



Australian Competition and Consumer Commission

National Electricity Market: Regional Boundaries Review

**Submission to the Ministerial Council on Energy
Standing Committee of Officials**

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Glossary

ACCC	Australian Competition and Consumer Commission
Capex	Capital expenditure
Code	National Electricity Code
CRA	Charles River Associates (Asia Pacific) Pty Ltd
CSP/CSC	Constraint Support Pricing/Constraint Support Contract
DNSP	Distribution Network Service Provider
ESIPC	Electricity Supply Industry Planning Council
FTRs	Financial Transmission Rights
IES	International Energy Solutions
IRPC	Inter Regional Planning Committee
IRSR	Inter Regional Settlement Residues
MCE	Ministerial Council on Energy
MW	Megawatt
NECA	National Electricity Code Administrator
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NSP	Network Service Provider
REIMNS	Review of Integrating Energy Markets and Network Services
RRN	Regional Reference Node
RRP	Regional Reference Price
SCO	Standing Committee of Officials
SOO	Statement of Opportunities
TNSP	Transmission Network Service Provider
VoLL	Value of Lost Load

Executive Summary

Background

The National Electricity Market (NEM) is a regional wholesale market that currently posts a separate price for each region each half hour. The spot market within the NEM is currently divided into five regions.

It was recognised at market start that as the system evolved and the transmission network became more extensive and integrated, it might become desirable to modify the regional boundaries in the NEM. Provisions were therefore incorporated into the National Electricity Code (code) that could trigger a review and where necessary, a redetermination of region boundaries be made.¹ The idea was that the region boundaries would align with network congestion, leading to more pricing points in the market.

Ahead of its consideration of reforms to the energy market, the NEM Ministers requested a moratorium on the investigation and progressing of all transmission and regional boundary issues by the NEM institutions.

In its communiqué of 11 December 2003², the Ministerial Council on Energy (MCE) adopted four principles to underpin transmission policy in the NEM:

1. The transmission system fulfils three key roles – it provides a transportation service from generation source to load centre, facilitates competition, and ensure secure and reliable supply.
2. There is a central and ongoing role for the regulated provision of transmission, with some scope for competitive (market) provision.
3. Transmission investment decisions should be timely, transparent, predictable and nationally consistent, at the lowest sustainable cost.
4. The regulatory framework should maximise the economic value of transmission, including through the efficient removal of regional price differences in the operation of the NEM.

Within these principles, the MCE recommended “*A new process to be developed for assessing wholesale market regional boundaries while maintaining jurisdictional boundaries for retail customer pricing*”³. The MCE commissioned Charles River Associates (Asia Pacific) Pty Ltd (CRA) to consider this issue. On 1 October 2004, the Standing Committee of Officials (SCO) released the CRA report for consultation with the market.

¹ Clause 3.5 of the code sets out the process for the consideration and refinement of the regional structure of the NEM. This currently requires that the National Electricity Market Management Company (NEMMCO) review and recommend to the National Electricity Code Administrator (NECA) the number of regions that operate in the NEM. Clause 3.5.1(b)(2) of the code outlines the region boundary criteria in the form of seven principles to be applied in order of priority.

² Ministerial Council on Energy, *Report to Council of Australian Governments on Reform of Energy Markets*, 11 December 2003.

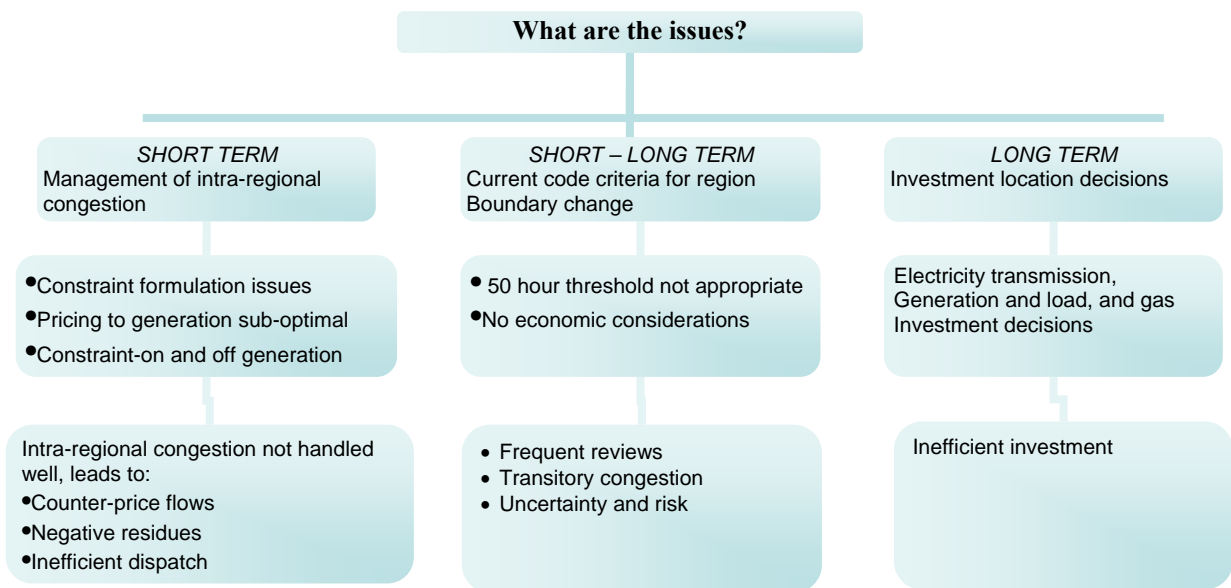
³ *ibid*

The Australian Competition and Consumer Commission (ACCC) is currently responsible for regulating the revenues of transmission network service providers (TNSPs) in the NEM. The proposed link between the review of regional boundaries and the transmission investment framework has clear implications for the operation and reliability of transmission facilities in the NEM, as well the incentives on transmission businesses. These issues are directly relevant to the ACCC’s role of transmission revenue regulator and it is in this capacity that the ACCC makes this submission.

The regional structure of the market impacts a number areas relating to market operation and development. The ACCC considers that the CRA report provides a useful contribution to the debate on possible reforms to the regional structure of the NEM. Given the importance of the region structure of the market the ACCC’s submission touches on a number of areas or issues which need further consideration in taking this review forward in order to ensure that the framework established is sound and economic. These are briefly outlined below.

The context to the review

The regional structure of the NEM affects both short term and long term developments in the market. The figure below broadly summarises some of the issues that the current NEM structure presents.



An issue that exists with the current arrangements concerns the way in which the market deals with intra-regional congestion. Currently the existence of intra-regional congestion is not recognised in prices differences. This affects the bidding behaviour of generators in that region. For example, if there exists a constraint in the network, generators are dispatched for more or less than they are willing to produce at the

regional reference node (RRN)– that is, generators are either constrained on or off⁴. Under these circumstances, generators have limited incentives to submit bids reflecting their true costs, which could compromise the efficiency of dispatch.

A second issue relates to the current region boundary criteria as specified in the code. The current criterion focuses on hours of constraints. Such a threshold is unlikely to provide insight into the materiality or economic impact that the constraint has on the operation of the market. This could potentially lead to frequent reviews or amendments to regions where the constraint is transitory or non-persistent in nature.

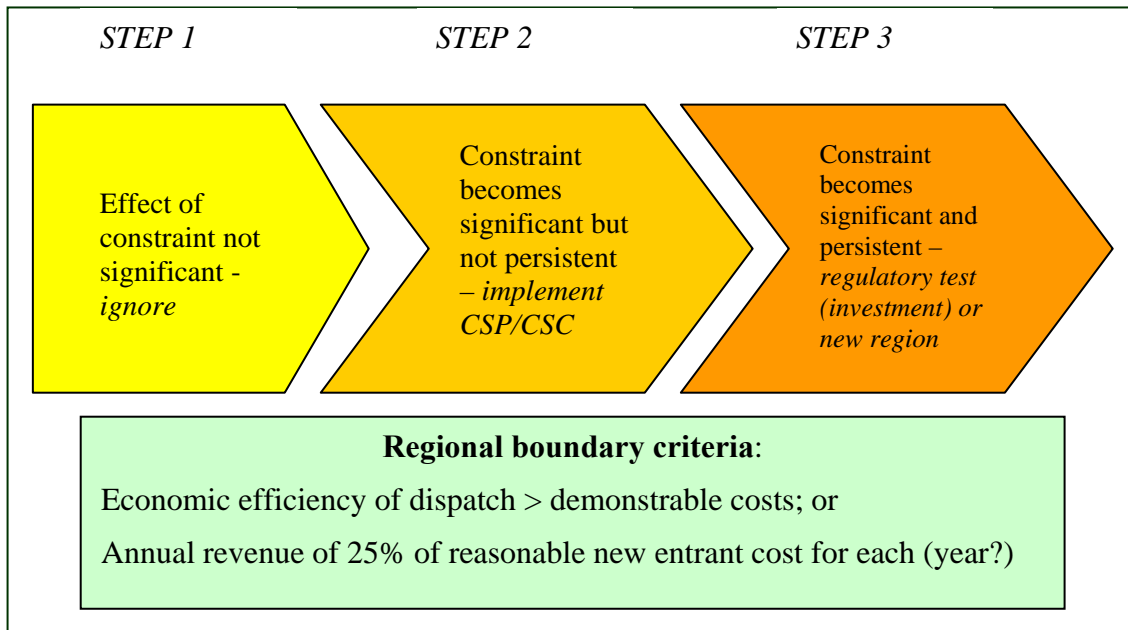
A third issue which often arises when issues associated with nodal versus zonal regimes are considered is whether the current regime provides the appropriate investment location decisions. The ACCC notes that prices in the long term play a role in influencing location and fuel choice decisions for both consumers and producers of electricity.

CRA recommendations

As part of its assessment, CRA conducted a broad empirical analysis of likely intra-regional congestion in the NEM and found that significant boundary change to price congestion is not warranted at this time. CRA also found that the current arrangements would see regular changes that would result in insufficient economic benefits, but would cause commercial dislocation to market participants and impact on the jurisdictions' retail market arrangements.

CRA concluded that there are limited benefits from adopting a nodal pricing regime. It suggested that a regime that closely integrates the regulatory and competitive arrangements in the NEM, with a gradual regional boundary framework and targeted contracting and pricing incentives to manage network congestion as and when it occurs would best suit the NEM. It therefore recommended a three step process to considering congestion management, review of regions every 5 years, and amendment to region boundary criteria in the code to have an economic focus. The three step process proposed is outlined in the diagram below.

⁴ The code defines constrained on as “in respect of a *generating unit*, the state where due to a *constraint* on a *network*, the output of that *generating unit* is limited above the level to which it would otherwise have been *dispatched* by *NEMMCO* on the basis of its *dispatch offer*.”
Constrained off generation is defined as “in respect of a *generating unit*, the state where, due to a *constraint* on a *network* the output of that *generating unit* is limited below the level to which it would otherwise have been *dispatched* by *NEMMCO* on the basis of its *dispatch offer*.”



Summary of ACCC comments

The ACCC considers that the CRA report is an important step in the consideration of possible refinements to the region boundaries framework to operate in the NEM.

The ACCC considers that this has enabled useful debate with industry about the problems with the current structural arrangements and possible issues that need to be addressed in taking this review forward. While the CRA recommendations are an important step, many need further development to clearly articulate how such arrangements will operate in the market, and whether such solutions best address the problems trying to be resolved.

The ACCC’s main comments are summarised in the following section.

Congestion management and pricing

The ACCC notes that from an economic perspective, when it comes to the management of congestion on a transmission network, a system which forces the prices paid by consumers to be the same at all locations within a predefined region will always yield outcomes which are less efficient than a full nodal pricing regime. That said, the ACCC notes that in considering the implementation of a full nodal pricing regime, a balance needs to be struck between the benefits and costs of moving to its implementation.

One argument that has been used in the past is that a move to full nodal pricing raises significant implementation issues. While recognising this, the ACCC considers that based on the work of its consultant, International Energy Solutions (IES), the potential benefits likely to result from full nodal pricing certainly warrant a detailed examination of the implementation issues necessary for this regime to apply in the NEM before it is disregarded as an option.

The ACCC considers that the Constraint Support Pricing (CSP)/Constraint Support Contracts (CSC) proposal is a form of nodal pricing to generation given that it provides the correct pricing signals to generators in the event of congestion in the network, coupled with a system for transmission rights. While the pricing aspect of this regime is similar to that provided by a full nodal system, its accuracy will critically depend on the allocation or distribution of the transmission rights. There remain a number of issues that need further consideration including how, for how long, and who will determine the allocation of the transmission rights. These issues need to be resolved for such a mechanism to operate effectively in the market.

The ACCC considers that further investigation is required on the need for and benefits from implementing a congestion pricing mechanism such as that proposed by CRA or any other mechanism before such proposals are added to the NEM framework.

Constraint formulation and system security

One of the important principles in constraint formulation is to ensure a consistent treatment across the NEM, limited occurrences of counter price flows, transparency in the constraint formulation process and therefore the dispatch process.

To deal with the issue of intra-regional congestion, the ACCC considers that there needs to be consistency between pricing and dispatch. This means that if a generator faces a given price, it should be dispatched for the corresponding quantity on its offer curve. Under the present arrangement there is no consistency between pricing and dispatch for intra-regional constraints.

The best way to deal with intra-regional congestion is not through the constraint formulation but rather by providing the appropriate price signals to generators – that is pricing intra-regional congestion.

The ACCC considers that once a system for managing intra-regional congestion is established, the problems arising from inefficient dispatch and negative residues could be dealt with. Therefore, constraint equations can be formulated in the most sensible and economically efficient manner reflecting the pricing arrangements.

Boundary change criteria and process

The ACCC supports the notion of ensuring consistency between the regulatory test and the NEM regional boundaries review given that there may be circumstances where network investment or enhancements could possibly deal with transmission congestion. However, practical issues arise in integrating the regulatory test and the region boundaries review processes, which the ACCC considers needs further consideration. Some of the issues that arise include:

- *TNSP to consider region boundary change* - the regulatory test is currently undertaken by transmission businesses. Therefore, the CRA recommendation effectively proposes that a transmission business is to consider region boundaries change. This raises issues as to whether regional structure considerations are the responsibility of transmission businesses.

- *The interaction between the regulatory test and region boundary process* – currently the regulatory test is performed by network service providers on a needs basis (not every 5 years). However, CRA propose a review every 5 years. The ACCC is of the view that consideration therefore needs to be given to how the timing and interaction of these processes are to work in practice.
- *Consistency between the regulatory test and region boundary criteria* – there is inconsistency between the proposed region boundary criteria and that specified by the regulatory test. The benefits considered in a regulatory test assessment are not confined to dispatch benefits and losses. However, the proposed region boundary criteria is limited to the benefits associated with the efficiency of dispatch and losses.

Given these issues, the ACCC suggests that further consideration needs to be given to how the three steps are to work in practice, in particular, how the regulatory test process and the region boundaries review process are to be integrated.

Conclusion

The ACCC considers that the CRA report is an important step in the development of possible refinements to the region boundaries framework to operate in the NEM. This has enabled useful debate with industry about the problems with the current structural arrangements and possible issues that need to be addressed in taking this review forward. While the CRA recommendations are an important step, most need further development to clearly understand how they will operate in the market, and whether such solutions best address the problems trying to be resolved.

The ACCC therefore considers that further consideration is required on the likely benefits in implementing a CSP/CSC regime. Such consideration needs to be done in close consultation with industry, given they will largely be affected by the regime that is to be implemented. The ACCC recommends that the detail relating to the implementation of the CSP/CSC mechanism needs to be worked through before it is introduced into the NEM. This appears to be a pragmatic approach in taking some of these issues forward.

1 Introduction

The Australian Competition and Consumer Commission (ACCC) welcomes the opportunity to make this submission to the Standing Committee of Officials (SCO) on its consultation documents concerning the review of the National Electricity Market (NEM) regional structure. The ACCC is pleased to contribute to this debate.

The ACCC is currently responsible for regulating the revenues of transmission network service providers (TNSPs) in the NEM. The proposed link between the review of regional boundaries and the transmission investment framework has clear implications for the operation and reliability of transmission facilities in the NEM, as well as the incentives on transmission businesses. These issues are directly relevant to the ACCC's role of transmission revenue regulator and it is in this capacity that the ACCC makes this submission.

The ACCC agrees that the issues associated with the regional structure of the NEM are of critical importance and significance to the operation of the energy market. The regional structure of the NEM and the policy decisions going forward on this issue have profound implications for the location and commercial incentives for generation and load, pricing outcomes and dispatch in the NEM, investment signals including energy investment location decisions, and certainty and risk management for NEM participants.

The ACCC considers that the Charlies River Associates (Asia Pacific) Pty Ltd (CRA) proposals are an important step in the consideration of possible refinements to the region boundaries framework. This has enabled constructive debate with industry about the problems with the current structural arrangements and possible issues that need to be addressed in taking the review forward.

The ACCC considers that while the CRA report is a useful contribution to the region boundary debate, many of the proposals need further development to clearly understand how such arrangements will operate in the market, and whether such solutions best address the problems trying to be resolved.

The ACCC's submission considers these issues and touches on proposals which need to be considered further.

The structure of the submission is as follows:

- section 2 presents the ACCC's consideration of the context to the regional boundaries review
- section 3 comments on the proposals relating to congestion management including Constraint Support Pricing (CSP)/Constraint Support Contracts (CSC)
- section 4 address the recommendations made by CRA with respect to constraint formulation and system security
- section 5 considers CRA's recommendation with respect to the regional boundaries change process, including the boundary change criteria

- section 6 presents the ACCC's conclusions
- appendix A presents a report commissioned by the ACCC by International Energy Systems (IES) which considers costs/benefits that are associated with the implementation of a nodal pricing regime
- appendix B presents a paper prepared by Dr Darryl Biggar, the ACCC's economic consultant, titled "Understanding Constraint Support Pricing/Constraint Support Contracts".

2 The Context to the Regional Boundaries Review

2.1 Introduction

This section presents the framework to the regional boundaries review in order to provide the context to the specific issues addressed in subsequent parts of this submission.

Before considering the options to reform the structure or operation of the NEM, it is important to consider the issues, if any, that exist with the current arrangements or mechanisms in place, and whether they are significant. In considering these issues, the Ministerial Council on Energy (MCE) required CRA to review and develop “...*proposed regional boundary criteria and means of managing network congestion with the policy set by the MCE...*”.⁵ CRA notes that the issue addressed in its report relates to congestion. CRA states that “*congestion is ...the primary cause of differences in wholesale prices between different locations on the transmission network and is the focus of this review*”⁶.

The following section outlines the ACCC’s consideration of some of the perceived issues with the market.

2.2 Issues with the current regional boundaries structure

The ACCC considers that there are two main issues with the current NEM regional boundaries arrangements:

- The current code criteria and process for changing regional boundaries does not adequately reflect the commercial and economic considerations associated with such a change.
- Intra-regional congestion is poorly handled in the NEM, which can lead to inefficient dispatch, counter-price flows and negative settlement residues. The handling of intra-regional congestion is related to that of locational marginal pricing and constraint formulation. Intra-regional congestion affects price signalling to generation and load on production and consumption decisions, and investment location decisions.

Both issues influence the effective operation of the NEM and related markets’ particularly the gas market. The ACCC agrees with CRA that ‘*network tariffs, representation of losses and the risk of triggering a region boundary change all create locational incentives in their own right*’.⁷ Therefore, the ACCC is of the view that the

⁵ In its December 2003 communiqué, the MCE recommended that “A new process to be developed for assessing wholesale market regional boundaries while maintaining jurisdictional boundaries for retail customer pricing”.

⁶ CRA, September 2004, p 14

⁷ CRA, *NEM Transmission Region Boundaries Structure*, September 2004, p 15.

issues associated with the regional structure of the NEM should be considered alongside broader transmission issues such as transmission pricing.

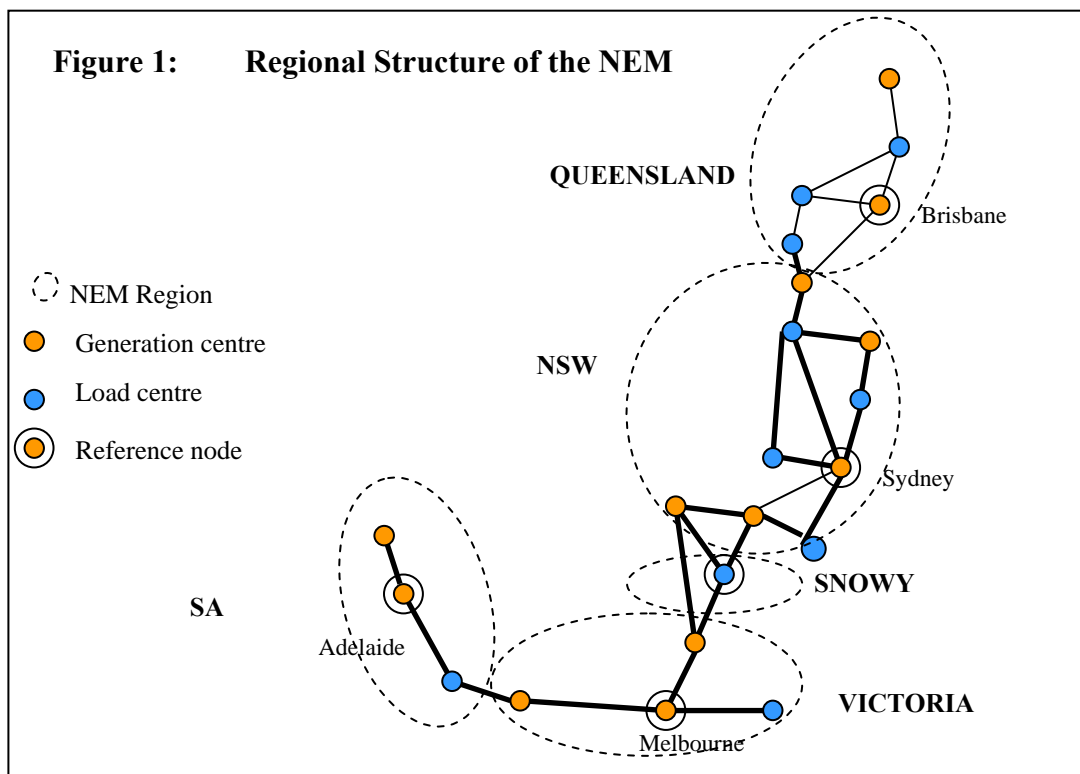
The following section provides a discussion of these issues.

2.2.1 The significance of regions in the NEM

Within an electricity market, prices play an important role in both the short and long term in providing the appropriate signals to market participants. In the short term, high (low) spot prices signal either the presence of congestion or a shortage (surplus) of generation. These prices signal to generators to increase (decrease) their output, and to consumers to decrease (increase) their demand.

In the long term, prices play a role in influencing location and fuel choice decisions for both consumers and producers of electricity. High average prices in a region signal the need for new generation investment and discourage new large loads from choosing electricity as an energy source. On the other hand, low average prices signal the need to decrease generation investment for the region.

Currently the NEM is structured around a regional or zonal pricing scheme where price is determined against a limited number of pricing reference points – the regional reference nodes (RRN). In the NEM there is a pricing reference point for each of the regions. This is presented in figure 1.



Spot prices are determined at each RRN, every half hour. Price variations between RRNs reflect:

- times when the transmission lines that interconnect one region to another are at their limit and more expensive generators in the importing regions are required to run to meet demand
- the electrical losses associated with transporting electricity between regions.

The treatment of losses and constraints differ within regions and between regions. Within regions, prices are fixed with reference to a single node, the RRN, which is usually located near the largest load centre. The prices paid for generation, or charged to load, at the specific transmission node are adjusted for losses between the RRN and that node.⁸

The transmission system connects generation to load, and enables competition between different generation sources to supply load. Constraints on the transmission system can limit its ability to transfer electricity from generation to load. Furthermore, if there are constraints in the transmission system, the marginal cost of supplying an additional one MW may differ within a region.

Keeping this in mind, the region structure of the market affects a number of market elements. The configuration of regions impacts the operation of the spot and forward markets as well as:

- the costs and revenues of NEM participants
- the risk to which NEM participants are exposed and their ability to manage those risks
- investment outcomes at the transmission, generation and retail/load levels
- influences the nature and accuracy of price signals for losses and constraints, which critically depend on the number of pricing points in the NEM, and have an impact on the ease with which trading risk can be priced and hedged.

2.2.2 The management of intra-regional congestion

The existence of intra-regional congestion within a region is not explicitly recognised or reflected in price differences. This affects the bidding behaviour of generation within a region and investment signals. This therefore may result in inefficient market outcomes.⁹

⁸ That adjustment is made using a static marginal loss factor i.e. losses are estimated and fixed for a year. However as a result of the Review of Integrating Energy Markets and Network Services (REIMNS) code changes which were authorised by the ACCC in 2002, for 2004/05 NEMMCO moved towards using forward looking loss factors for all regions in the NEM. Between regions, dynamic loss factors are used, which are calculated from a loss to flow relationship, allowing estimated losses to be reset every five minutes.

⁹ In contrast to intra-regional congestion, inter-regional constraints are explicitly reflected in price differences.

The National Electricity Market Management Company (NEMMCO) summarised this problem as follows:

“A generator on the other side of an intra-regional constraint from the regional reference node in its region (‘a remote intra-regional generator’) would have an incentive to offer power for less than the cost of producing it whenever the network constraint bound, as long as the local reference price remained profitable for that generator.”¹⁰

In the NEM, prices paid by consumers are the same at all points in a region (ignoring losses). In the absence of intra-regional congestion, competition between generation provides the incentive for each generator to submit an offer curve which approximates its true marginal cost.

However, where there is intra-regional congestion, this is managed by dispatch of the generator’s output by either constraining generation on or off.¹¹ Constrained generators have limited incentives to submit bids reflecting their true costs because each generator in a region is paid the same price – the regional reference price (RRP), no matter what constraint exists within the region.

Therefore, generators which are constrained off have a strong incentive to bid low (down to the price floor of \$-1,000/MWh) in an attempt to be dispatched, given they will still be paid the RRP. On the other hand, constrained on generators, who are also paid the RRP, have an incentive to bid very high (up to the price cap - VoLL) in an attempt to avoid being dispatched.

The case study presented in Box 1 demonstrates the affect of a significant intra-regional congestion event on market participants and their behaviour.

¹⁰ NEMMCO, *Management of network limitations within the Snowy region and constraint formulation in the NEM – interim actions*, 3 March 2003.

¹¹ The code defines constrained on as “in respect of a *generating unit*, the state where due to a *constraint* on a *network*, the output of that *generating unit* is limited above the level to which it would otherwise have been *dispatched* by NEMMCO on the basis of its *dispatch offer*.” Constrained off generation is defined as “in respect of a *generating unit*, the state where, due to a *constraint* on a *network* the output of that *generating unit* is limited below the level to which it would otherwise have been *dispatched* by NEMMCO on the basis of its *dispatch offer*.”

Box 1: Victorian Case Study - The Effect of Intra-Regional Constraints

During 2004 a significant intra-regional constraint has arisen in Victoria. This constraint is a result of transformer limits of 1500 MW at the Hazelwood terminal station. Under certain conditions generation from Hazelwood, Jeeralang, Morwell, Bairnsdale and Yallourn (a total of 2600 MW capacity) must be constrained off to avoid a transformer overloading for the contingent loss of any one of the existing four transformers. This constraint has now bound for 140 hours since April 2004, predominantly over the evening peaks.

Generators affected by these constraints have used a number of strategies to avoid being constrained off. Hazelwood has made significant use of “fixed load” bids. Jeeralang and Morwell have offered zero ramp rates. Yallourn Energy has used ancillary service offers to limit the impact of the constraint. These strategies have an impact on the ability of NEMMCO to manage the security of the network.

In its weekly report for 11-17 July 2004, NECA made the following comments:

“Network limitations in the Latrobe Valley, which began to impact in April, have now bitten for a total of some 140 hours, predominantly over the evening peaks. ... The offer structure of generators behind these constraints has included use of despatch inflexibilities and zero ramp rates of change. Those constraints may also have affected the structure of some bids in the ancillary services markets. We have been concerned in the past in particular about the need to ensure that the despatch inflexibility provisions should be used only in response to abnormal plant conditions or other abnormal operating requirements. We have written to those generators making extensive use of inflexibility reminding them of those provisions and the need to demonstrate evidence of a genuine technical operating requirement. We will continue to closely monitor the use of these provisions to satisfy ourselves that the intent of the market rules is being delivered.”

In its weekly report for the following week (18-24 July 2004) NECA reports the following behaviour on the 19th of July:

“Network limitations in the Latrobe Valley constrained generation for nearly three hours over the evening peak. Hazelwood Power presented, for a short period, some 925MW of its capacity as inflexible. Rebid reasons included “Fuel limitation”, “Minimum stable level of generation” and “Boiler stability due to boiler auto control”. Rebids by Ecogen at 2.45pm, reduced the rate of change down on all Jeeralang units to zero for the evening peak. The rebid reason given was “ROC alt – ensuring tech min not breached by constraint @ 1440”. Yallourn Energy unit 1 was impacted by less than 10MW as a result of its ancillary services offer profiles. Morwell power station continues to have zero ramp rates on all units. All of these strategies reduce the amount of generation available to manage the security of the network. There was no other significant rebidding.”

How significant is the intra-regional congestion issue?

Currently the NEM power system contains constraints that do not align with the existing regional boundaries and the alignment is generally deteriorating as the system evolves. This could result in generators being dispatched out of merit order, negative residues, and transmission lines being utilised less than their potential capacity.¹²

Hours of constraints data provides some insight into how many hours parts of the network are operating at their limit. However, the frequency and persistence of constraints is a better reflection of the significance of congestion and its affect on the market. The ACCC is currently assembling this information to better understand the affect of transmission congestion on transmission businesses' service standards.

Since the development of the NEM, the number and frequency of intra-regional constraints has increased. Table 1 presents the hours of binding intra-regional congestion in the NEM since 1999. This shows that in most regions, intra-regional congestion has decreased from levels in 2001.

Table 1: Hours of binding Intra-regional congestion

HOURS	1999	2000	2001	2002	2003
Queensland ¹	69	402	1649	675	164
NSW	96	-	140	89	33
Snowy	-	-	266	120	143
Victoria ²	-	-	94	254	55
SA ³	-	-	-	100	111

SOURCE: 2004 Statement of Opportunities (SOO).

List of Regional Boundaries and Marginal Loss Factors 2003/04, 2004/05

1. Since January 2002 the Central-North limit has predominantly been managed via a grid support contract between Powerlink and generators in northern Queensland. In the 2003 figure the grid support contract operation is reported as a constraint.
2. Constraints associated with the 500/330 kV transformer at South Marong in Melbourne have been reported in 1999 and 2000 under inter-regional congestion, and under intra-regional constraints from 2001.
3. In 2003, data operation of a grid support agreement involving generation at Snuggery is included as a constraint.

In contrast to intra-regional congestion, inter-regional constraints occurring in the NEM have varied. Table 2 presents the hours of inter-regional congestion and interconnector settlement residues. This shows general fluctuation in the level of inter-regional congestion in the NEM. However, inter-regional congestion has been managed in part through settlement residue auctions, although the magnitude of the settlement residues has not necessary fallen.

¹² NEMMCO, *Presentation at the Regional Boundaries Forum*, 31 March 2004

Table 2: Hours of binding inter-regional congestion

Inter-regional	Constraint (hours)					IRSR (\$,000)				
	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
NSW to Queensland	-	-	1,286	0	60	0	1	5,128	17,251	355
Queensland to NSW	-	-	1,085	253	404	0	0	4,059	7,598	16,053
Snowy to NSW	6	-	-	3	7	4707	5,857	15,514	85,085	56,669
NSW to Snowy	1	7	3	0	3	5	190	84	15	63
Victoria to Snowy	505	441	579	468	556	3,961	3,482	6,881	16,422	14,064
Snowy to Victoria	9	121	73	27	291	7,967	40,314	46,659	1,761	10,588
Victoria to SA	5,053	2,226	799	638	1,964	108,595	51,482	19,407	7,251	12,662
SA to Victoria	-	7	70	490	87	0	1,261	1,425	1,231	2,387

SOURCE: 2003 and 2004 Statement of Opportunities

List of Regional Boundaries and Marginal Loss Factors 2003/04, 2004/05.

Settlement residues allow market participants to hedge their risks. It also provides some insight into the value of inter-regional congestion. As shown in table 2, the hours of inter-regional congestion and the value attributable to these constraints through settlement proceeds do not exhibit a proportionate relationship. For example, the link between Snowy to NSW bound approximately 3 and 7 hours in 2002 and 2003, however the settlement auction proceeds were \$85 million (62 percent of all settlement proceeds) and \$56 million (50 percent of all settlement proceeds) in each of those respective years.

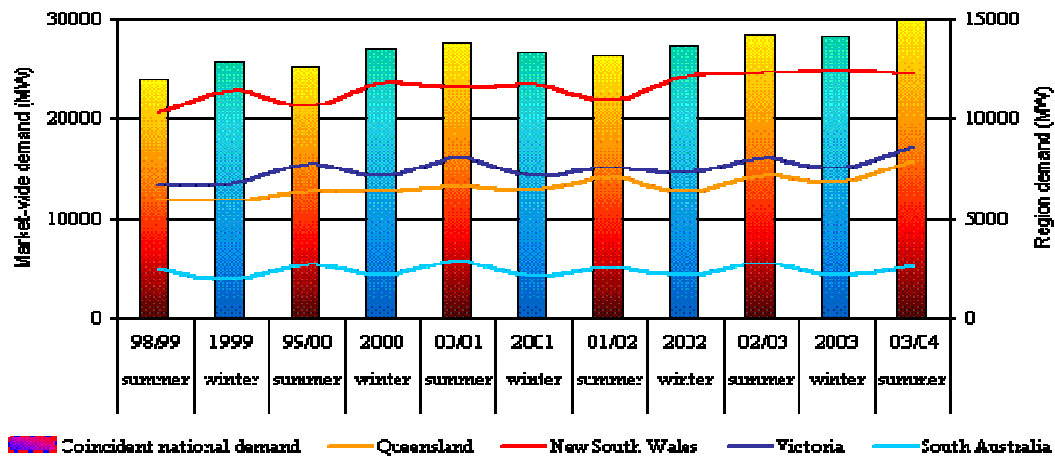
Demand side signalling

One of the primary reasons for the persistence of congestion is from the increased demand for electricity. Demand levels continue to increase NEM wide.

Figure 2 presents peak winter and summer demand for electricity since the NEM's inception. During 2003 and 2004, both summer and winter national peak demand reached almost 30,000MW (winter - 29,242 MW, summer – 29,791MW), with record demand in two regions.¹³

¹³ Increasing demand levels have resulted in the need for increased national energy levels. Annual energy levels from 1999/00 to 2003/04 were 167.1TWh, 172.5TWh, 175TWh, 179.3TWh and 185.3TWh in each of the financial years respectively. The 2003 SOO noted the decline in NEM reserve levels due to strong demand growth in the NEM.

Figure 2 Regional summer and winter peak demand (MW)



SOURCE: NECA market snapshot.

The ACCC considers that there are a number of ways to deal with growing demand for electricity, including demand side management initiatives negotiated between distribution businesses and end users. However, a change in the regional structure of the NEM would enable some degree of price signalling to load through price variations, and may also curb demand.

2.2.3 Locational investment signals

An issue which often arise in the consideration of a nodal versus zonal regime is whether such structure provides the appropriate location decisions for participants in the market. There is uncertainty surrounding whether the regional structure of the NEM has affected investment location decisions. Some have argued that there are existing market mechanisms that operate within the NEM which provide locational signalling to NEM participants. These include:

- differences in regional pool prices
- marginal static and dynamic loss factors
- transmission pricing arrangements including cost reflective network pricing for transmission services
- costs related to connection charges for generators.¹⁴

Generation and transmission investment in the NEM

Since market start, over 4,500MW of new market scheduled capacity has been commissioned. This includes:

¹⁴ Joint review by Firecone Ventures and Frontier Economics, *Undertaking a review of the regional structure of the NEM*, May 2004.

- 150MW of coal-fired generation in NSW which operates as baseload
- 552MW of gas-fired generation in Victoria which operates as peaking plant
- 3,090MW of new generation capacity in Queensland. Of this 1,722MW is operated as baseload and 1,369MW as peaking plant
- 925MW of new generation capacity in South Australia. Of this 80MW is operated as baseload, 500MW as intermediate plant and 345MW as peaking plant.

Generation development since market start is summarised in figure 3.

Figure 3: Scheduled generation in the NEM, 1997-2008

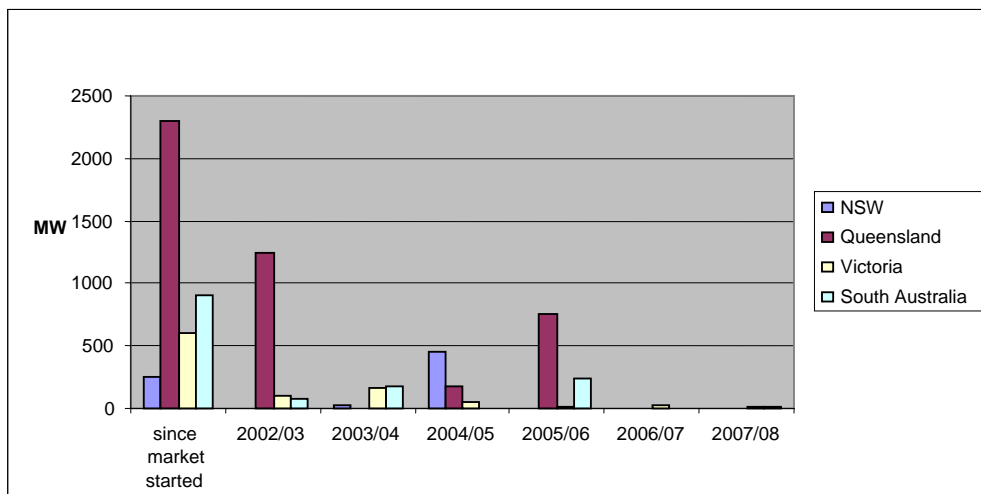


Figure 3 also shows the information from the 2004 SOO on committed generation developments in the NEM. There are a number of developments in most regions with the exception of South Australia, Snowy and Tasmania.

Generation investment decisions are largely driven by pricing signals provided within regions. Other factors include proximity to fuel sources, distribution network costs, and transmission considerations. Fuel costs account for between 15 percent and 25 percent of a generator's total costs, depending on the fuel type and running pattern of the power station.

To some degree, historical trends show that prices were high where new capacity was needed (i.e. South Australia and Queensland), and new capacity came on line, prices fell. Similarly, where there was an abundance of capacity, prices were relatively low and little new capacity has been built (i.e. NSW and Victoria).¹⁵ Therefore, while a number of factors affect the location decisions of generation, pricing signals clearly influence a generator's decision to invest.

¹⁵ Joint review by Firecone Ventures and Frontier Economics, *Undertaking a review of the regional structure of the NEM*, May 2004.

Transmission investment has also been significant in most regions of the NEM. Table 3 shows the capital expenditure (capex) allowances and likely capex spend for the respective transmission businesses. These figures represent capex over a five year period. The capex figures for ElectraNet, SPI PowerNet and Transend represent the trend of actual capex. Capex figures for Powerlink and TransGrid have been adjusted to reflect actual expenditure.

Table 3 TNSP’s capital expenditure

	Capital expenditure allowance	Expected or actual capital expenditure over 5 years	Asset base DORC (ORC)	Expected or actual capital expenditure as a proportion of the asset base
Transgrid	\$ 881 m	\$ 1,195 m*	\$ 1,935 m (\$ 3,726 m)	62% (32%)
Powerlink	\$ 1,040 m	\$ 1,280 m	\$ 2,276 m (\$ 3,300 m)	56% (39%)
SPI PowerNet	\$ 700 m	> \$ 700 m	\$ 1,835 m (\$ 3,356 m)	38% (21%)
ElectraNet	\$ 358 m	> \$ 358 m	\$ 824 m (\$ 1,585 m)	43% (23%)
Transend	\$ 307 m	≈ \$ 307 m	\$604 m (\$ 1,000 m)	51% (31%)
Total	\$ 3,286 m	≈ \$ 3,840 m	\$ 7,474 m (\$ 12,976 m)	44% (30%)

* denotes actual expenditure

2.2.4 The current regional boundaries review process

At the time the NEM was established, it was recognised that as the system evolved and the transmission network become more extensive and integrated, it might become desirable to modify the regional boundaries in the NEM. Provisions were therefore incorporated into the code that could trigger a review and where necessary, a redetermination of region boundaries.

Clause 3.5 of the code sets out the process for the consideration and refinement of the regional structure of the NEM. This currently requires that NEMMCO review and recommend to the National Electricity Code Administrator (NECA) the number of regions that operate in the NEM. Clause 3.5.1(b)(2) of the code outlines the region boundary criteria in the form of seven principles to be applied in order of priority by NEMMCO. The code includes criteria for setting regional boundaries, a process for NECA to review the criteria, and for NEMMCO to apply them.

Concerns have been raised that the current code criteria has a limited focus on the economic implications of regional boundaries change, and frequent reviews, potentially every year under the existing regime, affect the commercial and economic operation of the NEM and create risk and uncertainty for investors and market participants. As

noted by CRA, if the current regional boundaries criteria was implemented in 2003, there would have been four regional boundary changes implemented.¹⁶

As a result of the MCE moratorium since 2002 and code derogations,¹⁷ the current code regional boundaries criteria has been limited in its application. Therefore it is difficult to form a judgement on the effectiveness of the framework given that it has not been tested.

On the one occasion that the code criterion was applied, concerns were raised with respect to the interpretation and application of the criteria. In particular issues were raised with NEMMCO's proposed approach to apply arbitrary descending linear weights to the criteria. Interested parties argued that there was no basis for linear weights.

In refining the regional boundaries criteria and process, it is important to ensure that it strikes a balance between simplicity, transparency and consistency. The ACCC considers that it is important that once these provisions are incorporated into the code or 'rules' they are then applied. Developing arrangements that are not put into practice can only heighten uncertainty and confusion for the market and represents a significant waste of resources.

2.3 Summary

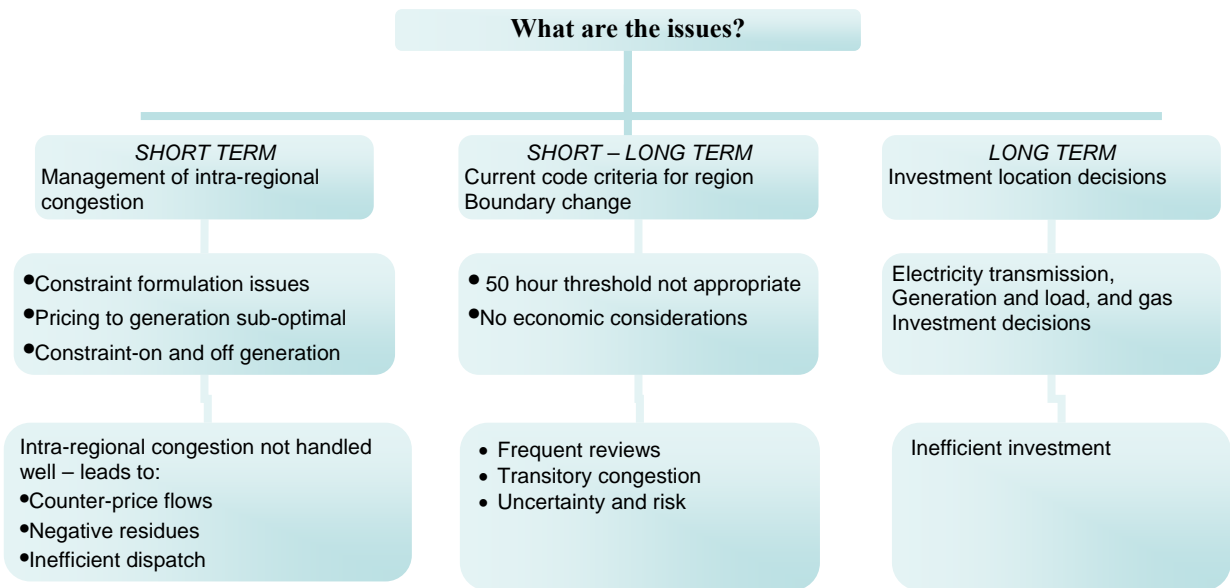
It is important to consider, within the context to the review, the issues with the current arrangements, and the material affect they have on the operation of the market.

The figure below broadly summarises some of the perceived issues with the current arrangements and the affect they have on market operation.

¹⁶ CRA, September 2004, p 26

¹⁷ Prior to 2002, there existed a number of derogations against clause 3.5 of the code, including: Queensland derogation (derogation 9.35.4(a)), Victorian derogation (derogation 9.5.3), and South Australian derogation (derogation 9.27.4).

Figure 4 Issues with the current arrangements



Based on the issues outlined above, the ACCC considers that there are two aspects to resolving these issues. These are:

- Refining and amending the regional boundaries change process and criteria to reflect economic and commercial considerations.
- Resolving the handling of intra-regional congestion. The ACCC notes that there are a number of mechanisms and proposals to deal with this issue, including eliminating intra-regional congestion through investment or properly handling intra-regional congestion through market design.

In light of some of the issues outlined in this chapter, the following sections consider the CRA recommendations.

3 Congestion management and pricing

CRA recommendations

4. **Within the regulatory framework for transmission established for the NEM, on balance, an evolutionary region structure, reviewed at relatively lengthy intervals in parallel with a flexible congestion contracting/pricing regime is recommended.**
9. **Subject to a development of details for implementation within the market, inter-regional pricing/contracting should be adopted as part of the package for a stable boundary approach**
10. **The MCE should request market authorities to develop proposals for implementation of intra-regional contracting/pricing mechanisms. The broad design of Constraint Support Pricing (CSP)/Constraint Support Contracts (CSC) regime presented should be used as the basis for this development.**

3.1 Introduction

Congestion can be managed through either locational pricing or non-locational pricing. Locational pricing can be subdivided into approaches defined by the level of aggregation used to calculate the price. For the NEM, the debate has centered on whether or not a nodal or zonal regime would best provide the appropriate pricing signals to market participants.

The ACCC notes that the different solutions to the intra-regional congestion management problem, whether constraint support prices or locational marginal prices, involve some form of nodal pricing for generation. These solutions however differ in the nature of the grandfathering entitlements they grant to existing generators, how the residues resulting from the constraint are to be allocated, and the degree to which nodal pricing is introduced into the market.

In addressing the issue of congestion, CRA considers the “granularity” of locational energy prices in the wholesale market, and examines three models for pricing:

- a nodal pricing regime with financial transmission rights (FTRs)
- a “dynamic” region structure with inter-regional hedging (status quo)
- an evolutionary region structure with intra-regional contracting and pricing.

CRA concludes that the economic benefits likely to accrue from implementing a more nodal pricing regime does not warrant its adoption until policy issues surrounding the implementation of such a regime are resolved.

The following sections consider the CRA recommendations on congestion management, in particular its recommendations regarding the pricing of intra-regional congestion.

3.2 Dynamic regional structure – status quo

The ACCC understands that the NEM was originally designed with the aim that the market would move to more pricing points, and then eventually full nodal pricing. Provisions were therefore inserted into the code for region boundary change and an amendment when intra-regional network constraints were in the order of 50 hours or more in the year. The current arrangements simultaneously set the frequency of changes, potentially every 12 months, and the advanced notice to participants - 12 months.

Under a dynamic regional approach, regular changes in the location of the boundary would in effect follow the changing conditions. At the same time, the dynamic regional approach does not include any explicit mechanism to create incentives for participant performance to enhance effective network capability over and above the regional price. Furthermore, such a regime could see a number of boundary changes within a year which affects end-user prices and may see greater price variability, changes to the allocation of rights, and uncertainty regarding the value and wealth of generation.

The ACCC considers that a dynamic regional structure would optimally work where congestion within a region is limited in frequency and hours. However, this does not appear to be the case in the NEM.¹⁸ That said, the ACCC notes that if such arrangements were implemented for congestion that appeared in the NEM, it would have provided accurate pricing signals to generation and load. However, the accuracy of the pricing signals would largely depend on the number of reviews and changes to the boundaries undertaken, and on the persistent nature of the constraint. This is because the optimal number and location of boundaries may move depending on market conditions.

Congestion within a region is to be expected, and will occur under outage conditions and as the system grows. The current dynamic regime does not factor the cases where congestion in a network is transitory. There may be circumstance where a constraint exists in a network, binding for the required 50 hours in a financial year and thus a boundary change is made. In the following year, it may be revealed that the constraint was transitory in nature.

Frequent boundary changes will have financial implications for participants' commercial position and the commercial and economic operation of the NEM. It would incur substantial transaction costs, including costs associated with the need for market participants to renegotiate their hedging arrangements.

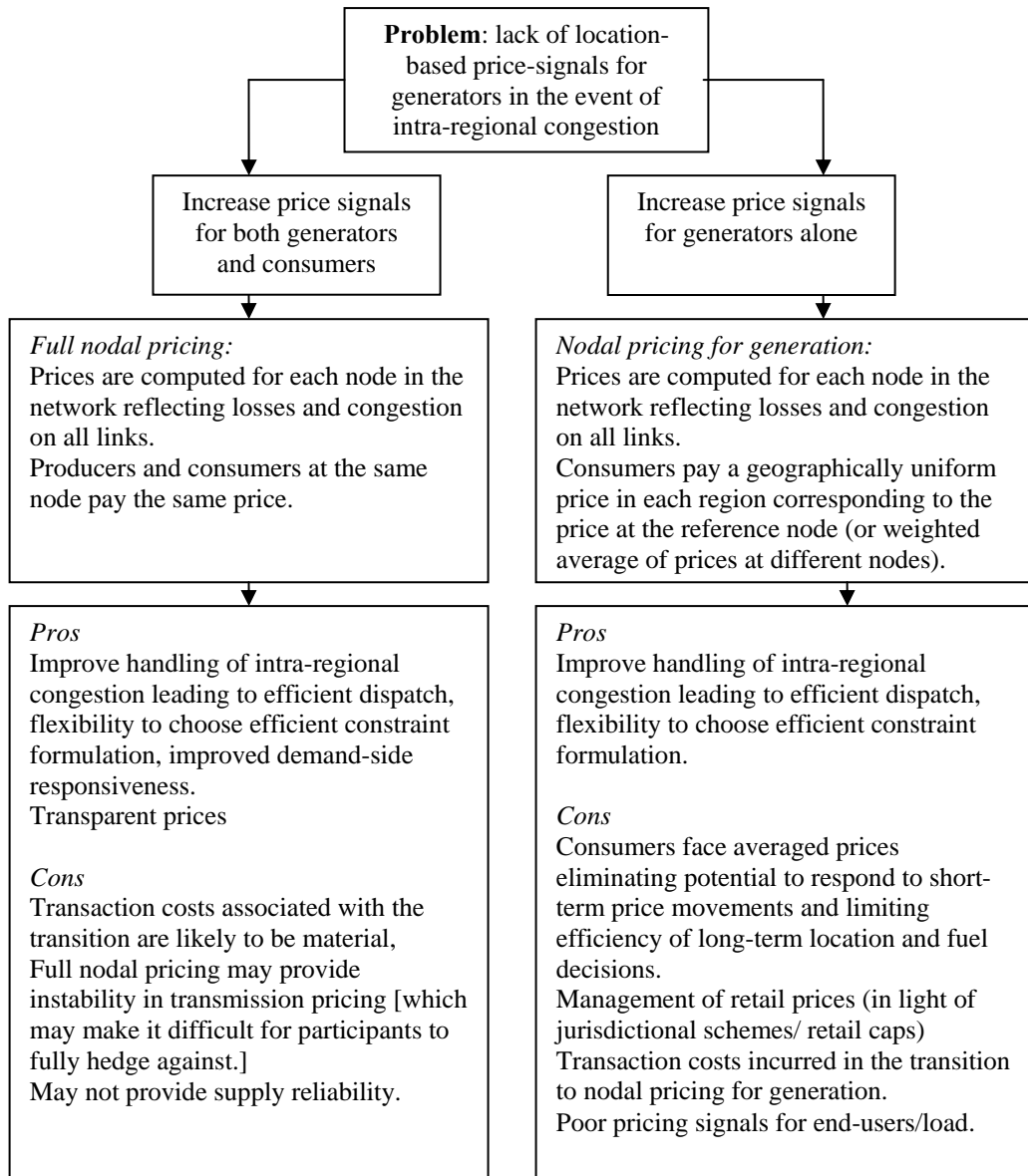
The ACCC considers that such an arrangement is not appropriate given the uncertainty created by frequent boundary changes. Given these issues, the current regional boundaries framework needs review.

¹⁸ As noted by CRA, if the current process was applied to the NEMMCO 2003 data on the frequency of binding intra-regional constraints, four boundary changes would have been necessary.

3.3 Nodal pricing regime

There has been ongoing debate about whether or not a full nodal pricing regime should apply in the NEM. The ACCC considers that there are two forms of nodal pricing which could apply in the NEM depending on the form of pricing signals to be achieved: full nodal pricing for generation and load or full nodal pricing for generation. Figure 5 provides a comparison of both nodal pricing models.

Figure 5 Comparison – Nodal Pricing and nodal pricing for generation



The ACCC agrees with CRA that “...[full nodal pricing is] *designed primarily for the purpose of signalling efficient pricing/participant hedging, and [is] clearly superior in*

*that role*¹⁹. The ACCC considers that from an economic perspective, a system which forces the prices paid by consumers to be the same at all locations within a predefined region will always yield outcomes which are less efficient than full nodal pricing.

The ACCC considers that there may be benefits in moving to a nodal pricing regime, or through the introduction of more regions, given that this introduces more pricing points in the market providing better signals to NEM participants. That said, the ACCC is of the view that a move to a nodal pricing regime will not address transmission investment issues and mean that there be only a limited role for regulation of these businesses. The ACCC still considers that under a nodal pricing regime, there would still be a need for networks to be regulated and a role for the regulatory test in ensuring options are considered in a competitively neutral and transparent manner.

The ACCC notes that in considering the applicability of full nodal pricing within the context of the Australian market, a balance needs to be struck between the benefits and costs to the NEM in moving to such a regime.

One argument that has been used in the past is that a move to full nodal pricing raises significant implementation issues. While recognising this, the ACCC considers that the potential benefits likely to result from full nodal pricing certainly warrant a detailed examination of the implementation issues necessary for this regime to apply in the NEM.

The ACCC considers that while the benefits and costs associated with the implementation of a nodal pricing regime in the NEM have been discussed at some length, there has been limited attempts to quantify the costs associated with the implementation of a full nodal pricing regime (whether for generation alone or for both generation and load) in Australia. Therefore, the ACCC engaged International Energy Solutions (IES) to consider likely magnitude and materiality of the costs and benefits of implementing either a full nodal pricing regime for generators and customers or just a full nodal pricing for generators alone. The IES report is contained in Appendix A to this submission.

IES has considered the applicability of full nodal pricing and full nodal pricing for generation within the context of the Queensland region, i.e. comparing 1 region to 10 regions for both full nodal pricing, and nodal pricing for generation. Based on its modelling, the IES report comes to the following conclusions:

- There is likely to be significant price differences between various nodes and the RRN.
- Given that there are materially different nodal prices within Queensland, a nodal pricing regime is likely to induce different generator behaviour and this may have material benefits in terms of the NEM's dispatch costs – mainly fuel costs. Based on IES modelling, the average dispatch cost benefit of \$2.9 million from pursuing a nodal pricing regime appear quite large when compared to the total constraint costs in Queensland – these appear to be half the constraint costs.

¹⁹ CRA, September 2004, p 31

- A nodal pricing regime is likely to provide different investment signals to that of a regional pricing regime and this is likely to lead to different locations, timing and types of generation investment.

On the issue of costs, IES assessed the likely costs from the implementation a nodal pricing regime in Australia. This is summarised in the table below.

Table 4: IES estimate of Capital and operational IT costs

	Full Nodal pricing – generation and load (\$m)	Full Nodal pricing – generation (\$m)
Capital IT cost	\$13.7 – \$27.4	\$7.2 - \$14.9
Operational IT costs	\$0.5 - \$6.1	\$0.35 - \$2.4
TOTAL	\$14.2 – \$33.5	\$7.55 - \$17.5

The ACCC notes that given the difficulty of estimating such costs, IES has presented ranges for both the operational and capital IT costs. The issue however is how material these costs are in comparison to other regimes considered by CRA. The ACCC notes that the IES estimates of the costs of moving to nodal pricing shows that these costs are likely to be much lower than the costs of major transmission upgrades aimed at resolving network congestion.

The ACCC considers that the IES report illustrates that further consideration and investigation of the likely benefits and costs from implementing a nodal pricing regime is warranted before it is disregarded as an option. Such an assessment should also consider the affect that nodal pricing will have on the contract position of market participants in the NEM. The ACCC notes that in considering the implementation of a nodal pricing regime, a balance needs to be struck between the benefits and costs of moving to such a regime. However, as noted above, the introduction of a nodal pricing regime does not mean that there be only a limited role for transmission regulation.

3.4 Evolutionary boundaries with congestion management – CSP/CSC

CRA recommends an interim process for managing congestion which it refers to as Constraint Support Pricing/Constraint Support Constraints (CSP/CSC).

In considering the CSP/CSC proposal, the ACCC is of the view that there are two distinct issues – the need for improved price signals to generation, which the CSP aspect of this regime does address, and the possible role for grandfathered rights, i.e. why grandfathered rights are important or necessary to their proposal – the CSC aspect of the proposal.

The ACCC considers that the detail concerning the applicability of such a regime, how it fits in with the long term objective of market development and how it is to operate

within the NEM requires further development. The ACCC notes that the CSP/CSC proposal is not well established and does not operate in other international markets. Therefore, the ACCC is of the view that further consideration is required on the needs for and the likely benefits in implementing this regime before it is incorporated into the market arrangements.

The ACCC considered that the proposed CSP/CSC arrangement raises a number of issues which need to be addressed before it is implemented in the NEM. These include, among other:

- how will transmission rights be allocated?
- who would identify the need for CSP/CSC and what criteria or threshold would apply in implementing this regime?
- how will NEMMCO use the surplus revenues from this regime – will it be auctioned, allocated, and who will they go to and on what basis will this be determined?
- who would be the winners and losers out of this process?

Appendix B to this submission presents a paper prepared by Dr Darryl Biggar titled “*Understanding Constraint Support Pricing/Constraint Support Contracts*”. Dr Biggar comments on two aspects of the CRA proposal:

- whether CSP provide the correct pricing signals to generators in the event of intra-regional congestion and
- the distribution of rights brought about by the CSC aspect of this regime.

Dr Biggar notes that the CSP part of the CRA proposal provides the correct pricing signals to generators in the event of an intra-regional constraint. However, Dr Biggar raises a number of concerns with respect to the second aspect of CRA’s proposal – CSC. In particular, Dr Biggar notes that it is not clear how these grandfathered rights would be determined. He demonstrates that if the grandfathered rights are set in a particular way – specifically equal to the dispatch of the generator under the existing arrangements, the resulting outcome ensures that neither any generator nor the system operator is left worse off as a result. However, he notes and the ACCC agrees that any attempt to define a set of grandfathered rights will be difficult and contentious.

The following section considers the two aspects of the CRA proposal – CSPs and CSCs.

3.4.1 Price signalling to generation – constraint support pricing

The pricing element of the CRA proposal has a similar but localised effect to nodal pricing in the spot market. The CSP proposal is a mechanism for setting locational prices within a region by reference to the RRP and the “cost” or “marginal value” of any binding constraint. CRA claims this is a generalisation of nodal pricing in that it allows for pricing not just of energy at each location but non-energy services, such as reactive support.

One of the advantages of this proposal is that it allows the system operator to decide which binding constraints will be handled by this mechanism and which will be ignored. Furthermore, the ACCC notes that if the system operator chooses to reflect all material binding constraints in this mechanism, this would provide the correct pricing signals to generators, but not to load.

That is, this proposal ensures that generators face correct prices at the margin, and therefore, in principle, eliminates the current incentive that exists for constrained generators and thereby enhances the efficiency of dispatch.

The ACCC considers the critical aspect for this proposal to work is its correct implementation and its appropriate application to intra-regional constraints in the network. Otherwise, it leads to inefficient outcomes for the effective operation of the NEM.

CRA anticipates that the mechanism it proposes will not be permanently applied but, rather will only apply for intra-regional constraints which are “significant but not persistent”. The first issue that arises from such a proposal is what is the threshold test to be applied in determining whether the intra-regional constraint is “significant but not persistent”? Secondly, how long would the arrangement apply to the constraint: is this to be left flexible or will a set period be specified for the application of the CSP/CSC?

The ACCC considers that if such issues are not clearly determined, the effective operation of this proposal will be undermined. Without an appropriate threshold, there may be circumstances that arise where the intra-regional constraint is not appropriately handled leading to inefficient outcomes for the market.

The ACCC notes that while the pricing accuracy of the CSP/CSC regime is similar to that provided by a full nodal regime, the ACCC considers that the accuracy of the pricing signals will critically depend on the allocation of the transmission rights and the treatment of the residues that eventuate from this regime. This aspect of the proposal needs further work.

3.4.2 Grandfathering of rights – constraint support contracts

The second aspect of the CRA proposal relates to the allocation of the transmission rights. The ACCC notes that one of CRA’s criticisms of the nodal pricing/FTR regime relates to the difficulty and controversy associated with the allocation of rights. CRA states:

“Allocation, rather than sale, of FTRs to protect the financial position of (existing) participants following the introduction of nodal pricing would theoretically be possible, but difficult to implement. We are aware that this is of vital concern to incumbent generators in particular and is seen as a matter of significant regulatory risk.

...

The methodology for initial allocation of FTRs would thus be contentious, as would any subsequent transition following major changes in the network configuration. We have concluded that, even had there been a case on economic grounds for nodal, or other highly

granular market design, it would have been unsafe to recommend such a change until the matter of policy raised here had been resolved²⁰.

The ACCC notes that the same issues arise with the CSP/CSC proposal – i.e. how and on what basis will the transmission rights be distributed to the market? That is, since CSC defines property rights in a similar way to FTRs, the same issues arise with respect to the need for a process to allocate the CSC rights, the ability of network rent to sustain CSC allocation, and the potential for conflict over allocation that would exist under such a regime. The ACCC agree with CRA that “*Assignment of contracts and thus level of participation in the regime will be a key matter to be established and highlights the similarity between CSP/CSC and FTR regimes discussed in this report*”²¹.

The ACCC notes that the report does not make clear precisely what rights should be grandfathered or the reasoning behind why such rights would need to be grandfathered. The ACCC considers that grandfathering of rights is not necessary to achieve the efficiency benefits of the proposal. The decision about whether or not to grandfather existing rights is purely a distribution question, affecting the extent to which individual market participants will be made better off or worse off from a change to the regime.

In his paper, Dr Biggar notes that one of the strongest arguments for grandfathering certain rights would be to obtain the consensus needed for a move to a system of enhanced nodal pricing.

Dr Biggar demonstrates that assuming existing rights are grandfathered, under the CSP/CSC approach each generator is no worse off under the CSP/CSC approach than it would be under the existing arrangements. However, Dr Biggar explains that this method of grandfathering transmission rights would be particularly challenging, given that generator dispatch depends on a number of factors including the level of demand, generator outages, transmission outages, network configuration, cost of input fuels, and the level of market power. Therefore, it is difficult to construct an entitlement that accurately predicts the dispatch of a particular generator under each of these factors, as the entitlements are likely to be an approximation and could lead to sub-optimal outcome.

The grandfathering of provisions is a difficult and often controversial task. The success of the CSP/CSC proposal critically depends on being able to correctly set the entitlements. One issue that needs to be addressed is how and on what basis would the entitlements be defined under the CSP/CSC regime - will it be based on historic information or forecast information?

In addition to the issue of how to allocate these rights, it is also not clear for what period of time these rights would be set and how rights would be reallocated in the event that new generation comes on line in an area where an intra-regional constraint occurs. Further, the party responsible for the determination and allocation of these rights must be established.

²⁰ CRA, September 2004, p 25

²¹ CRA, September 2004, p 55

The ACCC is of the view that such issues need to be fully addressed before changes are made to the pricing arrangements in the NEM. This would not only allow adequate consideration of the applicability of the CSP/CSC regime.

Going forward, if it is decided that the intra-regional settlements residues will be grandfathered, the ACCC suggests transitional provisions be established for the grandfathering and allocation of transmission rights. For example, rights could be allocated for a specified/ transitional period, i.e. 5 years, where the allocation of rights decreases proportionately over that period. For example, if the transition period is 5 years, the allocation of rights decreases in the following manner – 100% are allocated in the first year, 80% are allocated in the second year, 60% are allocated in the third year, 40% are allocated in the fourth year, and 20% allocated in the final year. This would assist in the transition to such arrangements.

3.5 Alternative arrangements

The options discussed above address possible regimes for the proper management and pricing of intra-regional congestion within a network. An alternative method raised previously, involves eliminating intra-regional congestion through network augmentation. Some markets, including Alberta in Canada, have an explicit policy of building the transmission link to the point where intra-regional congestion is minimal.

3.5.1 Alberta's transmission policy

The ACCC notes that Alberta's electricity generating capacity increased 23 percent during the period 1999-2001, whilst the length of transmission lines remained reasonably static, with just over 20,300 kilometres of transmission lines in 2001. Because of the growth in generation, by 2002 management of congestion on Alberta's electricity transmission system became a critical issue for the Alberta Energy and Utilities board.

To deal with congestion through the transmission system, a Policy Paper was released in November 2003, which stated:

"The open access transmission structure in Alberta consists of an implicit system of injection and withdrawal rights for generators and loads. There are no explicit transmission rights. Given this structure, the transmission system must be relatively congestion free or the underlying market model will not function effectively.

The ISO [*Independent System Operator*] must therefore proactively plan transmission development to achieve this result of "congestion free" transmission. The ISO will be required to ensure that the transmission system internal to Alberta is appropriately reinforced so that under normal operating conditions (i.e. all transmission facilities in service) all in-merit generation can be dispatched and virtually all economic wholesale transactions may be realized without congestion."²²

Congestion management generally means dispatching around constraints when congestion is present. Efficient congestion management minimises the cost of the

²² Alberta Energy - *Electricity Business Unit, Transmission Development: the right path for Alberta – A Policy Paper*, November 2003, p 8

dispatch.²³ In Alberta, congestion is managed through prevention via transmission development. An issue with such a policy is that it could lead to inefficient overbuilding of the system and limited incentives for generation investment.

Is such a policy appropriate in Australia?

The Alberta market's current policy for transmission development seeks to quantify the level of bottleneck facilities it requires on the major electricity transmission link, thereby building out persistent transmission congestion. However, such an approach may not be feasible within the Australian electricity market. The ACCC notes that unlike the situation in Alberta, transmission development has been significant in the NEM. This was shown in section 2.2.3.

The ACCC considers that the existence of a persistent constraint may not necessarily cause a reliability problem in contravention of planning standards given there is no direct link between the planning standards and the issues of congestion.

A policy of building out congestion, i.e. a "congestion free" policy, distorts the incentives on generation investment decisions and load. Eliminating all congestion from the market limits the degree to which prices can signal to market participants. Furthermore, there may be instances where building out the constraint through transmission investment is not optimal to the market, leading to customers paying for inefficient investment.

The ACCC considers that the Alberta option would not be economically efficient in the context of the NEM. Properly managing congestion rather than eliminating it would fit within the NEM framework. The ACCC is of the view that intra-regional congestion could be reduced through incentives on transmission businesses to improve service quality and improve utilisation of existing networks. The ACCC is currently reviewing possible transparency measures as part of its service standards work. The purpose of this work is to provide transmission businesses with the incentive to fully utilise their networks at the margin. The ACCC considers that the affect of such regulatory arrangements should be considered in terms of whether it would provide the incentive to deal with intra-regional congestion issues.

The role of the regulatory test and the investment framework within the regional boundaries process is considered in section 5.1.

3.6 Conclusion

From an economic perspective, when it comes to the management of congestion on a transmission network, a system which forces the prices paid by consumers to be the same at all locations within a predefined region will always yield outcomes which are less efficient than full nodal pricing. That said, the ACCC notes that in considering the

²³ S. Stoft Ph.D on behalf of ATCO Power and Calpine Canada, *A proposal for long term and short-term congestion management in Alberta*, March 4 2002.

implementation of a nodal pricing regime, a balance needs to be struck between the benefits and costs of moving to such a regime.²⁴

One argument that has been used in the past is that a move to full nodal pricing raises significant implementation issues. While recognising this, the ACCC considers that based on the work of IES the potential benefits likely to result from full nodal pricing certainly warrant a detailed examination of the implementation issues necessary for this regime to apply in the NEM before it is completely dismissed from considerations.

The ACCC considers that the CSP/CSC proposal is a form of pricing to generation in the event of congestion in the network coupled with a system for transmission rights. While the pricing aspect of this regime is similar to that provided by a full nodal system, its accuracy will critically depend on the allocation or distribution of the transmission rights. There remain a number of unanswered questions regarding how, for how long, and who will determine the allocation of the transmission rights. These issues need to be resolved for such a mechanism to operate effectively in the market.

The ACCC considers that further investigation is required on the need for and benefits from implementing a congestion pricing mechanism such as that proposed by CRA. Such consideration needs to be done in close consultation with industry, given they will largely be affected by the regime that is to be implemented, before it is introduced into the NEM. The ACCC is of the view that this is a pragmatic approach in taking some of these issues forward.

²⁴ The ACCC notes that the introduction of a nodal pricing regime in the NEM does not mean that there be only a limited role for the regulation of network businesses.

4 Constraint formulation and system security

CRA's recommendations

For the management of network congestion and dispatch, CRA recommend:

- 1. On the basis of no change to the current economic objective of the five-minute spot market dispatch process is made, NEMMCO should allow the Direct Physical Representation (DRP or “fully optimised”) form of constraint (Option 4/5) to all network constraints. The code should be amended to confirm this.**
- 2. Following resolution of the form of constraint equation NEMMCO should review if it believes a full nodal network model is necessary in order to meet its obligations for system security.**
- 3. Concerns about inappropriate bidding behaviour should be referred to the relevant authorities. If it is deemed necessary:**
 - 3.1 NEMMCO should, after due account is taken of the impact on efficiency in the short and long term, when the existing derogation in the Code expires in December 2004, be instructed to continue to impose a simple constraint on network transfers as a function of settlement residues in the short term in preference to altering the form of network constraint; and**
 - 3.2 If and when new network elements that will create major network loops emerge are planned a mechanism external to the operation of the dispatch process should be investigated – intra-regional pricing and contacting mechanisms provide a ready mechanism for this.**

4.1 Introduction

In the previous section, the ACCC commented on aspects relating to the pricing of intra-regional congestion. This section of the submission discusses the formulation of constraint equations.

A pre-condition for the establishment of the market was the development of a policy to deal with intra-regional constraints.²⁵ NEMMCO published a paper outlining how it would handle intra-regional constraints. Prior to the establishment of the NEM, NEMMCO proposed the use of constraint equations from the state based transmission operators, even though this would introduce inconsistencies in the way that the constraints were formulated. However, it was intended following the commencement of the NEM that NEMMCO would review the constraint equations with the aim of adopting a consistent approach to formulating these equations.

²⁵ Market start pre-condition 9.5.

In early 2001, with the convening of the Network Constraint References Group, nine options for the formulation of network constraints were identified.²⁶ Following this, NEMMCO commissioned CRA to advise on the economic issues surrounding the formulation of constraints. In doing so, CRA acknowledged the problems with the option 4 constraint formulation, and identified a need to develop policies to overcome the incentive for generator to game the market in the existence of congestion.

In early 2003, NEMMCO determined that immediate action needed to be taken with respect to the representation of network constraints. Therefore NEMMCO proposed a derogation intended to give effect to the proposals for the management of network limitations within the Snowy region and constraint formulation in the NEM. NEMMCO proposed an option 4 constraint formulation²⁷ approach, which also gave NEMMCO express powers to manage counter-price flows and therefore negative settlement residues.

Responses to NECA's consultation on the proposed amendments were polarised between those who supported NEMMCO's proposal, and those who favoured an alternative approach Option 1 formulation.²⁸ This option places all interconnector terms on the right hand side of the constraint equation (non-optimised), thereby constraining generation to manage flow on critical network elements. Therefore, NECA proposed an alternative approach intended to address the inadequacies in the short term, by providing express powers for NEMMCO to manage negative settlement residues and to combine inter- and intra-regional limits in the same constraint equation. In April 2004, the ACCC authorised these interim arrangements for the formulation of congestion equations. These interim arrangements expire on 31 December 2004.

4.2 Market dispatch and congestion management

Under clause 3.8.1 of the code, NEMMCO is required to operate a central dispatch process to dispatch scheduled generating units, scheduled load, scheduled network services and market ancillary services to balance supply and demand power system security. In doing so, NEMMCO must use reasonable endeavours to maintain power system security in accordance with Chapter 4 of the code and maximise the value of spot market trading on the basis of dispatch offers and dispatch bids.

In order to maximise the value of spot market trading, NEMMCO must maximise the value of dispatched load, which means maximising the value of the difference between dispatched bids and the combined cost of dispatched generation. This is based on generation dispatch offers, dispatched network services based on network dispatch

²⁶ NEMMCO, *Formulation of intra-regional constraints*, January 2002

²⁷ Under the option 4 approach, the constraint equation relates the injections on the network to the flows over the constrained line. This tries to ensure that maximum use is made of the constrained line and that the security limits on the constrained line are not violated.

²⁸ An option 1 formulation sets a priority between generators and interconnector flow. This option is used because it allows control of network flows while simultaneously removing the incentive for inappropriate bidding behaviour by participants who, as a result of their location in the network and the regional structure, are able to bid in a way that creates commercial disadvantage, at the expense of negative settlement residues in the market.

offers, and dispatched market ancillary services based on market ancillary service offers. Amongst other things, this objective is met subject to:

- dispatch offers, dispatch bids and market ancillary service offers
- constraints due to availability and commitment
- power system security requirements and reliability standards determined as described in Chapter 4 of the code
- intra-regional network constraints and intra-regional losses
- inter-regional network constraints and inter-regional losses
- constraints imposed by ancillary service requirements.

The dispatch engine co-optimises the energy market and frequency control ancillary services through the use of a linear programming model. The model minimises an objective function of the cost of dispatched energy, frequency control ancillary services and reserve, subject to the set of constraints that represent participant bid information, network constraints, regional demand and reserve requirement.²⁹

The existing derogation allows NEMMCO to use the option 4 approach to constraint formulation if a constraint has bound for more than 10 hours over the past year, or if trends indicate that the constraint will bind for more than 10 hours over a year. NEMMCO will seek to change the constraint formulation if it is found to be ineffective in maintaining power system flows within the required limits, or ineffective in utilising the available transmission capacity. Furthermore, the derogation also allows NEMMCO to use the option 4 approach if the pre-NEM constraint formulation is significantly out of alignment with the current NEM practice.

In instances where NEMMCO considers that counter-price flows will lead to the accumulation of negative settlement residues, the ACCC understands that NEMMCO will use an option 1 approach to stop this accumulation. This implies that any interconnectors associated within a constraint formulation will be dispatched first, as opposed to generation and interconnectors. Application of option 1 will minimise the effect of counter-price flows and the accumulation of negative settlement residues.

That said, seeking to fix the incentives on constrained generation primarily through the dispatch process is a sub-optimal process. The optimal and efficient solution to resolving this problem would provide the appropriate locational price signals to generation to ensure that productive and dynamic efficiencies are met, generators are dispatched according to bids, and efficient outcomes are achieved.

²⁹ Document Number SO_OP3705, *NEMMCO Operating Procedure*, 25 February 2004, p 7

4.3 Role of constraint formulation and dispatch

Currently, certain constraint equations in the NEM do not accurately reflect how the physical flows over the network are determined by the injections to the network. Consequently power flows over certain links may threaten to exceed secure operating limits and/or the capacity of certain links may be under-utilised. As noted previously, the current approach to resolving intra-regional constraints in the NEM results in incentives for constrained generators to submit bids which do not reflect their true costs.

The ACCC notes comments by CRA that disagreement about the form of constraint formulation focuses on the purpose of dispatch representation and whether it should:

- lead to disincentives for certain types of bidding behaviour deemed to be detrimental to the longer term efficiency of the NEM. (as per the current provisions) or
- ensure consistency with the economic (least cost) objective for dispatch in the short term, and rely on other processes to manage any adverse effects of bidding behaviour that might impact longer-term efficiency.

Because of the lack of price signals for intra-regional congestion, the NEM is currently forced to deal with this issue through dispatch representation. The ACCC considers that it would be inappropriate to address this inefficiency through changes to the constraint equation primarily because it reduces the transparency of the dispatch process, and adds a further dimension to the role of NEMMCO as the system operator.

The ACCC considers that the best way to deal with this problem is to provide generation with appropriate price signals rather than quantity control through the current process of constraining generation. Price signals restore the link between the marginal price paid to the generators, which affect the bidding behaviour of the constrained generator, and the quantity for which they are dispatched.

The ACCC considers that there should be consistency between pricing and dispatch. This means that if a generator faces a given price, it should be dispatched for the corresponding quantity on its offer curve. Conversely, if a generator is dispatched for a given quantity, it should be compensated at a rate given by the corresponding price on its offer curve. Under the present arrangements this “consistency” between pricing and dispatch is broken for intra-regional constraints.

The ACCC concurs with CRA that one of the important principles in constraint formulation is to ensure consistent treatment and to ensure no counter price flows, which lead to a breakdown in dispatch, pricing and settlement. The ACCC is also of the view that any solution to constraint formulation options should improve transparency in the constraint formulation process.

The ACCC considers that once a system for managing intra-regional congestion is established, the problems arising from inefficient dispatch and negative residues will be eliminated. Therefore, constraint equations can be formulated in the most sensible and economically efficient manner reflecting the pricing arrangements. The ACCC notes

that CRA acknowledge this, and therefore recommends the implementation of the “Direct Physical Representation” formulation of constraint equations.

The ACCC considers that the approach to be adopted for the purposes of constraint formulation critically depends on the locational pricing approach adopted i.e. full nodal pricing or some form of nodal pricing for generators. If a policy decision is made to adopt a CSP/CSC regime to provide the appropriate signalling to constrained generation, the ACCC considers that an option 4/5 approach to constraint formulation would fit in with the objectives of such an arrangement.

4.4 Conclusion

One of the important principles in constraint formulation is to ensure a consistent treatment across the NEM, limited occurrences of counter price flows, and transparency in the constraint formulation process and therefore the dispatch process.

To deal with the issue of intra-regional congestion, the ACCC considers that there needs to be consistency between pricing and dispatch. This means that if a generator faces a given price, it should be dispatched for the corresponding quantity on its offer curve. Under the present arrangement there is no consistency between pricing and dispatch for intra-regional constraints.

The best way to deal with the issue of lack of pricing signal for intra-regional congestion is not through constraint formulation but to ensure that the NEM provides the appropriate price signals to generators – that is pricing intra-regional congestion.

The ACCC considers that once a system for managing intra-regional congestion is established, the problems arising from inefficient dispatch and negative residues could be dealt with. Therefore, constraint equations can be formulated in the most sensible and economically efficient manner reflecting the pricing arrangements.

5 Boundary change criteria and process

5.1 Boundary change process – process for managing life-cycle of network

CRA recommendations

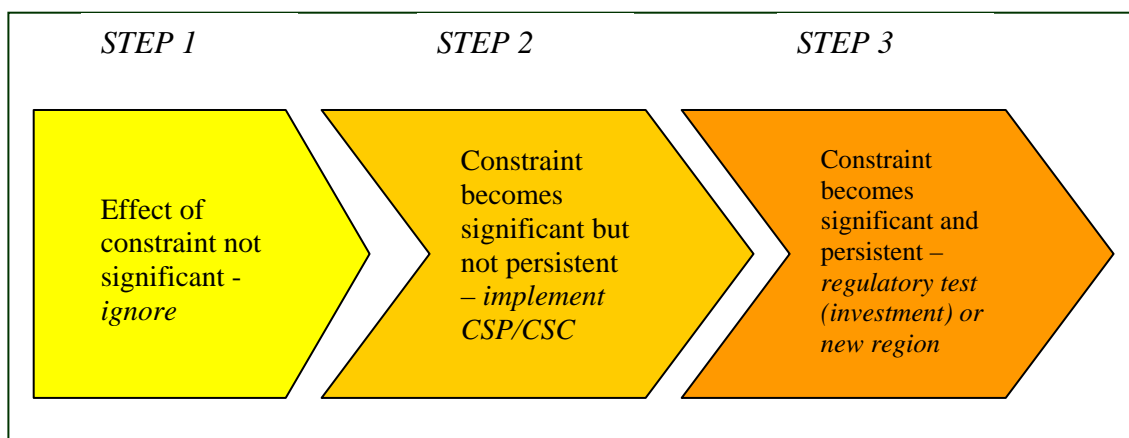
CRA recommend and consider closer integration is required between the regulatory test and Code provisions for regional boundaries and intra-regional pricing, and that the existence of each should be recognised in the provisions of the other.

8. To ensure consistency between the application of the regulatory test and NEM boundary reviews, these processes should be augmented as follows:
 - 8.1 in assessing the benefits of network investment, the regulatory test should consider whether boundary change or specific contracting/pricing of congestion would bring benefits either to dispatch or to alleviation of congestion; and similarly
 - 8.2 at each review of region boundaries the potential for net network not already declared as part of the planning process should be explored as part of consultation on a proposed boundary change.
6. NEM boundaries should be established for a 5 year period commencing no earlier than 3 years after the date of the final determination.

5.1.1 The process proposed by CRA

In managing intra-regional congestion, CRA’s proposal can be summarised into three steps. This is outlined in figure 6.

Figure 6: CRA proposed process for managing congestion



Within each step, there are a number of threshold questions:

- Step 1 – what is the threshold to determine whether the constraint which appears in the network is significant or not? Who will determine whether the constraint is significant or not – the system operator, transmission business, or generation businesses?
- Step 2 – what is the threshold for determining that the constraint is significant but not persistent and therefore requires the implementation of a CSP/CSC regime?
- Step 3 – will a trigger for a review of regional boundaries be put in place? While CRA presents a threshold for the consideration of boundary change, it is not clear whether there is to be a threshold to be applied in determining whether a review of the regional boundaries should be undertaken.

The ACCC considers that the critical question in all of these steps is at what point does a constraint become significant, and how to determine whether it is unlikely to be persistent. The ACCC notes that certain intra-regional congestion that appears in a network can be transitory in nature. However, the period over which they do exist and their impact will vary from case to case. Therefore, the exercise of determining whether or not a constraint in the network is transitory in nature is not a simple task.

To determine the transitory nature of congestion, two considerations, among others, are important:

- the time period over which the constraint exists and
- whether it has a material effect on the efficient operation of the market – i.e. the efficiency of dispatch.

The process proposed by CRA to manage intra-regional congestion raises a number of functionality issues. These issues are discussed further below, in particular the ability of the transmission regulatory framework to deal with persistent and significant congestion.

5.1.2 The role of regional boundaries change

The ACCC envisages two roles for the change of regional boundaries within the CRA proposal. This includes:

- a mechanism to deal with persistent and material constraints and
- a mechanism to provide appropriate signalling to load, given that in the ACCC's opinion, the CSP/CSC proposal is a form of nodal pricing for generation.

The ACCC is of the view that there are a number of benefits from changing the regional structure of the NEM. Some of the benefits from boundary change include, providing a more efficient dispatch process, providing price signals that encourage generation and load to produce or consume more/less electricity, and providing the appropriate incentives and signals for efficient investment.

The ACCC also notes that changing regional boundaries creates cost to the market including transaction cost such as redesigning the IT system to accommodate the new structure of the NEM, and costs of participants reworking their contract positions.

The ACCC considers that further consideration needs to be given to the practical workability of the investment framework within the regional boundaries review. This is discussed further below.

5.1.3 What is the role of the regulatory test in this framework?

The ACCC is currently responsible for the promulgation of the regulatory test. The ACCC recently released a revised regulatory test³⁰ making a number of amendments to the original regulatory test³¹ including outlining a methodology for the determination of “competition” benefits.

Given its role as transmission regulator and the body currently responsible for the promulgation of the regulatory test, the ACCC sees CRA’s proposal to align the process and assessment criteria for regional boundaries change with that for transmission investment development to be important to the regulatory transmission investment framework.

The ACCC notes in particular CRA recommendation number 8, which states:

To ensure consistency between the application of the regulatory test and NEM boundary reviews, these processes should be augmented as follows:

- In assessing the benefits of network investment, **the regulatory test should consider whether boundary change or intra-regional contracting/pricing would bring benefits either to dispatch or to alleviation of congestion;** and similarly
- At each review of region boundaries the potential for new network not already declared as part of the planning process should be explored as part of consultation on a proposed boundary change.

The ACCC is of the view that in considering the practical workability in aligning the regulatory test process with the review of region boundaries process, consideration needs to be given to the purpose of both elements within the NEM operation.

The ACCC considers that the regulatory test is a regulatory tool used and applied by network service providers in assessing and ranking of options to deal with either reliability issues that arise in the network and/or the optimal option from an economic efficiency point of view to implement. The ACCC considers that the role and purpose of region boundaries change, among others, is primarily to align region boundaries with network congestion.

Therefore, given that both these purposes align to some degree, the ACCC supports the notion of ensuring consistency between the regulatory test and the NEM regional boundaries review, given that there may be circumstances where network investment or

³⁰ ACCC, *Decision – Review of the Regulatory Test for Network Augmentations*, 11 August 2004.

³¹ Regulatory test version 1 is the version promulgated by the ACCC in 1999.

enhancements could possibly deal with transmission congestion. Furthermore, there may also be circumstances where incentives on transmission businesses via service standards may be able to relieve network congestion. However, the ACCC consider that the practical integration of these processes needs to be further considered.

An issue that stems from this proposal is that currently transmission businesses are responsible for applying and consulting on augmentation developments. If a regional boundary change is to be assessed as part of a regulatory test assessment, this would effectively mean that network owners/operators would be assessing boundary changes. The ACCC does not consider that this is an appropriate responsibility for transmission businesses'. Further, if this was to be the case, it is likely that transmission businesses will deal with these issues from a state perspective, rather than considering the efficient outcome from a national perspective.

Furthermore, the ACCC considers that it is not clear how region boundaries review would be conducted within the regulatory test framework. If the regulatory test is to be used to consider change in regional boundaries as an alternative to network and market developments, consideration needs to be given as to how an assessment of the regional boundaries change would be conducted within the regulatory test framework.

For example, the regulatory test currently contains two limbs. The first limb relates to reliability augmentation, on which network service providers are to perform a "minimisation of cost test". The second limb of the regulatory test is for investment that is non-reliability related. In such circumstances, network service providers are to perform a "net benefits test".

Currently, the majority of augmentations undertaken by transmission businesses are conducted in accordance with the reliability limb of the test - a minimisation of cost test. But, the regional boundaries criterion is an economic test. Therefore, consideration needs to be given to how region boundaries reviews would be conducted where the reliability limb of the regulatory test is used.

Furthermore, the criteria for regulatory test assessments and that proposed for region boundaries are inconsistent. That is, unlike the proposed region boundaries criteria, benefits considered in a regulatory test assessment are not limited to benefits from dispatch efficiency and losses, other benefits such as deferral benefits, reliability benefits etc can be incorporated into a regulatory test assessment.

The ACCC considers that while interaction and a consistent approach is important between the regulatory regime and the basis upon which regions are determined, further consideration from a practical sense, needs to be given as to how the assessment of regional boundaries fits within the regulatory test assessment.

5.1.4 The investment framework – planning and reliability standards

In planning and developing transmission networks, TNSPs must comply with a number of statutory requirements, which vary between jurisdictions. These obligations include technical performance requirements on the networks in terms of supply reliability and quality of supply. The obligations are imposed through a range of statutory instruments including the code, state legislation, licence requirements, jurisdictional regulations, and state codes.

The ACCC notes that there may be circumstances where a persistent and significant constraint appears but may not contravene a reliability obligation or a transmission businesses' planning standard. This is because it is not clear whether there is a link between the planning standards and management of network congestion.

In addition, the reliability requirements imposed on transmission business vary between jurisdictions. For example, the South Australian Transmission Code³² places explicit and detailed locational design requirements on ElectraNet SA and Electricity Supply Industry Planning Council (ESIPC) in relation to network redundancy (network redundancy planning criteria of “N-1”, “N-2”, etc.). The Queensland Electricity Regulation 1994 and Victorian Electricity System Code³³ require the maintenance of voltage levels which differ from those specified in the code.

Furthermore, in some cases, the obligations placed on TNSPs are not specific, but placed in qualitative terms in the legislation or licence. For example, the Queensland legislation requires “... *that the transmission entity must provide, as far as technically and economically practicable for the transmission entity, network services on fair and reasonable terms ...*”. Similarly, the Victorian Electricity System Code requires the TNSPs to “*develop and implement plans for the acquisition, creation, [etc.] ... of transmission network assets to, economically ... meet reasonable customer expectations of transmission services*”. This requirement to meet customer expectation may result in different design practices depending on the customer.

The different reliability standards and their interpretation by transmission businesses will lead to different outcomes in the NEM. In addition, there is no explicit link between planning standards and dealing with intra-regional congestion.

5.1.5 Should there be a threshold for regional boundaries review?

The ACCC understands that CRA is proposing 5 year periodic reviews of regional boundaries, with a 3 year notice period if a change is to be implemented. This means that it is possible that regional boundaries may not be amended for 8 years or longer from the time constraints become significant.

The question that arises is whether the process proposed by CRA requires a threshold test which would trigger a region boundaries review. The ACCC notes that if a trigger is not put in place for reviews, this could potentially lead to costly and unnecessary processes. The issue is what the threshold should be based upon. One suggestion is that it could be based on hours of binding constraints i.e. the current 50 hour threshold in the code.

³² “Transmission Code”, 1 July 2001, Essential Services Commission of South Australia (previously SAIIR).

³³ Essential Services Commission, *Electricity System Code*, October 2000.

5.2 Regional boundaries change criteria

CRA recommendations

- 5. At each review a transmission connection point should become part of region where it can be demonstrated that compared to the next best alternative there is expected to be:**
- **an increase in economic efficiency of dispatch (including as a result of the treatment of inter-regional loss factors) within the NEM determined in accordance with an endorsed methodology, less demonstrable costs, exceeding \$1Mp.a; or**
 - **a change in locational price indicators sustained over the review cycle in excess of levels to be published annually that would provide indicative investments in generation plant an increase in annual revenue of 25% of reasonable new entrant cost for each**

Provided that:

- **no region shall have a maximum demand of less than 200MW; and**
- **a separate region shall not be created where in the reasonable opinion of the relevant authority there is little prospect of market based investment within the review period.**

5.2.1 The code's regional boundaries criteria

In the investigation and development of an improved system to handle intra-regional constraints, weaknesses in the current regional boundaries process and criteria should be reviewed. To the ACCC's knowledge, the criteria has been applied once by NEMMCO in early 2002.

Current regional boundary criteria focus on the number of hours for which a constraint is binding, but not the severity of the constraint when it does bind, and technical matters relating to the ability to define loss factors within and between the new regions. The code acknowledges that the definition of a region's boundary may not be able to satisfy all criteria. It specifically states, however, that they are set out in order of priority.

The code's lack of an economic focus on the determination of the regional structure of the NEM has been raised as an issue. Further concerns have been raised that the current criteria provides no measure of size or scale of the constraint, how long the constraint is likely to remain, or measurement of the value of the constraint to the operation of the NEM. Firecone³⁴, in a report to the NEM Ministers, recommended that instead of the technical 'rule of thumb' currently used in the code, the application of an economics test would be consistent with the overall aim of the code.

³⁴ Firecone, *Regulatory and Institutional Framework for Transmission – Final Report*, November 2003.

A shortcoming associated with the current criteria is the reliance on historical information for losses and constraints, not factoring in committed transmission or generation investment which critically affects losses and constraints.

The current criteria in the code is not based on market impact or economic considerations, or the market's ability to manage additional regions. Currently one of the criteria in the code requires that there be the existence of a binding constraint in the order of '50 hours or more in the financial year'. However the issue arises as to whether 50 hours is a material binding constraint, its materiality will depend on, among other factors, the location and duration of the constraint.

Concerns have also been raised with respect to the interpretation and application of the code criteria. In particular issues were raised with NEMMCO's proposed approach to apply arbitrary descending linear weights to the criteria. Furthermore, due to the multiple criteria addressing loss factors (3 out of the 7 criteria) the use of linear weights substantially outweighs consideration of loss factors, which could result in new regions even when there are no binding constraints.

The ACCC considers that while the criteria in the code has been limited in its application, it does not take into account such matters as the economic implication of amending regions.

5.2.2 CRA's proposed regional boundary criteria

One proposal outlined by CRA is that regional boundary change should be determined on a case-by-case. The ACCC considers that such a proposal would provide unlimited discretion and limited guidance. This could potentially create confusion in the market and controversy on the threshold to be applied in amending the regional structure.

The important consideration in outlining a criteria is that it should be general enough to ensure the economic value across a wide range of circumstances are encompassed, while striking a balance between simplicity, transparency, and consistency.

The ACCC generally supports the economic focus of the regional boundaries criteria, subject to the comments provided below.

CRA proposes that a dispatch efficiency criterion should be employed, stating:

"We have noted also that there may be improvements in the efficiency of dispatch due to a regional boundary change where the change alters the incentives on market participants bidding. This is the same benefit that the ACCC is seeking to use as a measure of benefits of a network investment under the "competition test" and is just as relevant in considering a new region or an intra-regional contracting option. It would be counterproductive to develop a different approach to test for the same basic benefit. We therefore recommend that benefit to dispatch efficiency due to a possible region boundary change be incorporated in the criteria where a clear value in excess of demonstratable costs can be shown."³⁵

The ACCC notes that the competition test referred to in CRA's report is an 'add-on' within the regulatory test assessment. That is, the network service providers have some

³⁵ CRA, September 2004, p 48

discretion as to whether competition benefits should be included in a regulatory test assessment. Furthermore, other benefits apart from dispatch efficiency are considered within a regulatory test assessment. It appears from the criteria presented, that benefits other than dispatch efficiency cannot be considered in considering a change to the regional boundaries.

CRA also propose that “*no region shall have a maximum demand of less than 200MW*”. The ACCC questions whether currently the Snowy region has a maximum demand of 200W. Furthermore, the ACCC considers that the current code criteria states that a region must enclose load and generation as well. The ACCC considers that the revised criteria must also make reference to maximum generation in a region, given that the creation of a regional will not only influence load but generation as well.

Should the regional boundaries assessment be forward looking?

The current regional boundaries change process is based on the need to assess historic information. The ACCC notes that by adopting such an approach, one is making decisions based on information which may not be applicable to today’s environment.

A forward looking approach to the assessment of regional boundaries effectively means making decisions today based on predictions of what the market will look like in the future, including making forecasts about possible generation and transmission development in the NEM.

The ACCC considers that a balance needs to be struck between the use historic and forecast information. The ACCC notes that the regulatory test requires a forward looking assessment. The ACCC considers that if the assessment is to be forward looking, an issue arises about the length of the assessment period. CRA recommends that the efficiency of dispatch (including the treatment of losses) less demonstrable costs must exceed \$1 million per annum. The CRA report, however, is silent on the period over which needs to be demonstrated.

The ACCC notes that under a regulatory test assessment, a transmission business assesses the benefits and costs of augmentation development over the life of that investment. That is, it considers the benefits and cost up to about 12 years, after which residual values are determined for subsequent years. The ACCC does not consider that this approach is appropriate given it would be difficult to predict the life of any region. Therefore, the ACCC considers that an assessment period of 5 years would appear appropriate and consistent with the 5 yearly intervals for reviews proposed by CRA.

5 year reviews and regional boundaries criteria

The ACCC notes that under a regulatory test assessment, in particular under a market benefits assessment (expected present value of benefits less cost), transmission businesses are to assess the optimal timing for the implementation of the option that maximises the expected net benefits compared to other alternative options.

It is not clear whether the same principle is to be applied. The issue is whether the implementation of a regional boundaries change should occur at such a time when it is, from an economic perspective, most optimal to do so. The ACCC does notes that in

doing so, this may not align with the 3 year notice period and 5 yearly review period specified by CRA.

Furthermore, the ACCC notes that a regulatory test assessment is conducted by network service providers on a needs basis, rather than conducted every year or every 5 years. However, it is proposed that a review of region boundaries be conducted every 5 year. The ACCC considers that further consideration is required on precisely how a review of regional boundaries and investment proposal is to be undertaken, in particular the timing and interaction of such processes.

5.3 Conclusion

The ACCC supports the notion of ensuring consistency between the regulatory test and the NEM regional boundaries review, given that there may be circumstances where network investment or enhancements could possibly deal with transmission congestion. However, practical issues arise in integrating the regulatory test and the region boundaries review processes, which the ACCC considers needs further consideration. Some of the issues that arise include:

- *TNSP to consider region boundary change* - the regulatory test is currently undertaken by transmission businesses. Therefore, the CRA recommendation effectively proposes that a transmission business is to consider region boundaries change. This raises issues as to whether regional structure considerations are the responsibility of transmission businesses.
- *The interaction between the regulatory test and region boundary process* – currently the regulatory test is performed by network service providers on a needs basis (not every 5 years). However, CRA propose a review every 5 years. The ACCC is of the view that consideration therefore needs to be given to how the timing and interaction of these processes are to work in practice.
- *Consistency between the regulatory test and region boundary criteria* – there is inconsistency between the proposed region boundary criteria and that specified by the regulatory test. The benefits considered in a regulatory test assessment are not confined to dispatch benefits and losses. However, the proposed region boundary criteria is limited to the benefits associated with the efficiency of dispatch and losses.

Given these issues, the ACCC suggests that further consideration needs to be given to how the three steps are to work in practice, in particular, how the regulatory test process and the region boundaries review process are to be integrated.

6 Conclusions

The ACCC notes that the regional structure of the market has been one issue yet to be adequately addressed in the NEM. This issue has profound implications on the commercial incentives for generators and load, pricing outcomes and dispatch in the NEM, investment signals, and certainty and risk management for NEM participants.

The ACCC considers that the CRA report and proposals are an important step in the consideration of possible refinements to the region boundaries framework. This has enabled constructive debate with industry about the problems with the current structural arrangements and possible issues that need to be addressed in taking the review forward.

The ACCC considers that while the CRA report is a useful contribution to the region boundary debate, most of the proposals need further development to clearly understand how such arrangements will operate in the market, and whether such solutions best address the problems trying to be resolved.

The focus of this submission has been to outline the areas the ACCC considers need further consideration or refinement, in an aim to constructively add to this review process. The main points made in this submission can be summarised as follows:

- The ACCC believes that further consideration is required in relation to the options for management of congestion within a network, in particular, the nodal pricing option and the CSP/CSC proposal. Issues associated with how such regimes will apply in the NEM and detailed assessments of the benefits and costs of these regimes need to be considered in proceeding further with this review.
- While the ACCC recognises that a nodal pricing regime may raise significant implementation issues, the potential benefits likely to result from its introduction means that a detailed examination of the costs and benefits of nodal pricing in the NEM is warranted before it is disregarded.
- The CSP/CSC proposal requires further development. It is unclear how such a mechanism will be implemented. While the ACCC notes that the pricing aspect of this regime (CSP) may provide accurate signals to generators, its accuracy will critically depend on the allocation or distribution of the transmission rights (CSC). There remain a number of questions, which need to be worked through before such a regime is implemented. These include:
 - how will transmission rights be allocated?
 - who would identify the need for CSP/CSC and what criteria or threshold would apply in implementing this regime?
 - how will NEMMCO use the surplus revenues from this regime – will it be auctioned, allocated, and who will they go to and on what basis will this be determined?
 - who would be the winners and losers out of this process?
 - for how long will the transmission rights be allocated for?

- The ACCC supports the notion of ensuring consistency between the regulatory test and the NEM regional boundaries review, given that there may be circumstances where network investment or enhancements could possibly deal with transmission congestion. However, practical issues arise in integrating the regulatory test and the region boundaries review processes, which the ACCC considers needs further consideration. Some of the issues that arise include:
 - *TNSP to consider region boundary change* - the regulatory test is currently undertaken by transmission businesses. Therefore, the CRA recommendation effectively proposes that a transmission business is to consider region boundaries change. This raises issues as to whether regional structure considerations are the responsibility of transmission businesses.
 - *The interaction between the regulatory test and region boundary process* – currently the regulatory test is performed by network service providers on a needs basis (not every 5 years). However, CRA propose a review every 5 years. The ACCC is of the view that consideration therefore needs to be given to how the timing and interaction of these processes are to work in practice.
 - *Consistency between the regulatory test and region boundary criteria* – there is inconsistency between the proposed region boundary criteria and that specified by the regulatory test. The benefits considered in a regulatory test assessment are not confined to dispatch benefits and losses. However, the proposed region boundary criteria is limited to the benefits associated with the efficiency of dispatch and losses.

The ACCC recommends that the detail relating to the implementation of proposals recommended by CRA require further consideration before they are introduced into the NEM. The ACCC is of the view that this process requires close consultation with industry, given they will largely be affected by the regime that is to be implemented. This appears to be a pragmatic approach in taking some of these critical market issues forward.