Modelling of Load Export Charges

prepared for

Australian Energy Market Commission

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1. Executive Summary

This report has been prepared to provide AEMC with indicative outcomes of a range of alternative approaches to determining inter-regional transport charges.

The AEMC Discussion Paper, National Electricity Amendment (Inter-regional Transmission Charging) Rule 2011 – 25 August 2011, provides background.

The current work was carried out using data provided by the Transmission Network Service Providers (TNSPS) and Coordinating Network Service Providers (CNSPs) for the regions of New South Wales, Queensland, South Australia, Tasmania and Victoria. This was generally the data used for transmission access pricing runs for 2009/10, 2010/11 and 2011/12. The network loading data for 2007/08, 2008/09 and 2009/10, respectively, was used.

1.1 Background

Locational transmission charges are determined annually by TNSPs for each point of supply. In the analysis, regional interconnection points are represented as equivalent loads and generators, matched to export and import power flows. In a full analysis, these equivalent loads would attract transmission charges, but the present arrangements between regions exclude such charges.

As there are variations in the details of the methodology used to assess transmission charges in the various regions, there is a need for a uniform methodology that can be used to determine inter-regional charges.

The present project examines the outcome of a number of alternative approaches to the calculation of these charges.

Analysis was carried out using the TPRICE software package, which is used in all transmission regions for the calculation of locational transmission prices. This software has a number of different modes of operation and data preparation, which are explored in this report.

1.2 Analysis Variations

The transmission pricing analysis was carried out with a number of variations in methodology, and the outcome in terms of inter-regional charges reported. The variations are discussed below.

1.2.1 Trading intervals

The analysis involves the simulation and assessment of transmission usage over a number of trading intervals. The intra-regional calculations use either full year or selected 10 interval cases, depending on the TNSP.

The following cases are considered in this report:-

- Full year of trading intervals (17,520 trading intervals in a non-leap year)
- 10 trading intervals at times of highest regional demand
- 10 trading intervals per interconnected region at times of high export
- 10 trading intervals at times of highest NEM wide demand

1.2.2 Standard or Modified Cost Reflective Network Pricing

TPRICE assesses the relative usage of transmission elements associated with the power flow to supply points. This is referred to as Cost Reflective Network Pricing (CRNP) since the share of network asset costs required for supply to each load point, is used to determine the charge.

Since transmission assets frequently provide capacity considerably in excess of the level of load supplied (due to provision for load growth and the capacity steps of transmission lines), a modified form of CRNP, referred to as MCRNP, is used by some TNSPs. With the MCRNP approach, the charges associated with a transmission element are discounted according to their level of utilisation, as determined from their peak loading during the simulated intervals, and their assigned ratings.

Both CRNP and MCRNP cases are considered for this report. However, with the MCRNP cases, only radial transmission is subject to discounting.

1.2.3 All Assets or Cumulative New Assets

The intra-regional transmission charges are determined by all TNSPs by including charges associated with all transmission assets in service. In order to look at marginal costs of interconnections, cases using only new assets, installed after a certain date to enhance or maintain interconnection capacity, were also considered. The cases were:-

- The “All Asset” cases, in which all transmission assets in a region were used in the charge determination.
- The cumulative new asset case, in which charges associated with all new assets installed to extend or maintain interconnection capacity in the period from 1 July 2007 were included in the analysis. That is, in the 2009/10 charges, only new assets installed in 2007/08 were included. For the 2010/11 charges, the new assets installed in both 2007/08 and 2008/09 were included, etc.

1.2.4 Capacity or Energy Mode

For each trading interval simulated, the usage of each transmission element by each load is determined. If the average usage over all intervals is used for transmission charge determination, the calculation is said to be using the Energy Mode. If the peak usage over the simulated intervals is used, the calculation is said to be using the Capacity Mode.

Most of the TNSPs use the Capacity Mode for intra-regional charges, as transmission augmentation is largely driven by peak loading levels. One TNSP, however, uses the Energy Mode and with ten trading intervals at times of highest system loading.

For this report both Capacity and Energy Modes are considered.

1.2.5 NEM wide system

In addition to individual region analysis, the data provided by the regions was merged to form a single NEM wide system case. A reduced number of cases with this composite system model were run. These were the Capacity and Energy modes, full year of intervals or 10 NEM wide highest demand intervals, all with standard CRNP, and all assets.

1.3 Results

With 5 regions and three years, these options yield a large number of combinations, the results of which are summarised in Appendix 1.

The TPRICE results were scaled so that the total locational charges matched 50% of each region's Annual Service Revenue Requirement (ASRR).

The following observations are drawn from the studies:

- The differences between the CRNP and MCRNP outcomes were not significant, due to the discounted elements in the MCRNP analysis being restricted to radial transmission.
- There were insufficient new assets to make a meaningful cumulative new asset approach in the period considered.
- The 10 interval cases provided significant variations from year to year, whilst the full year capacity based cases were more consistent from year to year.

It would appear that the full year, capacity mode, standard CRNP, all assets approach, would be a likely candidate for inter-regional charges, as it has the following attributes:

- Reasonable consistency between annual outcomes
- Capacity Mode most closely reflects transmission cost drivers
- The full year approach aligns with the methodology used by most TNSPs in determining intra-regional locational charges
- It avoids the need to select a limited number of intervals that may not adequately capture the usage of interconnections for both import and export

With this approach, the average nett revenues ($M) from inter-regional charges, would be as given in Table 9 of the report. This is reproduced below.

Year	Tas	SA	Vic	NSW	Qld
09/10	3.40	-13.68	17.84	-17.27	9.71
10/11	4.71	-13.80	16.42	-17.11	9.79
11/12	5.40	-11.44	12.49	-15.35	8.89
Average	4.50	-12.97	15.58	-16.58	9.46

These figures (and those in Appendix 1) are the result of a single set of calculations. If the inter-regional charges are then used to adjust the total regional locational TUOS charges, which in turn will change the inter-regional charges, an iterative approach is required.

Such an iterative approach to the determination of inter-regional charges is recommended, as TUOS charges change significantly when allowance is made for the inclusion of inter-regional charges in the allocation of costs.

With the iterative approach, the nett revenues ($M) for the regions would be as given in Table 8 of the report, which is reproduced below.

Year	Tas	SA	Vic	NSW	Qld
09/10	3.17	-10.26	11.91	-13.43	8.60
10/11	4.34	-10.49	11.01	-13.63	8.77
11/12	4.94	-8.65	8.10	-12.48	8.09
Average	4.15	-9.80	10.34	-13.18	8.49

A number of issues were identified during the project, the most significant of these were:-

- The quality of the load and generation data provided by the TNSPs was generally poor. An approach to derive the data from a system wide model, as produced by AEMO in its National role, and used for the calculation of Marginal Loss Factors, should avoid these inaccuracies. Such a system wide model could be split into regional equivalents and be provided to the various TNSPs for their calculations, and provide a consistent basis for inter-regional charges. [This would require some effort by the TNSPs to align their cost data with the AEMO network model.]
- Some sensitivity to TPRICE results was seen in variation in the modelled generator source impedance. It is suggested that a unified approach should be defined for the calculation of inter-regional charges, particularly generator source impedances.

The NEM wide system approach provided a similar pattern of outcomes for all but Queensland. The allocation of load to generation within TPRICE is on the basis of fault level contributions. This leads to some difficulties in allocation to remote regions if low source impedance generators are represented at interconnection points. The resolution of applicable generator model source impedances (as mentioned above), or the modification of the method for interconnected regions, may be necessary to get reliable NEM wide system results. The absence of equivalent generators at the interconnection points, as would be possible with a consistent set of load and generation data, would also assist here.

Modelling of Load Export Charge

2. Methodology

This report has been prepared to provide AEMC with indicative outcomes of a range of alternative approaches to determining inter-regional transport charges.

The AEMC Discussion Paper, National Electricity Amendment (Inter-regional Transmission Charging) Rule 2011 – 25 August 2011, provides background.

The current work was carried out using data provided by the TNSPS (or CNSPs) for the regions of New South Wales, Queensland, South Australia, Tasmania and Victoria. This was generally the data used for transmission access pricing runs for 2009/10, 2010/11 and 2011/12. The network loading data of 2007/08, 2008/09 and 2009/10, respectively, was used.

The analysis was carried out using the TPRICE software package; a brief overview of which is given in Appendix 4.

2.1 Modified Load Export Charge

The TPRICE software has the ability to allocate costs to both loads and to generators. For the present study, only allocation to loads is considered. The total locational Transmission Use of System (TUOS) charge is 50% of the Annual Service Revenue Requirement (ASRR) for each region. There are a number of minor adjustments to this to allow for settlement residues etc., but these are ignored in this study.

In the representation of individual regions for TPRICE studies, inter-regional transfers are represented by equivalent loads and generators at, or near, the regional border interconnection points. These are set to simulate the historic interconnection transfers.

The TPRICE calculated charges for each point of supply in each region, including those at the borders, were scaled to summate to 50% of the ASRR for that region. The resulting charges at the equivalent loads at the regional boundaries were then taken as the load export charges applied to the associated interconnected regions.

A number of different approaches were simulated. These are summarised below.

2.1.1 Iterative Inter-Regional Charge Solution

If the nett inter-regional charges are added to the locational ASRR charges, and redistributed to the points of supply, including those associated with regional interconnections, an iterative solution is required.

The changes resulting from an iterative approach are quite significant, and should therefore justify such an iterative approach.

This is discussed in more detail in Section 3.7.

2.1.2 CRNP and MCRNP

Both the standard cost reflective network pricing (CRNP) and modified cost reflective network pricing (MCRNP) methods were simulated.

The MCRNP method differed from the CRNP method in that the charges for selected transmission elements are scaled by their utilisation, so that charges for under-utilised elements are discounted.

For this study, only radial transmission was discounted in the MCRNP cases.

2.1.3 All Assets or Cumulative New Assets

The "All Assets" studies involve charging on the basis of all network elements, whilst in the "Cumulative New Assets" studies involve charging only for new network elements that are required to maintain or extend inter-regional transfer capability and were installed later than June 2007.

For the cumulative new asset cases only a limited number of variations were considered.

2.1.4 Number of Intervals

Most TNSPs simulate a full year of trading intervals in their calculation of locational TUOS charges. This gives 17,520 30 minute trading intervals for a non-leap year. Thus, the full year case was simulated.

As it is standard practice for the Victorian TNSP to determine transmission charges on the basis of 10 high load trading intervals, using the Energy Mode, 10 interval cases were also considered as a possible candidate for assessing inter-regional charges.

Following comments from the TNSPs, this approach was extended to consider three alternative approaches to the selection of the 10 trading intervals.

The different approaches for selecting the "10" intervals for each region were:-

a) The 10 days having maximum regional demand between the hours of 11:00 and 19:00 were determined. Then, for each of these 10 days, the interval with the maximum demand between those hours was selected.
b) The 10 days having maximum regional export between the hours of 11:00 and 19:00 were determined. Then, for each of these days the interval with the maximum export between those hours was selected. For regions with a number of interconnected regions, 10 intervals were selected for each interconnected region. For Victoria, this results in 30 intervals being selected. For NSW, 20 intervals and 10 for the other regions.

c) The 10 days having maximum demand on the overall NEM wide system between the hours of 11:00 and 19:00 were determined. Then, for each of these days, the interval with the maximum demand between those hours was selected. These selected intervals were then applied for each region.

Thus, in all 4 different approaches to interval selection were simulated.

The timings of maximum demand and maximum exports varied from region to region. The selected dates and intervals, together with demand and export levels, are given in Appendix 2.

An alternative of using only summer months, as is the case for Victoria, could have been analysed, but it is expected that the changes in outcomes would be negligible.

2.1.5 Capacity and Energy Modes

For each trading interval simulated, the usage of each transmission element by each load is determined. If the average usage over all intervals is used for transmission charge determination, the calculation is said to be using the Energy Mode. If the peak usage over the simulated intervals is used, the calculation is said to be using the Capacity Mode.

Most of the TNSPs use the Capacity Mode for intra-regional TUOS charges, as transmission augmentation is largely driven by peak loading levels. The Victorian TNSP, however, uses the Energy Mode and ten trading intervals at times of highest system loading.

After some initial studies, it appeared that the Capacity Mode offered some advantages over the Energy Mode for the 10 trading interval cases, so both Capacity and Energy Modes were simulated.

2.2 NEM wide system Cases

The individual regions were combined to form a single network, together with load and cost data for each year. Only standard CRNP with 365 day and 10 interval cases at high system demand were simulated for the three years.

2.3 Preparation of Data

2.3.1 Data Provided

The following data items were supplied by the TNSPs:-

- Load data files – giving load and generation output data for each trading interval in the three years under consideration.
- Loadflow data files - which provide an analytic model of the networks for each year.

- Cost data files – which give relative costs for each transmission element and, where appropriate, the ratings of transmission elements for use in MCRNP analysis. These are for both all and new assets.
- The Annual Service Revenue Requirement (ASRR) for each region.

Adjustments to this data found necessary to provide a consistent basis for these studies, are covered in Appendix 3.

2.3.2 Case Preparation

Sets of TPRICE data had to be prepared to enable the cases to be run. This required the following number of cases:

Individual region all asset cases
3 years * 5 regions * 2 CRNP modes * 4 Interval modes * 2 Capacity /Energy = 240 cases.

Cumulative new assets
3 years * 5 regions * 1 CRNP modes * 2 Interval modes * 1 Capacity /Energy = 30 cases for the cumulative new assets.

NEM wide system cases
3 years * 2 Interval modes * 2 Capacity/Energy modes = 12 cases for the NEM wide system cases.

In all, some 282 cases were prepared.

3. Results for Modified Load Export Charge

TPRICE studies were carried out for all combinations of variables. This involved 270 cases for the individual regional studies (including 30 from cumulative new assets), and 12 cases using the NEM wide system cases.

The 270 individual region studies were grouped to form 54 sets, with the same approach for each region.

The results of the TPRICE studies are summarised in Appendix 1. Specific cases are discussed below.

3.1 Example Case

It is useful to introduce the results by way of an example. The case with the full 365 days, standard CRNP, all assets, Capacity Mode is chosen. The results are in Tables A1_01, A1_02, and A1_03, for 2009/10, 2010/11 and 2011/12 respectively. Table A1_01(a) is repeated below for reference.

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	45.350	0.000	3.929	0.000	0.000	0.000	49.279
SA	0.000	79.929	17.578	0.000	0.000	0.000	97.507
Vic	0.529	31.259	173.978	30.732	0.000	0.000	236.498
NSW	0.000	0.000	23.174	231.440	7.579	0.000	262.193
QLD	0.000	0.000	0.000	17.289	189.710	0.000	206.999

Table A1_01(a): Interconnection charges ($M) for 2009/10, 365 day period, standard CRNP, capacity method, all assets. Based on individual region analysis.

In this table each row gives the results of a separate TPRICE study. The figures for each row summate to the locational ASRR (50% of the total ASRR) for that region. They give a breakdown of the charges associated with the equivalent loads for each region.

For example, for Tasmania, $45.35M is associated with charges to loads within Tasmania, and $3.929 M is associated with the equivalent load representing transfer to Victoria. In Victoria, the charge associated with the Tasmanian equivalent load is $0.529 M.

Accordingly, the nett revenue to Tasmania from inter-regional charges is
$3.929 M - $0.529 M = $3.400 M.

For Victoria $0.529 M is associated with the Tasmanian equivalent load, $31.259 M with the SA equivalent (sum of the two interconnection points) and $30.732 M with the NSW equivalent (sum of three interconnection points). However, other regions ascribe the following costs to the Victorian equivalent loads, Tasmania $3.929 M, SA $17.578 M, and NSW $23.174 M.

The nett payment to Victoria becomes $0.529 M + $31.259 M + $30.732 M - $3.929 M - $17.578 M - $23.174 M = $17.839 M.

This calculation can be repeated for SA, NSW and Qld. The resultant nett revenues are given in Table A1_01(b), reproduced below.

Tas	SA	Vic	NSW	QLD
3.400	-13.681	17.839	-17.268	9.710

Table A1_01(b): Nett inter-regional revenue, conditions as per A1_01(a).

These (b) series tables capture the nett outcome of the method.

The unallocated column in Table A1_01(a), as reproduced above, gives the revenue that cannot be associated with demand. This can be due to either assets that are not in the path of supply, as represented in the loadflow, or the discount applied to transmission using the modified CRNP method.

The results of all studies are summarised in Table A1_57, which provides a quick overview.

3.2 Consolidated Averages

Table 1, below, summarises the cases by giving the averages of the three years under consideration.

Ints	Mode	C/E	Assets	Runs	Tas	SA	Vic	NSW	Qld
365D	CRNP	C	All	5	4.50	-12.97	15.58	-16.58	9.46
365D	MCRNP	C	All	5	4.49	-13.06	15.68	-15.58	8.47
365D	CRNP	E	All	5	0.78	-4.11	10.54	-20.94	13.73
365D	MCRNP	E	All	5	0.78	-4.14	10.57	-20.22	13.01
10L	CRNP	C	All	5	1.55	-25.52	17.11	2.58	4.28
10L	MCRNP	C	All	5	1.55	-25.55	17.14	3.20	3.67
10L	CRNP	E	All	5	0.71	-20.18	15.57	0.78	3.11
10L	MCRNP	E	All	5	0.71	-20.20	15.59	1.17	2.72
10E	CRNP	C	All	5	9.31	-2.10	-1.40	-19.61	13.80
10E	MCRNP	C	All	5	9.27	-2.52	-0.94	-18.41	12.60
10E	CRNP	E	All	5	9.75	7.82	-12.95	-21.30	16.69
10E	MCRNP	E	All	5	9.71	7.36	-12.45	-20.09	15.48
10S	CRNP	C	All	5	8.45	-12.00	-3.76	-6.93	14.23
10S	MCRNP	C	All	5	8.42	-12.15	-3.57	-6.13	13.43
10S	CRNP	E	All	5	7.55	-9.70	-3.71	-6.07	11.93
10S	MCRNP	E	All	5	7.52	-9.77	-3.61	-5.44	11.30
365D	CRNP	C	CumNew	5	0.14	0.00	-8.24	8.95	-0.85
10E	CRNP	C	CumNew	5	0.28	0.00	-11.63	11.57	-0.22
365D	CRNP	C	All	1	5.97	-10.17	25.55	-15.71	-5.65
365D	CRNP	E	All	1	1.73	-7.74	16.09	-9.39	-0.68
10S	CRNP	C	All	1	12.29	-18.87	15.53	-6.50	-2.45
10S	CRNP	E	All	1	9.44	-13.92	10.18	-8.05	2.35

Table 1 Summary of average nett revenues ($M) from inter-regional charges for the 3 years
Where 365 D = full year of trading intervals, 10 L = 10 intervals of local maximum demand, 10E = 10 intervals of maximum export for each interconnected region, 10 S = 10 intervals at time of maximum interconnected system demand, CRNP = cost reflective network pricing, MCRNP = modified cost reflective network pricing, C = Capacity Mode of calculation, E = Energy mode of calculation, 5 runs requires 5 TPRICE runs per year, one for each region, 1 run corresponds to modelling of a NEM wide system. All = all transmission assets included, CumNew = cumulative new assets from 1 July 2007.

Considerable variation in the outcomes from the approaches can be seen.

3.3 Standard or Modified CRNP

As, in this project, the modified cost reflective network pricing (MCRNP) was applied to radial transmission elements only, there was relatively little difference between the MCRNP results and the standard cost reflective network pricing CRNP results, as far as inter-regional charges are concerned. This is not unexpected, as TPRICE associates charges for the use of system elements in the path of power transfer to the particular connection point. If a transmission element does not serve to support transfer to a particular point of supply, TPRICE will not allocate costs from this element to that point of supply.

Table A1_04, which corresponds to the case in Table A1_01, discussed above, except that the MCRNP methodology is used, and is reproduced below.

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	40.506	0.000	3.917	0.000	0.000	4.856	49.279
SA	0.000	72.813	17.451	0.000	0.000	7.242	97.507
Vic	0.529	31.256	170.668	30.732	0.000	3.313	236.498
NSW	0.000	0.000	23.174	231.440	7.579	0.000	262.193
QLD	0.000	0.000	0.000	16.321	182.796	7.882	206.999

Table A1_04(a): Interconnection charges ($M) for 2009/10, 365 day period, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
3.388	-13.805	17.975	-16.300	8.742

Table A1_04(b): Nett inter-regional revenue, conditions as per A1_04(a).

It can be seen that the "Unalloc" column now has significant entries which result from the discounts applied to under-utilised radial assets. There are no such discounts for the NSW region, as the radial assets have been assigned zero value in the cost data, since they are treated as connection assets.

However, the changes in charges accrued at the interconnection buses are relatively small. Examples, derived from Table A1_01 and A1_04, are Tas to Vic changes from $3.929 M to $3.917 M, Vic to SA changes from $31.259 M to $31.256 M, Qld to NSW changes from $17.289 M to $16.321 M.

The largest differences apply to the Queensland region. It is suspected that some of the Queensland discounted transmission is not "strictly radial".

The relatively small differences in the standard and modified CRNP methods can be seen in Table 1, and throughout the results in Appendix 1. In order to reduce the number of cases under consideration, only the standard CRNP method is considered further in this report.

Table A1_68 gives a consolidated list of result summaries, by excluding the MCRNP and new individual year asset results.

3.4 Cumulative New Assets or All Assets

3.4.1 Cumulative New Asset

There were very few new assets associated with maintaining or extending interconnection capability identified by the TNSPs, for the period under consideration. Only the NSW and Tasmanian regions have identified such new assets.

Table A1_49, reproduced below, gives the results corresponding to those in Table A1_01, but for new assets only.

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	2.134	0.000	0.077	0.000	0.000	0.000	2.211
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	6.106	28.266	0.571	0.000	34.943
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_49(a): Interconnection charges ($M) for 2009/10, 365 day period, standard CRNP, capacity method, cumulative new assets only. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.077	0.000	-6.183	6.677	-0.571

Table A1_49(b): Nett inter-regional revenue, conditions as per A1_13(a).

The data was provided by the TNSPs on the basis of new assets in each of the three years considered. From this data cumulative new asset cases were developed[1].

These are calculated for the 365 day, and the 10 high export sets of loading data only. Only the CRNP and capacity methods were considered.

Table 2 below gives the results for the cumulative new asset cases.

Year	Ints	C/E	Tas	SA	Vic	NSW	QLD	Table
09/10	365D	C	0.08	0.00	-6.18	6.68	-0.57	A1_49
10/11	365D	C	0.15	0.00	-8.71	9.43	-0.87	A1_50
11/12	365D	C	0.18	0.00	-9.82	10.74	-1.10	A1_51
Average	365D	C	0.14	0.00	-8.24	8.95	-0.85	
09/10	10E	C	0.19	0.00	-8.80	8.69	-0.08	A1_52
10/11	10E	C	0.30	0.00	-12.27	12.19	-0.22	A1_53
11/12	10E	C	0.35	0.00	-13.83	13.84	-0.36	A1_54
Average	10E	C	0.28	0.00	-11.63	11.57	-0.22	

Table 2 Nett revenue ($M) from the inter-regional charges for the cumulative new asset cases

A majority of the charges are established in 2009/10, and a major portion of the increase in subsequent years, is due to growth in the locational ASRRs, which are used to escalate the charges from the earlier years.

A key issue is when to start including new assets. TNSPs who installed interconnection assets prior to 2007/08 are not given any credit in Table 2.

3.4.2 All Assets

With the CRNP and all assets approach, only those assets that support interconnection export flows will be included in the inter-regional charges due to the TPRICE methodology. This

[1] The cumulative data was determined by summating the data for earlier years with a weighting of the locational ASRRs to allow for escalation of asset charges.

would, therefore, appear to give the same result if all new assets that support interconnection capability were accumulated over all time.

The all asset avoids both a need to define a starting point, and a need to identify which assets support the interconnection.

3.5 Energy Mode versus Capacity Mode

The Energy mode of operation of TPRICE averages the usage of transmission elements over the period considered, whilst the Capacity Mode captures the peak usage of elements. As the need for transmission asset augmentation is driven by peak usage, it can be argued that a capacity approach is a more efficient indicator of transmission costs. This is particularly the case when peak loading conditions align with high ambient temperatures, during which the thermal loading becomes most critical. From the tables in Appendix 2, most peak demands are in the hotter months.

There are considerable differences between the energy and capacity outcomes in Table 1. Both modes will be included in the further results, so that the differences remain visible. However, it is asserted that the Capacity Mode is most applicable to transmission pricing calculations.

3.6 Interval Selection

3.6.1 Full Year Cases

The remaining full year, all asset cases are summarised in Table 3, below.

Year	Ints	C/E	Tas	SA	Vic	NSW	QLD	Table
09/10	365D	C	3.40	-13.68	17.84	-17.27	9.71	A1_01
10/11	365D	C	4.71	-13.80	16.42	-17.11	9.79	A1_02
11/12	365D	C	5.40	-11.44	12.49	-15.35	8.89	A1_03
Average	365D	C	4.50	-12.97	15.58	-16.58	9.46	
09/10	365D	E	0.22	-1.16	2.13	-14.98	13.80	A1_07
10/11	365D	E	-0.16	-4.02	11.64	-21.58	14.12	A1_08
11/12	365D	E	2.28	-7.17	17.85	-26.26	13.29	A1_09
Average	365D	E	0.78	-4.11	10.54	-20.94	13.73	

Table 3 Nett revenue ($M) from the inter-regional charges for the full year all asset cases (The Table column gives the reference into Appendix 1 tables for more detailed results.)

There is some similarity in the outcomes from the Capacity and Energy Modes of calculation. However, there is greater consistency between years for the Capacity Mode.

3.6.2 10 Interval Cases

3.6.2.1 Local Maximum Demand

The results for the 10 local regional maximum demand, all asset cases are summarised in Table 4, below.

Year	Ints	C/E	Tas	SA	Vic	NSW	QLD	Table
09/10	10L	C	0.65	-22.44	16.33	-2.75	8.22	A1_13
10/11	10L	C	1.11	-26.04	17.66	6.09	1.18	A1_14
11/12	10L	C	2.91	-28.09	17.32	4.41	3.46	A1_15
Average	10L	C	1.55	-25.52	17.11	2.58	4.28	
09/10	10L	E	0.17	-13.79	10.69	-1.73	4.65	A1_19
10/11	10L	E	0.60	-20.91	16.78	1.54	1.98	A1_20
11/12	10L	E	1.36	-25.85	19.24	2.54	2.70	A1_21
Average	10L	E	0.71	-20.18	15.57	0.78	3.11	

Table 4 Nett revenue ($M) from the inter-regional charges for the 10 interval local maximum demand cases

It can be argued that at the time of maximum demand in a region, the ability for export from a region will be reduced, and that import from neighbouring regions to support the demand is likely. Accordingly, the charges attributed to interconnecting regions will not reflect the transmission usage required for export. Instead, cost for the interconnecting transmission will be largely recovered as part of the intra-regional charges.

It is, therefore, unlikely that this approach can provide a cost reflective outcome for inter-regional charges.

3.6.2.2 Maximum Export Cases

Whilst on a state by state basis the use of the maximum export cases with a capacity method maximises the interconnection charges for each region, the nett revenue position for each region is not maximised. This can be seen in Table 5.

Year	Ints	C/E	Tas	SA	Vic	NSW	QLD	Table
09/10	10E	C	9.34	-3.54	-2.53	-18.98	15.72	A1_25
10/11	10E	C	7.66	-5.38	5.14	-19.83	12.41	A1_26
11/12	10E	C	10.93	2.63	-6.80	-20.03	13.27	A1_27
Average	10E	C	9.31	-2.10	-1.40	-19.61	13.80	
09/10	10E	E	9.81	7.55	-15.82	-18.63	17.09	A1_31
10/11	10E	E	7.80	6.80	-8.65	-22.41	16.46	A1_32
11/12	10E	E	11.63	9.12	-14.39	-22.86	16.50	A1_33
Average	10E	E	9.75	7.82	-12.95	-21.30	16.69	

Table 5 Nett revenue ($M) from the inter-regional charges for the 10 interval maximum export cases

Interconnection assets support both import and export. Under import conditions it is reasonable that the consumers within the region contribute to the costs of these assets. With only high export cases, credit for the role of the transmission in supporting import is not taken into account.

It is, therefore, unlikely that this approach can provide a cost reflective outcome for inter-regional charges.

3.6.2.3 Maximum System Demand Cases

The results for the cases with 10 intervals, selected at times of maximum interconnected system demand, are summarised in Table 6, below.

Year	Ints	C/E	Tas	SA	Vic	NSW	QLD	Table
09/10	10S	C	5.94	-10.53	-0.02	-11.97	16.58	A1_37
10/11	10S	C	8.19	-16.15	0.37	-5.54	13.13	A1_38
11/12	10S	C	11.24	-9.31	-11.62	-3.30	12.99	A1_39
Average	10S	C	8.45	-12.00	-3.76	-6.93	14.23	
09/10	10S	E	4.60	-4.19	-0.26	-14.16	14.01	A1_43
10/11	10S	E	6.48	-10.91	-3.27	-5.31	13.00	A1_44
11/12	10S	E	11.58	-14.01	-7.60	1.26	8.77	A1_45
Average	10S	E	7.55	-9.70	-3.71	-6.07	11.93	

Table 6 Nett revenue ($M) from the inter-regional charges for the 10 interval maximum interconnected system demand cases

Whilst conditions at the time of maximum interconnected system demand may be critical in some regions, it is unlikely to capture critical conditions in all regions. It is, therefore, unlikely that this approach can provide a cost reflective outcome for inter-regional charges.

3.7 Iterative Inter-Regional Charge Solution

The analysis for the individual 5 region cases, discussed above, is on the basis of a single distribution of the locational ASRRs on a region by region basis.

If, however, the nett inter-regional charges are added to the locational ASRR charges, and redistributed to the points of supply, including those associated with regional interconnections, an iterative solution is required.

For example, if we take the 2009/10 case with 366 days, CRNP, all assets and capacity method, as summarised in Table A1_01, the following iterations are obtained.

Iteration	Tas	SA	Vic	NSW	Qld
1	3.40	-13.68	17.84	-17.27	9.71
2	3.17	-8.86	9.40	-12.11	8.40
3	3.17	-10.84	12.94	-13.92	8.66
4	3.18	-10.02	11.49	-13.23	8.58
5	3.17	-10.36	12.08	-13.51	8.61
6	3.17	-10.22	11.84	-13.40	8.60
7	3.17	-10.28	11.94	-13.44	8.60
8	3.17	-10.25	11.90	-13.42	8.60
9	3.17	-10.26	11.91	-13.43	8.60
10	3.17	-10.26	11.91	-13.43	8.60

Table 7 Estimated nett revenue ($M) from inter-regional charges for each region as it varies during iterations.

After 10 iterations a stable result is achieved. These iterative calculations do not require repetitive TPRICE calculations, but can be calculated from knowledge of the fraction of the locational ASRR charged to each neighbouring region. As would be expected, the magnitudes of the charges are reduced by this process, as a positive inter-regional charge will reduce the locational charges applied in that region.

The initial estimates for the three years, as per Table A1_58 are repeated in Table 8 below.

Year	Tas	SA	Vic	NSW	Qld
09/10	3.40	-13.68	17.84	-17.27	9.71
10/11	4.71	-13.80	16.42	-17.11	9.79
11/12	5.40	-11.44	12.49	-15.35	8.89
Average	4.50	-12.97	15.58	-16.58	9.46

Table 8 Estimated nett revenue ($M) from inter-regional charges for each region prior to iterative solution.

Following the iterative solution for each year, these figures become those given in Table 9.

Year	Tas	SA	Vic	NSW	Qld
09/10	3.17	-10.26	11.91	-13.43	8.60
10/11	4.34	-10.49	11.01	-13.63	8.77
11/12	4.94	-8.65	8.10	-12.48	8.09
Average	4.15	-9.80	10.34	-13.18	8.49

Table 9 Estimated nett revenue ($M) from inter-regional charges for each region following iterative solution.

The changes are quite significant, and should therefore justify such an iterative approach.

This can be readily done for any of the cases in Appendix 1, using only the information contained in that Appendix.

4. Results for NEM Wide CRNP

The results for the NEM wide system approach are given in Table 10 below.

Potentially this method offers the most consistent approach, with cost being allocated without recognition of borders, but with cost at each point of supply being split into costs associated with each asset owner, or in this case, to each TNSP.

Unfortunately, in the present investigations, inconsistencies in the transfer levels in the data from adjacent regions required that some generation be modelled at the regional borders to maintain flow conditions, within regions, to their individual region solution values.

As the allocation of generation to load is done on the basis of fault level contributions, the source impedance for these equivalent generators, and other generators, becomes significant. This is much less of an issue for the analysis of a single region.

As an example, whilst the amount of transfer from Tasmania to Victoria is well defined by the load/generation balance in Tasmania, the modelling of low generation source impedances in the Latrobe Valley makes the association between Tasmanian generation and loads in the mainland difficult.

More detailed consideration of the approach to generator source impedances is needed before a reliable NEM wide system analysis can be produced.

Table 10 below gives the results applying a generator source impedance of 0.001 per unit on 100 MVA for all modelled generators.

Year	Ints	C/E	Tas	SA	Vic	NSW	QLD	Table
09/10	365D	C	4.98	-14.00	22.31	-13.46	0.17	A1_55
10/11	365D	C	4.76	-8.77	25.28	-10.77	-10.51	A1_56
11/12	365D	C	8.18	-7.74	29.05	-22.90	-6.59	A1_57
Average	365D	C	5.97	-10.17	25.55	-15.71	-5.65	
09/10	365D	E	1.13	-7.66	6.97	-6.09	5.65	A1_58
10/11	365D	E	0.72	-5.99	15.48	-6.50	-3.72	A1_59
11/12	365D	E	3.32	-9.58	25.83	-15.60	-3.97	A1_60
Average	365D	E	1.73	-7.74	16.09	-9.39	-0.68	
09/10	10S	C	8.34	-21.62	25.30	-26.74	14.72	A1_61
10/11	10S	C	10.33	-18.40	17.21	-3.27	-5.88	A1_62
11/12	10S	C	18.21	-16.59	4.08	10.51	-16.21	A1_63
Average	10S	C	12.29	-18.87	15.53	-6.50	-2.45	
09/10	10S	E	5.69	-9.79	21.13	-27.63	10.61	A1_64
10/11	10S	E	7.01	-14.29	10.02	-4.92	2.18	A1_65
11/12	10S	E	15.62	-17.67	-0.62	8.41	-5.74	A1_66
Average	10S	E	9.44	-13.92	10.18	-8.05	2.35	

Table 10 Nett revenue ($M) from the inter-regional charges for the NEM wide system cases

Comparing these results with those in Tables 3 and 6 shows that the results are significantly different, particularly for the Queensland and Victorian regions.

An iterative solution does not apply to the NEM wide system approach, as the costs are allocated across the entire system in one step.

5. Concluding Remarks

A wide range of approaches to inter-regional transmission charges have been analysed and are summarised in Appendix 1.

5.1 Interval Selection

The various 10 interval selection methods all appear to have deficiencies in capturing the relative usage of the interconnection related assets.

It is suggested that only the full year of intervals approach can give a balanced allocation of charges, which allow for the use of interconnection assets for both import and export, as well as local connections of load and generation.

5.2 Capacity or Energy Mode

As the Capacity Mode is based on peak asset usage, it inherently is more representative of drivers for transmission augmentation.

5.3 CRNP or MCRNP

With the charges being discounted by the MCRNP method being limited to those associated with radial transmission, there is little difference between the inter-regional charge outcomes. As the allocation of appropriate ratings in the MCRNP approach is somewhat subjective, the standard CRNP approach would appear to be superior.

5.4 All Assets or Cumulative New Assets

The approach of using only cumulative new assets, associated with enhancing or maintaining interconnection capacity, raises the questions of when the new asset accumulation begins.

There is also an issue with identifying new assets to enhance export capability. If they were primarily built for increasing import capability, should associated increases in export charges be paid? Over a period of time the role of the interconnection may change from dominantly import to dominantly export. Similarly, significant load or generation may be connected to the interconnection assets changing their role.

The TPRICE CRNP methodology will assess the relative usage of the assets in supporting export, and this assessment will vary over time as the network develops and the role of assets change.

Thus using all assets, as an accumulation of all new assets over history, and allowing TPRICE to assess their relevance to supporting export, is seen as a simple and less subjective approach.

5.5 Load Data Accuracy

The network load and generation data prepared by the various TNSPs contained significant errors. It should be an underlying requirement that an accurate and self consistent set of data be available for determining the inter-regional charges. It is suggested that AEMO, in its National capacity, prepares NEM wide data sets that can be split into individual regions, and be used as the basis for individual regional calculations. AEMO already prepares such a NEM wide set of TPRICE load and generation data as a starting point for the calculation of Marginal Loss Factors. A TPRICE ancillary program[2], "REDUCE", can automatically reduce system-wide data to a regional basis, including the modelling of interconnection transfers, by the creation of equivalent loads and generators.

This data could then be used as a starting point for the TNSPs to prepare their models. Some splitting of loads etc may be necessary. The matching of bus numbers, cost data and supply points could be a once-off task.

5.6 Generator Source Impedances

Some sensitivity to the generation source impedances was observed during the conduct of these studies. It is suggested that a consistent approach to source impedances is adopted by all TNSPs in relation to inter-regional charge determination.

5.7 NEM Wide Cost Allocation

Prior to the current investigation, I held a view that a NEM wide approach would provide the most effective assessment of inter-regional charges. It would also offer the ability to more effectively determine the locational charges within regions, taking into account the inter-regional charges that apply for a particular location.

However, for this to be effective, a more consistent approach would need to be taken to the assigning of generator impedances, so that allocation using a fault contribution approach has a firm basis.

At this stage, the calculation of inter-regional charges based on individual region calculations is considered to be more reliable.

[2] As there has been no known usage of this software for more than a decade, it has been discontinued.

5.8 Iterative Solution Approach

As per the Section 3.7, above, it would appear that the effect of an iterative approach to inter-regional charges is significant, and may be sufficient to justify its use.

If this approach were used, TNSPs would need to share initial pricing outcomes that gives the split of their locational ASRR into intra and inter-regional components. With this information, all TNSPs could carry out the simple iterative calculations to determine the final outcome, or calculations could be done by a co-ordinating body.

5.9 Overall View

It is suggested that the full year approach, using Capacity Mode, standard CRNP, and with all assets, is likely to result in the most applicable methodology for inter-regional transmission charges.

This is because:

- Table 2 shows reasonable consistency between annual outcomes
- Capability Mode most closely reflects transmission augmentation drivers
- The full year approach aligns with the methodology used by most TNSPs in determining intra-regional locational charges
- It avoids the need to select a limited number of trading intervals that may not adequately capture the usage of interconnections for both import and export.

5.10 Common Service Charges

This analysis has not addressed common service, or postage stamp charges that could be included in inter-regional charges.

A possible approach would be to apply the ratio of inter-regional locational charges to total locational charges, to the total common service and postage stamp charges, to determine appropriate inter-regional common service charges.

Roger Bolden
21 September 2012

6. Appendix 1 - Summary of TPRICE Results

This appendix provides a summary of the results from TPRICE runs. The index below provides a reference into the result tables.

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Table A1_58: 09/10, 365 days , CRNP , Energy, all assets, combined regions
Table A1_59: 10/11, 365 days , CRNP , Energy, all assets, combined regions
Table A1_60: 11/12, 365 days , CRNP , Energy, all assets, combined regions
Table A1_61: 09/10, 10 system, CRNP , Capcty, all assets, combined regions
Table A1_62: 10/11, 10 system, CRNP , Capcty, all assets, combined regions
Table A1_63: 11/12, 10 system, CRNP , Capcty, all assets, combined regions
Table A1_64: 09/10, 10 system, CRNP , Energy, all assets, combined regions
Table A1_65: 10/11, 10 system, CRNP , Energy, all assets, combined regions
Table A1_66: 11/12, 10 system, CRNP , Energy, all assets, combined regions
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Each table is broken into two parts. Part(a) gives the results of TPRICE runs, for Tables A1_1 to A1_54 each row represents a separate TPRICE run for the associated region. For Tables A1_55 to A1_66 each table represents a single run of TPRICE with the combined regions represented.

Each row in the tables gives the breakdown of the allocation of the locational ASRR to the various regions. Part (b) of the tables gives the corresponding nett revenue for each region from the inter-regional charges given in the Part (a) table.

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	45.350	0.000	3.929	0.000	0.000	0.000	49.279
SA	0.000	79.929	17.578	0.000	0.000	0.000	97.507
Vic	0.529	31.259	173.978	30.732	0.000	0.000	236.498
NSW	0.000	0.000	23.174	231.440	7.579	0.000	262.193
QLD	0.000	0.000	0.000	17.289	189.710	0.000	206.999

Table A1_01(a): Interconnection charges ($M) for 2009/10, 365 day period, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
3.400	-13.681	17.839	-17.268	9.710

Table A1_01(b): Nett inter-regional revenue, conditions as per A1_01(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	53.313	0.000	5.384	0.000	0.000	0.000	58.697
SA	0.000	89.305	18.758	0.000	0.000	0.286	108.349
Vic	0.677	32.560	175.629	31.302	0.000	0.000	240.168
NSW	0.000	0.000	23.977	285.031	8.231	0.000	317.239
QLD	0.000	0.000	0.000	18.017	221.011	0.924	239.951

Table A1_02(a): Interconnection charges ($M) for 2010/11, 365 day period, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
4.707	-13.802	16.420	-17.111	9.786

Table A1_02(b): Nett inter-regional revenue, conditions as per A1_02(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	56.539	0.000	6.221	0.000	0.000	0.000	62.759
SA	0.000	95.599	22.782	0.000	0.000	0.277	118.658
Vic	0.821	34.217	177.221	33.636	0.000	0.000	245.895
NSW	0.000	0.000	27.178	319.846	8.275	0.000	355.299
QLD	0.000	0.000	0.000	17.168	247.819	4.353	269.340

Table A1_03(a): Interconnection charges ($M) for 2011/12, 365 day period, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
5.400	-11.435	12.493	-15.351	8.893

Table A1_03(b): Nett inter-regional revenue, conditions as per A1_03(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	40.506	0.000	3.917	0.000	0.000	4.856	49.279
SA	0.000	72.813	17.451	0.000	0.000	7.242	97.507
Vic	0.529	31.256	170.668	30.732	0.000	3.313	236.498
NSW	0.000	0.000	23.174	231.440	7.579	0.000	262.193
QLD	0.000	0.000	0.000	16.321	182.796	7.882	206.999

Table A1_04(a): Interconnection charges ($M) for 2009/10, 365 day period, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
3.388	-13.805	17.975	-16.300	8.742

Table A1_04(b): Nett inter-regional revenue, conditions as per A1_04(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	48.185	0.000	5.364	0.000	0.000	5.149	58.697
SA	0.000	82.397	18.731	0.000	0.000	7.221	108.349
Vic	0.677	32.554	172.915	31.301	0.000	2.721	240.168
NSW	0.000	0.000	23.977	285.031	8.231	0.000	317.239
QLD	0.000	0.000	0.000	17.011	214.673	8.266	239.951

Table A1_05(a): Interconnection charges ($M) for 2010/11, 365 day period, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
4.687	-13.823	16.460	-16.104	8.780

Table A1_05(b): Nett inter-regional revenue, conditions as per A1_05(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.627	0.000	6.207	0.000	0.000	5.925	62.759
SA	0.000	89.057	22.677	0.000	0.000	6.924	118.658
Vic	0.821	34.214	173.635	33.635	0.000	3.589	245.895
NSW	0.000	0.000	27.178	319.846	8.275	0.000	355.299
QLD	0.000	0.000	0.000	16.167	242.138	11.035	269.340

Table A1_06(a): Interconnection charges ($M) for 2011/12, 365 day period, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
5.386	-11.537	12.608	-14.349	7.892

Table A1_06(b): Nett inter-regional revenue, conditions as per A1_06(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	48.650	0.000	0.629	0.000	0.000	0.000	49.279
SA	0.000	87.418	10.089	0.000	0.000	0.000	97.507
Vic	0.414	11.250	209.623	15.210	0.000	0.000	236.498
NSW	0.000	0.000	14.026	247.686	0.480	0.000	262.193
QLD	0.000	0.000	0.000	14.276	192.723	0.000	206.999

Table A1_07(a): Interconnection charges ($M) for 2009/10, 365 day period, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.215	-1.161	2.130	-14.980	13.796

Table A1_07(b): Nett inter-regional revenue, conditions as per A1_07(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	58.363	0.000	0.334	0.000	0.000	0.000	58.697
SA	0.000	98.143	9.920	0.000	0.000	0.286	108.349
Vic	0.489	13.935	204.618	21.126	0.000	0.000	240.168
NSW	0.000	0.000	13.658	303.014	0.566	0.000	317.239
QLD	0.000	0.000	0.000	14.681	224.346	0.924	239.951

Table A1_08(a): Interconnection charges ($M) for 2010/11, 365 day period, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
-0.155	-4.015	11.638	-21.583	14.115

Table A1_08(b): Nett inter-regional revenue, conditions as per A1_08(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	60.149	0.000	2.611	0.000	0.000	0.000	62.759
SA	0.000	107.946	10.435	0.000	0.000	0.277	118.658
Vic	0.332	17.602	201.028	26.932	0.000	0.000	245.895
NSW	0.000	0.000	13.967	341.119	0.212	0.000	355.299
QLD	0.000	0.000	0.000	13.503	251.483	4.353	269.340

Table A1_09(a): Interconnection charges ($M) for 2011/12, 365 day period, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
2.279	-7.167	17.853	-26.256	13.291

Table A1_09(b): Nett inter-regional revenue, conditions as per A1_09(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	43.794	0.000	0.629	0.000	0.000	4.856	49.279
SA	0.000	80.211	10.053	0.000	0.000	7.242	97.507
Vic	0.414	11.250	206.311	15.210	0.000	3.313	236.498
NSW	0.000	0.000	14.026	247.686	0.480	0.000	262.193
QLD	0.000	0.000	0.000	13.570	185.547	7.882	206.999

Table A1_10(a): Interconnection charges ($M) for 2009/10, 365 day period, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.215	-1.197	2.166	-14.274	13.090

Table A1_10(b): Nett inter-regional revenue, conditions as per A1_10(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	53.215	0.000	0.334	0.000	0.000	5.149	58.697
SA	0.000	91.214	9.914	0.000	0.000	7.221	108.349
Vic	0.489	13.934	201.898	21.126	0.000	2.721	240.168
NSW	0.000	0.000	13.658	303.014	0.566	0.000	317.239
QLD	0.000	0.000	0.000	13.992	217.693	8.266	239.951

Table A1_11(a): Interconnection charges ($M) for 2010/11, 365 day period, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
-0.155	-4.020	11.643	-20.894	13.426

Table A1_11(b): Nett inter-regional revenue, conditions as per A1_11(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	54.227	0.000	2.607	0.000	0.000	5.925	62.759
SA	0.000	101.333	10.401	0.000	0.000	6.924	118.658
Vic	0.332	17.601	197.441	26.932	0.000	3.589	245.895
NSW	0.000	0.000	13.967	341.119	0.212	0.000	355.299
QLD	0.000	0.000	0.000	12.736	245.569	11.035	269.340

Table A1_12(a): Interconnection charges ($M) for 2011/12, 365 day period, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
2.275	-7.200	17.890	-25.489	12.524

Table A1_12(b): Nett inter-regional revenue, conditions as per A1_12(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	48.633	0.000	0.646	0.000	0.000	0.000	49.279
SA	0.000	94.310	2.936	0.000	0.000	0.261	97.507
Vic	0.000	25.377	211.121	0.000	0.000	0.000	236.498
NSW	0.000	0.000	5.461	256.623	0.109	0.000	262.193
QLD	0.000	0.000	0.000	8.324	198.675	0.000	206.999

Table A1_13(a): Interconnection charges ($M) for 2009/10, 10 interval local, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.646	-22.441	16.334	-2.754	8.215

Table A1_13(b): Nett inter-regional revenue, conditions as per A1_13(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	57.457	0.000	1.241	0.000	0.000	0.000	58.697
SA	0.000	104.244	3.731	0.000	0.000	0.374	108.349
Vic	0.136	29.773	210.258	0.000	0.000	0.000	240.168
NSW	0.000	0.000	7.273	307.353	2.613	0.000	317.239
QLD	0.000	0.000	0.000	3.792	235.236	0.924	239.951

Table A1_14(a): Interconnection charges ($M) for 2010/11, 10 interval local, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
1.105	-26.042	17.664	6.094	1.179

Table A1_14(b): Nett inter-regional revenue, conditions as per A1_14(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	59.625	0.000	2.908	0.000	0.000	0.226	62.759
SA	0.000	118.126	0.170	0.000	0.000	0.362	118.658
Vic	0.000	28.257	216.622	1.015	0.000	0.000	245.895
NSW	0.000	0.000	8.875	345.575	0.849	0.000	355.299
QLD	0.000	0.000	0.000	4.304	260.683	4.353	269.340

Table A1_15(a): Interconnection charges ($M) for 2011/12, 10 interval local, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
2.908	-28.087	17.319	4.405	3.455

Table A1_15(b): Nett inter-regional revenue, conditions as per A1_15(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	43.428	0.000	0.643	0.000	0.000	5.209	49.279
SA	0.000	84.610	2.889	0.000	0.000	10.007	97.507
Vic	0.000	25.374	207.188	0.000	0.000	3.935	236.498
NSW	0.000	0.000	5.461	256.623	0.109	0.000	262.193
QLD	0.000	0.000	0.000	7.598	191.261	8.139	206.999

Table A1_16(a): Interconnection charges ($M) for 2009/10, 10 interval local, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.643	-22.485	16.381	-2.028	7.489

Table A1_16(b): Nett inter-regional revenue, conditions as per A1_16(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	51.868	0.000	1.233	0.000	0.000	5.596	58.697
SA	0.000	94.633	3.683	0.000	0.000	10.033	108.349
Vic	0.136	29.767	206.746	0.000	0.000	3.518	240.168
NSW	0.000	0.000	7.273	307.353	2.613	0.000	317.239
QLD	0.000	0.000	0.000	3.281	228.090	8.580	239.951

Table A1_17(a): Interconnection charges ($M) for 2010/11, 10 interval local, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
1.097	-26.084	17.714	6.605	0.668

Table A1_17(b): Nett inter-regional revenue, conditions as per A1_17(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	53.236	0.000	2.900	0.000	0.000	6.624	62.759
SA	0.000	108.162	0.169	0.000	0.000	10.327	118.658
Vic	0.000	28.254	212.436	1.015	0.000	4.188	245.895
NSW	0.000	0.000	8.875	345.575	0.849	0.000	355.299
QLD	0.000	0.000	0.000	3.694	254.539	11.107	269.340

Table A1_18(a): Interconnection charges ($M) for 2011/12, 10 interval local, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
2.900	-28.085	17.325	5.015	2.845

Table A1_18(b): Nett inter-regional revenue, conditions as per A1_18(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	49.106	0.000	0.174	0.000	0.000	0.000	49.279
SA	0.000	95.648	1.598	0.000	0.000	0.261	97.507
Vic	0.000	15.390	221.107	0.000	0.000	0.000	236.498
NSW	0.000	0.000	2.925	259.245	0.023	0.000	262.193
QLD	0.000	0.000	0.000	4.675	202.324	0.000	206.999

Table A1_19(a): Interconnection charges ($M) for 2009/10, 10 interval local, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.174	-13.792	10.693	-1.727	4.652

Table A1_19(b): Nett inter-regional revenue, conditions as per A1_19(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	58.051	0.000	0.647	0.000	0.000	0.000	58.697
SA	0.000	105.587	2.389	0.000	0.000	0.374	108.349
Vic	0.043	23.295	216.831	0.000	0.000	0.000	240.168
NSW	0.000	0.000	3.522	313.119	0.598	0.000	317.239
QLD	0.000	0.000	0.000	2.579	236.448	0.924	239.951

Table A1_20(a): Interconnection charges ($M) for 2010/11, 10 interval local, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.604	-20.906	16.780	1.541	1.981

Table A1_20(b): Nett inter-regional revenue, conditions as per A1_20(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	61.169	0.000	1.364	0.000	0.000	0.226	62.759
SA	0.000	118.261	0.035	0.000	0.000	0.362	118.658
Vic	0.000	25.883	219.732	0.279	0.000	0.000	245.895
NSW	0.000	0.000	5.522	349.522	0.255	0.000	355.299
QLD	0.000	0.000	0.000	2.959	262.028	4.353	269.340

Table A1_21(a): Interconnection charges ($M) for 2011/12, 10 interval local, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
1.364	-25.848	19.241	2.539	2.704

Table A1_21(b): Nett inter-regional revenue, conditions as per A1_21(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	43.898	0.000	0.173	0.000	0.000	5.209	49.279
SA	0.000	85.926	1.574	0.000	0.000	10.007	97.507
Vic	0.000	15.390	217.173	0.000	0.000	3.935	236.498
NSW	0.000	0.000	2.925	259.245	0.023	0.000	262.193
QLD	0.000	0.000	0.000	4.257	194.602	8.139	206.999

Table A1_22(a): Interconnection charges ($M) for 2009/10, 10 interval local, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.173	-13.816	10.718	-1.309	4.234

Table A1_22(b): Nett inter-regional revenue, conditions as per A1_22(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	52.457	0.000	0.644	0.000	0.000	5.596	58.697
SA	0.000	95.952	2.364	0.000	0.000	10.033	108.349
Vic	0.043	23.291	213.316	0.000	0.000	3.518	240.168
NSW	0.000	0.000	3.522	313.119	0.598	0.000	317.239
QLD	0.000	0.000	0.000	2.245	229.126	8.580	239.951

Table A1_23(a): Interconnection charges ($M) for 2010/11, 10 interval local, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.601	-20.927	16.804	1.875	1.647

Table A1_23(b): Nett inter-regional revenue, conditions as per A1_23(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	54.774	0.000	1.362	0.000	0.000	6.624	62.759
SA	0.000	108.296	0.035	0.000	0.000	10.327	118.658
Vic	0.000	25.881	215.546	0.279	0.000	4.188	245.895
NSW	0.000	0.000	5.522	349.522	0.255	0.000	355.299
QLD	0.000	0.000	0.000	2.541	255.691	11.107	269.340

Table A1_24(a): Interconnection charges ($M) for 2011/12, 10 interval local, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
1.362	-25.846	19.241	2.957	2.286

Table A1_24(b): Nett inter-regional revenue, conditions as per A1_24(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	39.398	0.000	9.881	0.000	0.000	0.000	49.279
SA	0.000	67.636	29.610	0.000	0.000	0.261	97.507
Vic	0.544	33.150	168.675	34.129	0.000	0.000	236.498
NSW	0.000	0.000	30.864	224.532	6.797	0.000	262.193
QLD	0.000	0.000	0.000	22.514	184.485	0.000	206.999

Table A1_25(a): Interconnection charges ($M) for 2009/10, 10 interval export, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
9.337	-3.540	-2.532	-18.982	15.717

Table A1_25(b): Nett inter-regional revenue, conditions as per A1_25(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.410	0.000	8.287	0.000	0.000	0.000	58.697
SA	0.000	77.605	30.458	0.000	0.000	0.286	108.349
Vic	0.630	35.842	166.644	37.053	0.000	0.000	240.168
NSW	0.000	0.000	29.637	277.512	10.089	0.000	317.239
QLD	0.000	0.000	0.000	22.502	216.525	0.924	239.951

Table A1_26(a): Interconnection charges ($M) for 2010/11, 10 interval export, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
7.657	-5.384	5.143	-19.829	12.413

Table A1_26(b): Nett inter-regional revenue, conditions as per A1_26(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.760	0.000	11.773	0.000	0.000	0.226	62.759
SA	0.000	80.564	37.817	0.000	0.000	0.277	118.658
Vic	0.842	35.192	171.773	38.087	0.000	0.000	245.895
NSW	0.000	0.000	31.328	317.139	6.832	0.000	355.299
QLD	0.000	0.000	0.000	20.101	244.886	4.353	269.340

Table A1_27(a): Interconnection charges ($M) for 2011/12, 10 interval export, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
10.931	2.625	-6.797	-20.028	13.269

Table A1_27(b): Nett inter-regional revenue, conditions as per A1_27(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	34.018	0.000	9.847	0.000	0.000	5.414	49.279
SA	0.000	58.193	29.137	0.000	0.000	10.176	97.507
Vic	0.544	33.147	164.127	34.129	0.000	4.550	236.498
NSW	0.000	0.000	30.864	224.532	6.797	0.000	262.193
QLD	0.000	0.000	0.000	21.320	176.902	8.777	206.999

Table A1_28(a): Interconnection charges ($M) for 2009/10, 10 interval export, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
9.303	-4.010	-2.028	-17.788	14.523

Table A1_28(b): Nett inter-regional revenue, conditions as per A1_28(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.735	0.000	8.232	0.000	0.000	5.730	58.697
SA	0.000	67.683	30.032	0.000	0.000	10.634	108.349
Vic	0.630	35.836	162.339	37.052	0.000	4.311	240.168
NSW	0.000	0.000	29.637	277.512	10.089	0.000	317.239
QLD	0.000	0.000	0.000	21.338	209.158	9.455	239.951

Table A1_29(a): Interconnection charges ($M) for 2010/11, 10 interval export, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
7.602	-5.804	5.617	-18.664	11.249

Table A1_29(b): Nett inter-regional revenue, conditions as per A1_29(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.260	0.000	11.738	0.000	0.000	6.762	62.759
SA	0.000	70.884	37.451	0.000	0.000	10.323	118.658
Vic	0.842	35.189	166.856	38.087	0.000	4.920	245.895
NSW	0.000	0.000	31.328	317.139	6.832	0.000	355.299
QLD	0.000	0.000	0.000	18.858	238.685	11.797	269.340

Table A1_30(a): Interconnection charges ($M) for 2011/12, 10 interval export, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
10.896	2.262	-6.399	-18.785	12.026

Table A1_30(b): Nett inter-regional revenue, conditions as per A1_30(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	39.093	0.000	10.186	0.000	0.000	0.000	49.279
SA	0.000	66.712	30.534	0.000	0.000	0.261	97.507
Vic	0.373	22.986	188.763	24.376	0.000	0.000	236.498
NSW	0.000	0.000	22.834	234.066	5.293	0.000	262.193
QLD	0.000	0.000	0.000	22.383	184.616	0.000	206.999

Table A1_31(a): Interconnection charges ($M) for 2009/10, 10 interval export, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
9.813	7.548	-15.819	-18.632	17.090

Table A1_31(b): Nett inter-regional revenue, conditions as per A1_31(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.322	0.000	8.375	0.000	0.000	0.000	58.697
SA	0.000	75.629	32.435	0.000	0.000	0.286	108.349
Vic	0.571	25.637	184.696	29.264	0.000	0.000	240.168
NSW	0.000	0.000	23.313	287.152	6.774	0.000	317.239
QLD	0.000	0.000	0.000	23.237	215.790	0.924	239.951

Table A1_32(a): Interconnection charges ($M) for 2010/11, 10 interval export, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
7.804	6.798	-8.651	-22.414	16.463

Table A1_32(b): Nett inter-regional revenue, conditions as per A1_32(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.440	0.000	12.094	0.000	0.000	0.226	62.759
SA	0.000	78.792	39.590	0.000	0.000	0.277	118.658
Vic	0.469	30.470	184.203	30.752	0.000	0.000	245.895
NSW	0.000	0.000	24.398	326.398	4.503	0.000	355.299
QLD	0.000	0.000	0.000	21.005	243.982	4.353	269.340

Table A1_33(a): Interconnection charges ($M) for 2011/12, 10 interval export, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
11.625	9.120	-14.391	-22.856	16.502

Table A1_33(b): Nett inter-regional revenue, conditions as per A1_33(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	33.709	0.000	10.157	0.000	0.000	5.414	49.279
SA	0.000	57.355	29.975	0.000	0.000	10.176	97.507
Vic	0.373	22.985	184.214	24.376	0.000	4.550	236.498
NSW	0.000	0.000	22.834	234.066	5.293	0.000	262.193
QLD	0.000	0.000	0.000	21.133	177.089	8.777	206.999

Table A1_34(a): Interconnection charges ($M) for 2009/10, 10 interval export, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
9.784	6.990	-15.232	-17.382	15.840

Table A1_34(b): Nett inter-regional revenue, conditions as per A1_34(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.649	0.000	8.319	0.000	0.000	5.730	58.697
SA	0.000	65.749	31.966	0.000	0.000	10.634	108.349
Vic	0.571	25.635	180.387	29.264	0.000	4.311	240.168
NSW	0.000	0.000	23.313	287.152	6.774	0.000	317.239
QLD	0.000	0.000	0.000	22.117	208.379	9.455	239.951

Table A1_35(a): Interconnection charges ($M) for 2010/11, 10 interval export, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
7.748	6.331	-8.128	-21.294	15.343

Table A1_35(b): Nett inter-regional revenue, conditions as per A1_35(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	43.942	0.000	12.055	0.000	0.000	6.762	62.759
SA	0.000	69.122	39.213	0.000	0.000	10.323	118.658
Vic	0.469	30.468	179.285	30.752	0.000	4.920	245.895
NSW	0.000	0.000	24.398	326.398	4.503	0.000	355.299
QLD	0.000	0.000	0.000	19.749	237.794	11.797	269.340

Table A1_36(a): Interconnection charges ($M) for 2011/12, 10 interval export, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
11.586	8.745	-13.977	-21.600	15.246

Table A1_36(b): Nett inter-regional revenue, conditions as per A1_36(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	43.342	0.000	5.938	0.000	0.000	0.000	49.279
SA	0.000	84.209	13.037	0.000	0.000	0.261	97.507
Vic	0.000	23.568	202.199	10.730	0.000	0.000	236.498
NSW	0.000	0.000	15.339	246.758	0.096	0.000	262.193
QLD	0.000	0.000	0.000	16.673	190.326	0.000	206.999

Table A1_37(a): Interconnection charges ($M) for 2009/10, 10 interval system, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
5.938	-10.531	-0.016	-11.968	16.577

Table A1_37(b): Nett inter-regional revenue, conditions as per A1_37(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.361	0.000	8.336	0.000	0.000	0.000	58.697
SA	0.000	100.811	7.164	0.000	0.000	0.374	108.349
Vic	0.149	23.314	211.094	5.611	0.000	0.000	240.168
NSW	0.000	0.000	13.208	301.333	2.698	0.000	317.239
QLD	0.000	0.000	0.000	15.830	223.197	0.924	239.951

Table A1_38(a): Interconnection charges ($M) for 2010/11, 10 interval system, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
8.187	-16.150	0.366	-5.535	13.132

Table A1_38(b): Nett inter-regional revenue, conditions as per A1_38(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	51.521	0.000	11.238	0.000	0.000	0.000	62.759
SA	0.000	100.838	17.543	0.000	0.000	0.277	118.658
Vic	0.000	26.849	207.412	11.633	0.000	0.000	245.895
NSW	0.000	0.000	21.325	333.593	0.381	0.000	355.299
QLD	0.000	0.000	0.000	13.371	251.615	4.353	269.340

Table A1_39(a): Interconnection charges ($M) for 2011/12, 10 interval system, standard CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
11.238	-9.306	-11.624	-3.298	12.990

Table A1_39(b): Nett inter-regional revenue, conditions as per A1_39(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	38.188	0.000	5.908	0.000	0.000	5.183	49.279
SA	0.000	74.768	12.818	0.000	0.000	9.921	97.507
Vic	0.000	23.566	197.942	10.730	0.000	4.259	236.498
NSW	0.000	0.000	15.339	246.758	0.096	0.000	262.193
QLD	0.000	0.000	0.000	15.830	183.111	8.058	206.999

Table A1_40(a): Interconnection charges ($M) for 2009/10, 10 interval system, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
5.908	-10.748	0.231	-11.125	15.734

Table A1_40(b): Nett inter-regional revenue, conditions as per A1_40(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.713	0.000	8.289	0.000	0.000	5.695	58.697
SA	0.000	90.462	7.061	0.000	0.000	10.826	108.349
Vic	0.149	23.308	207.532	5.611	0.000	3.569	240.168
NSW	0.000	0.000	13.208	301.333	2.698	0.000	317.239
QLD	0.000	0.000	0.000	14.969	215.929	9.053	239.951

Table A1_41(a): Interconnection charges ($M) for 2010/11, 10 interval system, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
8.140	-16.247	0.510	-4.674	12.271

Table A1_41(b): Nett inter-regional revenue, conditions as per A1_41(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.842	0.000	11.204	0.000	0.000	6.713	62.759
SA	0.000	90.790	17.398	0.000	0.000	10.470	118.658
Vic	0.000	26.847	203.177	11.633	0.000	4.238	245.895
NSW	0.000	0.000	21.325	333.593	0.381	0.000	355.299
QLD	0.000	0.000	0.000	12.653	245.295	11.392	269.340

Table A1_42(a): Interconnection charges ($M) for 2011/12, 10 interval system, modified CRNP, capacity method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
11.204	-9.449	-11.447	-2.580	12.272

Table A1_42(b): Nett inter-regional revenue, conditions as per A1_42(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.684	0.000	4.596	0.000	0.000	0.000	49.279
SA	0.000	89.127	8.119	0.000	0.000	0.261	97.507
Vic	0.000	12.307	218.266	5.925	0.000	0.000	236.498
NSW	0.000	0.000	5.775	256.396	0.021	0.000	262.193
QLD	0.000	0.000	0.000	14.035	192.964	0.000	206.999

Table A1_43(a): Interconnection charges ($M) for 2009/10, 10 interval system, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
4.596	-4.188	-0.258	-14.164	14.014

Table A1_43(b): Nett inter-regional revenue, conditions as per A1_43(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	52.193	0.000	6.505	0.000	0.000	0.000	58.697
SA	0.000	103.206	4.770	0.000	0.000	0.374	108.349
Vic	0.024	15.677	222.787	1.680	0.000	0.000	240.168
NSW	0.000	0.000	9.374	307.297	0.568	0.000	317.239
QLD	0.000	0.000	0.000	13.570	225.457	0.924	239.951

Table A1_44(a): Interconnection charges ($M) for 2010/11, 10 interval system, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
6.481	-10.907	-3.268	-5.308	13.002

Table A1_44(b): Nett inter-regional revenue, conditions as per A1_44(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	51.181	0.000	11.578	0.000	0.000	0.000	62.759
SA	0.000	109.787	8.595	0.000	0.000	0.277	118.658
Vic	0.000	22.600	219.885	3.409	0.000	0.000	245.895
NSW	0.000	0.000	13.440	341.728	0.130	0.000	355.299
QLD	0.000	0.000	0.000	8.904	256.083	4.353	269.340

Table A1_45(a): Interconnection charges ($M) for 2011/12, 10 interval system, standard CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
11.578	-14.005	-7.604	1.257	8.774

Table A1_45(b): Nett inter-regional revenue, conditions as per A1_45(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	39.516	0.000	4.581	0.000	0.000	5.183	49.279
SA	0.000	79.560	8.026	0.000	0.000	9.921	97.507
Vic	0.000	12.306	214.008	5.925	0.000	4.259	236.498
NSW	0.000	0.000	5.775	256.396	0.021	0.000	262.193
QLD	0.000	0.000	0.000	13.251	185.690	8.058	206.999

Table A1_46(a): Interconnection charges ($M) for 2009/10, 10 interval system, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
4.581	-4.280	-0.151	-13.380	13.230

Table A1_46(b): Nett inter-regional revenue, conditions as per A1_46(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	46.533	0.000	6.470	0.000	0.000	5.695	58.697
SA	0.000	92.812	4.712	0.000	0.000	10.826	108.349
Vic	0.024	15.674	219.221	1.680	0.000	3.569	240.168
NSW	0.000	0.000	9.374	307.297	0.568	0.000	317.239
QLD	0.000	0.000	0.000	12.907	217.991	9.053	239.951

Table A1_47(a): Interconnection charges ($M) for 2010/11, 10 interval system, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
6.446	-10.962	-3.178	-4.645	12.339

Table A1_47(b): Nett inter-regional revenue, conditions as per A1_47(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.504	0.000	11.542	0.000	0.000	6.713	62.759
SA	0.000	99.668	8.520	0.000	0.000	10.470	118.658
Vic	0.000	22.599	215.649	3.409	0.000	4.238	245.895
NSW	0.000	0.000	13.440	341.728	0.130	0.000	355.299
QLD	0.000	0.000	0.000	8.451	249.497	11.392	269.340

Table A1_48(a): Interconnection charges ($M) for 2011/12, 10 interval system, modified CRNP, energy method, all assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
11.542	-14.079	-7.494	1.710	8.321

Table A1_48(b): Nett inter-regional revenue, conditions as per A1_48(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	2.134	0.000	0.077	0.000	0.000	0.000	2.211
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	6.106	28.266	0.571	0.000	34.943
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_49(a): Interconnection charges ($M) for 2009/10, 365 day period, standard CRNP, capacity method, cumulative new assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.077	0.000	-6.183	6.677	-0.571

Table A1_49(b): Nett inter-regional revenue, conditions as per A1_109(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	3.141	0.000	0.150	0.000	0.000	0.000	3.291
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	8.556	45.895	0.870	0.000	55.321
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_50(a): Interconnection charges ($M) for 2010/11, 365 day period, standard CRNP, capacity method, cumulative new assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.150	0.000	-8.706	9.426	-0.870

Table A1_50(b): Nett inter-regional revenue, conditions as per A1_110(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	3.582	0.000	0.178	0.000	0.000	0.000	3.760
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	9.638	67.726	1.096	0.000	78.461
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_51(a): Interconnection charges ($M) for 2011/12, 365 day period, standard CRNP, capacity method, cumulative new assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.178	0.000	-9.816	10.735	-1.096

Table A1_51(b): Nett inter-regional revenue, conditions as per A1_111(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	2.026	0.000	0.185	0.000	0.000	0.000	2.211
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	8.613	26.254	0.076	0.000	34.943
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_52(a): Interconnection charges ($M) for 2009/10, 10 interval export, standard CRNP, capacity method, cumulative new assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.185	0.000	-8.798	8.689	-0.076

Table A1_52(b): Nett inter-regional revenue, conditions as per A1_112(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	2.992	0.000	0.298	0.000	0.000	0.000	3.291
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	11.973	43.131	0.218	0.000	55.322
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_53(a): Interconnection charges ($M) for 2010/11, 10 interval export, standard CRNP, capacity method, cumulative new assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.298	0.000	-12.272	12.191	-0.218

Table A1_53(b): Nett inter-regional revenue, conditions as per A1_113(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	3.408	0.000	0.352	0.000	0.000	0.000	3.760
SA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vic	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NSW	0.000	0.000	13.479	64.622	0.360	0.000	78.461
QLD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table A1_54(a): Interconnection charges ($M) for 2011/12, 10 interval export, standard CRNP, capacity method, cumulative new assets. Based on individual region analysis.

Tas	SA	Vic	NSW	QLD
0.352	0.000	-13.831	13.839	-0.360

Table A1_54(b): Nett inter-regional revenue, conditions as per A1_114(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	42.228	0.613	6.241	0.198	0.000	0.000	49.280
SA	0.637	72.505	21.143	2.648	0.313	0.261	97.507
Vic	1.088	35.486	158.854	31.383	9.686	0.000	236.497
NSW	0.352	2.636	26.916	218.867	13.422	0.000	262.193
QLD	0.000	0.002	1.033	22.557	183.407	0.000	206.999

Table A1_55(a): Interconnection charges for 2009/10, 365 day period, standard CRNP, capacity method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
4.975	-13.996	22.310	-13.460	0.171

Table A1_55(b): Nett inter-regional payments, conditions as per A1_97(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.400	0.817	7.277	0.204	0.000	0.000	58.698
SA	1.284	79.195	23.074	3.915	0.595	0.286	108.349
Vic	1.593	33.446	154.629	37.558	12.942	0.000	240.168
NSW	0.658	3.368	28.977	263.990	20.246	0.000	317.239
QLD	0.001	0.002	0.927	22.339	215.760	0.924	239.953

Table A1_56(a): Interconnection charges for 2010/11, 365 day period, standard CRNP, capacity method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
4.762	-8.765	25.284	-10.767	-10.514

Table A1_56(b): Nett inter-regional payments, conditions as per A1_98(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	50.862	1.593	10.044	0.261	0.000	0.000	62.760
SA	1.674	84.532	26.982	4.620	0.573	0.277	118.658
Vic	1.541	36.145	151.831	43.966	12.412	0.000	245.895
NSW	0.506	3.845	27.450	302.176	21.322	0.000	355.299
QLD	0.000	0.001	0.539	27.175	237.271	4.353	269.339

Table A1_57(a): Interconnection charges for 2011/12, 365 day period, standard CRNP, capacity method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
8.177	-7.735	29.049	-22.899	-6.592

Table A1_57(b): Nett inter-regional payments, conditions as per A1_99(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	47.591	0.029	1.651	0.008	0.000	0.000	49.279
SA	0.028	81.589	14.347	1.220	0.061	0.261	97.506
Vic	0.521	21.825	196.170	15.337	2.644	0.000	236.497
NSW	0.007	1.465	17.042	238.377	5.302	0.000	262.193
QLD	0.000	0.000	0.318	13.343	193.338	0.000	206.999

Table A1_58(a): Interconnection charges for 2009/10, 365 day period, standard CRNP, energy method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
1.132	-7.663	6.969	-6.092	5.654

Table A1_58(b): Nett inter-regional payments, conditions as per A1_100(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	57.278	0.035	1.379	0.005	0.000	0.000	58.697
SA	0.061	92.359	13.614	1.818	0.212	0.286	108.350
Vic	0.580	20.189	194.391	19.305	5.703	0.000	240.168
NSW	0.054	1.467	15.187	290.706	9.823	0.000	317.237
QLD	0.000	0.000	0.120	11.898	227.010	0.924	239.952

Table A1_59(a): Interconnection charges for 2010/11, 365 day period, standard CRNP, energy method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
0.724	-5.986	15.477	-6.495	-3.720

Table A1_59(b): Nett inter-regional payments, conditions as per A1_101(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	58.992	0.153	3.602	0.013	0.000	0.000	62.760
SA	0.039	102.598	13.163	2.266	0.316	0.277	118.659
Vic	0.399	23.512	190.099	25.058	6.825	0.000	245.893
NSW	0.010	1.696	13.104	329.123	11.366	0.000	355.299
QLD	0.000	0.000	0.099	14.435	250.453	4.353	269.340

Table A1_60(a): Interconnection charges for 2011/12, 365 day period, standard CRNP, energy method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
3.320	-9.577	25.826	-15.596	-3.973

Table A1_60(b): Nett inter-regional payments, conditions as per A1_102(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	40.857	0.595	7.686	0.141	0.000	0.000	49.279
SA	0.000	82.489	12.935	1.789	0.032	0.261	97.506
Vic	0.086	33.190	173.475	28.758	0.989	0.000	236.498
NSW	0.000	2.593	16.825	236.449	6.129	0.197	262.193
QLD	0.000	0.001	0.274	21.595	182.936	2.193	206.999

Table A1_61(a): Interconnection charges for 2009/10, 10 interval local, standard CRNP, capacity method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
8.336	-21.623	25.303	-26.736	14.720

Table A1_61(b): Nett inter-regional payments, conditions as per A1_103(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	48.250	0.841	9.498	0.108	0.000	0.000	58.697
SA	0.000	93.914	11.940	1.763	0.358	0.374	108.349
Vic	0.113	29.372	186.059	17.587	7.036	0.000	240.167
NSW	0.000	2.245	15.275	283.987	15.731	0.000	317.238
QLD	0.000	0.000	0.183	17.064	218.561	4.143	239.951

Table A1_62(a): Interconnection charges for 2010/11, 10 interval local, standard CRNP, capacity method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
10.334	-18.397	17.212	-3.271	-5.878

Table A1_62(b): Nett inter-regional payments, conditions as per A1_104(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	44.526	2.264	15.779	0.190	0.000	0.000	62.759
SA	0.000	95.813	19.969	2.264	0.336	0.277	118.659
Vic	0.026	32.928	181.839	20.572	10.529	0.000	245.894
NSW	0.000	3.970	24.052	308.825	18.452	0.000	355.299
QLD	0.000	0.001	0.174	12.937	251.874	4.353	269.339

Table A1_63(a): Interconnection charges for 2011/12, 10 interval local, standard CRNP, capacity method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
18.207	-16.594	4.081	10.511	-16.205

Table A1_63(b): Nett inter-regional payments, conditions as per A1_105(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	43.533	0.217	5.475	0.054	0.000	0.000	49.279
SA	0.000	83.572	12.243	1.420	0.010	0.261	97.506
Vic	0.061	21.947	188.337	25.810	0.343	0.000	236.498
NSW	0.000	1.298	9.243	246.542	4.913	0.197	262.193
QLD	0.000	0.000	0.068	15.804	188.934	2.193	206.999

Table A1_64(a): Interconnection charges for 2009/10, 10 interval local, standard CRNP, energy method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
5.685	-9.789	21.132	-27.634	10.606

Table A1_64(b): Nett inter-regional payments, conditions as per A1_106(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	51.593	0.383	6.687	0.034	0.000	0.000	58.697
SA	0.000	96.045	10.316	1.522	0.093	0.374	108.350
Vic	0.090	24.336	200.945	12.673	2.124	0.000	240.168
NSW	0.000	1.500	12.115	295.864	7.760	0.000	317.239
QLD	0.000	0.000	0.086	12.070	223.652	4.143	239.951

Table A1_65(a): Interconnection charges for 2010/11, 10 interval local, standard CRNP, energy method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
7.014	-14.288	10.019	-4.924	2.179

Table A1_65(b): Nett inter-regional payments, conditions as per A1_107(a).

Rgn	Tas	SA	Vic	NSW	QLD	Unalloc	Total
Tas	47.109	1.433	14.176	0.042	0.000	0.000	62.760
SA	0.000	103.156	13.586	1.513	0.126	0.277	118.658
Vic	0.031	29.052	202.822	10.290	3.699	0.000	245.894
NSW	0.000	2.413	15.824	325.280	11.782	0.000	355.299
QLD	0.000	0.000	0.107	9.764	255.115	4.353	269.339

Table A1_66(a): Interconnection charges for 2011/12, 10 interval local, standard CRNP, energy method, all assets. Based on NEM wide system analysis.

Tas	SA	Vic	NSW	QLD
15.620	-17.673	-0.621	8.410	-5.736

Table A1_66(b): Nett inter-regional payments, conditions as per A1_108(a).

Year	Ints	Mode	C/E	Assets	Runs	Tas	SA	Vic	NSW	QLD	Table
09/10	365D	CRNP	C	All	5	3.40	-13.68	17.84	-17.27	9.71	A1_01
10/11	365D	CRNP	C	All	5	4.71	-13.80	16.42	-17.11	9.79	A1_02
11/12	365D	CRNP	C	All	5	5.40	-11.44	12.49	-15.35	8.89	A1_03
Average	365D	CRNP	C	All	5	4.50	-12.97	15.58	-16.58	9.46	
09/10	365D	MCRNP	C	All	5	3.39	-13.81	17.98	-16.30	8.74	A1_04
10/11	365D	MCRNP	C	All	5	4.69	-13.82	16.46	-16.10	8.78	A1_05
11/12	365D	MCRNP	C	All	5	5.39	-11.54	12.61	-14.35	7.89	A1_06
Average	365D	MCRNP	C	All	5	4.49	-13.06	15.68	-15.58	8.47	
09/10	365D	CRNP	E	All	5	0.22	-1.16	2.13	-14.98	13.80	A1_07
10/11	365D	CRNP	E	All	5	-0.16	-4.02	11.64	-21.58	14.12	A1_08
11/12	365D	CRNP	E	All	5	2.28	-7.17	17.85	-26.26	13.29	A1_09
Average	365D	CRNP	E	All	5	0.78	-4.11	10.54	-20.94	13.73	
09/10	365D	MCRNP	E	All	5	0.22	-1.20	2.17	-14.27	13.09	A1_10
10/11	365D	MCRNP	E	All	5	-0.16	-4.02	11.64	-20.89	13.43	A1_11
11/12	365D	MCRNP	E	All	5	2.28	-7.20	17.89	-25.49	12.52	A1_12
Average	365D	MCRNP	E	All	5	0.78	-4.14	10.57	-20.22	13.01	
09/10	10L	CRNP	C	All	5	0.65	-22.44	16.33	-2.75	8.22	A1_13
10/11	10L	CRNP	C	All	5	1.11	-26.04	17.66	6.09	1.18	A1_14
11/12	10L	CRNP	C	All	5	2.91	-28.09	17.32	4.41	3.46	A1_15
Average	10L	CRNP	C	All	5	1.55	-25.52	17.11	2.58	4.28	
09/10	10L	MCRNP	C	All	5	0.64	-22.49	16.38	-2.03	7.49	A1_16
10/11	10L	MCRNP	C	All	5	1.10	-26.08	17.71	6.61	0.67	A1_17
11/12	10L	MCRNP	C	All	5	2.90	-28.09	17.33	5.02	2.85	A1_18
Average	10L	MCRNP	C	All	5	1.55	-25.55	17.14	3.20	3.67	
09/10	10L	CRNP	E	All	5	0.17	-13.79	10.69	-1.73	4.65	A1_19
10/11	10L	CRNP	E	All	5	0.60	-20.91	16.78	1.54	1.98	A1_20
11/12	10L	CRNP	E	All	5	1.36	-25.85	19.24	2.54	2.70	A1_21
Average	10L	CRNP	E	All	5	0.71	-20.18	15.57	0.78	3.11	
09/10	10L	MCRNP	E	All	5	0.17	-13.82	10.72	-1.31	4.23	A1_22
10/11	10L	MCRNP	E	All	5	0.60	-20.93	16.80	1.88	1.65	A1_23
11/12	10L	MCRNP	E	All	5	1.36	-25.85	19.24	2.96	2.29	A1_24
Average	10L	MCRNP	E	All	5	0.71	-20.20	15.59	1.17	2.72	
09/10	10E	CRNP	C	All	5	9.34	-3.54	-2.53	-18.98	15.72	A1_25
10/11	10E	CRNP	C	All	5	7.66	-5.38	5.14	-19.83	12.41	A1_26
11/12	10E	CRNP	C	All	5	10.93	2.63	-6.80	-20.03	13.27	A1_27
Average	10E	CRNP	C	All	5	9.31	-2.10	-1.40	-19.61	13.80	

Table A1_67 Summary of Results – Sheet 1 of 3
(Explanation of columns is given in Sheet 3)

Year	Ints	Mode	C/E	Assets	Runs	Tas	SA	Vic	NSW	Qld	Table
09/10	10E	MCRNP	C	All	5	9.30	-4.01	-2.03	-17.79	14.52	A1_28
10/11	10E	MCRNP	C	All	5	7.60	-5.80	5.62	-18.66	11.25	A1_29
11/12	10E	MCRNP	C	All	5	10.90	2.26	-6.40	-18.79	12.03	A1_30
Average	10E	MCRNP	C	All	5	9.27	-2.52	-0.94	-18.41	12.60	
09/10	10E	CRNP	E	All	5	9.81	7.55	-15.82	-18.63	17.09	A1_31
10/11	10E	CRNP	E	All	5	7.80	6.80	-8.65	-22.41	16.46	A1_32
11/12	10E	CRNP	E	All	5	11.63	9.12	-14.39	-22.86	16.50	A1_33
Average	10E	CRNP	E	All	5	9.75	7.82	-12.95	-21.30	16.69	
09/10	10E	MCRNP	E	All	5	9.78	6.99	-15.23	-17.38	15.84	A1_34
10/11	10E	MCRNP	E	All	5	7.75	6.33	-8.13	-21.29	15.34	A1_35
11/12	10E	MCRNP	E	All	5	11.59	8.75	-13.98	-21.60	15.25	A1_36
Average	10E	MCRNP	E	All	5	9.71	7.36	-12.45	-20.09	15.48	
09/10	10S	CRNP	C	All	5	5.94	-10.53	-0.02	-11.97	16.58	A1_37
10/11	10S	CRNP	C	All	5	8.19	-16.15	0.37	-5.54	13.13	A1_38
11/12	10S	CRNP	C	All	5	11.24	-9.31	-11.62	-3.30	12.99	A1_39
Average	10S	CRNP	C	All	5	8.45	-12.00	-3.76	-6.93	14.23	
09/10	10S	MCRNP	C	All	5	5.91	-10.75	0.23	-11.13	15.73	A1_40
10/11	10S	MCRNP	C	All	5	8.14	-16.25	0.51	-4.67	12.27	A1_41
11/12	10S	MCRNP	C	All	5	11.20	-9.45	-11.45	-2.58	12.27	A1_42
Average	10S	MCRNP	C	All	5	8.42	-12.15	-3.57	-6.13	13.43	
09/10	10S	CRNP	E	All	5	4.60	-4.19	-0.26	-14.16	14.01	A1_43
10/11	10S	CRNP	E	All	5	6.48	-10.91	-3.27	-5.31	13.00	A1_44
11/12	10S	CRNP	E	All	5	11.58	-14.01	-7.60	1.26	8.77	A1_45
Average	10S	CRNP	E	All	5	7.55	-9.70	-3.71	-6.07	11.93	
09/10	10S	MCRNP	E	All	5	4.58	-4.28	-0.15	-13.38	13.23	A1_46
10/11	10S	MCRNP	E	All	5	6.45	-10.96	-3.18	-4.65	12.34	A1_47
11/12	10S	MCRNP	E	All	5	11.54	-14.08	-7.49	1.71	8.32	A1_48
Average	10S	MCRNP	E	All	5	7.52	-9.77	-3.61	-5.44	11.30	
09/10	365D	CRNP	C	CumNew	5	0.08	0.00	-6.18	6.68	-0.57	A1_49
10/11	365D	CRNP	C	CumNew	5	0.15	0.00	-8.71	9.43	-0.87	A1_50
11/12	365D	CRNP	C	CumNew	5	0.18	0.00	-9.82	10.74	-1.10	A1_51
Average	365D	CRNP	C	CumNew	5	0.14	0.00	-8.24	8.95	-0.85	
09/10	10E	CRNP	C	CumNew	5	0.19	0.00	-8.80	8.69	-0.08	A1_52
10/11	10E	CRNP	C	CumNew	5	0.30	0.00	-12.27	12.19	-0.22	A1_53
11/12	10E	CRNP	C	CumNew	5	0.35	0.00	-13.83	13.84	-0.36	A1_54
Average	10E	CRNP	C	CumNew	5	0.28	0.00	-11.63	11.57	-0.22	

Table A1_67 Summary of Results – Sheet 2 of 3
(Explanation of columns is given in Sheet 3)

Year	Ints	Mode	C/E	Assets	Runs	Tas	SA	Vic	NSW	Qld	Table
09/10	365D	CRNP	C	All	1	4.98	-14.00	22.31	-13.46	0.17	A1_55
10/11	365D	CRNP	C	All	1	4.76	-8.77	25.28	-10.77	-10.51	A1_56
11/12	365D	CRNP	C	All	1	8.18	-7.74	29.05	-22.90	-6.59	A1_57
Average	365D	CRNP	C	All	1	5.97	-10.17	25.55	-15.71	-5.65	
09/10	365D	CRNP	E	All	1	1.13	-7.66	6.97	-6.09	5.65	A1_58
10/11	365D	CRNP	E	All	1	0.72	-5.99	15.48	-6.50	-3.72	A1_59
11/12	365D	CRNP	E	All	1	3.32	-9.58	25.83	-15.60	-3.97	A1_60
Average	365D	CRNP	E	All	1	1.73	-7.74	16.09	-9.39	-0.68	
09/10	10S	CRNP	C	All	1	8.34	-21.62	25.30	-26.74	14.72	A1_61
10/11	10S	CRNP	C	All	1	10.33	-18.40	17.21	-3.27	-5.88	A1_62
11/12	10S	CRNP	C	All	1	18.21	-16.59	4.08	10.51	-16.21	A1_63
Average	10S	CRNP	C	All	1	12.29	-18.87	15.53	-6.50	-2.45	
09/10	10S	CRNP	E	All	1	5.69	-9.79	21.13	-27.63	10.61	A1_64
10/11	10S	CRNP	E	All	1	7.01	-14.29	10.02	-4.92	2.18	A1_65
11/12	10S	CRNP	E	All	1	15.62	-17.67	-0.62	8.41	-5.74	A1_66
Average	10S	CRNP	E	All	1	9.44	-13.92	10.18	-8.05	2.35	

Table A1_67 Summary of Results – Sheet 3 of 3

Explanation of columns for Table A1_67

Year – the year corresponding to pricing calculations – load and generation data relate to system operation two years earlier.

Ints – the intervals selected – the following code is used
365D – Full year data is used - 17520 intervals used (17568 for 09/10)
10L – 10 intervals based on the regions local maximum demand
10E – 10 intervals based on maximum export per interconnected region
10S – 10 intervals based on interconnected system maximum demand

Mode – The mode of cost application
CRNP – Standard cost reflective pricing
MCRNP – Modified cost reflective pricing

C/E – The mode of usage accumulation
C – Capacity method – results based on peak usage
E – Energy method – results based on average usage

Assets – the assets used in the cost allocation
All – All assets included in the cost allocation
CumNew – Cumulative new assets

Runs – The number of TPRICE runs to produce the figures

1 – The NEM wide system is analysed
5 – The individual regions are separately analysed

Region Columns – Tas, SA, Vic, NSW, Qld
These columns contain the nett revenue from inter-regional charges.

Table
The number of the table that provides more detail on the TPRICE results, allowing the charges to individual regions to be seen.

Year	Ints	Mode	C/E	Assets	Runs	Tas	SA	Vic	NSW	QLD	Table
09/10	365D	CRNP	C	All	5	3.40	-13.68	17.84	-17.27	9.71	A1_01
10/11	365D	CRNP	C	All	5	4.71	-13.80	16.42	-17.11	9.79	A1_02
11/12	365D	CRNP	C	All	5	5.40	-11.44	12.49	-15.35	8.89	A1_03
Average	365D	CRNP	C	All	5	4.50	-12.97	15.58	-16.58	9.46	
09/10	365D	CRNP	E	All	5	0.22	-1.16	2.13	-14.98	13.80	A1_07
10/11	365D	CRNP	E	All	5	-0.16	-4.02	11.64	-21.58	14.12	A1_08
11/12	365D	CRNP	E	All	5	2.28	-7.17	17.85	-26.26	13.29	A1_09
Average	365D	CRNP	E	All	5	0.78	-4.11	10.54	-20.94	13.73	
09/10	10L	CRNP	C	All	5	0.65	-22.44	16.33	-2.75	8.22	A1_13
10/11	10L	CRNP	C	All	5	1.11	-26.04	17.66	6.09	1.18	A1_14
11/12	10L	CRNP	C	All	5	2.91	-28.09	17.32	4.41	3.46	A1_15
Average	10L	CRNP	C	All	5	1.55	-25.52	17.11	2.58	4.28	
09/10	10L	CRNP	E	All	5	0.17	-13.79	10.69	-1.73	4.65	A1_19
10/11	10L	CRNP	E	All	5	0.60	-20.91	16.78	1.54	1.98	A1_20
11/12	10L	CRNP	E	All	5	1.36	-25.85	19.24	2.54	2.70	A1_21
Average	10L	CRNP	E	All	5	0.71	-20.18	15.57	0.78	3.11	
09/10	10E	CRNP	C	All	5	9.34	-3.54	-2.53	-18.98	15.72	A1_25
10/11	10E	CRNP	C	All	5	7.66	-5.38	5.14	-19.83	12.41	A1_26
11/12	10E	CRNP	C	All	5	10.93	2.63	-6.80	-20.03	13.27	A1_27
Average	10E	CRNP	C	All	5	9.31	-2.10	-1.40	-19.61	13.80	
09/10	10E	CRNP	E	All	5	9.81	7.55	-15.82	-18.63	17.09	A1_31
10/11	10E	CRNP	E	All	5	7.80	6.80	-8.65	-22.41	16.46	A1_32
11/12	10E	CRNP	E	All	5	11.63	9.12	-14.39	-22.86	16.50	A1_33
Average	10E	CRNP	E	All	5	9.75	7.82	-12.95	-21.30	16.69	
09/10	10S	CRNP	C	All	5	5.94	-10.53	-0.02	-11.97	16.58	A1_37
10/11	10S	CRNP	C	All	5	8.19	-16.15	0.37	-5.54	13.13	A1_38
11/12	10S	CRNP	C	All	5	11.24	-9.31	-11.62	-3.30	12.99	A1_39
Average	10S	CRNP	C	All	5	8.45	-12.00	-3.76	-6.93	14.23	
09/10	10S	CRNP	E	All	5	4.60	-4.19	-0.26	-14.16	14.01	A1_43
10/11	10S	CRNP	E	All	5	6.48	-10.91	-3.27	-5.31	13.00	A1_44
11/12	10S	CRNP	E	All	5	11.58	-14.01	-7.60	1.26	8.77	A1_45
Average	10S	CRNP	E	All	5	7.55	-9.70	-3.71	-6.07	11.93	

Table A1_68 Summary of Results – Sheet 1 of 2 – Excluding MCRNP cases
(Columns same as described for Table A1_67)

Year	Ints	Mode	C/E	Assets	Runs	Tas	SA	Vic	NSW	QLD	Table
09/10	365D	CRNP	C	CumNew	5	0.08	0.00	-6.18	6.68	-0.57	A1_49
10/11	365D	CRNP	C	CumNew	5	0.15	0.00	-8.71	9.43	-0.87	A1_50
11/12	365D	CRNP	C	CumNew	5	0.18	0.00	-9.82	10.74	-1.10	A1_51
Average	365D	CRNP	C	CumNew	5	0.14	0.00	-8.24	8.95	-0.85	
09/10	10E	CRNP	C	CumNew	5	0.19	0.00	-8.80	8.69	-0.08	A1_52
10/11	10E	CRNP	C	CumNew	5	0.30	0.00	-12.27	12.19	-0.22	A1_53
11/12	10E	CRNP	C	CumNew	5	0.35	0.00	-13.83	13.84	-0.36	A1_54
Average	10E	CRNP	C	CumNew	5	0.28	0.00	-11.63	11.57	-0.22	
09/10	365D	CRNP	C	All	1	4.98	-14.00	22.31	-13.46	0.17	A1_55
10/11	365D	CRNP	C	All	1	4.76	-8.77	25.28	-10.77	-10.51	A1_56
11/12	365D	CRNP	C	All	1	8.18	-7.74	29.05	-22.90	-6.59	A1_57
Average	365D	CRNP	C	All	1	5.97	-10.17	25.55	-15.71	-5.65	
09/10	365D	CRNP	E	All	1	1.13	-7.66	6.97	-6.09	5.65	A1_58
10/11	365D	CRNP	E	All	1	0.72	-5.99	15.48	-6.50	-3.72	A1_59
11/12	365D	CRNP	E	All	1	3.32	-9.58	25.83	-15.60	-3.97	A1_60
Average	365D	CRNP	E	All	1	1.73	-7.74	16.09	-9.39	-0.68	
09/10	10S	CRNP	C	All	1	8.34	-21.62	25.30	-26.74	14.72	A1_61
10/11	10S	CRNP	C	All	1	10.33	-18.40	17.21	-3.27	-5.88	A1_62
11/12	10S	CRNP	C	All	1	18.21	-16.59	4.08	10.51	-16.21	A1_63
Average	10S	CRNP	C	All	1	12.29	-18.87	15.53	-6.50	-2.45	
09/10	10S	CRNP	E	All	1	5.69	-9.79	21.13	-27.63	10.61	A1_64
10/11	10S	CRNP	E	All	1	7.01	-14.29	10.02	-4.92	2.18	A1_65
11/12	10S	CRNP	E	All	1	15.62	-17.67	-0.62	8.41	-5.74	A1_66
Average	10S	CRNP	E	All	1	9.44	-13.92	10.18	-8.05	2.35	

Table A1_68 Summary of Results – Sheet 2 of 2 – Excluding MCRNP cases
(Columns same as described for Table A1_67)

7. Appendix 2 – Selected 10 Interval Cases

This Appendix gives the intervals selected for the various "10 interval" cases.

2009/10 Date - Interval	2009/10 Demand MW	2010/11 Date - Interval	2010/11 Demand MW	2011/12 Date - Interval	2011/12 Demand MW
28/05/2008 - 36	2126.87	13/08/2008 - 34	2155.29	11/01/2010 - 22	2932.12
23/06/2008 - 36	2020.51	10/06/2009 - 35	2144.66	19/11/2009 - 33	2922.16
05/06/2008 - 36	1978.08	12/08/2008 - 35	2132.21	10/02/2010 - 28	2888.54
23/07/2007 - 36	1969.84	14/08/2008 - 36	2091.24	11/11/2009 - 33	2854.78
24/07/2007 - 36	1962.90	21/07/2008 - 35	2086.05	08/02/2010 - 33	2851.59
05/07/2007 - 36	1947.50	18/08/2008 - 36	2063.86	09/02/2010 - 26	2818.38
04/06/2008 - 36	1945.98	24/07/2008 - 35	2021.48	16/12/2009 - 34	2813.67
02/07/2007 - 36	1911.79	22/07/2008 - 35	1994.77	12/11/2009 - 28	2811.29
30/04/2008 - 36	1911.34	09/06/2009 - 34	1988.44	10/11/2009 - 33	2786.04
12/07/2007 - 37	1905.08	28/07/2008 - 35	1975.46	10/01/2010 - 36	2758.83

Table A2_1(a) Tasmanian Region – 10 Peak Demand Cases

Export To	2009/10 Date - Interval	2009/10 Export MW	2010/11 Date - Interval	2010/11 Export MW	2011/12 Date - Interval	2011/12 Export MW
VIC	19/02/2008 - 35	632.64	28/01/2009 - 35	628.58	23/12/2009 - 30	632.21
VIC	17/03/2008 - 35	631.50	28/07/2008 - 38	570.65	10/11/2009 - 31	631.57
VIC	10/01/2008 - 35	631.40	29/01/2009 - 35	543.72	11/11/2009 - 33	631.06
VIC	13/03/2008 - 31	626.27	07/02/2009 - 31	502.12	16/12/2009 - 24	630.45
VIC	14/03/2008 - 33	616.04	22/07/2008 - 38	455.13	04/06/2010 - 37	630.27
VIC	19/11/2007 - 32	615.46	30/01/2009 - 24	435.36	03/06/2010 - 38	629.22
VIC	16/11/2007 - 28	613.78	22/09/2008 - 35	418.52	30/12/2009 - 33	629.18
VIC	06/12/2007 - 31	608.53	01/06/2009 - 37	416.65	12/01/2010 - 26	627.48
VIC	18/02/2008 - 33	594.82	11/06/2009 - 38	413.93	09/02/2010 - 33	627.39
VIC	07/12/2007 - 27	584.78	10/06/2009 - 37	396.19	27/06/2010 - 37	626.80

Table A2_1(b) Tasmanian Region – 10 Peak Export Cases

2009/10 Date - Interval	2009/10 Demand MW	2010/11 Date - Interval	2010/11 Demand MW	2011/12 Date - Interval	2011/12 Demand MW
13/03/2008 - 27	2828.79	29/01/2009 - 27	3079.57	11/01/2010 - 22	2932.12
14/03/2008 - 34	2816.85	28/01/2009 - 31	3054.67	19/11/2009 - 33	2922.16
12/03/2008 - 32	2779.14	30/01/2009 - 32	2996.78	10/02/2010 - 28	2888.54
19/02/2008 - 33	2764.02	06/02/2009 - 33	2960.02	11/11/2009 - 33	2854.78
20/08/2007 - 22	2755.86	27/01/2009 - 32	2907.32	08/02/2010 - 33	2851.59
17/03/2008 - 25	2755.86	02/02/2009 - 32	2903.57	09/02/2010 - 26	2818.38
18/02/2008 - 33	2751.72	03/02/2009 - 33	2733.59	16/12/2009 - 34	2813.67
10/01/2008 - 33	2748.69	31/01/2009 - 33	2730.60	12/11/2009 - 28	2811.29
11/03/2008 - 33	2716.28	01/02/2009 - 35	2693.66	10/11/2009 - 33	2786.04
07/03/2008 - 33	2707.38	13/01/2009 - 32	2670.50	10/01/2010 - 36	2758.83

Table A2_2(a) South Australian Region – 10 Peak Demand Cases

Export To	2009/10 Date - Interval	2009/10 Export MW	2010/11 Date - Interval	2010/11 Export MW	2011/12 Date - Interval	2011/12 Export MW
VIC	16/07/2007 - 34	453.77	22/09/2008 - 33	444.87	27/11/2009 - 37	467.69
VIC	09/09/2007 - 37	444.80	03/04/2009 - 25	436.36	16/05/2010 - 35	445.85
VIC	15/07/2007 - 35	443.72	07/11/2008 - 38	436.22	28/11/2009 - 32	435.90
VIC	10/06/2008 - 36	438.83	05/12/2008 - 32	435.19	10/12/2009 - 29	432.92
VIC	15/05/2008 - 36	428.77	08/11/2008 - 35	432.18	12/01/2010 - 27	432.09
VIC	07/12/2007 - 22	428.66	30/04/2009 - 36	431.08	06/08/2009 - 34	431.24
VIC	03/12/2007 - 25	426.29	16/04/2009 - 36	430.98	17/09/2009 - 30	425.09
VIC	04/06/2008 - 35	421.26	06/10/2008 - 32	429.97	21/11/2009 - 24	419.81
VIC	09/12/2007 - 28	420.74	07/02/2009 - 38	428.99	28/02/2010 - 23	412.94
VIC	17/12/2007 - 35	420.58	27/10/2008 - 33	428.14	11/02/2010 - 28	411.49

Table A2_2(b) South Australian Region – 10 Peak Export Cases

2009/10 Date - Interval	2009/10 Demand MW	2010/11 Date - Interval	2010/11 Demand MW	2011/12 Date - Interval	2011/12 Demand MW
17/03/2008 - 32	8749.91	29/01/2009 - 25	9578.70	11/01/2010 - 32	8864.97
14/03/2008 - 31	8443.74	30/01/2009 - 25	9329.40	12/01/2010 - 27	8480.00
10/01/2008 - 32	8246.29	28/01/2009 - 31	9053.30	08/02/2010 - 32	8462.90
19/02/2008 - 33	8106.29	20/01/2009 - 26	8179.00	09/02/2010 - 28	8404.13
13/03/2008 - 34	7973.74	07/02/2009 - 31	8138.50	10/11/2009 - 32	8254.34
11/01/2008 - 22	7890.46	27/01/2009 - 33	8009.70	16/12/2009 - 32	8232.73
19/11/2007 - 31	7818.94	04/02/2009 - 33	7810.10	11/11/2009 - 32	8115.65
18/02/2008 - 33	7663.02	13/01/2009 - 32	7711.30	03/02/2010 - 31	8071.51
06/12/2007 - 32	7557.03	19/01/2009 - 33	7678.60	19/11/2009 - 32	8071.03
31/12/2007 - 33	7504.29	05/02/2009 - 27	7640.60	10/02/2010 - 26	8066.09

Table A2_3(a) Victorian Region – 10 Peak Demand Cases

Export To	2009/10 Date - Interval	2009/10 Export MW	2010/11 Date - Interval	2010/11 Export MW	2011/12 Date - Interval	2011/12 Export MW
SA	04/07/2007 - 37	571.10	29/05/2009 - 28	587.16	14/06/2010 - 38	597.17
SA	30/12/2007 - 28	504.96	18/01/2009 - 26	586.51	15/06/2010 - 37	594.23
SA	02/07/2007 - 34	504.22	18/02/2009 - 37	576.22	13/11/2009 - 38	577.57
SA	08/03/2008 - 37	501.60	21/12/2008 - 37	550.90	03/08/2009 - 24	547.79
SA	20/10/2007 - 29	494.17	26/12/2008 - 30	524.68	15/11/2009 - 25	543.66
SA	17/02/2008 - 23	485.81	26/02/2009 - 30	523.58	07/01/2010 - 38	541.33
SA	12/03/2008 - 30	463.49	27/01/2009 - 37	514.57	14/11/2009 - 24	534.56
SA	01/01/2008 - 24	463.23	19/01/2009 - 23	496.67	30/06/2010 - 28	533.57
SA	21/10/2007 - 28	455.56	12/01/2009 - 38	481.05	30/10/2009 - 26	530.58
SA	26/12/2007 - 36	454.94	24/12/2008 - 36	474.81	12/11/2009 - 37	528.64
NSW	07/10/2007 - 31	1012.30	01/01/2009 - 27	1230.80	22/11/2009 - 28	1242.77
NSW	22/09/2007 - 22	937.91	24/01/2009 - 29	1164.93	02/01/2010 - 29	1242.57
NSW	03/10/2007 - 32	935.66	31/12/2008 - 30	1099.36	25/12/2009 - 28	1220.98
NSW	25/12/2007 - 29	921.84	30/12/2008 - 31	1084.71	23/08/2009 - 30	1188.00
NSW	13/01/2008 - 28	915.30	28/09/2008 - 31	1020.43	17/01/2010 - 27	1167.65
NSW	06/10/2007 - 31	876.46	07/01/2009 - 38	1002.03	21/11/2009 - 25	1163.50
NSW	14/10/2007 - 36	838.69	25/12/2008 - 38	975.14	03/11/2009 - 31	1140.77
NSW	23/12/2007 - 28	824.71	06/12/2008 - 30	966.81	13/09/2009 - 25	1136.94
NSW	23/09/2007 - 38	823.93	29/12/2008 - 38	964.77	22/08/2009 - 30	1123.64
NSW	30/10/2007 - 38	801.90	06/09/2008 - 36	960.71	12/09/2009 - 22	1096.79
TAS	19/06/2008 - 37	495.89	07/11/2008 - 36	492.39	20/03/2010 - 38	500.50

TAS	29/04/2008 - 25	490.16	05/11/2008 - 38	491.21	25/02/2010 - 37	498.50
TAS	26/04/2008 - 22	490.12	22/10/2008 - 36	489.72	05/01/2010 - 35	498.32
TAS	24/05/2008 - 22	490.07	29/10/2008 - 34	489.18	22/05/2010 - 38	497.95
TAS	22/05/2008 - 22	489.99	24/10/2008 - 23	488.76	02/03/2010 - 34	497.14
TAS	03/05/2008 - 22	488.78	12/11/2008 - 38	488.28	04/01/2010 - 38	495.35
TAS	14/05/2008 - 29	488.30	03/11/2008 - 35	487.28	27/02/2010 - 36	494.05
TAS	11/03/2008 - 23	488.17	10/11/2008 - 36	485.62	21/03/2010 - 28	493.70
TAS	27/05/2008 - 23	488.11	19/10/2008 - 37	485.01	08/01/2010 - 22	493.63
TAS	15/07/2007 - 22	487.92	02/11/2008 - 37	484.38	23/01/2010 - 22	493.32

Table A2_3(b) Victorian Region – 10 x 3 Regions Peak Export Cases

2009/10 Date - Interval	2009/10 Demand MW	2010/11 Date - Interval	2010/11 Demand MW	2011/12 Date - Interval	2011/12 Demand MW
18/07/2007 - 38	12377.89	28/07/2008 - 38	13063.62	22/01/2010 - 33	12188.86
16/07/2007 - 38	12303.00	05/02/2009 - 33	12712.64	12/01/2010 - 33	12150.08
17/07/2007 - 38	12233.39	06/02/2009 - 33	12499.03	20/11/2009 - 27	11992.89
19/07/2007 - 38	11989.33	29/07/2008 - 38	12118.55	17/12/2009 - 33	11896.17
29/01/2008 - 31	11717.00	15/01/2009 - 29	12071.08	22/02/2010 - 33	11887.33
30/01/2008 - 31	11710.88	09/07/2008 - 38	12025.30	12/02/2010 - 33	11487.89
31/01/2008 - 33	11690.24	23/07/2008 - 38	12006.40	29/06/2010 - 38	11414.07
09/07/2007 - 38	11625.07	21/01/2009 - 29	11993.69	30/06/2010 - 38	11234.41
20/07/2007 - 38	11581.68	23/01/2009 - 31	11968.32	06/07/2009 - 38	11227.62
10/07/2007 - 38	11465.05	11/08/2008 - 38	11949.54	07/12/2009 - 33	11212.97

Table A2_4(a) New South Wales Region – 10 Peak Demand Cases

Export To	2009/10 Date - Interval	2009/10 Export MW	2010/11 Date - Interval	2010/11 Export MW	2011/12 Date - Interval	2011/12 Export MW
VIC	04/02/2008 - 29	1721.34	30/01/2009 - 27	1990.71	11/01/2010 - 35	1834.67
VIC	26/01/2008 - 27	1678.56	29/01/2009 - 29	1921.49	02/02/2010 - 27	1788.47
VIC	17/03/2008 - 25	1560.85	28/01/2009 - 33	1856.51	08/02/2010 - 33	1752.97
VIC	06/12/2007 - 33	1558.53	19/01/2009 - 31	1783.11	19/05/2010 - 35	1740.37
VIC	18/07/2007 - 22	1541.48	20/01/2009 - 22	1742.55	24/05/2010 - 35	1736.00
VIC	25/01/2008 - 27	1525.85	27/01/2009 - 25	1697.30	09/02/2010 - 31	1701.33
VIC	13/03/2008 - 37	1474.59	11/08/2008 - 22	1677.83	03/02/2010 - 29	1690.99
VIC	21/04/2008 - 22	1471.99	04/02/2009 - 23	1661.69	26/02/2010 - 37	1682.62
VIC	16/04/2008 - 29	1458.61	13/01/2009 - 38	1630.95	29/06/2010 - 31	1680.79
VIC	17/04/2008 - 29	1449.93	13/11/2008 - 27	1606.33	09/11/2009 - 33	1671.44
QLD	09/10/2007 - 33	383.96	21/02/2009 - 35	496.94	11/12/2009 - 29	433.21
QLD	07/02/2008 - 31	372.50	04/12/2008 - 37	492.51	17/11/2009 - 35	429.96
QLD	17/09/2007 - 33	343.12	01/03/2009 - 31	451.59	10/12/2009 - 35	419.48
QLD	07/01/2008 - 25	337.92	29/11/2008 - 29	442.44	30/11/2009 - 35	414.10
QLD	05/10/2007 - 33	333.11	11/02/2009 - 37	428.26	09/12/2009 - 35	376.09
QLD	31/10/2007 - 38	326.49	10/12/2008 - 33	424.79	05/11/2009 - 33	322.89
QLD	04/10/2007 - 31	322.14	19/02/2009 - 29	417.99	24/01/2010 - 29	289.84
QLD	08/02/2008 - 29	316.08	16/03/2009 - 33	412.53	04/02/2010 - 25	278.89
QLD	30/09/2007 - 35	308.59	17/03/2009 - 25	410.52	11/04/2010 - 29	271.21
QLD	05/02/2008 - 27	291.86	11/12/2008 - 27	380.79	02/02/2010 - 37	228.13

Table A2_4(b) New South Wales Region – 10 x 2 Regions Peak Export Cases

2009/10 Date - Interval	2009/10 Demand MW	2010/11 Date - Interval	2010/11 Demand MW	2011/12 Date - Interval	2011/12 Demand MW
22/02/2008 - 33	7110.14	09/02/2009 - 34	7789.07	15/02/2010 - 32	8522.51
23/02/2008 - 28	7009.96	20/02/2009 - 28	7566.53	18/01/2010 - 29	8451.72
07/01/2008 - 28	7002.37	10/02/2009 - 28	7526.40	10/12/2009 - 32	8225.93
19/07/2007 - 38	6950.15	19/12/2008 - 34	7516.18	11/12/2009 - 29	8184.92
11/12/2007 - 28	6935.69	02/03/2009 - 29	7493.48	23/02/2010 - 32	8123.06
17/12/2007 - 29	6916.04	22/01/2009 - 28	7492.79	09/12/2009 - 29	8094.66
21/01/2008 - 29	6883.60	11/12/2008 - 29	7490.74	27/01/2010 - 33	8093.99
14/01/2008 - 30	6871.88	19/02/2009 - 33	7479.91	28/01/2010 - 29	8054.97
07/12/2007 - 28	6844.24	16/01/2009 - 29	7411.20	30/11/2009 - 27	8022.68
07/02/2008 - 29	6839.30	28/07/2008 - 38	7368.27	17/11/2009 - 27	8001.18

Table A2_5(a) Queensland – 10 Peak Demand Cases

Export To	2009/10 Date - Interval	2009/10 Export MW	2010/11 Date - Interval	2010/11 Export MW	2011/12 Date - Interval	2011/12 Export MW
NSW	15/08/2007 - 38	1347.15	16/07/2008 - 37	1399.77	29/05/2010 - 22	1368.20
NSW	18/07/2007 - 35	1322.42	06/06/2009 - 37	1391.03	31/05/2010 - 22	1348.41
NSW	26/04/2008 - 26	1303.04	19/07/2008 - 34	1388.98	27/05/2010 - 25	1347.10
NSW	07/06/2008 - 38	1299.54	31/05/2009 - 38	1382.05	05/06/2010 - 31	1342.85
NSW	17/07/2007 - 33	1294.53	29/05/2009 - 37	1370.99	07/06/2010 - 34	1338.58
NSW	29/04/2008 - 30	1292.40	11/06/2009 - 23	1369.04	01/06/2010 - 25	1334.37
NSW	01/07/2007 - 25	1291.06	30/05/2009 - 35	1368.41	04/06/2010 - 29	1328.32
NSW	16/08/2007 - 36	1288.62	02/04/2009 - 37	1367.49	03/06/2010 - 33	1322.53
NSW	01/05/2008 - 34	1287.83	18/07/2008 - 37	1364.01	14/06/2010 - 32	1320.72
NSW	30/04/2008 - 35	1286.94	16/05/2009 - 38	1358.36	30/05/2010 - 24	1315.28

Table A2_5(b) Queensland – 10 Peak Export Cases

2009/10 Date - Interval	2009/10 Demand MW	2010/11 Date - Interval	2010/11 Demand MW	2011/12 Date - Interval	2011/12 Demand MW
18/07/2007 - 38	30766.09	29/01/2009 - 30	32310.16	12/01/2010 - 28	30986.54
17/07/2007 - 38	30536.96	30/01/2009 - 32	32064.29	20/11/2009 - 26	30617.53
19/07/2007 - 38	30485.51	28/07/2008 - 38	31899.37	10/02/2010 - 28	30502.99
16/07/2007 - 38	30016.86	28/01/2009 - 31	31813.39	19/11/2009 - 31	30491.81
09/07/2007 - 38	29135.34	06/02/2009 - 32	31400.08	16/12/2009 - 33	30362.56
20/07/2007 - 38	28953.02	05/02/2009 - 32	31300.38	22/01/2010 - 30	30229.19
10/01/2008 - 32	28852.03	11/08/2008 - 38	30744.20	29/06/2010 - 38	29908.92
10/07/2007 - 38	28845.74	29/07/2008 - 38	30518.43	09/02/2010 - 26	29829.11
23/07/2007 - 38	28781.57	12/08/2008 - 38	30397.38	08/02/2010 - 32	29708.27

12/07/2007 - 38	28780.46	04/02/2009 - 32	30238.58	11/01/2010 - 29	29637.02

Table A2_6 NEM wide system 10 Peak Demand Cases

8. Appendix 3 – Preparation of Data

8.1 Data Supplied

The following data items were supplied by the TNSPs:-

- Load data files – giving load and generation output data for each trading interval in the three years under consideration.
- Loadflow data files - which provide an analytic model of the networks for each year.
- Cost data files – which give relative costs for each transmission element and, where appropriate, the ratings of transmission elements.
- The Annual Service Revenue Requirement (ASRR) for each region.

8.2 Balance of Load and Generation

For the preparation of NEM wide system cases, it is necessary to balance the load/generation and transfers in each region prior to interconnecting the systems. This is necessary so that any errors in the load and generation data do not lead to spurious levels of interchange. This was done for all cases, so that the differences in assessed inter-regional charges could be on a consistent basis.

The additional load and generation was applied at the following central locations:

Tasmania: Sheffield 220 kV (bus 72221)
South Australia: Torrens Island 275 kV (bus 3380)
Victoria: South Morang 500 kV (bus 35720)
New South Wales: Sydney West 330 kV (bus 37)
Queensland: Middle Range 275 kV (bus 46140)

The adjustments applied at these "balance" buses were iteratively determined so that the generation on the associated swing generator (calculated from the loadflow solution for the region) matched its historic value for each time interval.

Ideally, the adjustment at these balance buses should be zero, but for most regions it was a significant part of the region's demand.

Initially, the adjustment was applied by an equivalent generator. However, it was found that the allocation between load and generation by TPRICE became unstable for some cases with large negative generation. Therefore, the adjustment was implemented by equivalent loads and generators at these balance buses to avoid this allocation problem.

8.3 Treatment of SA Region Data

The ElectraNet representation of the interconnection with Victoria included constant loads at the Portland and Murraylink buses, and variable generation at Mortlake and Murraylink. The

combination was such that the resulting AC and DC interconnection flows (not allowing for losses) precisely matched the corresponding interconnection flows in the Victorian load and generation data. The use of constant loads at Portland and Murraylink, however, resulted in TPRICE allocating charges based on these constant loads, rather than from the actual interchange levels.

To overcome this problem, the load and generation data was adjusted so that the AC export to Victoria was represented by load at the Heywood 275 kV bus (which was zero during import to SA) and by generation at Mortlake (which was zero during export from SA). Following these adjustments, the Portland load in the South Australian model was set to zero.

A similar adjustment was made to the representation of Murraylink.

Many trading intervals were absent in the SA load and generation data. In order to build a system wide model, this would require that the corresponding intervals be deleted for all other regions, or that data for the missing intervals was provided. The latter alternative was chosen. The interconnection transfers for the missing intervals were determined from the Victorian data, and the SA data searched for cases that best matched the missing time of day, day of week and interchange level. This was done for all three years and used as the base case for all SA and system related calculations.

8.4 Treatment of NSW Region Data

The NSW data was provided on an hour by hour basis, rather than by 30 minute trading intervals, as provided by the other regions. In order to provide a basis for merging the data from all regions, the data was interpolated to produce a set of load and generation data at 30 minute intervals. This extended data set was then used for all NSW related analysis.

The NSW region has four TNSPs, TransGrid, AusGrid, Essential Energy and Directlink. Separate cost files were provided for each TNSP. These cost files were combined to form a single cost file for each year. This was achieved by weighting the individual costs by each of the TNSP's prescribed locational ASRRs, and summing these ASRRs to give the overall region's locational ASRR. The same weighting factors were applied to the respective new asset cost files in building the composite cost data files for new assets.

The utilisation field in the cost data files was set to 1.0 for the CRNP studies, and to 0.0 for the MCRNP studies.

The transfer on the Murray to Dederang interconnection with Victoria, as given in the data, was in the wrong direction. It was necessary to reverse this by swapping the values of the equivalent load and generation at the border equivalents.

8.5 Treatment of Victorian Region Data

Loadflow files were modified to reduce the number of voltage regulated buses to avoid cases of high reactive transfer between adjacent regulated buses.

The initial loadflow data was inconsistent with the approach to generator source impedances. As a result the source impedances of generators were initially changed to zero following discussions with AEMO. A zero impedance level is actually represented within TPRICE as 0.000001 per unit on 100 MVA. However, it was found that this resulted in inconsistent outcomes due to near singularity of the fault contribution matrix. A value of 0.001 per unit was therefore used, instead of zero. This resulted in reasonably consistent outcomes.

In the initial development of TPRICE, it was intended that actual generator source impedances would be used. However, in practical usage, this was reduced to low, or zero values, partly as a matter of convenience and arguably so that the selection of generator impedance parameters was not influenced by pricing considerations.

A 500 MW generating unit would typically have a source impedance in the order of 0.07 per unit (generator transient reactance plus transformer), so a value of 0.001 per unit used here remains comparatively small.

8.6 Cumulative New System Assets

New asset cost files for assets that have a role in extending or maintaining interconnection capacity were provided by two TNSPs. These were on a year by year basis. The individual years were combined to form cumulative new asset cost files. In combining the years the values were scaled by the corresponding ASRRs to allow for escalation.

In effect the cumulative new asset files covered new assets installed to maintain or enhance interconnection capability since 1 July 2007.

8.7 NEM Wide System

For the NEM Wide System approach, ideally there is no equivalent load or generation at the borders; rather the interchange is a result of the balance between load and generation in each region. However, due to mismatches in the regional data, it was necessary to retain small loads and generators at the interconnections to balance the flows.

As there was some overlap in the bus numbers used by the TNSPs, it was necessary to re-number the buses in all data files.

For the integrated system analysis it was necessary to connect Tasmania to the mainland by an equivalent AC interconnection. This was taken to have an impedance of 10% on a nominal rating of 700 MW. There was very close matching between the Tasmanian and Victorian data for the interconnection flow when the Tasmanian data was shifted by one trading interval. Losses on Basslink were represented by a load in the importing region.

There is no representation of charges associated with Basslink.

TPRICE allocates charges to each load on the basis of its usage of assets in each region. These regional charges to loads are summated to give the charge that applies for each region to each other region.

It was also found that very low impedances caused difficulty in the allocation of load to generation for the NEM wide system, particularly for Tasmania. With Tasmanian export levels up to 630 MW, it was difficult to "see" into Victoria past low impedances at Loy Yang and other Latrobe Valley generators as well as equivalent generators at both sides of the interconnection. This allocation was reasonably stable when a minimum source impedance of 0.001 per unit was used. (Also discussed for Victoria above.)

8.8 Data Manipulation

With the handling of a large amount of data and large files (for example, the NEM wide system load files were each about 180 MByte in length), most of the data preparation and analysis of results was carried out using purpose written software. In all, approximately 9,000 lines of C++ code were prepared for this project.

9. Appendix 4 – Overview of TPRICE

TPRICE software provides network analysis facilities for the calculation of network access prices and marginal loss factors. This overview covers only the access pricing aspects.

The network access pricing is carried out in a manner that reflects the relative usage of transmission system components and their associated costs by customers at the various points of supply (that is a cost reflective network pricing (CRNP) methodology).

To assess the relative use of the system, TPRICE carries out loadflow studies for a number of system operating conditions.

For each system condition, a full (A.C.) load flow is set up from historic system load and generation conditions. Then, there is an allocation of generation to load. This determines how the supply to a particular location is distributed amongst generators. This allocation is carried out on the basis of the relative contribution of fault currents from generators to the total fault level at a point of supply. The result of this process is an allocation of power to the "electrically closest" generators. For example, if there were two generators, and one had a fault contribution at a point of supply of 10 units, and the other had a contribution of 5 units, the first generator would be considered to supply twice as much power to the load as the second unit. This allocation process is done in a manner that constrains the generation output to the value in the loadflow data.

After the allocation of generation, a sensitivity analysis is carried out using a linearised model about the loadflow solution. This is used to determine the variation in current in all network elements for a variation at each point of supply, equal to the load at that point. This provides an indication of the usage of each transmission element by each point of supply. These "usage" components are assessed for each trading interval.

In the so called "**Energy Method**", these "usage" components are summated over all of the intervals analysed. The cost associated with each transmission element is distributed to the points of supply, in proportion to the summated usage of that element by the point of supply, compared with the total summated usage of that element by all points of supply.

The "**Capacity Method**" is the same, except that instead of summing the usages over all the intervals, the maximum value is determined. This results in the allocation of charges on the basis of the peak usage of each transmission element by each point of supply. [This does not necessarily correspond to the maximum co-incident usage of each element.]

9.1 Key Data Files

Four files are most significant to the operation of TPRICE. (There are additional files that are of a legacy nature, and are not of current significance.) These files are briefly described here.

Loadflow Data File
This file provides data describing the transmission system, including load and generation parameters, network topology, and transmission line and transformer impedances.

This file also allows the user to identify the voltage regulation points in the system, and the voltage reference levels to be applied at these points. Provided a reasonable set of voltage controlled points and voltage reference levels are applied, the TPRICE outcome is little influenced by these nominations. An adequate set of these nominations will provide loadflow convergence, and avoid abnormally high reactive transfer between buses, for the entire set of load and generation conditions.

Generator source impedances are also defined in this file. These influence the fault contribution calculations and can modify the allocation of load to generation. However, if the impedances are set to relatively low values, there is not a great sensitivity to this parameter. For example, if they are set to the sub-transient impedance of the generators. However, it has been usual practice to set the source impedances to zero.

Cost File

The cost file gives the relative cost recovery from each transmission element. As the output of TPRICE is scaled in post-processing, to give total target locational revenue, it is only the relative costs that are significant in this file.

The file offers the user the ability to scale the revenue for a given element, according to the utilisation of that line, so that if a circuit is only being used, to say 50% of its capability, its relative revenue value is halved. In this regard, the user can nominate a utilisation level to be used or a rating to be applied. If the rating is defined (and the utilisation is set to zero for that element in the cost data), the maximum loading on the line, within the defined set of generation and loading conditions, is calculated and used to determine the utilisation and the relative revenue for that element. The element rating can be assigned a value that allows for overload conditions, as the TPRICE analysis applies only to system normal (i.e. no transmission outage consideration).

For the standard cost reflective pricing methodology (CRNP) 100% utilisation is applied to all transmission elements. For the modified cost reflective network pricing methodology (MCRNP) utilisations, as calculated for selected transmission elements, are applied.

Load and Generation Data File

This file provides load and generation data for each loading interval. A number of formats are available, but most of these are now obsolete. The format now generally used contains active and reactive loads at each supply point, and active and reactive generation at each generation point for each interval considered. The number of intervals ranges from 10 to 17,520 (or 17,568 for a leap year).

Case File

The case file is used to set up a TPRICE analysis case. It includes the addresses of the various input and output files necessary to run TPRICE. For the present project the case files were prepared by ROLIB Pty Ltd.

The case file also includes the selection of options that are applied to the running of TPRICE.

9.2 Key Options

There are a number of options that control the behaviour of TPRICE. The most important of these, for transmission access pricing, are summarised below.

ENERGY
If this parameter is set to 1, the Energy Method, as described above, is applied. If it is set to zero, the Capacity Method is used.

ZEROREVERSE
If this parameter is set to 1, TPRICE ignores usage components where the usage is in a direction that will reduce the total loading on a transmission element. For example, a load in the Latrobe Valley will reduce the power transfer on the Latrobe Valley to Melbourne transmission. Variation of this load will vary the loading on this transmission, and this will associate a "usage" of this transmission to the load. With ZEROREVERSE enabled, TPRICE will not allocate this line usage to the load. That is, a load in the Latrobe Valley would not pay towards the Latrobe Valley to Melbourne transmission (unless there is the unlikely operating condition of a nett power transfer from Melbourne to the Latrobe Valley). ZEROREVERSE is normally set to be on.

ALPHASCALE
If ALPHASCALE is enabled, marginal loss factors are calculated for each loadflow condition, and are applied to the generation variations required to support a load variation. In so doing, the incremental losses in the system during the sensitivity analysis are precisely compensated for. Without the ALPHASCALE option being applied, spurious transmission sensitivities are created to the loadflow swing bus, which otherwise would supply the incremental losses. ALPHASCALE is normally be set to on.

For the present studies ALPHASCALE and ZEROREVERSE were enabled for all analysis.