A Response to the

MCE Report
NEM - Transmission Regional Boundary Structure

by Queensland Generators

Contributors:
CS Energy
Enertrade
InterGen
Stanwell Corporation
Tarong Energy

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1.0 Introduction

This paper provides comments on the Charles River and Associates CRA report entitled NEM – Transmission Region Boundary Structure submitted to the Ministerial Council on Energy MCE. The views presented in this paper represent the consensus position of the following Queensland generators (referred to in the submission as “the Group”):

CS Energy
Enertrade
InterGen
Stanwell Corporation
Tarong Energy

Generally the Group is strongly supportive of the CRA report recommendations, subject to qualifications explained in the submission. We support a stable region structure where reviews of region boundaries are infrequent (five yearly) and changes occur only after other alternatives such as regulated transmission investment and merchant investment in generation or load have been discounted as viable alternatives.

The Group also agrees that management of transmission constraints needs to be addressed as an issue in conjunction with transmission investment and region boundaries. The Group believes a successful constraint management regime should where possible:

- Allow full utilisation of available transmission capacity;
- Lead to efficient dispatch of existing plant; and
- Provide effective signals for the location of new plant.

On that basis the Group supports the usage of a fully optimised Option 4 formulation for all constraints. Furthermore the group supports in principle the proposed Constraint Support Pricing (“CSP”) / Constraint Support Contract (“CSC”) regime but believes there are some issues to be resolved before it can be implemented.

Constraints will arise from time to time and the fully optimised Option 4 formulation is supported, as it is the only one that provides optimal dispatch of plant and secure utilisation of the full transmission capability.

We concur with CRA that effective management of constraints to achieve the objectives detailed above does require some processes external to the dispatch engine. Intervention to control negative residues is acceptable as a stopgap method but does not achieve the required objectives. The CSP/CSC regime is supported in principle. Nonetheless, the regime requires further development and assessment before the Group could give it final endorsement for implementation. Implementation should be gradual following extensive market consultation by the SCO on fundamental policy matters such as the criteria for applying the regime to constraints and the method of allocating CSCs to generators. Where possible, constraint management arrangements should be kept simple; for example the complexity of CSP and CSCs should be avoided where a network support contract is adequate.

The Group recognises there may need to be a compromise between the dynamics of optimising 5 minute dispatch and promotion of investment in new plant, which as investment often over thirty or more years is enhanced by predictability and certainty.

Our view is that economically sound region boundary change criteria that result in minimal changes to boundaries combined with effective constraint management will promote merchant investment and liquid financial markets for managing risk.

The Group strongly supports the proposed regime outlined in the chart on page 5 of the Report which describes the interaction of transmission investment, region boundary reviews and the management of constraints.

2.0 Regulatory Test

The Group supports the CRA view that the transmission regulatory test, the NEMMCO constraint management regime and the Code region boundary criteria need to form an integrated and consistent package. The whole basis for CRA's recommendations is that transmission constraints, at least within regions, will not be prolific as transmission investment will occur in a timely manner. Consequently it is the Group's view that it is essential that the MCE ensure that the regulated transmission investment criteria are consistent with stated MCE policy and the assumptions that form the basis of CRA's recommendations.

A constraint management regime as described in the CRA report will be effective only if the occurrence of material and persistent constraints does not increase significantly within regions. The outcome of the current review of transmission investment arrangements will be critical in determining the level of future constraints and will be the largest factor in determining the need to move to more regions or nodal pricing. Transmission investment arrangements will also have an effect on the type, location and quantity of competitive investment in generation assets.

3.0 Constraint Management - General

3.1 Constraint Formulation

We support CRA's recommendation that the fully optimised "Option 4" type constraint be used for all constraints.

The reason the Group supports the recommendation is that other constraint formulations such as Option 1, 3 or 8 give a particular category of generators priority over others by removing them from the left hand side ("LHS") of the constraint. The allocation of priority is arbitrary, is not based on sound economic principles and fails to optimise the value of trade for bids and offers. Commentators have stated that the use of Option 1 prevents inappropriate bidding that can lead to inefficient dispatch and accumulation of negative settlement residues on interconnectors. We concur with the CRA report recommendations that incentives for efficient dispatch and impacts on settlement residues should be handled outside the dispatch optimisation. This is because the use of Option 1 formulations does not necessarily lead to a more efficient dispatch and it has the side effect of reducing secure transmission capacity.

With Option 1, generators not present on the LHS (inter-regional generation) are free to be dispatched to the limit of their ramping capability in any dispatch interval, which can take the flow on a transmission element well over its secure limit before any corrective action can be taken. This leads to the necessity for very conservative limits to avoid the system operating in an insecure state and results in under-utilisation of transmission capacity.

3.2 Negative Residues

The Group notes NEMMCO's current policy of intervening and changing constraint formulations as required to minimise or avoid negative settlement residues on interconnectors. The group generally supports the avoidance of uneconomic negative settlement surpluses. However we also note that in some cases such as loop flows or where interconnector loss functions exhibit negative losses for positive flows, negative settlement surpluses are economic. In other cases negative residues are not practically avoidable.

Given that negative residues will occur, the group believes the current arrangement where accumulated negative residues are recovered through future auction fees is not sustainable. Negative residues should be recovered from other funds such as the actual auction proceeds, which are used to offset TUOS payments. With a more sustainable method of recovering negative settlement residues should be allowed to occur in the following cases:

- Negative residues that are economic resulting form loop flows or loss functions;
- Negative residues, which will inevitably arise due to the 5minute/30minute settlement issues;
- In cases such a joint inter-connector, intra-connector constraints where some time lapses between the commencement of negative residues and NEMMCO's actions to avoid them become ineffective; and
- If Security or reliability issues arise when management results in large rapid changes in inter-connector flows.

It should be stressed that management of negative residues will not promote efficient dispatch of generators. It is a blunt instrument serving only to avoid the undesirable aspects of negative residues.

3.3 Management outside the dispatch engine

The proposed CSP and CSP regime is supported in principle as a superior method of promoting efficient dispatch by showing generators appropriate price signals without jeopardising their ability to hedge at their regional reference node (RRN). Therefore we support NEMMCO's derogation to manage negative residues only as a temporary measure prior to the introduction of a more suitable management scheme such as CSP/CSCs.

4.0 Constraint Management external to the dispatch engine – Constraint Support Pricing and Constraint Support Contracts

Regardless of the region boundary criteria adopted, issues will always arise for the management of temporary constraints during the lead-in-time for changing region boundaries or augmenting the network. The Group sees the need for the introduction of measures external to the NEMDE (National Electricity Market Dispatch Engine) to provide incentives to avoid bidding wars and achieve efficient dispatch whilst maintaining financial trading risks at an acceptable level.

4.1 Objectives of Constraint Management

CRA have extended previous gatekeeper work and proposed a CSP and CSC regime. The report also acknowledges that other more simple arrangements such as Network Support Agreements may be more suitable in some situations. In principle the group supports a flexible approach to constraint management, such as the proposed CSP/CSC arrangements, network support agreements or other similar arrangement which will achieve the following aims:

- Encourage efficient generator dispatch through price signals (this may involve a combination of signal both from the NEMDE and external to the NEMDE);
- Allocate payments or rights to generators that allow them hedge at regional reference nodes with acceptable risk levels (not worse than exist now); and
- Share allocation of transmission capacity between generators and inter-connectors on an equitable basis.

4.2 Alternatives

These arrangements are preferred to creating additional regions on a frequent basis as region changes cause a high degree of commercial disruption. A region change will either lead to unacceptable risk or require all affected financial hedges to be renegotiated (if possible). This is extremely disruptive and is likely to raise irresolvable disputes over changes in the value of hedge positions. Transaction costs will increase with the added requirement for inter-regional trading and matching of inter-regional positions with customer hedge contracts. Region changes can also cause permanent reductions in merchant investor asset values.

4.3 Essential Features

Parties affected by these constraint management arrangements must be able to predict outcomes for hedging and not be disadvantaged over the status quo (i.e. the current implied price hedge to the RRN that generators enjoy within a region). Failure to do so will mean that the CSP/CSC regime could create as much or more risk and disruption than the creation of new regions. The group supports further development of these arrangements but insists that the following features are incorporated as a mater of policy:

- The arrangements must be known in advance;
- They must be fixed for a reasonable period of time for certainty and predictability to allow financial hedging;
- Baselines for sharing of capacity between inter-connectors and local generators must be based on contestable capacity not full capacity;
- Rights must be allocated to existing generators to preserve their financial position within an existing region; and
- Where interaction occurs between inter-connectors and local generators the capacity should be shared on an equitable basis.

4.4 Extension to Pure Intra-regional Constraints

The concept of gatekeeper type network support payments in previous work was based on constraints where inter-connectors and local generators compete for the same limited intra-regional capacity. In this new report the concept is extended to all constraints including pure intra-regional constraints. The current dispatch algorithm incorporates tie-breaking methodology such that when a bidding war occurs behind a constraint dispatch is shared equally in proportion to bid capacity. However in some cases dispatch is not shared equally due to differences in constraint coefficients placing some generators at a severe disadvantage (potentially forced off line). Also, unscheduled generators have priority over scheduled generators, as they are not controlled by constraints. Therefore a CSP / CSC regime appears appropriate for intra-regional constraints as it allows a sensible allocation of CSC volumes to generators and removes incentives for bidding wars behind constraints. In fact it is more economic for a generator holding a CSC to reduce output if bidding results in a local price lower than its variable operating cost even if the output is hedged at the higher priced RRN.

Some clarification of the CSP/CSC methodology is required to ensure CSP payments only apply to the constrained flow and not to supply of local loads behind a constraint.

4.5 Extension to Other Regimes

The group also notes the CRA work that extends the CSP/CSC concept to non-energy issues such as reactive support or ancillary services. Whilst this may be possible, the focus in the short to medium term should be on the known energy constraints which are relatively simple to implement to prove the methodology. The possibility of applying it to other issues should be a matter for review at a later date.

4.6 Trigger for CSP/CSC regime

The concept that a CSP/CSC regime should be implemented only for constraints that become significant is supported. However a review process is required that incorporates a review frequency and criteria to trigger the introduction of a constraint management regime such as CSP/CSCs or network support arrangement. It is suggested that the ANTS review could be extended for this purpose or alternately a review could be undertaken when the cost of a constraint exceeds a predetermined value.

4.7 Examples

Whilst the concept of CSP/CSCs has been described, considerable further work is required to determine how it would be applied in particular circumstances or whether a network support agreement would be more appropriate. Some examples of constraints are provided in Attachment 1 with commentary on how they should be handled.

4.7 Our Position

The proposed constraint management regime involving CSP/CSC or network support arrangements is supported in principle as the best regime presented to date for achievement of efficient dispatch outcomes with minimal commercial disruption. Further investigation is needed to resolve a number of outstanding issues with the CSP/CSC regime before it can be implemented. The issues are outlined in the following sections.

5.0 Firmness and Quantity of CSC

As CSCs are in effect a form of Financial Transmission Right (“FTR”) the issue of firmness and quantity issued must be addressed. Some commentators insist that these instruments must be firm to minimise risks of trading. However if “revenue adequacy” (settlement surplus sufficient to fund payments) is to be maintained it becomes clear that there is a trade-off between the quantity of CSCs and their firmness. If CSCs are made firm only to the capacity of the transmission system at the time then CSCs can be issued for the full transmission capacity. This, in fact, is the status quo where generators have an effective price hedge to the RRN only for the transmission capacity available at the time. If there is a transmission outage, which temporarily reduces transmission capacity then the effective price hedge volume is reduced.

If the firmness of CSCs is to be increased to make holders immune to temporary reductions in transmission capacity, then this requires an additional source of funds that can be used to top up the residues at times of reduction. The additional funds can come from auction proceeds where the CSCs are auctioned (SRAs are currently auctioned so this source of funds exists for SRAs. It could also be argued that using the SRA auction proceeds to improve firmness increases the value of the SRAs and subsequent action proceeds). However if the CSCs are allocated to existing generators free of charge, then there is no pool of funds that can be used to increase firmness.

5.1 Our position

Therefore, the Group’s position is that CSCs should be made firm only to the level of transmission capacity available in any dispatch interval. Allocating CSCs for a proportion of available transmission capacity rather than a MW value would be suitable way of facilitating this outcome.

6.0 Allocation of CSC

The allocation of Constraint Support Contracts is critical to the success of CRA’s proposed arrangements.

6.1 Objectives of Allocation

The group considers that allocation should be considered in the context of the overall aims of the CSP/CSC arrangements. We believe the aims should be as follows:

- Encourage efficient dispatch of existing generators through effective price signals;
- Minimise commercial disruption with respect to financial hedging arrangements and existing merchant investment value; and
- Provide efficient locational signals for new investment.

6.2 Efficient Dispatch

The CSP arrangements should encourage efficient dispatch because generator output at a marginal cost which is greater than the local price after CSPs are applied would result in a net decrease in revenue.

6.3 Commercial Considerations

Commercial disruption to existing generators can be avoided only if CSCs are allocated to existing generators free of charge. Failure to allocate CSCs to existing generators or forcing then to purchase them at auction imposes sovereign risk on incumbents discouraging future investment. Failure to allocate free of charge to would put them into a similar position as the imposition as a region boundary change. Generators would be less inclined to not enter into financial hedges for fear that a CSP/CSC regime would arise leaving them exposed to price differences to their RRN.

6.4 Consistency with Region Boundary Regime

The overarching recommendation of the CRA report is that region boundary criteria be adopted that result in infrequent changes to regions. The basis for this recommendation is that stability in the market environment promotes the certainty and predictability required to minimise investors' cost of capital. The Group believes that allocation of CSCs to existing generators free of charge so they do not suffer significant revenue or value changes within a region review period is consistent with the CRA recommendations. The reduction in the cost of capital will have the flow on effect of reducing the cost of electricity.

6.5 Locational Signals for New Investment

Another aim of market arrangements is the efficient location of new generation and load assets. To achieve this aim, there should be incentives for generation investment not to locate in an area where transmission constraints will limit export from the area. Currently, a generator can locate in a transmission-constrained area and get a share of dispatch at the RRN through the NEMDE tie-breaking methodology. Under the proposed CSP/CSC arrangements, if CSCs are allocated to existing generators this will provide a stronger signal for new generation investment to locate in an area to relieve transmission investment. This would also preserve asset values for existing sunk generation investments. However, it should be recognised that this is only an improved locational signal. When other costs are considered, new generators may still choose to invest in a transmission-constrained area if they can achieve sufficient revenue based on the local price after CSP rather than receiving the RRP.

6.6 Review of Allocation

Assuming that allocation free of charge to existing generators is supported, the question arises as to what should be the duration of the allocation. For existing generators it would be desirable for the CSC to be allocated in perpetuity. However, in practise constraint locations can change due to generator dispatch and load changes, transmission investments or plant retirement. A more pragmatic approach may be to allocate CSCs for the duration of a particular CSP/CSC regime. Another approach may be to link the allocation to a region boundary review period. If the relevant constraint is built out or is no longer expected to bind then the CSP/CSC arrangement for that constraint would be terminated. The term of a CSC needs further consultation.

6.7 Alternatives

Whilst the proposed CSP/CSC regime has not been proven, any issues that may arise are likely to be less significant than those which may accompany the creation of additional regions and FTRs or relying on the purchase of SRAs.

6.8 Our Position

CSCs should be allocated to existing generators free of charge to preserve the status quo for revenue expectations within a region and minimise sovereign risk. The regime can then provide stronger locational signals for new investment, certainty for all merchant investment, efficient dispatch and liquidity in hedging at regional reference nodes.

7.0 Region Criteria

The group notes the difficulties and regulatory limitations set out in the report regarding criteria for assessing region boundary change. The report recommends that a change of boundary (or more precisely, a change of connection point to another region) can be based on the value of either the resultant improvement in dispatch or change in locational price signal. The concept of a benefits test, which underlies the recommendation, is supported by the group, provided it is on a basis consistent with the regulatory test and constraint management regime.

7.1 Dispatch Efficiency

With regard to dispatch efficiency, the recommendation is that the benefit for moving each connection point must exceed $1Mpa in accordance with an endorsed methodology. Presumably, this means for a new region to form with, say, 10 connection points, the benefit must exceed $10Mpa. Although the amount of $1M seems arbitrary, it is noted that the intention is a clear benefit to be demonstrated (as opposed to anything better than break even). This principle is supported by the group with the proviso that further work be undertaken to determine if a $1Mpa benefit is sufficient or whether, for example, the threshold should be linked in some way to the cost-benefit methodology in the transmission regulatory test.

Furthermore, the concept of an ‘endorsed methodology’ appears arbitrary, but it is recognised by the Group that specification of a methodology is beyond the scope of the report. The Group encourages the MCE to hold an open consultation on the methodology and ensure that it is consistent with the transmission regulatory test and constraint management criteria.

The Group finds the recommendation on locational price signal benefits to be confusing and therefore finds it difficult to comment. However, the Group acknowledges the principle that a benefit from a change in locational price signal be incorporated into the region boundary criteria.

The group also supports the implied ‘forward looking’ approach in the report to both the recommendations.

It is noted by the Group that the benefits are to exceed the costs by a measured amount. The Group considers that the costs should include the cost of commercial disruption to participants, transaction costs and costs of establishing and managing jurisdictional customer pricing arrangements.

7.2 Timing and Scope of reviews

Given the NEM is an interconnected system, each review of region boundaries must by definition consider the NEM as a whole. This will provide certainty and predictability for participants and simplify the task of the decision-maker.

The Group is supportive of the recommended timetable for review of region boundaries, namely a three year lead time to a boundary change, and a minimum five year period in which it is applied. Further, the recommended snapshot approach in which all regions are reviewed at the one time is appropriate and will avoid uncertainty. The Group does not support an approach where reviews of regions are staggered or out of step because the flow-on effects to other regions of a change to one creates uncertainty.

The Group believes the ANTS process should provide sufficient warning in the lead up to a snapshot test for region boundary change, obviating the need for an annual region boundary review as proposed by some commentators.

The three year lead time to a boundary change is important for allowing generators to manage their contract position. Only a relatively small amount of contract trading occurs beyond a three year horizon, therefore a potential boundary change is not likely to have a significant impact on contract liquidity.

The five year period for the application of a boundary change provides sufficient certainty for investment. The term is consistent with that required to develop a generating plant from scratch and the first five years of a commercial project are critical to its success.

The Group believes the report could include a discussion on the joining of regions. Although the general approach in the report of evaluating the benefits of moving a connection point may result in the elimination of region, it could be made clearer in the report. The Group believes the transaction costs associated with joining boundaries would be minimal (effectively replacing a dynamic loss factor with a static one).

7.3 Initial Review

CRA's conclusion that is no immediate need to change the pricing to more regions or nodal pricing is supported. In the short term, increasing granularity of pricing and forcing more complex risk management arrangements will not benefit the market, particularly given that financial market liquidity is just now beginning to increase.

The Group considers that, upon the implementation of the complete transmission package, time should be allowed for investment to occur before a region boundary review commences.

7.4 Review Process

The process should be similar to the current consultation arrangements for transmission investments where an issues paper is written identifying a need for action and calling for regulated or competitive market proposals before taking action.

8.0 Network model

The debate on the most appropriate form of dispatch model for the NEM is seen as a secondary issue because both the full network model and the current regional model are capable of delivering the Report's recommendations with respect to constraint management and region boundary outcomes.

Some commentators indicate that a move to a full network model would make NEMMCO's task of developing and maintaining constraints for the dispatch engine simpler. This may be so for thermal branch constraints, which make up about 70% of constraints but the other 30% of constraints (for example, stability) will still require representation with generator and other non-network terms. We note that NEMMCO is currently investigating the use of a full network model and to date have not released any information on the benefits or costs to the market of moving to a full network model. Although the Group believes that the consideration of which model is most appropriate should be deferred until NEMMCO makes an initial assessment of the costs and benefits, views on certain issues affecting the choice and implementation of a dispatch model are presented in this section.

8.1 Predictability and Consistency

The Group considers predictability and consistency between pricing and dispatch to be an important principle to be maintained. It is important for generators to be able to predict the relationship between the regional price and their local price to determine generation levels required to support financial contracts. The current fixed loss factors provide this predictability and avoid generators having to continually monitor and adjust their generation output for financial hedges. The current regional model with fixed loss factors also provides consistency between the bid price, the regional price and dispatch. A generator can enter a bid price and be confident they will be dispatched when the price rises above that price. With variable loss factors the volume required to support a particular financial hedge position would vary continuously and frequent rebidding may be required. Generators would have to monitor their dispatch continuously and it would be too difficult to distinguish between the effect of constraints and changing loss factors.

8.2 System Security and Utilisation of Network

The CRA report tends to overstate the problems with the existing regional model particularly with respect to system security. Our understanding is that a move to fully optimised constraints (Option 4) will provide improved network capacity (less safety margin) and system security (control of all relevant variables). Approximation in use of fixed loss factors is not material with regard to system security, particularly when many constraints use actual measured flows in feedback type constraints rather than calculated or inferred flows. It could be argued that use of feedback constraints with the regional model allows for greater utilisation of transmission assets than does a full network model.

8.3 Implementation

Much of the work to date indicates that variable loss factors are mandatory with a network model. If NEMMCO determines that there are benefits in moving to a full network model then further work should be commissioned to determine how fixed loss factors within a region could be accommodated in a full network model. This may require some changes to the treatment of interconnectors.

Material presented by CRA indicates that the CSP/CSC regime will require the use of regional constraints where generator terms are represented with flow coefficients. This would detract from the benefits of easier constraint management in moving to a full network model.

8.4 Publishing of Shadow Prices

CRA also recommend that shadow prices behind intra-regional constraints be published. It should be noted that in the absence of a CSP/CSC regime shadow prices will not mean much because of bidding behaviour behind them is for dispatch outcomes rather than revenue. It is well documented that some constraints initiate bidding wars where the shadow price provides little indication of economic drivers. However where a CSP/CSC regime is implemented the CSP must be published in real time to allow generators to optimise dispatch. The transmission capacity available to share amongst CSC holders also needs to be published in real time.

8.5 Queensland Generator Position

In conclusion, regardless of the model used, maintaining fixed loss factors has considerable benefits in consistency, predictability and transparency. Fixed loss factors reduce participant analysis costs and the predictability allows increased financial contract volumes. If NEMMCO find it easier to develop and maintain constraints with a network model, this needs to be weighed up against participant costs in maintaining their own network model to reconcile dispatch and price outcomes and potential constraint points.

9.0 Conclusions

The Group generally endorses the findings of the report and is very supportive of the recommendations. There are some areas which need clarification within the scope of the report and, as acknowledged by the report itself, there is a substantial amount of work required outside of the scope of the report.

It is important that the issue of transmission in the NEM be dealt with in a consistent manner. The group agrees that region boundary review must form part of a solution package that incorporates the regulatory test, constraint management and region boundary review. Transmission investment should occur in line with the MCE's transmission policy settings for network investment announced in December 2003. The Group supports the Option 4 constraint management approach and the further development of the CSC and CSP methodology. A region boundary change is viewed by the Group as a last resort after other options have failed to resolve the issues.

Within the scope of the report, further clarification of the boundary change criteria is required, particularly in relation to the locational price signal benefits.

Outside of the scope of the report, further work clearly is required on the regulatory test in a consistent manner with the proposed constraint management regime and boundary change criteria. The Goup believes that a CSC and CSP arrangement which is stable and which recognizes that new generation plant should be exposed to locational price signals is essential for low risk, low cost investment in generating plant into the future. The boundary change criteria must take into account the full costs to which the electricity market is exposed as a result of an increase in regions or a change in boundaries.

Finally, the Group would like to emphasise the importance of recognising the framework outlined by CRA (and illustrated in the flow chart on page 5 of the CRA report) as a package deal. That is, the issues surrounding regional boundary criteria must be considered in the same framework as the policy settings for network investment (the Regulatory Test), and network congestion management (constraint formulation).

Attachment 1- Examples of Constraint Management Arrangements

As stated in the body of this submission, the Group supports a flexible approach to constraint management where arrangements are outside of the current dispatch engine. The CSP/CSC methodology is also supported in principle but requires further work on application to known constraints to determine its suitability. This Attachment is included to provide an insight into the Group's views on how particular constraints should be managed.

A1.1 Snowy to NSW in the northerly direction

At times the flow north between Murray (RRN) and Tumut can be constrained at a value of 1300MW. However flow between Tumut and NSW, which can be defined as the inter-connector flow can be as high as 3200MW before a constraint occurs. It the Murray –Tumut constraint binds, the NSW price will increase in relation to the Snowy price. Tumut generation receives the Snowy price when it is effectively in the NSW region. Under a CSP/CSC arrangement the inter-connector would be limited to 1300MW in the absence of Tumut generation. Therefore any settlement residue for flow in excess to 1300MW (i.e. Tumut generation) should incur a CSP payment. Tumut should have a CSC for its output which gives it the NSW price. The arrangement is revenue adequate because the payments above Snowy RRP come from the CSP made by the inter-connector. This is a competitive outcome as Tumut output participates in setting the NSW price and increased output by Tumut will reduce the NSW RRP and its own revenue. This is no different to the position of any other NSW generator at the time.

A1.2 North Queensland

During high demand periods in north Queensland, generation needs to be constrained on to meet demand as there is insufficient transmission capacity for flow from central Queensland. North Queensland generators are at the higher end of the cost spectrum and generally the RRN is not sufficient for them to commit. Generally the generators run under direction form NEMMCO or under a Network Support arrangement with Powerlink. As this occurs entirely within an existing region there is no interaction with inter-connectors. In this case an external source of funds is required for the required generation to occur so a CSP arrangement would not be revenue adequate. There is also very limited competition in the area so a negotiated arrangement seems most appropriate. In negotiation of the network support arrangement Powerlink compared the arrangement with other options such as a transmission augmentation and found it provided the highest value. In this situation the group endorses the use of a network support arrangement as the most appropriate form of constraint management.

A1.3 The Tarong Constraint.

This is a typical example of the application of the CSP/CSC regime. An intra-regional constraint occurs on the NSW-QLD inter-connector within the Queensland region. Local Queensland generators compete with the inter-connector for the limited transmission capacity. The maximum inter-connector flow into Queensland is generally around 500MW. The allowable flow though the constraint is around 2500MW. In this situation only 500MW of the capacity is contestable and this should be shared between the local generators and the inter-connector (say 50/50, but this could be determined in other ways). In this case the local generators would make a

CSP so they effectively get the NSW price for output but also get a CSC for 2000MW + 0.5X500MW to allow them to contract safely at the Brisbane node. The SRA would get a CSC for 250MW which would make the SRA firm to that volume if there are no transmission outages.

This arrangement allows effective competition between the local generators in Queensland and NSW generators because they both get the effective marginal price signal equivalent to the NSW price. Once again, the competition is effective if lower bids from the Queensland generators increase flow into NSW, and reduce the NSW price and their own income. This should result in efficient dispatch of available generation resources.

In contrast the current practise of controlling negative residues does little to encourage efficient dispatch and reduces the firmness of the SRA.

A1.4 Central Queensland CQ to South East Queensland SEQ (large local load)

In this case the constraint between central Queensland ("CQ") and south east Queensland ("SEQ") limits flow to around 1800MW but there is about 4000MW of generation in CQ to support local load. This constraint lends itself to a CSP/CSC regime where 1800MW of CSCs are allocated to CQ generators. This situation is not clear in the CRA work to date and needs clarification. To preserve value for the generators in CQ the CSP must apply only to the 1800MW of constrained flow and they receive the RRP for the remainder of the generation to support local load. Therefore when pool, CSP and CSC revenue streams are aggregated the generators effectively receive the RRP for all dispatched generation.

ATTACHMENT 2 - Network Model

Regional model versus network model

- Network model is easier for defining constraints and maintaining them.
- Management of security overstated by CRA. Issue is about option 4 opposed to option 1
- Non-NEO (e.g. stability) constraint issues still remain for both and require regional style constraints (30% of constraints fall into this category)
- Regional style constraints will be required for CSP/CSC regime
- Transparency will be compromised with a network model or regional model if dispatch and pricing and settlement consistency is not maintained.

Treatment of losses

- Regional - fixed
- Network – CRA appear to claim they must be variable. NEMMCO have stated that they can be loss-less, fixed losses or variable. If variable losses are adopted with approximately 700 branches in the NEM, NEMMCO will be able to include only 3 segment loss models on each branch and this would provide a very granular loss function. Otherwise computing time will be excessive. A 3-segment loss model will be course and result in sudden dispatch changes at transition points.
- Fixed losses are preferred
  - Provide greater certainty for hedging – Volume required to cover hedges can vary dramatically for central Queensland generators (9% average but real time vary significantly). This will result in less hedging.
  - Loss of value for generators as higher losses generally occur at high priced periods.
- As for system security effect of errors in losses will be very small. Most constraints that mater are now feedback constraints so they use actual measurements to determine flows rather than calculations incorporating losses.

Transparency

Existing regional model makes it easy to see constraints, limits and generators that effect constraints and their coefficients. Also with fixed loss factors it is simple to check sanity of dispatch outcomes in real time as a generator can convert their bid to a RRN price and determine if they should be dispatched.

With a Network model and variable loss factors, the model will define constraints and participants will have to install and maintain their own network model and run scenarios to determine where constraints may occur and proportion that each plant is affected. With variable loss factors generators will not be able to check their dispatch outcome as they will not be able to determine loss factors. Even with their own network model they will not know the flows as a result of other participant dispatch so will not be able to determine losses applicable at any time. NEMMCO will not be able to publish flows and losses in real time as participants can infer other generator positions with this information.

Loop Flows

Loop flows spanning multiple regions are difficult with current model but achievable with appropriate constraints. Loops are not a problem when they are contained within a region.

No interconnector loops exist at present so no urgent need to do something. SNI may be the first. It may be possible to use a network model for interconnectors and regional reference nodes and all other nodes modeled as radials with fixed loss factors.

Different dispatch and settlement pricing is possible but would be confusing.

Summary

It may be possible to make a case for a move to a network model if fixed loss factors are retained within a region but moving to variable losses would add considerable complexity and costs for participants with very limited benefits.