussed in Appendix D, multiple incremental fixes have been introduced to manage the problem until the implementation of a longer term solution. This constant short term change and the ambiguity around which of the potential longer term solutions (including region boundary change) may be implemented and at what time, has promulgated a degree of uncertainty in the NEM.

As discussed further in Section A.9, the Commission considers that the costs of implementing one of these Rule change proposals is minimal relative to the market benefit of providing certainty around a permanent solution manage the material and enduring congestion in the Snowy region.

A.7.4 Proportionate response

A proportionate response to the issues arising from the congestion in the Snowy region would need to address the problem, therefore addressing a major legacy congestion issue, but without pre-empting possible market-based responses to future congestion problems in the NEM.

As discussed in Appendix D, the congestion in the Snowy region has been, and unless addressed is likely to continue to be, a source of material and enduring congestion, which has material implications for the efficient operation of the NEM. The MCE's policy, as set out in the CMR Terms of Reference, specifies that material and enduring constraint issues should ultimately be "addressed through investment or regional boundary change".¹⁰⁷

The congestion in the Snowy region is unlikely to be addressed by either network augmentation or load or generation investment. TransGrid, as the relevant TNSP, provided the Commission with advice to the effect that augmentation would be unlikely to satisfy the Regulatory Test. For example, upgrades to the Murray-Tumut

¹⁰⁶ Snowy Hydro, *Rule Change Proposal for the Snowy Region: Revision of Transmission Connection Nodes*, 11 November 2005, Appendix B, p.9.

¹⁰⁷ Ministerial Council on Energy, "Terms of Reference for Australian Energy Market Commission - Congestion Management Review", 5 October 2005, p.4.

lines, such as raising the height of transmission towers, would require extensive outages over many months. This would be likely to exacerbate the congestion problem in the interim, imposing significant market costs. Further, generation or load responses are also unlikely to occur given the restrictions on developing such investments in a national park.¹⁰⁸

The Southern Generators' Congestion Pricing proposal prices this Snowy region congestion, using a mechanism other than region boundary change. It provides incentives for Snowy Hydro to offer its Murray and Tumut generation into the market in a more cost-reflective manner than it would do under the base case. It is, however, a long term extension to what was intended to be an interim pricing mechanism.¹⁰⁹ Moreover, as a mechanism implemented directly through the Rules like the Southern Generators' Congestion Pricing proposal would be open to further change under a new Rule change proposal. Should the Southern Generators' Congestion Pricing proposal be implemented, it is possible that additional region boundary change option or new Rule change proposals could be lodged with the Commission in the short term.

In contrast, region boundary change in the Snowy provides a more stable, permanent mechanism to price congestion, consistent with the MCE's suggested approach for addressing material and enduring congestion where that congestion is unlikely to be resolved by investment.

The Commission, therefore, considers that the Abolition alternative and the Split Snowy Region proposals perform better than the Southern Generators' Congestion Pricing proposal against this criterion. While the Commission does not consider that the Southern Generators' Congestion Pricing proposal is the best long term mechanism for addressing congestion in the Snowy region, it does consider it would be beneficial to retain this interim mechanism (currently in Part 8 of Chapter 8A of the Rules) until implementation of a region boundary change.

Having identified that a region boundary change is the best approach to addressing the legacy congestion issues in the Snowy region, the question then arises as to which of the two such proposals is the most appropriate response.

The Split Snowy Region proposal retains the existing region boundaries north of Tumut and south of Murray, while the then Abolition proposal removes these boundaries. If the Commission observed significant increases of congestion at the present boundaries in its forward-looking quantitative analysis, this may support implementation of the Split Snowy Region proposal. In this case this proposal would avoid the market uncertainty of removing region boundaries only to reintroduce

¹⁰⁸ See Appendix D for further information.

¹⁰⁹ See "History of the current Part 8 derogation for implementing the Tumut CSP/CSC Trial and NEMMCO's power to manage negative residues" Section in AEMC 2007, *Decision Report - Determination By The AEMC On The Expiry Date Of The Participant Derogation In Part 8 Of Chapter 8A Of The National Electricity Rules - Network Constraint Formulation*, Determination, 3 May 2007, Sydney.

them in a few years time. Some stakeholders cited this argument in their submissions.¹¹⁰

While the Commission's conceptual analysis indicates that congestion may increase north of Tumut and south of Murray power stations under the then Abolition proposal, it is uncertain to what extent and what precise location any such increase may arise. Material and enduring congestion does not appear in the historical analysis. Where material congestion does arise, for example, around the South Morang transformers, network upgrades are currently underway to address that congestion (see Appendix G). More importantly, material and enduring congestion is not evident in the forward-looking analysis (see Appendix B). Some stakeholders made this observation in their submissions.¹¹¹

Even if congestion were to appear, there is not necessarily a case for retaining the present region boundaries just north of Tumut and just south of Murray (or Dederang in the case of the Split Snowy Region proposal). The MCE's policy intent in its staged approach to congestion management places strong emphasis on allowing scope for investment responses prior to considering a region boundary change.¹¹² For instance, the Last Resort Planning Power (LRPP) gives the AEMC the power to direct certain market participants to take the Regulatory Test for transmission investment under certain circumstances, including where the Commission considers an investment response has not been investigated to address material network congestion.

This good regulatory practice principle of a proportionate response to a problem is concerned with identifying a permanent mechanism to address the material and enduring congestion between Murray and Tumut power stations in the Snowy region, without pre-empting other possible market responses to any future congestion problems. On balance, the Commission considers the Abolition alternative is the most appropriate and proportionate response to address congestion in the Snowy region when compared to the Split Snowy Region and Southern Generators' Congestion Pricing proposals.

A.7.5 Robust longer term changes

Addressing the Snowy region legacy issue will provide a sensible starting point from which to apply the future congestion management regime. In this regime, a region boundary change is intended to price congestion that would not otherwise be addressed by the activities of market participants or network service providers; MCE policy has identified it is the last stage for managing material and enduring congestion. For the reasons discussed above, the Commission considers that between the three Rule change proposals assessed the Abolition alternative would

¹¹⁰ Eraring Energy, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.5; and Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.6.

¹¹¹ See for example, Origin Energy, s.99 Abolition submission, p.3.

¹¹² MCE, "Terms of Reference for Australian Energy Market Commission - Congestion Management Review", p.4.

provide the most robust starting point for the longer term congestion management regime.

A.7.6 Commission's considerations

The Commission considers that any of these Snowy region related Rule change proposals would offer an improvement in terms of the transparency and predictability of market operation compared with the base case. They all improve the operation of the NEM relative to the base case by reducing the likely incidence of NEMMCO's intervention to manage negative residues, and they all price the material and enduring congestion between Murray and Tumut.

As discussed further in Section A.9, the Commission considers that the costs of implementing one of the Rule change proposals is minimal relative to the market benefit of providing certainty around a permanent solution manage the material and enduring congestion in the Snowy region.

The Commission considers, however, that the Abolition alternative is the most appropriate proportionate response to the material and enduring congestion problem in the Snowy region. Moreover, the Commission considers that the Abolition alternative provides the most appropriate starting point from which to apply the future congestion management regime.

The Commission, therefore, considers the Abolition alternative to be, on balance, the most appropriate response with respect to the principles of good regulatory practice compared to the Split Snowy Region and Southern Generators' Congestion Pricing proposals.

A.8 Long term implications and consistency with public policy settings

At this stage of the NEM's development, radical changes to the market design and operation are unlikely to be either necessary or desirable in terms of promoting the NEM Objective. The Commission, therefore, regards that most Rule change proposals submitted to the Commission will focus on smaller incremental improvements compared to the overall costs of operating the power system. In this regard, the NEM Objective provides the Commission with guidance on what is meant by incremental improvement to the market.

The NEM Objective is oriented towards an efficiently operating market and power system for the long term benefits of consumers. In its assessment of the three Rule change proposals, the Commission considers it important that the effect of the proposals on economic efficiency, reliable supply, and power system security in the short to medium term is consistent with the provision of appropriate longer term investment decisions and hence contribute to the achievement of benefits for consumers in the longer term.

In considering Rule change proposals, the Commission must also have regard to the broader public policy settings. For example, in assessing these Rule change proposals, the Commission has considered the policy position put forward by the

MCE regarding the management of congestion and the long term options for addressing material and enduring congestion.

A.8.1 Long term implications

As discussed above, the Commission considers that relative to the base case, the three proposals are likely to promote more efficient dispatch and, proportionately, more competitive pricing outcomes. Quantitatively, these economic efficiency improvements suggested incremental benefits to the market rather than substantial economic gains. That being said, these proposals address the most material and enduring congestion problem currently in the NEM. By pricing this congestion, these proposals will not only provide incremental economic benefits, but will also promote greater market certainty by addressing this legacy problem. Improving longer term market certainty is in the long term interest of consumers as it creates a more stable and transparent environment for future investment decisions.

As discussed in Section A.5, the Commission expects that the increased competition under the Abolition alternative is most likely to promote allocative and dynamic efficiency in the NEM over the longer term, is therefore most likely to provide longer term benefits for end-use customers.

A.8.2 Consistency with public policy

Stakeholders' views on the consistency of the various proposals with public policy settings were divided. Several considered the legacy problem in the Snowy Region required a tailored solution and that a decision to change the Snowy region boundary was consistent with MCE policy.¹¹³ They indicated the current market uncertainty was negatively impacting on competitiveness and the quality of contracts in the NEM.¹¹⁴

Others expressed concern over the Commission's approach to review a one-off region boundary change while finalising the process and criteria for determining future region boundary changes. They stated that an *ad hoc* approach could lead to regulatory uncertainty and could pre-empt decisions on the related processes. Some submissions stated that the processes to be set out in the CMR and MCE Process for Region Change were the appropriate processes to assess the problems in the Snowy Region.¹¹⁵

¹¹³ Macquarie Generation, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.8; and Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.16-17.

¹¹⁴ See for example, EnergyAustralia, s.99 Abolition submission, p.2; Origin Energy, s.99 Abolition submission, p.1; and Snowy Hydro, letter to the AEMC chairman, 15 March 2007, p.3.

¹¹⁵ Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.4; South Australian Minister for Energy, s.99 Abolition submission, p.1.; ESIPC, s.99 Abolition submission, p.1; ERM Power, s.99 Abolition submission, p.1; International Power Australia, s.99 Abolition submission, p.2; and Hydro Tasmania, s.99 Abolition submission, p.1-2.

In assessing the Abolition alternative and the Split Snowy Region, and the Southern Generators' Congestion Pricing proposals, the Commission has ensured its consideration and decision-making process has had regard to the MCE's public policy settings for managing congestion and region boundary change.

As discussed above in Section A.7, the MCE set out in its CMR Terms of Reference that material and enduring congestion should ultimately be addressed through either investment or region boundary change. In October 2005, the MCE also proposed a Rule change proposal on the process for region change. In its proposal, the MCE confirmed this position stating that:

"A stable [NEM] regional structure is envisaged in which a regional boundary change is justified by the lack its investment response to material and ongoing congestion."¹¹⁶

The congestion in the Snowy region is not likely to be addressed by an investment response in the short to medium term. In the absence of investment, a region boundary change that prices the material and enduring congestion is consistent with the public policy position of the MCE.

The Commission therefore considers that its decision to implement a region boundary change to address this legacy issue is consistent with the MCE's public policy settings as set out in its CMR Terms of Reference and its proposal on the process for region change. Waiting until the conclusion of the CMR or the final Rule determination on the MCE proposal would unnecessarily extend the market uncertainty around managing congestion in the Snowy region; it would only delay what the Commission's considers to be the inevitable consideration and implementation of a change to the Snowy region boundaries.

A.8.3 Commission's considerations

While all three proposals are likely to improve economic efficiency in the market, for the reasons discussed in earlier Sections, the Abolition alternative is more likely to promote a more stable and transparent longer term environment compared to the Split Snowy Region and Southern Generators' Congestion Pricing proposals. The Commission considers that consumers would be expected to gain from these efficiency improvements in the longer term, through the creation of a more stable and transparent environment for future investment decisions. The Commission also considers that region boundary change resulting from to the Abolition alternative is consistent with the policy settings as set out by the MCE.

A.9 Implementation

A change to the existing Snowy region boundaries would be the first such change to region boundaries since the start of the NEM in 1998.¹¹⁷ It is also worth noting that

¹¹⁶ Ministerial Council on Energy, "Reform of Regional Boundaries", Rule change request, 5 October 2005, p.8.

this change would be given effect through a change to the Rules, rather than through the review mechanism currently provided for in the Rules (clauses 3.5.2 and 3.5.3). This review mechanism is currently suspended. Since the making of the initial Rules on 1 July 2005, clauses 3.5.2 and 3.5.3 have not commenced. Consequently, the Commission has sought advice from NEMMCO and input from market participants on the steps required to implement both the Abolition alternative and the Split Snowy Region proposals.

The implementation issues surrounding the Abolition alternative, the Split Snowy Region, and the Southern Generators' Congestion Pricing proposals are important considerations for the Commission. In particular, the benefits of making a change to the Rules should exceed the costs of that change. In reaching its decision, the Commission has considered the relative costs and benefits of implementing the proposals.

The Commission understands that the Southern Generators' Congestion Pricing proposal has minimal implementation costs. The only implementation step for the Southern Generators' Congestion Pricing proposal would be to incorporate into the body of Chapter 3 of the Rules the current CSP/CSC trial at Tumut and the Southern Generators Rule (to manage negative settlement residues in the Snowy Region), rather than have them operate as a temporary arrangement under the derogation in Part 8 of Chapter 8A of the Rules.

Both the region boundary proposals have similar implementation processes, although the Abolition alternative could be implemented more quickly and at a lower cost than the Split Snowy Region proposal. There are a number of common steps required to implement the Abolition alternative and the Split Snowy region proposal. However, from NEMMCO advice and stakeholder submissions it appears that the Abolition alternative would be simpler to implement than the Split Snowy Region proposal because:

1. It involves the abolition of a region and one interconnector (in net terms); and
2. It is likely to involve smaller adjustments to the contract portfolios, IRSR unit holdings, and risk positions of a smaller number of market participants than the Split Snowy Region proposal.

Based on advice from NEMMCO and subsequent input from market participants, both proposals would require changes to: data used in dispatch; market information and dispatch systems; and, most significantly for market participants, financial hedging and risk management arrangements. These changes are outlined below. The Commission then considers the risks and costs of implementation.

¹¹⁷ Excluding: a) the addition of Tasmania to the NEM in 2005, which did not require any change in boundaries, but involved the addition of a region previously electrically separated from the other parts of the NEM; and b) reassignment of load at the Terranora node from the Queensland region to the NSW region as part of the conversion of Directlink to a prescribed network service.

A.9.1 NEMMCO advice

NEMMCO provided a series of letters advising the Commission on the changes required to implement region boundary change, and the likely time required to implement these changes. This advice is discussed below.

NEMMCO's letters were published on the Commission's website and interested parties were invited to make submissions regarding issues relating to implementation of a change to the Snowy region boundaries.

A.9.1.1 NEMMCO's August 2006 advice

On 12 July 2006, the AEMC wrote to NEMMCO seeking its advice on the steps and timeframes required to implement a region boundary change, in particular the (then) two boundary change proposals for the Snowy region.¹¹⁸ After conducting an internal assessment process, NEMMCO wrote to the Commission on 25 August 2006.¹¹⁹

Changes required

NEMMCO advised that implementation of either region boundary change proposal would be likely to require changes to:

1. Physical systems and data used to manage the market:
 - (a) NEMMCO's market management systems (MMS);
 - (b) Participant computer systems interfacing with NEMMCO's systems;
 - (c) Marginal loss factors – static and dynamic;
 - (d) Transmission constraints and limits;
 - (e) Energy and demand projections for new regions;
 - (f) Minimum Reserve Requirements of each region; and
 - (g) SRA arrangements;
2. Financial risk management arrangements of market participants:
 - (a) Prudential limits calculated by NEMMCO for market participants;
 - (b) Credit-support arrangements of market participants;
 - (c) Financial hedge contracts; and

¹¹⁸ The Abolition proposal and the original May 2006 Macquarie Generation proposal.

¹¹⁹ NEMMCO, Letter to Dr John Tamblyn, Implementation of a region boundary change, 25 August 2006.

- (d) Inter-regional settlement residue unit holdings;
3. Information concerning:
- (a) The Statement of Opportunities (SOO)/Annual National Transmission Statement (ANTS); and
- (b) Mapping National Metering Identifiers, generator and load connection points to new regions; and
4. Metering. A change in the Snowy region boundary may require the installation of revenue metering on the new boundaries so that the distribution of settlement residues to Auction Participants could be calculated to a very high degree of accuracy. Two types of metering are used in the NEM – operational (or “SCADA”) metering and revenue metering.¹²⁰ At present, there is both revenue metering and operational metering installed at various points along the existing Snowy region’s boundaries, but it is not apparent to NEMMCO whether revenue metering must be used for the purpose of calculating settlement residue distributions. NEMMCO stated that the question of revenue metering was more relevant to the May 2006 Macquarie Generation proposal than the Abolition alternative, with existing metering likely to be adequate for the Abolition alternative. However, in both cases, as a transitional step, lower accuracy SCADA metering could be used prior to the installation of revenue metering at the new regional boundaries.

NEMMCO’s implementation timeframe

NEMMCO stated that if a Rule determination recommending a change to the Snowy region boundaries were made by December 2006, it estimated that it could implement the Abolition alternative by November 2007.¹²¹ This implementation timeframe would:

- Align with its procedure and cycle for implementing changes to its MMS; and
- Allow time for market participants to modify and test their Information Technology (IT) systems and inter-faces with the MMS.

NEMMCO highlighted that there were a number of uncertainties relating to its estimated timeframe, in particular the need to install revenue metering and sourcing new data on transmission limits from TNSPs for inclusion in NEMMCO’s dispatch constraints. However, NEMMCO noted that there was potential for these risks to be managed through:

¹²⁰ Operational metering requirements, which relate to monitoring power flows between transmission the ends of each transmission line (i.e. between nodes), are set out in clauses 4.11.1 and 4.11.2 of the Rules. Revenue metering requirements, which relate to connection points, are set out in rule 7.9 and Item 1 of Table S7.2.3.2 of Schedule 7.2.

¹²¹ NEMMCO also stated it could implement this discontinued Macquarie Generation proposal, which at that time, the Commission was still considering.

1. Using lower accuracy SCADA data on interconnector flows in place of revenue metering to calculate settlement residue distribution;
2. Permitting NEMMCO to substitute estimated limit equations where it is not practicable for TNSPs to deliver within NEMMCO's timeframes; and
3. Using estimates of reserve margin levels for the new regions prior to the completion of a formal review of these levels, which would take at least nine months to complete.

NEMMCO stated that making these compromises could enable an even shorter implementation timeframe.

NEMMCO also noted that delaying TNSPs' delivery of 10-year regional energy and demand projections beyond the regular time of May might delay the publication of the SOO/ANTS beyond its Rule requirement deadline of 31 October. NEMMCO stated that the Commission's determination on a new region boundary would need to provide further technical detail on the exact placement of the boundary change, so that NEMMCO and TNSPs could initiate detailed technical work on implementation. In particular, NEMMCO needed details of:

- "cutsets that form the interconnectors, including specification of the line end; and
- substations that form the regional reference node."¹²²

Without these details, the implementation of the boundary change may be delayed because NEMMCO may need to conduct a consultation "to determine the placement of a regional reference node and the transmission lines and line ends constituting an interconnector".¹²³

A number of submissions commented that NEMMCO's proposed start date was conservative, and could be advanced if additional resources were made available.¹²⁴

A.9.1.2 NEMMCO's revised 5 March 2007 advice

On 5 March 2007, the Commission received a letter from NEMMCO advising that the proposed 1 November 2007 implementation date was not feasible. This letter suggested a revised implementation date of 1 July 2008. Reasons for the revised timeframe included NEMMCO's:¹²⁵

- Underestimation of the amount of work involved in converting approximately 2,500 constraint equations. This work is expected to take a total of 8 months;

¹²² NEMMCO, Letter on implementation, p.9.

¹²³ NEMMCO, Letter on implementation, p.9.

¹²⁴ EnergyAustralia, s.99 Abolition submission, p.2.; TransGrid, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.3; and Snowy Hydro, Supplementary submission, 26 March 2007, p.5, 42.

¹²⁵ NEMMCO, Letter on revised implementation, 5 March 2007, p.1-2.

- Requirement for a new method to test constraint equations in pre-production; and
- Proposed trialling time prior to before introducing the new region structure into a production environment to minimise market risk.

NEMMCO also noted that commencing the region boundary change on 1 July 2008 would smooth the transition in two key ways:¹²⁶

- It would avoid the need for supplementary loss factor equations, making a transition from the current 2007/08 loss factors to the new 2008/09 loss factors smoother; and
- It would align with the start of the Q3 SRA process avoiding the complication of having some SRA units apply for only part of a quarter.

A.9.2 Implementation risks

Region boundary change raises a number of implementation risks for both NEMMCO and market participants. While NEMMCO needs to manage the risks associated with making changes to the market systems, participants have to manage their portfolio risks. These include reassessing their hedging portfolios to determine whether and how a change to the region boundaries is likely to affect any of their spot and contract positions. To the extent it does, a participant may need to renegotiate its position or otherwise alter its wholesale market strategy.

More specifically, shorter implementation timeframes may increase the cost and risks for market participants of unwinding their contractual positions. Shorter timeframes may therefore result in participants bearing a greater loss than would be the case if the transition period were longer. That being said, the current degree of uncertainty in the market is arguably causing its own problems regarding participants' willingness to contract.

Some submissions contended that the proposed start date of 4 November 2007 for the Abolition alternative did not provide participants with adequate time to adjust their positions.¹²⁷ Other participants suggested a shorter time frame should be possible, as participants have already commenced transitioning their portfolios.¹²⁸

In either case, a shorter implementation timeframe than three years for the Abolition alternative is less of a problem than it would be for the Split Snowy Region proposal, as there are fewer contracts that would be affected by the removal of the Snowy RRN than the creation of two new regions between Victoria and NSW.

¹²⁶ NEMMCO, Letter on revised implementation, p.3.

¹²⁷ Country Energy, s.99 Abolition submission, p.7; Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.19.

¹²⁸ EnergyAustralia, s.99 Abolition submission, pp.2-3.

A.9.3 Implementation costs

Several submissions expressed concern at the Commission's failure to quantify the costs of implementing the Abolition alternative in the draft determination.¹²⁹ Accordingly, the Commission has attempted a clearer quantification of the implementation costs, which can then be assessed against the estimated benefits identified earlier in this Appendix. However, despite participant comments about the lack of information on implementation costs, very few participants provided information to assist the Commission's analysis.

As noted above, the costs of implementing the Southern Generators' Congestion Pricing proposal are likely to be minimal.

NEMMCO provided the Commission with a very rough estimate of what it would cost to implement the Abolition alternative. This estimate was approximately \$160,000. Relevant costs included:

- Market system changes;
- Modification and testing of constraint equations;
- Modification of loss factors;
- Amendments to the SRA auction;
- Updates for the SOO/ANTS;
- Updates for metering and settlement;
- Adjustments to reserve margins;
- Changes to operating procedures;
- Updates to the medium term Projected Assessment of System Adequacy (PASA);
- Updates for the Energy Management System (EMS);
- Setup and running of the pre-production trials; and
- Project management oversight.

Only two submissions provided estimates of participants' implementation costs. EnergyAustralia commented that it would cost them around \$5,000 to implement the Abolition alternative and around \$15,000 to implement the Split Snowy Region

¹²⁹ ESIPC, s.99 Abolition submission, p.3; Hydro Tasmania, s.99 Abolition submission, p.3; Hydro Tasmania, s.95 Split Snowy Region submission, p.3-5; and Southern Generators, joint s.99 Abolition and s.95 Southern Generators' Congestion Pricing submission, p.19.

proposal.¹³⁰ Snowy Hydro stated implementation of the Abolition alternative would cost them about \$10,000.¹³¹

As of 17 July 2007, NEMMCO's registration list identified: 31 Scheduled Market Generators; 17 Non-Market Scheduled generators; 44 Market Customers; and 5 Traders. The following tables present a rough estimate for the market as a whole of the implementation costs of these region boundary changes. For these purposes, it is assumed both Scheduled and Non-Market Scheduled Generators have the same implementation costs, as do Market Customers and Traders.

Table A.1: Estimated implementation costs for Abolition proposal

Participant type	Individual cost (\$)	No. participants	Total
Generator	\$10,000	48	\$480,000
Retailer/Market Customer	\$5,000	44	\$220,000
Trader	\$5,000	5	\$25,000
TOTAL			\$725,000

Data source: NEMMCO advice to the Commission; NEMMCO Registration List, 17 July 2007; participant submissions.

For the purposes of costing the implementation of the Split Snowy Region proposal, the number of retailers and market customers was arbitrarily split to reflect the likely range in the costs of implementing this region boundary change. The implementation cost for generators was assumed to be \$15,000 consistent with the Abolition alternative, as no generators provided any advice on the likely costs of implementing the Split Snowy Region proposal.

Table A.2: Estimated implementation costs for Split Snowy Region proposal

Participant type	Individual cost (\$)	No. participants	Total
Generator	\$15,000	48	\$720,000
Retailer/Market Customer - Small	\$5,000	22	\$110,000
Retailer/Market Customer - Large	\$15,000	22	\$330,000
Trader	\$15,000	5	\$75,000
Total			\$1,235,000

Data source: NEMMCO advice to the Commission; NEMMCO Registration List, 17 July 2007; participant submissions.

¹³⁰ EnergyAustralia, s.99 Abolition submission, p.2.

¹³¹ Snowy Hydro, joint s.99 Abolition, s.95 Southern Generators' Congestion Pricing, and s.95 Split Snowy Region submission, p.44-45. Note that this cost estimate refers to both Snowy Hydro Generator and Red Energy Retailer, meaning that the Commission's cost estimate is likely to be conservative.

Additional implementation costs under the Split Snowy Region proposal include the provision of adequate revenue metering at Dederang (either new meters or an alternative estimation mechanism). There would also be additional costs if implementation was not aligned with the start of the financial year. For example, this would include the recalculation of loss factors.

A.9.4 Commission's consideration

The implementation issues surrounding each of these Rule change proposals are important considerations for the Commission. In particular, the benefits of making a change to the Rules should exceed the costs of that change. The Commission's analysis indicates that each of the proposals is likely to result in net benefits to the market.

The Commission notes that all three Rule change proposals are capable of being implemented in a reasonable timeframe and at relatively low cost. The Commission also notes the NEMMCO advice that the Abolition alternative could be implemented sooner than the Split Snowy Region proposal.

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