LIST OF REGIONAL BOUNDARIES AND MARGINAL LOSS FACTORS FOR THE 2009-10 FINANCIAL YEAR

PREPARED BY:	Electricity System Operations Planning and Performance
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FINAL

Contents

Version Release History

VERSION	DATE	CHANGES
3.0	01/04/10	1. The following new transmission network connection points have been added: Amcor Glass UN 1 (SRSW1E) Ashgrove West 110 kV (QCBW) (replaces Brisbane CBD) Ballarat Health Services (VBAT1H) Boambee South 132 (NWST) (replaces West Sawtel) Bogong Power Station and McKay Power Station (VT14 replaced VMKP) Davenport 33 (SDAW) Molendinar 33 (QMAL) Mount Stewart Unit 3 (QMSP3M) Mudgeeraba 33 (QMGL) Peakhurst 132 (NPH1) Yarwun – Boat Creek (Ergon) (QYAE) Yarwun – Rio Tinto (QYAR)Yarwun – Rio Tinto Generator (QYAG) 2. Tamer Valley OCGT Connection Point ID has been corrected (TTB14A) 3. Bayswater PS Unit 4 Connection Point ID has been corrected (NBAY4) 4. The following Market Non-Scheduled generators are included: • Rochedale Renewable Energy Plant (QBMH2) • Roghan Road Generator (QSPN2) • Awaba Renewable Energy Facility (NNEW2) • Campbelltown WSLC (NING1C) • EarthPower Biomass Plant (NSW22) • Bankstown Sport Club (NSYS3R) • Eraring BS UN (GT) (ERGT01) • Jindabyne Generator (NCMA2) • Jounama PS (NTU21J) • Lucas Heights Stage 2 Power Station (NSYS1) • Teralba Power Station (NNEW1) • Mornington Landfill Site Generator (VTBT1) • Wyndham Landfill Site Generator (VATS1) • Shepparton Waste Gas (VSHT2S) • Amcor Glass UN1 (SRSW1E) 5. The following generators are either Non-Market and Non-Scheduled or inactive and are therefore excluded: • Springvale Power Plant (VSV22S); • HRL Site (Tramway Road PS) • Burnie Paper Mill (TEB21B) • Dapto 132 Whyte's Gully (NDT11) • Paradise Dam (QGNG2P) • Stapylton Loganlea 110 kV (QLGH1) • Bayswater Power Station Load (NBAYL) • Callide A PS Unit 1 and 3 (QCAA1 and QCAA3) • Broken Hill GT 2 (NBKG2) • Williamsdale (AWIL)

		6. Standard Deviation has been removed from Appendix A 7. Dispatchable Unit IDs (or DUIDs) have been added to Appendix A to assist in TNI identification
2.0	30/04/09	1. Rearrangement of these connections will take place shortly and for 2009/10 the following connection points will apply: Wagga 66 (NWG2) Wagga North 132 (NWGN) Wagga North 66 (NWG6) - new connection point Wagga 132 (NWG1) - to be deleted in May/June 2009. 2. TNI code corrected for Capital Wind Farm 3. TNI code and connection point id updated for Bayswater 4 500 kV connection point 4. Included MLF for Starfish Hill Wind Farm
1.0	31/03/09	Original

Disclaimer

Purpose

This report has been prepared by NEMMCO prior to formation of AEMO for the sole purpose of producing Intra-Regional transmission loss factors and Inter-Regional loss factor equations to apply for the 2009/10 financial year pursuant to clause 3.6 of the Rules.

No Reliance

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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, NEMMCO 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 that requires NEMMCO 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 2009/10 financial year

This section describes the process followed in applying the forward-looking loss factor methodology calculation of the marginal loss factors for 2009/10 financial year. Further details for the forward-looking loss factor methodology can be found in the methodology document on AEMO's website[1].

The Snowy region was abolished as of 1 July 2008, therefore this report reflects the removal of Snowy region by relocating the previous Snowy connection points to Victoria or New South Wales

[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

regions as determined by the AEMC. The previous Snowy and Victoria – Snowy interconnectors have also been replaced with a single Victoria – New South Wales interconnector.

2.1 Overview of the Forward-looking Loss Factor Methodology

The forward-looking loss factor methodology developed by NEMMCO 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;
- 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, Snowy, Victoria, South Australia and Tasmanian regions for the period of 1 July 2007 to the 30 June 2008 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 2009/10 financial year by scaling the historical data. The forecast connection point load traces for 2009/10 was 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 2008 Statement of Opportunities (SOO) and the update to the 2008 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, Snowy, 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 2009/10 is given in the table 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 2009/10 in Appendix A.

2.4 Connection point load data

As described in section 2.2, Powerlink, TransGrid, Energy Australia, Country Energy, VENCorp, ESIPC and Transend provided NEMMCO with the forecast connection point load data that was used for Queensland, New South Wales, Victoria, South Australia and Tasmania respectively, in accordance with section 5.2.2 of the Forward-looking loss factor Methodology[1]. The SOO 2008 load growth rates were used to perform the due diligence on the forecast connection point loads.

Amendments to the forecast load data

Forecast of connection point loads is based on the historical data from the 2007/08 financial year. However, in New South Wales, no historical data is available for the following Energy Australia connection points:

Bunnerong 132	Bunnerong 33	Chullora 132	Campbell St 11
Campbell St 132	Canterbury 33	Drummoyne 11	Gosford 33
Gosford 66	Green Square 11	West Gosford 11	Homebush Bay 11
Lane Cove 132	Meadowbank 11	Marrickville 11	Mason Park 132
Macquarie Park 11	Mount Colah 132	Ourimbah 33	Peakhurst 33
Pyrmont 132	Pyrmont 33	Rozelle 132	Rozelle 33
Somersby 11	St Peters 11		

The metered energy was not recorded in the NEMMCO settlements database for the 2007/08 financial year. Rather they were included in the metered data at TransGrid substations (bulk supply points) at Sydney East 132, Sydney West 132, Sydney South 132, Sydney North 132 and Newcastle 132.

TransGrid, Energy Australia and Country Energy provided the forecast for their substations. Based on advice received from the TNSPs, forecasts were then rationalised to ensure that the appropriate portion of the load was allocated to their individual downstream connection points.

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 NEMMCO 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 2009/10 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.

VENCorp, in consultation with Yallourn, prepared a forecast of switching for Yallourn unit 1 reflecting its anticipated operation for the loss factors calculations. 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 unit 4 will be connected to the 500 kV network starting from April 2009. Bayswater unit 3 will be switched onto the 500 kV network from April 2010. Bayswater units 1 & 2 will remain connected to the 330kV network for the 2009/10 financial year. Both the 330 kV connection points for Bayswater units 1 & 2 and the 500 kV connection points for units 3 & 4 will have loss factors that reflect the predicted time that Bayswater unit 3 would be in each configuration.

2.8 Network augmentations for 2009/10 financial year

The following network augmentations have been advised by the relevant TNSPs in each region of the NEM for 2009/10.

Queensland

Powerlink advised the following major augmentations to be completed in 2009/10 in Queensland:

- Establish new Condamine Power Station connection point
- Establish new Braemar Stage 2 connection point
- Establish new Mt Stuart unit 3 connection point
- Establish new 110/33 kV Substation at Jimboomba
- 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
- Far North Queensland Rebuild – Edmonton to Innisfail Augmentation
- Establish new 132/11kV substation at Merrimac
- Establish a second 110kV Line to and second 110/33kV 120 MVA transformer at Browns Plains
- Supply reinforcement to the Wide Bay area
- Establish a new 110/33kV substation at Myrtletown
- Establish a new 132/66kV substation at Granite Creek
- Establish a new 110/25kV Queensland Rail Transit Centre substation
- Installation of a second 275/110kV transformer at Murarrie
- Mackay 132kV reinforcement
- Establish a new 132/66kV substation at Townsville East
- Establishment of 275 kV Abermain (H062) substation
- Installation of a third 275kV 120 MVAr capacitor bank at South Pine
- Installation of a static Var compensator at Alligator Creek
- Establish a new 110kV substation at Cooran

New South Wales

TransGrid, Energy Australia and Country Energy advised the following major augmentations to be completed in 2009/10 in New South Wales:

- Establish new Waratah West 330kV – 132kV substation
- Establish new Queanbeyan 132kV – 66kV substation

- Establish new Tomago 330kV – 132kV substation
- Modification of Vineyard 330kV -132kV substation
- Establish new Haymarket 330kV – 132kV substation
- Establish new Leafs Gully 330kV switchyard
- Establish new Tuggerah 330kV – 132kV substation
- Establish new Port Macquarie 132kV -33kV substation
- Modification of Sydney South 330kV -132kV substation
- Modification of Beaconsfield 330kV -132kV substation
- Establish new Gullen Range 330kV switchyard
- Establish new Bayswater 500kV – 330kV substation
- Decommissioning of two Tamworth – Gunnedah 66 kV (875 & 969) lines
- Establish new Tamworth – Gunnedah 66 kV (969) line
- Decommissioning of Bayswater – Wallerawang 330kV (74) line
- Establish new Bayswater – Mt Piper 500kV (5A4) line
- Establish new Mt Piper – Wallerawang 330kV (70) line
- Modification of Queanbeyan - Williamsdale 132kV (975) line
- Modification of Queanbeyan – tee Canberra tee Yass tee Murrumbateman 132kV (976/1) line
- Modification of Queanbeyan – tee Canberra tee Yass 132kV (977/3) line
- Modification of Queanbeyan – Canberra tee Yass 132kV (977/2) line
- Decommissioning of Macarthur – Avon 330kV (17) line
- Establish new Macarthur – Leafs Gully 330kV (15) line
- Establish new Leafs Gully – Avon 330kV (17) line
- Decommissioning of Sydney West – Yass 330kV (39) line
- Establish new Sydney West – Bannaby 330kV (39) line
- Establish new Bannaby – Yass 330kV (61) line
- Decommissioning of Mt Piper – Marulan 330kV (36) line
- Establish new Mt Piper – Bannaby 500kV (5A7) line
- Establish new Bannaby – Marulan 330kV (36) line
- Modification of Sydney South – Peakhurst 132 kV (91F) line
- Modification of Sydney South – Peakhurst 132 kV (91J) line
- Modification of Sydney South – Bankstown 132 kV (910) line
- Modification of Sydney South – Chullora132kV (911) line
- Decommissioning of Peakhurst – Beasonsfield West 132kV (91M/1)line
- Establish new Peakhurst – Kogarah 132kV (918) line
- Establish new Kogarah – Beaconsfield West 132kV (91M/1) line
- Decommissioning of Mt Piper – Marulan 330kV (35) line
- Establish new Mt Piper – Bannaby 500kV (5A6) line
- Establish new Bannaby – Marulan 330kV (35) line
- Decommissioning of Bayswater – Mt Piper 500kV (5A4) line
- Establish new Bayswater – Wollar 500kv (5A4) line
- Establish new Wollar – Mt Piper 500kV (5A5) line
- Establish new Wollar – Wellington 330kV (79) line
- Decommissioning of Bannaby - Yass 330kV (61) line
- Establish new Bannaby – Gullen Range 330kV (61/B) line
- Establish new Gullen Range – Yass 330kV (61/Y) line
- Establish new Glen Innes – Inverell 132kV (9U4) line
- Decommissioning of Queanbeyan 132/66kV No.1 transformer
- Decommissioning of Queanbeyan 132/66kV No.2 transformer
- Decommissioning of Queanbeyan 132/66kV No.3 transformer
- Decommissioning of Queanbeyan 132/66kV No.4 transformer
- Establish new Queanbeyan 132/66kV No.1 transformer
- Establish new Queanbeyan 132/66kV No.2 transformer
- Establish new Tomago 330/138.5/11kV No.5 transformer
- Establish new Tomago 330/138.5/11kV No.7 transformer
- Establish new Tuggerah 132/66kV No.5 transformer
- Establish new Bannaby 525/345/34.5kV No.1 transformer
- Establish new Bannaby 525/345/34.5kV No.2 transformer
- Decommissioning of Coffs Harbour 132/66/11kV No.1 transformer
- Replacement of Coffs Harbour 132/66/11kV No.3 transformer

- Establish new Coffs Harbour 132/66/11kV No.2 transformer
- Replacement of Koolkhan 132/66/11kV No.2 transformer
- Replacement of Sydney South 330/138.6/66/11kV No.4 transformer
- Decommissioning of Wagga 330/138.6/16kV No.1 transformer
- Replacement of Wagga 330/138.6/16kV No.2 transformer
- Establish new Wagga 330/138.6/16kV No.3 transformer
- Establish new Wollar 525/345/34.5kV No.1 transformer
- Decommissioning of Bayswater 330/23kV (3A) transformer
- Decommissioning of Bayswater 330/23kV (3B) transformer
- Establish new Bayswater 500/23kV (3A) transformer
- Establish new Bayswater 500/23kV (3B) transformer
- Establish new Cowra 132/66/11kV No.1 transformer
- Establish new Cowra 132/66/11kV No.3 transformer
- Decommissioning of 10Mvar No.1 capacitor at Queanbeyan 66kV
- Establish new 8Mvar No.1 capacitor at Queanbeyan 66kV
- Establish new 8Mvar No.2 capacitor at Queanbeyan 66kV
- Modification of 8Mvar No.1 capacitor at Griffith 33kV
- Modification of 8Mvar No.2 capacitor at Griffith 33kV
- Decommissioning of 7.5Mvar No.1 capacitor at Port Macquarie 33kV
- Establish new 16Mvar No.1 capacitor at Port Macquarie 33kV
- Establish new 150Mvar No.1 reactor at Bannaby 33kV
- Establish new 150Mvar No.2 reactor at Bannaby 33kV
- Establish new 50Mvar No.2 reactor at Wellington 132kV

Victoria

VENCorp advised the following major augmentations to be completed in 2009/10 in Victoria.

- Establish new Bogong Power Station connection point
- Establish new Mt Mercer Wind Farm connection point
- Establish new Waubra Wind Farm connection point;
- Establish new 220/66 kV, 70 MVA transformer at Wemen terminal station
- 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 2009/10 in South Australia:

- Establish new Penola West 33 kV load connection point
- Establish new Hallet Hill Wind Farm connection point at Mokota 275 kV
- Establish new Clements Gap Wind Farm connection point at Redhill 132 kV
- Establish new Quarantine unit 5 connection point at Torrens Island North 66 kV
- Modification of Torrens Island Power Station – Torrens Island North Substation 66 kV No. 1 line
- Establish new No. 2 Torrens Island Power Station – Torrens Island North Substation 66 kV line
- Establish new Olympic Dam West – Prominent Hill 132 kV line
- Modification of Brinkworth – Bungama 132 kV No. 1 line
- Establish new Brinkworth – Redhill 132 kV No.1 line
- Establish new Bungama – Redhill 132 kV No.1 line
- Establish new Redhill – Clements Gap Wind Farm 132 KV No.1 line
- Modifications to Snowtown Tee point – Snowtown Wind Farm 132 kV

- Modification to Whyalla – Yadnarie 132 kV No.1 line
- Modification to Yadnarie – Port Lincoln 132 kV line
- Modification to Cherry Gardens – Morphett Vale East 275 kV line
- Modification to Olympic Dam West No.3 275/132/11 kV transformer
- Modification to Penola West 132/33/11kV No.1 transformer
- Modification to Penola West 132/33/11kV No.2 transformer
- Establish new 132/11kV No.1 transformer at Prominent Hill mine
- Establish new 132/11kV No.2 transformer at Prominent Hill mine
- Establish new No.1 11/0.48kV transformer at Prominent Hill Mine
- Establish new No.2 11/0.48kV transformer at Prominent Hill Mine
- Modification to 275/33kV No.1 transformer at Hallet Wind Farm
- Modifications to No.1, No.2, & No.3 33/0.48kV transformers at Hallet Wind Farm
- Modifications of No.1, No.2, No.3, No.4, No.5, & No.6 33/0.48kV transformers at Lake Bonney Wind Farm
- Modification of 132/33kV No.2 transformer at Mayura
- Modification of 132/33kV No.1 transformer at Snowtown
- Modification of No.1, No.2, & No.3 33/0.48kV transformers at Snowtown Wind Farm
- Establish new 132/33kV No.1 transformer at Clements Gap Wind Farm
- Establish new No.1 & No. 2 33/0.48kV transformers at Clements Gap Wind Farm
- Establish new Hallet Hill Wind Farm 275/33kV transformer
- Establish new 33/0.48kV No.1, No.2 & No.3 transformers at Hallet Hill Wind Farm
- Establish new 66/15kV transformer as part of the expansion of Quarantine Power Station
- Modifications to No.5 switchable capacitor bank at Hallet Wind Farm
- Modifications to No.5 switchable capacitor bank at Snowtwon Wind Farm
- Modifications to No.6 switchable capacitor bank at Prominent Hill Mine
- Establish new No.4 switchable capacitor bank at Clements Gap Wind Farm
- Establish new No.4 switchable capacitor bank at Hallet Hill Wind Farm
- Establish new No.1 switchable capacitor bank at Parafield Gardens
- Establish new No.1 switchable capacitor bank at Mobilong
- Establish new No.1 switchable capacitor bank at Meadows
- Establish new No.1 switchable reactor at Davenport – Brinkworth 275kV line exit
- Modifications of No.1 switchable reactor at Davenport – Canowie 275kV line exit
- Modifications of No.1 switchable reactor at Hallet Wind Farm
- Modifications of No.1 switchable reactor at Snowtown Wind Farm
- Modifications of No.1 switchable reactor at Hallet Hill Wind Farm
- Installation of two new DVAR devices at Prominent Hill Mine
- Modification of three DVAR devices Hallet Wind farm
- Modification of three DVAR devices Snowtown Wind farm
- Installation of three new DVAR devices at Hallet Hill Wind Farm
- Installation of two new DVAR devices at Clements Gap Wind Farm

Tasmania

Transend advised the following major augmentations to be completed in 2009/10 in Tasmania:

- Decommissioning of Waddamana–Lindisfarne 110 kV line
- Establish new 220 kV Tamar Valley Combined Cycle Power Station connection point
- Establish additional 110/11kV transformer at Electrona
- Establish additional 220/110 kV transformer at Georgetown
- Establish new 220/110 kV transformer at Mowbray
- Installation of four new 2.5 MVAr capacitors at Chapel St 11 kV
- Installation of two new 2.5 MVAr capacitors at Knights Road 11 kV
- Installation of two new 5 MVAr capacitors at Railton 22 kV
- Installation of new 5 MVAr capacitor at Ulverston 22 kV
- Installation of new 5 MVAr capacitor at Smithton 22 kV
- Installation of new 5 MVAr capacitor at Port Latta 22 kV
- Installation of four new 5 MVAr capacitor at Trevallyn 22 kV
- Installation of two new 5 MVAr capacitor at Hadspen 22 kV

- Installation of two new 5 MVAr capacitor at Mowbray 22 kV
- Installation of two new 40 MVAr capacitors at Risdon 110 kV
- Installation of two new 2.5 MVAr Capacitors at Electrona 11 kV
- Modifications to Knights Road – Electrona 110 kV line
- Commissioning of George Town – Tamar Valley Three 220 kV line
- Establish new 110 kV Tamar Valley OCGT unit 4 connection
- Modification of Waddamana 110/22 kV substation

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. As the boundary between Queensland and NSW is Northwards of Directlink located between Terranora and Mudgeeraba, Directlink is now part of the NSW network. In accordance with section 5.3 of the forward-looking loss factor methodology, NEMMCO has treated the Terranora interconnector as a controllable regulated network element in parallel with the regulated Queensland to New South Wales Interconnector. However, Directlink capability is included in the calculation.

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, NEMMCO 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

The Tallawarra Power Station gas turbine was commissioned in summer 2008/09. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of this generator from the historical dispatch of 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.

Uranquinty Power Station gas turbines were commissioned in summer 2008/09. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of these units from the historical dispatch of Braemar stage 1 and Laverton North generating units. These units were chosen because they use similar technology and fuel, and are less than 5 years older than the new unit.

Three generating units of the Braemar Power Station Stage 2 plan are to be commissioned in June 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of these units from the historical dispatch of Braemar Power Station Stage 1 and Laverton North generating units.

The Condamine gas turbines were commissioned to start from February 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of these units from the historical dispatch of 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.

Quarantine Power Station unit 5 was commissioned in summer 2008/09 In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of this generating unit from the historical dispatch of Braemar stage 1 and Laverton North generating units. These units were chosen because they use similar technology and fuel, and are less than 5 years older than the new unit.

Colongra Power Station gas turbines will be commissioned in summer 2009/10. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of these generating units from the historical dispatch of Braemar stage 1 and Laverton North generating units. These units were chosen because they use similar technology and fuel, and are less than 5 years older than the new unit.

Yarwun Cogeneration will be commissioned in winter 2010. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of this generator unit from the historical dispatch of Braemar stage 1 and Laverton North generating units. These units were chosen because they use similar technology and fuel, and are less than 5 years older than the new unit.

Mount Stuart unit 3 will be commissioned in summer 2009/2010. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of this generator unit from the historical dispatch of Braemar stage 1 and Laverton North generating units. These units were chosen because they use similar technology and fuel, and are less than 5 years older than the new unit.

Tamar Valley combined cycle gas turbine will be commissioned in September 2009. In accordance with section 5.4.2 of the forward-looking loss factor methodology, NEMMCO estimated the dispatch of this generator from the historical dispatch of 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) will be commissioned in winter 2009. NEMMCO estimated the dispatch of this generator unit from the historical dispatch of the existing Bell Bay 3 units.

Jounama Hydro Power Station will be commissioned in August 2009. NEMMCO obtained the dispatch of this generating unit from the proponents of the Hydro Power Station.

NEMMCO obtained the dispatch of the new wind generation from the proponents of the new wind farms. The new wind generation expected to be commissioned during 2009/10 include Hallet 2, Cape Bridgewater, Cape Nelson South, Capital, Cullerin Range, Waubra, and Clements Gap Wind Farms.

2.13 Generator Unit Capability

In accordance with section 5.5.3 of the forward-looking loss factor methodology, NEMMCO 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 2008 Statement of Opportunities, NEMMCO 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 has 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 will be separately defined in MMS for dispatch purposes only, and the DLF for settlement purposes will be applied in the Market Settlement and Transfer Solution (MSATS) as per all other market connection points (i.e. the generated energy will be adjusted by the DLF). The MLF in MMS will no longer be adjusted by the DLF.

The site specific DLFs for embedded generators (scheduled and non-scheduled) are published separately in the "Distribution Loss Factors for the 2009/10 Financial Year" document which is available on AEMO's website.

2.15 Interconnector Capability

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

Interconnector limits assumed for the MLF calculation 2009/10:

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	1300	1300	1300	1300
Victoria	New South Wales	1500	1500	1500	1500
Victoria	South Australia	460	460	460	460
South Australia	Victoria	300	300	300	300
Murraylink Vic	South Australia	220	220	220	220
Murraylink SA	Victoria	30	120	70	120
Terranora Interconnector Qld	NSW	200	200	200	200
Terranora Interconnector NSW	Qld	200	200	200	200
* 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 NEMMCO using the relevant load forecast data from TNSPs and historical generation data from the NEMMCO 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 2009/10.

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 2008 for 2009/10 financial year;
- Check that load shapes are consistent with load profile of the historical year 2007/08;

- 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 Queensland 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.
- Typically, generation loss factors are weighted against generator output and load loss factors against load consumption. However, where load and generation are connected to the same connection point and individual metering is not available for the separate components, the same loss factor is calculated for both the generator and load.

The static intra-regional loss factors that apply for the 2009/10 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

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.

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 2009/10 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. The Terranora Interconnector loss factor model, Murraylink loss factor model and the Basslink loss equation is included.

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 2009/10 financial year.

3 Differences in loss factors compared to the 2008/09 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 it is referred to the RRN, and are therefore more likely to be dispatched. The price paid to the 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

There are significant increases in MLF values compared with last year's values at locations north of Ross. However, it should be noted that last year's (2008/09) values were significantly lower than the 2007/08 values as a result of the drought conditions reducing Tarong and Swanbank generation with subsequent reduction in the transfer to North Queensland. This year's (2009/10) transfer has increased significantly due to the return to normal conditions together with additional Southern generation from Kogan Creek and Braemar. This has increased the MLF values in both Central and North Queensland, because of the decrease in Central to Southern Queensland transfers and increase in Central to Northern Queensland transfers, respectively.

Thus, the MLF values have returned to levels under pre-drought conditions. However, this year's (2009/10) values are lower than the 2007/08 values, because of the transmission reinforcements in North and Central Queensland during 2008/09.

There is a moderate increase in loss factors elsewhere due to the normal increase in network loading resulting from increased demand.

3.3 New South Wales

Northern New South Wales, in particular the mid-north coast, has relatively high load growth. But the supply for this area has decreased leading to higher loss factor values. The reason for this is that there is no additional QNI and Terranora transfer capability. In addition, there is a significant reduction in output from the two embedded generators at Lismore and Terranora. These generators were newly installed in the previous 2008/09 year and their forecast output at that time was above actual output.

The Loss factor at Hume PS has reduced by a substantial amount due to its increased generation and possibly variations of load patterns nearby. There is a transfer of load at Wagga between the 132kV and 66 kV buses, resulting in the higher Wagga North loss factor.

Similar to last year, there is again a significant amount of pumping operation at Lower Tumut. The difference between pumping and generation energy is just under 10% of the generation energy. This has resulted in an unacceptable MLF value. In accordance with the determination of the recent consultation and consistent with the current FLLF methodology, a time averaged MLF has been calculated for Lower Tumut.

3.4 Victoria

There is a significant reduction in Basslink import this year. As there is no major new generation installed, import from NSW and SA has increased. The loss factors for points associated with these interconnectors have subsequently reduced as more power is sent towards the regional reference node.

Loss factors in most parts of the region do not differ much from last year's values. These differences are in line with values normally encountered from increased yearly load growth.

3.5 South Australia

There is a significant increase in wind farm generation from existing and newly installed units. This has resulted in significant increase in SA to Victoria transfers on the Heywood interconnector and Murraylink. The loss factors at points associated with these interconnectors have subsequently increased as there is more power flowing away from the regional reference node towards Victoria.

In the South East corner where Snuggery PS and Ladbroke Grove are located, this situation is exacerbated by the reduction in generation from Ladbroke Grove and Canunda wind farm. Though the generation from Snuggery has increased improving the situation, the increase in loss factor values here is still slightly higher than other parts of the region.

3.6 Tasmania

Compared with last year, export to Victoria on Basslink has reduced and import has increased. As there is increased generation from the newly installed Bell Bay OCGT unit 4 and CCGT, generation from the hydro PS is significantly reduced.

The combined effect is that the Southern region, particularly areas from Palmerston onwards, have their loss factors substantially increased from last year. The increase elsewhere is moderate and in line with what is expected from normal load growth.

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[3].

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, Mount Colah 132, 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.

[3] 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's TNIs.

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

5 Region boundaries and regional reference nodes for 2009/10

Appendix F contains the list of regional reference nodes and region boundaries that apply for the 2009/10 financial year.

6 Appendix A: Intra-regional loss factors for 2009/10

Queensland (regional reference node is South Pine 275)

Loads

Location	Voltage (kV)	TNI code	2008/09 Loss factor	2009/10 Loss factor
Abermain	33	QABM	0.9958	1.0018
Abermain (Lockrose)	110	QABR	0.9918	0.999
Alan Sherriff	132	QASF	0.9924	1.0608
Algester	33	QALG	1.0099	1.0145
Alligator Creek	33	QALC	1.0284	1.0322
Alligator Creek	132	QALH	0.9976	1.0266
Ashgrove West	33	QAGW	1.0385	1.0402
Ashgrove West	110	QCBW	1.0405	1.0476
Belmont	110	QBMH	0.9987	1.0003
Belmont Wecker Road	11	QMOB	-	1.0103
Belmont Wecker Road	33	QBBS	1.0019	1.0037
Biloela	66/11	QBIL	0.908	0.9326
Blackwater	132	QBWH	0.9873	1.0375
Blackwater	66&11	QBWL	0.9889	1.0334
Bolingbroke	132	QBNB	0.9565	1.0046
Boyne Island	132	QBOL	0.9554	0.9749
Boyne Island	275	QBOH	0.9533	0.9727
Bulli Creek (CE)	132	QBK2	0.9733	0.9528
Bulli Creek (Waggamba)	132	QBLK	0.9733	0.9528
Bundamba	110	QBDA	0.9913	0.997
Burton Downs	132	QBUR	1.0104	1.0169
Cairns	22	QCRN	1.0303	1.0961
Cairns City	132	QCNS	1.0281	1.0935
Callemondah (Rail)	132	QCMD	0.9438	0.9623
Cardwell	22	QCDW	1.0321	1.0979
Clare	66	QCLR	0.9901	1.0743
Collinsville Load	33	QCOL	0.9661	0.9983
Coppabella (Rail)	132	QCOP	1.0371	1.0493
Dan Gleeson	66	QDGL	0.9994	1.0678
Dingo (Rail)	132	QDNG	0.9742	1.015
Dysart	66/22	QDYS	1.0276	1.05

Location	Voltage (kV)	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Edmonton	22	QEMT	1.0342	1.1006
Egans Hill	66	QEGN	0.936	0.9613
El Arish	22	QELA	1.0456	1.1023
Garbutt	66	QGAR	0.9871	1.0597
Gin Gin	132	QGNG	0.9658	0.9823
Gladstone	132	QGLA	0.9462	0.9627
Gladstone South	66/11	QGST	0.945	0.9646
Goodna	33	QGDA	0.9939	0.9977
Grantleigh (Rail)	132	QGRN	0.9473	0.9813
Gregory (Rail)	132	QGRE	0.9769	0.9988
Ingham	66	QING	0.9989	1.0692
Innisfail	22	QINF	1.0372	1.1073
Invicta Load	132	QINV	0.9805	1.077
Kamerunga	22	QKAM	1.0171	1.0967
Kemmis	132	QEMS	0.9999	1.0209
King Creek	132	QKCK	0.9685	1.0217
Lilyvale (Barcaldine)	132	QLCM	0.97	0.9961
Loganlea	33	QLGL	1.0049	1.0073
Lilyvale	66	QLIL	0.9762	0.9991
Loganlea	110	QLGH	1.0001	1.0035
Mackay	33	QMKA	1.0106	1.0326
Middle Ridge (Energex)	110	QMRX	0.9777	0.9665
Middle Ridge (Ergon)	110	QMRG	0.9777	0.9665
Mindi (Rail)	132	QMND	0.9734	1.0003
Molendinar	33	QMAL	-	1.002
Molendinar	110	QMAR	1.0057	0.9991
Moranbah (Mine)	66	QMRN	1.0334	1.0421
Moranbah (Town)	11	QMRL	1.0353	1.0348
Moranbah South (Rail)	132	QMBS	1.0335	1.0413
Moura	66/11	QMRA	0.9421	0.9682
Mt McLaren (Rail)	132	QMTM	1.0483	1.0588
Mudgeeraba	110	QMGB	0.9957	1.0012
Mudgeeraba	33	QMGL	-	1.0013
Murarrie (Belmont)	110	QMRE	0.9962	1.0005
Nebo	11	QNEB	0.9712	0.9963
Newlands	66	QNLD	1.0206	1.0378
North Goonyella	132	QNGY	1.0229	1.0426

Location	Voltage (kV)	TNI code	2008/09 Loss factor	2009/10 Loss factor
Norwich Park (Rail)	132	QNOR	1.0019	1.0266
Oonooie (Rail)	132	QOON	1.0152	1.0348
Palmwoods	132/110	QPWD	1.0097	1.0293
Peak Downs (Rail)	132	QPKD	1.0306	1.0456
Pioneer Valley	66	QPIV	1.0074	1.0366
Proserpine	66	QPRO	1.0074	1.0387
QAL (Gladstone South)	132	QQAH	0.9464	0.9655
QLD Nickel (Yabulu)	132	QQNH	0.992	1.0529
Redbank Plains	11	QRPN	0.9927	0.9958
Richlands	33	QRLD	1.0125	1.0201
Rockhampton	66	QROC	0.9469	0.969
Rocklands (Rail)	132	QRCK	0.9344	0.9567
Rocklea (Archerfield)	110	QRLE	1.0055	1.0095
Ross	132	QROS	0.9961	1.057
Runcorn	33	QRBS	1.0081	1.0112
South Pine	110	QSPN	1.005	1.0048
Stony Creek	132	QSYC	0.9891	1.0143
Sumner	110	QSUM	1.0114	1.0127
Swanbank (Raceview)	110	QSBK	0.9887	0.9902
Tangkam (Dalby)	110	QTKM	0.9772	0.9718
Tarong 132kV Load	132	QTRH	0.9676	0.9634
Tarong 66kV Load	66	QTRL	0.9686	0.9671
Teebar Creek	132	QTBC	0.9859	0.9991
Tennyson	33	QTNS	1.0107	1.0149
Tennyson (Rail)	110	QTNN	1.0083	1.0129
Townsville East	66	QTVE	0.9904	1.0801
Townsville South	66	QTVS	1.0032	1.0807
Townsville South (KZ)	132	QTZS	1.0075	1.0828
Tully	22	QTLL	1.0456	1.1191
Turkinje	66	QTUL	1.0409	1.1069
Turkinje (Craiglee)	132	QTUH	1.0393	1.1052
Wandoo (Rail)	132	QWAN	0.9736	0.9999
Wivenhoe Pump	275	QWIP	0.9937	0.9954
Woolooga (Energex)	132	QWLG	0.9895	0.9993
Woolooga (Ergon)	132	QWLN	0.9895	0.9993
Woree	132	QWRE	1.0263	1.09
Yarwun – Boat Creek (Ergon)	132	QYAE	-	0.9667

Location	Voltage (kV)	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Yarwun – Rio Tinto	132	QYAR	-	0.9667

Generators

Location	Voltage (kV)	Dispatched Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Barron Gorge PS Unit 1	132	BARRON-1	QBGH1	QBGH	0.9861	1.0691
Barron Gorge PS Unit 2	132	BARRON-2	QBGH2	QBGH	0.9861	1.0691
Braemar PS	275	BRAEMAR1	QBRA1	QBRA	0.9609	0.9436
Braemar PS	275	BRAEMAR2	QBRA2	QBRA	0.9609	0.9436
Braemar PS	275	BRAEMAR3	QBRA3	QBRA	0.9609	0.9436
Braemar Stage 2 PS Unit 5	275	BRAEMAR5	QBRA5B	QBRA	0.9609	0.9436
Braemar Stage 2 PS Unit 6	275	BRAEMAR6	QBRA6B	QBRA	0.9609	0.9436
Braemar Stage 2 PS Unit 7	275	BRAEMAR7	QBRA7B	QBRA	0.9609	0.9436
Callide A PS Load	132	CALLNL1	QCAX	QCAX	0.8997	0.9229
Callide A PS Unit 2	132	CALL_A_2	QCAA2	QCAA	0.8997	0.9229
Callide A PS Unit 4	132	CALL_A_4	QCAA4	QCAA	0.8997	0.9229
Callide B PS Unit 1	275	CALL_B_1	QCAB1	QCAB	0.9049	0.9242
Callide B PS Unit 2	275	CALL_B_2	QCAB2	QCAB	0.9049	0.9242
Callide C PS Unit 3	275	CPP_3	QCAC3	QCAC	0.9041	0.9218
Callide C PS Unit 4	275	CPP_4	QCAC4	QCAC	0.9041	0.9218
Collinsville PS Load	132	COLNSNL1	QCLX	QCLX	0.9487	0.9793
Collinsville PS Unit 1	132	COLNSV_1	QCVL1	QCVP	0.9487	0.9793
Collinsville PS Unit 2	132	COLNSV_2	QCVL2	QCVP	0.9487	0.9793
Collinsville PS Unit 3	132	COLNSV_3	QCVL3	QCVP	0.9487	0.9793
Collinsville PS Unit 4	132	COLNSV_4	QCVL4	QCVP	0.9487	0.9793
Collinsville PS Unit 5	132	COLNSV_5	QCVL5	QCVP	0.9487	0.9793
Gladstone PS (132 kV) Unit 3	132	GSTONE3	QGLD3	QGLL	0.9362	0.9559
Gladstone PS (132 kV) Unit 4	132	GSTONE4	QGLD4	QGLL	0.9362	0.9559
Gladstone PS (132kV) Load	132	GLADNL1	QGLL	QGLL	0.9362	0.9559
Gladstone PS (275 kV) Unit 1	275	GSTONE1	QGLD1	QGLH	0.935	0.957
Gladstone PS (275 kV) Unit 2	275	GSTONE2	QGLD2	QGLH	0.935	0.957
Gladstone PS (275 kV) Unit 5	275	GSTONE5	QGLD5	QGLH	0.935	0.957
Gladstone PS (275 kV) Unit 6	275	GSTONE6	QGLD6	QGLH	0.935	0.957
Kareeya PS Unit 1	11	KAREEYA1	QKAH1	QKAH	0.9986	1.0491
Kareeya PS Unit 2	11	KAREEYA2	QKAH2	QKAH	0.9986	1.0491
Kareeya PS Unit 3	11	KAREEYA3	QKAH3	QKAH	0.9986	1.0491
Kareeya PS Unit 4	11	KAREEYA4	QKAH4	QKAH	0.9986	1.0491
Kogan Creek PS	275	KPP_1	QBRA4K	QBRA	0.9609	0.9436
Koombooloomba	132	KAREEYA5	QKYH5	QKYH	0.9996	1.0545
Mackay GT	33k	MACKAYGT	QMKG	QMKG	0.9568	1.0357

Location	Voltage (kV)	Dispatched Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Millmerran PS Unit 1 (Millmerran)	330	MPP_1	QBCK1	QMLN	0.9708	0.9544
Millmerran PS Unit 2 (Millmerran)	330	MPP_2	QBCK2	QMLN	0.9708	0.9544
Mt Stuart PS Unit 1	132	MSTUART1	QMSP1	QMSP	0.9446	1.0321
Mt Stuart PS Unit 2	132	MSTUART2	QMSP2	QMSP	0.9446	1.0321
Mt Stuart PS Unit 3	132	MSTUART3	QMSP3M	QMSP	0.9446	1.0321
Oakey PS Unit 1	110	OAKEY1	QOKY1	QOKY	0.9389	0.9305
Oakey PS Unit 2	110	OAKEY2	QOKY2	QOKY	0.9389	0.9305
Stanwell PS Load	132	STANNL1	QSTX	QSTX	0.9232	0.9467
Stanwell PS Unit 1	275	STAN-1	QSTN1	QSTN	0.9232	0.9467
Stanwell PS Unit 2	275	STAN-2	QSTN2	QSTN	0.9232	0.9467
Stanwell PS Unit 3	275	STAN-3	QSTN3	QSTN	0.9232	0.9467
Stanwell PS Unit 4	275	STAN-4	QSTN4	QSTN	0.9232	0.9467
Swanbank B PS Unit 1	275	SWAN_B_1	QSWB1	QSWB	0.9887	0.9908
Swanbank B PS Unit 2	275	SWAN_B_2	QSWB2	QSWB	0.9887	0.9908
Swanbank B PS Unit 3	275	SWAN_B_3	QSWB3	QSWB	0.9887	0.9908
Swanbank B PS Unit 4	275	SWAN_B_4	QSWB4	QSWB	0.9887	0.9908
Swanbank E GT	275	SWAN_E	QSWE	QSWE	0.9885	0.9913
Swanbank PS Load	110	SWANNL2	QSW1	QSWB	0.9887	0.9908
Tarong North PS	275	TNPS1	QTNT	QTNT	0.9673	0.9656
Tarong PS Unit 1	275	TARONG#1	QTRN1	QTRN	0.9665	0.9659
Tarong PS Unit 2	275	TARONG#2	QTRN2	QTRN	0.9665	0.9659
Tarong PS Unit 3	275	TARONG#3	QTRN3	QTRN	0.9665	0.9659
Tarong PS Unit 4	275	TARONG#4	QTRN4	QTRN	0.9665	0.9659
Wivenhoe Generation Unit 1	275	W/HOE#1	QWIV1	QWIV	0.9866	0.9868
Wivenhoe Generation Unit 2	275	W/HOE#2	QWIV2	QWIV	0.9866	0.9868
Wivenhoe Pump 1	275	PUMP1	QWIP1	QWIP	0.9937	0.9954
Wivenhoe Pump 2	275	PUMP2	QWIP2	QWIP	0.9937	0.9954
Wivenhoe Small Hydro	110	WIVENSH	QABR1	QABR	0.9918	0.999
Yabulu PS	132	YABULU	QTYP	QTYP	0.9668	1.028
Yarwun – Rio Tinto Generator	132	YARWUN_1	QYAG1R	QYAG	-	0.9667

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09 Loss factor	2009/10 Loss factor
Barcaldine PS @ Lilyvale	132	BARCALDN	QBCG	QBCG	0.9305	0.973
Condamine PS	132	CPSA	QCND1C	QCND	0.9691	0.9638
Daandine PS	110	DAANDINE	QTKM1	QTKM	0.9772	0.9718
German Creek Generator	66	GERMCRK	QLIL2	QLIL	0.9762	0.9991
Isis CSM	132	ICSM	QGNG1I	QTBC	0.9859	0.9991
KRC Co-Gen	110	KRCCOGEN	QMRG1K	QMRG	0.9777	0.9665
Moranbah Gen	11	MORANBAH	QMRL1M	QMRL	1.0353	1.0348
Oakey Creek Generator	66	OAKYCREK	QLIL1	QLIL	0.9762	0.9991
Rochedale Renewable Energy Plant	110	ROCHEDAL	QBMH2	QBMH	0.9987	1.0003
Rocky Point Gen (Loganlea)	110	RPCG	QLGH2	QLGH	1.0001	1.0035
Roghan Road Generator	110	EDLRGNRD	QSPN2	QSPN	1.0048	1.0024
Roma PS @ Tarong Unit 7	132	ROMA_7	QRMA7	QRMA	0.9598	0.9594
Roma PS @ Tarong Unit 8	132	ROMA_8	QRMA8	QRMA	0.9598	0.9594
Somerset Dam Hydro Gen (South Pine)	110	SOMERSET	QSPN1	QSPN	1.005	1.0048
Southbank Institute of Technology	110	STHBKTEC	QCBD1S	QCBD	1.0405	1.0476
Suncoast Gold Macadamias Co-Gen (Palmwoods)	110	SUNCOAST	QPWD1	QPWD	1.0097	1.0293
Ti Tree BioReactor	33	TITREE	QABM1T	QABM	0.9958	1.0018
Windy Hill Windfarm (Turkinje)	66	WHILL1	QTUL	QTUL	1.0409	1.1069
Yabulu Steam Turbine (Garbutt)	66	YABULU2	QGAR1	QYST	0.9711	1.0363

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

Loads

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Albury	132	NALB	1.046	1.0413
Alcan (EA)	132	NALC	1.0051	1.0042
ANM	132	NANM	1.0484	1.0448
Armidale	66	NAR1	0.916	0.9687
Balranald	22	NBAL	1.1075	1.1234
Beaconsfield West	132	NBFW	1.01	1.0102
Beresfield (EA)	33	NBRF	1.0045	1.0015
Beryl	66	NBER	0.9943	0.9955
BHP (Waratah) (EA)	132	NWR1	0.9956	0.9941
Boambee South	132	NWST	0.9584	1.0032
Broken Hill	22	NBKG	1.1578	1.1708
Broken Hill	220	NBKH	1.1558	1.1625
Bunnerong (EA)	132	NBG1	1.0137	1.0279
Bunnerong (EA)	33	NBG3	1.0204	1.0215
Burrinjuck	132	NBU2	1.0197	1.0132
Canterbury (EA)	33	NCTB	1.0236	1.0222
Carlingford	132	NCAR	1.003	1.0033
Casino (CE)	132	NCSN	0.9537	1.0131
Coffs Harbour	66	NCH1	0.941	0.9978
Charmhaven (EA)	11	NCHM	0.9898	0.9946
Chullora (EA)	132	NCHU	1.0128	1.013
Coleambally	132	NCLY	1.0706	1.0585
Cooma 132 & 66	132	NCMA	1.0395	1.0269
Cowra	66	NCW8	1.0425	1.0327
Dapto (CE)	132	NDT2	1.0006	1
Dapto (Integral)	132	NDT1	1.0006	1
Darlington Point	132	NDNT	1.0577	1.0543
Deniliquin	66	NDN7	1.1185	1.1002
Dorrigo	132	NDOR	0.9471	0.9873
Drummoyne	11	NDRM	1.0201	1.0191
Dunoon (CE)	132	NDUN	0.9563	1.0101
Far North VTN (EA)		NEV1	0.947	0.9615
Finley	66	NFNY	1.1067	1.0928
Forbes	66	NFB2	1.0587	1.0479

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Gadara	132	NGAD	1.038	1.0258
Glen Innes	66	NGLN	0.9446	1.0033
Gosford (EA)	33	NGSF	1.0018	1.0138
Gosford (EA)	66	NGF3	1.0005	1.0117
Green Square (EA)	11	NGSQ	1.0101	1.0101
Griffith	33	NGRF	1.0836	1.0779
Gunnedah	66	NGN2	0.988	1.0085
Haymarket	132	NHYM	1.0095	1.0095
Homebush Bay (EA)	11	NHBB	1.0173	1.0164
Ilford	132	NLFD	0.9826	0.983
Ingleburn	66	NING	0.9994	1.0006
Inverell	66	NNVL	0.9772	1.0179
Kemps Creek	330	NKCK	0.9951	0.9965
Kempsey	33	NKS3	1.0067	1.0324
Kempsey	66	NKS2	1.0069	1.0321
Koolkhan	66	NKL6	0.9625	1.0155
Kurri	132	NKUR	0.9981	1.0014
Kurri	33	NKU3	1.004	1.0037
Kurri	66	NKU6	1.0063	1.0042
Lane Cove	132	NLCV	1.0147	1.0133
Liddell	33	NLD3	0.9506	0.9619
Lismore (CE)	132	NLS2	0.9582	1.025
Liverpool	132	NLP1	1.0035	0.9997
Macarthur	132	NMC1	0.9965	0.9954
Macarthur	66	NMC2	0.9974	0.9986
Macksville	132	NMCV	0.9938	1.0165
Macquarie Park	11	NMQP	1.0168	1.0156
Manildra	132	NMLD	1.0146	1.0139
Marrickville (EA)	11	NMKV	1.0179	1.0175
Marulan (CE)	132	NMR1	0.9908	0.9897
Marulan (IE)	132	NMR2	0.9908	0.9897
Mason Park (EA)	132	NMPK	1.0139	1.013
Meadowbank (EA)	11	NMBK	1.0188	1.0176
Molong	132	NMOL	1.0126	1.0111
Moree	66	NMRE	1.0312	1.0512
Mt Piper	132	NMPP	0.9668	0.9664
Mt Piper	66	NMP6	0.9668	0.9664

Location	**Voltage kV**	**TNI code**	**2008/09**	**2009/10**
			Loss factor	**Loss factor**
Mudgee	132	NMDG	0.9931	0.994
Mullumbimby (CE)	132	NMLB	0.9595	1.0108
Munmorah (EA)	33	NMNP	0.987	0.9925
Munyang	11	NMY1	1.0459	1.0289
Munyang	33	NMYG	1.0459	1.0289
Murrumbateman	132	NMBM	1.0142	1.0309
Murrumburrah	66	NMRU	1.0371	1.0305
Muswellbrook	132	NMRK	0.9465	0.9614
Nambucca Heads	132	NNAM	0.9744	1.0101
Narrabri	66	NNB2	1.0177	1.0401
Newcastle	132	NNEW	0.9933	0.9924
North of Broken Bay VTN (EA)		NEV2	0.9944	0.9952
Orange	132	NRG1	1.027	1.0208
Orange	66	NRGE	1.0268	1.022
Ourimbah (EA)	33	NORB	0.9963	1.0107
Panorama	66	NPMA	1.0192	1.0127
Parkes	132	NPKS	1.0488	1.044
Parkes	66	NPK6	1.0511	1.0461
Peakhurst (EA)	132	NPH1	-	1.0063
Peakhurst (EA)	33	NPHT	1.0112	1.0112
Pt Macquarie	33	NPMQ	1.0554	1.0661
Pyrmont (EA)	132	NPT1	1.0167	1.0163
Pyrmont (EA)	33	NPT3	1.0132	1.0131
Raleigh	132	NRAL	0.9611	1.0054
Regentville	132	NRGV	0.9976	0.9986
Rozelle (EA)	132	NRZH	1.0169	1.0178
Rozelle (EA)	33	NRZL	1.017	1.0161
Snowy Adit	132	NSAD	1.0263	1.0174
Somersby (EA)	11	NSMB	1.0011	1.0117
South of Broken Bay VTN (EA)		NEV3	1.0089	1.0087
St Peters	11	NSPT	1.0145	1.0141
Stroud	132	NSRD	1.0409	1.0318
Sydney East	132	NSE2	1.0057	1.0067
Sydney North (EA)	132	NSN1	1.0055	1.003
Sydney North (IE)	132	NSN2	1.0055	1.003
Sydney South	132	NSYS	1.0021	1.0032
Sydney West (EA)	132	NSW1	1.003	1.0033

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Sydney West (IE)	132	NSW2	1.003	1.0033
Tamworth	66	NTA2	0.9396	0.97
Taree (CE)	132	NTR2	1.0764	1.0627
Tenterfield	132	NTTF	0.955	1.0103
Terranora (CE)	110	NTNR	0.948	1.0397
Tomago (EA)	33	NTMJ	1.0065	0.9916
Tomago	330	NTMG	0.9893	0.9918
Tuggerah	132	NTG3	0.9915	1.0039
Tumut	66	NTU2	1.0423	1.0252
Vales Pt. (EA)	132	NVP1	0.9845	0.9848
Vineyard	132	NVYD	0.9988	0.9987
Wagga	66	NWG2	1.0422	1.0264
Wagga North	66	NWG6	-	1.0268
Wagga North	132	NWGN	0.9959	1.0300
Wallerawang (CE)	132	NWW8	0.9677	0.9677
Wallerawang (IE)	132	NWW9	0.9677	0.9677
Wellington	132	NWL8	0.9708	0.9789
West Gosford (EA)	11	NGWF	1.0025	1.0138
Wyong (EA)	11	NWYG	0.9933	0.9989
Yanco	33	NYA3	1.072	1.0602
Yass	132	NYS1	1.0182	0.992
Yass	66	NYS6	1.015	1.0089

Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09 Loss factor	2009/10 Loss factor
Bayswater PS Unit 1	330	BW01	NBAY1	NBAY	0.9478	0.9579
Bayswater PS Unit 2	330	BW02	NBAY2	NBAY	0.9478	0.9579
Bayswater PS Unit 3[4]	330	BW03	NBAY3	NBAY	0.9478	0.9579
Bayswater PS Unit 4	500	BW04	NBAY4	NBYW	-	0.959
Blowering	132	BLOWERNG	NBLW8	NBLW	1.0376	1.0205
Blowering Ancillary Services	132		NBLW1	NBLW	1.0376	1.0205
Broken Hill GT 1	22	GB01	NBKG1	NBK1	1.1578	1.1708
Burrinjuck	132	BURRIN	NBUK	NBUK	1.0174	1.0032
Capital Wind Farm	330	CAPTL_WF	NCWF1R	NCWF		1.0011
Colongra PS Unit 1	330	CG1	NCLG1D	NCLG	0.981	0.9854
Colongra PS Unit 2	330	CG2	NCLG2D	NCLG	0.981	0.9854
Colongra PS Unit 3	330	CG3	NCLG3D	NCLG	0.981	0.9854
Colongra PS Unit 4	330	CG4	NCLG4D	NCLG	0.981	0.9854
Cullerin Range Wind Farm	132	CULLRGWF	NYS11C	NYS1		1.0055
Eraring 330 PS Unit 1	330	ER01	NEPS1	NEP3	0.9818	0.9839
Eraring 330 PS Unit 2	330	ER02	NEPS2	NEP3	0.9818	0.9839
Eraring 500 PS Unit 3	500	ER03	NEPS3	NEPS	0.9837	0.9858
Eraring 500 PS Unit 4	500	ER04	NEPS4	NEPS	0.9837	0.9858
Eraring PS Load	500	ERNL1	NEPSL	NEPS	0.9837	0.9858
Guthega	132	GUTH-1	NGUT	NGUT	0.9798	0.9359
Guthega	132	GUTHEGA	NGUT8	NGUT	0.9798	0.9359
Guthega Ancillary Services 2	132	GUTH-2	NGUT2	NGUT	0.9798	0.9359
Hume (NSW Share)	132	HUMENSW	NHUM	NHUM	1.0703	1.021
Kangaroo Valley – Bendeela (Shoalhaven) 330	330	SHGEN	NSHL	NSHL	1.0162	1.0144
Kangaroo Valley (Shoalhaven) 330 Pumps	330	SHPUMP	NSHP1	NSHL	1.0162	1.0144
Liddell 330 PS Load	330	LIDDNL1	NLDPL	NLDP	0.9491	0.9585
Liddell 330 PS Unit 1	330	LD01	NLDP1	NLDP	0.9491	0.9585
Liddell 330 PS Unit 2	330	LD02	NLDP2	NLDP	0.9491	0.9585
Liddell 330 PS Unit 3	330	LD03	NLDP3	NLDP	0.9491	0.9585
Liddell 330 PS Unit 4	330	LD04	NLDP4	NLDP	0.9491	0.9585
Lower Tumut[5]	330	TUMUT3	NLTS	NLTS	1.0197	1.0151
Lower Tumut Ancillary Services 2 (pumps)	330	SNOWYP	NLTS3	NLTS	1.0197	1.0151

[4] Bayswater Unit 3 switches on to the 500 kV connection point in April 2010. Refer to section 2.7 of this report for details.

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

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Mt Piper PS Load	330	MPNL1	NMPPL	NMTP	0.9651	0.9683
Mt Piper PS Unit 1	330	MP1	NMTP1	NMTP	0.9651	0.9683
Mt Piper PS Unit 2	330	MP2	NMTP2	NMTP	0.9651	0.9683
Munmorah 330 Load	330	MMNL1	NMNPL	NMN1	0.9845	0.9866
Munmorah Unit 3	330	MM3	NMNP3	NMN1	0.9845	0.9866
Munmorah Unit 4	330	MM4	NMNP4	NMN1	0.9845	0.9866
Tomago 1	330		NTMG1	NTMG	0.9893	0.9918
Tomago 2	330		NTMG2	NTMG	0.9893	0.9918
Tomago 3	330		NTMG3	NTMG	0.9893	0.9918
Upper Tumut	330	UPPTUMUT	NUTS8	NUTS	0.9796	0.9854
Uranquinty PS Unit 11	132	URANQ11	NURQ1U	NURQ	0.9571	0.9959
Uranquinty PS Unit 12	132	URANQ12	NURQ2U	NURQ	0.9571	0.9959
Uranquinty PS Unit 13	132	URANQ13	NURQ3U	NURQ	0.9571	0.9959
Uranquinty PS Unit 14	132	URANQ14	NURQ4U	NURQ	0.9571	0.9959
Vales Point 330 PS Load	330	VPNL1	NVPPL	NVPP	0.9844	0.984
Vales Point 330 PS Unit 5	330	VP5	NVPP5	NVPP	0.9844	0.984
Vales Point 330 PS Unit 6	330	VP6	NVPP6	NVPP	0.9844	0.984
Wallerawang 330 PS Load	330	WWNL1	NWWPL	NWWP	0.966	0.9688
Wallerawang 330 Unit 7	330	WW7	NWW27	NWWP	0.966	0.9688
Wallerawang 330 Unit 8	330	WW8	NWW28	NWWP	0.966	0.9688

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Awaba Renewable Energy Facility	132	AWABAREF	NNEW2	NNEW	0.9933	0.9924
Bankstown Sport Club	132		NSYS3R	NSYS	1.0055	1.003
Broadwater PS	66	BWTR1	NLS21B	NLS2	0.9582	1.025
Brown Mountain	66	BROWNMT	NCMA1	NBRM	1.0395	1.0269
Campbelltown WSLC	66		NING1C	NING	0.9994	1.0006
Condong PS	66	CONDONG1	NTNR1C	NTNR	0.948	1.0397
EarthPower Biomass Plant	132	PMATTAEP	NSW22	NSW1	1.003	1.0033
Eastern Creek	132	EASTCRK	NSW21	NSW2	1.003	1.0033
Eraring BS UN (GT)	330	ERGT01	NEP35B	NEP3	0.9818	0.9839
Glenn Innes (Pindari PS)	66	PINDARI	NGLN1	NGLN	0.9446	1.0033
Grange Avenue	11	GRANGEAV	NVYD1	NVYD	0.9988	0.9987
HEZ Power Station	33	HEZ	NKU31H	NKU3	1.004	1.0037
Jindabyne Generator	132	JNDABNE1	NCMA2	NCMA	1.0021	1.0032
Jounama PS	66	JOUNAMA1	NTU21J	NTU2	1.0423	1.0252
Keepit	66	KEEPIT	NKPT	NKPT	0.988	1.0085
Liddell – Hunter Valley GTs	33	HVGTS	NLD31	NLD3	0.9506	0.9619
Liverpool (Jacks Gully)	132	JACKSGUL	NLP11	NLP1	1.0035	0.9997
Lucas Heights Stage 2 Power Station	132	LUCAS2S2	NSYS1	NSYS	1.0055	1.003
Redbank PS Unit 1	132	REDBANK1	NMRK1	NRED	0.9449	0.9602
Sithe	132	SITHE01	NSYW1	NSW2	1.003	1.0033
Tallawarra PS	132	TALWA1	NDT13T	NTWA	1	0.9972
Teralba Power Station	132	TERALBA	NNEW1	NNEW	0.9933	0.9924
West Nowra	132	AGLNOW1	NDT12	NDT1	1.0006	1
Woodlawn Bioreactor	132	WDLNGN01	NMR21W	NMR2	0.9908	0.9897

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

Loads

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Canberra	132	ACA1	1.0179	1.0117
Queanbeyan (ACTEW)	66	AQB1	1.0298	1.0197
Queanbeyan (CE)	66	AQB2	1.0298	1.0197

Victoria (regional reference node is Thomastown 66)

Loads

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Altona	66	VATS	1.0061	1.0075
Ballarat	66	VBAT	1.0383	1.0336
Bendigo	22	VBE2	1.0735	1.0695
Bendigo	66	VBE6	1.0727	1.0695
BHP Western Port	220	VJLA	0.9896	0.9898
Brooklyn (Jemena)	22	VBL2	1.0038	1.0049
Brooklyn (Jemena)	66	VBL6	1.0035	1.0058
Brooklyn (POWERCOR)	22	VBL3	1.0038	1.0049
Brooklyn (POWERCOR)	66	VBL7	1.0035	1.0058
Brunswick (CITIPOWER)	22	VBT2	0.9979	0.9983
Brunswick (Jemena)	22	VBTS	0.9979	0.9983
Cranbourne (SPI Electricity)	66	VCBT	0.9896	0.9897
Cranbourne (UE)	66	VCB5	0.9896	0.9897
East Rowville (SPI Electricity)	66	VER2	0.9924	0.9932
East Rowville (UE)	66	VERT	0.9924	0.9932
Fishermens Bend (CITIPOWER)	66	VFBT	0.9999	1.0001
Fishermens Bend (POWERCOR)	66	VFB2	0.9999	1.0001
Fosterville	220	VFVT	1.067	1.063
Geelong	66	VGT6	1.01	1.0091
Glenrowan	66	VGNT	1.0406	1.0353
Heatherton	66	VHTS	0.9969	0.9978
Horsham	66	VHOT	1.0716	1.0827
Keilor (Jemena)	66	VKT2	1.007	1.0089
Keilor (POWERCOR)	66	VKTS	1.007	1.0089
Kerang	22	VKG2	1.1021	1.0997
Kerang	66	VKG6	1.1027	1.1002
Khancoban	330	NKHN	1.0085	1.0008
Loy Yang Power Station Switchyard (Basslink)	500	VTBL	0.9758	0.9722
Loy Yang Substation	66	VLY6	0.9709	0.9698
Malvern	22	VMT2	0.9968	1.0048
Malvern	66	VMT6	1.0063	1.0024
Morwell TS	66	VMWT	0.9709	0.9703
Mt Beauty	66	VMBT	1.0171	1.0073

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Portland	500	VAPD	1.0133	1.0112
Pt Henry	220	VPTH	1.0145	1.0136
Red Cliffs	22	VRC2	1.126	1.1232
Red Cliffs	66	VRC6	1.1228	1.1162
Red Cliffs (CE)	66	VRCA	1.1228	1.1162
Richmond	22	VRT2	0.9963	0.9967
Richmond (CITIPOWER)	66	VRT7	1.0062	1.0077
Richmond (UE)	66	VRT6	1.0062	1.0077
Ringwood (SPI Electricity)	22	VRW3	1.0021	0.9982
Ringwood (SPI Electricity)	66	VRW7	0.9999	0.9983
Ringwood (UE)	22	VRW2	1.0021	0.9982
Ringwood (UE)	66	VRW6	0.9999	0.9983
Shepparton	66	VSHT	1.0541	1.0472
South Morang	66	VSM6	-	0.9913
South Morang	66	VSMT	-	0.9913
Springvale (CITIPOWER)	66	VSVT	0.9993	1.0004
Springvale (UE)	66	VSV2	0.9993	1.0004
Templestowe (CITIPOWER)	66	VTS2	1	1.0001
Templestowe (Jemena)	66	VTST	1	1.0001
Templestowe (SPI Electricity)	66	VTS3	1	1.0001
Templestowe (UE)	66	VTS4	1	1.0001
Terang	66	VTGT	1.0436	1.0395
Thomastown (Jemena)	66	VTTS	1	1
Thomastown (SPI Electricity)	66	VTT2	1	1
Tyabb	66	VTBT	0.9924	0.9931
West Melbourne	22	VWM2	1.0009	1.001
West Melbourne (CITIPOWER)	66	VWM7	1.0021	1.0022
West Melbourne (Jemena)	66	VWM6	1.0021	1.0022
Wodonga	22	VWO2	1.0248	1.017
Wodonga	66	VWO6	1.0237	1.013
Yallourn	11	VYP1	0.9527	0.9559

Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Banimboola	220	BAPS	VDPS2	VDPS	1.0137	1.0226
Basslink (Loy Yang Power Station Switchyard)	500	BLNKVIC	VLYP13	VTBL	0.9758	0.9722
Bogong PS and McKay Creek PS	220	MCKAY1	VMK1	VT14	-	0.9728
Laverton	220	LAVNORTH	VAT21	VAT2	0.9966	0.996
Dartmouth PS	220	DARTM1	VDPS	VDPS	1.0137	1.0226
Hazelwood PS Load	220	HWPNL1	VHWPL	VHWP	0.9675	0.9668
Eildon PS Unit 1	220	EILDON1	VEPS1	VEPS	0.99	0.9876
Eildon PS Unit 2	220	EILDON2	VEPS2	VEPS	0.99	0.9876
Hazelwood PS Unit 1	220	HWPS1	VHWP1	VHWP	0.9675	0.9668
Hazelwood PS Unit 2	220	HWPS2	VHWP2	VHWP	0.9675	0.9668
Hazelwood PS Unit 3	220	HWPS3	VHWP3	VHWP	0.9675	0.9668
Hazelwood PS Unit 4	220	HWPS4	VHWP4	VHWP	0.9675	0.9668
Hazelwood PS Unit 5	220	HWPS5	VHWP5	VHWP	0.9675	0.9668
Hazelwood PS Unit 6	220	HWPS6	VHWP6	VHWP	0.9675	0.9668
Hazelwood PS Unit 7	220	HWPS7	VHWP7	VHWP	0.9675	0.9668
Hazelwood PS Unit 8	220	HWPS8	VHWP8	VHWP	0.9675	0.9668
Jeeralang A PS Unit 1	220	JLA01	VJLGA1	VJLG	0.9626	0.9621
Jeeralang A PS Unit 2	220	JLA02	VJLGA2	VJLG	0.9626	0.9621
Jeeralang A PS Unit 3	220	JLA03	VJLGA3	VJLG	0.9626	0.9621
Jeeralang A PS Unit 4	220	JLA04	VJLGA4	VJLG	0.9626	0.9621
Jeeralang B PS Unit 1	220	JLB01	VJLGB1	VJLG	0.9626	0.9621
Jeeralang B PS Unit 2	220	JLB02	VJLGB2	VJLG	0.9626	0.9621
Jeeralang B PS Unit 3	220	JLB03	VJLGB3	VJLG	0.9626	0.9621
Jindabyne pump at Guthega	132	SNOWYGJP	NGJP	NGJP	1.1099	1.0714
Loy Yang A PS Load	500	LYNL1	VLYPL	VLYP	0.9703	0.9698
Loy Yang A PS Unit 1	500	LYA1	VLYP1	VLYP	0.9703	0.9698
Loy Yang A PS Unit 2	500	LYA2	VLYP2	VLYP	0.9703	0.9698
Loy Yang A PS Unit 3	500	LYA3	VLYP3	VLYP	0.9703	0.9698
Loy Yang A PS Unit 4	500	LYA4	VLYP4	VLYP	0.9703	0.9698
Loy Yang B PS Unit 1	500	LOYYB1	VLYP5	VLYP	0.9703	0.9698
Loy Yang B PS Unit 2	500	LOYYB2	VLYP6	VLYP	0.9703	0.9698
Morwell PS G4	11	MOR2	VMWP4	VMWP	0.9623	0.9635

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Morwell PS G5	11	MOR3	VMWP5	VMWP	0.9623	0.9635
Morwell PS G1, 2 and 3	11	MOR1	VMWT1	VMWG	0.9706	0.97
Morwell PS Load	11	MORNL1	VMWTL	VMWT	0.9709	0.9703
Murray	330	MURRAY	NMUR8	NMUR	0.9772	0.9547
Newport PS	220	NPS	VNPS	VNPS	0.9935	0.9939
Portland 500 DU 1	500	APD01	VAPD1	VAPD	1.0133	1.0112
Portland 500 DU 2	500	APD02	VAPD2	VAPD	1.0133	1.0112
Pt Henry DU 1	220	PTH01	VPTH1	VPTH	1.0145	1.0136
Pt Henry DU 2	220	PTH02	VPTH2	VPTH	1.0145	1.0136
Pt Henry DU 3	220	PTH03	VPTH3	VPTH	1.0145	1.0136
Valley Power PS	500	VPGS	VLYP7	VLYP	0.9703	0.9698
VICSMLT	220	VICSMLT	VAPS1	VAPS	1.0145	1.0136
Waubra Wind Farm	66	WAUBRAWF	VWBT1A	VWBT		1.0352
West Kiewa PS Unit 1	220	WKIEWA1	VWKP1	VWKP	1.002	0.9968
West Kiewa PS Unit 2	220	WKIEWA2	VWKP2	VWKP	1.002	0.9968
Yallourn W PS 220 Unit 1	220	YWPS1	VYP21	VYP3	0.9566	0.9569
Yallourn W PS 220 Unit 2	220	YWPS2	VYP22	VYP2	0.9502	0.9521
Yallourn W PS 220 Unit 3	220	YWPS3	VYP23	VYP2	0.9502	0.9521
Yallourn W PS 220 Unit 4	220	YWPS4	VYP24	VYP2	0.9502	0.9521
Yallourn W PS 220 Load	220	YWNL1	VYP2L	VYP2	0.9502	0.9521

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Anglesea PS	220	APS	VAPS	VAPS	1.0145	1.0136
Bairnsdale Unit 1	66	BDL01	VMWT2	VBDL	0.9685	0.9673
Bairnsdale Unit 2	66	BDL02	VMWT3	VBDL	0.9685	0.9673
Ballarat Health Services	66	BBASEHOS	VBAT1H	VBAT	-	1.0336
Brooklyn Landfill	22	BROOKLYN	VBL61	VBL6	1.0035	1.0058
Hume (Victorian Share)	66	BROOKLYN	VHUM	VHUM	1.0003	0.9896
Longford	66	HLMSEW01	VMWT6	VMWT	0.9709	0.9703
Mornington Landfill Site Generator	66	MORNW	VTBT1	VTBT	0.9924	0.9931
Shepparton Waste Gas	66	SHEP1	VSHT2S	VSHT	1.0541	1.0472
Somerton Power Station	66	BROOKLYN	VTTS1	VSOM	1	0.9847
Sunshine Energy Park	66	HLMSEW01	VKTS1	VKTS	1.007	1.0089
Tatura	22	BROOKLYN	VSHT1	VSHT	1.0541	1.0472
Toora Wind Farm	66	HLMSEW01	VMWT5	VMWT	0.9709	0.9703
Wonthaggi Wind Farm	22	BROOKLYN	VMWT7	VMWT	0.9709	0.9703
Wyndham Landfill Site Generator	66	WYNDW	VATS1	VATS	1.0061	1.0075
Yambuk Wind Farm	66	HLMSEW01	VTGT1	VTGT	1.0436	1.0395

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

Loads

Location	Voltage kV	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Angas Creek	33	SANC	1.0158	1.0518
Ardrossan West	33	SARW	0.9415	0.9426
Baroota	33	SBAR	0.993	0.9834
Berri	66	SBER	1.0249	1.0738
Berri (POWERCOR)	66	SBE1	1.0249	1.0738
Blanche	33	SBLA	1.0075	1.0402
Blanche (POWERCOR)	33	SBL1	1.0075	1.0402
Brinkworth	33	SBRK	0.9847	0.9836
Bungama Industrial	33	SBUN	0.9787	0.9792
Bungama Rural	33	SBUR	0.9787	0.9793
Dalrymple	33	SDAL	0.906	0.9121
Davenport	275	SDAV	0.9674	0.9699
Davenport	33	SDAW		0.9735
Dorrien	33	SDRN	1.0152	1.0195
East Terrace	66	SETC	1.0076	1.0094
Happy Valley	66	SHVA	1.0102	1.0139
Hummocks	33	SHUM	0.9589	0.9592
Kadina East	33	SKAD	0.9616	0.9633
Kanmantoo	11	SKAN	1.0211	1.0229
Keith	33	SKET	1.0139	1.0367
Kilburn	66	SKLB	1.0035	1.0037
Kincraig	33	SKNC	1.0033	1.0368
Lefevre	66	SLFE	0.9986	1.0008
Leigh Creek	33	SLCC	0.996	1.0137
Leigh Creek South	33	SLCS	0.9942	1.0094
Magill	66	SMAG	1.0072	1.0088
Mannum	33	SMAN	1.022	1.0428
Mannum - Adelaide Pipeline 1	3.3	SMA1	1.0284	1.0532
Mannum - Adelaide Pipeline 2	3.3	SMA2	1.0285	1.0585
Mannum - Adelaide Pipeline 3	3.3	SMA3	1.0261	1.058
Middleback	132	SMBK	0.9856	0.984
Middleback	33	SMDL	0.986	0.9836
Millbrook	33	SMLB	1.0104	1.0095
Mobilong	33	SMBL	1.0212	1.0391

Location	Voltage kV	TNI code	2008/09 Loss factor	2009/10 Loss factor
Morgan - Whyalla Pipeline 1	3.3	SMW1	1.007	1.0349
Morgan - Whyalla Pipeline 2	3.3	SMW2	1.007	1.0247
Morgan - Whyalla Pipeline 3	3.3	SMW3	0.9948	1.0051
Morgan - Whyalla Pipeline 4	3.3	SMW4	0.9932	0.9992
Morphett Vale East	66	SMVE	1.0093	1.0127
Mt Barker	66	SMBA	1.0207	1.0213
Mt Gambier	33	SMGA	1.0083	1.0395
Mt Gunson	33	SMGU	0.9866	0.9793
Murray Bridge - Hahndorf Pipeline 1	11	SMH1	1.0216	1.0393
Murray Bridge - Hahndorf Pipeline 2	11	SMH2	1.023	1.0244
Murray Bridge - Hahndorf Pipeline 3	11	SMH3	1.0226	1.024
Neuroodla	33	SNEU	0.9834	0.9926
New Osborne	66	SNBN	0.9985	1.0006
North West Bend	66	SNWB	1.0076	1.035
Northfield	66	SNFD	1.0032	1.0049
Para	66	SPAR	1.0029	1.0052
Parafield Gardens West	66	SPGW	1.0018	1.0037
Pimba	132	SPMB	0.9904	0.9811
Playford	33	SPAA	0.9744	0.9713
Port Lincoln	33	SPLN	1	0.9768
Port Pirie	33	SPPR	0.9834	0.982
Roseworthy	11	SRSW	1.0129	1.0152
Snuggery Industrial	33	SSNN	0.9966	1.022
Snuggery Rural	33	SSNR	0.9955	1.0224
South Australian VTN		SJP1	1.0009	1.0057
Stony Point	11	SSPN	0.9754	0.9791
Tailem Bend	33	STAL	1.0145	1.0265
Templers	33	STEM	1.0105	1.0143
Torrens Island	66	STSY	1	1
Waterloo	33	SWAT	1.0019	1.0054
Whyalla	33	SWHY	0.9867	0.9836
Whyalla Terminal BHP	33	SBHP	0.9865	0.9837
Woomera	132	SWMA	0.9902	0.9808
Wudina	66	SWUD	1.0084	0.9952
Yadnarie	66	SYAD	0.996	0.9823

Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Cathedral Rocks Wind Farm	132	CATHROCK	SCRK	SCRK	0.9278	0.9044
Clements Gap Wind Farm	132	CLEMGPWF	SCGW1P	SCGW		0.9689
Dry Creek PS Unit 1	66	DRYCGT1	SDCA1	SDPS	1.0037	1.0063
Dry Creek PS Unit 2	66	DRYCGT2	SDCA2	SDPS	1.0037	1.0063
Dry Creek PS Unit 3	66	DRYCGT3	SDCA3	SDPS	1.0037	1.0063
Hallet Hill Wind Farm	275	HALLWF2	SMOK1H	SMOK		0.9824
Hallet PS	275	AGLHAL	SHPS1	SHPS	0.9702	0.976
Hallet Brown Hill Wind Farm	275	HALLWF1	SHPS2W	SHPS	0.9702	0.976
Ladbroke Grove PS Unit 1	132	LADBROK1	SPEW1	SPEW	0.9741	1.0105
Ladbroke Grove PS Unit 2	132	LADBROK2	SPEW2	SPEW	0.9741	1.0105
Lake Bonney Wind Farm	33	LKBONNY1	SMAY1	SMAY	0.9736	0.9891
Lake Bonney Wind Farm Stage 2	33	LKBONNY2	SMAY2	SMAY 2	0.9736	0.9891
Leigh Creek Northern PS Load 2	33	NPSNL2	SLCCL	SLCC	0.996	1.0137
Mintaro PS	132	MINTARO	SMPS	SMPS	0.9664	0.969
Mt Millar Wind Farm	33	MTMILLAR	SMTM1	SMTM	0.9632	0.9486
Northern PS Unit 1	275	NPS1	SNPA1	SNPS	0.965	0.9649
Northern PS Unit 2	275	NPS2	SNPA2	SNPS	0.965	0.9649
O.C.P.L. Unit 1	66	OSB-AG	SNBN1	SOCP	0.9985	1.0006
Pelican Point PS	275	PPCCGT	SPPT	SPPT	0.9986	0.9998
Playford Northern PS Load 1	33	NPSNL1	SPAAL	SPAA	0.9744	0.9713
Playford PS	275	PLAYB-AG	SPSD1	SPPS	0.9643	0.9671
Port Lincoln PS	132	POR01	SPLN1	SPTL	0.943	0.9161
Quarantine PS Unit 1	66	QPS1	SQPS1	SQPS	0.9943	1
Quarantine PS Unit 2	66	QPS2	SQPS2	SQPS	0.9943	1
Quarantine PS Unit 3	66	QPS3	SQPS3	SQPS	0.9943	1
Quarantine PS Unit 4	66	QPS4	SQPS4	SQPS	0.9943	1
Quarantine PS Unit 5	66	QPS5	SQPS5Q	SQPS	0.9943	1

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Snowtown Wind Farm	33	SNOWTWN1	SNWF1T	SNWF	0.9393	0.9018
Snuggery PS Unit 1	132	SNUG1	SSGA1	SSPS	0.9756	0.9415
Snuggery PS Unit 2	132	SNUG2	SSGA2	SSPS	0.9756	0.9415
Snuggery PS Unit 3	132	SNUG3	SSGA3	SSPS	0.9756	0.9415
Torrens Island PS A Unit 1	275	TORRA1	STSA1	STPS	0.9995	1.0008
Torrens Island PS A Unit 2	275	TORRA2	STSA2	STPS	0.9995	1.0008
Torrens Island PS A Unit 3	275	TORRA3	STSA3	STPS	0.9995	1.0008
Torrens Island PS A Unit 4	275	TORRA4	STSA4	STPS	0.9995	1.0008
Torrens Island PS B Unit 1	275	TORRB1	STSB1	STPS	0.9995	1.0008
Torrens Island PS B Unit 2	275	TORRB2	STSB2	STPS	0.9995	1.0008
Torrens Island PS B Unit 3	275	TORRB3	STSB3	STPS	0.9995	1.0008
Torrens Island PS B Unit 4	275	TORRB4	STSB4	STPS	0.9995	1.0008
Torrens Island PS Load	275	TORNL1	STSYL	STPS	0.9995	1.0008
Wattle Point Wind Farm	132	WPWF	SSYP1	SSYP	0.835	0.8194

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Amcor Glass UN 1	11	AMCORGR	SRW1E	SRSW	1.0129	1.0152
Angaston Power Station	33	ANGAS1	SDRN1	SANG	0.9634	0.9678
Angaston Power Station	33	ANGAS2	SDRN2	SANG	0.9634	0.9678
Lonsdale PS	66	LONSDALE	SMVE1	SMVE	1.0093	1.0127
Starfish Hill Wind Farm	66	STARHLWF	SMVE2	SMVE	1.0093	1.0127
Terminal Storage Mini-Hydro	66	TERMSTOR	SNFD1	SNFD	1.0032	1.0049

Tasmania (regional reference node is George Town 220 kV)

Loads

Location	Voltage (kV)	TNI code	2008/09	2009/10
			Loss factor	Loss factor
Arthurs Lake	6.6	TAL2	1.0009	1.02
Avoca	22	TAV2	1.0166	1.0324
Boyer SWA	6.6	TBYA	1.0215	1.0676
Boyer SWB	6.6	TBYB	1.0259	1.0762
Bridgewater	11	TBW2	1.0396	1.0841
Burnie	22	TBU3	0.9944	0.9998
Chapel St.	11	TCS3	1.0265	1.0786
Comalco	220	TCO1	1.0005	1.0005
Creek Road	33	TCR2	1.0278	1.08
Derby	22	TDE2	1.0048	1.0128
Derwent Bridge	22	TDB2	0.9538	0.9918
Devonport	22	TDP2	0.9988	1.0004
Electrona	11	TEL2	1.0354	1.0837
Emu Bay	11	TEB2	0.9947	1.0002
Fisher (Rowallan)	220	TFI1	0.9757	0.97934
George Town	22	TGT3	0.999	1.0035
George Town (Basslink)	220	TGT1	1	1
Gordon	22	TGO2	0.9899	1.0409
Greater Hobart Area VTN		TVN1	1.0301	1.0826
Greater Tamar Area VTN		TVN2	0.9974	1.0118
Hadspen	22	THA3	0.9964	1.0098
Hampshire	110	THM2	0.991	0.9975
Huon River	11	THR2	1.046	1.0863
Kermandie	11	TKE2	1.039	1.0897
Kingston	11	TKI2	1.0374	1.0891
Knights Road	11	TKR2	1.0378	1.089
Lindisfarne	33	TLF2	1.0369	1.0893
Meadowbank	22	TMB2	0.99	1.0357
Mowbray	22	TMY2	0.9943	1.0105
New Norfolk	22	TNN2	1.0174	1.0656
Newton	22	TNT2	0.9952	0.9949
Newton	11	TNT3	0.9813	0.9749
North Hobart	11	TNH2	1.027	1.0778
Norwood	22	TNW2	1.0008	1.0142

Palmerston	22	TPM3	0.9859	1.0024
Port Latta	22	TPL2	0.9676	0.9804
Que	22	TQU2	1.0075	0.9858
Queenstown	22	TQT2	0.9802	0.9826
Queenstown	11	TQT3	0.9867	0.9889
Railton	22	TRA2	0.9976	0.9977
Risdon	11	TRI3	1.0304	1.0757
Risdon	33	TRI4	1.0289	1.081
Rokeby	11	TRK2	1.0396	1.0939
Rosebery	44	TRB2	0.9825	0.9817
Savage River	22	TSR2	1.0174	0.9832
Scottsdale	22	TSD2	1.0025	1.0143
Sorell	22	TSO2	1.05	1.0898
St. Marys	22	TSM2	1.0328	1.0493
Smithton	22	TST2	0.949	0.9718
Starwood	110	TSW1	0.999	1.001
Temco	110	TTE1	1.0004	1.0033
Trevallyn	22	TTR2	0.9968	1.0115
Triabunna	22	TTB2	1.0388	1.0998
Tungatinah	22	TTU2	0.9608	1.0006
Ulverstone	22	TUL2	1.0041	1.0009
Waddamana	22	TWA2	0.9735	1.0064
Wayatinah	11	TWY2	0.9948	1.0235
Wesley Vale	11	TWV2	1.0018	1.0015

Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09	2009/10
					Loss factor	Loss factor
Basslink (George Town)	220	BLNKTAS	TGT11	TGT1	1	1
Bastyan	220	BASTYAN	TFA11	TFA1	0.9562	0.9559
Bell Bay No.1	110	BELLBAY1	TBBA1	TBBA	0.9929	0.9983
Bell Bay No.2	110	BELLBAY2	TBBB1	TBBB	0.9943	0.9981
Bell Bay No.3	110	BBTHREE1	TBB11	TBB1	0.9915	0.9988
Bell Bay No.3	110	BBTHREE2	TBB12	TBB1	0.9915	0.9988
Bell Bay No.3	110	BBTHREE3	TBB13	TBB1	0.9915	0.9988
Bluff Point and Studland Bay Wind Farms	110	WOOLNTH1	TST11	TST1	0.9012	0.9387
Butlers Gorge	110	BUTLERSG	TBG11	TBG1	0.9516	0.9756
Catagunya[6]	220	LI_WY_CA	TLI11	TLI1	0.9944	1.0225
Cethana	220	CETHANA	TCE11	TCE1	0.9716	0.9742
Cluny[7]	220	CLUNY	TCL11	TCL1	1.0004	1.0319
Devils gate	110	DEVILS_G	TDG11	TDG1	0.9764	0.9777
Fisher[8]	220	FISHER	TFI11	TFI1	0.9757	0.9793
Gordon	220	GORDON	TGO11	TGO1	0.9644	0.9915
John Butters	220	JBUTTERS	TJB11	TJB1	0.9527	0.9521
Lake Echo	110	LK_ECHO	TLE11	TLE1	0.9451	0.9737
Lemonthyme	220	LEM_WIL	TSH11	TSH1	0.9776	0.982
Liapootah	220	LI_WY_CA	TLI11	TLI1	0.9944	1.0225
Mackintosh	110	MACKNTSH	TMA11	TMA1	0.9471	0.9451
Meadowbank	110	MEADOWBK	TMB11	TMB1	0.9935	1.0382
Paloona	110	PALOONA	TPA11	TPA1	0.9891	0.9822
Poatina	220	POAT220	TPM11	TPM1	0.9777	0.9954
Poatina	110	POAT110	TPM21	TPM2	0.9732	0.9868
Reece No.1	220	REECE1	TRCA1	TRCA	0.9488	0.9512
Reece No.2	220	REECE2	TRCB1	TRCB	0.9462	0.9456
Repulse	220	REPULSE	TCL12	TCL1	1.0004	1.0319
Rowallan	220	ROWALLAN	TFI12	TFI1	0.9757	0.9793
Tamar Valley CCGT	220	TVCC201	TTV11A	TTV1	-	0.9992
Tamar Valley OCGT	110	TVPP104	TBB14A	TBB1	-	0.9988
Tarraleah	110	TARRALEA	TTA11	TTA1	0.9568	0.9891
Trevallyn	110	TREVALLN	TTR11	TTR1	0.9905	1.0051

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

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09 Loss factor	2009/10 Loss factor
Tribute	220	TRIBUTE	TTI11	TTI1	0.9469	0.9474
Tungatinah	110	TUNGATIN	TTU11	TTU1	0.9421	0.9828
Wayatinah	220	LI_WY_CA	TLI11	TLI1	0.9944	1.0225
Wilmot	220	LEM_WIL	TSH11	TSH1	0.9776	0.982

Embedded Generators

Location	Voltage (kV)	Dispatchable Unit ID	Connection Point ID	TNI code	2008/09 Loss factor	2009/10 Loss factor
Remount	22	REMOUNT	TMY21	TMY2	0.9943	1.01049

7 Appendix B: Inter-regional loss factors equations for 2009/10

NEMMCO has determined the following inter-regional loss factor equations for 2009/10 by performing a regression analysis against key variables for each interconnector.

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

= 1.0036 + 2.1396E-04 *NQt - 3.3876E-06*Nd + 1.3432E-05*Qd

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

= 0.9628 + 1.5094E-04*VNt – 1.6017E-05*Vd + 1.1692E-05*Nd + 1.1043E-05*Sd

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

= 1.0164 + 3.0875E-04*VSAt – 7.2093E-06*Vd + 1.2805E-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.

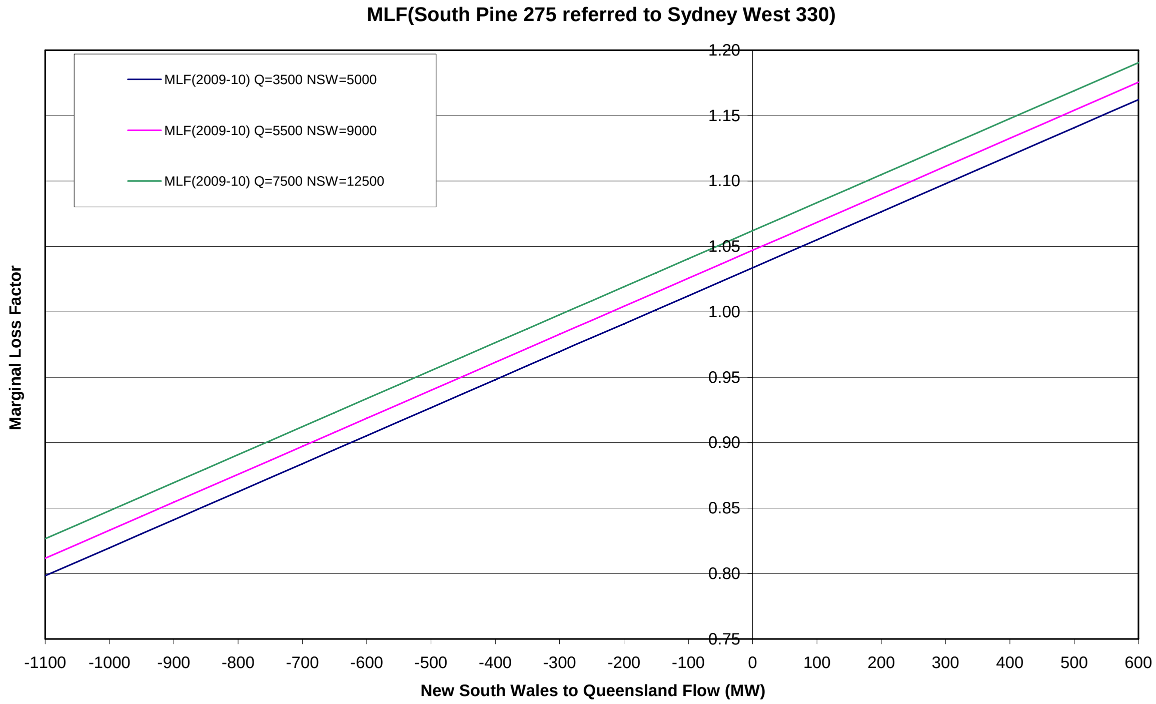


Figure B1: South Pine 275 referred to Sydney West 330 marginal loss factor verses NSW to Qld flow

Coefficient statistics

Coefficient	Q_d	N_d	NQ_t	CONSTANT
Coefficient value	1.3432E-05	-3.3876E-06	2.1396E-04	1.0036
Standard error values for the coefficients	1.6567E-07	1.1635E-07	2.7305E-07	5.8232E-04
Coefficient of determination (R2)	0.9829			
Standard error of the y estimate	0.0102			

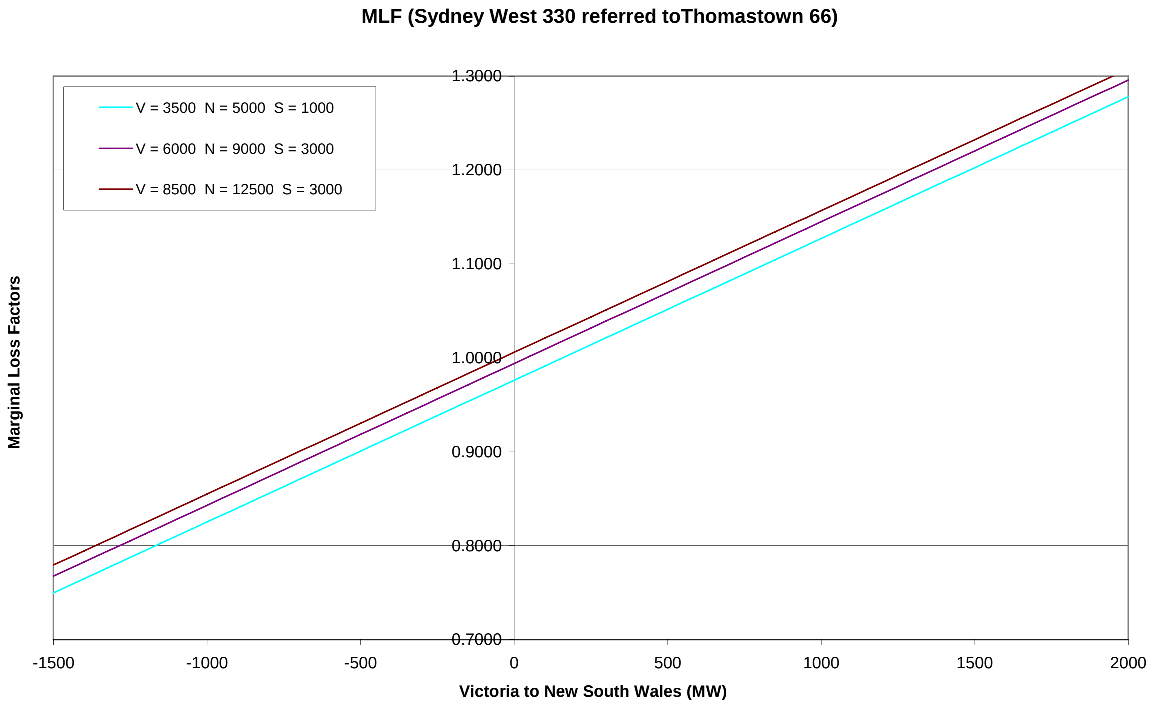


Figure B2: Sydney West 330 referred to Thomastown 66 marginal loss factor versus Victoria to NSW flow

Coefficient statistics

Coefficient	S_d	N_d	V_d	VN_t	CONSTANT
Coefficient value	1.1043E-05	1.1692E-05	-1.6017E-05	1.5094E-04	0.9628
Standard error values for the coefficients	1.0440E-06	2.7975E-07	5.7480E-07	4.7670E-07	1.5758E-03
Coefficient of determination (R^2)	0.9043				
Standard error of the y estimate	0.0253				

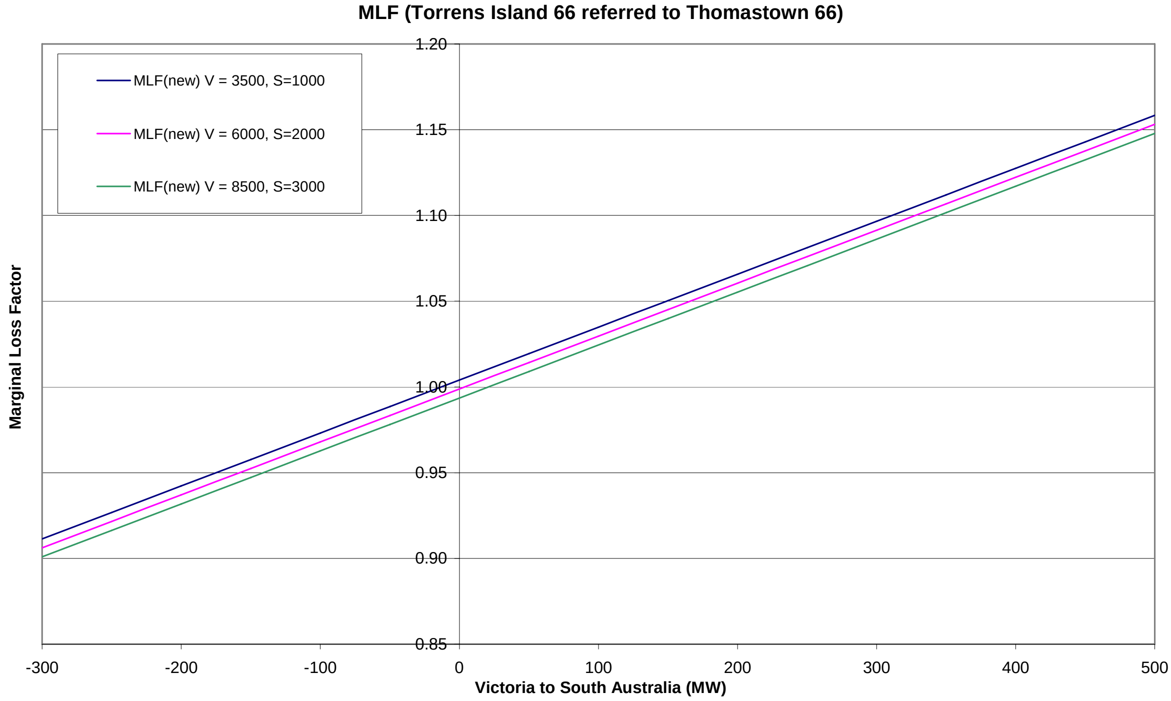


Figure B3: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Victoria to SA flow

Coefficient statistics

Coefficient	S_d	V_d	VSA_t	CONSTANT
Coefficient value	1.2805E-05	-7.2093E-06	3.0875E-04	1.0164
Standard error values for the coefficients	7.8999E-07	3.1292E-07	9.6713E-07	9.9268E-04
Coefficient of determination (R^2)	0.8790			
Standard error of the y estimate	0.0183			

8 APPENDIX C: INTER-REGIONAL LOSS EQUATIONS FOR 2009/10

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

= (0.0036 - 3.3876E-06*Nd + 1.3432E-05*Qd)*NQt + 1.0698E-04 *NQt^2

Sydney West 330 referred to Thomastown 66 notional link average losses

= (-0.0372 + 1.1043E-05*Sd + 1.1692E-05*Nd – 1.6017E-05*Vd)*VNt + 7.547E- 05*VNt^2

Torrens Island 66 referred to Thomastown 66 notional link average losses

= (0.0164– 7.2093E-06*Vd + 1.2805E-05*Sd)*VSAt + 1.5438E-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.

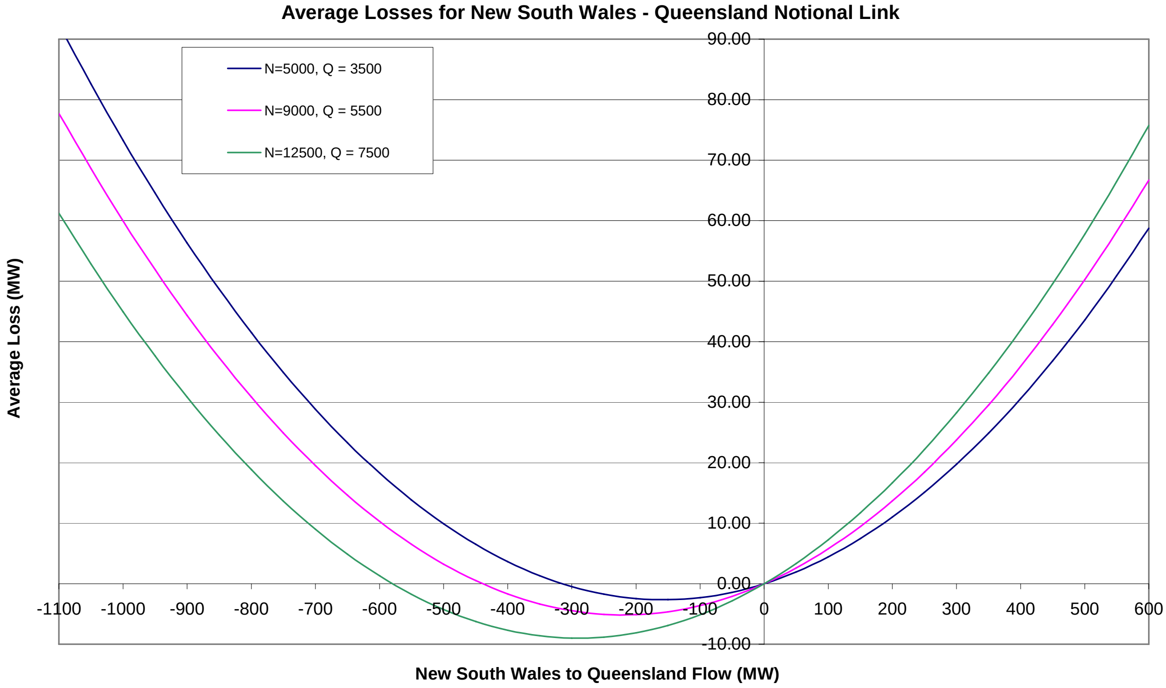


Figure C1: NSW to Queensland notional link losses versus NSW to Queensland notional link flow

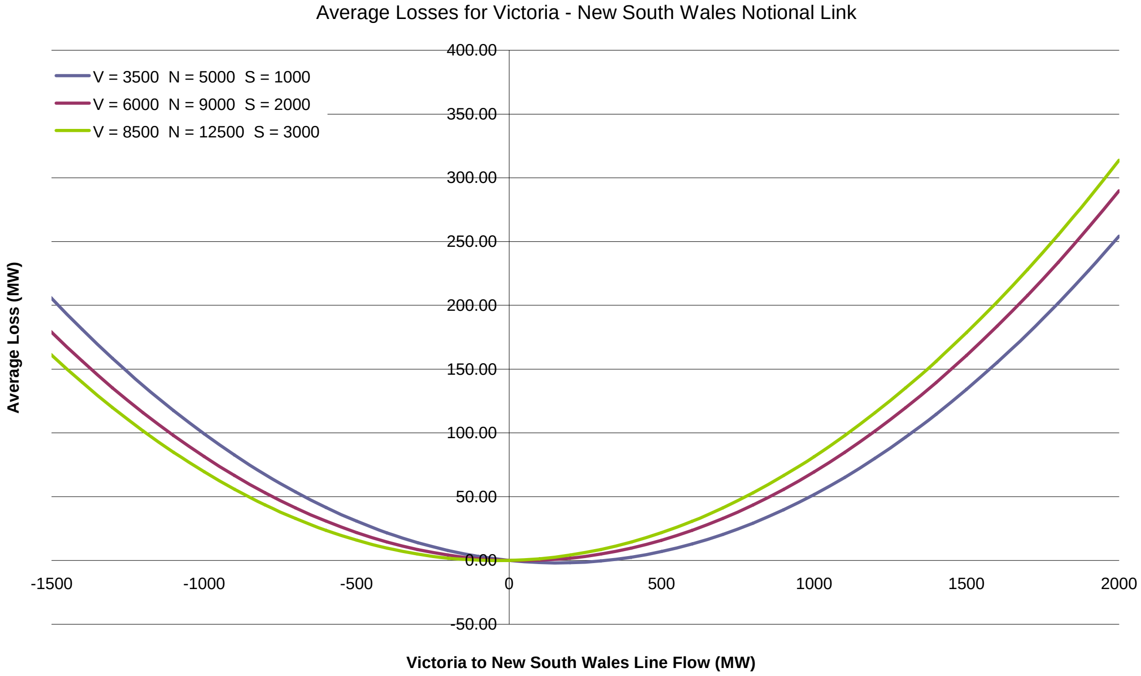


Figure C2: Victoria to NSW notional link losses versus Victoria to NSW notional link flow

Average Losses for Victoria - SA Notional Link

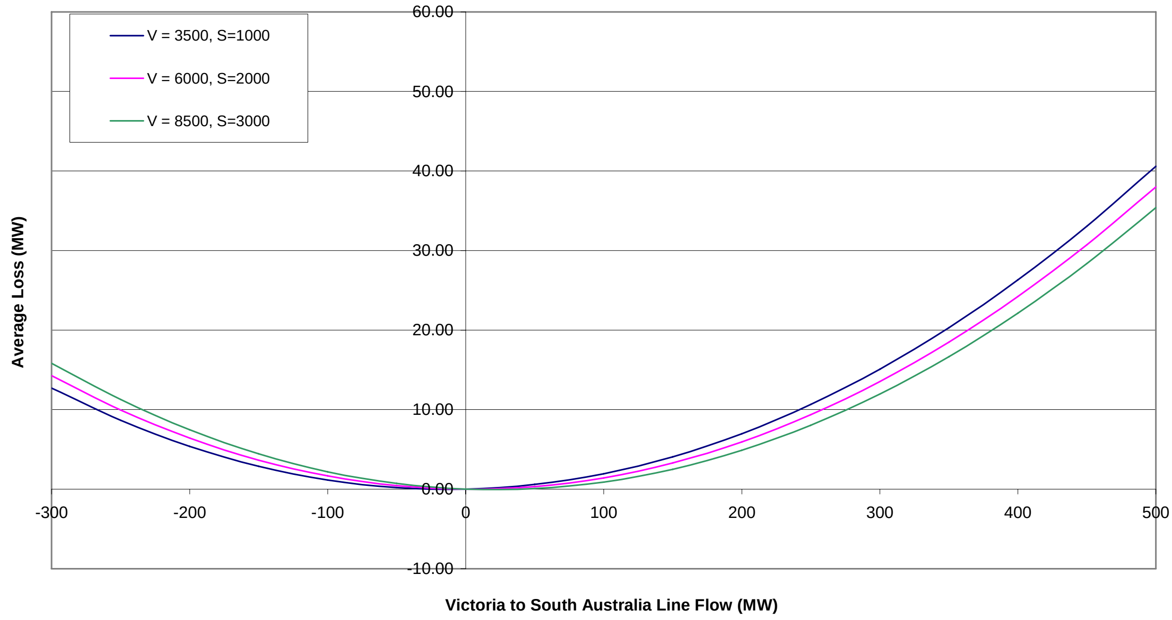


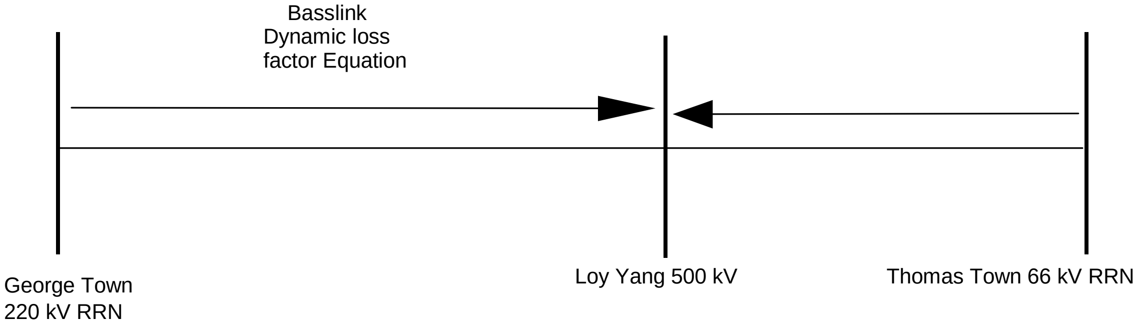
Figure C3: Victoria to SA notional link losses versus Victoria to SA notional link flow

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 = 0.9722.



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:

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

NEMMCO determined the following MLF model using regression analysis:

Murraylink MLF (Torrens Island 66 referred to Thomastown 66) = 1.0706 + 2.3116E-03*$Flow_t$

NEMMCO 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	2.3116E-03	1.0706
Standard error values for the coefficients	4.2527E-06	2.3583E-04
Coefficient of determination (R^2)	0.9439	
Standard error of the y estimate	0.0305	

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

Murraylink loss = 0.0706*$Flow_t$ + 1.1558E-03*$Flow_t^2$

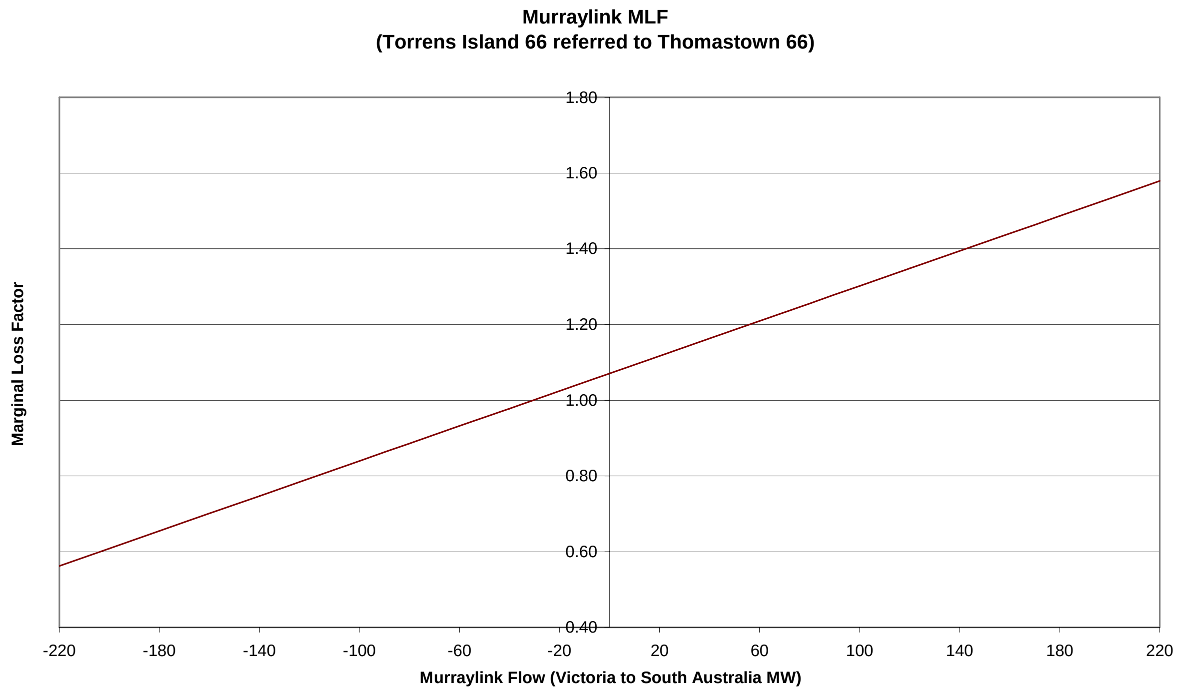


Figure D1: Torrens Island 66 referred to Thomastown 66 marginal loss factor versus Murraylink flow (Victoria to SA)

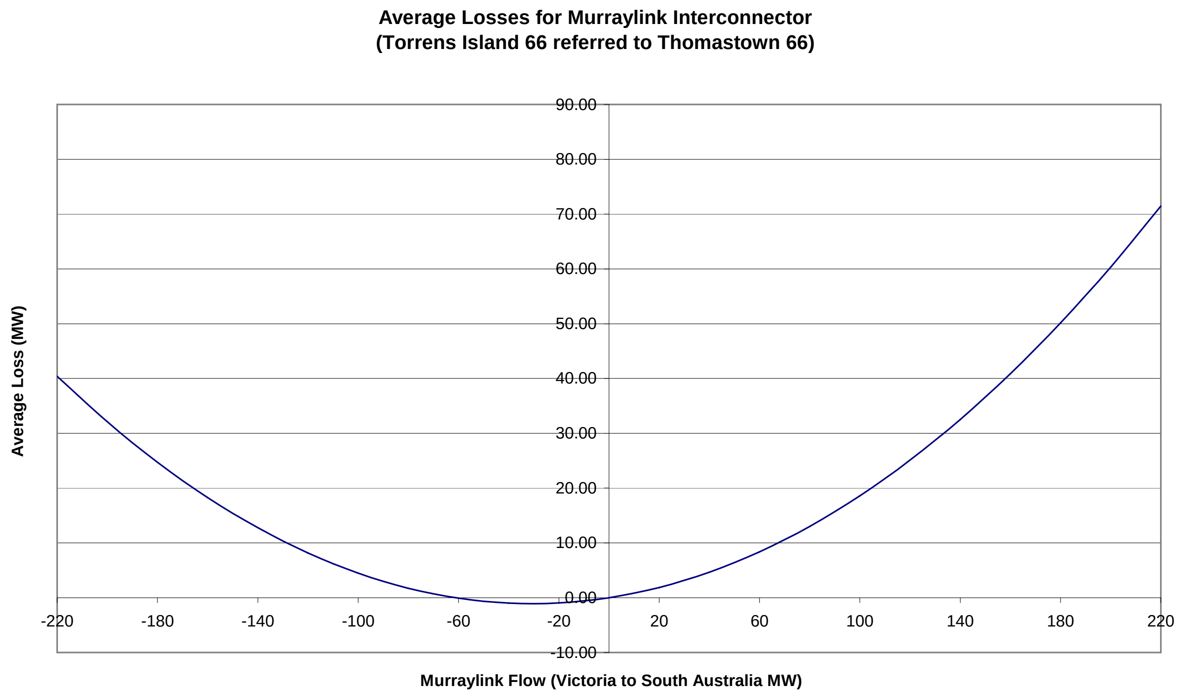


Figure D2: Murraylink notional link losses versus Murraylink flow (Victoria to SA)

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:

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

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

Terranora interconnector MLF (South Pine 275 referred to Sydney West 330) = 1.1449 + 2.3757E-03*$Flow_t$

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

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

Coefficient	$Flow_t$	CONSTANT
Coefficient value	2.3757E-03	1.1449
Standard error values for the coefficients	4.1914E-06	4.3258E-04
Coefficient of determination (R^2)	0.9482	
Standard error of the y estimate	0.0416	

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

$$\text{Terranora interconnector loss} = 0.1449*Flow_t + 1.18785E\text{-}03*Flow_t^2$$

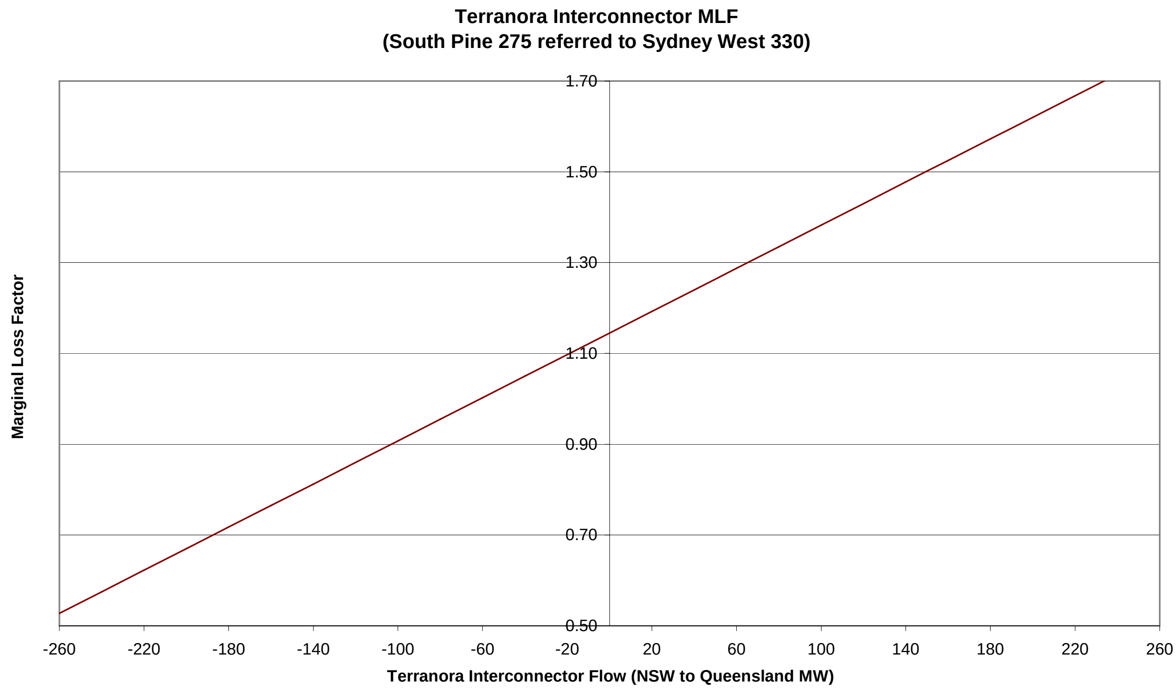


Figure D3: South Pine 275 referred to Sydney West 330 marginal loss factor versus Terranora interconnector flow (NSW to Queensland)

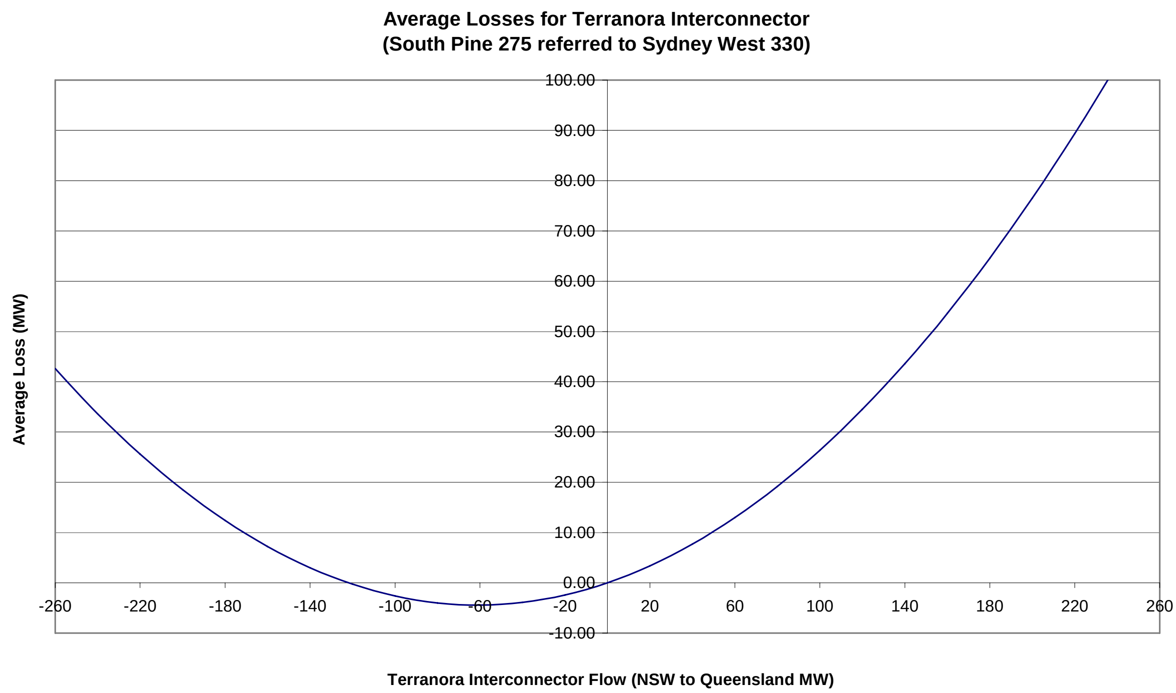


Figure D4: Terranora interconnector notional link losses versus flow (NSW to Queensland)

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 within Regions" documents the calculation of the proportioning of the inter-regional losses to regions and is available on AEMO website. [9]

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)	0.44	New South Wales
Queensland – New South Wales (Terranora Interconnector)	0.52	New South Wales
Victoria – New South Wales	0.64	New South Wales
Victoria – South Australia (Heywood)	0.88	Victoria
Victoria – South Australia (Murraylink)	0.85	Victoria

[9] "Proportioning Inter-Regional Losses Within Regions" document is available on AEMO website at: http://www.aemo.com.au/electricityops/lossfactors.html

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[10];
  - 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.

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

12 APPENDIX G: LIST OF NEW CONNECTION POINTS FOR 2009/10

NAME	Voltage Level (kV)	Connection Point ID	TNI	Region
Molendinar	33	QMAL	QMAL	QLD
Mount Stewart Unit 3	132	QMSP3M	QMSP	QLD
Mudgeeraba	33	QMGL	QMGL	QLD
Yarwun – Boat Creek (Ergon)	132	QYAE	QYAE	QLD
Yarwun – Rio Tinto	132	QYAR	QYAR	QLD
Yarwun – Rio Tinto Generator	132	QYAG11R	QYAG	QLD
Bayswater PS Unit 4	500	NBAY4	NBYW	NSW
Boambee South	132	NWST	NWST	NSW
Cullerin Range Wind Farm	132	NYS11C	NYS1	NSW
Capital Hill Wind Farm	330	NCFW1R	NCFW	NSW
Peakhurst	132	NPH1	NPH1	NSW
Amcor Glass UN 1	11	SRSW1E	SRSW	SA
Davenport	33	SDAW	SDAW	SA
Hallet Hill Wind Farm	275	SMOK1H	SMOK	SA
Clements Gap Wind Farm	132	SCGW1P	SCGW	SA
Quarantine PS Unit 5	66	SQPS5Q	SQPS	SA
Ballarat Health Services	66	VBAT1H	VBAT	VIC
Bogong Power Station and McKay Power Station	220	VMK1	VT14	VIC
South Morang	66	VSMT	VSMT	VIC
South Morang	66	VSM6	VSM6	VIC
Waubra Wind Farm	66	VWBT1A	VWBT	VIC
Tamar Valley CCGT	220	TTV11A	TTV1	TAS
Tamar Valley OCGT	110	TBB14	TBB1	TAS