LIST OF REGIONAL BOUNDARIES AND MARGINAL LOSS FACTORS FOR THE 2010-11 FINANCIAL YEAR

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Contents

Version Release History

VERSION	DATE	CHANGES
0.1	23/03/10	Draft regional boundaries and marginal loss factors for the 2010-11 financial year
1.0	01/04/10	Regional boundaries and marginal loss factors for the 2010-11 financial year

Disclaimer

Purpose

This report has been prepared by AEMO for the sole purpose of producing Intra-Regional transmission loss factors and Inter-Regional loss factor equations to apply for the 2010/11 financial year pursuant to clause 3.6 of the Rules.

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1 Rules requirements

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

1.1 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.

1.2 Intra-regional loss factors

The Rules require AEMO to calculate a volume weighted average (intra-regional) loss factor for each transmission network connection point. AEMO must publish the intra-regional loss factors.

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 4.

1.3 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 February 2009.

2 Application of the forward-looking loss factor methodology for 2010/11 financial year

This section describes the process followed in applying the forward-looking loss factor methodology calculation of the marginal loss factors for 2010/11 financial year. Further details for the forward-looking loss factor methodology can be found in the methodology document on AEMO’s website[1].

2.1 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 new methodology is to:

- develop a load flow model of the transmission network that includes committed augmentations for the year that the loss factors apply;

[1] “Methodology for Calculating Forward-Looking Transmission Loss Factors: Final Methodology”, 12 August 2003 (revised 27 February 2009), available on the AEMO Website at http://www.aemo.com.au/electricityops/172-0032.html

- 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[1]; 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.

2.2 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 2008 to the 30 June 2009 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 2010/11 financial year by scaling the historical data. The forecast connection point load traces for 2010/11was then sent to AEMO to be used in the actual loss factors calculations.
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 2009 Statement of Opportunities (SOO) and the update to the 2009 SOO.
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 is given in Section 2.17.

2.3 Connection point definitions

A list of new connection points that have been established for the 2010/11 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 2010/11 in Appendix A.

2.4 Connection point load data

As described in section 2.2, Powerlink, TransGrid, Energy Australia, Country 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[1]. Forecast connection point load data for the South Australia and Victoria regions was calculated by AEMO. The Electricity Statement of Opportunities (ESOO) 2009 load growth rates were used to perform the due diligence on the forecast connection point loads.

2.5 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 2.8. The snapshot is thus representative of the 2010/11 system normal network.

2.6 Treatment of Yallourn Unit 1

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

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

2.7 Treatment of Bayswater Power Station

The Bayswater Power Station unit 3 is expectyed to be switched onto the 500 kV network prior to July 2010, unit 4 is currently connected to the 500 kV Network. Bayswater units 1 & 2 will remain connected to the 330kV network for the 2010/11 financial year.

2.8 Network augmentations for 2010/11 financial year

The following network augmentations have been advised by the relevant TNSPs in each region of the NEM for 2010/11.

Queensland

Powerlink advised the following major augmentations to be completed in 2010/11 in Queensland:

- Establish new 132/22kV substation at El Arish.
- Establish new 132kV substation at Yabulu South.
- NQ Transmission reinforcement Strathmore-Nebo 275kV.
- FNQ rebuild – rearrangement of lines between Ingham South, Tully, Kareeya and Cardwell.
- Establish new 110kV substation at QR Transit Centre.
- Establish second 275/110 kV Transformer at Murarrie.
- Establish a new 132/66kV substation at Townsville East.
- Establish a new 110kV substation at Cooran.
- Establish second 110/33 kV Transformer at Sandgate, additional lines to Nudgee and rearrangement of existing lines to Nudgee.
- Establish new 132kV bus at Cooroy.
- Replacement of existing 132/66kV Transformers with 2 x 160 MVA transformers at Clare.
- Replacement of 275/110 kV transformer No. 5 at Belmont.
- Establish new South Pine East and West 110 kV buses.
- Establish new 132kV substation at Bolingbroke.
- Replacement of 110/33 kV transformer 2 at Abermain.
- Establish a Third 132/110kV transformer at Palmwoods, along with a reconfiguration of the transformer arrangements at Palmwoods.
- Establish a new 275/132kV substation at Larcom Creek.
- Far North Queensland Rebuild – Edmonton-Innisfail and Cairns-Turkinje Augmentations.

- Establish new connection of Yarwun Gas Turbine PS at Yarwun substation.
- Establish a new 110/33kV substation at Myrtletown.
- Supply reinforcement to the Wide Bay area.
- Installation of a second 50 MVAr capacitor bank at Gladstone South.
- Installation of a 20 MVAr capacitor bank at Moura.
- Installation of second 110/11kV transformer at Bundumba and line augmentations into Bundumba.
- Establish new 110kV substation at Blackstone.
- Replacement of 275/110kV transformer at Gin Gin.
- Bowen North substation expansion.
- NQ Transmission reinforcement Stage 3 – Strathmore – Ross 275kV.
- Installation of a fifth 200 MVAr capacitor bank at Greenbank.
- Installation of a third 275kV 120 MVAr capacitor bank at South Pine.
- Installation of a 275kV 200 MVAr capacitor bank at Tarong.
- Installation of a second 275kV 120 MVAr capacitor bank at Mt England.
- Establish new 132/66kV substation at Pandoin.
- Establish new transmission lines into Yabulu South substation.
- Cairns Substation rebuild.
- Belmont Substation rebuild.

New South Wales

TransGrid and Energy Australia advised the following major augmentations to be completed in 20010/11 in New South Wales. Country Energy advised that there were no augmentations in 2010/11:

- Establish new Williamsdale 132kV connection point
- Establish new Macarthur 132kV connection point
- Establish new Leafs Gully 330kV connection point
- Decommission two Canberra to Cooma 132kV lines
- Establish new Canberra to Williamsdale 330kV line
- Establish two new Williamsdale to Cooma 132kV lines
- Decommission Macarthur to Avon 330kV line
- Establish new Macarthur to Leafs Gully 330kV line
- Establish new Leafs Gully to Avon 330kV line
- Decommission Newcastle to Waratah West 132kV line
- Establish new Newcastle to Waratah West 330kV line
- Establish new Port Macquarie to Kempsey 132kV line
- Establish new Manildra to Parkes 132kV line
- Establish new Williamsdale 330/138.6/11kV transformer
- Modification to Macarthur 330/138.6/11kV transformer
- Establish new Sydney North 330/138.6/11kV transformer
- Establish new Waratah West 330/138.6/11kV transformer
- Modification to two Wallerawang 330/138.6/11kV transformers
- Establish new Vineyard 330/138.6/11kV transformer
- Decommission three Narrabri 132/66/11kV transformers
- Establish two new Narrabri 132/66/11kV transformers
- Establish Top Ryde Zone substation
- Decommission two Canterbury to Bunnerong 132kV lines
- Establish new Tomago 330/138.6/11kV transformer at Tomago330
- Decommission Tomago132 to Taree 132kV line
- Establish Tomago330 to Taree 132kV line
- Decommission Beresfield to Stroud Rd 132kV line
- Establish Tomago330 to Stroud Rd 132kV line
- Establish Tomago330 to Tomago132 132kV line

Victoria

The following major augmentations to be completed in 2010/11 in Victoria.

- Establish new 500 kV Mortlake Power Station connection point
- Establish new 220 kV Portland Wind Farm Stage 3 connection point
- Establish Wemen Terminal Station
- Establish 66 kV network between Wemen Terminal Station and Red Cliffs Terminal Station
- Establish 66 kV connection point at Brunswick Terminal Station and two 220/66kV 225 MVA transformers
- Establish a third 220/66kV 150 MVA transformer at Cranbourne Terminal Station
- Establish a fifth 220/66 kV 150 MVA transformer at Keilor Terminal Station
- Establish a third 66/22 kV transformer at Australian Paper Mill
- Establish a 66 kV connection point at South Morang Terminal Station with two 225 MVA 220/66 kV transformers
- Establish a 22 kV connection point at Heywood Terminal Station using tertiary windings of existing 500/275/22 kV transformers
- Replace 220/22kV transformers with 2 x 75 MVA transformers at Ringwood Terminal Station
- Removal of existing 66/22 kV tie-transformer at Ringwood Terminal Station.

South Australia

ElectraNet advised the following major augmentations to be completed in 2010/11 in South Australia:

- Establish new Penola West 33 kV load connection point
- Establish new Clare North 33 kV load connection point
- Establish new Davenport 33 kV load connection point
- Decommission Playford 33 kV load connection point
- Establish new Hallet Hill Wind Farm connection point at Mokota 275 kV
- Modification of Penfield-Elizabeth Downs 66 kV Line
- Modification of Penfield- Elizabeth South 66 kV Line
- Modification of Norwood - East Terrace 66 kV Line
- Establishment of Direk-Penfield 66 kV Line
- Modification of Direk-HNA 66 kV Line
- Modification of Penfield-HNA 66 kV Line
- Establishment of Morphett Vale East - Port Stanvac66 kV Line
- Establishment of Port Stanvac- Eastern Suburbs Desalination Plant 66 kV Line
- Establishment of Sheidow Park - Eastern Suburbs Desalination Plant 66 kV Line
- Modification of Morphett Vale East – Hackam - Port Noarlunga 66 kV Network
- Establishment of Parafield Gardens - Parafield Gardens West 66 kV no.2 Line
- Modification of Parafield Gardens - Parafield Gardens West 66 kV no.1 Line
- Establishment of Brinkworth - Clare North - Mintaro 132 kV Line
- Establishment of Davenport - Belalie - Mokota 275 kV Line
- Establishment of Waterloo - Morgan Whyalla Pumping Station #4 Network 132 kV Line
- Movement of Playford 132 kV connections to Davenport
- Establishment of Clare North 132/33 kV transformers 1 and 2
- Establishment of Davenport 132/33 kV transformers 3 and 4
- Decommissioning of Playford 132/33 kV transformers
- Modification of Davenport 275/132 kV transformer 1
- Establishment of Davenport 275/132 kV transformer 2
- Playford 275/132 kV ‘South Tie’ transformer moved to and installed at Davenport substation
- Modification of Happy Valley 275/66 kV transformer 2
- Modification of Morphett Vale East275/66 kV transformers 3 and 4
- Modification of Kilburn 275/66 kV transformer 5
- Establishment of 11 kV Victor Harbour 7 MVAr Capacitor
- Establishment of 66 kV Mount Barker 6 MVAr Capacitor
- Establishment of 33 kV Templers 1 MVAr Capacitor
- Establishment of 66 kV Evanston 7 MVAr Capacitor
- Establishment of 66 kV North Adelaide 7 MVAr Capacitor
- Establishment of 66 kV Hindley Street 9 MVAr Capacitor
- Establishment of 33 kV Port Lincoln 3.5 MVAr Capacitor

Tasmania

Transend advised the following major augmentations to be completed in 2010/11 in Tasmania:

- Establish new 33kV connection point at Mornington substation.
- Installation of two new Waddamana-Lindisfarne 220kV lines.
- Modification of two Palmerston-Waddamana 220kV lines.
- Modification of two Waddamana-Liapootah 220kV lines.
- Installation of new Derby-Musselroe Wind farm 110kV line.
- Installation of two new Mornington-Mornington Tee 110kV lines.
- Modification of two Lindisfarne-Mornington Tee 110kV lines.
- Modification of two Mornington Tee-Rockeby 110kV lines.
- Installation of two new Lindisfarne 220/110kV transformers.
- Installation of two new Mussleroe 110/33kV transformers.
- Installation of two new Mornington 110/33kV transformers.
- Modification of two George Town 220/110kV transformers.
- Installation of new 220/110kV transformers at Burnie.
- Decommissioning of two 220/110kV transformers at Burnie.
- Installation of two new 40MVAr capacitors at Risdon.

2.9 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.

2.10 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 Soth Wales located between Terranora and Mudgeeraba is North of Directlink. As such Directlink is now part of the NSW 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.

2.11 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.

2.12 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.

2.12.1 Queensland

The Condamine gas turbines were commissioned in July 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of these units from the historical dispatch of the Swanbank E and Pelican Point generating units. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

The Darling Downs Power Station was commissioned December 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of these units from the historical dispatch of the Swanbank E and Pelican Point generating units. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

Braemar Power Station stage 2 gas turbines were commissioned in autumn 2009. 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 generating units for the period where no metered data was available. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

Yarwun Cogeneration is due to be commissioned in winter 2010. A profile of the expected generation pattern was supplied by the relevant participant.

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. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

2.12.2 New South Wales

The Tallawarra Power Station gas turbine was commissioned in October 2008. 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 Swanbank E and Pelican Point generating units for the period where no metered data was available. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

Uranquinty Power Station gas turbines were commissioned spring 2008. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of these units from the historical dispatch of the Laverton North generating units for the period where no metered data was available. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

Colongra Power Station gas turbines were commissioned in winter 2009. 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 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 unit.

2.12.3 Victoria

Mortlake is due to be commissioned in 2010. 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 Swanbank E and Pelican Point generating units. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new 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.

2.12.4 South Australia

Quarantine Power Station unit 5 was commissioned in February 2009. 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 Quarantine generating units 1 to 4 for the period where no metered data was available. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

Port Lincoln unit 3 is due to be 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.

2.12.5 Tasmania

Tamar Valley combined cycle gas turbine was commissioned in winter 2009. 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 Swanbank E and Pelican Point generating units. These units were chosen because they use similar technology and fuel, and are less than 5 years older than the new unit.

Bell Bay 3 unit 4 (Tamar Valley OCGT) was commissioned in April 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, AEMO estimated the dispatch of this generator unit from the historical dispatch of the existing Bell Bay 3 units for the period where no metered data was available. These units were chosen because they use similar technology and fuel and are less than 10 years older than the new unit.

2.12.6 New Wind Farms and Other Energy Limited Generation

AEMO obtained the expected dispatch of Jounama Hydro Power Station from the proponents of the hydro power station.

AEMO obtained forecast dispatch of new wind generation from the proponents of the new wind farms. The new wind generation commissioned after 01 July 2009 include Hallet 2, Cape Bridgewater, Cape Nelson South, Capital, Cullerin Range, Waubra, Clements Gap, Portland Stage 2 Waubra Wind Farms and Lake Bonny 3.

2.13 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 2009 Statement of Opportunities, AEMO estimated the sent-out summer and winter generator terminal capacities.

2.14 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) will be published separately in the "Distribution Loss Factors for the 2010/11 financial Year" document which is available on the AEMO website at http://www.aemo.com.au/electricityops/0171-0004.html.

2.15 Interconnector Capability

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

Interconnector limits assumed for the MLF calculation 2010/11:

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 they refer 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.

2.16 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 2010/11.

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 SOO 2009 for 2010/11 financial year;
- Check that load shapes are consistent with load profile of the historical year 2008/09;
- Check that the forecast for connection points include the relevant embedded generation, if any;
- Check that industrial and auxiliary type loads are not escalated;
- Check that Energy Australia's forecast is consistent with TransGrid forecast for bulk supply connection points for all connection points on the TransGrid/Energy Australia transmission boundary.

2.17 Calculation of intra-regional loss factors

AEMO uses the TPRICE[2] 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, is 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 is 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. The standard deviation for each loss factor is also calculated.
- 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.

[2] 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 2010/11 financial year are tabulated in Appendix A.

2.18 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 2010/11 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.

2.19 Loss models for Controllable Links

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

2.20 Proportioning Inter-regional Losses to Regions

Appendix E contains the factors used to apportion the inter-regional losses to the associated regions for the 2010/11 financial year.

3 Differences in loss factors compared to the 2009/10 financial year

3.1 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 price of electricity at a connection point is the spot price at the reference node (RRN) multiplied by the MLF between it and the RRN.

3.1.1 MLFs less than 1

Connection points in areas where there is an overall net injection into the network will tend to have MLFs less than 1. This would normally be expected to apply to generators. However, this will also apply to loads situated in areas where the local level of generation is greater than the local load.

MLFs less than 1 at connection points indicate that network losses will increase as more generation is dispatched at that node and decrease as more load is taken. The smaller the MLF when it is below 1, the greater the increase (or decrease) in network losses for the same magnitude of change.

This is also reflected as an increase in the generator bid price when it is referred to the RRN, and therefore a reduced likelihood of the generator being dispatched. Similarly the price paid for output from generators (as determined at the generator connection point) reduces. Conversely, loads located in areas where MLFs are less than 1 pay less for the energy consumed than if they were at the RRN.

There is therefore a signal for increased load and decreased generation in areas of net generation until local load and generation is in balance and network losses are minimised.

3.1.2 MLFs greater than 1

Connection points in areas where there is an overall net load tend to have MLFs greater than 1. This would normally be expected to apply to loads. However, this will also apply to generators situated in areas where the local load is greater than the local level of generation.

MLFs greater than 1 at connection points indicate that losses will increase as more load is taken and decrease as more generation is dispatched. The higher the loss factor is above 1, the greater the increase (or decrease) in losses for the same magnitude of change

This is reflected in a higher price being paid by the load for the energy it takes from the NEM than if it were located at the RRN. Conversely generators located in the same area receive a reduced bid price when referred to the RRN, and are therefore more likely to be dispatched. The price paid to a generator for its output is higher than the price at the RRN.

There is therefore a signal for increased generation and decreased load in these areas until local load and generation is in balance and transmission losses are minimised.

3.2 Queensland

The 2010/11 forecast shows a slight net reduction in Queensland demand, however the reduction is not uniform across the region - there is a moderate load increase in North Queensland and a reduction in the rest of Queensland. This pattern of load change combined with significant newly installed generation in South West Queensland has led to a decrease in the Central to Southern Queensland power transfer and an increase in the Central to North Queensland transfer.

The decrease in Central to South Queensland power flow combined with the higher Central to North Queensland transfers have resulted in further increases to the North Queensland MLF values. These MLFs show the extent of the marginal losses involved in transferring the lower price generation from South West Queensland at the expense of Northern Queensland generation.

The area between Nebo and Collinsville has the highest increase in MLF values as the result of a combination of load increase and reduction in generation in this area. The forecast shows a higher than average increase in demand in the area west of Nebo, while the extracted generation for Collinsville Power Station has a significant reduction from the previous year.

The reduction of demand in Southern Queensland should see a corresponding reduction in MLF values. Whilst there is a reduction observed in South Queensland MLF values, the MLF reduction is only moderate due to the increases in transfers to Central and North Queensland and also NSW via QNI and Terranora.

3.3 New South Wales

There is a moderate reduction in the NSW demand forecast for 2010/11. There are also increases in transfers from Queensland and Victoria as a result of load reduction and generation increases in these regions. The combined effect is either no increase or a slight reduction in MLF values across the NSW region.

Northern NSW, however, has had relatively large reduction in MLF values due to higher QNI and Terranora inflows and lower loads. The combined effect is a reduction in transfer from the regional reference node to the Northern NSW connection points and consequently a reduction in MLF values beyond the reduction caused by the decrease in region demand.

The MLF for Uranquinty has significantly reduced. The forecast generation used for the 2009/10 MLF calculation was significantly more than the combined actual metered and forecast generation used for the 2010/11 calculation.

The MLF for Guthega has increased because the metered generation used in the 2010/11 MLF calculation is significantly lower than the metered generation used in the 2009/10 MLF calculation.

As the net energy balance between the energy absorption and energy generation is less than 30% of the energy generation for the 2008/09 financial year for Lower Tumut a time averaged MLF has been calculated for Lower Tumut. This is in accordance with the determination of a consultation completed in February 2009 and consistent with the current FLLF methodology[3].

3.4 Victoria

There is a moderate reduction in the energy forecast for the Victoria region. There is also significant amount of new generation, consequently and increases in power transfer to NSW, SA and Tasmania. The result is that the MLF values across the region have either not increased or slightly decreased. The exceptions are locations along the inter-regional flow paths where there have been slight increases in MLF values, examples include Murray, Red Cliffs and Jindabyne.

Waubra wind farm has a significant increase in MLF. It is a newly installed wind farm and the forecast generation used in the 2009/10 study was significantly different to the metered data and more realistic estimate used in the 2010/11 study.

3.5 South Australia

The demand forecast used in this year’s calculation is similar to the one used last year. However the historical metered wind farm generation used in the calculation is significantly lower compared with the data used in last year’s calculation.

The reduction in generation in South Australia and newly installed generation in Victoria led to an increase in transfer from Victoria via South East and Monash and consequently the MLFs in locations along these paths are further reduced. In addition, there are two new generation sources, Lake Bonny 3 in south east and Port Lincoln 3 in the Eyre Peninsula. This new generation contributed to the calculated MLFs in the south east and the Eyre Peninsula being significantly reduced.

3.6 Tasmania

The Extracted Basslink import from Victoria shows a slight increase compared with last year’s data. Therefore, there is a reduction in generation across the region. There is a moderate reduction in the load forecast leading to subsequent reductions in MLF values due to the system being more lightly loaded.

The network augmentation at Lindisfarne improves voltages in the south very significantly leading to further reductions in MLFs at Chapel St, Risdon and Lindisfarne.

Studland Bay and Woolnorth wind farms have significant reductions to their MLFs. This is due to a combination of the reduction in generation output and the effect of new network augmentation in this area.

[3] The consultation can be found on the AEMO website at: http://www.aemo.com.au/electricityops/178-0099.html.

Lake Echo's MLF is significantly increased, but MLFs for the generators nearby are decreased. The generation output from Lake Echo is significantly lower than last year. This shortfall is picked up by Meadowbank, Tungatinah, Taraleah and Butlers Gorge generating units.

4 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.

4.1 New South Wales

In accordance with clause 3.6.2(b)(3) of the Rules, the AER has approved Energy Australia's application to define the three VTNs listed in the following table[4].

VTN TNI code	Description	Associated transmission connection points (TCPs)
NEV1	Far North	Muswellbrook 132 and Liddell 33
NEV2	North of Broken Bay	Kurri 33, Kurri 66, Kurri 132, Newcastle 132, Munmorah 330, 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 (EA), Lane Cove 132, Meadowbank 132, Mason Park 132, Homebush Bay 132, Chullora 132, Peakhurst 132, Drummoyne 132, Rozelle 132, Pyrmont 132, Pyrmont 33, Marrickville 132, St Peters 132, Beaconsfield West 132, Canterbury 132, Bunnerong 33, Bunnerong 132, Sydney East 132, Sydney West 132 (EA) and Sydney South 132, Macquarie Park 11, Rozelle 132 and Haymarket 132

4.2 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.

4.3 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

[4] 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 Energy Australia TNIs.

5 Region boundaries and regional reference nodes for 2010/11

Appendix F contains the list of regional reference nodes and region boundaries that apply for the 2010/11 financial year.

6 Appendix A: Intra-regional loss factors for 2010/11

Queensland (regional reference node is South Pine 275)

Loads

Location	Voltage (kV)	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Abermain	33	QABM	1.0018	1.0043
Abermain (Lockrose)	110	QABR	0.9990	1.0022
Alan Sherriff	132	QASF	1.0608	1.0764
Algester	33	QALG	1.0145	1.0150
Alligator Creek	33	QALC	1.0322	1.0689
Alligator Creek	132	QALH	1.0266	1.0691
Ashgrove West	33	QAGW	1.0402	1.0163
Ashgrove West	110	QCBW		1.0158
Belmont	110	QBMH	1.0003	1.0101
Belmont Wecker Road	11	QMOB	1.0103	1.0103
Belmont Wecker Road	33	QBBS	1.0037	1.0120
Biloela	66/11	QBIL	0.9326	0.9580
Blackwater	132	QBWH	1.0375	1.0673
Blackwater	66&11	QBWL	1.0334	1.0682
Bolingbroke	132	QBNB	0.9565	1.0413
Boyne Island	132	QBOL	0.9749	0.9978
Boyne Island	275	QBOH	0.9727	0.9993
Bulli Creek (CE)	132	QBK2	0.9528	0.9613
Bulli Creek (Waggamba)	132	QBLK	0.9528	0.9613
Bundamba	110	QBDA	0.9970	1.0033
Burton Downs	132	QBUR	1.0169	1.0766
Cairns	22	QCRN	1.0961	1.1217
Cairns City	132	QCNS	1.0935	1.1173
Callemondah (Rail)	132	QCMD	0.9623	0.9877
Cardwell	22	QCDW	1.0979	1.1296
Clare	66	QCLR	1.0743	1.0961
Collinsville Load	33	QCOL	0.9983	1.0510
Coppabella (Rail)	132	QCOP	1.0493	1.0830
Dan Gleeson	66	QDGL	1.0678	1.0841
Dingo (Rail)	132	QDNG	1.0150	1.0807
Dysart	66/22	QDYS	1.0500	1.0822

Location	Voltage (kV)	TNI code	2009/10 Loss factor	2010/11 Loss factor
Edmonton	22	QEMT	1.1006	1.1239
Egans Hill	66	QEGN	0.9613	0.9976
El Arish	22	QELA	1.1023	1.1309
Garbutt	66	QGAR	1.0597	1.0787
Gin Gin	132	QGNG	0.9823	1.0026
Gladstone	132	QGLA	0.9627	0.9854
Gladstone South	66/11	QGST	0.9646	0.9898
Goodna	33	QGDA	0.9977	1.0077
Grantleigh (Rail)	132	QGRN	0.9813	0.9932
Gregory (Rail)	132	QGRE	0.9988	1.0252
Ingham	66	QING	1.0692	1.1403
Innisfail	22	QINF	1.1073	1.1343
Invicta Load	132	QINV	1.0770	1.0863
Kamerunga	22	QKAM	1.0967	1.1222
Kemmis	132	QEMS	1.0209	1.0637
King Creek	132	QKCK	1.0217	1.0835
Lilyvale	66	QLIL	0.9991	1.0288
Lilyvale (Barcaldine)	132	QLCM	0.9961	1.0256
Loganlea	33	QLGL	1.0073	1.0148
Loganlea	110	QLGH	1.0035	1.0111
Mackay	33	QMKA	1.0326	1.0758
Middle Ridge (Energex)	110	QMRX	0.9665	0.9742
Middle Ridge (Ergon)	110	QMRG	0.9665	0.9742
Mindi (Rail)	132	QMND	1.0003	1.0385
Molendinar	33	QMAL		1.0076
Molendinar	110	QMAR	0.9991	1.0052
Moranbah (Mine)	66	QMRN	1.0421	1.0965
Moranbah (Town)	11	QMRL	1.0348	1.0915
Moranbah South (Rail)	132	QMBS	1.0413	1.0942
Moura	66/11	QMRA	0.9681	0.9930
Mt McLaren (Rail)	132	QMTM	1.0588	1.1141
Mudgeeraba	33	QMGL		1.0111
Mudgeeraba	110	QMGB	1.0012	1.0100
Murarrie (Belmont)	110	QMRE	1.0005	1.0152
Nebo	11	QNEB	0.9963	1.0455
Newlands	66	QNLD	1.0378	1.0940
North Goonyella	132	QNGY	1.0426	1.0954

Location	Voltage (kV)	TNI code	2009/10 Loss factor	2010/11 Loss factor
Norwich Park (Rail)	132	QNOR	1.0266	1.0551
Oakey	133	QOKT	0.9749	0.9740
Oonooie (Rail)	132	QOON	1.0348	1.0714
Palmwoods	132/110	QPWD	1.0293	1.0283
Peak Downs (Rail)	132	QPKD	1.0456	1.0878
Pioneer Valley	66	QPIV	1.0366	1.0789
Proserpine	66	QPRO	1.0387	1.0908
QAL (Gladstone South)	132	QQAH	0.9655	0.9905
QLD Nickel (Yabulu)	132	QQNH	1.0529	1.0683
Redbank Plains	11	QRPN	0.9958	1.0087
Richlands	33	QRLD	1.0201	1.0174
Rockhampton	66	QROC	0.9690	1.0044
Rocklands (Rail)	132	QRCK	0.9567	0.9910
Rocklea (Archerfield)	110	QRLE	1.0095	1.0059
Ross	132	QROS	1.0570	1.0724
Runcorn	33	QRBS	1.0112	1.0124
South Pine	110	QSPN	1.0048	1.0024
Stony Creek	132	QSYC	1.0143	1.0897
Sumner	110	QSUM	1.0127	1.0073
Swanbank (Raceview)	110	QSBK	0.9902	1.0023
Tangkam (Dalby)	110	QTKM	0.9718	0.9725
Tarong	66	QTRL	0.9671	0.9695
Tarong	132	QTRH	0.9634	0.9654
Teebar Creek	132	QTBC	0.9991	1.0120
Tennyson	33	QTNS	1.0149	1.0106
Tennyson (Rail)	110	QTNN	1.0129	1.0079
Townsville East	66	QTVE	1.0801	1.1026
Townsville South	66	QTVS	1.0807	1.1033
Townsville South (KZ)	132	QTZS	1.0828	1.1014
Tully	22	QTLL	1.1191	1.1431
Turkinje	66	QTUL	1.1069	1.1310
Turkinje (Craiglee)	132	QTUH	1.1052	1.1317
Wandoo (Rail)	132	QWAN	0.9999	1.0395
Wivenhoe Pump	275	QWIP	0.9954	0.9961
Woolooga (Energex)	132	QWLG	0.9993	1.0097
Woolooga (Ergon)	132	QWLN	0.9993	1.0097
Woree	132	QWRE	1.0900	1.1166

Location	Voltage (kV)	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Yarwun – Boat Creek (Ergon)	132	QYAE	0.9667	0.9866
Yarwun – Rio Tinto	132	QYAR	0.9667	0.9866

Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Barron Gorge PS Unit 1	132	BARRON-1	QBGH1	QBGH	1.0691	1.0922
Barron Gorge PS Unit 2	132	BARRON-2	QBGH2	QBGH	1.0691	1.0922
Braemar PS	275	BRAEMAR1	QBRA1	QBRA	0.9410	0.9429
Braemar PS	275	BRAEMAR2	QBRA2	QBRA	0.9410	0.9429
Braemar PS	275	BRAEMAR3	QBRA3	QBRA	0.9410	0.9429
Braemar Stage 2 PS Unit 5	275	BRAEMAR5	QBRA5B	QBRA	0.9410	0.9429
Braemar Stage 2 PS Unit 6	275	BRAEMAR6	QBRA6B	QBRA	0.9410	0.9429
Braemar Stage 2 PS Unit 7	275	BRAEMAR7	QBRA7B	QBRA	0.9410	0.9429
Callide A PS Load	132	CALLNL1	QCAX	QCAX	0.9229	0.9682
Callide A PS Unit 2	132	CALL_A_2	QCAA2	QCAA	0.9229	0.9682
Callide A PS Unit 4	132	CALL_A_4	QCAA4	QCAA	0.9229	0.9682
Callide B PS Unit 1	275	CALL_B_1	QCAB1	QCAB	0.9242	0.9434
Callide B PS Unit 2	275	CALL_B_2	QCAB2	QCAB	0.9242	0.9434
Callide C PS Unit 3	275	CPP_3	QCAC3	QCAC	0.9218	0.9452
Callide C PS Unit 4	275	CPP_4	QCAC4	QCAC	0.9218	0.9452
Collinsville PS Load	132	COLNSNL1	QCLX	QCLX	0.9793	1.0360
Collinsville PS Unit 1	132	COLNSV_1	QCVL1	QCVP	0.9793	1.0360
Collinsville PS Unit 2	132	COLNSV_2	QCVL2	QCVP	0.9793	1.0360
Collinsville PS Unit 3	132	COLNSV_3	QCVL3	QCVP	0.9793	1.0360
Collinsville PS Unit 4	132	COLNSV_4	QCVL4	QCVP	0.9793	1.0360
Collinsville PS Unit 5	132	COLNSV_5	QCVL5	QCVP	0.9793	1.0360
Darling Downs		DDPS1	QBRA8D	QBRA	0.9410	0.9429
Gladstone PS Unit 3	132	GSTONE3	QGLD3	QGLL	0.9559	0.9786
Gladstone PS Unit 4	132	GSTONE4	QGLD4	QGLL	0.9559	0.9786
Gladstone PS Load	132	GLADNL1	QGLL	QGLL	0.9559	0.9786
Gladstone PS Unit 1	275	GSTONE1	QGLD1	QGLH	0.9570	0.9818
Gladstone PS Unit 2	275	GSTONE2	QGLD2	QGLH	0.9570	0.9818
Gladstone PS Unit 5	275	GSTONE5	QGLD5	QGLH	0.9570	0.9818
Gladstone PS Unit 6	275	GSTONE6	QGLD6	QGLH	0.9570	0.9818
Kareeya PS Unit 1	11	KAREEYA1	QKAH1	QKAH	1.0490	1.0802
Kareeya PS Unit 2	11	KAREEYA2	QKAH2	QKAH	1.0490	1.0802
Kareeya PS Unit 3	11	KAREEYA3	QKAH3	QKAH	1.0490	1.0802
Kareeya PS Unit 4	11	KAREEYA4	QKAH4	QKAH	1.0490	1.0802
Kogan Creek PS	275	KPP_1	QBRA4K	QBRA	0.9410	0.9429
Koombooloomba	132	KAREEYA5	QKYH5	QKYH	1.0545	1.0844

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Mackay GT	33	MACKAYGT	QMKG	QMKG	1.0357	1.0327
Millmerran PS Unit 1 (Millmerran)	330	MPP_1	QBCK1	QMLN	0.9544	0.9620
Millmerran PS Unit 2 (Millmerran)	330	MPP_2	QBCK2	QMLN	0.9544	0.9620
Mt Stuart PS Unit 1	132	MSTUART1	QMSP1	QMSP	1.0321	1.0229
Mt Stuart PS Unit 2	132	MSTUART2	QMSP2	QMSP	1.0321	1.0229
Mt Stuart PS Unit 3	132	MSTUART3	QMSP3M	QMSP	1.0321	1.0229
Oakey PS Unit 1	110	OAKEY1	QOKY1	QOKY	0.9305	0.9433
Oakey PS Unit 2	110	OAKEY2	QOKY2	QOKY	0.9305	0.9433
Stanwell PS Load	132	STANNL1	QSTX	QSTX	0.9467	0.9815
Stanwell PS Unit 1	275	STAN-1	QSTN1	QSTN	0.9467	0.9815
Stanwell PS Unit 2	275	STAN-2	QSTN2	QSTN	0.9467	0.9815
Stanwell PS Unit 3	275	STAN-3	QSTN3	QSTN	0.9467	0.9815
Stanwell PS Unit 4	275	STAN-4	QSTN4	QSTN	0.9467	0.9815
Swanbank B PS Unit 1	275	SWAN_B_1	QSWB1	QSWB	0.9908	0.9930
Swanbank B PS Unit 2	275	SWAN_B_2	QSWB2	QSWB	0.9908	0.9930
Swanbank B PS Unit 3	275	SWAN_B_3	QSWB3	QSWB	0.9908	0.9930
Swanbank B PS Unit 4	275	SWAN_B_4	QSWB4	QSWB	0.9908	0.9930
Swanbank E GT	275	SWAN_E	QSWE	QSWE	0.9913	0.9990
Swanbank PS Load	110	SWANNL2	QSW1	QSWB	0.9908	0.9930
Tarong North PS	275	TNPS1	QTNT	QTNT	0.9656	0.9680
Tarong PS Unit 1	275	TARONG#1	QTRN1	QTRN	0.9659	0.9679
Tarong PS Unit 2	275	TARONG#2	QTRN2	QTRN	0.9659	0.9679
Tarong PS Unit 3	275	TARONG#3	QTRN3	QTRN	0.9659	0.9679
Tarong PS Unit 4	275	TARONG#4	QTRN4	QTRN	0.9659	0.9679
Wivenhoe Generation Unit 1	275	W/HOE#1	QWIV1	QWIV	0.9868	0.9883
Wivenhoe Generation Unit 2	275	W/HOE#2	QWIV2	QWIV	0.9868	0.9883
Wivenhoe Pump 1	275	PUMP1	QWIP1	QWIP	0.9954	0.9961
Wivenhoe Pump 2	275	PUMP2	QWIP2	QWIP	0.9954	0.9961
Wivenhoe Small Hydro	110	WIVENSH	QABR1	QABR	0.9990	1.0022
Yabulu PS	132	YABULU	QTYP	QTYP	1.0280	1.0406
Yarwun PS	132	YARWUN_1	QYAG1R	QYAG	0.9498	0.9883

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Barcaldine PS @ Lilyvale	132	BARCALDN	QBCG	QBCG	0.9305	0.9963
Condamine PS	132	CPSA	QCND1C	QCND	0.9691	0.9651
Daandine PS	110	DAANDINE	QTKM1	QTKM	0.9772	0.9725
German Creek Generator	66	GERMCRK	QLIL2	QLIL	0.9762	1.0288
Isis CSM	132	ICSM	QGNG1I	QTBC	0.9859	1.0120
KRC Co-Gen	110	KRCCOGEN	QMRG1K	QMRG	0.9777	0.9742
Moranbah Gen	11	MORANBAH	QMRL1M	QMRL	1.0353	1.0915
Moranbah North PS	66	MBAHNTH	QMRN1P	QMRN	1.0421	1.0965
Oakey Creek Generator	66	OAKYCREK	QLIL1	QLIL	0.9762	1.0288
Rochedale Renewable Energy Plant	110	ROCHEDAL	QBMH2	QBMH	1.0003	1.0101
Rocky Point Gen (Loganlea)	110	RPCG	QLGH2	QLGH	1.0001	1.0111
Roghan Road Generator	110	EDLRGNRD	QSPN2	QSPN	1.0048	1.0024
Roma PS @ Tarong Unit 7	132	ROMA_7	QRMA7	QRMA	0.9598	0.9654
Roma PS @ Tarong Unit 8	132	ROMA_8	QRMA8	QRMA	0.9598	0.9654
Somerset Dam Hydro Gen (South Pine)	110	SOMERSET	QSPN1	QSPN	1.0048	1.0024
Southbank Institute Of Technology	110	STHBKTEC	QCBD1S	QCBW		1.0158
Suncoast Gold Macadamias Co-Gen (Palmwoods)	110	SUNCOAST	QPWD1	QPWD	1.0097	1.0283
Ti Tree BioReactor	33	TITREE	QABM1T	QABM	0.9958	1.0043
Whitwood Rd Renewable Energy Plant	110	WHIT1	QSBK1	QSBK	0.9902	1.0023
Windy Hill Windfarm (Turkinje)	66	WHILL1	QTUL	QTUL	1.0409	1.1310
Yabulu Steam Turbine (Garbutt)	66	YABULU2	QGAR1	QYST	0.9711	1.0504

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

Loads

Location	Voltage kV	TNI code	2009/10 Loss factor	2010/11 Loss factor
Albury	132	NALB	1.0412	1.0588
Alcan (EA)	132	NALC	1.0042	1.0054
ANM	132	NANM	1.0447	1.0600
Armidale	66	NAR1	0.9687	0.9218
Balranald	22	NBAL	1.1232	1.0958
Beaconsfield West	132	NBFW	1.0102	1.0090
Beresfield (EA)	33	NBRF	1.0015	1.0001
Beryl	66	NBER	0.9955	0.9988
BHP (Waratah) (EA)	132	NWR1	0.9941	0.9900
Boambee South	132	NWST	1.0032	0.9505
Broken Hill	22	NBKG	1.1706	1.1426
Broken Hill	220	NBKH	1.1624	1.1350
Bunnerong (EA)	132	NBG1	1.0279	1.0044
Bunnerong (EA)	33	NBG3	1.0215	1.0137
Burrinjuck	132	NBU2	1.0134	1.0138
Canterbury (EA)	33	NCTB	1.0222	1.0166
Carlingford	132	NCAR	1.0033	1.0021
Casino (EA)	132	NCSN	1.0130	0.9463
Charmhaven (EA)	11	NCHM	0.9946	0.9933
Chullora (EA)	132	NCHU	1.0130	1.0116
Coffs Harbour	66	NCH1	0.9978	0.9464
Coleambally	132	NCLY	1.0584	1.0641
Cooma	132	NCMA	1.0268	1.0280
Cowra	66	NCW8	1.0328	1.0336
Dapto (CE)	132	NDT2	1.0000	1.0008
Dapto (Integral)	132	NDT1	1.0000	1.0008
Darlington Point	132	NDNT	1.0542	1.0583
Deniliquin	66	NDN7	1.1000	1.1077
Dorrigo	132	NDOR	0.9873	0.9387
Drummoyne	11	NDRM	1.0191	1.0163
Dunoon (CE)	132	NDUN	1.0101	0.9275
Far North VTN (EA)		NEV1	0.9470	0.9597
Finley	66	NFNY	1.0926	1.1003
Forbes	66	NFB2	1.0479	1.0486

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Gadara	132	NGAD	1.0264	1.0340
Glen Innes	66	NGLN	1.0033	0.9553
Gosford (EA)	33	NGSF	1.0138	1.0033
Gosford (EA)	66	NGF3	1.0117	1.0035
Green Square	11	NGSQ	1.0101	1.0091
Griffith	33	NGRF	1.0777	1.0868
Gunnedah	66	NGN2	1.0085	0.9906
Haymarket	132	NHYM	1.0095	1.0087
Homebush Bay (EA)	11	NHBB	1.0164	1.0141
Ilford	132	NLFD	0.9830	0.9855
Ingleburn	66	NING	1.0006	1.0001
Inverell	66	NNVL	1.0179	0.9729
Kemps Creek	330	NKCK	0.9965	0.9979
Kempsey	33	NKS3	1.0324	1.0062
Kempsey	66	NKS2	1.0321	1.0072
Koolkhan	66	NKL6	1.0155	0.9585
Kurri	132	NKUR	1.0014	1.0020
Kurri	33	NKU3	1.0037	1.0043
Kurri	66	NKU6	1.0042	1.0051
Lane Cove	132	NLCV	1.0133	1.0121
Liddell	33	NLD3	0.9619	0.9591
Lismore (CE)	132	NLS2	1.0250	0.9397
Liverpool	132	NLP1	0.9997	1.0020
Macarthur	132	NMC1	0.9954	0.9983
Macarthur	66	NMC2	0.9986	0.9998
Macksville (EA)	132	NMCV	1.0165	0.9744
Macquarie Park	11	NMQP	1.0156	1.0143
Manildra	132	NMLD	1.0139	1.0261
Marrickville	11	NMKV	1.0175	1.0160
Marulan (CE)	132	NMR2	0.9897	0.9916
Marulan (IE)	132	NMR1	0.9897	0.9916
Mason Park (EA)	132	NMPK	1.0130	1.0114
Meadowbank (EA)	11	NMBK	1.0176	1.0155
Molong	132	NMOL	1.0111	1.0193
Moree	66	NMRE	1.0512	1.0272
Mt Piper	132	NMPP		0.9699
Mt Piper	66	NMP6	0.9664	0.9699

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Mudgee	132	NMDG	0.9940	0.9966
Mullumbimby (EA)	132	NMLB	1.0108	0.9086
Munmorah (EA)	33	NMNP	0.9925	0.9886
Munyang	11	NMY1	1.0288	1.0480
Munyang	33	NMYG	1.0288	1.0480
Murrumbateman	132	NMBM	1.0324	1.0060
Murrumburrah	66	NMRU	1.0320	1.0349
Muswellbrook	132	NMRK	0.9614	0.9597
Nambucca Heads	132	NNAM	1.0101	0.9644
Narrabri	66	NNB2	1.0401	1.0224
Newcastle	132	NNEW	0.9924	0.9932
North of Broken Bay VTN (EA)		NEV2	0.9952	0.9935
Orange	132	NRG1	1.0208	1.0212
Orange	66	NRGE	1.0220	1.0220
Ourimbah (EA)	33	NORB	1.0107	1.0072
Panorama	66	NPMA	1.0127	1.0146
Parkes	132	NPKS	1.0440	1.0422
Parkes	66	NPK6	1.0461	1.0430
Peakhurst (EA)	132	NPH1		1.0070
Peakhurst (EA)	33	NPHT	1.0112	1.0121
Pt Macquarie	33	NPMQ	1.0660	1.0230
Pyrmont	132	NPT1	1.0163	1.0088
Pyrmont	33	NPT3	1.0131	1.0095
Raleigh	132	NRAL	1.0054	0.9566
Regentville	132	NRGV	0.9986	0.9981
Rozelle (EA)	132	NRZH	1.0178	1.0122
Rozelle (EA)	33	NRZL	1.0161	1.0130
Snowy Adit	132	NSAD	1.0174	1.0307
Somersby (EA)	11	NSMB	1.0117	1.0044
South of Broken Bay VTN (EA)		NEV3	1.0087	1.0078
St Peters	11	NSPT	1.0141	1.0130
Stroud	132	NSRD	1.0318	1.0373
Sydney East	132	NSE2	1.0067	1.0088
Sydney North (EA)	132	NSN1	1.0030	1.0029
Sydney North (IE)	132	NSN2	1.0030	1.0029
Sydney South	132	NSYS	1.0032	1.0052
Sydney West (EA)	132	NSW1	1.0033	1.0021

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Sydney West (IE)	132	NSW2	1.0033	1.0021
Tamworth	66	NTA2	0.9700	0.9454
Taree (CE)	132	NTR2	1.0627	1.0513
Tenterfield	132	NTTF	1.0103	0.9535
Terranora (CE)	110	NTNR	1.0397	0.9756
Tomago (EA)	33	NTMJ	0.9916	0.9961
Tomago	330	NTMG	0.9918	0.9914
Tuggerah	132	NTG3	1.0039	0.9947
Tumut	66	NTU2	1.0257	1.0339
Vales Pt. (EA)	132	NVP1	0.9848	0.9848
Vineyard	132	NVYD	0.9987	0.9989
Wagga	66	NWG2	1.0264	1.0459
Wagga North	66	NWG6	1.0268	1.0485
Wagga North	132	NWGN	1.0300	1.0472
Wallerawang (CE)	132	NWW8	0.9677	0.9696
Wallerawang (IE)	132	NWW9	0.9677	0.9696
Wellington	132	NWL8	0.9789	0.9812
West Gosford (EA)	11	NGWF	1.0138	1.0059
Wyong (EA)	11	NWYG	0.9989	0.9974
Yanco	33	NYA3	1.0600	1.0685
Yass	132	NYS1	0.9922	0.9750
Yass	66	NYS6	1.0091	1.0072

Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Bayswater PS Unit 1	330	BW01	NBAY1	NBAY	0.9579	0.9545
Bayswater PS Unit 2	330	BW02	NBAY2	NBAY	0.9579	0.9545
Bayswater PS Unit 3	500	BW03	NBAY3	NBYW	0.9590	0.9558
Bayswater PS Unit 4	500	BW04	NBAY4	NBYW	0.9590	0.9558
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0211	1.0130
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0211	1.0130
Blowering Ancillary Services	132		NBLW1	NBLW	1.0211	1.0130
Broken Hill GT 1	22	GB01	NBKG1	NBKG	1.1706	1.1426
Burrinjuck	132	BURRIN	NBUK	NBUK	1.0034	1.0107
Capital Wind Farm	330	CAPTL_WF	NCWf1R	NCWF	1.0011	1.0012
Colongra PS Unit 1	330	CG1	NCLG1D	NCLG	0.9854	0.9811
Colongra PS Unit 2	330	CG2	NCLG2D	NCLG	0.9854	0.9811
Colongra PS Unit 3	330	CG3	NCLG3D	NCLG	0.9854	0.9811
Colongra PS Unit 4	330	CG4	NCLG4D	NCLG	0.9854	0.9811
Cullerin Range Wind Farm	132	CULLRGWF	NYS11C	NYS1	1.0057	0.9750
Eraring PS Unit 1	330	ER01	NEPS1	NEP3	0.9839	0.9857
Eraring PS Unit 2	330	ER02	NEPS2	NEP3	0.9839	0.9857
Eraring PS Unit 3	500	ER03	NEPS3	NEPS	0.9858	0.9875
Eraring PS Unit 4	500	ER04	NEPS4	NEPS	0.9858	0.9875
Eraring PS Load	500	ERNL1	NEPSL	NEPS	0.9858	0.9875
Guthega	132	GUTH-1	NGUT	NGUT	0.9359	0.9716
Guthega	132	GUTHEGA	NGUT8	NGUT	0.9359	0.9716
Guthega Ancillary Services 2	132	GUTH-2	NGUT2	NGUT	0.9359	0.9716
Hume (NSW Share)	132	HUMENSW	NHUM	NHUM	1.0209	1.0583
Kangaroo Valley – Bendeela (Shoalhaven)	330	SHGEN	NSHL	NSHL	1.0144	1.0134
Kangaroo Valley (Shoalhaven) Pumps	330	SHPUMP	NSHP1	NSHL	1.0144	1.0134
Liddell PS Load	330	LIDDNL1	NLDPL	NLDP	0.9585	0.9541
Liddell PS Unit 1	330	LD01	NLDP1	NLDP	0.9585	0.9541
Liddell PS Unit 2	330	LD02	NLDP2	NLDP	0.9585	0.9541
Liddell PS Unit 3	330	LD03	NLDP3	NLDP	0.9585	0.9541
Liddell PS Unit 4	330	LD04	NLDP4	NLDP	0.9585	0.9541

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Lower Tumut[5]	330	TUMUT3	NLTS8	NLTS	1.0151	1.0092
Lower Tumut Ancillary Services 2 (pumps)	330	SNOWYP	NLTS3	NLTS	1.0151	1.0092
Mt Piper PS Load	330	MPNL1	NMPPL	NMTP	0.9683	0.9703
Mt Piper PS Unit 1	330	MP1	NMTP1	NMTP	0.9683	0.9703
Mt Piper PS Unit 2	330	MP2	NMTP2	NMTP	0.9683	0.9703
Munmorah Load	330	MMNL1	NMNPL	NMN1	0.9866	0.9864
Munmorah Unit 3	330	MM3	NMNP3	NMN1	0.9866	0.9864
Munmorah Unit 4	330	MM4	NMNP4	NMN1	0.9866	0.9864
Tomago 1	330		NTMG1	NTMG	0.9918	0.9914
Tomago 2	330		NTMG2	NTMG	0.9918	0.9914
Tomago 3	330		NTMG3	NTMG	0.9918	0.9914
Upper Tumut	330		NUTS	NUTS	0.9854	0.9768
Upper Tumut	330	UPPTUMUT	NUTS8	NUTS	0.9854	0.9768
Uranquinty PS Unit 11	132	URANQ11	NURQ1U	NURQ	0.9957	0.9406
Uranquinty PS Unit 12	132	URANQ12	NURQ2U	NURQ	0.9957	0.9406
Uranquinty PS Unit 13	132	URANQ13	NURQ3U	NURQ	0.9957	0.9406
Uranquinty PS Unit 14	132	URANQ14	NURQ4U	NURQ	0.9957	0.9406
Vales Point PS Load	330	VPNL1	NVPPL	NVPP	0.9840	0.9854
Vales Point PS Unit 5	330	VP5	NVPP5	NVPP	0.9840	0.9854
Vales Point PS Unit 6	330	VP6	NVPP6	NVPP	0.9840	0.9854
Wallerawang PS Load	330	WWNL1	NWWPL	NWWP	0.9688	0.9718
Wallerawang Unit 7	330	WW7	NWW27	NWWP	0.9688	0.9718
Wallerawang Unit 8	330	WW8	NWW28	NWWP	0.9688	0.9718
Bayswater PS Load	330		NBAYL	NBAY	0.9579	0.9545

[5] This MLF is time averaged. Refer to section 3.3 of this report

Embedded Generators

Note these are MLF values only – DLF values not here

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Awaba Renewable Energy Facility	132	AWABAREF	NNEW2	NNEW	0.9924	0.9932
Bankstown Sport Club	132	[PENDING]	NSYS3R	NSYS	1.0032	1.0052
Broadwater PS	66	BWTR1	NLS21B	NLS2	0.9582	0.9397
Brown Mountain	66	BROWNMT	NCMA1	NBRM	1.0395	1.0280
Campbelltown WSLC	66	[PENDING]	NING1C	NING	1.0006	1.0001
Condong PS	66	CONDONG1	NTNR1C	NTNR	0.9480	0.9756
EarthPower Biomass Plant	132	PMATTAEP	NSW22	NSW1	1.0033	1.0021
Eastern Creek	132	EASTCRK	NSW21	NSW2	1.0030	1.0021
Eraring BS UN (GT)	330	ERGT01	NEP35B	NEP3		0.9857
Glenn Innes (Pindari PS)	66	PINDARI	NGLN1	NGLN	0.9446	0.9553
Grange Avenue	11	GRANGEAV	NVYD1	NVYD	0.9988	0.9989
HEZ Power Station	33	HEZ	NKU31H	NKU3	1.0037	1.0043
Jindabyne Generator	132	JNDABNE1	NCMA2	NCMA	1.0268	1.0280
Jounama PS	66	JOUNAMA1	NTU21J	NTU2	1.0257	1.0339
Keepit	66	KEEPIT	NKPT	NKPT	0.9880	0.9906
Liddell– Hunter Valley GTs	33	HVGTS	NLD31	NLD3	0.9506	0.9591
Liverpool (Jacks Gully)	132	JACKSGUL	NLP11	NLP1	1.0035	1.0020
Lucas Heights Stage 2 Power Station	132	LUCAS2S2	NSYS1	NSYS	1.0032	1.0052
Redbank PS Unit 1	132	REDBANK1	NMRK1	NRED	0.9449	0.9571
Sithe	132	SITHE01	NSYW1	NSW2	1.0030	1.0021
Tallawarra PS	132	TALWA1	NDT13T	NTWA	1.0000	0.9946
Teralba Power Station	132	TERALBA	NNEW1	NNEW	0.9924	0.9932
West Nowra	132	AGLNOW1	NDT12	NDT1	1.0006	1.0008
Woodlawn Bioreactor	132	WDLNGN01	NMR21W	NMR2	0.9908	0.9916

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

Loads

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Canberra	132	ACA1	1.0179	1.0099
Queanbeyan (ACTEW)	66	AQB1	1.0298	1.0273
Queanbeyan (CE)	66	AQB2	1.0298	1.0273

Victoria (regional reference node is Thomastown 66)

Loads

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Altona	66	VATS	1.0075	1.0016
Ballarat	66	VBAT	1.0336	1.0339
Bendigo	22	VBE2	1.0695	1.0780
Bendigo	66	VBE6	1.0695	1.0793
BHP Western Port	220	VJLA	0.9898	0.9889
Brooklyn (Jemena)	22	VBL2	1.0049	1.0040
Brooklyn (Jemena)	66	VBL6	1.0058	1.0052
Brooklyn (POWERCOR)	22	VBL3	1.0049	1.0040
Brooklyn (POWERCOR)	66	VBL7	1.0058	1.0052
Brunswick (CITIPOWER)	22	VBT2	0.9983	0.9999
Brunswick (Jemena)	22	VBTS	0.9983	0.9999
Cranbourne (SPI Electricity)	66	VCBT	0.9897	0.9884
Cranbourne (UE)	66	VCB5	0.9897	0.9884
East Rowville (SPI Electricity)	66	VER2	0.9932	0.9923
East Rowville (UE)	66	VERT	0.9932	0.9923
Fishermens Bend (CITIPOWER)	66	VFBT	1.0001	1.0023
Fishermens Bend (POWERCOR)	66	VFB2	1.0001	1.0023
Fosterville	220	VFVT	1.0630	1.0725
Geelong	66	VGT6	1.0091	1.0071
Glenrowan	66	VGNT	1.0353	1.0462
Heatherton	66	VHTS	0.9978	0.9933
Heywood	22	VHY2	0.9758	0.9715
Horsham	66	VHOT	1.0827	1.0988
Keilor (Jemena)	66	VKT2	1.0089	1.0010
Keilor (POWERCOR)	66	VKTS	1.0089	1.0010
Kerang	22	VKG2	1.0997	1.1165
Kerang	66	VKG6	1.1002	1.1171
Khancoban	330	NKHN	1.0008	1.0359
Loy Yang Power Station Switchyard (Basslink)	500	VTBL	0.9758	0.9715
Loy Yang Substation	66	VLY6	0.9698	0.9715
Malvern	22	VMT2	1.0048	1.0002
Malvern	66	VMT6	1.0024	0.9985
Morwell TS	66	VMWT	0.9703	0.9719

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Mt Beauty	66	VMBT	1.0073	1.0285
Portland	500	VAPD	1.0112	1.0064
Pt Henry	220	VPTH	1.0136	1.0114
Red Cliffs	22	VRC2	1.1232	1.1546
Red Cliffs	66	VRC6	1.1162	1.1494
Red Cliffs (CE)	66	VRCA	1.1162	1.1494
Richmond	22	VRT2	0.9967	0.9977
Richmond (CITIPOWER)	66	VRT7	1.0077	1.0017
Richmond (UE)	66	VRT6	1.0077	1.0017
Ringwood (SPI Electricity)	22	VRW3	0.9982	0.9938
Ringwood (SPI Electricity)	66	VRW7	0.9983	0.9946
Ringwood (UE)	22	VRW2	0.9982	0.9938
Ringwood (UE)	66	VRW6	0.9983	0.9946
Shepparton	66	VSHT	1.0472	1.0600
South Morang	66	VSM6	1.0004	0.9919
South Morang	66	VSMT	1.0004	0.9919
Springvale (CITIPOWER)	66	VSVT	1.0004	0.9919
Springvale (UE)	66	VSV2	1.0004	0.9919
Templestowe (CITIPOWER)	66	VTS2	1.0001	1.0045
Templestowe (Jemena)	66	VTST	1.0001	1.0045
Templestowe (SPI Electricity)	66	VTS3	1.0001	1.0045
Templestowe (UE)	66	VTS4	1.0001	1.0045
Terang	66	VTGT	1.0395	1.0421
Thomastown (Jemena)	66	VTTS	1.0000	1.0000
Thomastown (SPI Electricity)	66	VTT2	1.0000	1.0000
Tyabb	66	VTBT	0.9931	0.9918
West Melbourne	22	VWM2	1.0010	1.0004
West Melbourne (CITIPOWER)	66	VWM7	1.0022	1.0031
West Melbourne (Jemena)	66	VWM6	1.0022	1.0031
Wodonga	22	VWO2	1.0170	1.0360
Wodonga	66	VWO6	1.0130	1.0354
Yallourn	11	VYP1	0.9559	0.9487

Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Banimboola	220	BAPS	VDPS2	VDPS	1.0226	1.0271
Basslink (Loy Yang Power Station Switchyard)	500	BLNKVIC	VLYP13	VTBL	0.9722	0.9729
Bogong PS and McKay Creek PS	220	MCKAY1	VMKP1	VT14	0.9648	0.9912
Dartmouth PS	220	DARTM1	VDPS	VDPS	1.0226	1.0271
Eildon PS Unit 1	220	EILDON1	VEPS1	VEPS	0.9876	0.9964
Eildon PS Unit 2	220	EILDON2	VEPS2	VEPS	0.9876	0.9964
Hazelwood PS Load	220	HWPNL1	VHWPL	VHWP	0.9668	0.9691
Hazelwood PS Unit 1	220	HWPS1	VHWP1	VHWP	0.9668	0.9691
Hazelwood PS Unit 2	220	HWPS2	VHWP2	VHWP	0.9668	0.9691
Hazelwood PS Unit 3	220	HWPS3	VHWP3	VHWP	0.9668	0.9691
Hazelwood PS Unit 4	220	HWPS4	VHWP4	VHWP	0.9668	0.9691
Hazelwood PS Unit 5	220	HWPS5	VHWP5	VHWP	0.9668	0.9691
Hazelwood PS Unit 6	220	HWPS6	VHWP6	VHWP	0.9668	0.9691
Hazelwood PS Unit 7	220	HWPS7	VHWP7	VHWP	0.9668	0.9691
Hazelwood PS Unit 8	220	HWPS8	VHWP8	VHWP	0.9668	0.9691
Jeeralang A PS Unit 1	220	JLA01	VJLGA1	VJLG	0.9621	0.9659
Jeeralang A PS Unit 2	220	JLA02	VJLGA2	VJLG	0.9621	0.9659
Jeeralang A PS Unit 3	220	JLA03	VJLGA3	VJLG	0.9621	0.9659
Jeeralang A PS Unit 4	220	JLA04	VJLGA4	VJLG	0.9621	0.9659
Jeeralang B PS Unit 1	220	JLB01	VJLGB1	VJLG	0.9621	0.9659
Jeeralang B PS Unit 2	220	JLB02	VJLGB2	VJLG	0.9621	0.9659
Jeeralang B PS Unit 3	220	JLB03	VJLGB3	VJLG	0.9621	0.9659
Jindabyne pump at Guthega	132	SNOWYGJP	NGJP	NGJP	1.0714	1.1098
Laverton	220	LAVNORTH	VAT21	VAT2	0.9960	0.9961
Loy Yang A PS Load	500	LYNL1	VLYPL	VLYP	0.9698	0.9715
Loy Yang A PS Unit 1	500	LYA1	VLYP1	VLYP	0.9698	0.9715
Loy Yang A PS Unit 2	500	LYA2	VLYP2	VLYP	0.9698	0.9715
Loy Yang A PS Unit 3	500	LYA3	VLYP3	VLYP	0.9698	0.9715
Loy Yang A PS Unit 4	500	LYA4	VLYP4	VLYP	0.9698	0.9715
Loy Yang B PS Unit 1	500	LOYYB1	VLYP5	VLYP	0.9698	0.9715
Loy Yang B PS Unit 2	500	LOYYB2	VLYP6	VLYP	0.9698	0.9715

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Morwell PS G1, 2 and 3	11	MOR1	VMWT1	VMWG	0.9700	0.9716
Morwell PS G4	11	MOR2	VMWP4	VMWP	0.9635	0.9632
Morwell PS G5	11	MOR3	VMWP5	VMWP	0.9635	0.9632
Morwell PS Load	11	MORNL1	VMWTL	VMWT	0.9667	0.9719
Murray	330	MURRAY	NMUR8	NMUR	0.9547	0.9800
Newport PS	220	NPS	VNPS	VNPS	0.9939	0.9939
Portland DU 1	500	APD01	VAPD1	VAPD	1.0112	1.0064
Portland DU 2	500	APD02	VAPD2	VAPD	1.0112	1.0064
Pt Henry DU 1	220	PTH01	VPTH1	VPTH	1.0136	1.0114
Pt Henry DU 2	220	PTH02	VPTH2	VPTH	1.0136	1.0114
Pt Henry DU 3	220	PTH03	VPTH3	VPTH	1.0136	1.0114
Valley Power PS	500	VPGS	VLYP7	VLYP	0.9698	0.9715
Waubra Wind Farm	66	WAUBRAWF	VWBT1A	VWBT	0.9667	1.0353
West Kiewa PS Unit 1	220	WKIEWA1	VWKP1	VWKP	0.9968	1.0073
West Kiewa PS Unit 2	220	WKIEWA2	VWKP2	VWKP	0.9968	1.0073
Yallourn W PS Load	220	YWNL1	VYP2L	VYP2	0.9521	0.9471
Yallourn W PS Unit 1	220	YWPS1	VYP21	VYP3	0.9569	0.9582
Yallourn W PS Unit 2	220	YWPS2	VYP22	VYP2	0.9521	0.9471
Yallourn W PS Unit 3	220	YWPS3	VYP23	VYP2	0.9521	0.9471
Yallourn W PS Unit 4	220	YWPS4	VYP24	VYP2	0.9521	0.9471

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Anglesea PS	220	APS	VAPS	VAPS	1.0145	1.0114
Bairnsdale Unit 1	66	BDL01	VMWT2	VBDL	0.9685	0.9683
Bairnsdale Unit 2	66	BDL02	VMWT3	VBDL	0.9685	0.9683
Ballarat Health Services	66	BBASEHOS	VBAT1H	VBAT	1.0336	1.0339
Brooklyn Landfill	22	BROOKLYN	VBL61	VBL6	1.0035	1.0052
Hume (Victorian Share)	66	HUMEV	VHUM	VHUM	1.0003	1.0127
Longford	66	LONGFORD	VMWT6	VMWT	0.9709	0.9719
Mornington Landfill Site Generator	66	MORNW	VTBT1	VTBT	0.9931	0.9918
Shepparton Waste Gas	66	SHEP1	VSHT2S	VSHT	1.0472	1.0600
Somerton Power Station	66	AGLSOM	VTTS1	VSOM	1.0000	0.9943
Sunshine Energy Park	66	SUNSHINE	VKTS1	VKTS	1.0070	1.0010
Tatura	22	TATURA01	VSHT1	VSHT	1.0472	1.0600
Toora Wind Farm	66	TOORAWF	VMWT5	VMWT	0.9709	0.9719
Wonthaggi Wind Farm	22	WONWP	VMWT7	VMWT	0.9709	0.9719
Wyndham Landfill Site Generator	66	WYNDW	VATS1	VATS	1.0075	1.0016
Yambuk Wind Farm	66	YAMBUKWF	VTGT1	VTGT	1.0436	1.0421

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

Loads

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Angas Creek	33	SANC	1.0518	1.0144
Ardrossan West	33	SARW	0.9426	0.9588
Baroota	33	SBAR	0.9834	0.9857
Berri	66	SBER	1.0738	1.0334
Berri (POWERCOR)	66	SBE1	1.0738	1.0334
Blanche	33	SBLA	1.0402	0.9870
Blanche (POWERCOR)	33	SBL1	1.0402	0.9870
Brinkworth	33	SBRK	0.9836	0.9841
Bungama Industrial	33	SBUN	0.9792	0.9810
Bungama Rural	33	SBUR	0.9793	0.9809
Dalrymple	33	SDAL	0.9121	0.9285
Davenport	275	SDAV	0.9699	0.9691
Davenport	33	SDAW		1.0080
Dorrien	33	SDRN	1.0195	1.0183
East Terrace	66	SETC	1.0094	1.0076
Happy Valley	66	SHVA	1.0139	1.0114
Hummocks	33	SHUM	0.9592	0.9758
Kadina East	33	SKAD	0.9633	0.9794
Kanmantoo	11	SKAN	1.0229	1.0212
Keith	33	SKET	1.0367	1.0095
Kilburn	66	SKLB	1.0037	1.0023
Kincraig	33	SKNC	1.0368	1.0021
Lefevre	66	SLFE	1.0008	0.9997
Leigh Creek	33	SLCC	1.0137	1.0099
Leigh Creek South	33	SLCS	1.0094	1.0070
Magill	66	SMAG	1.0088	1.0068
Mannum	33	SMAN	1.0428	1.0202
Mannum - Adelaide Pipeline 1	3.3	SMA1	1.0532	1.0235
Mannum - Adelaide Pipeline 2	3.3	SMA2	1.0585	1.0227
Mannum - Adelaide Pipeline 3	3.3	SMA3	1.0580	1.0209
Middleback	132	SMBK	0.9840	0.9789
Middleback	33	SMDL	0.9836	0.9787
Millbrook	33	SMLB	1.0095	1.0069
Mobilong	33	SMBL	1.0391	1.0204

Location	Voltage kV	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Morgan - Whyalla Pipeline 1	3.3	SMW1	1.0349	1.0164
Morgan - Whyalla Pipeline 2	3.3	SMW2	1.0247	1.0062
Morgan - Whyalla Pipeline 3	3.3	SMW3	1.0051	0.9967
Morgan - Whyalla Pipeline 4	3.3	SMW4	0.9992	0.9944
Morphett Vale East	66	SMVE	1.0127	1.0090
Mt Barker	66	SMBA	1.0213	1.0211
Mt Gambier	33	SMGA	1.0395	0.9905
Mt Gunson	33	SMGU	0.9793	0.9752
Murray Bridge - Hahndorf Pipeline 1	11	SMH1	1.0393	1.0203
Murray Bridge - Hahndorf Pipeline 2	11	SMH2	1.0244	1.0216
Murray Bridge - Hahndorf Pipeline 3	11	SMH3	1.0240	1.0215
Neuroodla	33	SNEU	0.9926	0.9885
New Osborne	66	SNBN	1.0006	0.9999
North West Bend	66	SNWB	1.0350	1.0154
Northfield	66	SNFD	1.0049	1.0037
Para	66	SPAR	1.0052	1.0036
Parafield Gardens West	66	SPGW	1.0037	1.0018
Pimba	132	SPMB	0.9811	0.9758
Playford	33	SPAA	0.9713	0.9697
Port Lincoln	33	SPLN	0.9768	0.9723
Port Pirie	33	SPPR	0.9820	0.9866
Roseworthy	11	SRSW	1.0152	1.0140
Snuggery Industrial	33	SSNN	1.0220	0.9806
Snuggery Rural	33	SSNR	1.0224	0.9803
South Australian VTN		SJP1	1.0009	1.0003
Stony Point	11	SSPN	0.9791	0.9774
Tailem Bend	33	STAL	1.0265	1.0098
Templers	33	STEM	1.0143	1.0138
Torrens Island	66	STSY	1.0000	1.0000
Waterloo	33	SWAT	1.0054	0.9993
Whyalla	33	SWHY	0.9836	0.9790
Whyalla Terminal BHP	33	SBHP	0.9837	0.9767
Woomera	132	SWMA	0.9808	0.9742
Wudina	66	SWUD	0.9952	0.9852
Yadnarie	66	SYAD	0.9823	0.9716

Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Cathedral Rocks Wind Farm	132	CATHROCK	SCRK	SCRK	0.9044	0.8827
Clements Gap Wind Farm	132	CLEMGPWF	SCGW1P	SCGW	0.9689	0.9644
Dry Creek PS Unit 1	66	DRYCGT1	SDCA1	SDPS	1.0058	1.0072
Dry Creek PS Unit 2	66	DRYCGT2	SDCA2	SDPS	1.0058	1.0072
Dry Creek PS Unit 3	66	DRYCGT3	SDCA3	SDPS	1.0058	1.0072
Hallet Brown Hill Wind Farm	275	HALLWF1	SHPS2W	SHPS	0.9760	0.9746
Hallet Hill Wind Farm (Hallet 2 Wind Farm)	275	HALLWF2	SMOK1H	SMOK	0.9824	0.9763
Hallet PS	275	AGLHAL	SHPS1	SHPS	0.9760	0.9746
Ladbroke Grove PS Unit 1	132	LADBROK1	SPEW1	SPEW	1.0105	0.9741
Ladbroke Grove PS Unit 2	132	LADBROK2	SPEW2	SPEW	1.0105	0.9741
Lake Bonney Wind Farm	33	LKBONNY1	SMAY1	SMAY	0.9891	0.9388
Lake Bonney Wind Farm Stage 2	33	LKBONNY2	SMAY2	SMAY	0.9891	0.9388
Leigh Creek Northern PS Load 2	33	NPSNL2	SLCCL	SLCC	1.0137	1.0099
Mintaro PS	132	MINTARO	SMPS	SMPS	0.9690	0.9819
Mt Millar Wind Farm	33	MTMILLAR	SMTM1	SMTM	0.9486	0.8973
Northern PS Unit 1	275	NPS1	SNPA1	SNPS	0.9649	0.9655
Northern PS Unit 2	275	NPS2	SNPA2	SNPS	0.9649	0.9655
O.C.P.L. Unit 1	66	OSB-AG	SNBN1	SOCP	1.0005	0.9998
Pelican Point PS	275	PPCCGT	SPPT	SPPT	0.9998	0.9988
Playford Northern PS Load 1	33	NPSNL1	SPAAL	SPAA	0.9713	0.9697
Playford PS	275	PLAYB-AG	SPSD1	SPPS	0.9671	0.9677
Port Lincoln PS	132	POR01	SPLN1	SPTL	0.9161	0.8654
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

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Snowtown Wind Farm	33	SNOWTWN1	SNWF1T	SNWF	0.9018	0.9283
Snuggery PS Unit 1	132	SNUG1	SSGA1	SSPS	0.9415	0.9497
Snuggery PS Unit 2	132	SNUG2	SSGA2	SSPS	0.9415	0.9497
Snuggery PS Unit 3	132	SNUG3	SSGA3	SSPS	0.9415	0.9497
Torrens Island PS A Unit 1	275	TORRA1	STSA1	STPS	1.0008	0.9998
Torrens Island PS A Unit 2	275	TORRA2	STSA2	STPS	1.0008	0.9998
Torrens Island PS A Unit 3	275	TORRA3	STSA3	STPS	1.0008	0.9998
Torrens Island PS A Unit 4	275	TORRA4	STSA4	STPS	1.0008	0.9998
Torrens Island PS B Unit 1	275	TORRB1	STSB1	STPS	1.0008	0.9998
Torrens Island PS B Unit 2	275	TORRB2	STSB2	STPS	1.0008	0.9998
Torrens Island PS B Unit 3	275	TORRB3	STSB3	STPS	1.0008	0.9998
Torrens Island PS B Unit 4	275	TORRB4	STSB4	STPS	1.0008	0.9998
Torrens Island PS Load	275	TORNL1	STSYL	STPS	1.0008	0.9998
Wattle Point Wind Farm	132	WPWF	SSYP1	SSYP	0.8194	0.8436

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Amcor Glass UN 1	11	AMCORGR	SRSW1E	SRSW	1.0152	1.0140
Angaston Power Station	33	ANGAS1	SDRN1	SANG	0.9634	0.9505
Angaston Power Station	33	ANGAS2	SDRN2	SANG	0.9634	0.9505
Lonsdale PS	66	LONSDALE	SMVE1	SMVE	1.0093	1.0090
Starfish Hill Wind Farm	66	STARHLWF	SMVE2	SMVE	1.0093	1.0090
Terminal Storage Mini-Hydro	66	TERMSTOR	SNFD1	SNFD	1.0049	1.0037

Tasmania (regional reference node is George Town 220 kV)

Loads

Location	Voltage (kV)	TNI code	2009/10 Loss factor	2010/11 Loss factor
Arthurs Lake	6.6	TAL2	1.0200	1.0181
Avoca	22	TAV2	1.0324	1.0387
Boyer SWA	6.6	TBYA	1.0676	1.0457
Boyer SWB	6.6	TBYB	1.0762	1.0502
Bridgewater	11	TBW2	1.0841	1.0527
Burnie	22	TBU3	0.9998	0.9947
Chapel St.	11	TCS3	1.0786	1.0531
Comalco	220	TCO1	1.0005	1.0009
Creek Road	33	TCR2	1.0800	1.0545
Derby	22	TDE2	1.0128	1.0184
Derwent Bridge	22	TDB2	0.9918	0.9716
Devonport	22	TDP2	1.0004	0.9979
Electrona	11	TEL2	1.0837	1.0673
Emu Bay	11	TEB2	1.0002	0.9950
Fisher (Rowallan)	220	TFI1	0.9793	0.9795
George Town	22	TGT3	1.0035	1.0038
George Town (Basslink)	220	TGT1	1.0000	1.0000
Gordon	22	TGO2	1.0409	1.0342
Greater Hobart Area VTN		TVN1	1.0826	1.0543
Greater Tamar Area VTN		TVN2	1.0118	1.0153
Hadspen	22	THA3	1.0098	1.0130
Hampshire	110	THM2	0.9975	0.9918
Huon River	11	THR2	1.0863	1.0654
Kermandie	11	TKE2	1.0897	1.0688
Kingston	11	TKI2	1.0891	1.0637
Knights Road	11	TKR2	1.0890	1.0675
Lindisfarne	33	TLF2	1.0893	1.0552
Meadowbank	22	TMB2	1.0357	1.0210
Mowbray	22	TMY2	1.0105	1.0156
New Norfolk	22	TNN2	1.0656	1.0432
Newton	22	TNT2	0.9949	0.9902
Newton	11	TNT3	0.9749	0.9828
North Hobart	11	TNH2	1.0778	1.0535
Norwood	22	TNW2	1.0142	1.0179

Location	Voltage (kV)	TNI code	2009/10	2010/11
			Loss factor	Loss factor
Palmerston	22	TPM3	1.0024	1.0088
Port Latta	22	TPL2	0.9804	0.9767
Que	22	TQU2	0.9858	0.9782
Queenstown	22	TQT2	0.9826	0.9791
Queenstown	11	TQT3	0.9889	0.9848
Railton	22	TRA2	0.9977	0.9945
Risdon	33	TRI4	1.0810	1.0536
Risdon	11	TRI3	1.0757	1.0510
Rokeby	11	TRK2	1.0939	1.0566
Rosebery	44	TRB2	0.9817	0.9807
Savage River	22	TSR2	0.9832	1.0072
Scottsdale	22	TSD2	1.0143	1.0181
Smithton	22	TST2	0.9718	0.9629
Sorell	22	TSO2	1.0898	1.0674
St. Marys	22	TSM2	1.0493	1.0571
Starwood	110	TSW1	1.0010	1.0010
Temco	110	TTE1	1.0033	1.0037
Trevallyn	22	TTR2	1.0115	1.0146
Triabunna	22	TTB2	1.0998	1.0694
Tungatinah	22	TTU2	1.0006	0.9736
Ulverstone	22	TUL2	1.0009	0.9976
Waddamana	22	TWA2	1.0064	0.9906
Wayatinah	11	TWY2	1.0235	1.0239
Wesley Vale	11	TWV2	1.0015	0.9988

Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Basslink (George Town)	220	BLNKTAS	TGT11	TGT1	1.0000	1.0000
Bastyan	220	BASTYAN	TFA11	TFA1	0.9559	0.9618
Bell Bay No.3	110	BBTHREE1	TBB11	TBB1	0.9988	0.9996
Bell Bay No.3	110	BBTHREE2	TBB12	TBB1	0.9988	0.9996
Bell Bay No.3	110	BBTHREE3	TBB13	TBB1	0.9988	0.9996
Bluff Point and Studland Bay Wind Farms	110	WOOLNTH1	TST11	TST1	0.9387	0.9175
Butlers Gorge	110	BUTLERSG	TBG11	TBG1	0.9756	0.9622
Catagunya[6]	220	LI_WY_CA	TLI11	TLI1	1.0225	1.0240
Cethana	220	CETHANA	TCE11	TCE1	0.9742	0.9767
Cluny[7]	220	CLUNY	TCL11	TCL1	1.0319	1.0283
Devils gate	110	DEVILS_G	TDG11	TDG1	0.9777	0.9804
Fisher[8]	220	FISHER	TFI11	TFI1	0.9793	0.9795
Gordon	220	GORDON	TGO11	TGO1	0.9915	1.0070
John Butters	220	JBUTTERS	TJB11	TJB1	0.9521	0.9561
Lake Echo	110	LK_ECHO	TLE11	TLE1	0.9737	0.9933
Lemonthyme	220	LEM_WIL	TSH11	TSH1	0.9820	0.9830
Liapootah10	220	LI_WY_CA	TLI11	TLI1	1.0225	1.0240
Mackintosh	110	MACKNTSH	TMA11	TMA1	0.9451	0.9519
Meadowbank	110	MEADOWBK	TMB11	TMB1	1.0382	1.0189
Paloona	110	PALOONA	TPA11	TPA1	0.9822	0.9835
Poatina	220	POAT220	TPM11	TPM1	0.9954	1.0040
Poatina	110	POAT110	TPM21	TPM2	0.9868	0.9912
Reece No.1	220	REECE1	TRCA1	TRCA	0.9512	0.9550
Reece No.2	220	REECE2	TRCB1	TRCB	0.9456	0.9539
Repulse8	220	REPULSE	TCL12	TCL1	1.0319	1.0283
Rowallan9	220	ROWALLAN	TFI12	TFI1	0.9793	0.9795
Tamar Valley CCGT	220	TVCC201	TTV11A	TTV1	0.9992	0.9993
Tamar Valley OCGT	110	TVPP104	TBB14A	TBB1	0.9988	0.9996
Tarraleah	110	TARRALEA	TTA11	TTA1	0.9891	0.9703
Trevallyn	110	TREVALLN	TTR11	TTR1	1.0051	1.0097
Tribute	220	TRIBUTE	TTI11	TTI1	0.9474	0.9564
Tungatinah	110	TUNGATIN	TTU11	TTU1	0.9828	0.9617

[6] Catagunya, Liapootah and Wayatinah generators are to be dispatched together and hence get the same loss factor
[7] Cluny and Repulse generators are to be dispatched together and hence get the same loss factor
[8] Fisher and Rowallan generators are to be dispatched together and hence get the same loss factor

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Wayatinah10	220	LI_WY_CA	TLI11	TLI1	1.0225	1.0240
Wilmot11	220	LEM_WIL	TSH11	TSH1	0.9820	0.9830

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID (DUID)	Connection Point ID	TNI code	2009/10	2010/11
					Loss factor	Loss factor
Remount	22	REMOUNT	TMY21	TMY2	0.9943	1.0156

7 Appendix B: Inter-regional loss factors equations for 2010/11

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

= 0.9967 + 1.9404E-4 *NQt – 3.2842E-06*Nd + 1.3852E-05*Qd

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

= 1.0848 + 1.7470E-04*VNt – 3.5199E-05*Vd + 9.03410E-06*Nd + 7.4535E-06*Sd

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

= 1.0189 + 2.8020E-04*VSAt – 1.3328E-05*Vd + 3.7430E-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.

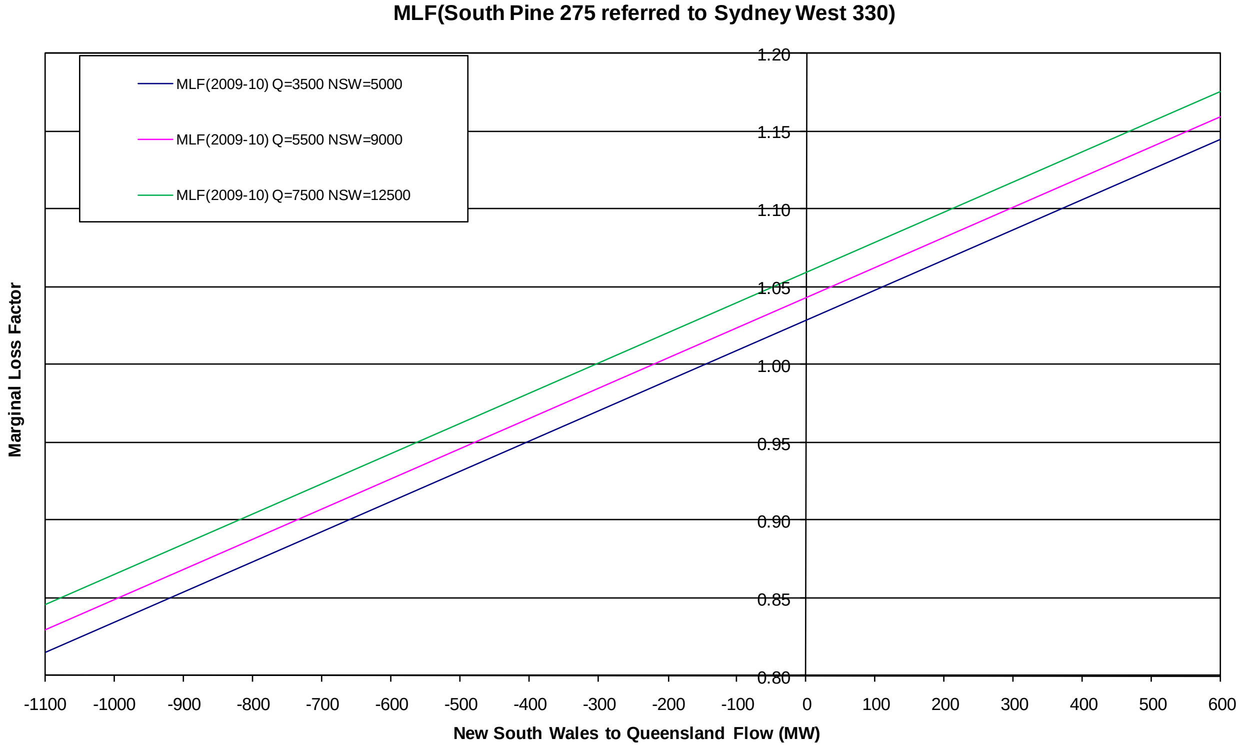


Figure B1: South Pine 275 referred to Sydney West 330 marginal loss factor verses NSW to Qld flow

Coefficient statistics

Coefficient	Q_d	N_d	NQ_t	CONSTANT
Coefficient value	1.3852E-05	-3.2842E-06	1.9404E-04	0.9967
Standard error values for the coefficients	1.6229E-07	1.0551E-07	2.9152E-07	5.3885E-04
Coefficient of determination (R2)	0.9796			
Standard error of the y estimate	0.0098			

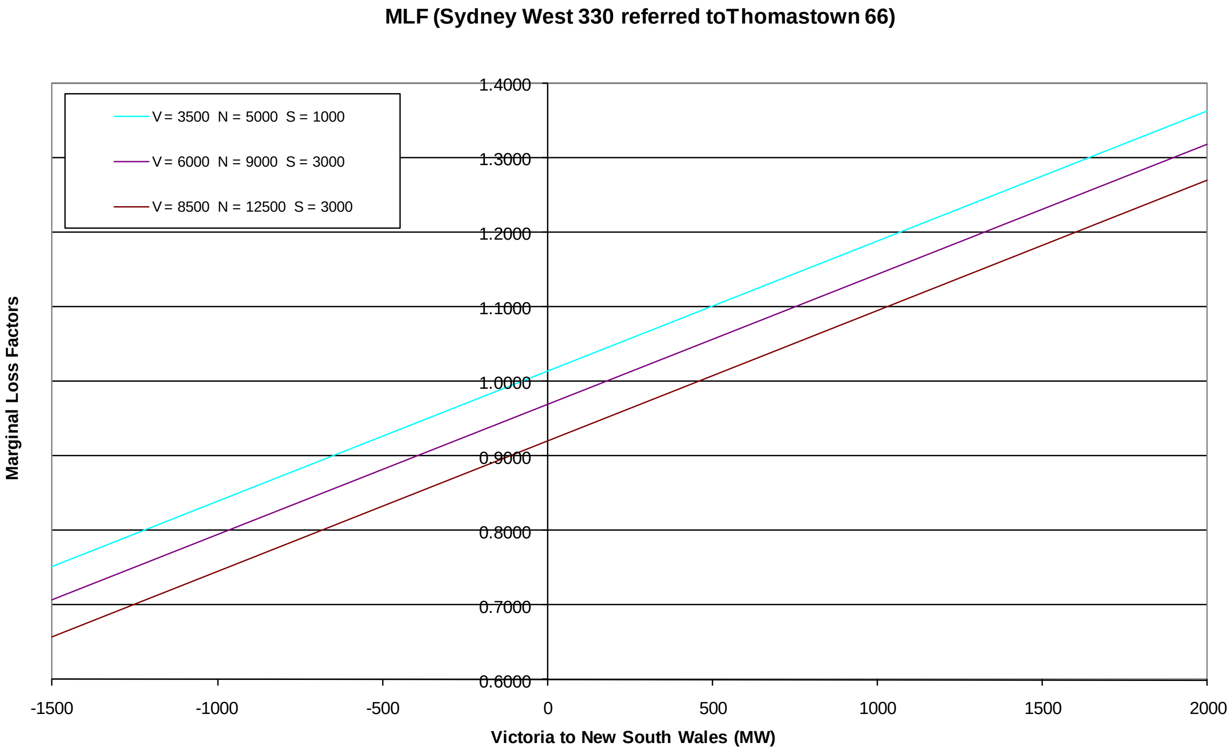


Figure B2: Sydney West 330 referred to Thomastown 66 marginal loss factor versus Victoria to NSW flow

Coefficient statistics

Coefficient	S_d	N_d	V_d	VN_t	CONSTANT
Coefficient value	7.4535E-06	9.0341E-06	-3.5199E-05	1.7470E-04	1.0848
Standard error values for the coefficients	1.3676E-06	2.9356E-07	5.9838E-07	5.3969E-07	1.5887E-03
Coefficient of determination (R^2)	0.9128				
Standard error of the y estimate	0.0266				

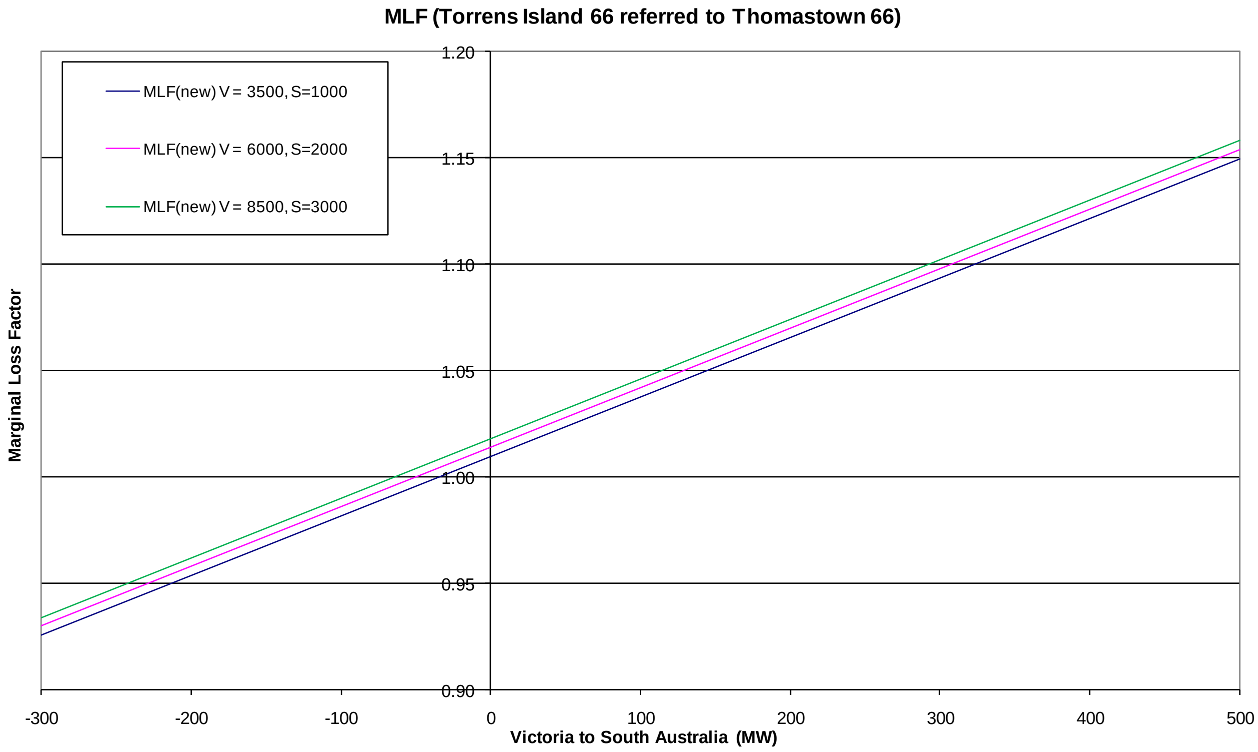


Figure B3: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Victoria to SA flow

Coefficient statistics

Coefficient	S_d	V_d	VSA_t	CONSTANT
Coefficient value	3.7430E-05	-1.3328E-05	2.8020E-04	1.0189
Standard error values for the coefficients	1.0164E-06	3.8035E-07	1.1083E-06	1.0066E-03
Coefficient of determination (R^2)	0.8195			
Standard error of the y estimate	0.0199			

8 Appendix C: Inter-regional loss equations for 2010/11

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

Losses = ∫(Loss factor – 1) dFlow

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

= (-0.0033 - 3.2842E-06*Nd + 1.3852E-05*Qd)*NQt + 9.7020E-05 *NQt^2

Sydney West 330 referred to Thomastown 66 notional link average losses

= (0.0848 – 3.5199E-05*Vd + 9.0341E-06*Nd + 7.4535E-06*Sd)*VNt + 8.7348E-05*VNt^2

Torrens Island 66 referred to Thomastown 66 notional link average losses

= (0.0189 – 1.3328E-05*Vd + 3.7430E-05*Sd)*VSAt + 1.4010E-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.

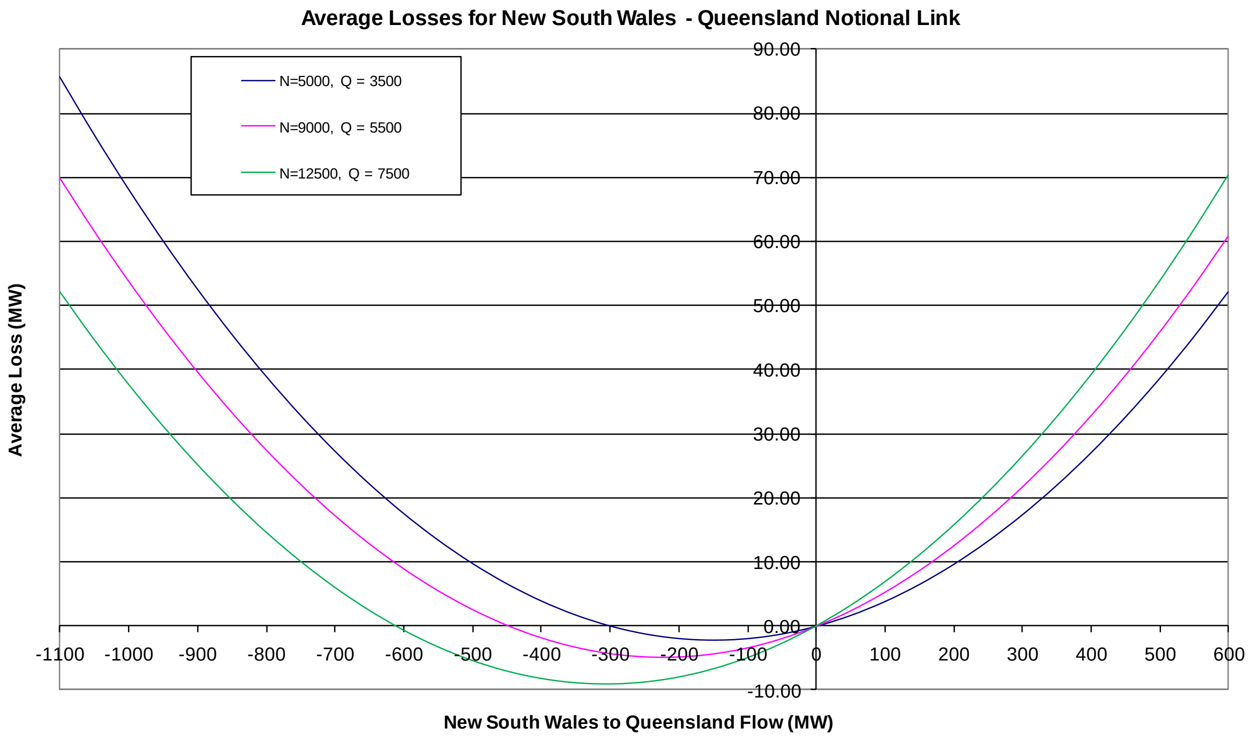


Figure C1: NSW to Queensland notional link losses versus NSW to Queensland notional link flow

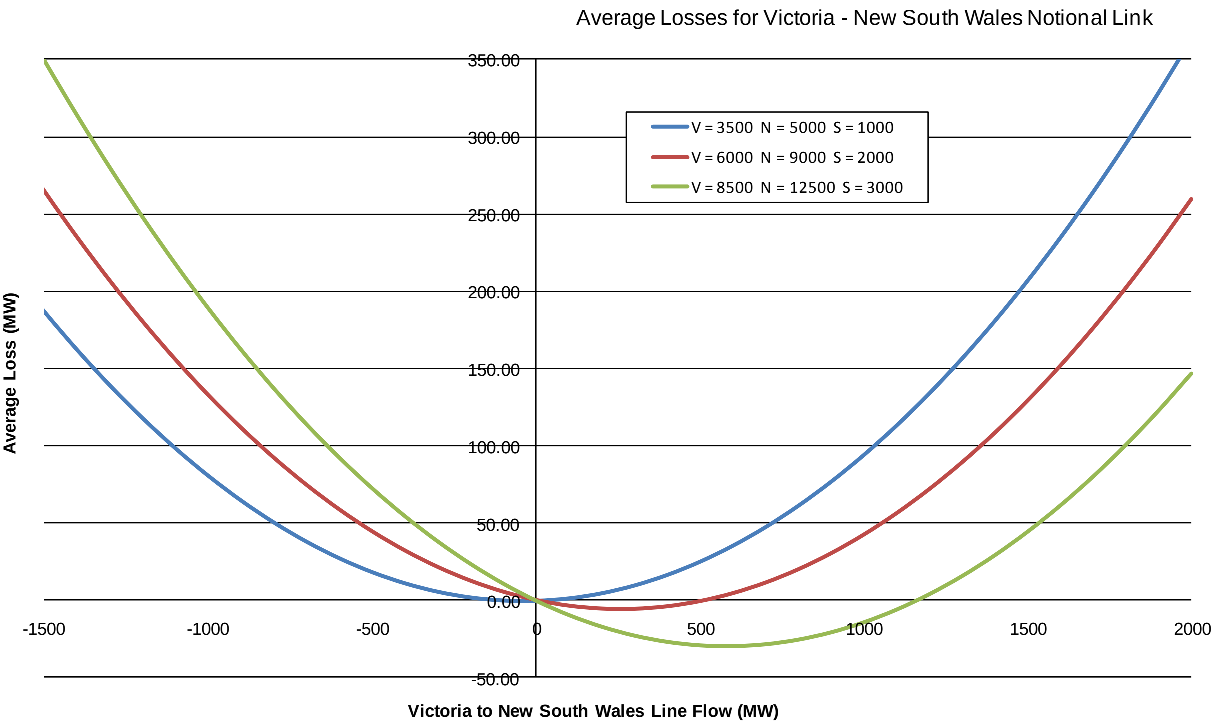


Figure C2: Victoria to NSW notional link losses versus Victoria to NSW notional link flow

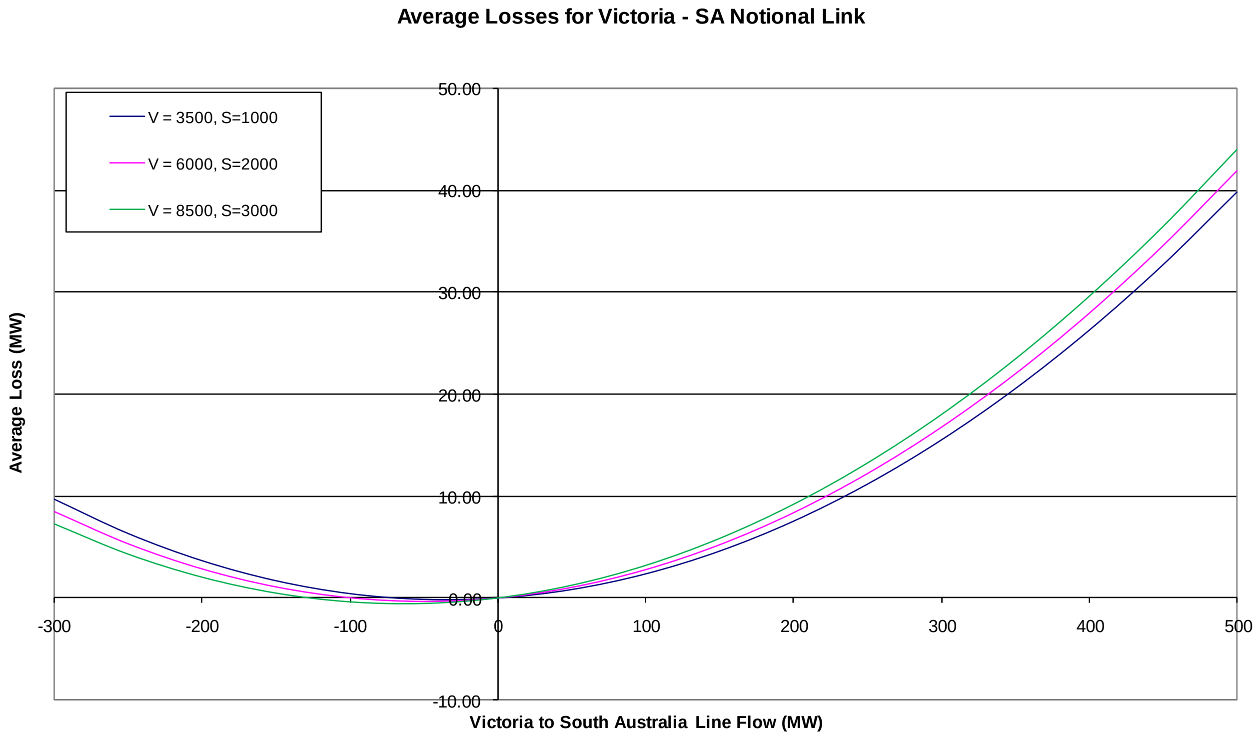


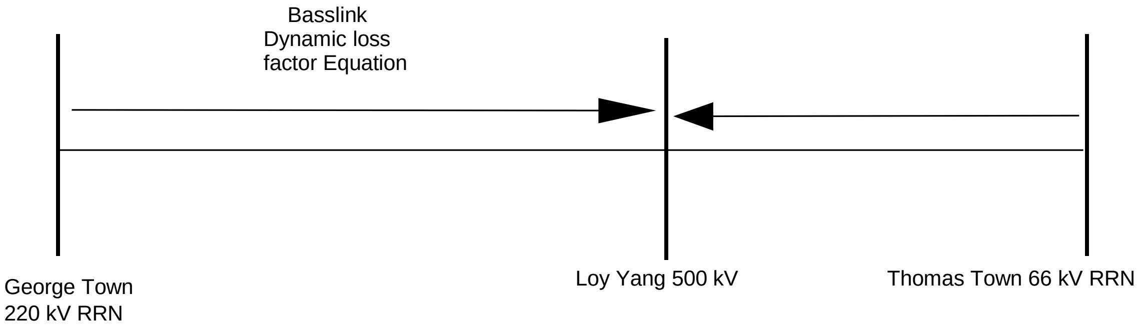
Figure C3: Victoria to SA notional link losses versus Victoria to SA notional link flow

9 Appendix D: Basslink, Terranora Interconnector and Murraylink loss factor models and loss equations

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. 9729.



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) = 1.0895 + 2.6120E-03*$Flow_t$

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	2.6121E-03	1.0895
Standard error values for the coefficient	3.7290E-06	2.6445E-04
Coefficient of determination (R^2)	0.9655	
Standard error of the y estimate	0.0336	

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

Murraylink loss = 0.0895*$Flow_t$ + 1.3060E-03*$Flow_t^2$

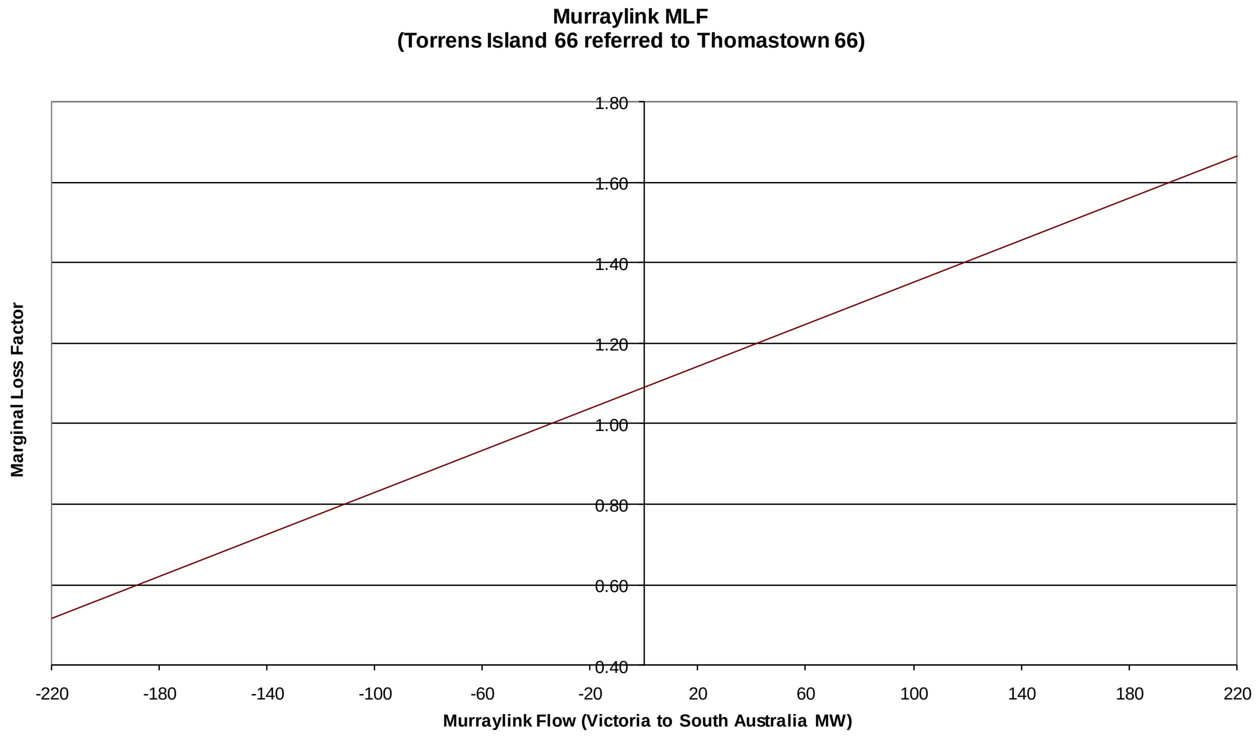


Figure D1: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Murraylink flow (Victoria to SA)

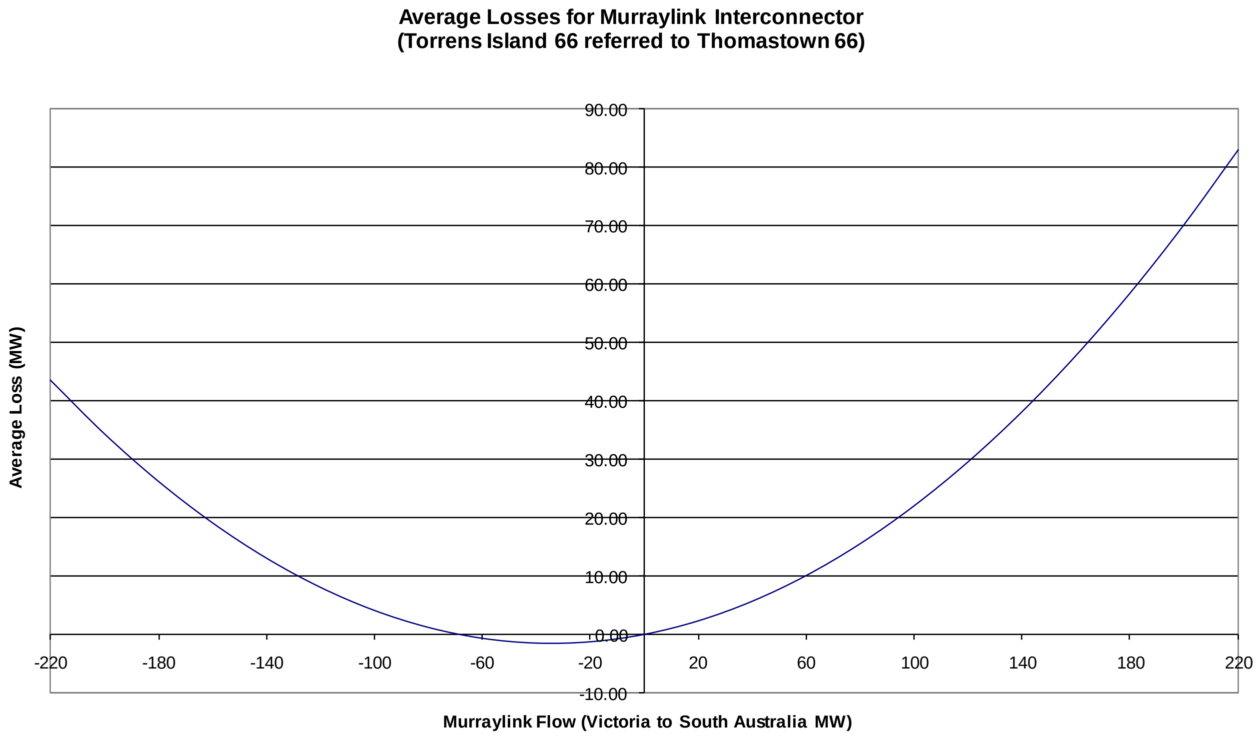


Figure D2: Murraylink notional link losses versus Murraylink flow (Victoria to SA)

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) = 1.1009 + 1.84464E-03*$Flow_t$

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	1.8464E-03	1.1009
Standard error values for the coefficients	5.2728E-06	8.5927E-04
Coefficient of determination (R^2)	0.8750	
Standard error of the y estimate	0.0412	

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

$$\text{Terranora interconnector loss} = 0.1009 * Flow_t + 9.2321E\text{-}04 * Flow_t^{2}$$

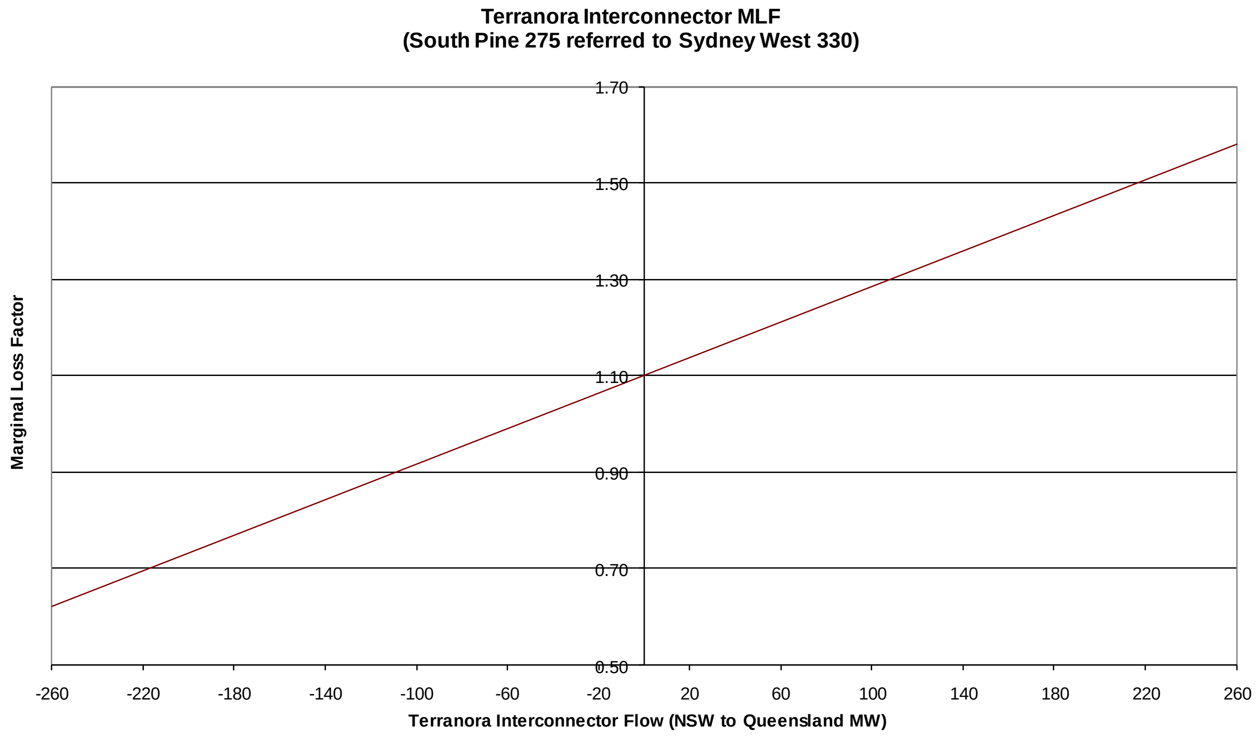


Figure D3: South Pine 275 referred to Sydney West 330 marginal loss factor versus Terranora interconnector flow (NSW to Queensland)

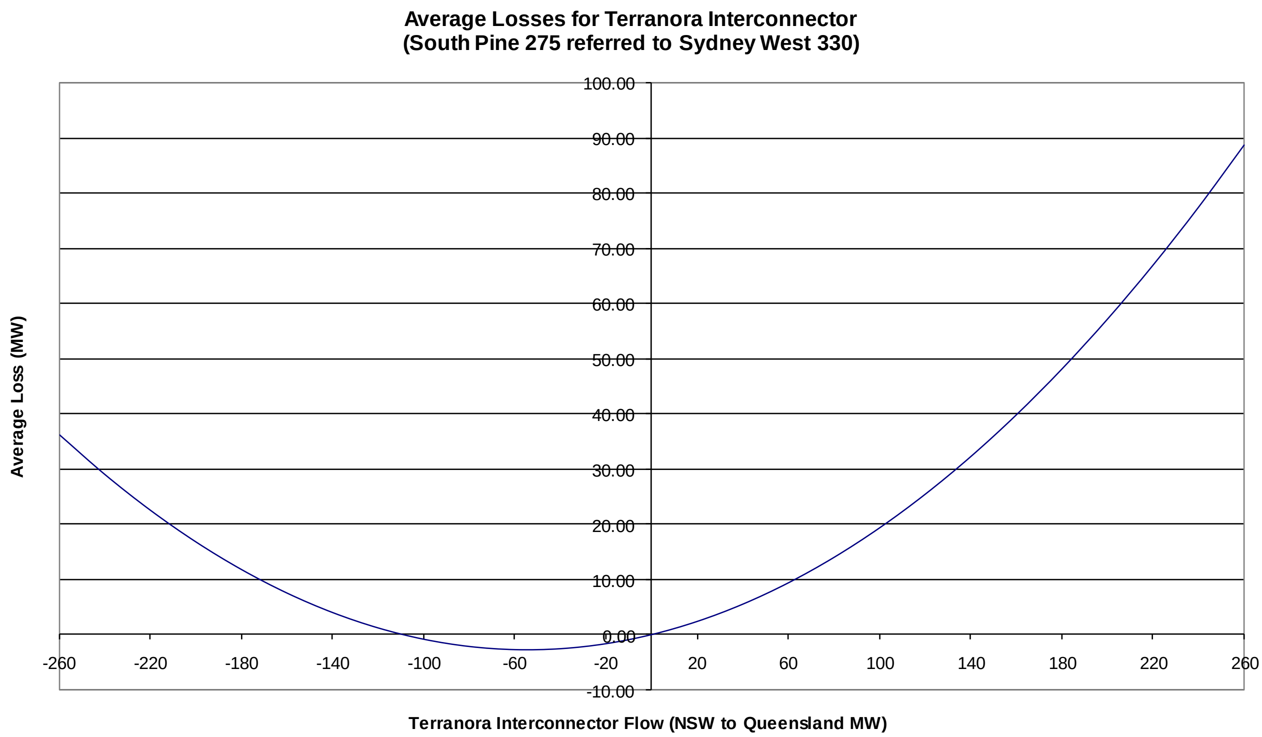


Figure D4: Terranora interconnector notional link losses versus flow (NSW to Queensland)

10 Appendix E: The Proportioning Inter-regional Losses to Regions

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 2009/10 financial year.

Notional interconnector	Proportioning factor	Applied to
Queensland – New South Wales (QNI)	0.42	New South Wales
Queensland – New South Wales (Terranora Interconnector)	0.65	New South Wales
Victoria – New South Wales	0.64	New South Wales
Victoria – South Australia (Heywood)	0.91	Victoria
Victoria – South Australia (Murraylink)	0.86	Victoria

11 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[9];
- 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.

12 Appendix G: List of New and Modified Connection Points for 2010/11

NAME	Voltage Level (kV)	Connection Point ID	TNI	Region
Bayswater PS Unit 3	500	NBAY3	NBYW	NSW
Peakhurst	132	NPH1	NPH1	NSW
Darling Downs	275	QBRA8D	QBRA	QLD
Ashgrove West	110	QCBW	QCBW	QLD
Molendinar	33	QMAL	QMAL	QLD
Mudgeeraba	33	QMGL	QMGL	QLD
Oakey	133	QOKT	QOKT	QLD
Yarwun – Boat Creek (Ergon)	132	QYAE	QYAE	QLD
Yarwun PS	132	QYAG1R	QYAG	QLD
Yarwun – Rio Tinto	132	QYAR	QYAR	QLD
Davenport	33	SDAW	SDAW	SA
Heywood	22	VHY2	VHY2	VIC
Bogong PS	220	VMKP1	VT14	VIC
McKay Creek PS Unit 1	220	VMKP1	VT14	VIC
McKay Creek PS Unit 2	220	VMKP1	VT14	VIC

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