Advice on the application of AEMC options for an inter-regional charging mechanism in the NEM

A REPORT PREPARED FOR THE AUSTRALIAN ENERGY MARKET COMMISSION

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1 Introduction

1.1 BACKGROUND

The Australian Energy Market Commission (AEMC or Commission) is presently in the process of developing a detailed implementation plan for a national transmission planning function at the request of the Ministerial Council on Energy (MCE). While this task does not involve reviewing inter-regional transmission charging arrangements, the Commission has indicated that it may choose to make recommendations in this area as part of the Commission's final report to the MCE.

To this end, Frontier Economics (Frontier) was asked by the Commission to undertake the second stage of a two-stage project on inter-regional transmission charging. The first stage was the identification of possible models for inter-regional transmission charging arrangements. Frontier's report forms the second stage of the project, and is intended to discuss the application and implementation of the possible models identified in stage one in the context of the Australian NEM.

Frontier understands that the purpose of this report is twofold:

- To advise the Commission as to appropriate arrangements for inter-regional transmission charging; and
- To inform stakeholders wishing to engage in the consultation process.

1.2 OPTIONS

As noted above, Frontier was asked to consider a range of options for the reform of inter-regional transmission charging arrangements. These options were developed by the AEMC following the completion of stage one of the project (see Attachment 1).

The options can be briefly outlined as follows:

- The costs of new investment in interconnector assets are shared between the relevant adjacent TNSPs (Interconnector cost sharing);
- The costs of new investment in interconnector assets are shared between all TNSPs in the NEM (NEM-wide interconnector cost sharing);
- Each TNSP charges its neighbouring TNSP as if (and to the extent) it is a load (Load export charge); and
- Application of a NEM-wide transmission charging methodology (NEM-wide methodology).

The base case counterfactual to each of these options is to be the status quo arrangements where the costs of assets providing inter-regional transfer capability are recovered from the TNSP who owns and operates those assets. Under this base case, individual jurisdictions may negotiate payments as between themselves, but this does not affect any transmission pricing methodology or the regulated revenues of any TNSP. It is also assumed in the base case that the existing derogation for the Victoria-South Australia payment no longer applies.

2 Framework for the assessment

This section describes the framework Frontier has adopted in preparing this report for the Commission. This framework is comprised of the:

- Context for the report, particularly the Commission's 2006 Rule determination on transmission pricing; and
- Criteria used for the assessment of the various inter-regional transmission charging options.

These matters will be discussed in turn.

2.1 CONTEXT OF THE ASSESSMENT

As noted in section 1, the Commission has sought advice on inter-regional transmission charging arrangements to assist it in determining whether it should make any recommendations on these arrangements as part of its final report to the MCE on the national transmission planning function. While inter-regional transmission charging is not strictly within the scope of the national transmission planner review, inter-regional transmission pricing is an issue that has remained unresolved for many years.

The Commission's November 2005 Issues Paper on transmission pricing explained that the National Electricity Code (Code) originally contained a moratorium on the payment of transmission use of system (TUoS) charges across regions until a national transmission pricing methodology was developed and implemented.[1] Such issues were first considered within the National Electricity Code Administrator's (NECA's) transmission and distribution pricing review.[2]

2.1.1 NECA transmission pricing review

In 1999, NECA proposed a change as part of its transmission pricing review that would have allowed TNSPs to compute TUoS Usage charges[3] in respect of its

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[1] AEMC, *Review of the Electricity Transmission Revenue and Pricing Rules, Consultation Program, Transmission Pricing: Issues Paper*, p.64.

[2] See NECA, Transmission and Distribution Pricing Review, Final Report, Volumes I-III, July 1999. All NECA reports are available at: http://www.neca.com.au/Reviewsdd14.html?CategoryID=51&SubCategoryID=202.

[3] Charges to off-take customers that are based on TUoS prices that vary by location according to a cost reflective network pricing (CRNP) cost allocation methodology.

exports to TNSPs in other regions.[4] Each TNSP would have been allowed to bill its neighbouring TNSP on an annual basis, based on estimated flows between them. The resulting financial transfers would have been taken into account by each TNSP in calculating its TUoS General charges[5], so that the required total allowed revenue was still recovered. These provisions would have ensured that any customers of neighbouring TNSPs who were identified as users of an asset contributed to its revenue requirement, albeit on a postage-stamped basis.

However, in its 2001 final authorisation decision, the ACCC rejected NECA's proposed approach to inter-regional transmission charging.[6] The ACCC considered that the pre-existing arrangements in the Code allowed for (but did not compel) TNSPs to agree to a transmission cost allocation across several regions and for TNSPs to make financial transfers to enable the settlement of the resulting charges. If agreed, this would produce TUoS Usage (ie locational) prices that reflected the costs of transmission assets located in other regions. By contrast, NECA's proposed change would imply that transmission customers in an importing region would only pay a non-locational TUoS General charge in respect of transmission assets located in the exporting region. The ACCC thus considered the proposed changes were inferior to the pre-existing arrangements and imposed an authorisation condition for NECA to consider this issue in the course of a review to be completed by 1 July 2003. This review was never undertaken due to the National Electricity Law (NEL) changes that led to the transfer of NECA's responsibilities to the AEMC and the AER.

2.1.2 AEMC Transmission Pricing Rules

Over 2005-2006, the Commission undertook a review of electricity transmission revenue and pricing, as required under the NEL. The pricing aspect of this review was concerned with the means by which TNSPs could recover the costs of providing prescribed transmission services. In the process of developing its Rule Change Proposal and Draft and Final Rule Determinations, the Commission came to the view that:

- subject to the outcomes of other reviews being undertaken, there was no need for substantive change to the general means by which TNSPs set prices for prescribed transmission services;
- the former pricing Rules specified excessively detailed requirements for the implementation and administration of pricing methodologies; and

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[4] See NECA's proposed changes to chapter 6 of the Code, available at: http://www.neca.com.au/Default87ca.html?CategoryID=34&SubCategoryID=161&ItemID=320.

[5] Charges to off-take customers that are based on postage-stamped TUoS prices. The default position under the Code was for 50% of the regulated revenues allocated to use of system services to be recovered through each of TUoS Usage and General charges.

[6] ACCC, *Amendments to the National Electricity Code, Network pricing and market network service providers*, 21 September 2001, pp.59-60.

- the procedural requirements for developing TNSPs' pricing methodologies should be clarified to reflect the degree of codification in the Rules.

As a consequence, the Commission developed a Final Pricing Rule that largely confirmed the continued operation of the previous pricing methodologies while providing scope for innovation into the future.

This was achieved through a recasted regulatory framework incorporating codification in the Rules of the key design features of the regime including:

- principles for prescribed transmission service pricing methodologies;
- the requirement for the AER to make guidelines in specific areas of pricing implementation and administration with a focus towards consistency across the NEM; and
- clear procedural requirements for the development, implementation and administration of pricing methodologies.

The Commission's review of transmission pricing arrangements specifically considered inter-regional TUoS pricing. In its Rule Proposal Report, the Commission outlined a number of options for change that had been identified in submissions.[7] These options included:

- Implementing inter-regional TUoS pricing arrangements by obliging TNSPs to apply the TUoS Usage charge to interconnectors; and
- Undertaking a full NEM-wide cost allocation exercise for inter-regional TUoS pricing arrangements.

The Commission went on to invite further submissions on this issue and undertook to raise the issue with the MCE.

In its draft Rule determination, the Commission re-emphasised the inadequacies of the current absence of arrangements for inter-regional transmission charging.[8] It noted that customers in an importing region currently do not pay a charge that reflects any of the transmission costs incurred in the relevant exporting region to serve their load. This means that the charges they pay are not likely to properly reflect the true long-run marginal cost of serving load at their location. This problem is exacerbated by the fact that TUoS charges paid by customers in importing regions are currently reduced by settlement residue proceeds from Settlement Residue Auctions (SRAs). The result is lower delivered energy prices

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[7] AEMC, *Transmission Pricing for Prescribed Transmission Services: Rule Proposal Report, Proposed National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, p.90.

[8] AEMC, *Transmission Pricing for Prescribed Transmission Services: Draft Rule Determination, Proposed National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, 19 October 2006, pp.75-76.

(wholesale electricity plus transmission) to consumers in importing regions than would otherwise be the case. Such signals are unlikely to promote efficient locational investment decisions.

In this context, the Commission commented that the full NEM-wide cost allocation approach had the advantage of ensuring that the locational TUoS charge paid by consumers reflected their notional use of all transmission assets in the NEM.[9] However, the Commission considered that this option was unlikely to be practicable in the short term and would require collaboration and consistency amongst all TNSPs. This would negate any benefits of diversity in transmission pricing methodology between regions, which the Commission had been keen to allow. On the other hand, the alternative of applying the TUoS Usage charge to interconnectors would not provide as clear locational and time-of-use signals as a NEM-wide TUoS Usage charge allocation – effectively the same issue as was identified by the ACCC – but it could be implemented fairly quickly.[10]

In its final Rule determination, the Commission refrained from making a Rule on inter-regional transmission charging, given the widely acknowledged need for policy direction from the MCE.[11]

2.2 CRITERIA FOR THE ASSESSMENT

As the Commission is bound under the NEL to have regard to the National Electricity Objective (NEO) in all its activities,[12] Frontier has itself been guided by the NEO in assessing the various inter-regional transmission charging options. The Commission has previously articulated the intent of the former National Electricity Market Objective as requiring a consideration of the following aspects of any change: [13]

- Economic efficiency – referring to the maximisation of economic welfare across productive, allocative and dynamic dimensions. In the context of its transmission pricing Rule determination, the Commission explained that transmission charging should seek to recover sunk costs as well as provide

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[9] AEMC, *Transmission Pricing for Prescribed Transmission Services: Draft Rule Determination, Proposed National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, 19 October 2006, p.76.

[10] AEMC, *Transmission Pricing for Prescribed Transmission Services: Draft Rule Determination, Proposed National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, 19 October 2006, p.77.

[11] AEMC, *Transmission Pricing for Prescribed Transmission Services: Rule Determination, National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, No.22, 21 December 2006, p.58.

[12] *National Electricity (South Australia) (National Electricity Law – Miscellaneous Amendments) Amendment Bill 2007*, section 7.

[13] See, for example, *National Electricity Amendment (Abolition of Snowy Region) Rule 2007*, 30 August 2007, pp.7-8.

efficient locational investment decisions to participants, while taking account of other aspects of the NEM arrangements;[14]

- Good regulatory practice – referring to the transparency and predictability of the means by which regulatory arrangements seek to meet their intended ends; and

- Safety, security and reliability of the power system and electricity supply.

Frontier does not consider that the replacement of the NEM Objective by the NEO materially alters this assessment framework.

In interpreting and applying the NEO to the charging options considered in this report, Frontier has also been guided by the terms of reference provided to it by the Commission. This particularly emphasised issues of practical implementation and the Commission's preference for options involving incremental change rather than fundamental change. The Commission's view of incremental change is change that retains existing charging responsibilities and relationships. Frontier considers that the views expressed by the Commission in the terms of reference help clarify the good regulatory practice aspect of the NEO and Frontier has attempted to apply the NEO to the options accordingly.

[14] AEMC, *Transmission Pricing for Prescribed Transmission Services: Rule Determination, National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, No.22, 21 December 2006, pp.24-25.

3 Assessment of the options

This section provides Frontier's assessment of the options referred to in section 1 (and outlined in Attachment 1) against the framework manner discussed in section 2.

3.1 APPROACH TO THE ASSESSMENT

This section explains the way in which Frontier has evaluated the AEMC's options for inter-regional transmission charging resulting from the first stage of this project.

For each option, we discuss:

- Description – our understanding of the key elements of the option. This would incorporate a:
  - Brief overarching summary of the option;
  - Description of the identities of the party(ies) imposing the charge and the party(ies) paying the charge;
  - Outline of the potential methodology for determining the charge levied by the imposing party on the paying party, including how payments would be settled (the imposition methodology); and
  - Outline of the potential methodology for determining how the charge would be recovered by the paying party from its customers (the recovery methodology).

    It is worth noting that there is a potential overlap between the methodology for allocating costs between TNSPs and the methodology for allocating costs amongst a TNSP's own customers. For example, if a load-flow methodology is used to allocate costs between two TNSPs, it or a more detailed version of that approach could also be used to allocate costs to individual customers at individual connection points within each TNSP's network;
- Application within the NEM design – a discussion of the potential means by which the option could be implemented in the NEM and the compatibility of the option with the other features of the existing NEM design. As most of the options could be implemented in a number of ways, this section effectively involves a more detailed specification of the option and its potential variations; and
- Impact on NEO – the advantages and disadvantages of each option in light of the NEO.

3.2 INTERCONNECTOR COST SHARING

3.2.1 Description

Summary

Under this option, costs associated with ***new*** 'interconnector' assets are identified and shared amongst the relevant pair of TNSPs according to some formula or agreement. The interconnector cost share charge is then recovered by each TNSP from its own customers in some manner. This option is loosely based on the approach that is developing in continental Europe.[15]

Imposed by/Paid by

The imposition of the charge under this methodology depends on the approach used for cost allocation between the relevant TNSPs. If one of the TNSPs incurs new interconnector costs in excess of its agreed share of the total new interconnector costs, it would levy a charge on the other TNSP. The paying TNSP would then need to recover those costs from its own customers, while the imposing TNSP would use payments from the paying TNSP to reduce transmission charges to its own customers.

For example, assume that TNSP A is seeking to develop a new interconnector between its region (region A) and an adjacent region (region B). The costs of this investment (say, $100 million) are to be shared between TNSP A and the TNSP in region B (TNSP B) on a 50/50 basis. If the new interconnector assets were all located in region A, this option would involve TNSP A imposing a $50 million charge on TNSP B.

Imposition methodology

There are two key variables in determining the imposition methodology for this option:

- The first is a clear identification of 'new interconnector assets' whose costs are to be recovered as between the relevant TNSPs; and
- The second is the mechanism for determining or agreeing the allocation of the costs between the TNSPs.

Identification of interconnector assets

As noted in Attachment 1, there are a variety of approaches for identifying those assets that are the subject of the charge:

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[15] See Brattle Group, *Models of Inter-Regional Transmission Charging, A Report for the Australian Energy Market Commission,* March 2008, chapter 4, pp.16-21.

- A simple technical threshold as applied in certain United States markets, such as all transmission assets operating above 330 kV or an alternate voltage level;
- An assessment of cost allocation by a central body according to a set of defined criteria; and
- Case-by-case agreement between the relevant TNSPs.

Mechanism for allocating interconnector costs between TNSPs

The second issue is determining how interconnector costs should be allocated between TNSPs. The three approaches set out in Attachment 1 are:

- Case-by-case negotiation;
- A simple rule such as a 50/50 split of the costs; and
- A detailed modelling exercise, such as using load-flow analysis.

As noted above, if a particular TNSP incurred new interconnector costs in excess of its agreed share of the total interconnector costs, it would levy a charge on the other TNSP.

Recovery methodology

This option does not incorporate a defined means of TNSPs recovering the costs of their payments to other TNSPs from their customers. Two potential alternatives for the importing TNSP to recover the charge are as follows:

- Recover from all of its customers in a 'postage-stamp' manner (same price or rate applicable to all customers); and
- Recover from those customers who are in some way identified as being most responsible for the utilisation of interconnector assets at times of power imports from the exporting region.

These are both discussed below.

3.2.2 Application within the NEM design

Administration

Depending on the precise imposition methodology, this option may require one or more central bodies to manage or facilitate certain administrative responsibilities. First, as noted above, the identification of new interconnector assets could be made the responsibility of a central body.

Additionally, if a detailed modelling approach was used to determine the allocation of new interconnector costs between TNSPs, this could involve several roles for central bodies:

- the formulation of the modelling methodology, subject to principles contained in the Rules (assuming that the methodology was not already prescribed in the Rules); and

- overseeing the modelling (assuming that the modelling itself would be undertaken by one or both TNSPs jointly).

The most appropriate central body to formulate a modelling methodology and to oversee any modelling would appear to be the AER, given that it is the economic regulator responsible for approving transmission pricing methodologies. The AER could also be required to determine which TNSP should be responsible for the modelling if they cannot agree amongst themselves.

Imposition methodology

Identification of interconnector assets

The first approach for identifying new interconnector assets – according to a simple voltage threshold – has a number of drawbacks derived from its arbitrariness.

First, different TNSPs may have networks based around assets operating at different voltages. The consequence of these differences is that any technical threshold is likely to 'rule in' a much larger proportion of one TNSP's assets than the other, resulting in substantial wealth transfers between different TNSPs' customers compared with the base case counterfactual. Moreover, many new higher-voltage assets may be used for functions other than facilitating inter-regional power transfer and many new lower-voltage assets may be used for interconnector support purposes.

Further, even if a consistent voltage threshold could be satisfactorily determined, it is not clear how individual new assets are to be allocated where a TNSP is contiguous to more than one other TNSP. For example, it may be difficult to determine what proportion of TransGrid's new high voltage assets should be deemed to relate to NSW-Victoria transfer capability as compared to NSW-Queensland transfer capability. This issue was not explicitly discussed in the Brattle Group's report for the AEMC in the United States context because it appears that:

- Within an ISO/RTO's 'footprint', the costs of all relevant 'regional' assets (those above the relevant voltage threshold) are shared between all the relevant utilities in the footprint – therefore, there is no need to attribute particular assets to particular inter-utility connections; and

- Between ISO/RTOs, interconnector costs are shared on a case-by-case basis.[16]

This suggests that the voltage threshold approach would not be practicable within the NEM unless it applied in the context of a NEM-wide interconnector cost sharing methodology (see section 3.3 below).

The second approach to identifying new interconnector assets is to give the task to a central body, who is obliged to classify such assets according to a set of defined criteria. The central body could be required to apply criteria such as the IRPC's criteria for assessing material inter-network impacts of transmission augmentations.[17] These criteria state that, *inter alia*:

> A material inter-network impact is inferred if there is an increase in power transfer capability between transmission networks of more than the minimum of 3% of maximum transfer capability and 50 MW, as a result of a transmission augmentation.[18]

We consider that this criterion is likely to provide a more appropriate and objective basis for making particular new transmission asset costs the subject of an inter-TNSP cost allocation than a simple voltage threshold. The IRPC's criteria are well known to TNSPs and clearly specified.

The final approach relies on case-by-case negotiation. We do not believe it is necessary to use this approach given the availability of the IRPC criteria. Case-by-case negotiation is likely to be less consistent and more prone to gaming than reliance on objective criteria.

Mechanism for allocating interconnector costs between TNSPs

The second issue for the imposition methodology is determining how interconnector costs should be allocated between TNSPs. The three approaches set out in Attachment 1 and highlighted above are:

- Case-by-case negotiation;
- A simple rule such as a 50/50 split of the costs; and
- A detailed modelling exercise, such as using load-flow analysis.

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[16] Brattle Group, *Models of Inter-Regional Transmission Charging, A Report for the Australian Energy Market Commission,* March 2008, pp.9-11.

[17] Inter-Regional Planning Committee, *Final Determination: Criteria for Assessing Material Inter-Network Impact of Transmission Augmentations*, Version No. 1.3, 21 October 2004, available at: http://www.nemmco.com.au/transmission_distribution/170-0035.pdf.

[18] See p.8 and p.11.

A case-by-case negotiation may work but could be problematic as it effectively involves TNSPs voluntarily agreeing to contribute to the cost of assets located in other regions and owned by other TNSPs. This could lead to gaming problems such as certain TNSPs 'holding out' from agreeing to contribute towards certain assets unless the other TNSP offers something in exchange that has nothing to do with the new interconnector assets in question.

A simple allocation rule such as equal contributions may be practicable but may be perceived as unfair in certain cases if the inter-network impact of an augmentation is particularly small or large relative to the project's within-region impacts.

A detailed modelling exercise may produce the most accurate allocation of new interconnection costs between regions, at least to the extent that, say, load-flow modelling is perceived to reflect true forward-looking costs. If applied, it could also be used for cost allocation purposes within a region (see below). The key disadvantage with load-flow or similar modelling is the complexity of the analysis for what may be a relatively small project. However, this analysis may need to be undertaken in any case under the Rules where there is a material inter-network impact.

The other issue raised by a modelling approach is that to the extent modelling is undertaken across several regions, it is likely to require co-operation or agreement between TNSPs as to how the modelling is undertaken. This, in turn, may require a degree of prescription of the methodology in the Rules or an obligation on the regulator to resolve the methodology according to principles contained in the Rules. While load-flow modelling may be the most obvious approach, it may also be reasonable to use market dispatch modelling (based on competitive and/or strategic generator bidding assumptions).

Finally, there is an overarching question with such modelling as to whether it should be undertaken on a once-and-for-basis when the interconnector augmentation is commissioned, or whether it ought to be repeated regularly, say, annually or at the start of some longer period such as a regulatory control period. A once-and-for-all modelling exercise would be the simplest approach, but may produce poor locational signals and be perceived as unfair if changes in market conditions lead to changes in the direction of power flows. For example, when QNI was originally planned, many commentators assumed that it would principally facilitate northward flows from NSW to Queensland. However, over time as new generation investment has been commissioned in south-west Queensland, QNI has tended to facilitate considerable southward flows. A once-off assessment that imposed most QNI costs on Queensland load customers would, in hindsight, neither promote efficient locational decisions by prospective loads nor be perceived as fair.

Recovery methodology

As noted above, there are two main ways for importing region TNSPs to recover their interconnector cost sharing charges. These are:

- Recover the charge from all of its customers through a postage-stamped price; or
- Recover the charge from those customers who are in some way identified as being most responsible for the utilisation of interconnector assets at times of power imports.

Under the former approach, the charge could be recovered through the non-locational component of charges for prescribed TUoS services. Under the latter approach, the charge could be recovered from the locational component of charges for prescribed TUoS services

3.2.3 Impact on NEO

The key advantage of this option is that it resolves the allocation of specific new transmission asset costs. In doing so, this option helps to overcome any barriers to investment in assets that enhance inter-regional transfer capability that could arise due to TNSPs' concerns about excessive charges on their own customers. This contrasts with the load export charge option and NEM-wide methodology option (see below), which both lead to the imposition of charges on TNSPs that may bear little relationship with new or recent interconnector augmentation projects. Consequently, to the extent that it is considered TNSPs do not invest in interconnector assets due to concerns about price impacts on their customers, interconnector cost sharing is likely to address these concerns more directly than those other options.

However, an important drawback of the interconnector cost sharing option is that regardless of the recovery methodology, it may not provide accurate forward-looking LRMC-type pricing signals to loads in an importing region that their locational and consumption decisions may increase the future need for upstream investment in the exporting region. This is because the importing TNSP's customers only receive a price signal ***after*** the costs of new interconnector assets are sunk. Yet given the 'lumpiness' of transmission network infrastructure, it is ***unlikely*** that the LRMC of transmission at a particular location will ***increase*** immediately after a new investment to enhance transmission capability to that location. Rather, the opposite is more likely to be the case – a new investment is likely to give rise to spare capacity that reduces the forward-looking costs of locating in an area that utilises that new investment. This is the philosophy behind ESCOSA's 'modified CRNP' approach to setting charges for prescribed TUoS services.[19]

Another potential drawback of this option is the burden it could place on the central body, who is required to determine which assets are 'new interconnector assets', knowing that its decisions could have significant pricing implications for network users.

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[19] ElectraNet, SA, *Transmission Pricing Methodology*, 15 May 2003, p.6.

Finally, this option requires agreement between the relevant TNSPs regarding the modelling methodology. However, this could either be prescribed in the Rules or left to the AER to resolve based on a set of principles in the Rules. Alternatively, to the extent the cost sharing methodology could be manipulated or 'gamed', it would undermine the predictability of the arrangements and hence the NEO.

3.3 NEM-WIDE INTERCONNECTOR COST SHARING

3.3.1 Description

Summary

This option can be regarded as a variation or extension of the interconnector cost sharing option discussed above. Under NEM-wide interconnector cost sharing, the costs of ***all*** new investment in interconnector assets across the NEM are identified and shared amongst ***all*** TNSPs. The charge is then recovered by each TNSP from its own customers. In order to minimise duplication, this section will focus on the differences between NEM-wide interconnector cost sharing option and the (bilateral) interconnector cost sharing option discussed above.

Imposed by/Paid by

Under this option, it is first necessary to identify the costs associated with all new interconnector assets across the NEM in some manner. Then either:

- a central body would impose charges on all TNSPs based on a mechanism for allocating new interconnector asset costs between them; or
- TNSPs could collectively agree as to a mechanism for allocating interconnector costs between them.

Finally, the central body (if there was one) would compare each TNSP's expenditures on new interconnector assets with the share of costs that have been allocated to that TNSP. Those TNSPs that have contributed less than their allocated share would need to make payments to the central body, which would distribute these amounts amongst those TNSPs that have contributed more than their allocated share. This process could also operate under a collective arrangement between TNSPs.

Imposition methodology

Similar to the interconnector cost sharing option, there are two key variables in determining the imposition methodology for this option:

- The identification of 'new interconnector assets' whose costs are to be recovered as between all TNSPs; and

- The mechanism for determining the allocation of the costs between all TNSPs.

Identification of interconnector assets

The same means for identifying those assets that are the subject of the charge are available as for the interconnector sharing option:

- Application of a voltage threshold;
- Determination by the central body; and
- Case-by-case negotiation.

Mechanism for allocating interconnector costs between TNSPs

Again the same means for determining how interconnector costs should be allocated between TNSPs are available as for the interconnector cost sharing option:

- Case-by-case negotiation;
- A simple rule such as a 50/50 split of the costs; and
- A detailed modelling exercise, such as using load-flow analysis.

Recovery methodology

As with the interconnector cost sharing charge option, this option does not incorporate a defined means for TNSPs to recover the costs of their payments to other TNSPs from their customers. Therefore, we have assumed the same alternatives could apply as for those options. These are:

- Recovery of the charge from all of the TNSP's customers through a postage-stamped price; or
- Recovery of the charge from those customers identified as being responsible for the utilisation of interconnector assets at times of imports from the exporting region.

3.3.2 Application within the NEM design

Administration

This option may require one or more central body(ies) to be tasked with certain administrative responsibilities. These could include collecting payments from, and making payments to, relevant TNSPs. NEMMCO, as market operator, could be responsible for these functions given its role in the management of the settlements process.

However, this option may also involve a central body having broader substantive responsibilities, such as identifying interconnector assets, formulating a modelling methodology and overseeing detailed modelling to determine the allocation of costs amongst TNSPs. In this case, we would submit that the same bodies could perform these functions as were suggested for the interconnector cost sharing option. These were:

- A central body for the identification of new interconnector assets according to defined criteria; and
- AER to formulate a modelling methodology based on principles in the Rules (only if the methodology is not prescribed in the Rules) and to oversee the actual modelling by one or more TNSPs, given that it is the relevant economic regulator.

As indicated above, TNSPs themselves would be best placed to actually undertake the cost allocation modelling. In the absence of agreement amongst the TNSPs as to who would be responsible for modelling, the Rules would need to oblige the AER to determine who it should be.

Imposition methodology

Identification of interconnector assets

Similar issues regarding the identification of new interconnector assets arise under this option as for interconnector cost sharing. Identification according to a simple voltage threshold has a number of drawbacks derived from its arbitrariness. The use of the IRPC's criteria for assessing material inter-network impacts of transmission augmentations is likely to be the most promising approach given its relatively transparent and objective nature.

Mechanism for allocating interconnector costs between TNSPs

As with the interconnector sharing option, a simple allocation rule such as equal contributions may be practicable but may be perceived as unfair in certain cases if the inter-network impact of an augmentation is particularly small or large relative to the project's within-region impacts.

A detailed modelling exercise may produce the most accurate allocation of new interconnection costs between regions, at least to the extent that, say, load-flow modelling is perceived to reflect true forward-looking costs. If applied, it could also be used for cost allocation purposes within each region (see below).

However, as noted in the discussion of the interconnector cost sharing option, the key disadvantage with load-flow or similar modelling is the complexity of the analysis. This complexity would be heightened under the present option because the assessment would potentially need to consider multiple investments in multiple interconnectors across the NEM. Further, as with interconnector cost sharing, the question arises as to the periodicity for the modelling – whether

modelling should be undertaken once-and-for-all for each interconnector augmentation or on an annual or periodic basis. The discussion of the interconnector cost sharing option explained that once-and-for-all modelling is likely to be problematic given potential changes in network flows over time.

Finally, even more than under the interconnector cost sharing option, the allocation methodology under the present option would need to be prescribed in the Rules. Alternatively, the Rules would need to place an obligation on the regulator to resolve the methodology.

Recovery methodology

As noted above, there are two main ways for importing region TNSPs to recover their NEM-wide interconnector cost sharing charges. These are:

- Recover the charge from all of its customers through a postage-stamped price; or
- Recover the charge from those customers who are in some way identified as being most responsible for the utilisation of interconnector assets at times of power imports.

Under the former approach, the charge could be recovered through the non-locational component of charges for prescribed TUoS services. Under the latter approach, the charge could be recovered from the locational component of charges for prescribed TUoS services

3.3.3 Impact on NEO

Similar to the interconnector cost sharing option, the key advantage of this option is that it resolves the allocation of specific new transmission asset costs. In doing so, this option helps to overcome any barriers to investment in assets that enhance inter-regional transfer capability that could arise due to TNSPs' concerns about excessive charges on their own customers.

However, like interconnector cost sharing, an important drawback of this option is that it may not provide accurate forward-looking LRMC-type pricing signal to loads in an importing region. Rather, recovering costs after they have been incurred specifically from importing region customers is likely to harm allocative and dynamic efficiency, regardless of the precise means of cost recovery. Further, this option places the burden on the central body to determine which assets are 'new interconnector assets', knowing that its decisions could have significant pricing implications for network users.

3.4 LOAD EXPORT CHARGE

3.4.1 Description

Summary

Under this option, each TNSP calculates a transmission charge for each interconnector as if the interconnector were a load at the boundary of its region. This 'load export charge' is levied on the importing TNSP, who is then required to recover the costs of the charge from its own customers.

Imposed by/Paid by

The transmission charge under this methodology is imposed by the TNSP of the region that exports power to an adjacent region, to the extent of that export. The charge is paid by the TNSP of the region that imports power from the exporting region to the extent of that import. As power flows between regions are likely to change direction from time to time over the course of a year, TNSPs within adjacent regions are both likely to impose load export charges on one another.

Imposition methodology

The key requirement of the imposition methodology is that the charge needs to reflect the costs of all assets that the exporting TNSP reasonably considers contribute to the export transfer capability of its network. The charge would not merely reflect the costs of new assets but would include the costs of existing assets. However, imposing TNSPs would not be required to include the costs of assets in neighbouring regions that contribute to their own network's export capability. For example, if power flowed from Queensland to NSW to Victoria, TransGrid would not be required to include the costs of Powerlink's network in setting its export charge to PowerNet.

Given that adjacent TNSPs are both likely to impose load export charges on one another, the means for settling inter-regional load charges could be a quarterly balancing transfer. Alternatively, the balancing amount could be reflected in an adjustment to SRA proceeds paid by NEMMCO.

Recovery methodology

As with the previous options, the load export charge option does not incorporate a defined means of the importing TNSP recovering the charge from its customers. Therefore, we have assumed that the same alternatives could apply as for the other options. These are:

- Recovery of the charge from all of the TNSP's customers through a postage-stamped price; or
- Recovery of the charge from those customers identified as being responsible for the utilisation of interconnector assets at times of power imports from the exporting region.

3.4.2 Application within the NEM design

This option is similar to that proposed by NECA in 1999 as part of its transmission and distribution pricing review (see section 2.1.1 above).

Administration

The administration of this option is unlikely to pose too many difficulties. The AER would continue to play its role in approving TNSPs' pricing methodologies. So long as these methodologies are applied correctly (as TNSPs are obliged to do under the Rules), the load export charges levied by TNSPs on each other should be appropriate. TNSPs upon whom load export charges were imposed would also be obliged under the Rules to pay these charges.

Imposition methodology

In the NEM context, the simplest and most obvious approach for setting the load export charge would be for it to comprise transmission charges currently imposed on within-network loads. Existing loads within each region of the NEM are presently subject to charges levied by their local TNSP for:

- Prescribed exit services;
- Prescribed common transmission services; and
- Prescribed TUoS services – with charges including both a locational and a non-locational component.[20]

The first of these is not applicable to interconnectors, but each of the others could be imposed on importing TNSPs as if they were loads. The following sub-sections discuss the appropriateness of imposing each of the present charges on importing region TNSPs under the designation of the load export charge.

Locational component of charges for prescribed TUoS services

The Rules for determining the locational component of prescribed TUoS services charges require that loads are charged on the basis of their estimated 'proportionate use' of the transmission network.[21] The Rules also permit TNSPs to use cost-reflective network pricing (CRNP) or modified CRNP to estimate proportionate use. Applying this methodology to interconnected TNSPs would mean that importing TNSPs would be charged on the basis of their estimated proportionate use of the exporting TNSP's transmission network. The use of CRNP or modified CRNP (or whatever alternative has been approved by the AER under the Rules as part of the TNSP's pricing methodology) to estimate

[20] See Part J of chapter 6A of the Rules.

[21] Rule 6A.23.3.(c).

proportionate use would help ensure a degree of consistency between the setting of the load export charge and the setting of charges payable by native loads located within the exporting region.

Non-locational component of charges for prescribed TUoS services

The non-locational component of charges for prescribed TUoS services recovers the balance of the TNSP's regulated revenue not recovered through other charges for prescribed transmission charges.

In its final authorisation decision on NECA's proposed Code changes in 2001, the ACCC considered that TUoS General charges (being the former equivalent charge) should not automatically be recovered from inter-regional customers. This was because these charges were not intended to fulfil an economic signalling function but to recover the remainder of a TNSP's regulated revenue. Therefore, the ACCC considered that TUoS General charges should be uniform over as wide an area as possible to avoid distorting participants' consumption, production and investment decisions.[22] The ACCC considered that levying the non-locational component of TUoS services charges on importing TNSPs was not certain to increase the overall degree of uniformity of these charges across the NEM and hence should not be imposed on inter-regional flows.

At the same time, it is true that such costs relate to assets that provide services across regional boundaries. Hence, it could be argued that loads in an importing region ought to be exposed to these costs when making their locational decisions as between an importing region and an exporting region.

Charges for prescribed common services

A similar question arises as to whether importing region TNSPs should be required to pay charges for prescribed common services provided by the exporting TNSP. This issue was not explicitly discussed by the ACCC in its final Determination on NECA's proposed Code changes. However, neither NECA nor the ACCC considered that common service charges for a particular TNSP should apply to customers in other regions. The ACCC commented that common service charges have many of the characteristics of fixed costs and as such should be recovered in a similar manner to the TUoS General charge.[23] Therefore, a similar approach could be taken towards the inclusion of the prescribed common service charge in the load export charge as is taken for the non-locational component of prescribed TUoS charges.

Recovery methodology

The two main ways for importing region TNSPs to recover their load export charges are:

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[22] ACCC, *Amendments to the National Electricity Code, Network pricing and market network service providers*, 21 September 2001, p.60.

[23] ACCC, *Amendments to the National Electricity Code, Network pricing and market network service providers*, 21 September 2001, p.46.

- Recover the charge from all of its customers through a postage-stamped price; or
- Recover the charge from those customers who are in some way identified as being most responsible for the utilisation of interconnector assets at times of power imports.

Under the former approach, the charge could be recovered through the non-locational component of charges for prescribed TUoS services. Under the latter approach, the charge could be recovered from the locational component of charges for prescribed TUoS services

3.4.3 Impact on NEO

Assuming this option was implemented in a practicable manner, it would help ensure that loads in an importing region contributed to the costs of the upstream transmission assets in the exporting region. This should help promote more efficient locational investment decisions over time, as potential loads would be less inclined to choose to locate in importing regions and more inclined to locate in exporting regions than they would be otherwise. To the extent that the proportionate use of existing assets provides a good proxy for the long-run marginal cost of serving different locations, this would be consistent with dynamic efficiency.

With respect to the recovery of the charge from importing region customers, this could be done on a locational basis, based on their estimated proportionate use of the exporting region TNSP's transmission assets. However, it is likely that a postage-stamped price would be simpler and more transparent to implement than a location-specific price.

A potential drawback of this option is that it could lead to disputes between TNSPs regarding the derivation of load export charges. TNSPs may formulate (or be perceived to formulate) charges for locational TUoS services that seek to extract very high payments from neighbouring TNSPs. The AER would need to be made responsible for resolving such disputes.

3.5 NEM-WIDE METHODOLOGY

3.5.1 Description

Summary

Under this option, the calculation and imposition of transmission charges across the NEM would occur on a consistent basis. The methodology for determining and recovering charges could either be prescribed in the Rules or be entrusted to a central body to formulate in accordance with principles in the Rules.

Imposed by/Paid by

Under this option, a central body may be required to administer the collection of the charge from TNSPs and the distribution of revenues from the charge between TNSPs. Alternatively, TNSPs could collectively agree an approach for collecting the charge and distributing the resultant revenues.

Imposition methodology

The key requirement of this option is a consistent single NEM-wide transmission charging methodology, although the actual methodology itself is not fully specified. The methodology would need to recover the annual costs of all (new and existing) transmission network assets and could be formulated to yield:

- A NEM-wide charge reflecting the costs of assets that provide or assist interconnector flows; and
- A local transmission charge reflecting the costs of other assets.

A methodology based on load-flow analysis may be the most practicable for determining the NEM-wide charge and possibly elements of the local transmission charge.

Recovery methodology

As with the other options, this option does not incorporate a defined means for TNSPs to recover the costs of their payments to other TNSPs from their customers. Therefore, we have assumed the same alternatives could apply as for those options. These are:

- Recovery of the charge from all of the TNSP's customers through a postage-stamped price; or
- Recovery of the charge from those customers identified as being responsible for the utilisation of interconnector assets at times of imports from the exporting region.

3.5.2 Application within the NEM design

Administration

Similar to the previous option, this option potentially requires a central body to (at a minimum) levy and collect transmission charges from all TNSPs in the NEM and to distribute the proceeds amongst TNSPs. This role could be performed by NEMMCO, as the market and settlements administrator. Alternatively, TNSPs could collectively agree to make payments to each other as required.

The pricing methodology could either be prescribed in the Rules or could be formulated by a central body subject to principles contained in the Rules. In the

case of a central body, the most appropriate body to formulate the methodology would be the AER, given that it is the economic regulator responsible for approving transmission pricing methodologies. The AER would also be the most appropriate central body to oversee the modelling for the derivation of charges. The modelling itself would most likely need to be undertaken by one or more TNSPs on behalf of all TNSPs, and the AER could be obliged to determine which one it should be in the absence of agreement amongst the TNSPs.

Imposition methodology

In the NEM context, probably the best way to apply this option would be in the manner originally contemplated by the ACCC in its 2001 final Determination (see section 2.1.1 above). The ACCC sought (but did not procure) an outcome that would involve TUoS Usage (ie locational) charges for all load customers being set in a way that reflected the costs of transmission assets located in all other regions. Hence, loads in importing regions would be required to contribute towards the costs of assets in exporting regions to an extent determined by the CRNP cost allocation methodology. This approach was also cited by Powerlink in its submission to the AEMC's transmission pricing issues paper[24] and was subsequently raised as a possible alternative by the AEMC in its draft and final Rule determinations on transmission pricing.[25]

Applying this methodology to the current transmission pricing regime in chapter 6A of the Rules would mean that transmission customers would continue to pay the same types of charges for prescribed transmission services as they do now:

- Prescribed entry and exit services charges;
- Prescribed common transmission services charges;
- Prescribed TUoS services – locational component; and
- Prescribed TUoS services – non-locational component.

The key differences would be that:

- Charges for prescribed TUoS services – locational component would be determined across the NEM based on the value of all transmission network assets in the NEM rather than within a region; and

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[24] Powerlink, *AEMC Review of the Electricity Transmission Revenue and Pricing Rules, Transmission Pricing: Issues Paper*, 23 December 2005, p.4.

[25] AEMC, *Transmission Pricing for Prescribed Transmission Services: Draft Rule Determination, Proposed National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, 19 October 2006, p.76; AEMC, *Transmission Pricing for Prescribed Transmission Services: Rule Determination, National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule 2006*, No.22, 21 December 2006, pp.57-58.

- Charges for prescribed common services and prescribed TUoS services – non-locational component would need to be uniform (postage-stamped) across the NEM rather than within a region.

Recovery methodology

As noted above, there are two main ways for importing region TNSPs to recover their NEM-wide charges. These are:

- Recover the charge from all of its customers through a postage-stamped price; or

- Recover the charge from those customers who are in some way identified as being most responsible for the utilisation of interconnector assets at times of power imports.

Under the former approach, the charge could be recovered through the non-locational component of charges for prescribed TUoS services. Under the latter approach, the charge could be recovered from the locational component of charges for prescribed TUoS services

3.5.3 Impact on NEO

As noted in the Commission's draft Rule determination on transmission pricing, the key advantage of this option is that the locational component of the TUoS services charge paid by a load consumer would reflect its notional usage of *all* transmission network assets in the NEM based on the CRNP (or substitute) allocation methodology. To the extent that CRNP provided a good proxy for the LRMC of the transmission network, this option would promote the most accurate locational signals to users of all the options under consideration.

Further, this option is likely to avoid some of the administrative complexities of the interconnector cost sharing and NEM-wide interconnector cost sharing options. In particular, the present option does not require new interconnector assets to be identified. It also avoids disputes between TNSPs regarding differences in charging methodologies that could arise under the load export charge and the (bilateral) interconnector cost sharing options.

Conversely, the main problem with this option also stems from the fact that it mandates a uniform methodology across the entire NEM. This would undermine the intention embodied in the recent transmission pricing Rule changes to minimise prescription and permit each TNSP's methodology to suit local conditions within an overarching framework. For example, the existing Rules allow for ElectraNet's use of 'modified CRNP'.

It is also important to note that this option would represent a major change from existing pricing arrangements.

Attachment 1 – AEMC inter-regional charging options

No.	Option	Explanation	What assets are covered?	Who levies the charge?	Who pays the charge?	What set of customers subject to the arrangement	Methodology for determining charge	Vehicle for distributing charge revenue
	Status Quo - to be use as a counterfactual for assessing other options	Cost lie where they fall, subject to case by case negotiation of payments by state governments						
1	**Interconnector Cost Sharing (transfer payments between TNSPs to share the cost of new 'interconnection-improving' investment between two regions)**	Costs associated with "interconnection" are identified and shared among the two TNSPs. There are three possible methods to identifying such assets a) Simple Threshold (e.g. US RTO example) of all assets above 330kv; b) An assessment by a independent body [which could be the NTP] which would be based upon guidelines (i.e., IRPC material inter-network impact guidelines) or c) the two TNSPs agree on a case by case basis (e.g. which might be proposed as part of the Reg Test consultation process).	A benefit of this option is that, unlike option 3, it could only be applied to new assets. Frontier should specify this option on the basis that it only applies to new assets, since existing assets would require a major change to existing charges	The TNSP whose individual costs are greater than the agreed share of the total costs.	The TNSP whose individual costs are less than the agreed share of total costs.	Customers who pay transmission charges in either region.	There are three possible ways to determine the appropriate share of the interconnection cost across the two regions. A) Case-by-case negotiation by the two TNSPs; b) simple, e.g. 50/50, rule or c) A detail load flow modelling to determine who benefits from the interconnection asset.	The TNSPs can either recover the costs via their own TUSO charge (possible with the interconnector charge separately identified) or use the IRSR auction proceeds as as vehicle to distribute the costs amongst themselves. Note - we think the use of auction proceeds (and shares thereof) as anything other than an existing route which can be used to make the transfer payments is misguided. There is no reason to assume that auction proceeds will be sufficient to fund the relevant investments, particular given that investment in interconnection may reduce residues.
2	**NEM-wide Interconnector Cost Sharing (transfer payments between TNSPs to spread the cost of new 'interconnection-improving' investment across all regions)**	Cost associated with interconnection are shared amongst the five NEM regions. Therefore instead of bilateral arrangements, there is one arrangement covering all TNSPs. This creates a need for a central body to adminstrate this NEM-wide arrangment	The same methods for identifying for Interconnections as with option 2.	In addition, to TNSPs leving the charge, another approach would be for a central body to levy the common NEM charge [i.e NEMMCO fee charge]	All NEM customers. The NEM wide charge could either be smear across all or a detailed flow modelling is applied to determine who causes interconnectors flows	All NEM customers contribute towards NEM wide interconnection	As above	As above - although the use of the IRSR auction proceeds probably because more difficult
3	**Load Export Charge (TNSP charges neigbouring TNSPs as 'load' at border)**	Each TNSPs calculates an export charge to be applied to exporting flow transported on each interconnector. That export charge is levied on the importing TNSP. The importing TNSP would then pass on such costs (net of its revenue from its own export charges) through its charges to its own customers.	Would have to cover all assets which the TNSP considers contribute to the transfer capability of the network needed to transport export flows. Therefore this will be "deep coverage" and cannot simply be applied to new assets. However TNSPs are not required to considers assets in neighbouring regions which may contribute to their network export capability.	Exporting TNSPs	Importing TNSPs	The importing TNSP could decide to either smear the charge across all its customers or apply a specifc charge to those customers which are importing flows.	Need appropriate safeguards and methodology to ensure that the export charge appropriately reflects true revenue requirement of assets contributing to assets. It should be based as if the export was a load at the regional boundary. ALso may need another methodology for determining and apportioning import flows to load if the importing TNSP decides to apply a specific charge to importing customers	TNSPs will charge one another their respective export charges. Probably needs an quarterly balancing redistribution transfer payment between TNSPs. The current auction proceeds transfers from NEMMCO to TNSPs may provide a means to facilitate TNSP to TNSP payments but could complicate matters
4	**NEM-wide Methodology**	Create a central body which will re-allocate all network costs into a single charging methodology with a NEM wide TUOS and a local TUOS charge	Would cover all new or existing assets. Assets which assist the flows on NTFPs would be recover through the NEM wide TUOS	Central Body	All NEM customers. The NEM wide charge could either be smear across all or a detailed flow modelling is applied to determine who causes interconnectors flows	All customers pay the NEM wide TUOS charge	Needs a new transmission charging methodology	TNSPs would become "passive", a central body would be responsible for charging. The central body would then pay the TNSPs their respective allowed revenues

Figure 1: AEMC inter-regional transmission charging options

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