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Dear Chairman

Macquarie Generation has prepared the following response to the AEMCs draft Rule determination on the Snowy Hydro proposal to *Abolish the Snowy Region* released on 19th January 2007. Macquarie Generation is of the view that the Split Region option offers a superior long-term solution, as outlined in the Corporation's Rule change proposal. The submission examines the relative merits of the two proposals and discusses some of the limitations of the Southern Generators' proposal, *Congestion Pricing and Negative Residue Management Arrangements for the Snowy Region*.

Assessing the alternatives

There is general agreement among all market participants that the current regional structure creates inefficient dispatch incentives for Snowy Hydro generation in the Snowy Region during periods of high demand coinciding with intra-regional congestion between Murray and Tumut under the business-as-usual base case. While there is consensus on the cause of the problem and the need to correct the inefficient dispatch signals, participants differ markedly on an appropriate solution.

Macquarie Generation has submitted a Rule change proposal supporting the Split Region Option – creating separating pricing regions for Murray and Tumut generation. The question for the AEMC to consider is whether three regional boundaries between Victoria and New South Wales delivers superior dispatch outcomes to a single interconnector and to what extent do multiple regions increase the costs and risks of inter-regional trading. Macquarie Generation maintains that the Split Region structure delivers improved incentives for dispatch that will support higher levels of inter-regional flows and trading than the Snowy Hydro proposal.

The main advantage of the Split Region Option is that it ensures there is a regional boundary across all of the likely points of actual congestion in and around the Snowy Region. The Option retains the existing regional boundary between Tumut and New South Wales regional reference node and Murray and the Victorian regional reference node. The Option effectively converts an existing intra-regional constraint into an inter-regional constraint which should improve market dispatch by aligning bidding incentives with underlying opportunity costs of generation.

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During periods of binding intra-regional congestion and high regional prices, generators located on the remote side of the constraint but still within the region can take advantage of their physical location by bidding low and maximising output without impacting the regional price. In this scenario, the formulation of Option 4 constraints can result in the dispatch of remote intra-regional generation ahead of possibly lower cost inter-regional generation. This pattern of dispatch would reduce the level of inter-regional transfers and the value of Inter-Regional Settlement Residue units in the direction of the region with the intra-regional constraint. Option 4 constraints can result in counter-price flows between regions if the volume of remote intra-regional generation exceeds the limit of the intra-regional constraint.

By definition, inter- and intra-regional congestion will occur less frequently under system normal conditions. With all transmission elements in service, there may be sufficient transmission capacity to allow all generation (local intra-regional, remote intra-regional and inter-regional generation) to compete on an equal terms. However, high price periods often occur when there are transmission outages. The nature of the outage is important:

- An outage that causes a reduction in the transfer capability of the interconnector will reduce the effectiveness of the IRSR units – the extent of any reduction will depend on the degree of price separation between regions;
- An outage that creates or exacerbates intra-regional congestion can create the incentive for remote intra-regional generation to maximise generation to take advantage of an Option 4 constraint, resulting in a reduction in inter-regional flows and a reduction in the effectiveness of IRSRs as a hedging instrument.

Appendix 1 provides some historical data on IRSR unit values on the Victoria to Snowy interconnector since 1998. The data show that prior to the introduction of Option 4 constraints in the Snowy Region, de-rating of the interconnector because of network outages had a significant impact on the effectiveness of IRSR units in enabling unit holders to confidently hedge inter-regional positions. The Appendix also shows that periods of network outages often coincide with periods of price separation between regions (the inability of the exporting region to supply the importing region during periods of high demand would contribute to the high prices in the importing region). Significant price separation at times of low inter-connector flows makes an IRSR unit much less effective as a risk management instrument.

Macquarie Generation's fundamental concern with the Snowy Hydro proposal is that it treats congestion between Tumut and the NSW node and Murray and the Victorian node as an intra-regional constraint. Macquarie Generation is concerned that Snowy Hydro would face incentives to maximise generation during periods of binding intra-regional congestion, potentially displacing lower cost inter-regional generation and reducing the effectiveness of IRSR units.

The Split Region option minimises the incentive for Snowy Hydro to bid below cost during periods of network congestion because Snowy Hydro would receive a regional price for Tumut and Murray generation that reflected its market offers. Minimising the scope for generators to take advantage of intra-regional constraints should improve the efficiency of dispatch. Most importantly, Macquarie Generation believes that the Split Region Option would maximise the effectiveness of IRSR units given the physical limits of the transmission system.

Macquarie Generation appreciates that the only way of testing the various views on an appropriate regional structure is through a robust modelling exercise. Macquarie Generation supports the modelling approach that the AEMC commissioned for the draft determination of the Snowy Hydro proposal. Macquarie Generation's only concern is that the modelling does not account for the impact of system outage conditions given the importance of such events in actual NEM outcomes. As noted in Appendix 1, network outages do result in significant de-rating of interconnectors and outages would accentuate the impact of intra-regional congestion under the Snowy Hydro proposal.

Macquarie Generation recommends that the AEMC model the impact of non-normal system conditions on the incentives for Snowy Hydro under its proposal relative to the Split Region Option in terms of both productive efficiency and the risks of inter-regional trade. Appendix 1 canvasses the possibility of applying an interconnector constraint duration curve based on historic transmission flows across key cut sets.

Dispatch efficiency

The AEMC's draft determination of the Snowy Hydro proposal reported modelling results showing relatively small potential savings in dispatch costs under the various scenarios. Possible production efficiency benefits against the base case were in the order of $1.5 to $3.5 million per annum or about 0.1 per cent of total NEM dispatch costs. The reported difference between the two alternatives examined was less than $1 million a year on average (p. 39). The Southern Generators have submitted comparable modelling work undertaken by Roam Consulting that found similar modest changes in dispatch efficiencies, albeit with a different ranking of scenarios.

The AMEC recognises that is not possible to make a judgement on a superior solution using only the modelling results of likely dispatch costs. Macquarie Generation maintains that the inclusion of outage conditions in the modelling analysis would help to differentiate the proposals by highlighting the potential for inefficient dispatch during periods when network elements are out of service.

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Inter-regional trading risk

The AEMCs draft determination of the Snowy Hydro proposal reported modelling results that tended to show lower inter-regional trading risks under the Split Region Option (Figure A.38, p. 136). The AEMC commented that "the transaction costs and execution risks associated with procuring a mix of three IRSR products would be materially higher than that for procuring a single IRSR product. The net result is that it is unclear whether the Snowy Hydro proposal or the Split Region Option would deliver less risky inter-regional contracting".

The Split Region Option effectively adds an additional region in the NEM and an additional transmission link between Victoria and New South Wales. As with the existing Snowy Region, neither the Murray or Tumut regions would contain any significant customer load. The two Snowy Regions would be generation centres that compete for dispatch against generation in other regions.

Macquarie Generation does not consider that the Split Region proposal would add significantly to the costs and risks of inter-regional trading.

The transaction costs of participating in settlement residue auctions are low. The addition of an extra region and an extra interconnector would not add significantly to the costs of conducting the auction process – auction fees as a percentage of auction proceeds are less than 0.5 per cent.

Macquarie Generation contends that the execution risk of purchasing a strip of IRSRs products is not significant. The settlement residue auction process currently allows participants to make linked bids for multiple interconnectors so that participants are able to purchase IRSR units simultaneously rather than having to make sequential purchases.

Participants bidding for IRSR units would need to account for Snowy Hydro's likely interest in the IRSRs on individual interconnectors. All other participants would only be interested in purchasing a strip of three IRSRs to support trading between New South Wales and Victoria.

Under the Split Region Option, participants would understand that Snowy Hydro bidding of both Tumut and Murray would reflect the opportunity cost of generation. There would not be an incentive to maximise production to take advantage of intra-regional constraints in a way that artificially constrained inter-regional flows. Participants are more likely to bid for IRSRs under a regional structure that supported a greater level of inter-regional transfers during periods of price separation between regions.

The AEMCs draft determination commented that Split Region Option may increase the complexity of inter-regional trading because participants do not have perfect information about the frequency, duration and severity of inter-regional price differences.

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Macquarie Generation notes that inter-regional trading is taking place currently without participants holding perfect information on price differences, albeit at a sub-optimal level because of the Murray-Tumut constraint. This trade requires the purchase of two IRSR links across a region containing insignificant load. Macquarie Generation is of the view that the addition of an extra region that contains insignificant load but has the effect of materially enhancing the effectiveness of the associated IRSR units will significantly improve inter-regional trading. This is because participants will have greater confidence that the IRSRs will more effectively hedge inter-regional price differences and therefore reduce the discount participants place on the lack of information about the risk characteristics of inter-regional trading.

The AEMCs draft determination did not attempt to quantify the possible additional costs and risks of the Split Region Option as it was not formally under consideration at that time. Macquarie Generation does not consider that these costs and risks would outweigh the benefits of more robust dispatch signals particularly during outage conditions. Macquarie Generation would welcome any additional modelling work that the AEMC is able to undertake to measure the significance of these risk and cost factors.

Good regulatory practice

Given the difficulty in identifying a preferred regional boundary proposal on quantitative grounds alone, a key criterion for assessing the merits of each proposal is likely to be the Commission's view on good regulatory practice.

The AEMCs draft determination of the Snowy Hydro proposal noted that good regulatory practice is "orientated towards promoting stablility and predictability of the regulatory framework for the NEM and encompasses:

- minimisation of operational intervention in the NEM;
- promotion of changes that are likely to be robust over the longer term; and
- promotion of transparency of the operation of the NEM.

Macquarie Generation agrees with the good regulatory practice criteria developed by the AEMC and believes that the Split Region Option would perform strongly against each factor. Macquarie Generation questions some of the AEMCs comments on good regulatory practice in its draft determination.

1. "… the outer boundaries of the Split Region Option … are likely to change in the future as pinch points of congestion change. … This potential need for change is unlikely to affect the boundary between Murray and Tumut under the Snowy Hydro proposal." (p. 64)

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Macquarie Generation agrees that the exact location of congestion north of Tumut and south of Murray may shift through time. However, that does not mean that there will not be persistent and enduring congestion at some point between these generation centres and the load centres of Melbourne and Sydney. The Split Region Option has the benefit of maintaining existing interconnectors creating one new interconnector so that there is an inter-regional boundary across all areas of congestion even if it is not the cut set that binds at any particular point in time. The Split Region Option minimises the possibility that Snowy Hydro would be placed on the remote side of a significant intra-regional constraint allowing Snowy to bid in a way that maximised generation and reduced the ability of inter-regional generators to compete on neutral terms.

2. "one argument made by Snowy Hydro in favour of its proposal is that it improves transparency because it removes Snowy Hydro's incentives to maintain headroom on the lines north of Tumut at times of northward flows, revealing the full extent of potential congestion on those lines". (p.64)

Under the business-as-usual base case, Snowy Hydro has an incentive to keep 20-30MW of headroom on the Snowy to New South Wales interconnector during periods of high New South Wales and Queensland prices, thereby delivering similar prices on all of Snowy Hydro's Tumut generation. Macquarie Generation does not consider that the dispatch of this amount of capacity would significantly influence the degree of competition in New South Wales or the overall efficiency of market dispatch.

3. "the potential for the proposed boundary change to expose Snowy Hydro to a more competitive market environment (as indicated by the modelling results) is likely to reduce Snowy Hydro's capacity and incentive to engage in strategic bidding behaviour while at the same time reducing the incidence of counter-price flows and the need for intervention by NEMMCO". (p. 65)

The major limitation of the modelling exercise that supports the AEMCs draft determination is that it assumes system normal conditions in all of the scenarios that were examined. The system normal assumption tends to favour the Snowy Hydro proposal because even if Snowy Hydro is bidding strategically to take advantage of an intra-regional constraint the modelling will not reveal any costs from this behaviour and there is no possibility of counter-price flows. The AEMC therefore concludes that there is no need for any intervention mechanism to manage negative residues.

Under a scenario where Snowy Hydro maximises Tumut or Murray generation to take advantage of an intra-regional constraint, every MW of transmission outage that adds to that constraint would reduce inter-regional flow by an equivalent amount. If the limit of the intra-regional constraint exceeded the capacity of Murray or Tumut generation, there is a real likelihood of counter-price flows.

The Frontier modelling precludes the possibility of significant counter-price flows between Victoria and New South Wales because it assumes that all transmission elements are always in service. The market may need to respond with new intervention mechanisms if counter-price flows emerge under the Snowy Hydro proposal. The Split Region Option provides a more robust model because it effectively eliminates the incentives for participants to bid in a way that could lead to the accumulation of negative residues.

The Frontier modelling work uses the simplified constraint equations that NEMMCO applies in the Annual National Transmission Statement. Macquarie Generation is of the view that this approach may overstate the likely level of inter-regional flows between Victoria and New South Wales. Given the importance of this issue, the AEMC should ask NEMMCO to conduct detailed load flow analysis to estimate maximum possible interconnector flows under various scenarios similar to actual NEMMDE dispatch conditions. These should include maximum generation from Upper and Lower Tumut and the proposed Uranquinty plant under high New South Wales and Queensland demand and maximum Murray and Guthega generation under high Victorian and South Australian demand. Macquarie Generation understands that there is the possibility of counter-price flows during periods of southerly flows under some system normal conditions depending on line ratings and the pattern of load and generation.

4. "… the Snowy Hydro proposal could be said to represent a "no regrets" boundary change in that it is unlikely that the proposed region boundary between Murray and Tumut would be eliminated in the foreseeable future. In other words, the boundary change is likely to be robust over the longer term." (p.65)

Macquarie Generation agrees that Snowy Hydro proposal would correct the problems created by intra-regional congestion in the current Snowy Region. However, the Split Region Option addresses this problem and corrects for other areas of likely intra-regional congestion that could create inefficient bidding incentives that would otherwise reduce the effectiveness of IRSR units as a risk management tool to support inter-regional hedging.

There is no evidence in the Vencorp or TransGrid annual planning reports of any proposed investment that will substantially increase transmission capacity north of Tumut and south of Murray in the next ten years. There is no reason to consider that the Split Region Option would need to be altered in the foreseeable future as the level of transmission capacity on the major lines between Melbourne and Sydney is unlikely to change materially.

Southern generators' proposal

The Southern Generators' proposal involves the permanent extension of existing temporary arrangements – the Tumut CSC/CSP trial and the funding of negative settlement residues on the Victoria to Snowy interconnector with positive residues from the Snowy to New South Wales interconnector.

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Macquarie Generation does not consider there is merit in entrenching temporary, band-aid solutions that were only developed as interim arrangements until the Snowy Regional boundary issues were resolved.

The AEMCs draft determination recognises that there are no current plans for solving the problem of congestion between Murray and Tumut through transmission investment. There is no prospect of a physical solution to the Snowy problem.

The Murray-Tumut constraint lies across the major transmission flow path between Victoria and New South Wales. The constraint is persistent and enduring and results in perverse bidding incentives and inefficient dispatch outcomes. The Snowy Region needs a long term solution through an appropriate configuration of the boundary structure.

Summary

If there was an easily demonstrated and measurable solution to the problems created by intra-regional congestion within the Snowy Region it would probably already be in place. The reality is that the market has inherited the current regional design; a structure that is complicated by the unique characteristics of the Snowy Region. Nowhere else in the NEM is there such a large volume of capacity owned by a single entity exposed to significant tidal flows between key regions where that capacity has unilateral control over these flows. This situation is made all the more complex by the existence of a physical network loop across regions and a major intra-regional constraint that has bound frequently during periods of relatively high demand and price in the key load centres.

The Snowy Region presents a unique problem that demands a tailored long term solution through a restructure of the regional boundary. The Split Region Option ensures that there are regional boundaries where there is likely to be significant and enduring points of transmission congestion. Under this arrangement Snowy Hydro faces efficient dispatch incentives which are preserved during periods of network outages in the transmission system. Inter-regional flows would reflect the opportunity cost of production in each region and IRSR effectiveness is maximised.

Yours faithfully

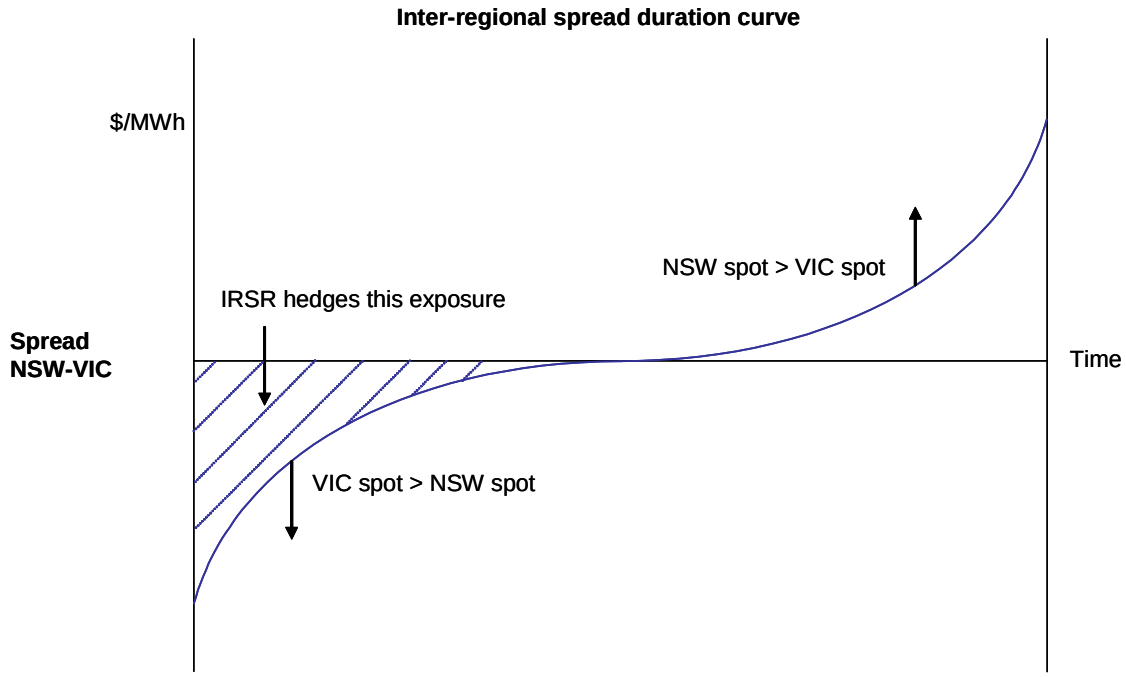
RUSSELL SKELTON
MANAGER, MARKETING & TRADING

Dr John Tamblyn, Chairman
Australian Energy Market Commission

Attachment 1: Facilitating inter-regional trade

For a market participant looking to trade inter-regionally in the NEM, the only financial product currently available to manage potential price movements between regions is the auction of Inter-Regional Settlement Residue (IRSR) units. A participant is able to buy or sell in another region on the understanding that purchased IRSR units will provide a revenue stream offsetting some of the basis risk arising during trading intervals when regional prices diverge. The only alternative way a participant could manage inter-regional price risk would be to acquire a physical position in the other region through the purchase of generation assets or developing a retail customer base.

Figure 1 provides a stylised example of a spread in prices between two regions, in this case New South Wales and Victoria, across a period of time, say a week. A New South Wales generator wanting to sell hedge product to a Victorian retailer faces the risk that the regional reference price in Victoria would exceed the New South Wales price. Assuming that the interconnector between New South Wales and Victoria operated at its rated capacity during those periods when the Victorian price was above the New South Wales price, then the IRSR units would provide a fully effective hedge for this price difference. It should also be noted that a New South Wales participant with a position in Victoria benefits whenever the New South Wales regional price exceeds the Victorian price.



The payout of IRSR units is equal to the flow on the interconnector and the price difference between regions. The lower the flow at times of price differences, particularly during relatively high prices in the importing region, the less effective is the IRSR in enabling the participant to manage an inter-regional position.

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Participants considering entering into an inter-regional trade will discount the value of IRSRs to reflect the expected level of interconnector flows during periods of price separation. As there are a fixed number of IRSR units sold in each quarter, the less effective are those units the lower the level of inter-regional hedging that they are likely to support.

Interconnector flows are a function of a number of variables including the incidence of network outages and prevailing demand and supply conditions within each region. A network outage that limited interconnector flows can contribute to the level of price separation between regions as the exporting region is no longer competing with local generators in the importing region. Similarly, under an Option 4 formulation a binding intra-regional constraint could provide the incentive for remote intra-regional generators to bid low to ensure dispatch and receive the higher regional price while at the same time displacing possible lower cost inter-regional generation and limiting inter-connector flows. Inefficient dispatch incentive can lead to counter-price flows between regions – reducing the value of all IRSRs accumulated within a trading week.

A participant looking to purchase IRSR units will need to form a view on the likely incidence and duration of a below nominal inter-connector flows during periods of price divergence between regions – whether it is because of outages or because of inefficient dispatch signals.

Figure 2 shows the history of constrained northerly inter-connector flows between Victoria and Snowy. Only those trading intervals where the inter-connector was constrained in dispatch are included. Pre-option 4 refers to the period from 1998 to November 2003, Option 4 is the period November 2003 to October 2005 and Option 4 plus CSC/CSP is the period October 2005 to April 2007.

The pre-option 4 line shows that 85% of the time when the interconnector was constrained the flow was below the nominal limit of 1,000 MW. Interconnector flows under Option 4 and Option 4 plus CSC/CSP have constrained more often at lower levels of inter-regional transfers. For example, the Vic-Snowy interconnector has constrained at 600 MW or less for about 25% of the time under pre-option 4 and about 50% of the time under the Option 4 and Option 4 plus CSC/CSP periods. The more often that the interconnector constrains below the nominal capacity the less effective are the IRSRs.

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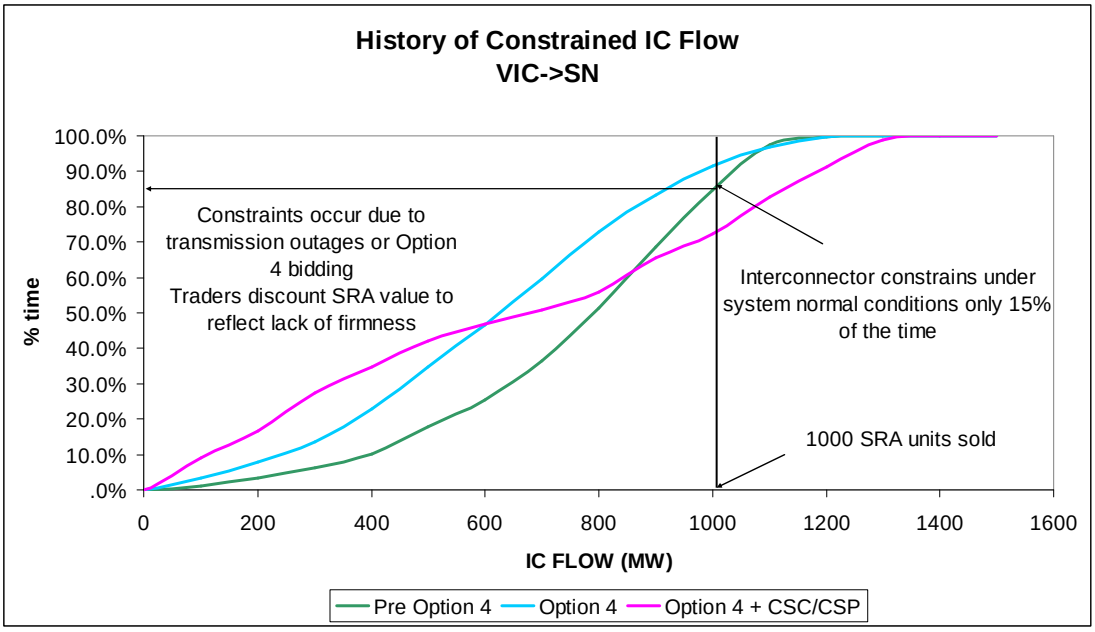

Figure 2: History of constrained Victoria to Snowy interconnector flows

While the level of interconnector flows at times of constrained dispatch is important, the level of price regional separation is the other key factor. A low interconnector flow combined with a high degree of price separation would substantially reduce the value of IRSRs. Figure 3 includes the frequency of reduced flows from Figure 2 but weights those flows by the value of all price separation events during the particular period. For example, during the CSC/CSP plus Option 4 period more than 90% of the total value of price separation between Victoria and Snowy occurred when interconnector flows were less than 200MW. During the Option 4 period, about 60% of the total value of price separation events occurred when flows were less than 200MW.

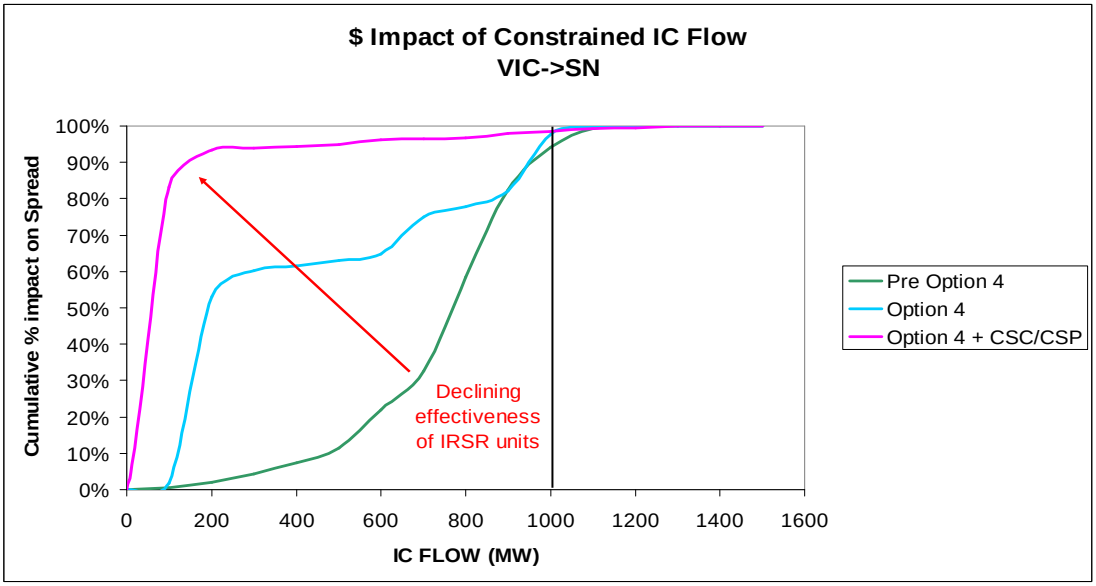

Figure 3: Value-weighted constrained Victoria to Snowy interconnector flows

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Figure 3 shows that IRSR units were significantly more effective during the pre-option 4 period in managing inter-regional positions. Network outages would have been the dominant factor limiting inter-connector flows during this time. Under the current CSC/CSP plus Option 4 scenario, Snowy Hydro only receives the New South Wales price for Tumut generation during periods of binding Murray-Tumut constraints and has an incentive to maximise Murray generation to induce the Murray-Tumut constraint to bind, often reducing northerly inter-connector flows reducing the effectiveness of IRSR and hence the level of inter-regional trade.

For the AEMCs modelling to provide a realistic picture of how Snowy Hydro would behave in future years and to accurately measure the likely risks of inter-regional trading, it would need to account for the impact that transmission outages have in limiting inter-regional flows. Macquarie Generation suggests that one possible way of replicating real-life outage conditions would be to use historical data to develop a constrained interconnector duration curve. The data would need to be taken prior to the introduction of Option 4 so that it only reflected the impact of outage conditions.