LIST OF REGIONAL BOUNDARIES AND MARGINAL LOSS FACTORS FOR THE 2012-13 FINANCIAL YEAR

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Contents

Version Release History

VERSION	DATE	CHANGES
0.1	14/03/2012	Draft regional boundaries and marginal loss factors for the 2012/13 financial year.
1.0	30/03/2012	Regional boundaries and marginal loss factors for the 2012/13 financial year.
1.1	10/04/2012	Correction of the typographical error in Callide A load MLF.
1.2	01/05/2012	Recalculation of Callide PS MLFs. Correction of typographical errors in page 27 and 33. Publication of the MLFs of new connection points at TNIs NBFS, NONO, VTRT, VTGT, QDRG, QBLF, QWCB and TSL2.
1.3	04/05/2012	Removal of the footnote on page 24 because of the confusion it causes to non-market generators.
1.4	12/06/2012	Recalculation of the MLFs at TNIs QCND and QRMA and calculation of the MLFs at new TNIs QCBL and QCHA as a result of the network asset transfer between Powerlink and Ergon Energy in the Tarong area.

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1 Introduction

In electricity pricing, it is widely accepted that marginal costs are the appropriate basis for pricing generation. Transmission pricing involves expanding this view to usage in different locations. It follows that electricity presents complex computational problems, but they are mostly similar to transport problems of other product markets.

For any market, the value of losses is always included in the cost of transport and recovered through increased prices at the receiving end. For electricity transmission, the percentage losses also increase with the load transmitted. Therefore, the more the transmission line is loaded, the higher the percentage losses. Thus the price differences between the sending and receiving ends will be determined not by the average losses, but by the marginal losses of the last MW of load delivered.

This document details the marginal loss factors representing losses across the five National Electricity Market (NEM) regions - Queensland, New South Wales, Victoria, South Australia, and Tasmania - calculated in accordance with Clause 3.6 of the National Electricity Rules (NER). The NER requires that the losses between regions be calculated dynamically by inter-regional loss factor equations. Within each region, the losses from sending electricity from the Regional Reference Node (RRN) to generators and customers are represented by static intra-regional loss factors.

In the dispatch process, generator bid prices within each region are adjusted by the intra-regional loss factors in dispatching generators to meet demand. In addition, depending on the flows between regions, the inter-regional loss factors obtained from the dynamic equations are also used to adjust the generator prices in determining which generators are dispatched to meet demand.

After the RRN prices are calculated for each region, prices for customers' connection points on the network are calculated using the intra-regional loss factors between these points and the RRN.

2 MLF calculation

The wholesale electricity market trades electricity power via the pool managed by AEMO. There are two basic components of the pool: the central dispatch and the spot price. The central dispatch process schedules generators to meet demand with the objective of minimising the cost of meeting demand based on the offer and generator bid prices.

For each half hour period, a spot price for electricity is calculated for matching supply and demand. AEMO calculates this spot price using daily price offers and bids. Another major factor that is required to be accounted for in calculating spot prices is the electrical losses in delivering electricity from generators to customers.

The NEM consists of five regions and the spot price at each regional reference node is calculated dynamically taking into account the losses between regions as generators are scheduled to meet demand. These losses between regions are pre-calculated and given in inter-regional loss factor equations. The inter-regional loss factors between regional reference nodes are then used to adjust the offer and bid prices when determining which generators are to be dispatched to meet demand.

Within a region, the losses between generators and the regional reference node and between the regional reference node and customers are represented by intra-regional loss factors relative to the regional reference node. These loss factors are pre-calculated from studies using forecast demands based on historical load and generator profiles. In the central dispatch process, offer and bid prices are adjusted by these intra-regional loss factors in dispatching generators to meet demand.

The following are the Rules requirements for the calculation of inter and intra regional loss factors.

2.1 Rules requirements

Clause 3.5 of the National Electricity Rules (referred to as the Rules) requires AEMO to establish, maintain, review and by April 1st each year, publish a list of regions, regional reference nodes and the region to which each market connection point is assigned. In addition, clause 3.6 of the Rules requires AEMO to calculate intra-regional transmission loss factors and inter-regional loss factor equations by 1st April each year to apply for the next financial year.

Clauses 3.6.1, 3.6.2 and 3.6.2(A) specify the requirements for calculating the inter-regional and intra-regional loss factors, and the data to be used in the calculation.

2.2 Inter-regional loss factor equations

The Rules require that AEMO apply a regression analysis to determine the significant variables and variable coefficients for an equation that describes the loss factor between regional reference nodes. AEMO must publish the equations resulting from the regression analysis, the correlation factors and the associated variances.

2.3 Intra-regional loss factors

The Rules require AEMO to calculate and publish a single volume weighted average (intra-regional) loss factor for each transmission network connection point. The Rules also require AEMO to calculate and publish dual MLFs for transmission network connection points where one MLF does not satisfactorily represent transmission network losses for active energy generation and consumption.

Under the National Electricity Rules, the use of virtual transmission nodes (VTNs) was gazetted on 1 November 2001. In accordance with these Rule changes, AEMO has developed a methodology to average transmission loss factors for each VTN authorised by the relevant Jurisdictional Regulator. Six VTNs have been approved in the NEM and these are described in section 5.

2.4 Forward-looking Loss Factors

New Rules clauses came into effect on 1 January 2004 requiring AEMO to use a ‘forward looking’ methodology for calculating loss factors.

Following a consultation process NEMMCO published the final version of the forward-looking loss factor methodology on 12 August 2003[1]. This document has since been revised, most recently in June 2011.

3 Application of the forward-looking loss factor methodology for 2012/13 financial year

This section describes the process followed in applying the forward-looking loss factor methodology to the calculation of the marginal loss factors for 2012/13 financial year. Further details regarding the forward-looking loss factor methodology can be found in the methodology document on AEMO’s website[1].

3.1 Overview of the Forward-looking Loss Factor Methodology

The forward-looking loss factor methodology developed by AEMO is based on the principle of “minimal extrapolation”. An overview of the methodology is to:

[1] “Methodology for Calculating Forward-Looking Transmission Loss Factors: Final Methodology”, 12 August 2003 (revised 29 June 2011), is available on the AEMO Website at http://www.aemo.com.au/electricityops/172-0008.html

- develop a load flow model of the transmission network that includes committed augmentations for the year that the loss factors apply;
- obtain from the TNSPs, connection point demand forecasts for the year that the loss factors apply;
- estimate the dispatch of committed new generating units;
- adjust the dispatch of new and existing generating units to restore the supply/demand balance using the rules defined in the published forward-looking loss factors methodology and
- calculate the loss factors using the resulting power flows in the transmission network.

The steps taken when calculating the forward-looking loss factors are explained below in detail.

3.2 Data requirements

The following steps were taken in preparing the basic data for calculating loss factors using the forward-looking methodology:

1. A set of historical load and generator real power (MW) and reactive power (MVAr) data for each trading interval (half hour) covering every transmission connection point in the Queensland, New South Wales, Victoria, South Australia and Tasmanian regions for the period 1 July 2010 to 30 June 2011 has been obtained from the AEMO settlements database.
2. The historical load data was sent to the relevant TNSPs where required. The TNSPs developed forecast connection point load traces for the 2012/13 financial year by scaling the historical data. The forecast connection point load traces for 2012/13 were then sent to AEMO to be used in the actual loss factor calculations. Transend has provided the demand forecast for Tasmania. In the case of Queensland, Powerlink provided energy and demand forecasts, and the load traces were developed by AEMO. For New South Wales, load traces provided by TransGrid, Ausgrid and Essential Energy were scaled to be consistent with the 2011 Electricity Statement of Opportunities (ESOO)[2] and 2011 ESOO update. The table below provides the annual energy targets used in load forecasting for 2012-13 MLF calculations.

Region	Adjusted scheduled and semi-scheduled sent-out energy [GWh]
New South Wales	75248
Victoria	47163
Queensland	51329
South Australia	13593
Tasmania	10400

3. The TNSPs also provided information and data for any network augmentations, i.e., new connection points, load, generation, and transmission line augmentations, etc.
4. The interconnector limits were confirmed with the relevant TNSPs.
5. Generation capacity data was derived from the 2011 ESOO and the update to the 2011 ESOO, which was published on 6 March 2012.
6. The historical generation availability and on/off status data was extracted from AEMO's Market Management Systems (MMS) for the Queensland, New South Wales, Victoria, Tasmania and South Australia regions.

[2] Available on the AEMO Website at http://www.aemo.com.au/planning/esoo2011.html

7. The historical generation data, forecast load, generation capacity, availability (on/off status data), interconnector limits and network augmentation data as described in steps 1 to 6 was then used in the calculation of forward-looking loss factors.
8. The details of the loss factor calculation algorithm are provided in Section 3.18.

3.3 Connection point definitions

A list of new connection points that have been established for the 2012/13 financial year is given in Appendix G. These connection points have been registered in AEMO's MMS and a loss factor has been calculated for each of them for 2012/13 as shown in Appendix A.

3.4 Connection point load data

As described in section 3.2, Powerlink, TransGrid, AusGrid, Essential Energy and Transend provided AEMO with the forecast connection point load data that was used for Queensland, New South Wales and Tasmania respectively, in accordance with section 5.2.2 of the Forward-looking loss factor Methodology. Forecast connection point load data for the South Australia and Victoria regions was calculated by AEMO. The Electricity Statement of Opportunities (ESOO) 2011 and ESOO 2011 update load growth rates were used to undertake the due diligence on the forecast connection point loads.

3.5 Network representation

The NEM interconnected power system load flow model used to calculate loss factors for the Queensland, New South Wales, Victoria, South Australia and Tasmania regions is based on an actual network configuration recorded by the AEMO Energy Management System (EMS). This recording is referred to as a snapshot.

The snapshot was checked and modified where necessary to accurately represent all normally connected equipment. The switching arrangement for the Victorian 220 kV and 500 kV networks in the Latrobe Valley was also checked to ensure that it reflected normal operating conditions. The load flow was also modified to include the relevant augmentations identified from consultation with the TNSPs, as described in section 3.8. The snapshot is thus representative of the 2012/13 system normal network.

3.6 Treatment of Yallourn Unit 1

The Yallourn unit 1 can be connected to either the 220 kV or 500 kV network in Victoria.

AEMO, in consultation with Yallourn, prepared a forecast of switching for Yallourn unit 1 reflecting its anticipated operation for the loss factors calculation. Both the 220 kV connection points for Yallourn units 2-4 and the 500 kV connection points for the other Latrobe Valley power stations will have loss factors that reflect the predicted time the Yallourn unit 1 would be in each configuration. A weighted average of the loss factors calculated for the Yallourn unit 1 on both buses will then apply to this unit.

3.7 Treatment of Bayswater Power Station

The Bayswater Power Station units 3 and 4 have been switched onto the 500kV network. Bayswater units 1 and 2 will remain connected to the 330kV network for the 2012/13 financial year.

3.8 Network augmentations for 2012/13 financial year

The following network augmentations have been advised by the relevant TNSPs in each region of the NEM for 2012/13.

Queensland

Powerlink has provided the following list of major augmentations to be completed in 2012/13 in Queensland:

- Installation of a new 275/132kV transformer at Bouldercombe
- Installation of a new 132/66kV transformer at Pioneer Valley
- Installation of a new Lilyvale – Blackwater 132kV line
- Modification of a new Lilyvale – Blackwater 132kV line
- Establishment of a new 275kV substation at Western Downs
- Installation of a new 275kV Braemar – Western Downs line
- Modification of a 275kV Braemar – Western Downs line
- Installation of new 275kV Western Downs – Kogan Switchyard line
- Establishment of a new 275kV substation at Halys
- Installation of two new 275kV Western Downs – Halys lines
- Modification of two 275kV Braemar – Halys lines
- Modification of two 275kV Calvale – Halys lines
- Installation of four new 275kV Tarong – Halys lines
- Modification of a 110kV Algester – Richlands line
- Installation of a new 110kV Rocklea – Richlands line
- Modification of two 110/33kV transformers at Richlands
- Installation of a 30MVAr Reactor at Chalumbin
- Modification of a 132kV Yabulu South – Ingham South line
- Installation of two new 132kV Tully – Cardwell lines
- Decommissioning of two 132kV Kareeya – Tully lines
- Establishment of a new 132kV connection point at Eagle Downs
- Modification of a 132kV Moranbah - PEAKTEE line
- Modification of a 132kV PEAKTEE - Dysart line
- Installation of a new 132kV Moranbah – Eagle Downs line
- Installation of a new 132kV Eagle Downs – Dysart line
- Establishment of a new 132kV connection point at Wandoan South
- Installation of two new 132kV Columboola – Wandoan South lines
- Modification of a 275kV Blackwall – Goodna line
- Modification of a 275kV Abermain – Blackstone line
- Installation of two new 275kV Blackstone – Greenbank lines
- Modification of 275kV Blackstone – Swanbank E network configuration
- Modification of 275kV Swanbank E – Greenbank network configuration
- Decommissioning of two 275kV Blackwall – Swanbank B lines
- Establishment of a new 132kV connection point at Woleebee Creek
- Installation of two new 132kV Wandoan South – Woleebee Creek lines
- Installation of a new 275/132kV transformer at Woolooga
- Decommissioning of two 275/132kV transformers at Woolooga
- Installation of a new 120MVAr capacitor at Belmont
- Installation of a new 20MVAr capacitor at Turkinje
- Establishment of a new 275kV connection point at Raglan
- Modification of 275kV Bouldercombe – Raglan line
- Installation of a new 275kV Raglan – Larcom Creek line
- Establishment of a new 132kV connection point at Wycarbah
- Installation of a new 132kV Stanwell – Wycarbah line
- Establishment of a new 132kV connection point at Duaringa
- Modification of a 132kV Baralaba – Duaringa Tee line
- Installation of a new 132kV Blackwater – Duaringa Tee line
- Installation of a new 132kV Duaringa Tee – Duaringa line
- Establishment of a new 132kV connection point at Bluff

- Installation of a new 132kV Blackwater – Bluff line
- Modification of 40MVAr capacitor at Kemmis
- Modification of a 275/132kV transformer at Gin Gin

New South Wales

TransGrid and AusGrid have provided the following list of major augmentations to be completed in 2012/13 in New South Wales. Essential Energy has advised that there are no augmentations planned for 2012/13:

- Replacement of No.4 transformer at Sydney South
- Replacement of 30MVA transformers at Munyang
- Replacement of No.1 & No.2 33 kV Capacitors at Griffith
- Construction of new Manildra to Parkes 132 kV transmission line
- Replacement of 132/66 kV transformers at Narrabri
- Replacement of No.1 Capacitor at Port Macquarie
- Decommissioning of 132 kV No.2 Capacitor at Wellington
- Installation of No.7 330/132 kV transformer at Tomago 330/132 kV switching station
- Establishment of Walleroo 330 kV Switching Station
- Construction of Tomago - Taree & Taree - Stroud 132 kV Line
- Modification of Haymarket - Beaconsfield West 132 kV line
- Establishment of new Hallidays Point 132/66 kV Substation cutting into 963 line
- Modification of Glenn Innes Wind Farm Switching Station
- Establishment of New Wallerawang 132/66 kV substation
- Modification of Munmorah 330/132 kV switching station
- Establishment of a new 132 kV connection point at Haymarket
- Establishment of a new 132 kV connection point at Brandy Hill
- Establishment of a new 11 kV connection point at Belmore Park
- Establishment of a new 11 kV connection point at Potts Hill
- Establishment of a new 132 kV connection point at Hurstville North
- Modification of Kogarah 132/11 kV substation
- Conversion of Crows Nest to 132/11kV (2 x 50MVA) operation to relieve Willoughby substation, including 3x4MVAr capacitors
- Establishment of a 66/11kV zone substation at Empire Bay
- Installation of a 132kV feeder between Beaconsfield West and Haymarket
- Replacement of 132kV oil filled cables 91L, 91M/1 and 91M/3 - no longer includes 91M/3
- Establishment of a new 11 kV connection point at Charlestown (New Charlestown 132/11kV (2 x 50MVA) to retire Charlestown 33/11kV Zone, including 2x6MVAr capacitors)
- Establishment of a new 11 kV connection point at Rathmines
- Establishment of a new 11 kV connection point at Broadmeadow

Victoria

AEMO Transmission Services has provided the following list of major augmentations to be completed in 2012/13 in Victoria.

- Establishment of new Tarrone 500kV connection point, including connection to the Moorabool to Heywood No. 1 500kV line

South Australia

ElectraNet has provided the following list of major augmentations to be completed in 2012/13 in South Australia:

- Modification of Torrens Island – City West 275 kV line
- Modification of City West – Keswick 66 kV line
- Modification of City West – Whitmore Square Switching Station 66kV line
- Modification of Whitmore Square Switching Station – Whitmore Square 66kV line
- Modification of Whitmore Square Switching Station – Whitmore Square Outdoor Bus 66kV line
- Modification of Whitmore Square Outdoor Bus – Whitmore Square 66kV line
- Modification of Whitmore Square Switching Station – Coromandel 66kV line
- Establishment of new 132 kV Whyalla Central substation
- Modification of Davenport – Whyalla Terminal 132 kV line
- Establishment of new Whyalla Central – Whyalla Terminal 132 kV line
- Modification of Davenport – Cultana No. 1 275 kV line
- Modification of Davenport – Cultana No. 2 275 kV line
- Establishment of new Cultana No. 2 275/132/11 kV transformer
- Modification of City West No. 1 275/66/11 kV transformer
- Modification of City West No. 2 275/66/11 kV transformer
- Establishment of new Wudinna No. 2 132/66/11 kV transformer
- Modification of Belalie No. 1 275/33 kV transformer
- Modification of Mount Barker South No. 2 275/66/11 kV transformer
- Modification of Templers West No. 2 275/66/11 kV transformer
- Decommissioning of Ardrossan West No. 1 132/33/11 kV transformer
- Decommissioning of Ardrossan West No. 2 132/33/11 kV transformer
- Establishment of new Ardrossan West No. 1 132/33/11 kV transformer
- Establishment of new Ardrossan West No. 2 132/33/11 kV transformer
- Establishment of new Dorrien No. 3 132/33/11 kV transformer
- Decommissioning of Whyalla Terminal No. 1 132/33/11 kV transformer
- Decommissioning of Whyalla Terminal No. 3 132/33/11 kV transformer
- Establishment of new Whyalla Central No. 1 132/33/11 kV transformer
- Establishment of new Whyalla Central No. 3 132/33/11 kV transformer
- Establishment of new Ardrossan West No. 1 132 kV 15 MVAr capacitor bank
- Establishment of new Kincraig No. 1 132 kV 15 MVAr capacitor bank
- Establishment of new Whyalla Central No. 1 132 kV 15 MVAr capacitor bank
- Establishment of new Whyalla Central No. 2 132 kV 15 MVAr capacitor bank
- Decommissioning of Whyalla Terminal No. 1 11 kV 5.3 MVAr capacitor bank
- Decommissioning of Whyalla Terminal No. 3 11 kV 5.3 MVAr capacitor bank

Tasmania

Transend has provided the following list of major augmentations to be completed in 2012/13 in Tasmania:

- Establishment of a new 22kV connection point at St Leonards
- Establishment of a new 33kV connection point at Kingston
- Installation of a new Norwood – St Leonards 110kV line
- Installation of a new St Leonards – Mowbray 110kV line
- Modification of a new Rosebery – Rosebery Tee 110kV line
- Installation of two new 110/22kV transformers at St Leonards
- Installation of two new 110/33kV transformers at Kingston
- Modification of a 110/6.6kV transformer at Arthurs Lake
- Modification of a 110/22kV transformer at Newton

- Modification of a 110/11kV transformer at Newton

3.9 Treatment of Basslink

Basslink is a Market Network Service that consists of a controllable network element that transfers power between the Tasmania and Victoria regions.

In accordance with section 5.3.2 of the forward-looking loss factor methodology, historical data are used for the calculation. The loss model for Basslink is provided in Appendix D.

3.10 Treatment of the Regulated Terranora Interconnector (previously Directlink)

From 21 March 2006 Terranora Interconnector (previously Directlink) has been operating as a regulated interconnector. The boundary between Queensland and New South Wales located between Terranora and Mudgeeraba is North of Directlink. As such Directlink is now part of the New South Wales network. The Terranora interconnector is in series with Directlink and in the MLF calculation the Terranora interconnector limit is managed by varying the Directlink limit when necessary.

The inter-regional loss factor equation for Terranora Interconnector is provided in Appendix D.

3.11 Treatment of the Regulated Murraylink Interconnector

In October 2003 Murraylink became a regulated interconnector. In accordance with section 5.3 of the forward-looking loss factor methodology, AEMO has treated the Murraylink interconnector as a controllable regulated network element in parallel with the regulated Heywood interconnector.

The inter-regional loss factor equation for Murraylink is provided in Appendix D.

3.12 Asset boundary changes in Queensland

It is understood that there will be asset transfers between Powerlink and Ergon Energy in the Tarong 132 kV connection point area in mid 2012. This assest transfer will result in a change to the boundary between the transmission and distribution networks. AEMO will calculate and publish MLFs for any new TNIs created and remove those that are no longer required once the TNIs for this boundary change are available. It has now been confirmed that the boundary change will take place on 1 July 2012 and the MLFs associated with this change are shown in the tables in Appendix A in section 7 below. This change results in Condamine Power Station from being an embedded generator to a transmission connected generator.

3.13 New and Recently Commissioned Generating Units

For new generating units, AEMO calculates the initial estimate of the output by identifying similar technology and fuel type in accordance with 5.4.2 of the forward-looking loss factor methodology.

For generating units with an incomplete year of historical data from the previous financial year, AEMO uses a combination of existing and estimated data.

3.13.1 Queensland

Yarwun Cogeneration was commissioned in August 2010. A full year’s historical generation profile for Yarwun was not available for the 2012/13 MLF calculation. Yarwun unit is non-scheduled and operates as a base load unit due to its primary function of producing steam in the production process at Rio Tinto Alcan. In the absence of any suitable alternative, Rio Tinto Alcan provided AEMO with a more representative generation profile for Yarwun cogeneration based on the nature of its operation for the first two months, prior to Yarwun being commissioned.

3.13.2 New South Wales

There are no committed new generation projects in New South Wales region during the financial year 2012/13.

3.13.3 Victoria

Commissioning of Mortlake commenced in July 2011. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of these generating units for the entire financial year from the historical dispatch of the Laverton North generating units. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new Mortlake units.

3.13.4 South Australia

Port Lincoln unit 3 was commissioned in November 2010. In accordance with section 5.4.2 of the forward-looking loss factor methodology, for the period prior to November 2010 when a historical generation profile is not available AEMO estimated the dispatch of this generating unit from the historical dispatch of Port Lincoln generating units 1 and 2.

3.13.5 Tasmania

There are no committed new generation projects in the Tasmania region during the financial year 2012/13.

3.13.6 New Wind Farms and Other Energy Limited Generation

The new wind generation commissioned after 1 July 2010 includes Gunning, Woodlawn, Oaklands Hill, Hallett 4 – North Brown Hill, Hallett 5 –The Bluff, Lake Bonny 3 and Waterloo. Macarthur wind farm is expected to be commissioned in January 2013. AEMO obtained forecast dispatch of new wind generation from the proponents of new wind farms. Where the proponent was unable to provide a generation profile, AEMO estimated suitable profiles in accordance with the forward-looking loss factor methodology.

3.14 Generator Unit Capability

In accordance with section 5.5.3 of the forward-looking loss factor methodology, AEMO has estimated the auxiliary requirements of the scheduled generating units by measuring the generator terminal and metered sent-out capacities at periods of high output. From this estimate of the unit auxiliaries, and the summer and winter generator terminal capacities in the 2011 ESOO, AEMO estimated the sent-out summer and winter generator terminal capacities.

3.15 Embedded Generation

An embedded generator is one connected to a distribution network, which is in turn connected to the transmission network. An embedded generator can be market or non-market and scheduled or non-scheduled.

MLFs are not required for non-market generators. For a market generator, the MLF is calculated for the transmission connection point, where the distribution network it is embedded in takes power from the transmission network. Between this transmission connection point and the embedded generator, there are also losses that have to be accounted for. These additional losses are calculated on an average basis and reflected through the Distribution Loss Factor (DLF). They are calculated each year by the DNSPs and then approved by the AER before submitting to AEMO for publication.

For dispatch purposes, the MLF of an embedded generator has to be adjusted by the DLF to reflect its offer price at the regional reference node. Similarly, adjustment of the MLF by the DLF is necessary for settlement purposes.

Up until the end of the 2007/08 financial year, the MLF associated with the scheduled embedded generators had been adjusted by their DLF in the dispatch process as well as in the settlement process (the DLF is applied to the spot price). Following the implementation of the Mid Year 2008 release into the Market Management System (MMS), the DLF is now separately defined in MMS for dispatch purposes only, and the DLF for settlement purposes is applied in the Market Settlement and Transfer Solution (MSATS) as per all other market connection points (i.e. the generated energy is adjusted by the DLF). The MLF in MMS will no longer be adjusted by the DLF.

The site specific DLFs for embedded generators (scheduled and non-scheduled) are published separately in the "Distribution Loss Factors for the 2012/13 Financial Year" document which is available on AEMO's website[3].

3.16 Interconnector Capability

In accordance with section 5.5.4 of the forward-looking loss factor methodology, AEMO has estimated nominal interconnector limits for summer peak, summer off-peak, winter peak and winter off-peak periods. These values are listed in the table below. AEMO sought feedback from the associated TNSPs to ensure that these limits are suitable.

From region	To region	Summer peak	Summer off-peak	Winter peak	Winter off-peak
Queensland	New South Wales	1078	1078	1078	1078
New South Wales	Queensland	400	550	400	550
New South Wales	Victoria	1900 minus Murray Generation	1900 minus Murray Generation	1900 minus Murray Generation	1900 minus Murray Generation
Victoria	New South Wales	3200 minus Upper & Lower Tumut Generation	3000 minus Upper & Lower Tumut Generation	3200 minus Upper & Lower Tumut Generation	3000 minus Upper & Lower Tumut Generation
Victoria	South Australia	460	460	460	460
South Australia	Victoria	460	460	460	460
Murraylink Vic	South Australia	220	220	220	220
Murraylink SA	Victoria	188 – North West Bend & Berri loads	198 – North West Bend & Berri loads	215 – North West Bend & Berri loads	215 – North West Bend & Berri loads
Terranora Interconnector Qld	NSW	220	220	220	220
Terranora Interconnector NSW	Qld	122	122	122	122
* Basslink VIC	Tasmania	478	478	478	478
* Basslink TAS	Victoria	594	594	594	594

[3] http://www.aemo.com.au/electricityops/0171-0008.html

The peak interconnector capability does not necessarily correspond to the network capability at the time of the maximum regional demand; rather it refers to average capability during the peak periods which corresponds to 7 AM to 10 PM on week days.

* Note that Basslink is a Market Network Service Provider that consists of a controllable network element that transfers power between the Tasmania and Victoria regions.

3.17 Data accuracy and due diligence of the forecast data

The marginal loss factors have been calculated by AEMO using the relevant load forecast data from TNSPs and historical generation data from the AEMO settlements database.

The historical connection point data has already been checked and finalised as part of the settlements process. For each region and half hour trading interval, the losses were calculated by adding the summated generation values to the interconnector flow and subtracting the summated load values. These transmission losses are used to indicate large errors in the data. Once convinced that the data is reasonable and consistent using this checking method, the historical load data is sent to the relevant TNSPs, to generate forecast loads for 2012/13.

The due diligence of the forecast data was performed as follows:

- Check that forecast data for each connection point is provided;
- Confirm that load growth is consistent with ESOO 2011 and ESOO 2011 update for 2012/13 financial year;
- Check that load shapes are consistent with the load profile for the historical year 2010/11;
- Check that the forecast for connection points includes the relevant embedded generation, if any;
- Check that industrial and auxiliary type loads are not scaled;
- Check that AusGrid's forecast is consistent with the TransGrid forecast for bulk supply connection points for all connection points on the TransGrid/Ausgrid transmission boundary.

3.18 Calculation of intra-regional loss factors

AEMO uses the TPRICE[4] software package to calculate the loss factors because of its ability to handle large data sets. TransGrid, ElectraNet SA and Powerlink also use versions of this package.

The loss factors for each connection point have been calculated as follows:

- The half hourly forecast load and historical generator data, generating unit capacity and availability data together with interconnector data, are converted into a format suitable for input to the TPRICE program.
- The load flow case is adjusted to ensure a reasonable voltage profile is maintained in each region at times of high demand.
- The load flow case is converted into a format suitable for use in TPRICE.
- The half hourly generator and load data for each connection point, generating unit capacity and availability data, together with interconnector data are fed into the TPRICE program one trading interval at a time. The TPRICE program allocates the load and generator values to the appropriate connection points in the load flow case.
- TPRICE iteratively dispatches generators to meet forecast demand and solves each half hourly load flow case and calculates the loss factors appropriate to the load flow conditions.

[4]TPRICE is a commercially available transmission pricing software package. It is capable of running a large number of consecutive load flow cases quickly. The program outputs loss factors for each trading interval as well as averaged over a financial year using volume weighting.

- The Regional Reference Node (RRN) and connection points are defined for each region. The loss factors in each region are therefore referred to the appropriate RRN.
- Once all the trading intervals have been processed, TPRICE averages the loss factors for the full year for each connection point using connection point load weighting.
- Typically, generation loss factors are weighted against generator output and load loss factors against load consumption. However, where load and generation are connected to the same connection point and individual metering is not available for the separate components, the same loss factor is calculated for both the generator and load.

The static intra-regional loss factors that apply for the 2012/13 financial year are tabulated in Appendix A. MLFs for transmission connection points shown in the load tables in Appendix A also apply to non-market embedded generators that are assigned to those transmission connection points.

3.19 Inter-regional loss factor equations

Inter-regional loss factor equations describe the variation in loss factor at one RRN with respect to an adjacent RRN. These equations are referred to as dynamic inter-regional loss factor equations, and are necessary to cater for the large variations in loss factors that may occur between reference nodes resulting from different (and particularly tidal) energy flow patterns. This is important in minimising the distortion of economic dispatch of generating units.

The inter-regional loss factor equations to apply for the 2012/13 financial year are provided in Appendix B. These equations have been obtained by applying linear regression to the full set of loss factor data for the RRNs. Relevant power system variables were used in the regression analysis. To meet the requirements of the AEMO dispatch algorithm the choice of variables and equation formulation has been restricted as follows:

- Only linear terms are permitted in the equation;
- Only the notional link flow between the reference nodes for which the loss factor difference is being determined can be used;
- Region demands are allowed as equation variables; and
- Other variables such as generator outputs cannot be used.
- Graphs of variation in inter-regional loss factor with notional link flow for typical system conditions are also included in Appendix B.
- The inter-regional loss equations, obtained by integrating the (inter-regional loss factor – 1) equations, are provided in Appendix C.
- The inter-regional loss equations for Basslink, Terranora Interconnector and Murraylink are provided in Appendix D.

3.20 Loss models for Controllable Links

Appendix D contains loss factor and loss models for controllable links, including the Terranora Interconnector loss factor model, Murraylink loss factor model and the Basslink loss equation.

3.21 Proportioning Inter-regional Losses to Regions

Appendix E contains the factors used to apportion the inter-regional losses to the associated regions for the 2012/13 financial year.

4 Differences in loss factors compared to the 2011/12 financial year

4.1 MLFs

Under marginal pricing, the spot price for electricity is defined as the incremental cost of additional generation (or demand reduction) for each spot market interval.

Consistent with this is that the marginal loss is the addition to the total loss for each additional unit of electricity (MW) delivered, given by the MLF calculated.

The tables in Appendix A show the intra-regional loss factors for each region in the NEM. As discussed in the introduction, the price of electricity at a connection point within a region is the price at the RRN multiplied by the Intra-regional loss factor between it and the RRN. Depending on network and loading configurations, loss factor values can vary quite significantly, ranging from below 1.0 to above 1.0.

4.1.1 MLFs greater than 1

At any instant at a connection point, the marginal value of electricity will equal the cost of generating additional supplies at the RRN and transmitting it to that point. Any increase or decrease in total losses is then the marginal loss associated with the transmission of electricity from the RRN to this connection point. If the marginal loss is positive, this means that less can be taken from this point than is supplied at the RRN, the difference having been lost in the network. In this case, the MLF is above 1.0. This would normally be expected to apply to loads. However, this would also apply to generators situated in areas where the local load is greater than the local level of generation.

For example, a generator supplying an additional 1 MW at the RRN may find that its customer at the connection point can only receive an additional 0.95 MW. Marginal losses are 0.05 MW, or 5% of generation, resulting in MLF = 1.05.

4.1.2 MLFs less than 1

In general, losses increase with distance, so that the further the distance between the RRN and a connection point is, the higher the MLF value. However, additional line flow only raises total losses if it moves in the same direction as the existing net flow. At any instant, when the additional flow is against the net flow, total losses on the network will be reduced. In this case, the MLF is below 1.0. This would normally be expected to apply to generators. However, this would also apply to loads situated in areas where the local level of generation is greater than the local load.

Using the example above, if the net flow is in the direction from the connection point to the RRN, then the generator at the RRN will only be required to supply an additional 0.95 MW to meet an additional load of 1 MW at the connection point. Marginal losses are then -0.05 MW, or 5% reduction in generation, resulting in MLF = 0.95.

4.2 Comparison of 2012/13 MLFs with 2011/12 MLFs

The 2012/13 energy forecasts in all regions have decreased (see the Table in Section 3.1). Historical Basslink energy transfer between Victoria and Tasmania used for the MLF calculations has changed from more than 1000 GWh flowing from Victoria to Tasmania in 2011/12 to around 200 GWh from Tasmania to Victoria in 2012/13. The substantial changes in Basslink power transfer and the reduction in demand in Victoria have resulted in significant increases in transfers to South Australia and New South Wales.

This increase in power transfer from Victoria to New South Wales has in turn, resulted in a significant reduction in Queensland to New South Wales power transfer. As the Queensland demand has also decreased it has led to a very significant reduction in the transfer from Central Queensland to South Queensland resulting in increases in MLFs across Central and North Queensland

The substantial changes in interconnector transfers referred to above, combined with the reduction in demand in all regions of the NEM have contributed to large changes in the marginal loss factor values in some areas.

4.2.1 Victoria

Though MLFs in the region would have decreased due to the reduction in demand forecast, they have been overshadowed by the effect of the very significant change in all interconnector transfers.

Basslink has changed from a net flow towards Tasmania to net flow towards Victoria. This has contributed to increases in the transfers to New South Wales and South Australia resulting in increased MLFs along these paths. The combined effect is that most MLFs in the region have increased slightly.

In addition, generation at the Murray power stations has increased significantly due to the increase in the amount of water available, and this has further increased the transfer towards New South Wales leading to a significant increase in MLFs in this area. There has also been a significant increase in the Hume (Victorian share) MLF due to the increased transfer to New South Wales and a decrease in its generation output.

Basslink (Loy Yang Power Station Switchyard) has a Net Energy Balance (NEB) of less than 30%. Therefore under clause 3.6.2 of the NER, two MLFs have been determined for Basslink (Loy Yang Power Station Switchyard).

4.2.2 New South Wales

The decrease in demand forecast would have decreased MLFs slightly in the region. However, the significant increase in the power transfer from Victoria to New South Wales has decreased the MLFs between the Victoria border and the New South Wales RRN further (e.g. Darlington Point, Albury, Wagga and most of the south-western New South Wales connection points).

This increase in the transfer from Victoria has also reduced the transfer from Queensland to New South Wales on QNI and the Terranora Link. This reduction in power transfers from Queensland has resulted in increased MLF values in the northern New South Wales (e.g. Armidale Mullumbimby, Lismore, Moree and Coffs Harbour).

The increase in Victoria to New South Wales power transfer has resulted in large reductions in some MLF values in southern New South Wales including Upper Tumut, Lower Tumut, Blowering, Burrinjuck and Hume (NSW share) power stations as well as most southern New South Wales loads. A large increase in the New South Wales share of generation from Hume power station has also caused a reduction in the Hume (NSW share) MLF value.

4.2.3 Queensland

The demand forecast shows a decrease for 2012/13. However, this decrease is not uniform across the region and the demand variations between Southern, Central, and North Queensland are substantial. This, together with the reduction in generation from Central Queensland power stations, has resulted in a significant decrease in the power transfer from Central and Northern Queensland to Southern Queensland, with the effect of increasing MLF values in Central and Northern Queensland.

The MLFs in Southern Queensland have decreased due to the decrease in transfer from Queensland to NSW on QNI. The QNI transfer reduction is at least in part due to the increased transfer into NSW from Victoria (refer 4.2.1 above).

In the case of Tarong and Millmerran power stations, the MLFs have followed the general trend of decreasing MLF values common to Southern Queensland. However, in the case of Braemar power station the augmentation between Halys and Tarong (construction of two new lines) has reduced losses, thereby slightly increasing the Braemar power station MLF.

4.2.4 South Australia

South Australia demand forecast for 2012/13 has decreased slightly resulting in lower MLFs for most connection points. Wind farm generation has increased but thermal generation has decreased. in part due to the net power transfer between South Australia and Victoria changing from flowing into Victoria in the previous year to reversing to a moderate flow from Victoria into South Australia in this year’s calculations. The increase in Basslink flows towards Victoria and the Victorian demand reduction (refer 4.2.1 above) have contributed to this increase in net transfer from Victoria to South Australia.

Consequently, the MLFs along the interconnector flow paths have higher reductions: Mt Gambier, Blanche, Ladbroke Grove power station, and Lake Bonney wind farm along the Heywood path, and Berri and North West Bend along the Murraylink path.

Snuggery power station output has reduced significantly compared to last year’s MLF data, while the number of time intervals where the historical trace for Snuggery power station shows power consumption has increased. This has resulted in the Snuggery power station MLF increasing compared to the 2011/12 MLF value.

Port Lincoln power station has shown a large reduction in its output compared to last year’s MLF data and its MLF has increased accordingly.

Increased generation from wind farms across the region has led to moderate reductions in the MLF values for the Cathedral Rocks, Mount Miller, Wattle Point, North Brown Hill and The Bluff wind farm connection points.

Snuggery Industrial load, however, has reduced its energy consumption significantly due to a large customer running a generator to meet part of the industrial load. Hence the Snuggery Industrial load MLF value has reduced.

4.2.5 Tasmania

The Tasmania load forecast for 2012/13 has reduced slightly. The hydro generation across the region has increased, particularly at Gordon, Lake Echo and Tungatinah power stations, which has resulted in the increase in Basslink power transfer towards Victoria. The net Basslink flow has changed from being towards Tasmania in 2011/12 MLF calculations, to being towards Victoria in this year’s calculations.

These changes have contributed to a significant decrease in the power flow from the the Regional Reference Node at George Town towards Southern and Central Tasmania resulting in slight reductions in MLF values at most Tasmania connection points. The increases in generation output at Gordon, Lake Echo and Tungatinah power stations in the 2012/13 MLF data relative to the 2011/12 MLF calculations, has resulted in a reduction in their MLF values.

5 Virtual transmission nodes

Six virtual transmission nodes (VTNs) have been approved by the AER for use in the NEM. The loss factors for the VTNs are included in Appendix A.

5.1 New South Wales

In accordance with clause 3.6.2(b)(3) of the Rules, the AER has approved Ausgrid's application to define the three VTNs listed in the following table[5].

VTN TNI code	Description	Associated transmission connection points (TCPs)
NEV1	Far North	Muswellbrook 132 and Liddell 33
NEV2	North of Broken Bay	Kurri 11, Kurri 33, Kurri 66, Kurri 132, Newcastle 132, Munmorah 330, Munmorah 33, Vales Pt. 132, Beresfield 33, Charmhaven 11, Gosford 33, Gosford 66, West Gosford 11, Ourimbah 33, Somersby 11, Tomago 33, BHP Waratah 132 and Wyong 11
NEV3	South of Broken Bay	Sydney North 132 (Ausgrid), Lane Cove 132, Meadowbank 11, Mason Park 132, Homebush Bay 11, Chullora 132 kV, Chullora 11, Peakhurst 132, Peakhurst 33, Drummoyne 11, Rozelle 33, Pyrmont 132, Pyrmont 33, Marrickville 11, St Peters 11, Beaconsfield West 132, Canterbury 33, Bunnerong 33, Bunnerong 132, Sydney East 132, Sydney West 132 (Ausgrid) and Sydney South 132, Macquarie Park 11, Rozelle 132 and Haymarket 132

5.2 South Australia

The AER has approved ETSA Utilities' application to define the SJP1 VTN for South Australia. The South Australian VTN includes all load transmission connection points excluding:

Snuggery Industrial as nearly its entire capacity services an industrial facility at Millicent; and

Whyalla MLF as its entire capacity services an industrial plant in Whyalla.

5.3 Tasmania

The AER has approved Aurora application to define the two VTNs listed in the following table:

[5] These VTNs are based on old definitions determined by IPART. They will be revised in due course to include newly classified transmission assets as well as changes in the definitions of some AusGrid TNIs.

VTN TNI code	Description	Associated transmission connection points (TCPs)
TVN1	Greater Hobart Area	Chapel Street 11, Creek Road 33, Lindisfarne 33, North Hobart 11, Risdon 33 and Rokeby 11.
TVN2	Tamar Region	Hadspen 22, Mowbray 22, Norwood 22, Trevallyn 22, George Town 22

6 Region boundaries and regional reference nodes for 2012/13

Appendix F comprises the list of regional reference nodes and region boundaries that apply for the 2012/13 financial year.

7 Appendix A: Intra-regional loss factors for 2012/13

Queensland (regional reference node is South Pine 275)

Queensland Loads

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Abermain	33	QABM	1.0037	0.9986
Abermain (Lockrose)	110	QABR	1.0014	0.9967
Alan Sherriff	132	QASF	1.0609	1.1076
Algester	33	QALG	1.0177	1.0148
Alligator Creek	33	QALC	1.0583	1.0767
Alligator Creek	132	QALH	1.0566	1.0782
Ashgrove West	33	QAGW	1.0175	1.0191
Ashgrove West	110	QCBW	1.0166	1.0151
Belmont	110	QBMH	1.0118	1.0088
Belmont Wecker Road	11	QMOB	1.0122	1.0218
Belmont Wecker Road	33	QBBS	1.0142	0.9965
Biloela	66/11	QBIL	0.9358	0.9457
Blackstone	110	QBKS	1.0007	1.0012
Blackwater	132	QBWH	1.0450	1.0552
Blackwater	66&11	QBWL	1.0476	1.0564
Bluff	132	QBLF		1.0558
Bolingbroke	132	QBNB	1.0147	1.0735
Bowen North	66	QBNN	1.0474	1.0679
Boyne Island	132	QBOL	0.9797	1.0046
Boyne Island	275	QBOH	0.9811	1.0051
Braemar - Kumbarilla Park	275	QBRE	0.9471	0.9493
Bulli Creek (CE)	132	QBK2	0.9600	0.9585
Bulli Creek (Waggamba)	132	QBLK	0.9600	0.9585
Bundamba	110	QBDA	1.0025	1.0000
Burton Downs	132	QBUR	1.0600	1.0905
Cairns	22	QCRN	1.1090	1.1348
Cairns City	132	QCNS	1.1037	1.1331
Callemondah (Rail)	132	QCMD	0.9681	0.9969
Cardwell	22	QCDW	1.1111	1.1435
Chinchilla	132	QCHA		0.9418
Clare	66	QCLR	1.0868	1.0922
Collinsville Load	33	QCOL	1.0415	1.0697
Columboola	132	QCBL		0.9219
Coppabella (Rail)	132	QCOP	1.0849	1.1312
Dan Gleeson	66	QDGL	1.0788	1.1253
Dingo (Rail)	132	QDNG	1.0317	1.0387
Duaringa	132	QDRG		1.0191
Dysart	66/22	QDYS	1.0727	1.1129
Edmonton	22	QEMT	1.1179	1.1373
Egans Hill	66	QEGN	0.9720	0.9992
El Arish	22	QELA	1.1255	1.1417
Garbutt	66	QGAR	1.0656	1.1170

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Gin Gin	132	QGNG	0.9866	1.0075
Gladstone	132	QGLA	0.9689	0.9953
Gladstone South	66/11	QGST	0.9682	1.0002
Goodna	33	QGDA	1.0072	1.0030
Grantleigh (Rail)	132	QGRN	0.9909	1.0100
Gregory (Rail)	132	QGRE	1.0147	1.0427
Ingham	66	QING	1.0646	1.1092
Innisfail	22	QINF	1.1295	1.1444
Invicta Load	132	QINV	1.0653	1.1027
Kamerunga	22	QKAM	1.1152	1.1291
Kemmis	132	QEMS	1.0479	1.0778
King Creek	132	QKCK	1.0708	1.0825
Lilyvale	66	QLIL	1.0139	1.0426
Lilyvale (Barcaldine)	132	QLCM	1.0108	1.0383
Loganlea	33	QLGL	1.0175	1.0079
Loganlea	110	QLGH	1.0132	1.0049
Mackay	33	QMKA	1.0553	1.0761
Middle Ridge (Energex)	110	QMRX	0.9725	0.9700
Middle Ridge (Ergon)	110	QMRG	0.9725	0.9700
Mindi (Rail)	132	QMND	1.0234	1.0469
Molendinar	33	QMAL	1.0115	1.0086
Molendinar	110	QMAR	1.0110	1.0089
Moranbah (Mine)	66	QMRN	1.0794	1.1206
Moranbah (Town)	11	QMRL	1.0716	1.1112
Moranbah South (Rail)	132	QMBS	1.0745	1.1203
Moura	66/11	QMRA	0.9802	0.9973
Mt McLaren (Rail)	132	QMTM	1.0970	1.1482
Mudgeeraba	33	QMGL	1.0153	1.0107
Mudgeeraba	110	QMGB	1.0151	1.0109
Murarrie (Belmont)	110	QMRE	1.0158	1.0088
Nebo	11	QNEB	1.0202	1.0418
Newlands	66	QNLD	1.0826	1.1141
North Goonyella	132	QNGY	1.0780	1.1395
Norwich Park (Rail)	132	QNOR	1.0455	1.0766
Oakey	110	QOKT	0.9725	0.9712
Oonooie (Rail)	132	QOON	1.0620	1.0810
Palmwoods	132/110	QPWD	1.0275	1.0272
Pandoin	66	QPAL	0.9446	1.0027
Pandoin	132	QPAN	0.9746	1.0027
Peak Downs (Rail)	132	QPKD	1.0772	1.1171
Pioneer Valley	66	QPIV	1.0626	1.0727
Proserpine	66	QPRO	1.0641	1.0890
QAL (Gladstone South)	132	QQAH	0.9713	1.0015
QLD Nickel (Yabulu)	132	QQNH	1.0542	1.1055
Raglan	275	QRGL	0.9723	0.9947
Redbank Plains	11	QRPN	1.0062	1.0024
Richlands	33	QRLD	1.0180	1.0129
Rockhampton	66	QROC	0.9790	1.0032
Rocklands (Rail)	132	QRCK	0.9670	0.9960
Rocklea (Archerfield)	110	QRLE	1.0059	1.0027
Ross	132	QROS	1.0609	1.1006

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Runcorn	33	QRBS	1.0180	1.0151
South Pine	110	QSPN	1.0024	1.0056
Stony Creek	132	QSYC	1.0837	1.1020
Sumner	110	QSUM	1.0080	1.0045
Swanbank (Raceview)	110	QSBK	1.0010	1.0011
Tangkam (Dalby)	110	QTKM	0.9756	0.9468
Tarong	66	QTRL	0.9671	0.9640
Tarong	132	QTRH	0.9633	0.9618
Teebar Creek	132	QTBC	1.0051	1.0161
Tennyson	33	QTNS	1.0111	1.0076
Tennyson (Rail)	110	QTNN	1.0084	1.0051
Townsville East	66	QTVE	1.0785	1.1266
Townsville South	66	QTVS	1.0801	1.1223
Townsville South (KZ)	132	QTZS	1.0761	1.1165
Tully	22	QTLL	1.1288	1.1504
Turkinje	66	QTUL	1.1260	1.1524
Turkinje (Craiglee)	132	QTUH	1.1242	1.1522
Wandoo (Rail)	132	QWAN	1.0258	1.0467
Wivenhoe Pump	275	QWIP	0.9952	0.9933
Woolooga (Energex)	132	QWLG	1.0006	1.0111
Woolooga (Ergon)	132	QWLN	1.0006	1.0111
Woree	132	QWRE	1.1118	1.1310
Wycarbah	132	QWCB		0.9978
Yarwun – Boat Creek (Ergon)	132	QYAE	0.9622	1.0016
Yarwun – Rio Tinto	132	QYAR	0.9602	0.9945

Queensland Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Barron Gorge PS Unit 1	132	BARRON-1	QBGH1	QBGH	1.0935	1.1135
Barron Gorge PS Unit 2	132	BARRON-2	QBGH2	QBGH	1.0935	1.1135
Braemar PS	275	BRAEMAR1	QBRA1	QBRA	0.9415	0.9471
Braemar PS	275	BRAEMAR2	QBRA2	QBRA	0.9415	0.9471
Braemar PS	275	BRAEMAR3	QBRA3	QBRA	0.9415	0.9471
Braemar Stage 2 PS Unit 5	275	BRAEMAR5	QBRA5B	QBRA	0.9415	0.9471
Braemar Stage 2 PS Unit 6	275	BRAEMAR6	QBRA6B	QBRA	0.9415	0.9471
Braemar Stage 2 PS Unit 7	275	BRAEMAR7	QBRA7B	QBRA	0.9415	0.9471
Callide PS Load	132	CALLNL1	QCAX	QCAX	0.9302	0.9383
Callide A PS Unit 4 Load	132	CALLNL4	QCAA2	QCAA	0.9302	0.9446
Callide A PS Unit 4	132	CALL_A_4	QCAA4	QCAA	0.9302	0.9446
Callide B PS Unit 1	275	CALL_B_1	QCAB1	QCAB	0.9285	0.9471
Callide B PS Unit 2	275	CALL_B_2	QCAB2	QCAB	0.9285	0.9471
Callide C PS Unit 3	275	CPP_3	QCAC3	QCAC	0.9269	0.9476
Callide C PS Unit 4	275	CPP_4	QCAC4	QCAC	0.9269	0.9476
Collinsville PS Load	132	COLNSNL1	QCLX	QCLX	1.0232	1.0389
Collinsville PS Unit 1	132	COLNSV_1	QCVL1	QCVP	1.0232	1.0389
Collinsville PS Unit 2	132	COLNSV_2	QCVL2	QCVP	1.0232	1.0389
Collinsville PS Unit 3	132	COLNSV_3	QCVL3	QCVP	1.0232	1.0389
Collinsville PS Unit 4	132	COLNSV_4	QCVL4	QCVP	1.0232	1.0389
Collinsville PS Unit 5	132	COLNSV_5	QCVL5	QCVP	1.0232	1.0389
Condamine PS	132	CPSA	QCND1C	QCND	0.9625	0.8895
Darling Downs	275	DDPS1	QBRA8D	QBRA	0.9415	0.9471
Gladstone PS (132 kV) Unit 3	132	GSTONE3	QGLD3	QGLL	0.9612	0.9885
Gladstone PS (132 kV) Unit 4	132	GSTONE4	QGLD4	QGLL	0.9612	0.9885
Gladstone PS (132kV) Load	132	GLADNL1	QGLL	QGLL	0.9612	0.9885
Gladstone PS (275 kV) Unit 1	275	GSTONE1	QGLD1	QGLH	0.9631	0.9919
Gladstone PS (275 kV) Unit 2	275	GSTONE2	QGLD2	QGLH	0.9631	0.9919
Gladstone PS (275 kV) Unit 5	275	GSTONE5	QGLD5	QGLH	0.9631	0.9919
Gladstone PS (275 kV) Unit 6	275	GSTONE6	QGLD6	QGLH	0.9631	0.9919
Kareeya PS Unit 1	11	KAREEYA1	QKAH1	QKAH	1.0600	1.1055
Kareeya PS Unit 2	11	KAREEYA2	QKAH2	QKAH	1.0600	1.1055
Kareeya PS Unit 3	11	KAREEYA3	QKAH3	QKAH	1.0600	1.1055
Kareeya PS Unit 4	11	KAREEYA4	QKAH4	QKAH	1.0600	1.1055
Kogan Creek PS	275	KPP_1	QBRA4K	QWDN	0.9415	0.9464
Koombooloomba	132	KAREEYA5	QKYH5	QKYH	1.0703	1.1144
Mackay GT	33	MACKAYGT	QMKG	QMKG	1.0353	1.0674
Millmerran PS Unit 1 (Millmerran)	330	MPP_1	QBCK1	QMLN	0.9600	0.9578

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Millmerran PS Unit 2 (Millmerran)	330	MPP_2	QBCK2	QMLN	0.9600	0.9578
Mt Stuart PS Unit 1	132	MSTUART1	QMSP1	QMSP	0.9772	0.9813
Mt Stuart PS Unit 2	132	MSTUART2	QMSP2	QMSP	0.9772	0.9813
Mt Stuart PS Unit 3	132	MSTUART3	QMSP3M	QMSP	0.9772	0.9813
Oakey PS Unit 1	110	OAKEY1	QOKY1	QOKY	0.9384	0.9395
Oakey PS Unit 2	110	OAKEY2	QOKY2	QOKY	0.9384	0.9395
Stanwell PS Load	132	STANNL1	QSTX	QSTX	0.9584	0.9876
Stanwell PS Unit 1	275	STAN-1	QSTN1	QSTN	0.9584	0.9876
Stanwell PS Unit 2	275	STAN-2	QSTN2	QSTN	0.9584	0.9876
Stanwell PS Unit 3	275	STAN-3	QSTN3	QSTN	0.9584	0.9876
Stanwell PS Unit 4	275	STAN-4	QSTN4	QSTN	0.9584	0.9876
Swanbank B PS Unit 1	275	SWAN_B_1	QSWB1	QSWB	0.9975	1.0011
Swanbank B PS Unit 2	275	SWAN_B_2	QSWB2	QSWB	0.9975	1.0011
Swanbank B PS Unit 3	275	SWAN_B_3	QSWB3	QSWB	0.9975	1.0011
Swanbank B PS Unit 4	275	SWAN_B_4	QSWB4	QSWB	0.9975	1.0011
Swanbank E GT	275	SWAN_E	QSWE	QSWE	0.9991	0.9963
Swanbank PS Load	110	SWANNL2	QSW1	QSWB	0.9975	1.0011
Tarong North PS	275	TNPS1	QTNT	QTNT	0.9652	0.9633
Tarong PS Unit 1	275	TARONG#1	QTRN1	QTRN	0.9655	0.9631
Tarong PS Unit 2	275	TARONG#2	QTRN2	QTRN	0.9655	0.9631
Tarong PS Unit 3	275	TARONG#3	QTRN3	QTRN	0.9655	0.9631
Tarong PS Unit 4	275	TARONG#4	QTRN4	QTRN	0.9655	0.9631
Wivenhoe Generation Unit 1	275	W/HOE#1	QWIV1	QWIV	0.9909	0.9871
Wivenhoe Generation Unit 2	275	W/HOE#2	QWIV2	QWIV	0.9909	0.9871
Wivenhoe Pump 1	275	PUMP1	QWIP1	QWIP	0.9952	0.9933
Wivenhoe Pump 2	275	PUMP2	QWIP2	QWIP	0.9952	0.9933
Wivenhoe Small Hydro	110	WIVENSH	QABR1	QABR	1.0014	0.9967
Yabulu PS	132	YABULU	QTYP	QTYP	1.0200	1.0524
Yarwun PS	132	YARWUN_1	QYAG1R	QYAG	0.9593	0.9934

Queensland Embedded Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Barcaldine PS @ Lilyvale	132	BARCALDN	QBCG	QBCG	0.9872	1.0235
Daandine PS	110	DAANDINE	QTKM1	QTKM	0.9756	0.9468
German Creek Generator	66	GERMCRK	QLIL2	QLIL	1.0139	1.0426
Isis CSM	132	ICSM	QGNG1I	QTBC	1.0051	1.0161
KRC Co-Gen	110	KRCCOGEN	QMRG1K	QMRG	0.9725	0.9700
Moranbah Gen	11	MORANBAH	QMRL1M	QMRL	1.0716	1.1112
Moranbah North PS	66	MBAHNTH	QMRN1P	QMRN	1.0794	1.1206
Oakey Creek Generator	66	OAKYCREK	QLIL1	QLIL	1.0139	1.0426
Rochedale Renewable Energy Plant	110	ROCHEDAL	QBMH2	QBMH	1.0118	1.0088
Rocky Point Gen (Loganlea 110kV)	110	RPCG	QLGH2	QLGH	1.0132	1.0049
Roghan Road Generator	110	EDLRGNRD	QSPN2	QSPN	1.0024	1.0056
Roma PS Unit 7	132	ROMA_7	QRMA7	QRMA	0.9633	0.8640
Roma PS Unit 8	132	ROMA_8	QRMA8	QRMA	0.9633	0.8640
Southbank Institute Of Technology	110	STHBKTEC	QCBD1S	QCBW	1.0166	1.0151
Suncoast Gold Macadamias Co-Gen (Palmwoods)	110	SUNCOAST	QPWD1	QPWD	1.0275	1.0272
Ti Tree BioReactor	33	TITREE	QABM1T	QABM	1.0037	0.9986
Whitwood Rd Renewable Energy Plant	110	WHIT1	QSBK1	QSBK	1.0010	1.0011
Windy Hill Windfarm (Turkinje 66kV)	66	WHILL1	QTUL	QTUL	1.1260	1.1524
Yabulu Steam Turbine (Garbutt 66kV)	66	YABULU2	QGAR1	QYST	1.0310	1.0634

New South Wales (regional reference node is Sydney West 330)

New South Wales Loads

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Albury	132	NALB	1.0172	0.9976
Alcan	132	NALC	1.0072	1.0025
ANM	132	NANM	1.0157	1.0063
Armidale	66	NAR1	0.9245	0.9428
Balranald	22	NBAL	1.0597	1.0537
Beaconsfield South	132	NBFS	1.0087	1.0081
Beaconsfield West	132	NBFW	1.0087	1.0081
Beresfield	33	NBRF	1.0032	0.9988
Beryl	66	NBER	0.9968	0.9964
BHP (Waratah)	132	NWR1	0.9912	0.9908
Broken Hill	22	NBKG	1.1027	1.1026
Broken Hill	220	NBKH	1.0949	1.0935
Bunnerong	33	NBG3	1.0144	1.0146
Bunnerong	132	NBG1	1.0090	1.0093
Burrinjuck	132	NBU2	1.0109	1.0001
Canterbury	33	NCTB	1.0193	1.0145
Carlingford	132	NCAR	1.0040	1.0053
Casino	132	NCSN	0.9452	0.9795
Charmhaven	11	NCHM	0.9973	0.9960
Chullora	132	NCHU	1.0122	1.0093
Coffs Harbour	66	NCH1	0.9426	0.9681
Coleambally	132	NCLY	1.0278	1.0222
Cooma	132	NCMA	1.0146	1.0071
Cowra	66	NCW8	1.0241	1.0151
Dapto (Endeavour Energy)	132	NDT1	0.9972	0.9942
Dapto (Essential Energy)	132	NDT2	0.9972	0.9942
Darlington Point	132	NDNT	1.0241	1.0169
Deniliquin	66	NDN7	1.0628	1.0519
Dorrigo	132	NDOR	0.9369	0.9602
Drummoyne	11	NDRM	1.0202	1.0157
Dunoon	132	NDUN	0.9285	0.9640
Far North VTN		NEV1	0.9558	0.9595
Finley	66	NFNY	1.0557	1.0497
Forbes	66	NFB2	1.0398	1.0348
Gadara	132	NGAD	1.0397	1.0242
Glen Innes	66	NGLN	0.9545	0.9772
Gosford	33	NGSF	1.0070	1.0049
Gosford	66	NGF3	1.0063	1.0040
Green Square	11	NGSQ	1.0095	1.0084
Griffith	33	NGRF	1.0532	1.0382
Gunnedah	66	NGN2	0.9830	1.0001
Haymarket	132	NHYM	1.0082	1.0079
Homebush Bay	11	NHBB	1.0184	1.0132
Ilford	132	NLFD	0.9810	0.9793
Ingleburn	66	NING	0.9992	0.9979

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Inverell	66	NNVL	0.9688	0.9944
Kemps Creek	330	NKCK	0.9971	0.9963
Kempsey	33	NKS3	0.9976	1.0061
Kempsey	66	NKS2	1.0087	1.0043
Koolkhan	66	NKL6	0.9547	0.9837
Kurnell	132	NKN1	1.0090	1.0082
Kurri	11	NKU1	1.0025	0.9992
Kurri	33	NKU3	1.0066	1.0023
Kurri	66	NKU6	1.0085	1.0027
Kurri	132	NKUR	1.0038	0.9998
Lane Cove	132	NLCV	1.0152	1.0109
Liddell	33	NLD3	0.9568	0.9641
Lismore	132	NLS2	0.9430	0.9836
Liverpool	132	NLP1	1.0014	0.9999
Macarthur	132	NMC1	0.9969	0.9965
Macarthur	66	NMC2	0.9980	0.9974
Macksville	132	NMCV	0.9662	0.9879
Macquarie Park	11	NMQP	1.0194	1.0132
Manildra	132	NMLD	1.0221	1.0203
Marrickville	11	NMKV	1.0177	1.0149
Marulan (Endeavour Energy)	132	NMR1	0.9867	0.9837
Marulan (Essential Energy)	132	NMR2	0.9867	0.9837
Mason Park	132	NMPK	1.0137	1.0105
Meadowbank	11	NMBK	1.0203	1.0148
Molong	132	NMOL	1.0155	1.0147
Moree	66	NMRE	1.0147	1.0527
Mt Piper	66	NMP6	0.9644	0.9616
Mt Piper	132	NMPP	0.9644	0.9616
Mudgee	132	NMDG	0.9937	0.9929
Mullumbimby	11	NML1	0.9125	0.9514
Mullumbimby	132	NMLB	0.9130	0.9502
Munmorah	33	NMNP	0.9917	0.9919
Munyang	11	NMY1	1.0157	1.0281
Munyang	33	NMYG	1.0157	1.0281
Murrumbateman	132	NMBM	0.9965	0.9886
Murrumburrah	66	NMRU	1.0166	1.0055
Muswellbrook	132	NMRK	0.9557	0.9588
Nambucca Heads	132	NNAM	0.9604	0.9797
Narrabri	66	NNB2	1.0123	1.0426
Newcastle	132	NNEW	0.9947	0.9933
North of Broken Bay VTN		NEV2	0.9982	0.9961
Orange	66	NRGE	1.0202	1.0190
Orange	132	NRG1	1.0189	1.0173
Orange North	132	NONO	1.0189	1.0173
Ourimbah	33	NORB	1.0036	1.0026
Ourimbah	132	NOR1	1.0014	1.0006
Ourimbah	66	NOR6	1.0014	1.0003
Panorama	66	NPMA	1.0118	1.0099
Parkes	66	NPK6	1.0376	1.0346
Parkes	132	NPKS	1.0366	1.0331

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Peakhurst	33	NPHT	1.0110	1.0074
Peakhurst	132	NPH1	1.0066	1.0039
Pt Macquarie	33	NPMQ	1.0148	1.0191
Pyrmont	33	NPT3	1.0090	1.0088
Pyrmont	132	NPT1	1.0083	1.0082
Raleigh	132	NRAL	0.9494	0.9718
Regentville	132	NRGV	0.9978	0.9979
Rozelle	33	NRZL	1.0158	1.0123
Rozelle	132	NRZH	1.0139	1.0131
Snowy Adit	132	NSAD	1.0020	1.0008
Somersby	11	NSMB	1.0081	1.0052
South of Broken Bay VTN		NEV3	1.0094	1.0076
St Peters	11	NSPT	1.0135	1.0118
Stroud	132	NSRD	1.0333	1.0050
Sydney East	132	NSE2	1.0095	1.0083
Sydney North (Ausgrid)	132	NSN1	1.0043	1.0030
Sydney North (Endeavour Energy)	132	NSN2	1.0043	1.0030
Sydney South	132	NSYS	1.0043	1.0024
Sydney West (Ausgrid)	132	NSW1	1.0040	1.0053
Sydney West (Endeavour Energy)	132	NSW2	1.0040	1.0053
Tamworth	66	NTA2	0.9452	0.9578
Taree (Essential Energy)	132	NTR2	1.0478	1.0282
Tenterfield	132	NTTF	0.9528	0.9820
Terranora	110	NTNR	0.9825	1.0090
Tomago	33	NTMJ	0.9976	0.9932
Tomago	330	NTMG	0.9926	0.9922
Tomago (Ausgrid)	132	NTME	0.9949	0.9925
Tomago (Essential Energy)	132	NTMC	0.9949	0.9925
Top Ride	11	NTPR	1.0142	1.0109
Tuggerah	132	NTG3	0.9972	0.9965
Tumut	66	NTU2	1.0393	1.0210
Vales Pt.	132	NVP1	0.9881	0.9882
Vineyard	132	NVYD	0.9994	0.9997
Wagga	66	NWG2	1.0140	1.0036
Wagga North	66	NWG6	1.0136	0.9942
Wagga North	132	NWGN	1.0136	1.0058
Wallerawang (Endeavour Energy)	132	NWW9	0.9638	0.9608
Wallerawang (Essential Energy)	132	NWW8	0.9638	0.9608
Wellington	132	NWL8	0.9781	0.9795
West Gosford	11	NGWF	1.0088	1.0059
West Sawtell	132	NWST	0.9476	0.9707
Williamsdale	132	NWDL	1.0044	0.9941
Wyong	11	NWYG	1.0017	0.9996
Yanco	33	NYA3	1.0335	1.0226
Yass	66	NYS6	0.9975	0.9895
Yass	132	NYS1	0.9726	0.9852

New South Wales Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Bayswater PS Load	330		NBAYL	NBAY	0.9515	0.9552
Bayswater PS Unit 1	330	BW01	NBAY1	NBAY	0.9515	0.9552
Bayswater PS Unit 2	330	BW02	NBAY2	NBAY	0.9515	0.9552
Bayswater PS Unit 3	500	BW03	NBAY3	NBYW	0.9530	0.9558
Bayswater PS Unit 4	500	BW04	NBAY4	NBYW	0.9530	0.9558
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0112	0.9709
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0112	0.9709
Blowering Ancillary Services	132		NBLW1	NBLW	1.0112	0.9709
Broken Hill GT 1	22	GB01	NBKG1	NBKG	1.1027	1.1026
Burrinjuck	132	BURRIN	NBUK	NBUK	1.0116	0.9816
Capital Wind Farm	330	CAPTL_WF	NCWF1R	NCWF	0.9920	0.9845
Colongra PS Unit 1	330	CG1	NCLG1D	NCLG	0.9863	0.9860
Colongra PS Unit 2	330	CG2	NCLG2D	NCLG	0.9863	0.9860
Colongra PS Unit 3	330	CG3	NCLG3D	NCLG	0.9863	0.9860
Colongra PS Unit 4	330	CG4	NCLG4D	NCLG	0.9863	0.9860
Cullerin Range Wind Farm	132	CULLRGWF	NYS11C	NYS1	0.9726	0.9852
Eraring 330 PS Unit 1	330	ER01	NEPS1	NEP3	0.9865	0.9859
Eraring 330 PS Unit 2	330	ER02	NEPS2	NEP3	0.9865	0.9859
Eraring 500 PS Unit 3	500	ER03	NEPS3	NEPS	0.9882	0.9859
Eraring 500 PS Unit 4	500	ER04	NEPS4	NEPS	0.9882	0.9859
Eraring PS Load	500	ERNL1	NEPSL	NEPS	0.9882	0.9859
Gunning Wind Farm	132	GUNNING1	NYS12A	NYS1	0.9726	0.9852
Guthega	132	GUTH-1	NGUT	NGUT	0.9399	0.9484
Guthega	132	GUTHEGA	NGUT8	NGUT	0.9399	0.9484
Guthega Ancillary Services 2	132	GUTH-2	NGUT2	NGUT	0.9399	0.9484
Hume (NSW Share)	132	HUMENSW	NHUM	NHUM	0.9967	0.9704
Kangaroo Valley – Bendeela (Shoalhaven) Generation	330	SHGEN	NSHL	NSHL	0.9671	0.9798
Kangaroo Valley (Shoalhaven) Pumps	330	SHPUMP	NSHP1	NSHL	1.0041	1.0017
Liddell 330 PS Load	330	LIDDNL1	NLDPL	NLDP	0.9518	0.9556
Liddell 330 PS Unit 1	330	LD01	NLDP1	NLDP	0.9518	0.9556
Liddell 330 PS Unit 2	330	LD02	NLDP2	NLDP	0.9518	0.9556
Liddell 330 PS Unit 3	330	LD03	NLDP3	NLDP	0.9518	0.9556
Liddell 330 PS Unit 4	330	LD04	NLDP4	NLDP	0.9518	0.9556
Lower Tumut Generation	330	TUMUT3	NLTS8	NLTS	0.9322	0.9233
Lower Tumut Pipeline Auxiliary	66	TUMT3NL3	NTU2L3	NTU2	1.0393	1.0210
Lower Tumut Pumps	330	SNOWYP	NLTS3	NLTS	1.0043	1.0069
Lower Tumut T2 Auxiliary	66	TUMT3NL1	NTU2L1	NTU2	1.0393	1.0210
Lower Tumut T4 Auxiliary	66	TUMT3NL2	NTU2L2	NTU2	1.0393	1.0210
Mt Piper PS Load	330	MPNL1	NMPPL	NMTP	0.9650	0.9629
Mt Piper PS Unit 1	330	MP1	NMTP1	NMTP	0.9650	0.9629
Mt Piper PS Unit 2	330	MP2	NMTP2	NMTP	0.9650	0.9629
Munmorah 330 Load	330	MMNL1	NMNPL	NMN1	0.9892	0.9857
Munmorah Unit 3	330	MM3	NMNP3	NMN1	0.9892	0.9857
Munmorah Unit 4	330	MM4	NMNP4	NMN1	0.9892	0.9857
Tomago 1	330		NTMG1	NTMG	0.9926	0.9922

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Tomago 2	330		NTMG2	NTMG	0.9926	0.9922
Tomago 3	330		NTMG3	NTMG	0.9926	0.9922
Upper Tumut	330		NUTS	NUTS	0.9709	0.9453
Upper Tumut	330	UPPTUMUT	NUTS8	NUTS	0.9709	0.9453
Uranquinty PS Unit 11	132	URANQ11	NURQ1U	NURQ	0.9652	0.9665
Uranquinty PS Unit 12	132	URANQ12	NURQ2U	NURQ	0.9652	0.9665
Uranquinty PS Unit 13	132	URANQ13	NURQ3U	NURQ	0.9652	0.9665
Uranquinty PS Unit 14	132	URANQ14	NURQ4U	NURQ	0.9652	0.9665
Vales Point 330 PS Load	330	VPNL1	NVPPL	NVPP	0.9876	0.9877
Vales Point 330 PS Unit 5	330	VP5	NVPP5	NVPP	0.9876	0.9877
Vales Point 330 PS Unit 6	330	VP6	NVPP6	NVPP	0.9876	0.9877
Wallerawang 330 PS Load	330	WWNL1	NWWPL	NWWP	0.9663	0.9633
Wallerawang 330 Unit 7	330	WW7	NWW27	NWWP	0.9663	0.9633
Wallerawang 330 Unit 8	330	WW8	NWW28	NWWP	0.9663	0.9633
Woodlawn Wind Farm	330	WOODLWN1	NCWF2W	NCWF	0.9920	0.9845

New South Wales Embedded Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Awaba Renewable Energy Facility	132	AWABAREF	NNEW2	NNEW	0.9947	0.9933
Bankstown Sport Club	132	BANKSPT1	NSYS3R	NSYS	1.0043	1.0024
Broadwater PS	66	BWTR1	NLS21B	NLS2	0.9430	0.9836
Brown Mountain	66	BROWNMT	NCMA1	NCMA	1.0146	1.0071
Campbelltown WSLC	66	WESTCBT1	NING1C	NING	0.9992	0.9979
Condong PS	66	CONDONG1	NTNR1C	NTNR	0.9825	1.0090
EarthPower Biomass Plant	132	PMATTAEP	NSW22	NSW1	1.0040	1.0053
Eastern Creek	132	EASTCRK	NSW21	NSW2	1.0040	1.0053
Eraring 330 BS UN (GT)	330	ERGT01	NEP35B	NEP3	0.9865	0.9859
Glenn Innes (Pindari PS)	66	PINDARI	NGLN1	NGLN	0.9545	0.9772
Glennies Creek PS	132	GLENNCRK	NMRK3T	NMRK	0.9557	0.9588
Grange Avenue	11	GRANGEAV	NVYD1	NVYD	0.9994	0.9997
HEZ Power Station	33	HEZ	NKU31H	NKU3	1.0066	1.0023
Jindabyne Generator	132	JNDABNE1	NCMA2	NCMA	1.0146	1.0071
Jounama PS	66	JOUNAMA1	NTU21J	NTU2	1.0393	1.0210
Keepit	66	KEEPIT	NKPT	NKPT	0.9830	1.0001
Liddell 33 – Hunter Valley GTs	33	HVGTS	NLD31	NLD3	0.9568	0.9641
Liverpool 132 (Jacks Gully)	132	JACKSGUL	NLP11	NLP1	1.0014	0.9999
Lucas Heights Stage 2 Power Station	132	LUCAS2S2	NSYS1	NSYS	1.0043	1.0024
Nine Willoughby	132	NINEWIL1	NSE21R	NSE2	1.0095	1.0083
Redbank PS Unit 1	132	REDBANK1	NMRK1	NRED	0.9535	0.9572
Sithe	132	SITHE01	NSYW1	NSW2	1.0040	1.0053
St George Leagues Club	33	STGEORG1	NPHT1E	NPHT	1.0110	1.0074
Tallawarra PS	132	TALWA1	NDT13T	NTWA	0.9962	0.9934
Teralba Power Station	132	TERALBA	NNEW1	NNEW	0.9947	0.9933
West Nowra	132	AGLNOW1	NDT12	NDT1	0.9972	0.9942
Wests Illawara Leagues Club	132	WESTILL1	NDT14E	NDT1	0.9972	0.9942
Woodlawn Bioreactor	132	WDLNGN01	NMR21W	NMR2	0.9867	0.9837
Wyangala A PS	66	WYANGALA	NCW81A	NCW8	1.0241	1.0151
Wyangala B PS	66	WYANGALB	NCW82B	NCW8	1.0241	1.0151

Australian Capital Territory (regional reference node is Sydney West 330)

Australian Capital Territory Loads

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Canberra	132	ACA1	1.0003	0.9896
Queanbeyan (ACTEW)	66	AQB1	1.0184	1.0082
Queanbeyan (Essential Energy)	66	AQB2	1.0184	1.0082

Victoria (regional reference node is Thomastown 66)

Victoria Loads

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Altona	66	VATS	1.0081	1.0072
Ballarat	66	VBAT	1.0306	1.0313
Bendigo	22	VBE2	1.0695	1.0715
Bendigo	66	VBE6	1.0706	1.0711
BHP Western Port	220	VJLA	0.9895	0.9908
Brooklyn (Jemena)	22	VBL2	1.0069	1.0086
Brooklyn (Jemena)	66	VBL6	1.0074	1.0090
Brooklyn (POWERCOR)	22	VBL3	1.0069	1.0086
Brooklyn (POWERCOR)	66	VBL7	1.0074	1.0090
Brunswick (CITIPOWER)	22	VBT2	0.9991	0.9997
Brunswick (Jemena)	22	VBTS	0.9991	0.9997
Cranbourne	220	VCB2	0.9884	0.9889
Cranbourne (SPI Electricity)	66	VCBT	0.9895	0.9915
Cranbourne (UE)	66	VCB5	0.9895	0.9915
East Rowville (SPI Electricity)	66	VER2	0.9917	0.9928
East Rowville (UE)	66	VERT	0.9917	0.9928
Fishermens Bend (CITIPOWER)	66	VFBT	1.0036	1.0056
Fishermens Bend (POWERCOR)	66	VFB2	1.0036	1.0056
Fosterville	220	VFVT	1.0655	1.0667
Geelong	66	VGT6	1.0087	1.0096
Glenrowan	66	VGNT	1.0456	1.0459
Heatherton	66	VHTS	0.9970	0.9978
Heywood	22	VHY2	1.0106	1.0083
Horsham	66	VHOT	1.0756	1.0764
Keilor (Jemena)	66	VKT2	1.0026	1.0038
Keilor (POWERCOR)	66	VKTS	1.0026	1.0038
Kerang	22	VKG2	1.0946	1.0969
Kerang	66	VKG6	1.0957	1.0969
Khancoban	330	NKHN	1.0240	1.0236
Loy Yang Substation	66	VLY6	0.9696	0.9709
Malvern	22	VMT2	1.0041	0.9958
Malvern	66	VMT6	1.0022	0.9946
Morwell TS	66	VMWT	0.9703	0.9713
Mt Beauty	66	VMBT	1.0309	1.0217
Portland	500	VAPD	1.0121	1.0103
Pt Henry	220	VPTH	1.0121	1.0135
Red Cliffs	22	VRC2	1.1119	1.1220
Red Cliffs	66	VRC6	1.1069	1.1197
Red Cliffs (CE)	66	VRCA	1.1069	1.1197
Richmond	22	VRT2	0.9971	0.9982
Richmond (CITIPOWER)	66	VRT7	1.0012	1.0009
Richmond (UE)	66	VRT6	1.0012	1.0009
Ringwood (SPI Electricity)	22	VRW3	0.9980	0.9991
Ringwood (SPI Electricity)	66	VRW7	0.9984	0.9991
Ringwood (UE)	22	VRW2	0.9980	0.9991
Ringwood (UE)	66	VRW6	0.9984	0.9991

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Shepparton	66	VSHT	1.0585	1.0569
South Morang	66	VSM6	0.9978	0.9980
South Morang	66	VSMT	0.9978	0.9980
Springvale (CITIPOWER)	66	VSVT	0.9957	0.9964
Springvale (UE)	66	VSV2	0.9957	0.9964
Templestowe (CITIPOWER)	66	VTS2	0.9985	0.9993
Templestowe (Jemena)	66	VTST	0.9985	0.9993
Templestowe (SPI Electricity)	66	VTS3	0.9985	0.9993
Templestowe (UE)	66	VTS4	0.9985	0.9993
Terang	66	VTGT	1.0356	1.0347
Thomastown (Jemena)	66	VTTS	1.0000	1.0000
Thomastown (SPI Electricity)	66	VTT2	1.0000	1.0000
Tyabb	66	VTBT	0.9925	0.9935
Wemen TS	66	VWET	1.1054	1.1160
West Melbourne	22	VWM2	1.0015	1.0033
West Melbourne (CITIPOWER)	66	VWM7	1.0042	1.0066
West Melbourne (Jemena)	66	VWM6	1.0042	1.0066
Wodonga	22	VWO2	1.0334	1.0340
Wodonga	66	VWO6	1.0328	1.0327
Yallourn	11	VYP1	0.9531	0.9519

Victoria Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Banimboola	220	BAPS	VDPS2	VDPS	1.0151	0.9885
Basslink (Loy Yang Power Station Switchyard) Tasmania to Victoria (See Section 4.2.1)	500	BLNKVIC	VLYP13	VTBL	0.9753	0.9684
Basslink (Loy Yang Power Station Switchyard) Victoria to Tasmania (See Section 4.2.1)	500	BLNKVIC	VLYP13	VTBL	0.9753	0.9742
Dartmouth PS	220	DARTM1	VDPS	VDPS	1.0151	0.9885
Eildon PS Unit 1	220	EILDON1	VEPS1	VEPS	0.9950	0.9902
Eildon PS Unit 2	220	EILDON2	VEPS2	VEPS	0.9950	0.9902
Hazelwood PS Load	220	HWPNL1	VHWPL	VHWP	0.9670	0.9685
Hazelwood PS Unit 1	220	HWPS1	VHWP1	VHWP	0.9670	0.9685
Hazelwood PS Unit 2	220	HWPS2	VHWP2	VHWP	0.9670	0.9685
Hazelwood PS Unit 3	220	HWPS3	VHWP3	VHWP	0.9670	0.9685
Hazelwood PS Unit 4	220	HWPS4	VHWP4	VHWP	0.9670	0.9685
Hazelwood PS Unit 5	220	HWPS5	VHWP5	VHWP	0.9670	0.9685
Hazelwood PS Unit 6	220	HWPS6	VHWP6	VHWP	0.9670	0.9685
Hazelwood PS Unit 7	220	HWPS7	VHWP7	VHWP	0.9670	0.9685
Hazelwood PS Unit 8	220	HWPS8	VHWP8	VHWP	0.9670	0.9685
Jeeralang A PS Unit 1	220	JLA01	VJLGA1	VJLG	0.9617	0.9640
Jeeralang A PS Unit 2	220	JLA02	VJLGA2	VJLG	0.9617	0.9640
Jeeralang A PS Unit 3	220	JLA03	VJLGA3	VJLG	0.9617	0.9640
Jeeralang A PS Unit 4	220	JLA04	VJLGA4	VJLG	0.9617	0.9640
Jeeralang B PS Unit 1	220	JLB01	VJLGB1	VJLG	0.9617	0.9640
Jeeralang B PS Unit 2	220	JLB02	VJLGB2	VJLG	0.9617	0.9640
Jeeralang B PS Unit 3	220	JLB03	VJLGB3	VJLG	0.9617	0.9640
Jindabyne pump at Guthega	132	SNOWYGJP	NGJP	NGJP	1.1322	1.1047
Laverton	220	LAVNORTH	VAT21	VAT2	0.9979	0.9980
Loy Yang A PS Load	500	LYNL1	VLYPL	VLYP	0.9696	0.9709
Loy Yang A PS Unit 1	500	LYA1	VLYP1	VLYP	0.9696	0.9709
Loy Yang A PS Unit 2	500	LYA2	VLYP2	VLYP	0.9696	0.9709
Loy Yang A PS Unit 3	500	LYA3	VLYP3	VLYP	0.9696	0.9709
Loy Yang A PS Unit 4	500	LYA4	VLYP4	VLYP	0.9696	0.9709
Loy Yang B PS Unit 1	500	LOYYB1	VLYP5	VLYP	0.9696	0.9709
Loy Yang B PS Unit 2	500	LOYYB2	VLYP6	VLYP	0.9696	0.9709
Macarthur Wind Farm	500	MACARTH1	VTRT1M	VTRT		1.0050
McKay Creek / Bogong PS	220	MCKAY1	VMKP1	VT14	0.9866	0.9993
Mortlake Unit 1	500	MORTLK11	VM0P1O	VM0P	0.9975	0.9971
Mortlake Unit 2	500	MORTLK12	VM0P2O	VM0P	0.9975	0.9971
Morwell PS G1, 2 and 3	11	MOR1	VMWT1	VMWG	0.9704	0.9713
Morwell PS G4	11	MOR2	VMWP4	VMWP	0.9607	0.9619
Morwell PS G5	11	MOR3	VMWP5	VMWP	0.9607	0.9619
Morwell PS Load	11	MORNL1	VMWTL	VMWT	0.9703	0.9713
Murray	330	MURRAY	NMUR8	NMUR	0.9628	1.0110
Newport PS	220	NPS	VNPS	VNPS	0.9950	0.9969
Oaklands Hill Wind Farm	66	OAKLAND1	VTGT3A	VTGT	1.0356	1.0347
Portland 500 DU 1	500	APD01	VAPD1	VAPD	1.0121	1.0103

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Portland 500 DU 2	500	APD02	VAPD2	VAPD	1.0121	1.0103
Pt Henry DU 1	220	PTH01	VPTH1	VPTH	1.0121	1.0135
Pt Henry DU 2	220	PTH02	VPTH2	VPTH	1.0121	1.0135
Pt Henry DU 3	220	PTH03	VPTH3	VPTH	1.0121	1.0135
Valley Power PS	500	VPGS	VLYP7	VLYP	0.9696	0.9709
VICSMLT	220	VICSMLT	VAPS1	VAPS	1.0121	1.0135
Waubra Wind Farm	220	WAUBRAWF	VWBT1A	VWBT	1.0226	1.0252
West Kiewa PS Unit 1	220	WKIEWA1	VWKP1	VWKP	1.0103	1.0191
West Kiewa PS Unit 2	220	WKIEWA2	VWKP2	VWKP	1.0103	1.0191
Yallourn W PS 220 Load	220	YWNL1	VYP2L	VYP2	0.9512	0.9494
Yallourn W PS 220 Unit 1	500	YWPS1	VYP21	VYP3	0.9561	0.9560
Yallourn W PS 220 Unit 2	220	YWPS2	VYP22	VYP2	0.9512	0.9494
Yallourn W PS 220 Unit 3	220	YWPS3	VYP23	VYP2	0.9512	0.9494
Yallourn W PS 220 Unit 4	220	YWPS4	VYP24	VYP2	0.9512	0.9494

Victoria Embedded Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Anglesea PS	220	APS	VAPS	VAPS	1.0121	1.0135
Bairnsdale Unit 1	66	BDL01	VMWT2	VBDL	0.9680	0.9701
Bairnsdale Unit 2	66	BDL02	VMWT3	VBDL	0.9680	0.9701
Ballarat Health Services	66	BBASEHOS	VBAT1H	VBAT	1.0306	1.0313
Brooklyn Landfill	66	BROOKLYN	VBL61	VBL6	1.0074	1.0090
Codrington Wind Farm	66	CODRNGTON	VTGT2C	VTGT	1.0356	1.0347
Hallam Mini Hydro	66	HLMSEW01	VER21H	VER2	0.9917	0.9928
Hepburn Community WF	66	HEPWIND1	VBAT2L	VBAT	1.0306	1.0313
Hume (Victorian Share)	66	HUMEV	VHUM	VHUM	1.0082	1.0912
Longford	66	LONGFORD	VMWT6	VMWT	0.9703	0.9713
Mornington Landfill Site Generator	66	MORNW	VTBT1	VTBT	0.9925	0.9935
Shepparton Waste Gas	66	SHEP1	VSHT2S	VSHT	1.0585	1.0569
Somerton Power Station	66	AGLSOM	VTTS1	VSOM	0.9939	0.9960
Sunshine Energy Park	66	SUNSHINE	VKTS1	VKTS	1.0026	1.0038
Symex Embedded Gen	66	SYMEX1	VFBT1E	VFBT	1.0036	1.0056
Tatura	66	TATURA01	VSHT1	VSHT	1.0585	1.0569
Toora Wind Farm	66	TOORAWF	VMWT5	VMWT	0.9703	0.9713
Wonthaggi Wind Farm	66	WONWP	VMWT7	VMWT	0.9703	0.9713
Wyndham Landfill Site Generator	66	WYNDW	VATS1	VATS	1.0081	1.0072
Yambuk Wind Farm	66	YAMBUKWF	VTGT1	VTGT	1.0356	1.0347

South Australia (regional reference node is Torrens Island PS 66)

South Australia Loads

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Angas Creek	33	SANC	1.0124	1.0124
Ardrossan West	33	SARW	0.9481	0.9438
Back Callington	11	SBAC	1.0160	1.0100
Baroota	33	SBAR	0.9821	0.9839
Berri	66	SBER	1.0913	1.0389
Berri (POWERCOR)	66	SBE1	1.0913	1.0389
Blanche	33	SBLA	1.0322	0.9988
Blanche (POWERCOR)	33	SBL1	1.0322	0.9988
Brinkworth	33	SBRK	0.9808	0.9835
Bungama Industrial	33	SBUN	0.9770	0.9800
Bungama Rural	33	SBUR	0.9770	0.9800
City West	66	SACR	1.0016	1.0012
Clare North	33	SCLN	0.9837	0.9844
Dalrymple	33	SDAL	0.9155	0.9067
Davenport	33	SDAW	0.9648	0.9683
Davenport	275	SDAV	0.9669	0.9678
Dorrien	33	SDRN	1.0050	1.0040
East Terrace	66	SETC	1.0049	1.0027
Happy Valley	66	SHVA	1.0076	1.0080
Hummocks	33	SHUM	0.9662	0.9672
Kadina East	33	SKAD	0.9672	0.9676
Kanmantoo	11	SKAN	1.0153	1.0126
Keith	33	SKET	1.0257	1.0100
Kilburn	66	SKLB	1.0032	1.0029
Kincraig	33	SKNC	1.0253	1.0051
Lefevre	66	SLFE	1.0002	0.9999
Leigh Creek	33	SLCC	1.0022	0.9884
Leigh Creek South	33	SLCS	1.0003	0.9914
Magill	66	SMAG	1.0091	1.0066
Mannum	33	SMAN	1.0176	1.0146
Mannum - Adelaide Pipeline 1	3.3	SMA1	1.0223	1.0209
Mannum - Adelaide Pipeline 2	3.3	SMA2	1.0212	1.0206
Mannum - Adelaide Pipeline 3	3.3	SMA3	1.0195	1.0190
Middleback	33	SMDL	0.9820	0.9785
Middleback	132	SMBK	0.9830	0.9784
Millbrook	33	SMLB	1.0060	1.0067
Mobilong	33	SMBL	1.0171	1.0134
Morgan - Whyalla Pipeline 1	3.3	SMW1	1.0386	1.0178
Morgan - Whyalla Pipeline 2	3.3	SMW2	1.0180	1.0059
Morgan - Whyalla Pipeline 3	3.3	SMW3	0.9991	0.9941
Morgan - Whyalla Pipeline 4	3.3	SMW4	0.9911	0.9890
Morphett Vale East	66	SMVE	1.0115	1.0092
Mount Barker South	66	SMBS	1.0082	1.0060
Mt Barker	66	SMBA	1.0094	1.0071
Mt Gambier	33	SMGA	1.0299	0.9977

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Mt Gunson	33	SMGU	0.9827	0.9869
Murray Bridge - Hahndorf Pipeline 1	11	SMH1	1.0197	1.0180
Murray Bridge - Hahndorf Pipeline 2	11	SMH2	1.0209	1.0193
Murray Bridge - Hahndorf Pipeline 3	11	SMH3	1.0185	1.0168
Neuroodla	33	SNEU	0.9862	0.9844
New Osborne	66	SNBN	1.0004	0.9999
North West Bend	66	SNWB	1.0387	1.0150
Northfield	66	SNFD	1.0050	1.0035
Para	66	SPAR	1.0037	1.0029
Parafield Gardens West	66	SPGW	1.0028	1.0020
Pimba	132	SPMB	0.9846	0.9888
Playford	33	SPAA	0.9644	0.9675
Port Lincoln	33	SPLN	0.9824	0.9748
Port Pirie	33	SPPR	0.9824	0.9832
Roseworthy	11	SRSW	1.0073	1.0083
Snuggery Industrial	33	SSNN	1.0231	0.9809
Snuggery Rural	33	SSNR	1.0212	0.9827
South Australian VTN		SJP1	1.0030	0.9981
Stony Point	11	SSPN	0.9735	0.9741
Tailem Bend	33	STAL	1.0165	1.0103
Templers	33	STEM	1.0028	1.0028
Torrens Island	66	STSY	1.0000	1.0000
Waterloo	33	SWAT	0.9892	0.9932
Whyalla	33	SWHY	0.9770	0.9754
Whyalla Terminal BHP	33	SBHP	0.9770	0.9759
Woomera	132	SWMA	0.9845	0.9889
Wudina	66	SWUD	0.9973	0.9837
Yadnarie	66	SYAD	0.9828	0.9738

South Australia Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Cathedral Rocks Wind Farm	132	CATHROCK	SCRK	SCRK	0.8982	0.8729
Clements Gap Wind Farm	132	CLEMGPWF	SCGW1P	SCGW	0.9590	0.9589
Dry Creek PS Unit 1	66	DRYCGT1	SDCA1	SDPS	1.0067	1.0009
Dry Creek PS Unit 2	66	DRYCGT2	SDCA2	SDPS	1.0067	1.0009
Dry Creek PS Unit 3	66	DRYCGT3	SDCA3	SDPS	1.0067	1.0009
Hallet Brown Hill Wind Farm	275	HALLWF1	SHPS2W	SHPS	0.9722	0.9705
Hallet Hill Wind Farm (Hallet 2 Wind Farm)	275	HALLWF2	SMOK1H	SMOK	0.9758	0.9718
Hallet PS	275	AGLHAL	SHPS1	SHPS	0.9722	0.9705
Ladbroke Grove PS Unit 1	132	LADBROK1	SPEW1	SPEW	0.9960	0.9626
Ladbroke Grove PS Unit 2	132	LADBROK2	SPEW2	SPEW	0.9960	0.9626
Lake Bonney Wind Farm	33	LKBONNY1	SMAY1	SMAY	0.9868	0.9404
Lake Bonney Wind Farm Stage 2	33	LKBONNY2	SMAY2	SMAY	0.9868	0.9404
Lake Bonney Wind Farm Stage 3	33	LKBONNY3	SMAY3W	SMAY	0.9868	0.9404
Leigh Creek Northern PS Load 2	33	NPSNL2	SLCCL	SLCC	1.0022	0.9884
Mintaro PS	132	MINTARO	SMPS	SMPS	0.9731	0.9778
Mt Millar Wind Farm	33	MTMILLAR	SMTM1	SMTM	0.9425	0.8983
North Brown Hill Wind Farm	275	NBHWF1	SBEL1A	SBEL	0.9763	0.9694
Northern PS Unit 1	275	NPS1	SNPA1	SNPS	0.9601	0.9638
Northern PS Unit 2	275	NPS2	SNPA2	SNPS	0.9601	0.9638
O.C.P.L. Unit 1	66	OSB-AG	SNBN1	SOCP	1.0003	0.9997
Pelican Point PS	275	PPCCGT	SPPT	SPPT	0.9995	0.9990
Playford Northern PS Load 1	33	NPSNL1	SPAAL	SPAA	0.9644	0.9675
Playford PS	275	PLAYB-AG	SPSD1	SPPS	0.9644	0.9573
Port Lincoln 3	33	POR03	SPL31P	SPL3	0.8933	0.9038
Port Lincoln PS	132	POR01	SPLN1	SPTL	0.8856	0.9300
Quarantine PS Unit 1	66	QPS1	SQPS1	SQPS	1.0000	1.0000
Quarantine PS Unit 2	66	QPS2	SQPS2	SQPS	1.0000	1.0000
Quarantine PS Unit 3	66	QPS3	SQPS3	SQPS	1.0000	1.0000
Quarantine PS Unit 4	66	QPS4	SQPS4	SQPS	1.0000	1.0000
Quarantine PS Unit 5	66	QPS5	SQPS5Q	SQPS	1.0000	1.0000
Snowtown Wind Farm	33	SNOWTWN1	SNWF1T	SNWF	0.9163	0.9154
Snuggery PS Unit 1	132	SNUG1	SSGA1	SSPS	0.9432	1.0289
Snuggery PS Unit 2	132	SNUG2	SSGA2	SSPS	0.9432	1.0289
Snuggery PS Unit 3	132	SNUG3	SSGA3	SSPS	0.9432	1.0289
The Bluff wind Farm	275	BLUFF1	SBEL2P	SBEL	0.9763	0.9694
Torrens Island PS A Unit 1	275	TORRA1	STSA1	STPS	1.0007	0.9999
Torrens Island PS A Unit 2	275	TORRA2	STSA2	STPS	1.0007	0.9999
Torrens Island PS A Unit 3	275	TORRA3	STSA3	STPS	1.0007	0.9999
Torrens Island PS A Unit 4	275	TORRA4	STSA4	STPS	1.0007	0.9999
Torrens Island PS B Unit 1	275	TORRB1	STSB1	STPS	1.0007	0.9999
Torrens Island PS B Unit 2	275	TORRB2	STSB2	STPS	1.0007	0.9999
Torrens Island PS B Unit 3	275	TORRB3	STSB3	STPS	1.0007	0.9999
Torrens Island PS B Unit 4	275	TORRB4	STSB4	STPS	1.0007	0.9999

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Torrens Island PS Load	275	TORNL1	STSYL	STPS	1.0007	0.9999
Waterloo Wind Farm	132	WATERLWF	SWLE1R	SWLE	0.9741	0.9747
Wattle Point Wind Farm	132	WPWF	SSYP1	SSYP	0.8254	0.8138

South Australia Embedded Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Amcor Glass UN 1	11	AMCORGR	SRSW1E	SRSW	1.0073	1.0083
Angaston Power Station	33	ANGAS1	SDRN1	SANG	0.9169	0.9222
Angaston Power Station	33	ANGAS2	SDRN2	SANG	0.9169	0.9222
Lonsdale PS	66	LONSDALE	SMVE1	SMVE	1.0115	1.0092
Pt Stanvac Unit 1	66	STANV1	SMVE3P	SMVE	1.0115	1.0092
Pt Stanvac Unit 2	66	STANV2	SMVE4P	SMVE	1.0115	1.0092
Starfish Hill Wind Farm	66	STARHLWF	SMVE2	SMVE	1.0115	1.0092
Tatiara Meat Co	33	TATIARA1	SKET1E	SKET	1.0257	1.0100
Terminal Storage Mini-Hydro	11	TERMSTOR	SNFD1	SNFD	1.0050	1.0035

Tasmania (regional reference node is George Town 220 kV)

Tasmania Loads

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Arthurs Lake	6.6	TAL2	1.0103	0.9964
Avoca	22	TAV2	1.0457	1.0282
Boyer SWA	6.6	TBYA	1.0545	1.0370
Boyer SWB	6.6	TBYB	1.0561	1.0377
Bridgewater	11	TBW2	1.0540	1.0394
Burnie	22	TBU3	0.9952	0.9850
Chapel St.	11	TCS3	1.0487	1.0333
Comalco	220	TCO1	1.0005	1.0006
Creek Road	33	TCR2	1.0527	1.0370
Derby	22	TDE2	1.0243	1.0072
Derwent Bridge	22	TDB2	0.9854	0.9518
Devonport	22	TDP2	0.9968	0.9919
Electrona	11	TEL2	1.0705	1.0420
Emu Bay	11	TEB2	0.9960	0.9820
Fisher (Rowallan)	220	TFI1	0.9735	0.9717
George Town	22	TGT3	1.0027	1.0033
George Town (Basslink)	220	TGT1	1.0000	1.0000
Gordon	22	TGO2	1.0366	1.0173
Greater Hobart Area VTN		TVN1	1.0526	1.0372
Greater Tamar Area VTN		TVN2	1.0151	1.0024
Hadspen	22	THA3	1.0144	1.0008
Hampshire	110	THM2	0.9939	0.9731
Huon River	11	THR2	1.0688	1.0456
Kermandie	11	TKE2	1.0713	1.0521
Kingston	33	TKI3	1.0718	1.0407
Kingston	11	TKI2	1.0605	1.0424
Knights Road	11	TKR2	1.0699	1.0486
Lindisfarne	33	TLF2	1.0549	1.0407
Meadowbank	22	TMB2	1.0317	1.0147
Mornington	33	TMT2	1.0531	1.0394
Mowbray	22	TMY2	1.0170	1.0025
New Norfolk	22	TNN2	1.0501	1.0332
Newton	22	TNT2	0.9895	0.9726
Newton	11	TNT3	0.9684	0.9647
North Hobart	11	TNH2	1.0517	1.0360
Norwood	22	TNW2	1.0190	1.0040
Palmerston	22	TPM3	1.0126	0.9955
Port Latta	22	TPL2	0.9778	0.9617
Que	22	TQU2	0.9860	0.9808
Queenstown	22	TQT2	0.9749	0.9636
Queenstown	11	TQT3	0.9840	0.9732
Railton	22	TRA2	0.9961	0.9877
Risdon	33	TRI4	1.0533	1.0374
Risdon	11	TRI3	1.0540	1.0397
Rokeby	11	TRK2	1.0554	1.0410

Location	Voltage [kV]	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Rosebery	44	TRB2	0.9797	0.9680
Savage River	22	TSR2	1.0116	0.9912
Scottsdale	22	TSD2	1.0203	1.0053
Smithton	22	TST2	0.9626	0.9453
Sorell	22	TSO2	1.0582	1.0471
St. Leonards	22	TSL2	1.0219	1.0027
St. Marys	22	TSM2	1.0677	1.0499
Starwood	110	TSW1	1.0005	1.0008
Temco	110	TTE1	1.0032	1.0035
Trevallyn	22	TTR2	1.0163	1.0020
Triabunna	22	TTB2	1.0780	1.0580
Tungatinah	22	TTU2	0.9847	0.9537
Ulverstone	22	TUL2	0.9984	0.9890
Waddamana	22	TWA2	0.9999	0.9740
Wayatinah	11	TWY2	1.0254	1.0076
Wesley Vale	11	TWV2	0.9933	0.9841
Wilmot	220	TSH1	0.9768	0.9746

Tasmania Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Basslink (George Town)	220	BLNKTAS	TGT11	TGT1	1.0000	1.0000
Bastyan	220	BASTYAN	TFA11	TFA1	0.9516	0.9436
Bell Bay No.3	110	BBTHREE1	TBB11	TBB1	0.9979	0.9994
Bell Bay No.3	110	BBTHREE2	TBB12	TBB1	0.9979	0.9994
Bell Bay No.3	110	BBTHREE3	TBB13	TBB1	0.9979	0.9994
Bluff Point and Studland Bay Wind Farms	110	WOOLNTH1	TST11	TST1	0.9072	0.8972
Butlers Gorge	110	BUTLERSG	TBG11	TBG1	0.9770	0.9480
Catagunya	220	LI_WY_CA	TLI11	TLI1	1.0203	1.0062
Cethana	220	CETHANA	TCE11	TCE1	0.9698	0.9668
Cluny	220	CLUNY	TCL11	TCL1	1.0231	1.0095
Devils gate	110	DEVILS_G	TDG11	TDG1	0.9735	0.9715
Fisher	220	FISHER	TFI11	TFI1	0.9735	0.9717
Gordon	220	GORDON	TGO11	TGO1	1.0030	0.9672
John Butters	220	JBUTTERS	TJB11	TJB1	0.9448	0.9420
Lake Echo	110	LK_ECHO	TLE11	TLE1	0.9744	0.9428
Lemonthyme	220	LEM_WIL	TSH11	TSH1	0.9768	0.9746
Liapootah	220	LI_WY_CA	TLI11	TLI1	1.0203	1.0062
Mackintosh	110	MACKNTSH	TMA11	TMA1	0.9410	0.9270
Meadowbank	110	MEADOWBK	TMB11	TMB1	1.0138	1.0064
Paloona	110	PALOONA	TPA11	TPA1	0.9752	0.9736
Poatina	220	POAT220	TPM11	TPM1	1.0071	0.9883
Poatina	110	POAT110	TPM21	TPM2	0.9962	0.9758
Reece No.1	220	REECE1	TRCA1	TRCA	0.9451	0.9348
Reece No.2	220	REECE2	TRCB1	TRCB	0.9396	0.9365
Repulse	220	REPULSE	TCL12	TCL1	1.0231	1.0095
Rowallan	220	ROWALLAN	TFI12	TFI1	0.9735	0.9717
Tamar Valley CCGT	220	TVCC201	TTV11A	TTV1	0.9988	0.9989
Tamar Valley OCGT	110	TVPP104	TBB14A	TBB1	0.9979	0.9994
Tarraleah	110	TARRALEA	TTA11	TTA1	0.9835	0.9522
Trevallyn	110	TREVALLN	TTR11	TTR1	1.0096	0.9974
Tribute	220	TRIBUTE	TTI11	TTI1	0.9391	0.9378
Tungatinah	110	TUNGATIN	TTU11	TTU1	0.9672	0.9395
Wayatinah	220	LI_WY_CA	TLI11	TLI1	1.0203	1.0062
Wilmot	22	LEM_WIL	TSH11	TSH1	0.9768	0.9746

Tasmania Embedded Generators

Location	Voltage [kV]	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2011/12 Loss Factor	2012/13 Loss Factor
Remount	22	REMOUNT	TMY21	TMY2	1.0170	1.0025

8 Appendix B: Inter-regional loss factor equations for 2012/13

Loss factor equation (South Pine 275 referred to Sydney West 330)

= 0.9971 + 2.0078E-04*NQt - 3.5604E-06*Nd + 1.4652E-05*Qd

Loss factor equation (Sydney West 330 referred to Thomastown 66)

= 1.0427 + 1.6065E-04*VNt - 1.2332E-05*Vd + 6.3122E-06*Nd - 2.6445E-05*Sd

Loss factor equation (Torrens Island 66 referred to Thomastown 66)

= 1.0013 + 2.8995E-04*VSAt - 4.9304E-06*Vd + 2.2240E-05*Sd

where,

Qd = Queensland demand

Vd = Victorian demand

Nd = New South Wales demand

Sd = South Australian demand

NQt = transfer from New South Wales to Queensland

VNt = transfer from Victoria to New South Wales

VSAt = transfer from Victoria to South Australia

The loss factor for the regulated Murraylink and Terranora interconnector is provided in Appendix D.

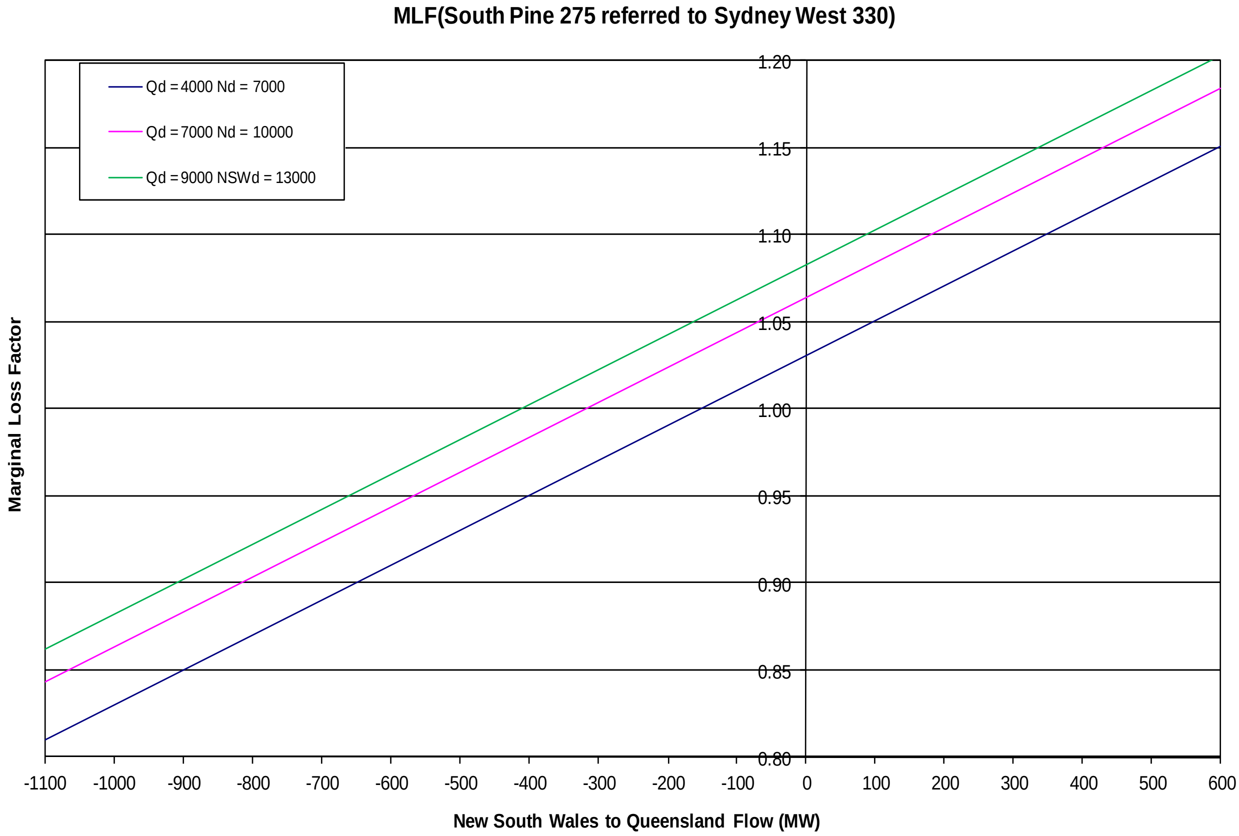


Figure B1: South Pine 275 referred to Sydney West 330 marginal loss factor verses NSW to Qld flow

Coefficient statistics

Coefficient	Q_d	N_d	NQ_t	CONSTANT
Coefficient value	1.4652E-05	-3.5604E-06	2.0078E-04	0.9971
Standard error values for the coefficients	3.2584E-07	1.8438E-07	4.3399E-07	1.2150E-03
Coefficient of determination (R2)	0.9495			
Standard error of the y estimate	0.0192			

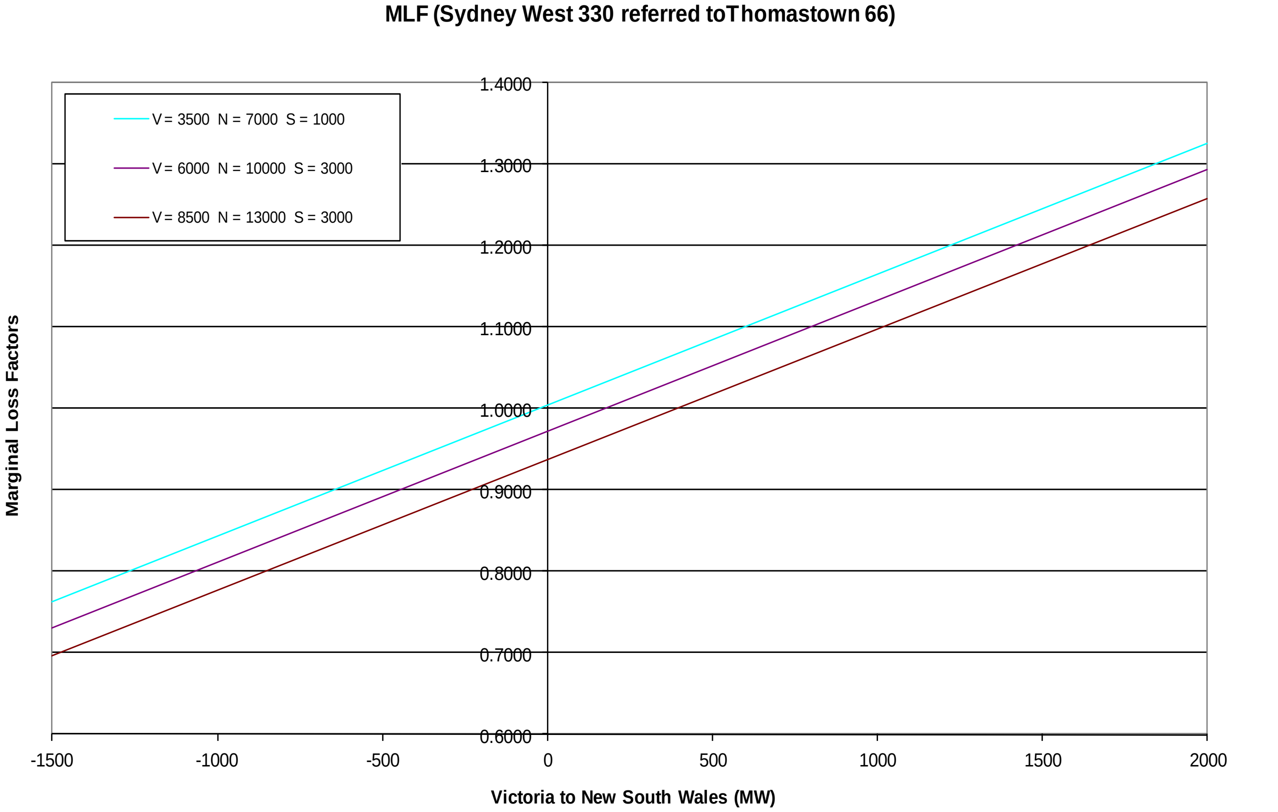


Figure B2: Sydney West 330 referred to Thomastown 66 marginal loss factor versus Victoria to NSW flow

Coefficient statistics

Coefficient	**S_d**	**N_d**	**V_d**	**VN_t**	**CONSTANT**
Coefficient value	-2.6445E-05	6.3122E-06	-1.2332E-05	1.6065E-04	1.0427
Standard error values for the coefficients	1.5831E-06	3.9716E-07	5.6185E-07	5.2264E-07	2.1427E-03
Coefficient of determination (R^2)	0.9198				
Standard error of the y estimate	0.0363				

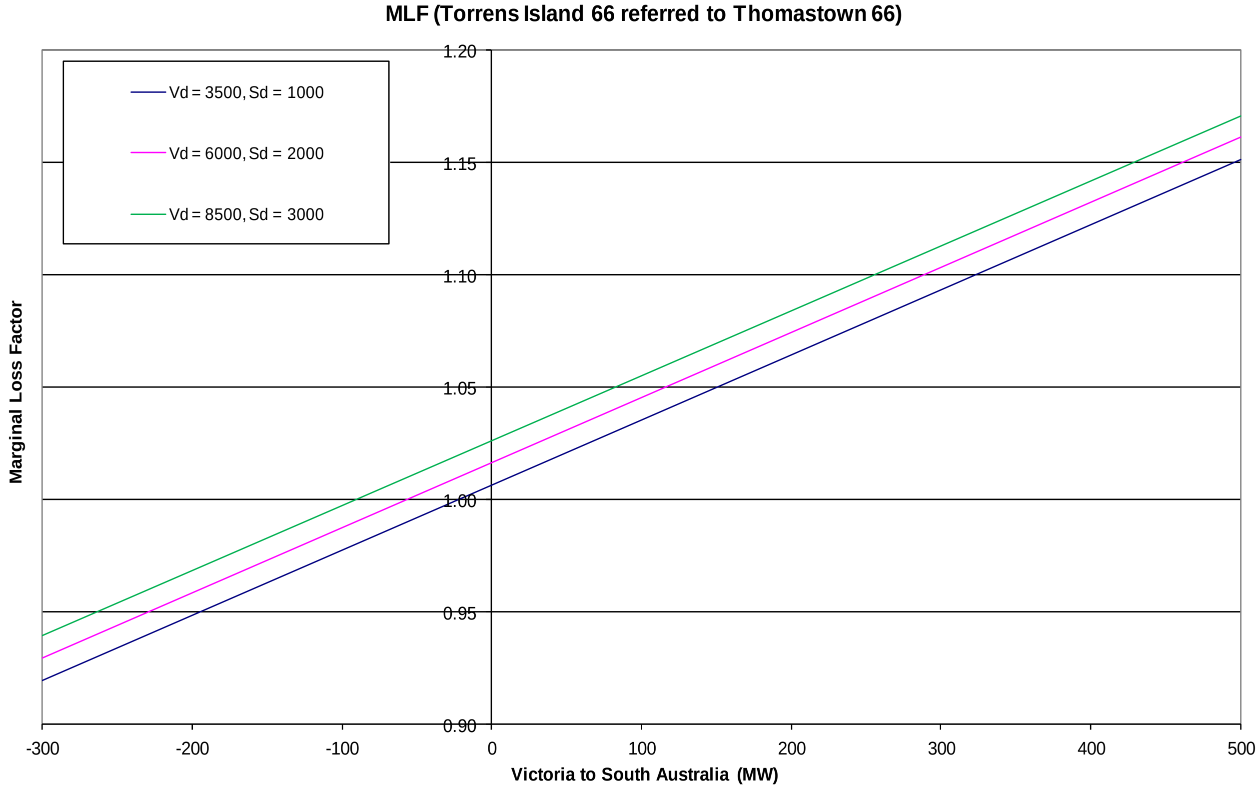


Figure B3: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Victoria to SA flow

Coefficient statistics

Coefficient	S_d	V_d	VSA_t	CONSTANT
Coefficient value	2.2240E-05	-4.9304E-06	2.8995E-04	1.0013
Standard error values for the coefficients	6.8018E-07	2.1542E-07	1.0090E-06	1.0494E-03
Coefficient of determination (R^2)	0.8800			
Standard error of the y estimate	0.0201			

9 Appendix C: Inter-regional loss equations for 2012/13

The loss equation is derived by integrating the equation *(Loss factor – 1)* with respect to the interconnector flow, i.e.

$$\text{Losses} = \int(\text{Loss factor} - 1)\, d\text{Flow}$$

Then, with the loss factor equations in Appendix B, we get the following inter-regional loss equations for each interconnector.

South Pine 275 referred to Sydney West 330 notional link average losses

$$= (-0.0029 - 3.5604E\text{-}06 * Nd + 1.4652E\text{-}05 * Qd) * NQt + 1.0039E\text{-}04 * NQt^2$$

Sydney West 330 referred to Thomastown 66 notional link average losses

$$= (0.0427 - 1.2332E\text{-}05 * Vd + 6.3122E\text{-}06 * Nd - 2.6445E\text{-}05 * Sd) * VNt + 8.0323E\text{-}05 * VNt^2$$

Torrens Island 66 referred to Thomastown 66 notional link average losses

$$= (0.0013 - 4.9304E\text{-}06 * Vd + 2.2240E\text{-}05 * Sd) * VSAt + 1.4498E\text{-}04 * VSAt^2$$

where,

Qd = Queensland demand

Vd = Victorian demand

Nd = New South Wales demand

Sd = South Australia demand

NQt = transfer from New South Wales to Queensland

VNt = transfer from Victoria to New South Wales

VSAt = transfer from Victoria to South Australia

The loss model for regulated Murraylink and Terranora interconnector is provided in Appendix D.

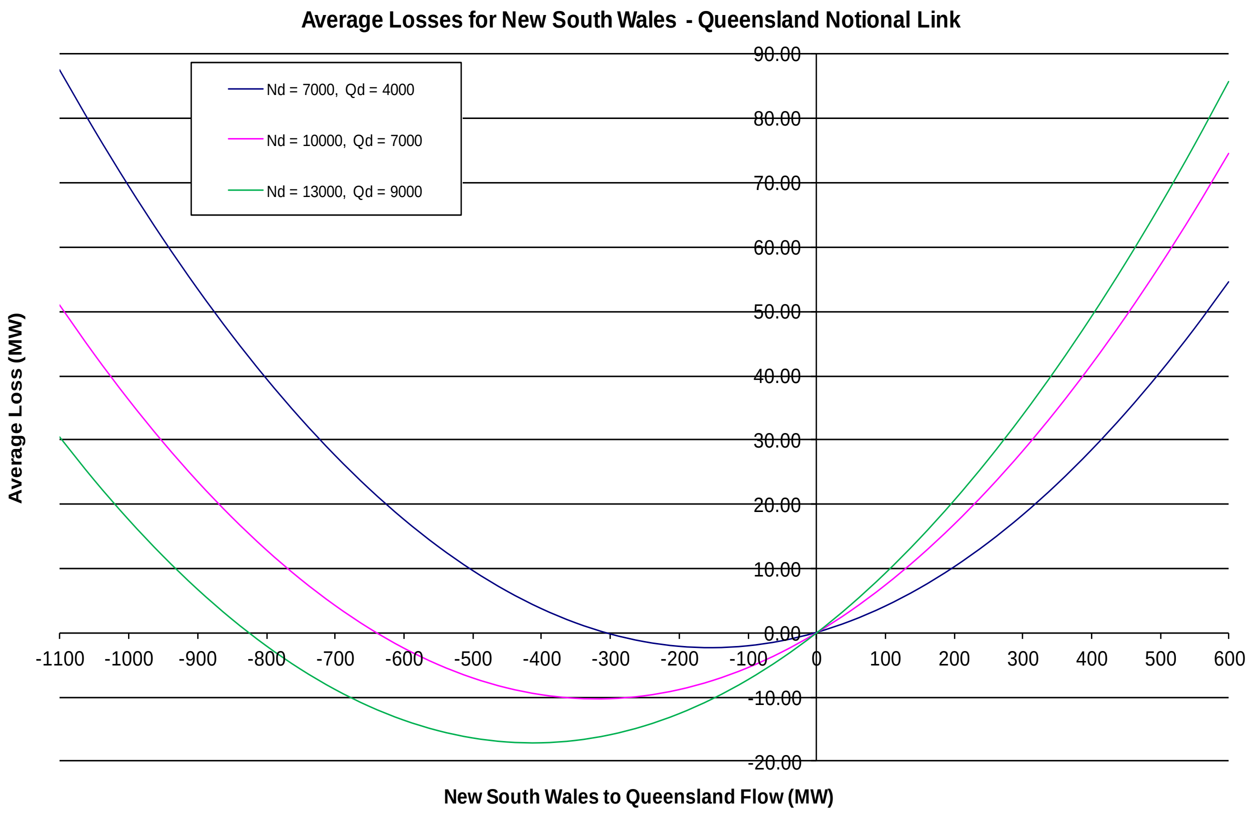


Figure C1: NSW to Queensland notional link losses versus NSW to Queensland notional link flow

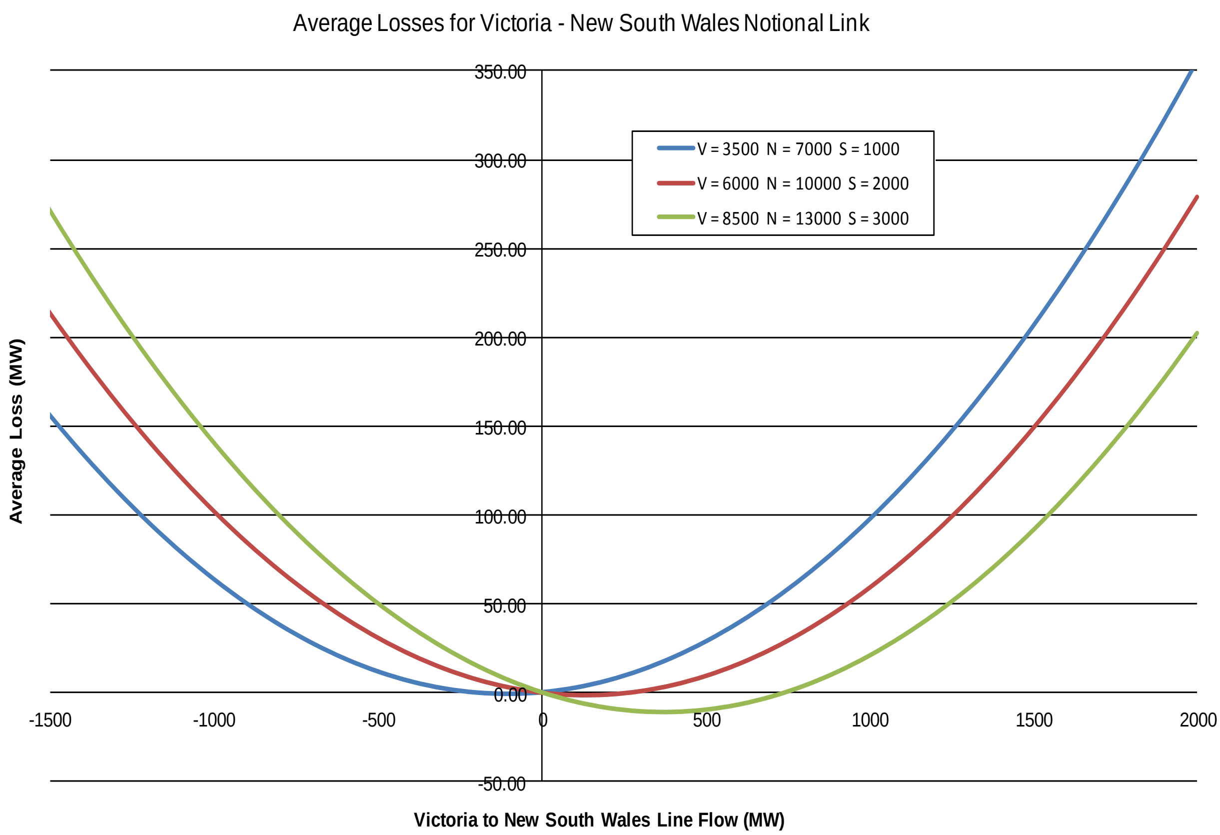


Figure C2: Victoria to NSW notional link losses versus Victoria to NSW notional link flow

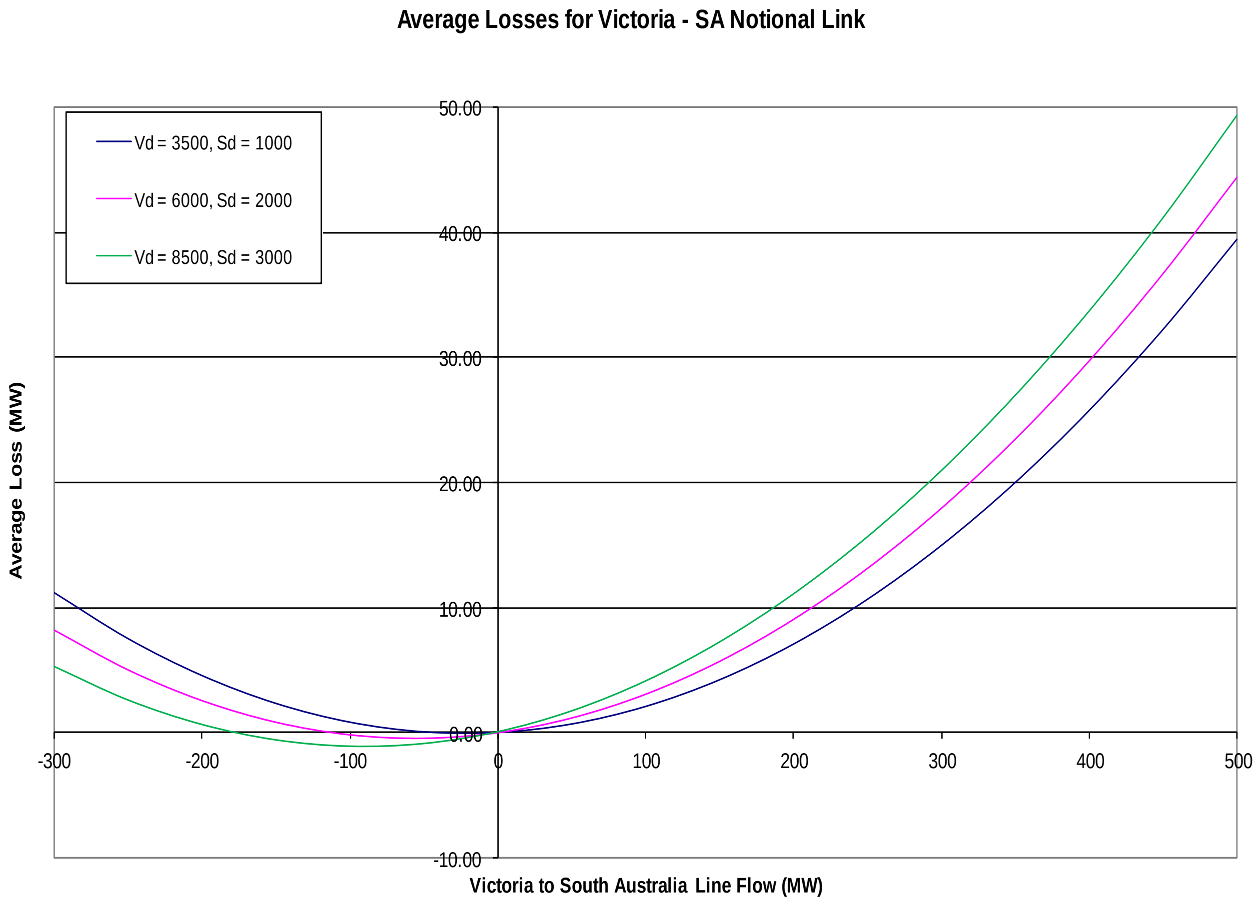


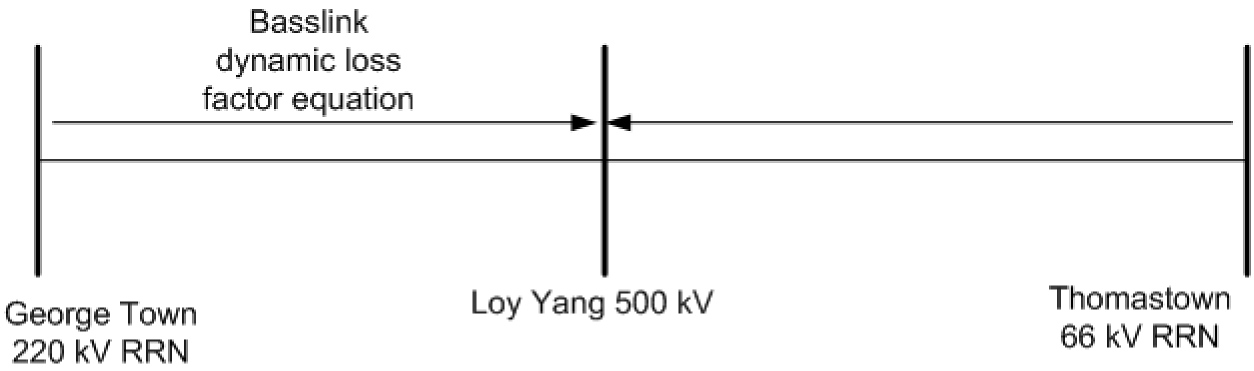
Figure C3: Victoria to SA notional link losses versus Victoria to SA notional link flow

10 Appendix D: Basslink, Terranora Interconnector and Murraylink loss factor models and loss equations for 2012/13

Basslink

The loss factor model for Basslink is made up of the following portions:

- George Town 220 kV intra-regional loss factor referred to Tasmania RRN Georgetown 220 = 1.0000
- Receiving end dynamic loss factor referred to the sending end= $0.99608 + 2.0786 * 10^{-4} * P_{(receive)}$, where $P_{(receive)}$ is the Basslink flow measured at the receiving end.
- Basslink (Loy Yang Power Station Switchyard) intra-regional loss factor referred to Thomastown 66 kV = 0. 9742 when exporting power to Tasmania and 0.9684 when importing power from Tasmania.



The equation describing the losses between the George Town 220 kV and Loy Yang 500 kV connection points can be determined by integrating the (loss factor equation – 1), giving:

$$P_{(send)} = P_{(receive)} + [(-3.92x10^{-3}) * P_{(receive)} + (1.0393x10^{-4}) * P_{(receive)}^{2} + 4]$$

where:

$P_{(send)}$ – Power in MW measured at the sending end,

$P_{(receive)}$ – Power in MW measured at the receiving end.

New model is limited from 40MW to 630MW. While the model fails below 40MW, this is within the ±50 MW no-go zone requirement for Basslink operation.

Murraylink (Regulated)

From 9 October 2003 Murraylink commenced operation as a regulated interconnector. To be compliant with Clause 3.6.1(a), the regulated Murraylink loss model needs to consist of a single dynamic MLF from the Victorian RRN to the South Australian RRN.

For the purposes of the AEMO market systems the measurement point of the regulated Murraylink interconnector is the 132 kV connection to the Monash converter. This effectively forms part of the boundary between the Victorian and South Australian regions.

The losses between Red Cliffs 220 kV and Monash 132 kV connection points in relation to flow are as described previously by the following equation:

$$= (0.0039 * Flow_t + 2.8182 * 10^{-4} * Flow_t^{\ 2})$$

AEMO determined the following MLF model using regression analysis:

Murraylink MLF (Torrens Island 66 referred to Thomastown 66) = 2.5579E-03*$Flow_t$ +1.0865

AEMO found that the simple model consisting of a constant and a Murraylink flow coefficient was suitable because most of the variation of the loss factor is due to variations in the Murraylink flow and other potential explanatory variables did not significantly improve the model.

The regression statistics for this Murraylink loss factor model are presented in the following table.

Coefficient	***$Flow_t$***	**CONSTANT**
Coefficient Value	2.5579E-03	1.0865
Standard error values for the coefficient	3.2213E-06	2.5805E-04
Coefficient of determination (R^2)	0.9730	
Standard error of the y estimate	0.0340	

The loss model for a regulated Murraylink interconnector can be determined by integrating (MLF-1), giving:

Murraylink loss = 0.0865*Flowt + 1.2790E-03*$Flowt^2$

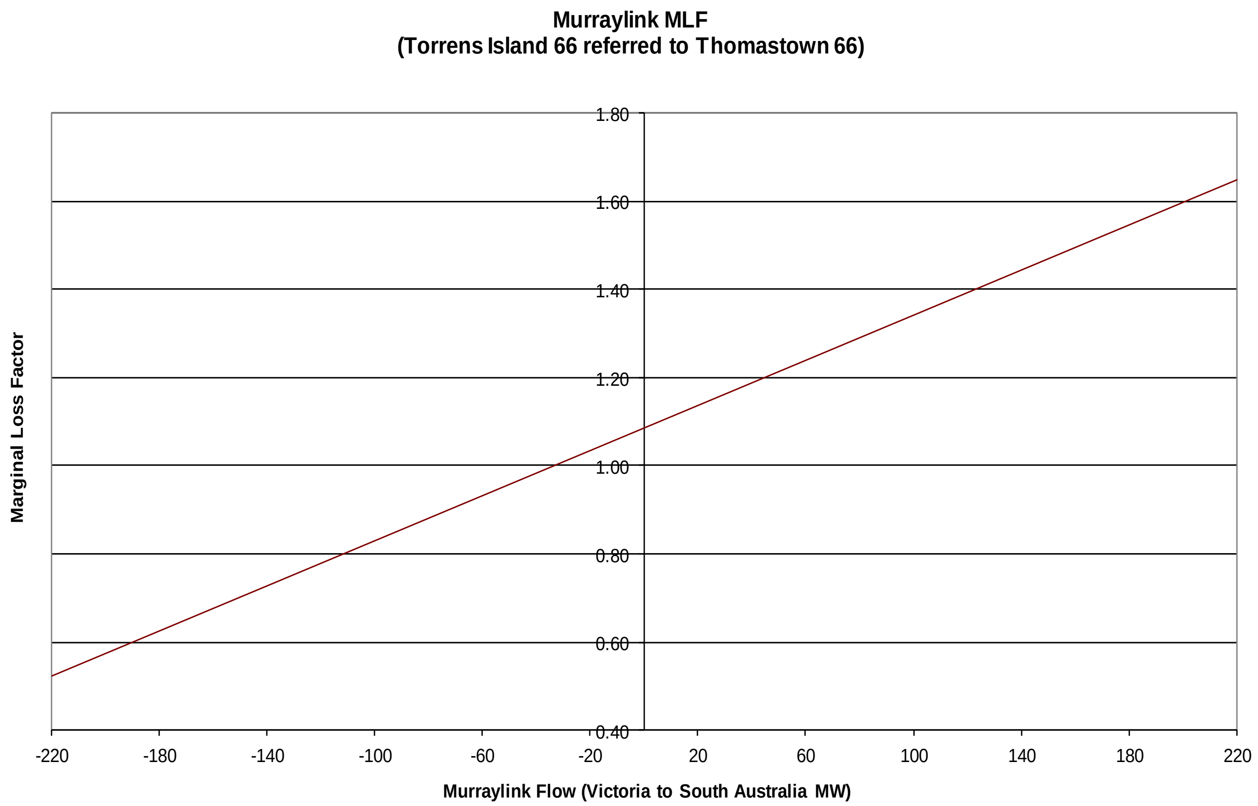


Figure D1: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Murraylink flow (Victoria to SA)

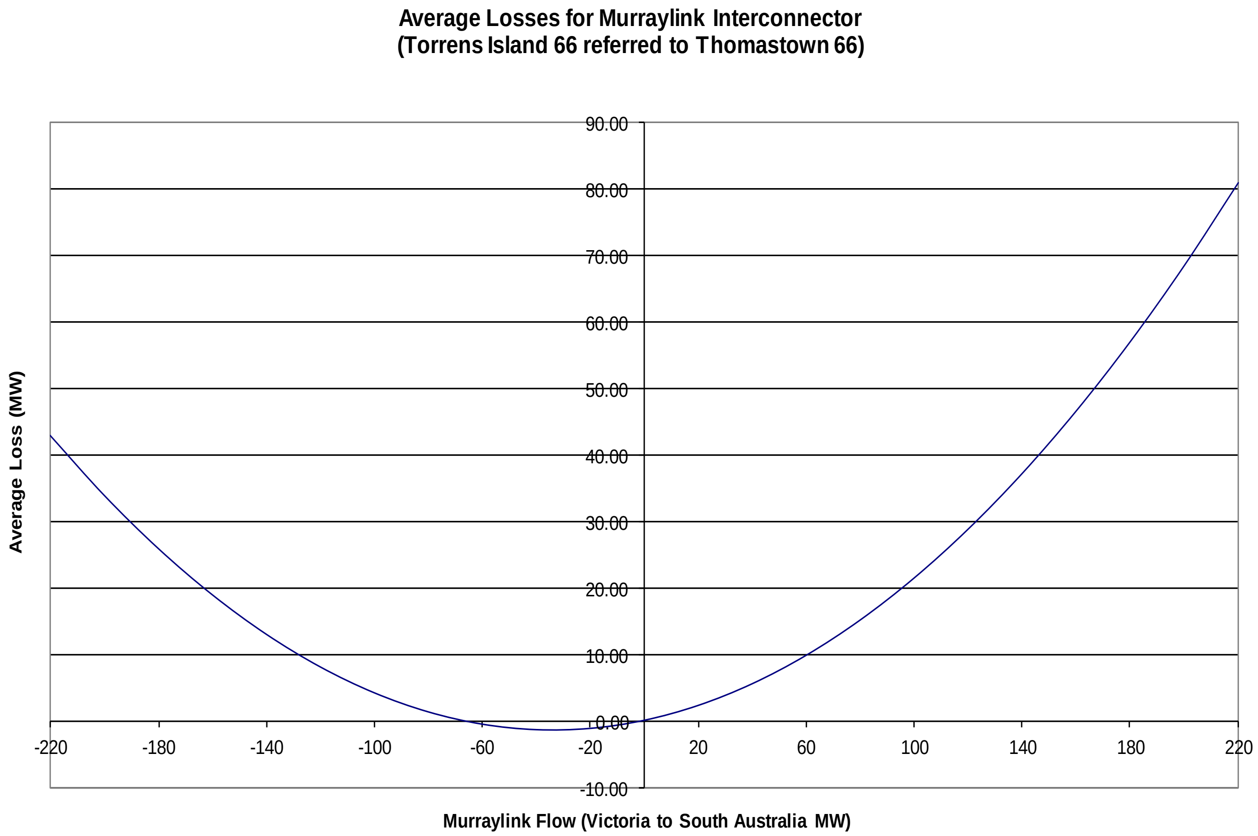


Figure D2: Murraylink notional link losses versus Murraylink flow (Victoria to SA)

Regulated Terranora Inerconnector (Previously Directlink)

From 21 March 2006 Terranora interconnector commenced operation as a regulated interconnector. To be compliant with Clause 3.6.1(a), the regulated Terranora interconnector loss model needs to consist of a single dynamic MLF from the New South Wales RRN to the Queensland RRN.

For the purposes of the AEMO market systems the measurement point of the regulated Terranora interconnector is 10.8 km north from Terranora on the two 110 kV lines between Terranora and Mudgeeraba. This effectively forms part of the boundary between the New South Wales and Queensland regions.

The losses between the Mullumbimby 132 kV and Terranora 110 kV connection points in relation to flow are as described previously by the following equation:

$$= (-0.0013 * Flow_t + 2.7372 * 10^{-4} * Flow_t^{\ 2})$$

AEMO determined the following Terranora interconnector MLF model using regression analysis:

Terranora interconnector MLF (South Pine 275 referred to Sydney West 330) = 1.1520 + 2.2604E-03*Flowt

AEMO found that the simple model consisting of a constant and a Terranora interconnector flow coefficient was suitable because most of the variation of the loss factor is due to variations in the Terranora interconnector flow and other potential explanatory variables did not significantly improve the model.

The regression statistics for this Terranora interconnector loss factor model are presented in the following table.

Coefficient	$Flow_t$	CONSTANT
Coefficient value	2.2604E-03	1.1520
Standard error values for the coefficients	3.7507E-06	5.2631E-04
Coefficient of determination (R^2)	0.9540	
Standard error of the y estimate	0.0376	

The loss model for a regulated Terranora interconnector can be determined by integrating (MLF-1), giving:

Terranora interconnector loss = 0.1520*Flowt + 1.1302E-03*$Flowt^2$

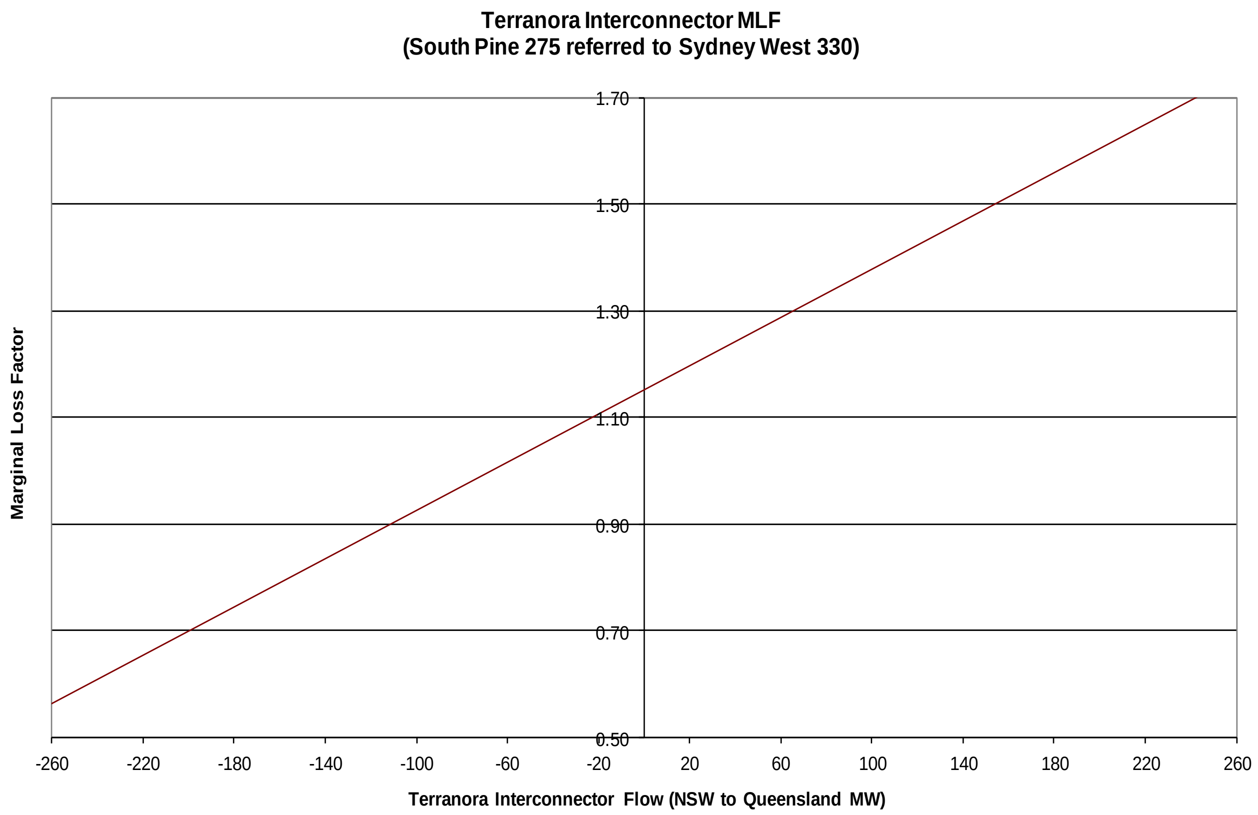


Figure D3: South Pine 275 referred to Sydney West 330 marginal loss factor versus Terranora interconnector flow (NSW to Queensland)

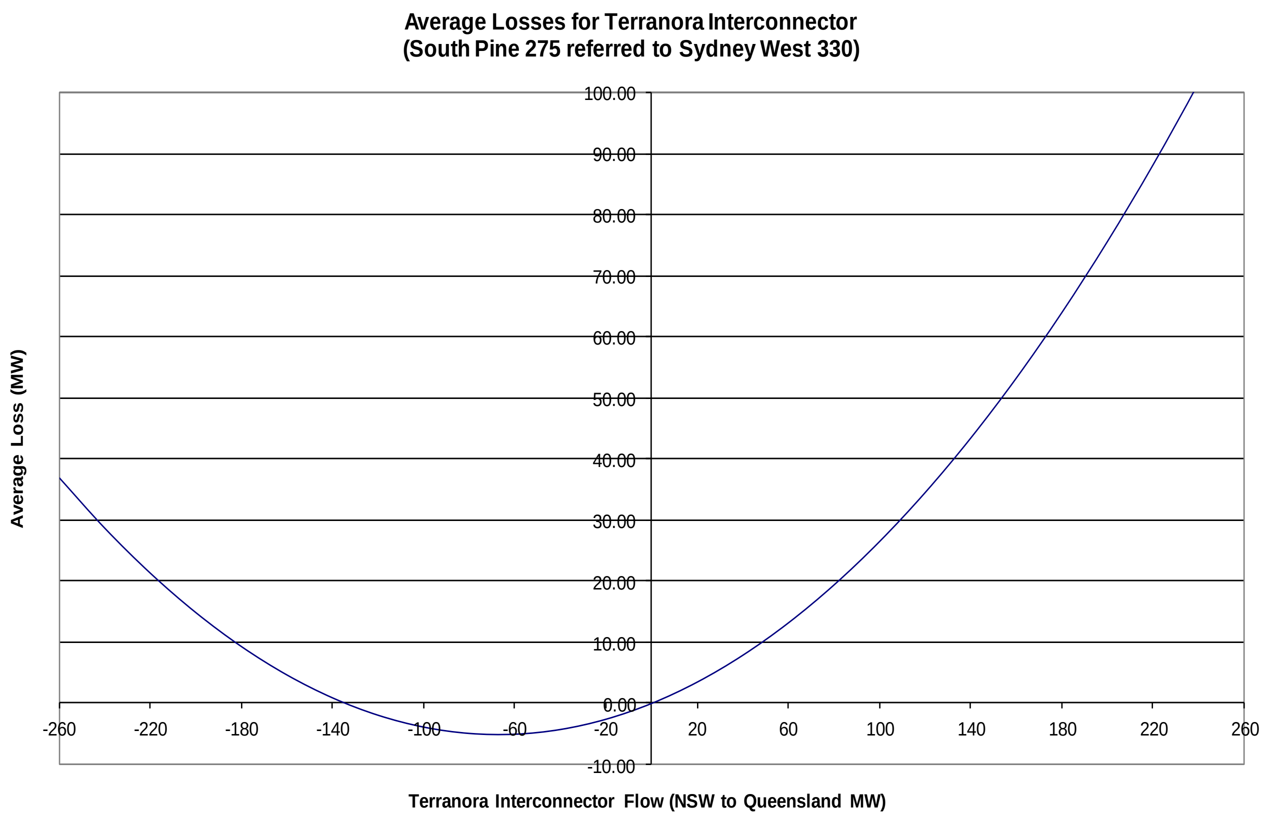


Figure D4: Terranora interconnector notional link losses versus flow (NSW to Queensland)

11 Appendix E: The Proportioning Inter-regional Losses to Regions for 2012/13

The AEMO dispatch engine (NEMDE) implements inter-regional loss factors by allocating the inter-regional losses defined by the equations in Appendix C to the two regions associated with the notional interconnector.

The factors used to proportion the inter-regional losses to the two regions are calculated by supplying an increment of load at one RRN from the second RRN. The incremental changes to the inter-regional losses in each region can be found from the changes to the interconnector flow and additional generation at the second RRN. The proportion of inter-regional losses in each region is then averaged over various system conditions to produce a single static factor. A detailed description of the process is defined in the AEMO document “Proportioning Inter-Regional Losses to Regions”, which is available on the AEMO website.

The document “Proportioning Inter-Regional Losses to Regions” specifies the calculation of the proportioning of the inter-regional losses to regions. This document is available from the AEMO website at: http://www.aemo.com.au/electricityops/701.html.

The following table provides the factors that will be used to proportion the inter-regional losses to the associated regions for the 2012/13 financial year.

Notional interconnector	Proportioning factor	Applied to
Queensland – New South Wales (QNI)	0.55	New South Wales
Queensland – New South Wales (Terranora Interconnector)	0.59	New South Wales
Victoria – New South Wales	0.65	New South Wales
Victoria – South Australia (Heywood)	0.78	Victoria
Victoria – South Australia (Murraylink)	0.78	Victoria

12 Appendix F: Regions and Regional Reference Nodes

Regional Reference Nodes

Region	Regional Reference Node
Queensland	South Pine 275kV node
New South Wales	Sydney West 330kV node
Victoria	Thomastown 66kV node
South Australia	Torrens Island Power Station 66kV node
Tasmania	George Town 220 kV node

Physical Location of Region Boundary Metering Points

The physical metering points defining the region boundaries are located at:

- **Between the Queensland and New South Wales regions**
  - At Dumaresq Substation on the 8L and 8M Dumaresq to Bulli Creek 330kV lines[6];
  - 10.8km north of Terranora on the two 110kV lines between Terranora and Mudgeeraba (lines 757 & 758). Metering at Mudgeeraba adjusted for that point.
- **Between the New South Wales and Victorian regions**
  - At Wodonga Terminal Station (WOTS) on the 060 Wodonga to Jindera 330kV line;
  - At Red Cliffs Terminal Station (RCTS) on the Red Cliffs to Buronga 220kV line;
  - At Murray Switching Station on the MSS to UTSS 330kV lines;
  - At Murray Switching Station on the MSS to LTSS 330kV line;
  - At Guthega Switching Station on the Guthega to Jindabyne PS 132kV line;
  - At Guthega Switching Station on the Guthega to Geehi Dam Tee 132kV line.
- **Between the Victorian and South Australian regions**
  - At South East Switching Station (SESS) on the SESS to Heywood 275kV lines.
  - At Monash Switching Station (MSS) on the Berri (Murraylink) converter 132kV line.
- **Between the Victorian and Tasmanian regions**

  Basslink is not a regulated interconnector; rather it is an MNSP with the following metering points allocated:
  - At Loy Yang 500 kV Power Station.
  - At George Town 220 kV Switching Station.

13 Appendix G: List of New and Modified Connection Points for 2012/13

Name	Voltage (kV)	Connection Point ID	TNI	Region
Mullumbimby	11	NML1	NML1	NSW
Top Ride	11	NTPR	NTPR	NSW
Williamsdale	132	NWDL	NWDL	NSW
Cranbourne	220	VCB2	VCB2	VIC
Pandoin	132	QPAL	QPAL	QLD
Raglan	275	QRGL	QRGL	QLD
The Bluff Wind Farm	275	SBEL2P	SBEL	SA
Back Callington	11	SBAC	SBAC	SA
Mount Barker South	66	SMBS	SMBS	SA
City West	66	SACR	SACR	SA

[6] The metering at Dumaresq is internally scaled to produce an equivalent flow at the NSW/Queensland State borders.