LIST OF REGIONAL BOUNDARIES AND MARGINAL LOSS FACTORS FOR THE 2011-12 FINANCIAL YEAR

PREPARED BY:	Electricity System Operations Planning & Performance
VERSION:	3.1
DATE:	07/07/2011

FINAL

Contents

Version Release History

VERSION	DATE	CHANGES
0.1	23/03/2011	Draft regional boundaries and marginal loss factors for the 2011/12 financial year
1.0	01/04/2011	Updates to generation profiles of a number of new generators
2.0	18/05/2011	Updates to Proportioning Factors in Appendix E (p. 60)
3.0	29/06/2011	• Updates to the MLFs of Shoalhaven and Lower Tumut pump-storage schemes (pp. 6, 7, 19, 30) • Updates to the MLFs of QYAR, QYAE and QYAG (pp. 12, 19, 23, 25)
3.1	07/07/2011	Inclusion of newly registered Hepburn Community Wind Farm (Market, Non-scheduled) under “Victoria Embedded Generators” in Appendix A (p 38)

Disclaimer

(a) ***Purpose*** *– This document has been prepared by the Australian Energy Market Operator Limited (**AEMO**) for the purpose of complying with clauses 3.5 and 3.6 of the National Electricity Rules (**Rules**).*

(b) ***Supplementary Information*** *– This document might also contain information the publication of which is not required by the Rules. Such information is included for information purposes only, does not constitute legal or business advice, and should not be relied on as a substitute for obtaining detailed advice about the National Electricity Law, the Rules, or any other relevant laws, codes, rules, procedures or policies or any aspect of the national electricity market, or the electricity industry. While AEMO has used due care and skill in the production of this document, neither AEMO, nor any of its employees, agents and consultants make any representation or warranty as to the accuracy, reliability, completeness, currency or suitability for particular purposes of the information in this document.*

(c) ***Limitation of Liability*** *– To the extent permitted by law, AEMO and its advisers, consultants and other contributors to this document (or their respective associated companies, businesses, partners, directors, officers or employees) shall not be liable for any errors, omissions, defects or misrepresentations in the information contained in this document or for any loss or damage suffered by persons who use or rely on this information (including by reason of negligence, negligent misstatement or otherwise). If any law prohibits the exclusion of such liability, AEMO's liability is limited, at AEMO's option, to the re-supply of the information, provided that this limitation is permitted by law and is fair and reasonable.*

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 increase 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 5 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 Nodes (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 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 April 1st 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.

2.1 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.

2.2 Intra-regional loss factors

The Rules require AEMO to calculate and publish 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 have 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.

2.3 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 2011/12 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 2011/12 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:

- 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 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 of 1 July 2009 to 30 June 2010 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 2011/12 financial year by scaling the historical data. The forecast connection point load traces for 2011/12 were then sent to AEMO to be used in the actual loss factor calculations. In the case of Queensland, Powerlink provided energy and demand forecasts, and the load traces

[1] "Methodology for Calculating Forward-Looking Transmission Loss Factors: Final Methodology", 12 August 2003 (revised 01 April 2010), available on the AEMO Website at http://www.aemo.com.au/electricityops/172-0032.html

were developed by AEMO. For New South Wales, load traces provided by TransGrid, Ausgrid and Essential Energy were scaled to be consistent with the 2010 Electricity Statement of Opportunities (ESOO)[2].

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 2010 ESOO and the update to the 2010 ESOO.
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.
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 3.17.

3.3 Connection point definitions

A list of new connection points that have been established for the 2011/12 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 2011/12 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) 2010 load growth rates were used to perform 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 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 2011/12 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.

[2] Available on the AEMO Website at http://www.aemo.com.au/planning/esoo2010.html

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 2011/12 financial year.

3.8 Network augmentations for 2011/12 financial year

The following network augmentations have been advised by the relevant TNSPs in each region of the NEM for 2011/12.

Queensland

Powerlink advised the following major augmentations to be completed in 2011/12 in Queensland:

- Establishment of new 110kV substation at Blackstone
- Replacement of both 275kV/132kV Transformers at Gin Gin
- Revised configuration of North Queensland (NQ) transmission network reinforcement from Strathmore to Ross
- Installation of a 30MVAr capacitor bank at Kemmis
- Establishment of 132kV Goonyella Riverside Expansion
- Replacement of Ingham to Yabulu South 132kV lines
- Installation of 50MVAr capacitor bank at Ashgrove West
- Installation of 200MVAr capacitor bank at Millmerran
- Installation of two 330kV 120MVAr capacitor bank at Middle Ridge
- Establishment of a new 110kV transmission line from Middle Ridge to Postmans Ridge 110kV
- Installation of a fourth 110kV 50MVAr Capacitor Bank at Loganlea
- Installation of a third 275kV 120MVAr Capacitor Bank at Belmont
- Installation of a third 110kV/33kV transformer at Molendinar
- Establishment of new connection point at Raglan
- Modification of Belmont substation 275/110kV transformers

New South Wales

TransGrid and Ausgrid advised the following major augmentations to be completed in 2011/12 in New South Wales. Essential Energy advised that there were no augmentations in 2011/12:

- Establishment of new Orange North 132kV connection point
- Decommission Orange 132kV connection point
- Disconnect Wallerawang to Orange 132kV line from Orange and reconnect to Orange North
- Disconnect Burrendong tee to Orange 132kV line from Orange and reconnect to Orange North
- Disconnect Mount Piper to Orange 132kV line from Orange and reconnect to Orange North
- Disconnect Molong to Orange 132kV line from Orange and reconnect to Orange North
- Disconnect Panorama to Orange 132kV line from Orange and reconnect to Orange North
- Defer Leafs Gully 330kV connection point and disconnect it from the Macarthur to Avon 330kV line
- Modification to new Sydney North 330/138.6/11kV transformer
- Modification to two new Williamsdale to Cooma 132kV lines
- Modification to new Canberra to Williamsdale 330kV line
- Modification to two new Williamsdale 330/138.6/11kV transformers
- Modification to Glen Innes to Inverell 132V line
- Modification to two Wallerawang 330/138.6/11kV transformers
- Modification to Malindra to Parkes 132V line
- Modification to Parkes to Forbes 132V line
- Establishment of new Beaconsfield West 330/138.6/11kV transformer
- Establishment of new Coffs Harbour 330/138.6/11kV transformer
- Establishment of new Yass 132/66/11kV transformer

- Establishment of new Crookwell 330kV connection point and connect it to the Bannaby to Yass 330kV line
- Decommission two Canterbury to Bunnerong 132kV lines
- Establishment of two new Kurnell to Bunnerong 132kV lines and reactors
- Establishment of two Tomago (TG) 330/138.6/11kV transformers
- Disconnect the Taree to Tomago (EA) 132kV line and reconnect as Taree to Tomago (TG) 132kV line
- Establish new Hawk's Nest 132kV connection point and connect it to the Taree to Tomago (TG) 132kV line
- Disconnect the Beresfield to Tomago (EA) 132kV line and reconnect as Beresfield to Tomago (TG) 132kV line
- Disconnect the Stroud to Beresfield 132kV line and reconnect as Stroud to Tomago (TG) 132kV line
- Establishment of new Beresfield to Tomago (TG) 132kV line
- Establishment of two new Tomago (EA) to Tomago (TG) 132kV lines
- Decommission Tomago (EA) to Waratah West 132kV line
- Establishment of new Ourimbah 132/33kV transformer

Victoria

AEMO Transmission Services advised the following major augmentations to be completed in 2011/12 in Victoria.

- Establish new Tarrone 500kV connection point and connect it to the Moorabool to Heywood No. 1 500kV line
- Establish new Mortlake 500kV connection point and connect it to the Moorabool to Heywood No. 2 500kV line
- Establish new Wemen 220kV connection point and connect it to the Kerang to Red Cliffs 220kV line
- Establishment of new East Rowville 220/66kV transformer

South Australia

ElectraNet advised the following major augmentations to be completed in 2011/12 in South Australia:

- Establishment of new 33kV Back Callington load connection point
- Establishment of new 66kV City West substation load connection point
- Establishment of new 275kV The Bluff wind farm connection point
- Establishment of new Torrens islands Power station - City West 275kV line
- Establishment of new City West - Keswick 66kV line
- Establishment of new City West - Whitmore Square Switching Station 66kV line
- Establishment of new Whitmore Square Switching Station - Whitmore Square 66kV line
- Modification of Whitmore Square - Coromandel Place 66kV line
- Decommission Whitmore Square - Kent Town Tee 66kV line
- Establishment of new Tungkillo - Mount Barker South and Mount Barker South - Cherry Gardens 275kV lines
- Modification of Tungkillo - Cherry Gardens 275kV line
- Establishment of new Mount Barker South to Meadows, Strathalbyn and Mount Barker 66kV lines
- Modification of Mount Barker – Meadows and Mount Barker – Strathalbyn 66kV lines
- Establishment of new Para - Templers West and Templers West – Brinkworth 275kV lines
- Establishment of new Templers – Roseworthy and Templers West – Dorrien 132kV lines
- Modification of Para – Brinkworth 275kV line
- Modification of Templers – Roseworthy/Dorrien and Templers – Dorrien 132kV lines
- Establishment of new MHP3 - Kanmantoo Tee, Kanmantoo Tee – Kanmantoo and Kanmantoo Tee -Back Callington 132kV lines
- Modification of MHP3 – Kanmantoo 132kV line
- Modification of Brinkworth - Clare North, Clare North – Mintaro, MWP4 - Waterloo East, Waterloo - Waterloo East 132kV lines

- Establishment of new Mount Barker South 275/66/11 kV No.3 transformer
- Establishment of new Templers 275/132/11 kV No.3 transformer
- Establishment of new City West substation 275/66/11 kV No.1 and 2 transformers
- Establishment of new Back Callington 132/33 kV No.1 and 2 transformers
- Establishment of new Port Lincoln Generator 33/11 kV No.3 transformer
- Establishment of new Wudinna 132/66/11 kV No.2 transformer
- Modification of Kadina East 132/33/11 kV No.1 transformer and installation of new Kadina East 132/33/11 kV No.2 transformer
- Decommission Davenport - Bungama link exit 275 kV reactor
- Establishment of new Davenport Substation 275 kV 50MVAr reactor
- Establishment of new City West Substation 275 kV 2x40MVAr reactor
- Establishment of new Tungkillo 275 kV 100MVAr capacitor bank
- Establishment of new Port Lincoln Power Station generating unit
- Establishment of new Port Stanvac generating units
- Replacement of Hallett power station gas turbine generating unit

Tasmania

Transend advised the following major augmentations to be completed in 2011/12 in Tasmania:

- Establish a new 33 kV connection point at Mornington
- Establish a new 22 kV connection point at St. Leonards
- Establish a new 33 kV connection point at Kingston
- Installation of two new Waddamana-Lindisfarne 220kV lines
- Modification of two Palmerston-Waddamana 220kV lines
- Modification of two Waddamana-Liapootah 220kV lines
- Modification of Electrona-Knights Road 110kV line
- Installation of two new Mornington-Mornington Tee 110kV lines
- Modification of two Lindisfarne-Mornington Tee 110kV lines
- Modification of two Mornington Tee-Rokeby 110kV lines
- Installation of new Norwood-St. Leonards 110kV line
- Installation of new St. Leonards-Mowbray 110kV line
- Installation of a new 220/110kV transformer at Burnie
- Decommissioning of two 220/110kV transformers at Burnie
- Installation of two new 220/110kV transformers at Lindisfarne
- Installation of two new 110/33kV transformers at Mornington
- Modification of two 110/22kV transformers at Sorel
- Installation of two new 110/33kV transformers at Kingston
- Installation of two new 110/22kV transformers at St. Leonards

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 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 use a combination of existing and estimated data.

3.12.1 Queensland

In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of Condamine gas turbine units from the historical dispatch of Swanbank E up to March 2010 for which historical profile for Condamine was not reflective of normal operation characteristics. The Swanbank E Power Station was chosen because it uses similar technology and fuel and is less than 10 years older than the new Condamine unit.

A full year's profile for Darling Downs was not available for the 2011/12 MLF calculation. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of this unit from the historical dispatch of the Swanbank E generating unit. This unit was chosen because it uses similar technology and fuel and is less than 10 years older than the new Darling Downs generating unit.

Yarwun Cogeneration was commissioned in August 2010. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of these generating units from the historical dispatch of the Braemar stage 1. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new Yarwun generating unit. Since the publication of this report on 1 April 2011, it was discovered that the application of a generation profile based on Braemar 1 was inconsistent with the operating characteristics of Yarwun. This is because the Yarwun unit, which is non-scheduled, 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.

Mount Stuart unit 3 was commissioned in October 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of this unit from the historical dispatch of the Laverton North generating units up to October 2009. These units were chosen because they use similar technology and fuel.

3.12.2 New South Wales

There are no committed new generation projects in New South Wales region during the financial year 2011/12.

3.12.3 Victoria

Mortlake is due to be commissioned in 2011. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of this generator 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 unit.

Bogong Power Station was commissioned in summer 2009/10. In accordance with section 5.4.2 of the forward-looking loss factor methodology and in consultation with the relevant participant, AEMO estimated the dispatch of this generator from the historical dispatch of McKay Creek Hydro generating units 1 and 2.

3.12.4 South Australia

Port Lincoln unit 3 was commissioned in 2010. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of this generating unit from the historical dispatch of Port Lincoln generating units 1 and 2.

3.12.5 Tasmania

There are no committed new generation projects in the Tasmania during the financial year 2011/12.

3.12.6 New Wind Farms and Other Energy Limited Generation

The new wind generation commissioned after July 2010 include Gunning, Woodlawn, Oakland Hills, Hallett 4 – North Brown Hill, Hallett 5 – Bluff Wind Farm, Lake Bonny 3 and Waterloo. 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.

3.13 Generator Unit Capability

In accordance with section 5.5.3 of the forward-looking loss factor methodology, AEMO estimates 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 2010 ESOO, AEMO estimated the sent-out summer and winter generator terminal capacities.

3.14 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 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 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 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 2011/12 Financial Year" document which is available on AEMO's website[3].

3.15 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 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

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

3.16 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 upon request, to generate forecast loads for 2011/12.

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 2010 for 2011/12 financial year;
- Check that load shapes are consistent with load profile of the historical year 2009/10;
- Check that the forecast for connection points include 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.

3.17 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, 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, 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.
- 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.

[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 static intra-regional loss factors that apply for the 2011/12 financial year are tabulated in Appendix A.

3.18 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 2011/12 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.

3.19 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.

3.20 Proportioning Inter-regional Losses to Regions

Appendix E contains the factors used to apportion the inter-regional losses to the associated regions for the 2011/12 financial year.

4 Differences in loss factors compared to the 2010/11 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 transmission 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 flowing 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 2011/12 MLFs with 2010/11 MLFs

The 2011/12 energy forecasts in all regions have increased except in South Australia[5]. The reduction in demand in South Australia together with new additional generation at Port Lincoln and new wind farms has resulted in a substantial increase in interconnector transfers from South Australia to Victoria.

In Victoria, in addition to the increased transfer from South Australia, there is a substantial reduction in the Basslink transfer to Tasmania. This has contributed to a significant increase in transfer to New South Wales.

In Queensland, the demand growth in South East Queensland together with the retirement of Swanbank B Power Station has increased the power flows from Central Queensland to South East Queensland. The slight increase in interconnector transfers from Queensland to New South Wales further increases the Central Queensland to South East Queensland flows.

Following the publication of this year's draft MLF document, Origin Energy advised AEMO that Mortlake is an open cycle GT plant, whereas last year it was modelled as a closed cycle GT. This has resulted in a reduction of approximately 2,000 GWh of energy generated in Victoria this year compared to 2010/11, which has consequently led to variations of MLF values in certain places.

4.2.1 South Australia

Due to the reduction in energy forecast and increase in generation capacity, the MLFs in most parts of this region are similar to last year's values or are slightly lower. Exceptions to this are a number of locations such as Snuggery, Mt Gambier, and Berri where increases in MLF value have occurred.

As discussed in section 4.2 above, the interconnector transfers from South Australia to Victoria have increased significantly. The consequence of this is that the MLF values for locations along the interconnector path have increased as can be seen in the MLF values for Snuggery and Berri. For Snuggery and Mt Gambier along the Heywood link, there is an additional effect from the reduction of Lake Bonney wind farm output.

4.2.2 Victoria

There is an increase in transfer from South Australia and a decrease in transfer to Tasmania. This has contributed to a significant increase in transfer to New South Wales. The resulting effect is that there is excess generation and hence most MLF values have decreased. Although the Mortlake PS output has reduced this year, its MLF value has changed only marginally, due to the increased transfer from SA to Victoria.

The MLF values at locations along the interconnector paths from Murraylink at Redcliffs have higher than normal reductions due to higher inflows from South Australia. Higher generation at Murray power station has also resulted in lower MLFs at Wodonga and Murray.

4.2.3 New South Wales

There is a significant increase in transfer from Victoria and a slight increase from Queensland. Consequently most MLF values show a slight decrease. Load growth in Northern New South Wales is moderate, and with the small increase in transfers from Queensland, MLF values in this area have decreased slightly.

The increased transfers from Murraylink via Buronga together with the increase in generation from Uranquinty have the effect of lowering the MLF values at locations such as Broken Hill, Darlington Point, and Wagga quite significantly. Though the Wagga area loads have increased, the MLFs have decreased due to the increased generation from Uranquinty nearby. Due to the increased Wagga area load, the Uranquinty MLF has increased.

[5] The scheduled and semi-scheduled energy projections for South Australia show a decrease in forecast energy in the 2010 ESOO as compared to the 2009 ESOO.

Since the publication of this report on 1 April 2011, the AEMC has made a Rule which allows two MLFs to be applied at connection points where energy is both generated and consumed – one MLF for generation and one for consumption. Under clause 11.41.4(b), AEMO is required to publish revised intra-regional loss factors for transmission network connection points that have been affected by this Rule change[6]. On 11 April 2011, AEMO commenced a consultation on the FLLF methodology to determine the criteria for calculating dual loss factors to take into account transmission network connection points where energy is both generated and consumed[7]. In accordance with the final determination of this consultation, AEMO has recalculated the MLFs of Shoalhaven and Lower Tumut, and they are listed in Appendix A.

4.2.4 Queensland

As discussed in section 4.2 above, increased flow from Central to South Queensland has resulted in the MLF values from Central to Northern Queensland being lower than the 2010/11 MLF values. This is in part due to the increased flow from Queensland to New South Wales and, the retirement of Swanbank B in Southern Queensland. As the 2011/12 forecast shows very little demand growth in Central Queensland, the effect is to further reduce MLF values in Central Queensland.

The forecast also shows only moderate demand growth in North Queensland, with most of this growth being in the Townsville area. Even though there is a reduction in generation from the hydro generators at Barron Gorge and Kareeya, the increased outputs from Yabulu and Mt. Stuart have resulted in lower MLF values in the area. The MLF for Yabulu is affected less than Mt. Stuart due to differences in generation profiles. The reduction in losses due to network augmentation in the Ingham area has resulted in a reduction in local MLF values.

Since the publication of this report on 1 April 2011, AEMO has recalculated the MLFs of QYAG, QYAE and QYAR using a more representative generation profile for Yarwun cogeneration plant as detailed in section 3.12.1. This change has minimal impact on MLFs at other locations.

4.2.5 Tasmania

The forecast load growth in Tasmania for 2011-2012 is around 4.5% and the Basslink import from Victoria shows a 58% decrease compared to last year's data. Consequently, there is an increase in generation across the Tasmania region resulting in a reduction in power flow from the George Town RRN towards Southern Tasmania compared to last year. This has resulted in slight reductions in the MLF values for most generators. The Lake Echo generating unit has a larger increase this year resulting in a larger reduction in its MLF. Load connection point MLF values show only moderate variations from last year's 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[8].

[6] http://www.aemc.gov.au/Electricity/Rule-changes/Completed/Application-of-Dual-Marginal-Loss-Factors.html
[7] http://www.aemo.com.au/electricityops/0178-0020.html
[8] 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)
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:

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 2011/12

Appendix F contains the list of regional reference nodes and region boundaries that apply for the 2011/12 financial year.

7 Appendix A: Intra-regional loss factors for 2011/12

Queensland (regional reference node is South Pine 275)

Queensland Loads

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Abermain	33	QABM	1.0043	1.0037
Abermain (Lockrose)	110	QABR	1.0022	1.0014
Alan Sherriff	132	QASF	1.0764	1.0609
Algester	33	QALG	1.0150	1.0177
Alligator Creek	33	QALC	1.0689	1.0583
Alligator Creek	132	QALH	1.0691	1.0566
Ashgrove West	33	QAGW	1.0163	1.0175
Ashgrove West	110	QCBW	1.0158	1.0166
Belmont	110	QBMH	1.0101	1.0118
Belmont Wecker Road	11	QMOB	1.0103	1.0122
Belmont Wecker Road	33	QBBS	1.0120	1.0142
Biloela	66/11	QBIL	0.9580	0.9358
Blackstone	110	QBKS		1.0007
Blackwater	132	QBWH	1.0673	1.0450
Blackwater	66&11	QBWL	1.0682	1.0476
Bolingbroke	132	QBNB	1.0413	1.0147
Bowen North	66	QBNN		1.0474
Boyne Island	132	QBOL	0.9978	0.9797
Boyne Island	275	QBOH	0.9993	0.9811
Bulli Creek (CE)	132	QBK2	0.9613	0.9600
Bulli Creek (Waggamba)	132	QBLK	0.9613	0.9600
Bundamba	110	QBDA	1.0033	1.0025
Burton Downs	132	QBUR	1.0766	1.0600
Cairns	22	QCRN	1.1217	1.1090
Cairns City	132	QCNS	1.1173	1.1037
Callemondah (Rail)	132	QCMD	0.9877	0.9681
Cardwell	22	QCDW	1.1296	1.1111
Clare	66	QCLR	1.0961	1.0868
Collinsville Load	33	QCOL	1.0510	1.0415
Coppabella (Rail)	132	QCOP	1.0830	1.0849
Dan Gleeson	66	QDGL	1.0841	1.0788
Dingo (Rail)	132	QDNG	1.0807	1.0317
Dysart	66/22	QDYS	1.0822	1.0727
Edmonton	22	QEMT	1.1239	1.1179
Egans Hill	66	QEGN	0.9976	0.9720
El Arish	22	QELA	1.1309	1.1255
Garbutt	66	QGAR	1.0787	1.0656
Gin Gin	132	QGNG	1.0026	0.9866
Gladstone	132	QGLA	0.9854	0.9689
Gladstone South	66/11	QGST	0.9898	0.9682
Goodna	33	QGDA	1.0077	1.0072
Grantleigh (Rail)	132	QGRN	0.9932	0.9909

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Gregory (Rail)	132	QGRE	1.0252	1.0147
Ingham	66	QING	1.1403	1.0646
Innisfail	22	QINF	1.1343	1.1295
Invicta Load	132	QINV	1.0863	1.0653
Kamerunga	22	QKAM	1.1222	1.1152
Kemmis	132	QEMS	1.0637	1.0479
King Creek	132	QKCK	1.0835	1.0708
Lilyvale	66	QLIL	1.0288	1.0139
Lilyvale (Barcaldine)	132	QLCM	1.0256	1.0108
Loganlea	33	QLGL	1.0148	1.0175
Loganlea	110	QLGH	1.0111	1.0132
Mackay	33	QMKA	1.0758	1.0553
Middle Ridge (Energex)	110	QMRX	0.9742	0.9725
Middle Ridge (Ergon)	110	QMRG	0.9742	0.9725
Mindi (Rail)	132	QMND	1.0385	1.0234
Molendinar	33	QMAL	1.0076	1.0115
Molendinar	110	QMAR	1.0052	1.0110
Moranbah (Mine)	66	QMRN	1.0965	1.0794
Moranbah (Town)	11	QMRL	1.0915	1.0716
Moranbah South (Rail)	132	QMBS	1.0942	1.0745
Moura	66/11	QMRA	0.9930	0.9802
Mt McLaren (Rail)	132	QMTM	1.1141	1.0970
Mudgeeraba	33	QMGL	1.0111	1.0153
Mudgeeraba	110	QMGB	1.0100	1.0151
Murarrie (Belmont)	110	QMRE	1.0152	1.0158
Nebo	11	QNEB	1.0455	1.0202
Newlands	66	QNLD	1.0940	1.0826
North Goonyella	132	QNGY	1.0954	1.0780
Norwich Park (Rail)	132	QNOR	1.0551	1.0455
Oakey	110	QOKT	0.9740	0.9725
Oonooie (Rail)	132	QOON	1.0714	1.0620
Palmwoods	132/110	QPWD	1.0283	1.0275
Pandolin	132	QPAN		0.9746
Peak Downs (Rail)	132	QPKD	1.0878	1.0772
Pioneer Valley	66	QPIV	1.0789	1.0626
Proserpine	66	QPRO	1.0908	1.0641
QAL (Gladstone South)	132	QQAH	0.9905	0.9713
QLD Nickel (Yabulu)	132	QQNH	1.0683	1.0542
Redbank Plains	11	QRPN	1.0087	1.0062
Richlands	33	QRLD	1.0174	1.0180
Rockhampton	66	QROC	1.0044	0.9790
Rocklands (Rail)	132	QRCK	0.9910	0.9670
Rocklea (Archerfield)	110	QRLE	1.0059	1.0059
Ross	132	QROS	1.0724	1.0609
Runcorn	33	QRBS	1.0124	1.0180
South Pine	110	QSPN	1.0024	1.0024
Stony Creek	132	QSYC	1.0897	1.0837
Sumner	110	QSUM	1.0073	1.0080
Swanbank (Raceview)	110	QSBK	1.0023	1.0010
Tangkam (Dalby)	110	QTKM	0.9725	0.9756
Tarong	66	QTRL	0.9695	0.9671

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Tarong	132	QTRH	0.9654	0.9633
Teebar Creek	132	QTBC	1.0120	1.0051
Tennyson	33	QTNS	1.0106	1.0111
Tennyson (Rail)	110	QTNN	1.0079	1.0084
Townsville East	66	QTVE	1.1026	1.0785
Townsville South	66	QTVS	1.1033	1.0801
Townsville South (KZ)	132	QTZS	1.1014	1.0761
Tully	22	QTLL	1.1431	1.1288
Turkinje	66	QTUL	1.1310	1.1260
Turkinje (Craiglee)	132	QTUH	1.1317	1.1242
Wandoo (Rail)	132	QWAN	1.0395	1.0258
Wivenhoe Pump	275	QWIP	0.9961	0.9952
Woolooga (Energex)	132	QWLG	1.0097	1.0006
Woolooga (Ergon)	132	QWLN	1.0097	1.0006
Woree	132	QWRE	1.1166	1.1118
Yarwun – Boat Creek (Ergon)[9]	132	QYAE	0.9866	0.9622
Yarwun – Rio Tinto[9]	132	QYAR	0.9866	0.9602

[9] Refer to section 4.2.4 for further information

Queensland Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Barron Gorge PS Unit 1	132	BARRON-1	QBGH1	QBGH	1.0922	1.0935
Barron Gorge PS Unit 2	132	BARRON-2	QBGH2	QBGH	1.0922	1.0935
Braemar PS	275	BRAEMAR1	QBRA1	QBRA	0.9429	0.9415
Braemar PS	275	BRAEMAR2	QBRA2	QBRA	0.9429	0.9415
Braemar PS	275	BRAEMAR3	QBRA3	QBRA	0.9429	0.9415
Braemar Stage 2 PS Unit 5	275	BRAEMAR5	QBRA5B	QBRA	0.9429	0.9415
Braemar Stage 2 PS Unit 6	275	BRAEMAR6	QBRA6B	QBRA	0.9429	0.9415
Braemar Stage 2 PS Unit 7	275	BRAEMAR7	QBRA7B	QBRA	0.9429	0.9415
Callide A PS Load	132	CALLNL1	QCAX	QCAX	0.9682	0.9302
Callide A PS Unit 2	132	CALL_A_2	QCAA2	QCAA	0.9682	0.9302
Callide A PS Unit 4	132	CALL_A_4	QCAA4	QCAA	0.9682	0.9302
Callide B PS Unit 1	275	CALL_B_1	QCAB1	QCAB	0.9434	0.9285
Callide B PS Unit 2	275	CALL_B_2	QCAB2	QCAB	0.9434	0.9285
Callide C PS Unit 3	275	CPP_3	QCAC3	QCAC	0.9452	0.9269
Callide C PS Unit 4	275	CPP_4	QCAC4	QCAC	0.9452	0.9269
Collinsville PS Load	132	COLNSNL1	QCLX	QCLX	1.0360	1.0232
Collinsville PS Unit 1	132	COLNSV_1	QCVL1	QCVP	1.0360	1.0232
Collinsville PS Unit 2	132	COLNSV_2	QCVL2	QCVP	1.0360	1.0232
Collinsville PS Unit 3	132	COLNSV_3	QCVL3	QCVP	1.0360	1.0232
Collinsville PS Unit 4	132	COLNSV_4	QCVL4	QCVP	1.0360	1.0232
Collinsville PS Unit 5	132	COLNSV_5	QCVL5	QCVP	1.0360	1.0232
Darling Downs	275	DDPS1	QBRA8D	QBRA	0.9429	0.9415
Gladstone PS (132 kV) Unit 3	132	GSTONE3	QGLD3	QGLL	0.9786	0.9612
Gladstone PS (132 kV) Unit 4	132	GSTONE4	QGLD4	QGLL	0.9786	0.9612
Gladstone PS (132kV) Load	132	GLADNL1	QGLL	QGLL	0.9786	0.9612
Gladstone PS (275 kV) Unit 1	275	GSTONE1	QGLD1	QGLH	0.9818	0.9631
Gladstone PS (275 kV) Unit 2	275	GSTONE2	QGLD2	QGLH	0.9818	0.9631
Gladstone PS (275 kV) Unit 5	275	GSTONE5	QGLD5	QGLH	0.9818	0.9631
Gladstone PS (275 kV) Unit 6	275	GSTONE6	QGLD6	QGLH	0.9818	0.9631
Kareeya PS Unit 1	11	KAREEYA1	QKAH1	QKAH	1.0802	1.0600
Kareeya PS Unit 2	11	KAREEYA2	QKAH2	QKAH	1.0802	1.0600
Kareeya PS Unit 3	11	KAREEYA3	QKAH3	QKAH	1.0802	1.0600
Kareeya PS Unit 4	11	KAREEYA4	QKAH4	QKAH	1.0802	1.0600
Kogan Creek PS	275	KPP_1	QBRA4K	QBRA	0.9429	0.9415
Koombooloomba	132	KAREEYA5	QKYH5	QKYH	1.0844	1.0703
Mackay GT	33	MACKAYGT	QMKG	QMKG	1.0327	1.0353
Millmerran PS Unit 1 (Millmerran)	330	MPP_1	QBCK1	QMLN	0.9620	0.9600
Millmerran PS Unit 2 (Millmerran)	330	MPP_2	QBCK2	QMLN	0.9620	0.9600

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Mt Stuart PS Unit 1	132	MSTUART1	QMSP1	QMSP	1.0229	0.9772
Mt Stuart PS Unit 2	132	MSTUART2	QMSP2	QMSP	1.0229	0.9772
Mt Stuart PS Unit 3	132	MSTUART3	QMSP3M	QMSP	1.0229	0.9772
Oakey PS Unit 1	110	OAKEY1	QOKY1	QOKY	0.9433	0.9384
Oakey PS Unit 2	110	OAKEY2	QOKY2	QOKY	0.9433	0.9384
Stanwell PS Load	132	STANNL1	QSTX	QSTX	0.9815	0.9584
Stanwell PS Unit 1	275	STAN-1	QSTN1	QSTN	0.9815	0.9584
Stanwell PS Unit 2	275	STAN-2	QSTN2	QSTN	0.9815	0.9584
Stanwell PS Unit 3	275	STAN-3	QSTN3	QSTN	0.9815	0.9584
Stanwell PS Unit 4	275	STAN-4	QSTN4	QSTN	0.9815	0.9584
Swanbank B PS Unit 1	275	SWAN_B_1	QSWB1	QSWB	0.9930	0.9975
Swanbank B PS Unit 2	275	SWAN_B_2	QSWB2	QSWB	0.9930	0.9975
Swanbank B PS Unit 3	275	SWAN_B_3	QSWB3	QSWB	0.9930	0.9975
Swanbank B PS Unit 4	275	SWAN_B_4	QSWB4	QSWB	0.9930	0.9975
Swanbank E GT	275	SWAN_E	QSWE	QSWE	0.9990	0.9991
Swanbank PS Load	110	SWANNL2	QSW1	QSWB	0.9930	0.9975
Tarong North PS	275	TNPS1	QTNT	QTNT	0.9680	0.9652
Tarong PS Unit 1	275	TARONG#1	QTRN1	QTRN	0.9679	0.9655
Tarong PS Unit 2	275	TARONG#2	QTRN2	QTRN	0.9679	0.9655
Tarong PS Unit 3	275	TARONG#3	QTRN3	QTRN	0.9679	0.9655
Tarong PS Unit 4	275	TARONG#4	QTRN4	QTRN	0.9679	0.9655
Wivenhoe Generation Unit 1	275	W/HOE#1	QWIV1	QWIV	0.9883	0.9909
Wivenhoe Generation Unit 2	275	W/HOE#2	QWIV2	QWIV	0.9883	0.9909
Wivenhoe Pump 1	275	PUMP1	QWIP1	QWIP	0.9961	0.9952
Wivenhoe Pump 2	275	PUMP2	QWIP2	QWIP	0.9961	0.9952
Wivenhoe Small Hydro	110	WIVENSH	QABR1	QABR	1.0022	1.0014
Yabulu PS	132	YABULU	QTYP	QTYP	1.0406	1.0200
Yarwun PS[10]	132	YARWUN_1	QYAG1R	QYAG	0.9883	0.9593

[10] Refer to section 4.2.4 for further information

Queensland Embedded Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Barcaldine PS @ Lilyvale	132	BARCALDN	QBCG	QBCG	0.9963	0.9872
Condamine PS	132	CPSA	QCND1C	QCND	0.9651	0.9625
Daandine PS	110	DAANDINE	QTKM1	QTKM	0.9725	0.9756
German Creek Generator	66	GERMCRK	QLIL2	QLIL	1.0288	1.0139
Isis CSM	132	ICSM	QGNG1I	QTBC	1.0120	1.0051
KRC Co-Gen	110	KRCCOGEN	QMRG1K	QMRG	0.9742	0.9725
Moranbah Gen	11	MORANBAH	QMRL1M	QMRL	1.0915	1.0716
Moranbah North PS	66	MBAHNTH	QMRN1P	QMRN	1.0965	1.0794
Oakey Creek Generator	66	OAKYCREK	QLIL1	QLIL	1.0288	1.0139
Rochedale Renewable Energy Plant	110	ROCHEDAL	QBMH2	QBMH	1.0101	1.0118
Rocky Point Gen (Loganlea 110kV)	110	RPCG	QLGH2	QLGH	1.0111	1.0132
Roghan Road Generator	110	EDLRGNRD	QSPN2	QSPN	1.0024	1.0024
Roma PS @ Tarong Unit 7	132	ROMA_7	QRMA7	QRMA	0.9654	0.9633
Roma PS @ Tarong Unit 8	132	ROMA_8	QRMA8	QRMA	0.9654	0.9633
Southbank Institute Of Technology	110	STHBKTEC	QCBD1S	QCBW	1.0158	1.0166
Suncoast Gold Macadamias Co-Gen (Palmwoods)	110	SUNCOAST	QPWD1	QPWD	1.0283	1.0275
Ti Tree BioReactor	33	TITREE	QABM1T	QABM	1.0043	1.0037
Whitwood Rd Renewable Energy Plant	110	WHIT1	QSBK1	QSBK	1.0023	1.0010
Windy Hill Windfarm (Turkinje 66kV)	66	WHILL1	QTUL	QTUL	1.1310	1.1260
Yabulu Steam Turbine (Garbutt 66kV)	66	YABULU2	QGAR1	QYST	1.0504	1.0310

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

New South Wales Loads

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Albury	132	NALB	1.0588	1.0172
Alcan	132	NALC	1.0054	1.0072
ANM	132	NANM	1.0600	1.0157
Armidale	66	NAR1	0.9218	0.9245
Balranald	22	NBAL	1.0958	1.0597
Beaconsfield West	132	NBFW	1.0090	1.0087
Beresfield	33	NBRF	1.0001	1.0032
Beryl	66	NBER	0.9988	0.9968
BHP (Waratah)	132	NWR1	0.9900	0.9912
Broken Hill	22	NBKG	1.1426	1.1027
Broken Hill	220	NBKH	1.1350	1.0949
Bunnerong	132	NBG1	1.0044	1.0090
Bunnerong	33	NBG3	1.0137	1.0144
Burrinjuck	132	NBU2	1.0138	1.0109
Canterbury	33	NCTB	1.0166	1.0193
Carlingford	132	NCAR	1.0021	1.0040
Casino	132	NCSN	0.9463	0.9452
Charmhaven	11	NCHM	0.9933	0.9973
Chullora	132	NCHU	1.0116	1.0122
Coffs Harbour	66	NCH1	0.9464	0.9426
Coleambally	132	NCLY	1.0641	1.0278
Cooma	132	NCMA	1.0280	1.0146
Cowra	66	NCW8	1.0336	1.0241
Dapto (Endeavour Energy)	132	NDT1	1.0008	0.9972
Dapto (Essential Energy)	132	NDT2	1.0008	0.9972
Darlington Point	132	NDNT	1.0583	1.0241
Deniliquin	66	NDN7	1.1077	1.0628
Dorrigo	132	NDOR	0.9387	0.9369
Drummoyne	11	NDRM	1.0163	1.0202
Dunoon	132	NDUN	0.9275	0.9285
Far North VTN		NEV1	0.9597	0.9558
Finley	66	NFNY	1.1003	1.0557
Forbes	66	NFB2	1.0486	1.0398
Gadara	132	NGAD	1.0340	1.0397
Glen Innes	66	NGLN	0.9553	0.9545
Gosford	33	NGSF	1.0033	1.0070
Gosford	66	NGF3	1.0035	1.0063
Green Square	11	NGSQ	1.0091	1.0095
Griffith	33	NGRF	1.0868	1.0532
Gunnedah	66	NGN2	0.9906	0.9830
Haymarket	132	NHYM	1.0087	1.0082
Homebush Bay	11	NHBB	1.0141	1.0184
Ilford	132	NLFD	0.9855	0.9810
Ingleburn	66	NING	1.0001	0.9992
Inverell	66	NNVL	0.9729	0.9688

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Kemps Creek	330	NKCK	0.9979	0.9971
Kempsey	33	NKS3	1.0062	0.9976
Kempsey	66	NKS2	1.0072	1.0087
Koolkhan	66	NKL6	0.9585	0.9547
Kurnell	132	NKN1	1.0097	1.0090
Kurri	132	NKUR	1.0020	1.0038
Kurri	33	NKU3	1.0043	1.0066
Kurri	66	NKU6	1.0051	1.0085
Kurri	11	NKU1	1.0015	1.0025
Lane Cove	132	NLCV	1.0121	1.0152
Liddell	33	NLD3	0.9591	0.9568
Lismore	132	NLS2	0.9397	0.9430
Liverpool	132	NLP1	1.0020	1.0014
Macarthur	132	NMC1	0.9983	0.9969
Macarthur	66	NMC2	0.9998	0.9980
Macksville	132	NMCV	0.9744	0.9662
Macquarie Park	11	NMQP	1.0143	1.0194
Manildra	132	NMLD	1.0261	1.0221
Marrickville	11	NMKV	1.0160	1.0177
Marulan (Endeavour Energy)	132	NMR1	0.9916	0.9867
Marulan (Essential Energy)	132	NMR2	0.9916	0.9867
Mason Park	132	NMPK	1.0114	1.0137
Meadowbank	11	NMBK	1.0155	1.0203
Molong	132	NMOL	1.0193	1.0155
Moree	66	NMRE	1.0272	1.0147
Mt Piper	132	NMPP	0.9699	0.9644
Mt Piper	66	NMP6	0.9699	0.9644
Mudgee	132	NMDG	0.9966	0.9937
Mullumbimby	132	NMLB	0.9086	0.9130
Munmorah	33	NMNP	0.9886	0.9917
Munyang	11	NMY1	1.0480	1.0157
Munyang	33	NMYG	1.0480	1.0157
Murrumbateman	132	NMBM	1.0060	0.9965
Murrumburrah	66	NMRU	1.0349	1.0166
Muswellbrook	132	NMRK	0.9597	0.9557
Nambucca Heads	132	NNAM	0.9644	0.9604
Narrabri	66	NNB2	1.0224	1.0123
Newcastle	132	NNEW	0.9932	0.9947
North of Broken Bay VTN		NEV2	0.9935	0.9982
Orange	132	NRG1	1.0212	1.0189
Orange	66	NRGE	1.0220	1.0202
Ourimbah	33	NORB	1.0072	1.0036
Ourimbah	132	NOR1	0.9982	1.0014
Ourimbah	66	NOR6	0.9980	1.0014
Panorama	66	NPMA	1.0146	1.0118
Parkes	132	NPKS	1.0422	1.0366
Parkes	66	NPK6	1.0430	1.0376
Peakhurst	132	NPH1	1.0070	1.0066
Peakhurst	33	NPHT	1.0121	1.0110
Pt Macquarie	33	NPMQ	1.0230	1.0148

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Pyrmont	132	NPT1	1.0088	1.0083
Pyrmont	33	NPT3	1.0095	1.0090
Raleigh	132	NRAL	0.9566	0.9494
Regentville	132	NRGV	0.9981	0.9978
Rozelle	132	NRZH	1.0122	1.0139
Rozelle	33	NRZL	1.0130	1.0158
Snowy Adit	132	NSAD	1.0307	1.0020
Somersby	11	NSMB	1.0044	1.0081
South of Broken Bay VTN		NEV3	1.0078	1.0094
St Peters	11	NSPT	1.0130	1.0135
Stroud	132	NSRD	1.0373	1.0333
Sydney East	132	NSE2	1.0088	1.0095
Sydney North (Ausgrid)	132	NSN1	1.0029	1.0043
Sydney North (Endeavour Energy)	132	NSN2	1.0029	1.0043
Sydney South	132	NSYS	1.0052	1.0043
Sydney West (Ausgrid)	132	NSW1	1.0021	1.0040
Sydney West (Endeavour Energy)	132	NSW2	1.0021	1.0040
Tamworth	66	NTA2	0.9454	0.9452
Taree (Essential Energy)	132	NTR2	1.0513	1.0478
Tenterfield	132	NTTF	0.9535	0.9528
Terranora	110	NTNR	0.9756	0.9825
Tomago	33	NTMJ	0.9961	0.9976
Tomago	330	NTMG	0.9914	0.9926
Tomago (Ausgrid)	132	NTME	0.9959	0.9949
Tomago (Essential Energy)	132	NTMC	0.9959	0.9949
Tuggerah	132	NTG3	0.9947	0.9972
Tumut	66	NTU2	1.0339	1.0393
Vales Pt.	132	NVP1	0.9848	0.9881
Vineyard	132	NVYD	0.9989	0.9994
Wagga	66	NWG2	1.0459	1.0140
Wagga North	66	NWG6	1.0485	1.0136
Wagga North	132	NWGN	1.0472	1.0136
Wallerawang (Endeavour Energy)	132	NWW9	0.9696	0.9638
Wallerawang (Essential Energy)	132	NWW8	0.9696	0.9638
Wellington	132	NWL8	0.9812	0.9781
West Gosford	11	NGWF	1.0059	1.0088
West Sawtell	132	NWST	0.9505	0.9476
Wyong	11	NWYG	0.9974	1.0017
Yanco	33	NYA3	1.0685	1.0335
Yass	66	NYS6	1.0072	0.9975
Yass	132	NYS1	0.9750	0.9726

New South Wales Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Bayswater PS Load	330		NBAYL	NBAY	0.9545	0.9515
Bayswater PS Unit 1	330	BW01	NBAY1	NBAY	0.9545	0.9515
Bayswater PS Unit 2	330	BW02	NBAY2	NBAY	0.9545	0.9515
Bayswater PS Unit 3	500	BW03	NBAY3	NBYW	0.9558	0.9530
Bayswater PS Unit 4	500	BW04	NBAY4	NBYW	0.9558	0.9530
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0130	1.0112
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0130	1.0112
Blowering Ancillary Services	132		NBLW1	NBLW	1.0130	1.0112
Broken Hill GT 1	22	GB01	NBKG1	NBKG	1.1426	1.1027
Burrinjuck	132	BURRIN	NBUK	NBUK	1.0107	1.0116
Capital Wind Farm	330	CAPTL_WF	NCWf1R	NCWF	1.0012	0.9920
Colongra PS Unit 1	330	CG1	NCLG1D	NCLG	0.9811	0.9863
Colongra PS Unit 2	330	CG2	NCLG2D	NCLG	0.9811	0.9863
Colongra PS Unit 3	330	CG3	NCLG3D	NCLG	0.9811	0.9863
Colongra PS Unit 4	330	CG4	NCLG4D	NCLG	0.9811	0.9863
Cullerin Range Wind Farm	132	CULLRGWF	NYS11C	NYS1	0.9750	0.9726
Eraring 330 PS Unit 1	330	ER01	NEPS1	NEP3	0.9857	0.9865
Eraring 330 PS Unit 2	330	ER02	NEPS2	NEP3	0.9857	0.9865
Eraring 500 PS Unit 3	500	ER03	NEPS3	NEPS	0.9875	0.9882
Eraring 500 PS Unit 4	500	ER04	NEPS4	NEPS	0.9875	0.9882
Eraring PS Load	500	ERNL1	NEPSL	NEPS	0.9875	0.9882
Gunning Wind Farm	132	GUNNING1	NYS12A	NYS1	0.9750	0.9726
Guthega	132	GUTH-1	NGUT	NGUT	0.9716	0.9399
Guthega	132	GUTHEGA	NGUT8	NGUT	0.9716	0.9399
Guthega Ancillary Services 2	132	GUTH-2	NGUT2	NGUT	0.9716	0.9399
Hume (NSW Share)	132	HUMENSW	NHUM	NHUM	1.0583	0.9967
Kangaroo Valley – Bendeela (Shoalhaven) Generation[11]	330	SHGEN	NSHL	NSHL	1.0134	0.9671
Kangaroo Valley (Shoalhaven) Pumps[11]	330	SHPUMP	NSHP1	NSHL	1.0134	1.0041
Liddell 330 PS Load	330	LIDDNL1	NLDPL	NLDP	0.9541	0.9518
Liddell 330 PS Unit 1	330	LD01	NLDP1	NLDP	0.9541	0.9518
Liddell 330 PS Unit 2	330	LD02	NLDP2	NLDP	0.9541	0.9518
Liddell 330 PS Unit 3	330	LD03	NLDP3	NLDP	0.9541	0.9518
Liddell 330 PS Unit 4	330	LD04	NLDP4	NLDP	0.9541	0.9518
Lower Tumut Generation[11]	330	TUMUT3	NLTS8	NLTS	1.0092	0.9322
Lower Tumut Pumps[11]	330	SNOWYP	NLTS3	NLTS	1.0092	1.0043
Lower Tumut Pipeline Auxiliary	66	TUMT3NL3	NTU2L3	NTU2	1.0339	1.0393
Lower Tumut T2 Auxiliary	66	TUMT3NL1	NTU2L1	NTU2	1.0339	1.0393
Lower Tumut T4 Auxiliary	66	TUMT3NL2	NTU2L2	NTU2	1.0339	1.0393
Mt Piper PS Load	330	MPNL1	NMPPL	NMTP	0.9703	0.9650
Mt Piper PS Unit 1	330	MP1	NMTP1	NMTP	0.9703	0.9650
Mt Piper PS Unit 2	330	MP2	NMTP2	NMTP	0.9703	0.9650
Munmorah 330 Load	330	MMNL1	NMNPL	NMN1	0.9864	0.9892

[11] Refer to section 4.2.3 for further information. Note that for the purposes of settlement, energy with respect to the pumps is recorded against the generation connection point, with the pump MLF applying where the net of generation and pump energy in the trading interval is negative.

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Munmorah Unit 3	330	MM3	NMNP3	NMN1	0.9864	0.9892
Munmorah Unit 4	330	MM4	NMNP4	NMN1	0.9864	0.9892
Tomago 1	330		NTMG1	NTMG	0.9914	0.9926
Tomago 2	330		NTMG2	NTMG	0.9914	0.9926
Tomago 3	330		NTMG3	NTMG	0.9914	0.9926
Upper Tumut	330		NUTS	NUTS	0.9768	0.9709
Upper Tumut	330	UPPTUMUT	NUTS8	NUTS	0.9768	0.9709
Uranquinty PS Unit 11	132	URANQ11	NURQ1U	NURQ	0.9406	0.9652
Uranquinty PS Unit 12	132	URANQ12	NURQ2U	NURQ	0.9406	0.9652
Uranquinty PS Unit 13	132	URANQ13	NURQ3U	NURQ	0.9406	0.9652
Uranquinty PS Unit 14	132	URANQ14	NURQ4U	NURQ	0.9406	0.9652
Vales Point 330 PS Load	330	VPNL1	NVPPL	NVPP	0.9854	0.9876
Vales Point 330 PS Unit 5	330	VP5	NVPP5	NVPP	0.9854	0.9876
Vales Point 330 PS Unit 6	330	VP6	NVPP6	NVPP	0.9854	0.9876
Wallerawang 330 PS Load	330	WWNL1	NWWPL	NWWP	0.9718	0.9663
Wallerawang 330 Unit 7	330	WW7	NWW27	NWWP	0.9718	0.9663
Wallerawang 330 Unit 8	330	WW8	NWW28	NWWP	0.9718	0.9663
Woodlawn Wind Farm	330	WOODLWN1	NCWF2W	NCWF	1.0012	0.9920

New South Wales Embedded Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Awaba Renewable Energy Facility	132	AWABAREF	NNEW2	NNEW	0.9932	0.9947
Bankstown Sport Club	132	BANKSPT1	NSYS3R	NSYS	1.0052	1.0043
Broadwater PS	66	BWTR1	NLS21B	NLS2	0.9397	0.9430
Brown Mountain	66	BROWNMT	NCMA1	NCMA	1.0280	1.0146
Campbelltown WSLC	66	WESTCBT1	NING1C	NING	1.0001	0.9992
Condong PS	66	CONDONG1	NTNR1C	NTNR	0.9756	0.9825
EarthPower Biomass Plant	132	PMATTAEP	NSW22	NSW1	1.0021	1.0040
Eastern Creek	132	EASTCRK	NSW21	NSW2	1.0021	1.0040
Eraring 330 BS UN (GT)	330	ERGT01	NEP35B	NEP3	0.9857	0.9865
Glenn Innes (Pindari PS)	66	PINDARI	NGLN1	NGLN	0.9553	0.9545
Glennies Creek PS	132	GLENNCRK	NMRK3T	NMRK	0.9597	0.9557
Grange Avenue	11	GRANGEAV	NVYD1	NVYD	0.9989	0.9994
HEZ Power Station	33	HEZ	NKU31H	NKU3	1.0043	1.0066
Jindabyne Generator	132	JNDABNE1	NCMA2	NCMA	1.0280	1.0146
Jounama PS	66	JOUNAMA1	NTU21J	NTU2	1.0339	1.0393
Keepit	66	KEEPIT	NKPT	NKPT	0.9906	0.9830
Liddell 33 – Hunter Valley GTs	33	HVGTS	NLD31	NLD3	0.9591	0.9568
Liverpool 132 (Jacks Gully)	132	JACKSGUL	NLP11	NLP1	1.0020	1.0014
Lucas Heights Stage 2 Power Station	132	LUCAS2S2	NSYS1	NSYS	1.0052	1.0043
Nine Willoughby	132	NINEWIL1	NSE21R	NSE2	1.0088	1.0095
Redbank PS Unit 1	132	REDBANK1	NMRK1	NRED	0.9571	0.9535
Sithe	132	SITHE01	NSYW1	NSW2	1.0021	1.0040
St George Leagues Club	33	STGEORG1	NPHT1E	NPHT	1.0121	1.0110
Tallawarra PS	132	TALWA1	NDT13T	NTWA	0.9946	0.9962
Teralba Power Station	132	TERALBA	NNEW1	NNEW	0.9932	0.9947
West Nowra	132	AGLNOW1	NDT12	NDT1	1.0008	0.9972
Wests Illawara Leagues Club	132	WESTILL1	NDT14E	NDT1	1.0008	0.9972
Woodlawn Bioreactor	132	WDLNGN01	NMR21W	NMR2	0.9916	0.9867
Wyangala A PS	66	WYANGALA	NCW81A	NCW8	1.0336	1.0241
Wyangala B PS	66	WYANGALB	NCW82B	NCW8	1.0336	1.0241

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

Australian Capital Territory Loads

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Canberra	132	ACA1	1.0099	1.0003
Queanbeyan (ACTEW)	66	AQB1	1.0273	1.0184
Queanbeyan (Essential Energy)	66	AQB2	1.0273	1.0184

Victoria (regional reference node is Thomastown 66)

Victoria Loads

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Altona	66	VATS	1.0016	1.0081
Ballarat	66	VBAT	1.0339	1.0306
Bendigo	22	VBE2	1.0780	1.0695
Bendigo	66	VBE6	1.0793	1.0706
BHP Western Port	220	VJLA	0.9889	0.9895
Brooklyn (Jemena)	22	VBL2	1.0040	1.0069
Brooklyn (Jemena)	66	VBL6	1.0052	1.0074
Brooklyn (POWERCOR)	22	VBL3	1.0040	1.0069
Brooklyn (POWERCOR)	66	VBL7	1.0052	1.0074
Brunswick (CITIPOWER)	22	VBT2	0.9999	0.9991
Brunswick (Jemena)	22	VBTS	0.9999	0.9991
Cranbourne (SPI Electricity)	66	VCBT	0.9884	0.9895
Cranbourne (UE)	66	VCB5	0.9884	0.9895
East Rowville (SPI Electricity)	66	VER2	0.9923	0.9917
East Rowville (UE)	66	VERT	0.9923	0.9917
Fishermens Bend (CITIPOWER)	66	VFBT	1.0023	1.0036
Fishermens Bend (POWERCOR)	66	VFB2	1.0023	1.0036
Fosterville	220	VFVT	1.0725	1.0655
Geelong	66	VGT6	1.0071	1.0087
Glenrowan	66	VGNT	1.0462	1.0456
Heatherton	66	VHTS	0.9933	0.9970
Heywood	22	VHY2	0.9715	1.0106
Horsham	66	VHOT	1.0988	1.0756
Keilor (Jemena)	66	VKT2	1.0010	1.0026
Keilor (POWERCOR)	66	VKTS	1.0010	1.0026
Kerang	22	VKG2	1.1165	1.0946
Kerang	66	VKG6	1.1171	1.0957
Khancoban	330	NKHN	1.0359	1.0240
Loy Yang Power Station Switchyard (Basslink)	500	VTBL	0.9729	0.9753
Loy Yang Substation	66	VLY6	0.9715	0.9696
Malvern	22	VMT2	1.0002	1.0041
Malvern	66	VMT6	0.9985	1.0022
Morwell TS	66	VMWT	0.9719	0.9703
Mt Beauty	66	VMBT	1.0285	1.0309
Portland	500	VAPD	1.0064	1.0121
Pt Henry	220	VPTH	1.0114	1.0121
Red Cliffs	22	VRC2	1.1546	1.1119
Red Cliffs	66	VRC6	1.1494	1.1069
Red Cliffs (CE)	66	VRCA	1.1494	1.1069
Richmond	22	VRT2	0.9977	0.9971
Richmond (CITIPOWER)	66	VRT7	1.0017	1.0012
Richmond (UE)	66	VRT6	1.0017	1.0012
Ringwood (SPI Electricity)	22	VRW3	0.9938	0.9980
Ringwood (SPI Electricity)	66	VRW7	0.9946	0.9984
Ringwood (UE)	22	VRW2	0.9938	0.9980
Ringwood (UE)	66	VRW6	0.9946	0.9984

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Shepparton	66	VSHT	1.0600	1.0585
South Morang	66	VSM6	0.9919	0.9978
South Morang	66	VSMT	0.9919	0.9978
Springvale (CITIPOWER)	66	VSVT	0.9919	0.9957
Springvale (UE)	66	VSV2	0.9919	0.9957
Templestowe (CITIPOWER)	66	VTS2	1.0045	0.9985
Templestowe (Jemena)	66	VTST	1.0045	0.9985
Templestowe (SPI Electricity)	66	VTS3	1.0045	0.9985
Templestowe (UE)	66	VTS4	1.0045	0.9985
Terang	66	VTGT	1.0421	1.0356
Thomastown (Jemena)	66	VTTS	1.0000	1.0000
Thomastown (SPI Electricity)	66	VTT2	1.0000	1.0000
Tyabb	66	VTBT	0.9918	0.9925
West Melbourne	22	VWM2	1.0004	1.0015
West Melbourne (CITIPOWER)	66	VWM7	1.0031	1.0042
West Melbourne (Jemena)	66	VWM6	1.0031	1.0042
Wodonga	22	VWO2	1.0360	1.0334
Wodonga	66	VWO6	1.0354	1.0328
Yallourn	11	VYP1	0.9487	0.9531

Victoria Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Yallourn W PS 220 Load	220	YWNL1	VYP2L	VYP2	0.9471	0.9512
Yallourn W PS 220 Unit 2	220	YWPS2	VYP22	VYP2	0.9471	0.9512
Yallourn W PS 220 Unit 3	220	YWPS3	VYP23	VYP2	0.9471	0.9512
Yallourn W PS 220 Unit 4	220	YWPS4	VYP24	VYP2	0.9471	0.9512
Yallourn W PS 220 Unit 1	220	YWPS1	VYP21	VYP3	0.9582	0.9561
Morwell PS G4	11	MOR2	VMWP4	VMWP	0.9632	0.9607
Morwell PS G5	11	MOR3	VMWP5	VMWP	0.9632	0.9607
Jeeralang A PS Unit 1	220	JLA01	VJLGA1	VJLG	0.9659	0.9617
Jeeralang A PS Unit 2	220	JLA02	VJLGA2	VJLG	0.9659	0.9617
Jeeralang A PS Unit 3	220	JLA03	VJLGA3	VJLG	0.9659	0.9617
Jeeralang A PS Unit 4	220	JLA04	VJLGA4	VJLG	0.9659	0.9617
Jeeralang B PS Unit 1	220	JLB01	VJLGB1	VJLG	0.9659	0.9617
Jeeralang B PS Unit 2	220	JLB02	VJLGB2	VJLG	0.9659	0.9617
Jeeralang B PS Unit 3	220	JLB03	VJLGB3	VJLG	0.9659	0.9617
Murray	330	MURRAY	NMUR8	NMUR	0.9800	0.9628
Hazelwood PS Load	220	HWPNL1	VHWPL	VHWP	0.9691	0.9670
Hazelwood PS Unit 1	220	HWPS1	VHWP1	VHWP	0.9691	0.9670
Hazelwood PS Unit 2	220	HWPS2	VHWP2	VHWP	0.9691	0.9670
Hazelwood PS Unit 3	220	HWPS3	VHWP3	VHWP	0.9691	0.9670
Hazelwood PS Unit 4	220	HWPS4	VHWP4	VHWP	0.9691	0.9670
Hazelwood PS Unit 5	220	HWPS5	VHWP5	VHWP	0.9691	0.9670
Hazelwood PS Unit 6	220	HWPS6	VHWP6	VHWP	0.9691	0.9670
Hazelwood PS Unit 7	220	HWPS7	VHWP7	VHWP	0.9691	0.9670
Hazelwood PS Unit 8	220	HWPS8	VHWP8	VHWP	0.9691	0.9670
Loy Yang A PS Load	500	LYNL1	VLYPL	VLYP	0.9715	0.9696
Loy Yang A PS Unit 1	500	LYA1	VLYP1	VLYP	0.9715	0.9696
Loy Yang A PS Unit 2	500	LYA2	VLYP2	VLYP	0.9715	0.9696
Loy Yang A PS Unit 3	500	LYA3	VLYP3	VLYP	0.9715	0.9696
Loy Yang A PS Unit 4	500	LYA4	VLYP4	VLYP	0.9715	0.9696
Loy Yang B PS Unit 1	500	LOYYB1	VLYP5	VLYP	0.9715	0.9696
Loy Yang B PS Unit 2	500	LOYYB2	VLYP6	VLYP	0.9715	0.9696
Valley Power PS	500	VPGS	VLYP7	VLYP	0.9715	0.9696
Morwell PS Load	11	MORNL1	VMWTL	VMWT	0.9719	0.9703
Morwell PS G1, 2 and 3	11	MOR1	VMWT1	VMWG	0.9716	0.9704
Basslink (Loy Yang Power Station Switchyard)	500	BLNKVIC	VLYP13	VTBL	0.9729	0.9753
McKay Creek / Bogong PS	220	MCKAY1	VMKP1	VT14	0.9912	0.9866
Eildon PS Unit 1	220	EILDON1	VEPS1	VEPS	0.9964	0.9950
Eildon PS Unit 2	220	EILDON2	VEPS2	VEPS	0.9964	0.9950
Newport PS	220	NPS	VNPS	VNPS	0.9939	0.9950
Mortlake Unit 1	500	MORTLK11	VM0P1O	VM0P	0.9977	0.9975
Mortlake Unit 2	500	MORTLK12	VM0P2O	VM0P	0.9977	0.9975
Laverton	220	LAVNORTH	VAT21	VAT2	0.9961	0.9979
West Kiewa PS Unit 1	220	WKIEWA1	VWKP1	VWKP	1.0073	1.0103
West Kiewa PS Unit 2	220	WKIEWA2	VWKP2	VWKP	1.0073	1.0103
Portland 500 DU 1	500	APD01	VAPD1	VAPD	1.0064	1.0121

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Portland 500 DU 2	500	APD02	VAPD2	VAPD	1.0064	1.0121
Pt Henry DU 1	220	PTH01	VPTH1	VPTH	1.0114	1.0121
Pt Henry DU 2	220	PTH02	VPTH2	VPTH	1.0114	1.0121
Pt Henry DU 3	220	PTH03	VPTH3	VPTH	1.0114	1.0121
VICSMLT	220	VICSMLT	VAPS1	VAPS	1.0114	1.0121
Banimboola	220	BAPS	VDPS2	VDPS	1.0271	1.0151
Dartmouth PS	220	DARTM1	VDPS	VDPS	1.0271	1.0151
Waubra Wind Farm	220	WAUBRAWF	VWBT1A	VWBT	1.0353	1.0226
Jindabyne pump at Guthega	132	SNOWYGJP	NGJP	NGJP	1.1098	1.1322

Victoria Embedded Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Anglesea PS	220	APS	VAPS	VAPS	1.0114	1.0121
Bairnsdale Unit 1	66	BDL01	VMWT2	VBDL	0.9683	0.968
Bairnsdale Unit 2	66	BDL02	VMWT3	VBDL	0.9683	0.968
Ballarat Health Services	66	BBASEHOS	VBAT1H	VBAT	1.0339	1.0306
Brooklyn Landfill	22	BROOKLYN	VBL61	VBL6	1.0052	1.0074
Codrington Wind Farm	66	CODRNGTON	VTGT2C	VTGT	1.0421	1.0356
Hallam Mini Hydro	66	HLMSEW01	VER21H	VER2	0.9923	0.9917
Hepburn Community Wind Farm	66	HEPWIND1	VBAT2L	VBAT		1.0306
Hume (Victorian Share)	66	HUMEV	VHUM	VHUM	1.0127	1.0082
Longford	66	LONGFORD	VMWT6	VMWT	0.9719	0.9703
Mornington Landfill Site Generator	66	MORNW	VTBT1	VTBT	0.9918	0.9925
Shepparton Waste Gas	66	SHEP1	VSHT2S	VSHT	1.06	1.0585
Somerton Power Station	66	AGLSOM	VTTS1	VSOM	0.9943	0.9939
Sunshine Energy Park	66	SUNSHINE	VKTS1	VKTS	1.001	1.0026
Symex Embedded Gen	66	SYMEX1	VFBT1E	VFBT	1.0023	1.0036
Tatura	22	TATURA01	VSHT1	VSHT	1.06	1.0585
Toora Wind Farm	66	TOORAWF	VMWT5	VMWT	0.9719	0.9703
Wonthaggi Wind Farm	22	WONWP	VMWT7	VMWT	0.9719	0.9703
Wyndham Landfill Site Generator	66	WYNDW	VATS1	VATS	1.0016	1.0081
Yambuk Wind Farm	66	YAMBUKWF	VTGT1	VTGT	1.0421	1.0356

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

South Australia Loads

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Angas Creek	33	SANC	1.0144	1.0124
Ardrossan West	33	SARW	0.9588	0.9481
Baroota	33	SBAR	0.9857	0.9821
Berri	66	SBER	1.0334	1.0913
Berri (POWERCOR)	66	SBE1	1.0334	1.0913
Blanche	33	SBLA	0.9870	1.0322
Blanche (POWERCOR)	33	SBL1	0.9870	1.0322
Brinkworth	33	SBRK	0.9841	0.9808
Bungama Industrial	33	SBUN	0.9810	0.9770
Bungama Rural	33	SBUR	0.9809	0.9770
Clare North	33	SCLN	0.9909	0.9837
Dalrymple	33	SDAL	0.9285	0.9155
Davenport	275	SDAV	0.9691	0.9669
Davenport	33	SDAW	1.0080	0.9648
Dorrien	33	SDRN	1.0183	1.0050
East Terrace	66	SETC	1.0076	1.0049
Happy Valley	66	SHVA	1.0114	1.0076
Hummocks	33	SHUM	0.9758	0.9662
Kadina East	33	SKAD	0.9794	0.9672
Kanmantoo	11	SKAN	1.0212	1.0153
Keith	33	SKET	1.0095	1.0257
Kilburn	66	SKLB	1.0023	1.0032
Kincraig	33	SKNC	1.0021	1.0253
Lefevre	66	SLFE	0.9997	1.0002
Leigh Creek	33	SLCC	1.0099	1.0022
Leigh Creek South	33	SLCS	1.0070	1.0003
Magill	66	SMAG	1.0068	1.0091
Mannum	33	SMAN	1.0202	1.0176
Mannum - Adelaide Pipeline 1	3.3	SMA1	1.0235	1.0223
Mannum - Adelaide Pipeline 2	3.3	SMA2	1.0227	1.0212
Mannum - Adelaide Pipeline 3	3.3	SMA3	1.0209	1.0195
Middleback	132	SMBK	0.9789	0.9830
Middleback	33	SMDL	0.9787	0.9820
Millbrook	33	SMLB	1.0069	1.0060
Mobilong	33	SMBL	1.0204	1.0171
Morgan - Whyalla Pipeline 1	3.3	SMW1	1.0164	1.0386
Morgan - Whyalla Pipeline 2	3.3	SMW2	1.0062	1.0180
Morgan - Whyalla Pipeline 3	3.3	SMW3	0.9967	0.9991
Morgan - Whyalla Pipeline 4	3.3	SMW4	0.9944	0.9911
Morphett Vale East	66	SMVE	1.0090	1.0115
Mt Barker	66	SMBA	1.0211	1.0094
Mt Gambier	33	SMGA	0.9905	1.0299
Mt Gunson	33	SMGU	0.9752	0.9827
Murray Bridge - Hahndorf Pipeline 1	11	SMH1	1.0203	1.0197
Murray Bridge - Hahndorf Pipeline 2	11	SMH2	1.0216	1.0209

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Murray Bridge - Hahndorf Pipeline 3	11	SMH3	1.0215	1.0185
Neuroodla	33	SNEU	0.9885	0.9862
New Osborne	66	SNBN	0.9999	1.0004
North West Bend	66	SNWB	1.0154	1.0387
Northfield	66	SNFD	1.0037	1.0050
Para	66	SPAR	1.0036	1.0037
Parafield Gardens West	66	SPGW	1.0018	1.0028
Pimba	132	SPMB	0.9758	0.9846
Playford	33	SPAA	0.9697	0.9644
Port Lincoln	33	SPLN	0.9723	0.9824
Port Pirie	33	SPPR	0.9866	0.9824
Roseworthy	11	SRSW	1.0140	1.0073
Snuggery Industrial	33	SSNN	0.9806	1.0231
Snuggery Rural	33	SSNR	0.9803	1.0212
South Australian VTN		SJP1	1.0003	1.0030
Stony Point	11	SSPN	0.9774	0.9735
Tailem Bend	33	STAL	1.0098	1.0165
Templers	33	STEM	1.0138	1.0028
Torrens Island	66	STSY	1.0000	1.0000
Waterloo	33	SWAT	0.9993	0.9892
Whyalla	33	SWHY	0.9790	0.9770
Whyalla Terminal BHP	33	SBHP	0.9767	0.9770
Woomera	132	SWMA	0.9742	0.9845
Wudina	66	SWUD	0.9852	0.9973
Yadnarie	66	SYAD	0.9716	0.9828

South Australia Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Cathedral Rocks Wind Farm	132	CATHROCK	SCRK	SCRK	0.8827	0.8982
Clements Gap Wind Farm	132	CLEMGPWF	SCGW1P	SCGW	0.9644	0.9590
Dry Creek PS Unit 1	66	DRYCGT1	SDCA1	SDPS	1.0072	1.0067
Dry Creek PS Unit 2	66	DRYCGT2	SDCA2	SDPS	1.0072	1.0067
Dry Creek PS Unit 3	66	DRYCGT3	SDCA3	SDPS	1.0072	1.0067
Hallet Brown Hill Wind Farm	275	HALLWF1	SHPS2W	SHPS	0.9746	0.9722
Hallet Hill Wind Farm (Hallet 2 Wind Farm)	275	HALLWF2	SMOK1H	SMOK	0.9763	0.9758
Hallet PS	275	AGLHAL	SHPS1	SHPS	0.9746	0.9722
Ladbroke Grove PS Unit 1	132	LADBROK1	SPEW1	SPEW	0.9741	0.9960
Ladbroke Grove PS Unit 2	132	LADBROK2	SPEW2	SPEW	0.9741	0.9960
Lake Bonney Wind Farm	33	LKBONNY1	SMAY1	SMAY	0.9388	0.9868
Lake Bonney Wind Farm Stage 2	33	LKBONNY2	SMAY2	SMAY	0.9388	0.9868
Lake Bonney Wind Farm Stage 3	33	LKBONNY3	SMAY3W	SMAY	0.9388	0.9868
Leigh Creek Northern PS Load 2	33	NPSNL2	SLCCL	SLCC	1.0099	1.0022
Mintaro PS	132	MINTARO	SMPS	SMPS	0.9819	0.9731
Mt Millar Wind Farm	33	MTMILLAR	SMTM1	SMTM	0.8973	0.9425
North Brown Hill Wind Farm	275	NBHWF1	SBEL1A	SBEL	0.9659	0.9763
Northern PS Unit 1	275	NPS1	SNPA1	SNPS	0.9655	0.9601
Northern PS Unit 2	275	NPS2	SNPA2	SNPS	0.9655	0.9601
O.C.P.L. Unit 1	66	OSB-AG	SNBN1	SOCP	0.9998	1.0003
Pelican Point PS	275	PPCCGT	SPPT	SPPT	0.9988	0.9995
Playford Northern PS Load 1	33	NPSNL1	SPAAL	SPAA	0.9697	0.9644
Playford PS	275	PLAYB-AG	SPSD1	SPPS	0.9677	0.9644
Port Lincoln 3	33	POR03	SPL31P	SPL3	0.8633	0.8933
Port Lincoln PS	132	POR01	SPLN1	SPTL	0.8654	0.8856
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	0.9283	0.9163
Snuggery PS Unit 1	132	SNUG1	SSGA1	SSPS	0.9497	0.9432
Snuggery PS Unit 2	132	SNUG2	SSGA2	SSPS	0.9497	0.9432
Snuggery PS Unit 3	132	SNUG3	SSGA3	SSPS	0.9497	0.9432
Torrens Island PS A Unit 1	275	TORRA1	STSA1	STPS	0.9998	1.0007
Torrens Island PS A Unit 2	275	TORRA2	STSA2	STPS	0.9998	1.0007
Torrens Island PS A Unit 3	275	TORRA3	STSA3	STPS	0.9998	1.0007
Torrens Island PS A Unit 4	275	TORRA4	STSA4	STPS	0.9998	1.0007
Torrens Island PS B Unit 1	275	TORRB1	STSB1	STPS	0.9998	1.0007
Torrens Island PS B Unit 2	275	TORRB2	STSB2	STPS	0.9998	1.0007
Torrens Island PS B Unit 3	275	TORRB3	STSB3	STPS	0.9998	1.0007
Torrens Island PS B Unit 4	275	TORRB4	STSB4	STPS	0.9998	1.0007
Torrens Island PS Load	275	TORNL1	STSYL	STPS	0.9998	1.0007

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Waterloo Wind Farm	132	WATERLWF	SWLE1R	SWLE	0.9776	0.9741
Wattle Point Wind Farm	132	WPWF	SSYP1	SSYP	0.8436	0.8254

South Australia Embedded Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Amcor Glass UN 1	11	AMCORGR	SRSW1E	SRSW	1.0140	1.0073
Angaston Power Station	33	ANGAS1	SDRN1	SANG	0.9505	0.9169
Angaston Power Station	33	ANGAS2	SDRN2	SANG	0.9505	0.9169
Lonsdale PS	66	LONSDALE	SMVE1	SMVE	1.0090	1.0115
Pt Stanvac Unit 1	66	STANV1	SMVE3P	SMVE	1.0090	1.0115
Pt Stanvac Unit 2	66	STANV2	SMVE4P	SMVE	1.0090	1.0115
Starfish Hill Wind Farm	66	STARHLWF	SMVE2	SMVE	1.0090	1.0115
Tatiara Meat Co	33	TATIARA1	SKET1E	SKET	1.0095	1.0257
Terminal Storage Mini-Hydro	11	TERMSTOR	SNFD1	SNFD	1.0037	1.0050

Tasmania (regional reference node is George Town 220 kV)

Tasmania Loads

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Arthurs Lake	6.6	TAL2	1.0181	1.0103
Avoca	22	TAV2	1.0387	1.0457
Boyer SWA	6.6	TBYA	1.0457	1.0545
Boyer SWB	6.6	TBYB	1.0502	1.0561
Bridgewater	11	TBW2	1.0527	1.0540
Burnie	22	TBU3	0.9947	0.9952
Chapel St.	11	TCS3	1.0531	1.0487
Comalco	220	TCO1	1.0009	1.0005
Creek Road	33	TCR2	1.0545	1.0527
Derby	22	TDE2	1.0184	1.0243
Derwent Bridge	22	TDB2	0.9716	0.9854
Devonport	22	TDP2	0.9979	0.9968
Electrona	11	TEL2	1.0673	1.0705
Emu Bay	11	TEB2	0.9950	0.9960
Fisher (Rowallan)	220	TFI1	0.9795	0.9735
George Town	22	TGT3	1.0038	1.0027
George Town (Basslink)	220	TGT1	1.0000	1.0000
Gordon	22	TGO2	1.0342	1.0366
Greater Hobart Area VTN		TVN1	1.0543	1.0526
Greater Tamar Area VTN		TVN2	1.0153	1.0151
Hadspen	22	THA3	1.0130	1.0144
Hampshire	110	THM2	0.9918	0.9939
Huon River	11	THR2	1.0654	1.0688
Kermandie	11	TKE2	1.0688	1.0713
Kingston	11	TKI2	1.0637	1.0605
Knights Road	11	TKR2	1.0675	1.0699
Lindisfarne	33	TLF2	1.0552	1.0549
Meadowbank	22	TMB2	1.0210	1.0317
Mowbray	22	TMY2	1.0156	1.0170
New Norfolk	22	TNN2	1.0432	1.0501
Newton	22	TNT2	0.9902	0.9895
Newton	11	TNT3	0.9828	0.9684
North Hobart	11	TNH2	1.0535	1.0517
Norwood	22	TNW2	1.0179	1.0190
Palmerston	22	TPM3	1.0088	1.0126
Port Latta	22	TPL2	0.9767	0.9778
Que	22	TQU2	0.9782	0.9860
Queenstown	22	TQT2	0.9791	0.9749
Queenstown	11	TQT3	0.9848	0.9840
Railton	22	TRA2	0.9945	0.9961
Risdon	33	TRI4	1.0536	1.0533
Risdon	11	TRI3	1.0510	1.0540
Rokeby	11	TRK2	1.0566	1.0554
Rosebery	44	TRB2	0.9807	0.9797
Savage River	22	TSR2	1.0072	1.0116

Location	Voltage	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Scottsdale	22	TSD2	1.0181	1.0203
Smithton	22	TST2	0.9629	0.9626
Sorell	22	TSO2	1.0674	1.0582
St. Marys	22	TSM2	1.0571	1.0677
Starwood	110	TSW1	1.0010	1.0005
Temco	110	TTE1	1.0037	1.0032
Trevallyn	22	TTR2	1.0146	1.0163
Triabunna	22	TTB2	1.0694	1.0780
Tungatinah	22	TTU2	0.9736	0.9847
Ulverstone	22	TUL2	0.9976	0.9984
Waddamana	22	TWA2	0.9906	0.9999
Wayatinah	11	TWY2	1.0239	1.0254
Wesley Vale	11	TWV2	0.9988	0.9933
Wilmot	220	TSH1	0.9830	0.9768

Tasmania Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Basslink (George Town)	220	BLNKTAS	TGT11	TGT1	1.0000	1.0000
Bastyan	220	BASTYAN	TFA11	TFA1	0.9618	0.9516
Bell Bay No.3	110	BBTHREE1	TBB11	TBB1	0.9996	0.9979
Bell Bay No.3	110	BBTHREE2	TBB12	TBB1	0.9996	0.9979
Bell Bay No.3	110	BBTHREE3	TBB13	TBB1	0.9996	0.9979
Bluff Point and Studland Bay Wind Farms	110	WOOLNTH1	TST11	TST1	0.9175	0.9072
Butlers Gorge	110	BUTLERSG	TBG11	TBG1	0.9622	0.9770
Catagunya	220	LI_WY_CA	TLI11	TLI1	1.0240	1.0203
Cethana	220	CETHANA	TCE11	TCE1	0.9767	0.9698
Cluny	220	CLUNY	TCL11	TCL1	1.0283	1.0231
Devils gate	110	DEVILS_G	TDG11	TDG1	0.9804	0.9735
Fisher	220	FISHER	TFI11	TFI1	0.9795	0.9735
Gordon	220	GORDON	TGO11	TGO1	1.0070	1.0030
John Butters	220	JBUTTERS	TJB11	TJB1	0.9561	0.9448
Lake Echo	110	LK_ECHO	TLE11	TLE1	0.9933	0.9744
Lemonthyme	220	LEM_WIL	TSH11	TSH1	0.9830	0.9768
Liapootah	220	LI_WY_CA	TLI11	TLI1	1.0240	1.0203
Mackintosh	110	MACKNTSH	TMA11	TMA1	0.9519	0.9410
Meadowbank	110	MEADOWBK	TMB11	TMB1	1.0189	1.0138
Paloona	110	PALOONA	TPA11	TPA1	0.9835	0.9752
Poatina	220	POAT220	TPM11	TPM1	1.0040	1.0071
Poatina	110	POAT110	TPM21	TPM2	0.9912	0.9962
Reece No.1	220	REECE1	TRCA1	TRCA	0.9550	0.9451
Reece No.2	220	REECE2	TRCB1	TRCB	0.9539	0.9396
Repulse	220	REPULSE	TCL12	TCL1	1.0283	1.0231
Rowallan	220	ROWALLAN	TFI12	TFI1	0.9795	0.9735
Tamar Valley CCGT	220	TVCC201	TTV11A	TTV1	0.9993	0.9988
Tamar Valley OCGT	110	TVPP104	TBB14A	TBB1	0.9996	0.9979
Tarraleah	110	TARRALEA	TTA11	TTA1	0.9703	0.9835
Trevallyn	110	TREVALLN	TTR11	TTR1	1.0097	1.0096
Tribute	220	TRIBUTE	TTI11	TTI1	0.9564	0.9391
Tungatinah	110	TUNGATIN	TTU11	TTU1	0.9617	0.9672
Wayatinah	220	LI_WY_CA	TLI11	TLI1	1.0240	1.0203
Wilmot	22	LEM_WIL	TSH11	TSH1	0.9830	0.9768

Tasmania Embedded Generators

Location	Voltage	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2010/11 Loss Factor	2011/12 Loss Factor
Remount	22	REMOUNT	TMY21	TMY2	1.0156	1.0170

8 Appendix B: Inter-regional loss factors equations for 2011/12

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

= 0.9964+ 1.8369E-04*NQt -3.9581E-06*Nd + 1.3024E-05*Qd

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

= 1.0247+ 1.6789E-04*VNt -1.9279E-05*Vd + 1.1680E-05*Nd -2.6149E-05*Sd

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

= 1.0104+ 2.8491E-04*VSAt -8.8115E-06*Vd + 2.5182E-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.

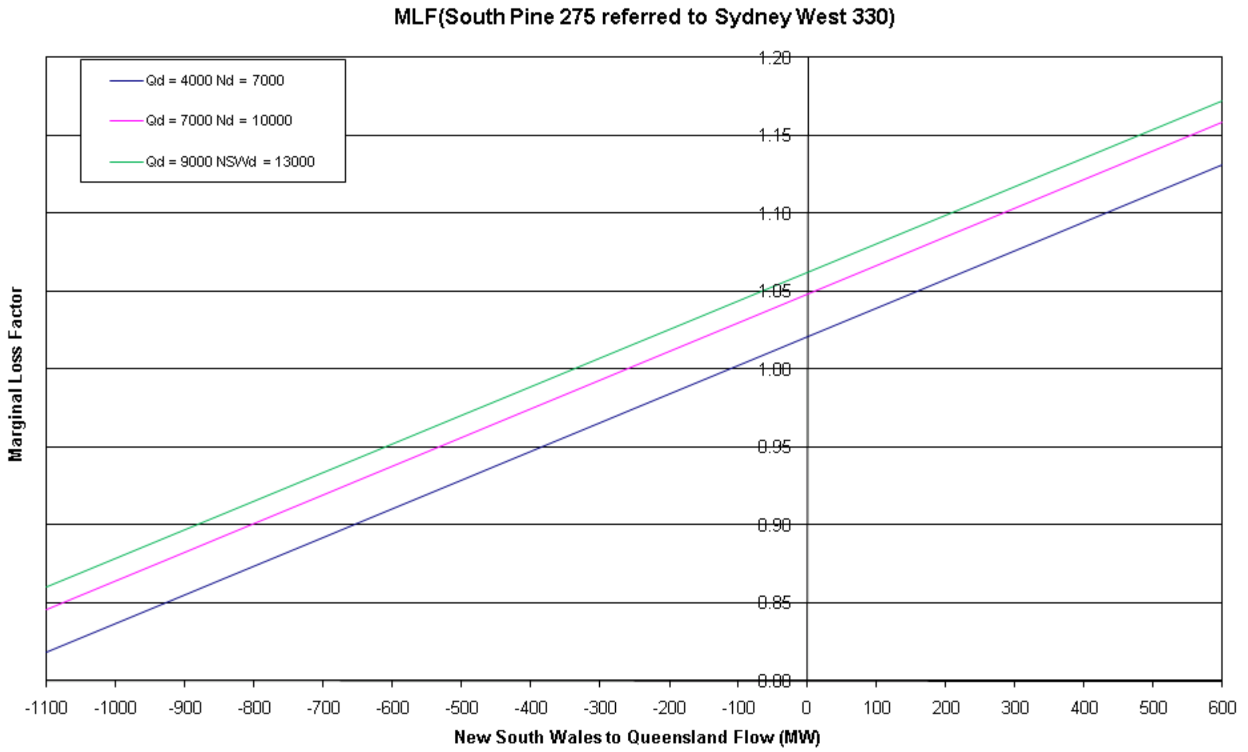


Figure B1: South Pine 275 referred to Sydney West 330 marginal loss factor verses NSW to Qld flow

Coefficient statistics

Coefficient	Q_d	N_d	NQ_t	CONSTANT
Coefficient value	1.3024E-05	-3.9581E-06	1.8369E-04	0.9964
Standard error values for the coefficients	2.3326E-07	1.6413E-07	5.0468E-07	9.6426E-04
Coefficient of determination (R2)	0.9118			
Standard error of the y estimate	0.0179			

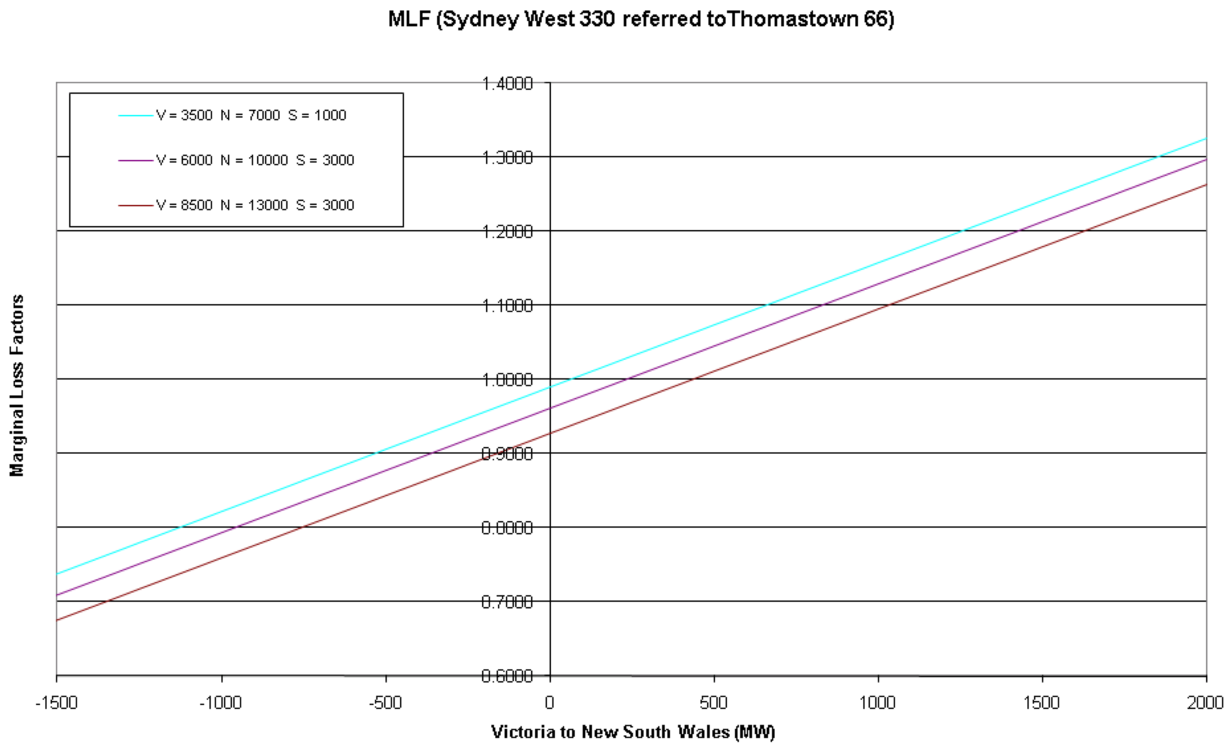


Figure B2: Sydney West 330 referred to Thomastown 66 marginal loss factor versus Victoria to NSW flow

Coefficient statistics

Coefficient	S_d	N_d	V_d	VN_t	CONSTANT
Coefficient value	-2.6149E-05	1.1680E-05	-1.9279E-05	1.6789E-04	1.0247
Standard error values for the coefficients	1.3226E-06	2.9937E-07	5.8568E-07	6.0144E-07	1.9528E-03
Coefficient of determination (R^2)	0.8914				
Standard error of the y estimate	0.0311				

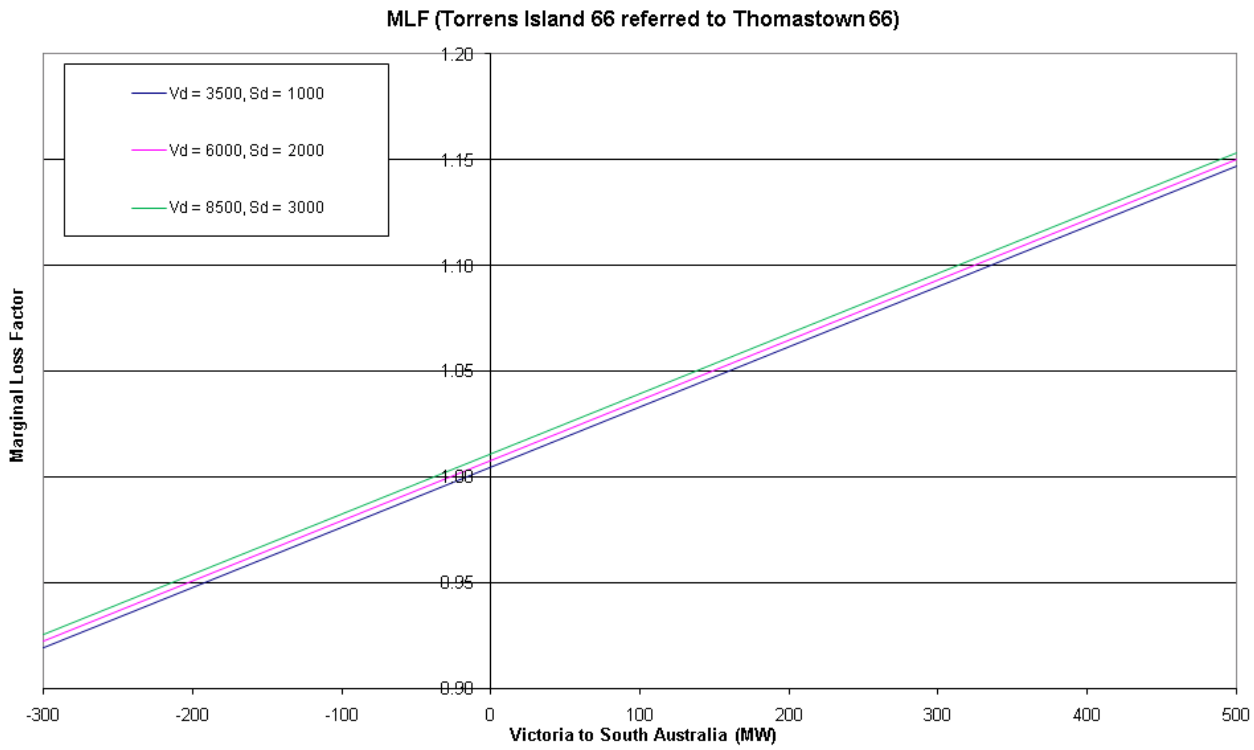


Figure B3: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Victoria to SA flow

Coefficient statistics

Coefficient	S_d	V_d	VSA_t	CONSTANT
Coefficient value	2.5182E-05	-8.8115E-06	2.8491E-04	1.0104
Standard error values for the coefficients	7.1463E-07	2.6671E-07	9.6542E-07	8.7924E-04
Coefficient of determination (R^2)	0.8579			
Standard error of the y estimate	0.0173			

9 Appendix C: Inter-regional loss equations for 2011/12

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

= (-0.0036-3.9581E-06*Nd + 1.3024E-05*Qd)*NQt + 9.1847E-05*NQt^2

Sydney West 330 referred to Thomastown 66 notional link average losses

= (0.0247-1.9279E-05*Vd + 1.1680E-05*Nd - 2.6149E-05*Sd)*VNt +8.3943E-05*VNt^2

Torrens Island 66 referred to Thomastown 66 notional link average losses

= (0.0104-8.8115E-06*Vd+2.5182E-05*Sd)*VSAt + 1.4245E-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.

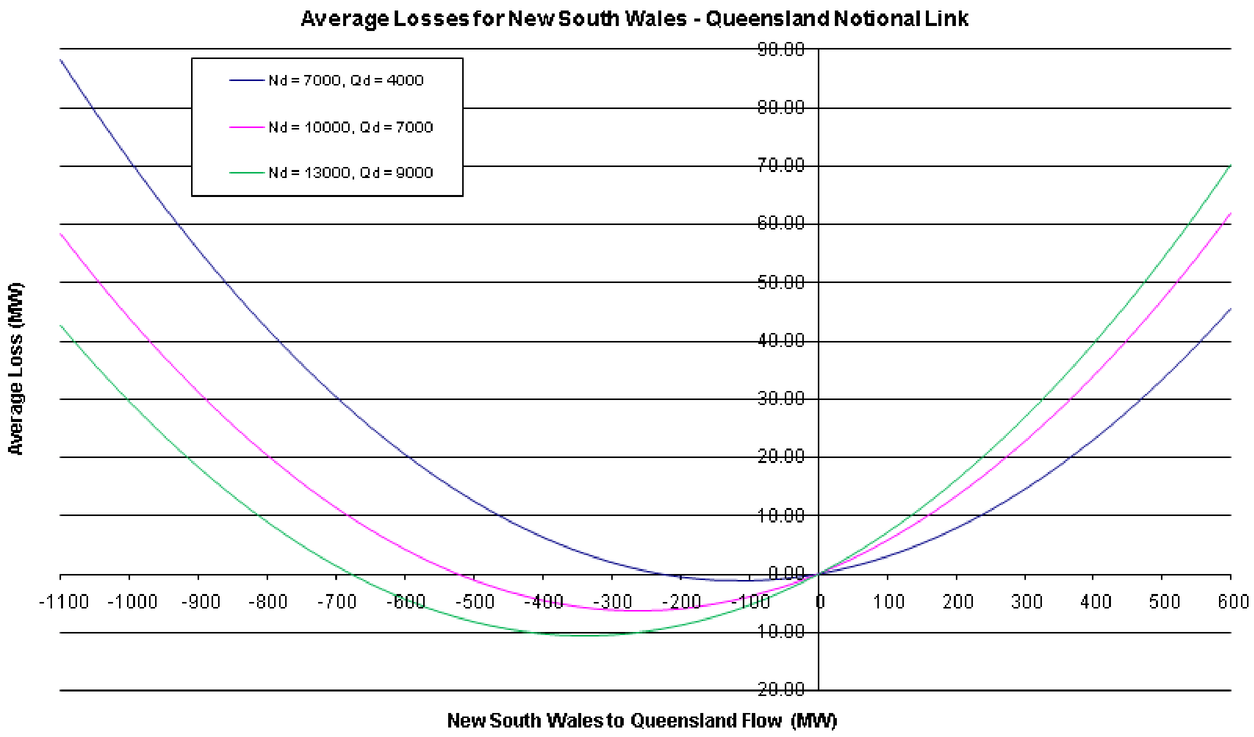


Figure C1: NSW to Queensland notional link losses versus NSW to Queensland notional link flow

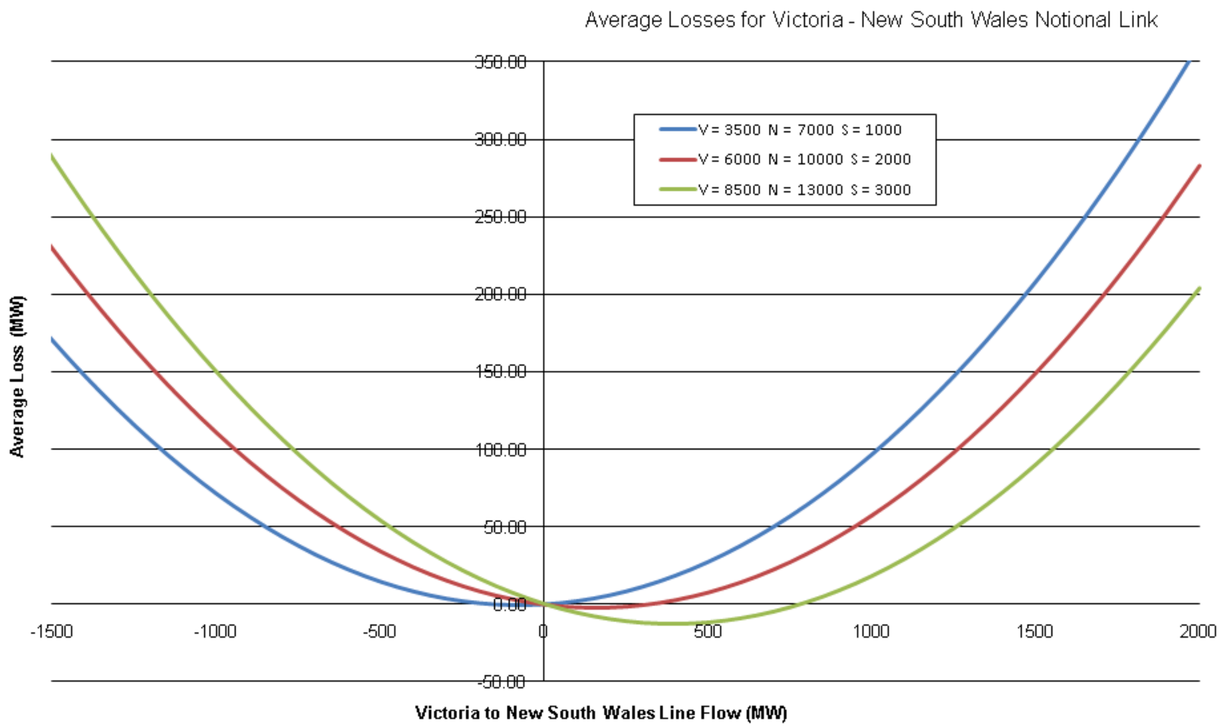


Figure C2: Victoria to NSW notional link losses versus Victoria to NSW notional link flow

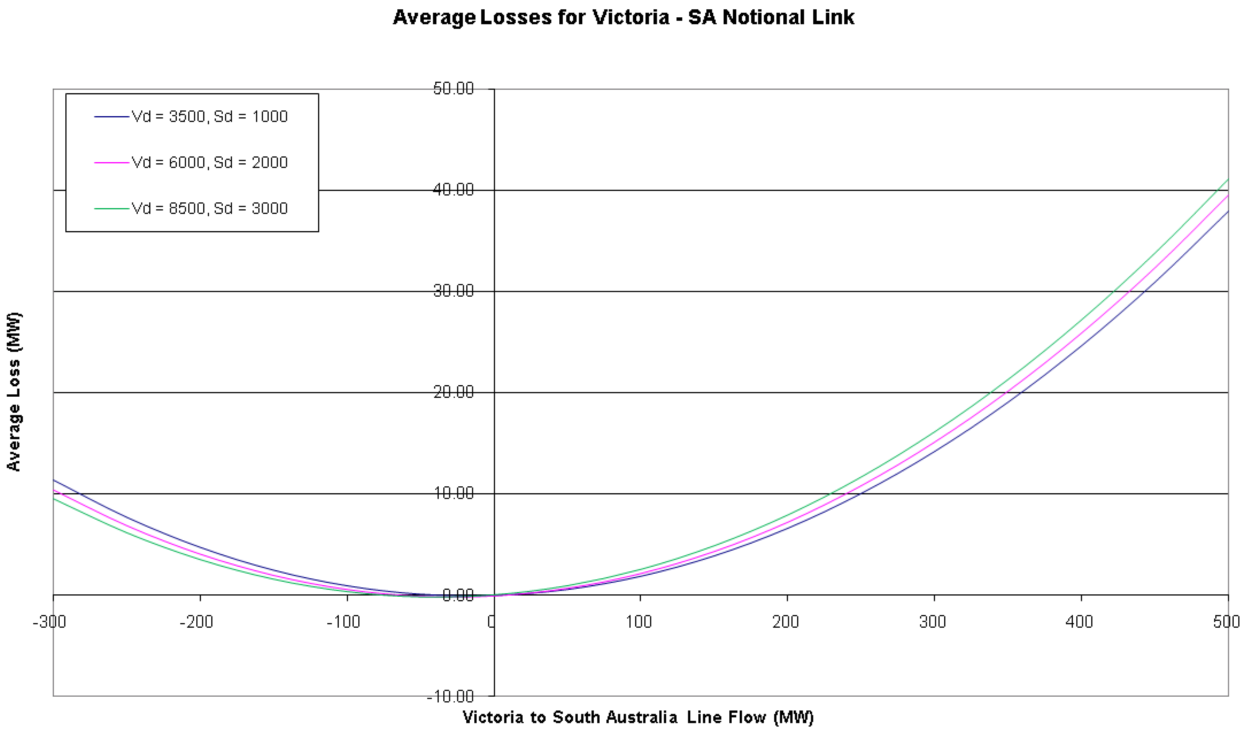


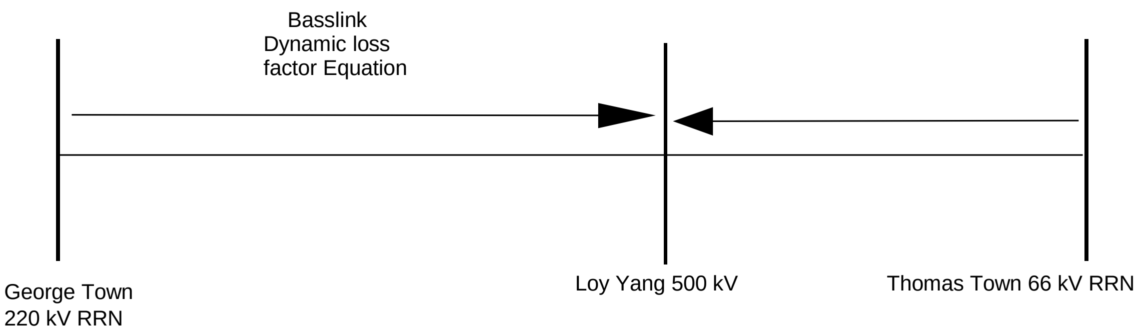
Figure C3: Victoria to SA notional link losses versus Victoria to SA notional link flow

10 Appendix D: Basslink, Terranora Interconnector and Murraylink loss factor models and loss equations for 2011/12

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 Thomas Town 66 kV = 0. 9753.



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. Model fails below 40MW however; this is within the ±50 MW no-go zone requirement for the 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) = 2.3649E-03*$Flow_t$ +1.0748

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	2.3649E-03	1.0748
Standard error values for the coefficient	3.3031E-06	2.3145E-04
Coefficient of determination (R^2)	0.9670	
Standard error of the y estimate	0.0284	

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

Murraylink loss = 0.0748*Flowt + 1.1825E-03*Flowt^2

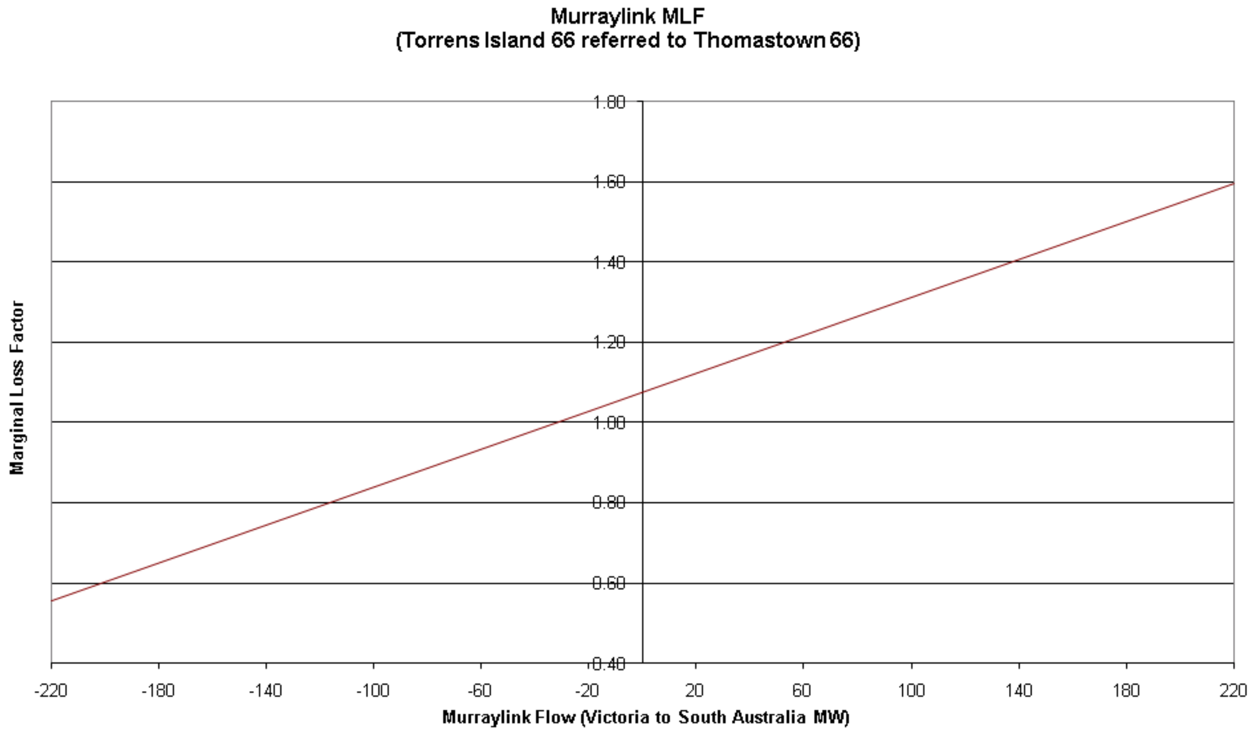


Figure D1: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Murraylink flow (Victoria to SA)

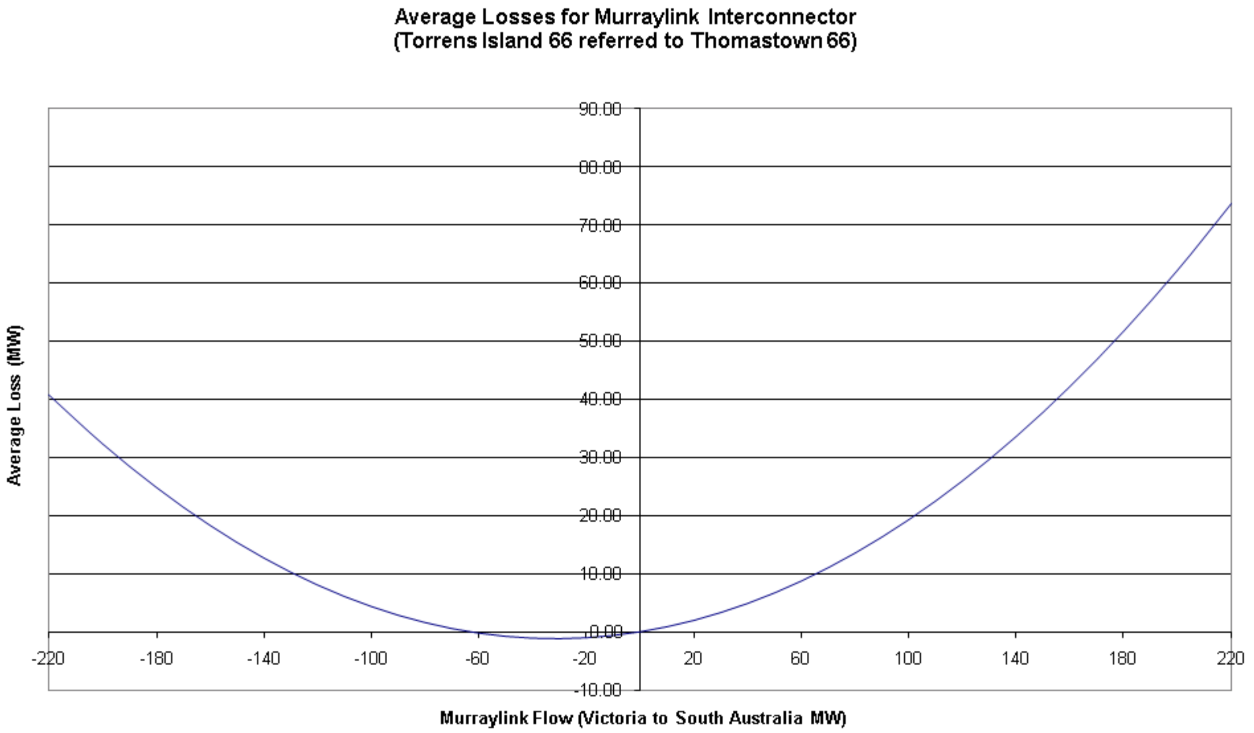


Figure D2: Murraylink notional link losses versus Murraylink flow (Victoria to SA)

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) = 1.0872 + 1.7913E-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	1.7913E-03	1.0872
Standard error values for the coefficients	4.9222E-06	7.8917E-04
Coefficient of determination (R^2)	0.8832	
Standard error of the y estimate	0.0342	

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

Terranora interconnector loss = 0. 0872*Flowt + 8.9563E-04*Flowt^2

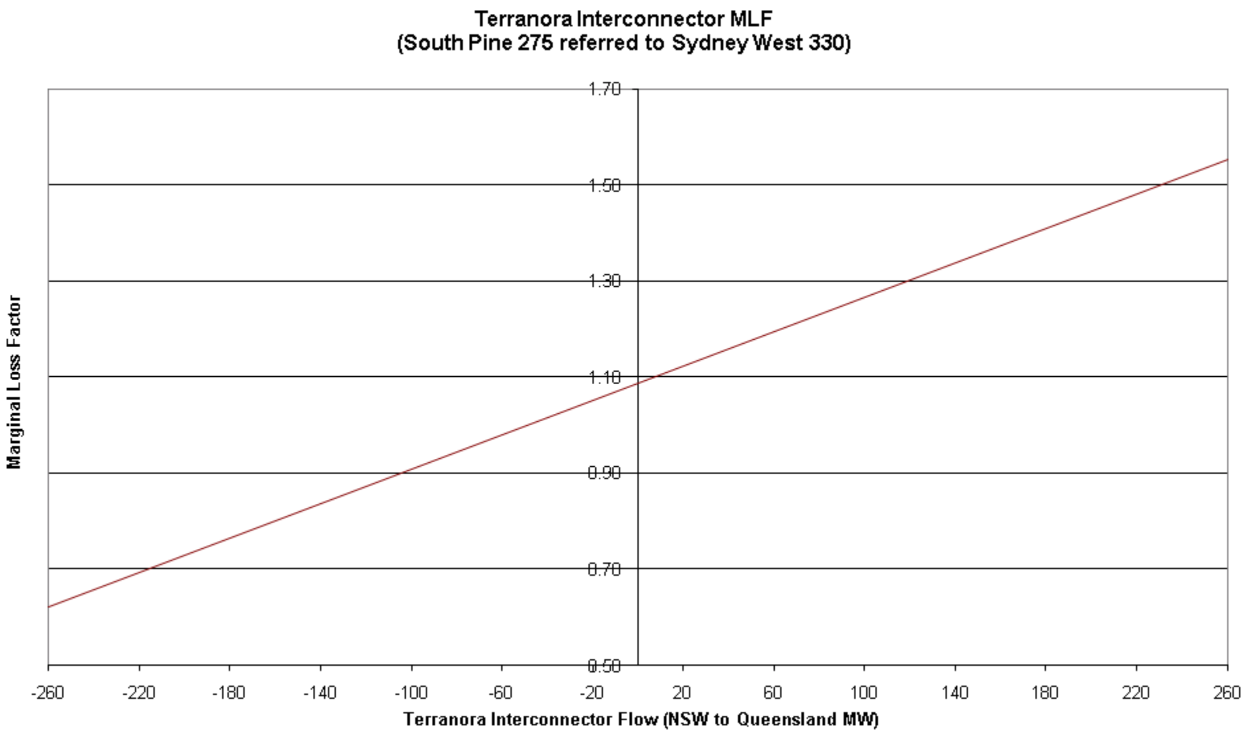


Figure D3: South Pine 275 referred to Sydney West 330 marginal loss factor versus Terranora interconnector flow (NSW to Queensland)

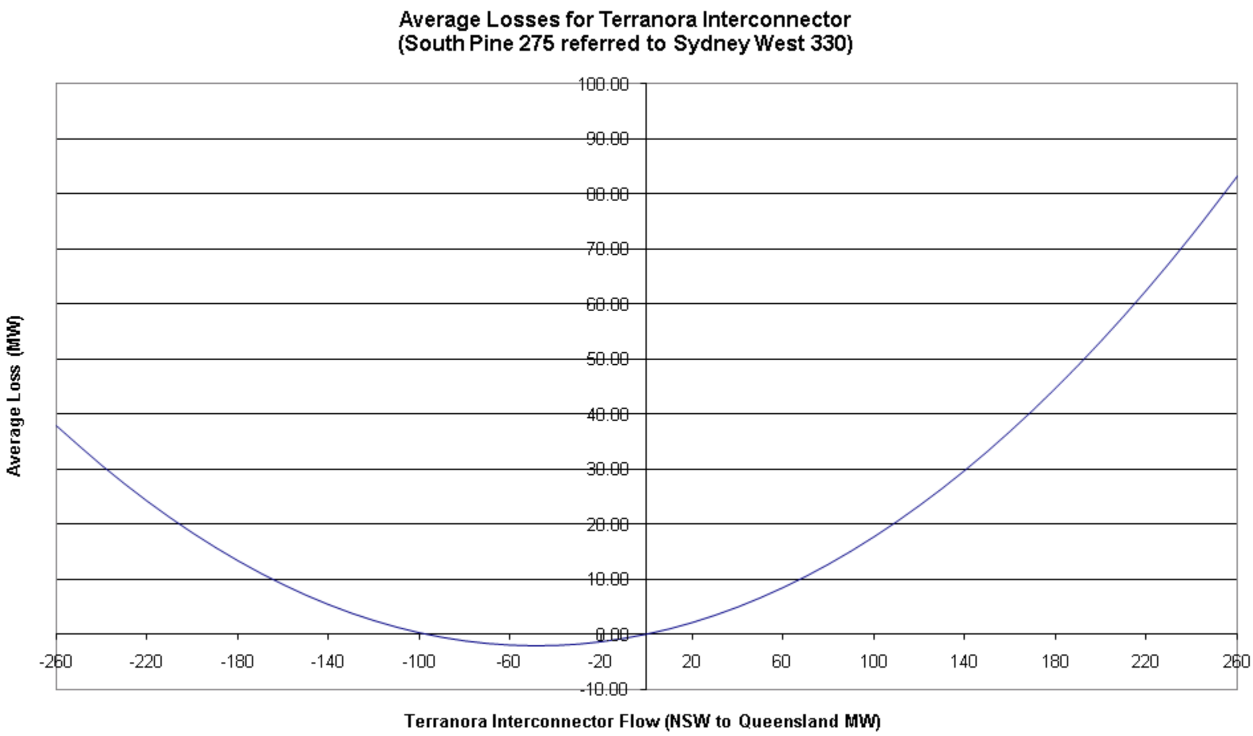


Figure D4: Terranora interconnector notional link losses versus flow (NSW to Queensland)

11 Appendix E: The Proportioning Inter-regional Losses to Regions for 2011/12

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 2011/12 financial year.

Notional interconnector	Proportioning factor	Applied to
Queensland – New South Wales (QNI)	0.44	New South Wales
Queensland – New South Wales (Terranora Interconnector)	0.41	New South Wales
Victoria – New South Wales	0.66	New South Wales
Victoria – South Australia (Heywood)	0.85	Victoria
Victoria – South Australia (Murraylink)	0.87	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[12];
- 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 2011/12

Name	Voltage (kV)	Connection Point ID	TNI	Region
Gunning Wind Farm	132	NYS12A	NYS1	NSW
Kurnell	132	NKN1	NKN1	NSW
Kurri	11	NKU1	NKU1	NSW
Ourimbah	132	NOR1	NOR1	NSW
Ourimbah	66	NOR6	NOR6	NSW
Tomago (Ausgrid)	132	NTME	NTME	NSW
Tomago (CE)	132	NTMC	NTMC	NSW
Woodlawn Wind Farm	330	NCWF2W	NCWF	NSW
Blackstone	110	QBKS	QBKS	QLD
Bowen North	66	QBNN	QBNN	QLD
Pandolin	132	QPAN	QPAN	QLD
Clare North	33	SCLN	SCLN	SA
Lake Bonney Wind Farm Stage 3	33	SMAY3W	SMAY	SA
North Brown Hill Wind Farm	275	SBEL1A	SBEL	SA
Port Lincoln 3	33	SPL31P	SPL3	SA
Waterloo Wind Farm	132	SWLE1R	SWLE	SA
Mortlake Unit 1	500	VM0P1O	VM0P	VIC
Mortlake Unit 2	500	VM0P2O	VM0P	VIC

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