REGIONS AND MARGINAL LOSS FACTORS: FY 2015–16

NATIONAL ELECTRICITY MARKET

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AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

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VERSION RELEASE HISTORY

Version No.	Release date	Description
2.0	05 June 2015	Updates to the following: • New TNI for Boco Rock Wind Farm. • Addition of MLF for Canunda Wind Farm after change to Market Generator. • Disaggregation of Laverton North units. • Disaggregation of Valley Power units • Correction of MLF for Morwell TS and Woodlawn Bioreactor. • Carlingford (NCAR) allocated to Sydney West (NSW1) instead of Sydney North (NSN1) • Correction of voltage information for some TNIs. • Correction of typographical error for the 2014-15 MLF for Taralga Wind Farm. • Correction of typographical error for the Hunter Valley GT TNI • Correction of typographical error for the TNI associated to Eastern Creek.. • Removal of Munmorah TNI NMN1 from the NSW Generation Table. • Change of Kangaroo Valley (Shoalhaven) TNI from NSHL to NSHN. • Removal of Brandy Hill TNI NBH1, as it is inactive. • Addition of Boggabri North TNI NBGN.
1.0	01 April 2015	Final document now includes modifications to MLFs due to: • Correction to the network model at Boyne Island. • Correction to volume weighting of MLFs for some TNIs. • Reviewed TNIs
0.1	20 March 2015	Draft version published

EXECUTIVE SUMMARY

This document details the 2015–16 Marginal Loss Factors (MLFs) that represent electrical transmission losses across the five regions in the National Electricity Market (NEM) – Queensland, NSW, Victoria, South Australia, and Tasmania. This is as required by clause 3.6 of the National Electricity Rules (Rules). This document also serves as the Regions Publication under clause 2A.1.3 of the Rules.

Other information in this document related to marginal losses for 2015–16 includes:

- Inter-regional loss factor and loss equations.
- Virtual Transmission Nodes (VTNs).
- Connection point Transmission Node Identifiers (TNIs).
- Regions, Regional Reference Nodes (RRNs), and region boundaries.
- Brief overview of the Forward Looking Loss Factors (FLLF) methodology used by AEMO to calculate MLFs and inter-regional loss factor equations.

Major changes in load and generation patterns have characterised the 2015–16 MLF calculation compared to the 2014–15 MLF study. The demand forecast has reduced in all regions. Reduced generation forecast in Tasmania has reduced modelled power exports to Victoria. Reduced thermal generation in South Australia has increased modelled power imports to South Australia. Reduced load in Queensland has increased power exports to NSW.

These flow changes have an impact on electrical losses, and drive significant changes in MLFs in 2015–16 from 2014–15. They are:

- An increase in MLFs at connection points in central and Southern Tasmania.
- A reduction in MLFs at connection points in the Riverland area in South Australia, and a reduction in MLFs at connection points in South-East of South Australia.
- A reduction in MLFs at connection points in Northern Victoria.
- An increase in MLFs at connection points in Southern NSW, and a reduction in MLFs at connection points in northern NSW.
- A reduction in MLFs at connection points in Northern Queensland, and an increase in MLFs at connection points in Central and Southern Queensland.

AEMO appreciates that the MLFs have financial implications for NEM participants, and for this reason AEMO takes care in their calculation and applies a number of quality assurance steps during the process. This includes having AEMO’s methods, data and results benchmarked and verified by external consultants each year.

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1. MARGINAL LOSS FACTORS BY REGION

This section shows the 2015–16 MLFs values for every load or generation TNI in each region.

1.1 Queensland Marginal Loss Factors

Table 1 Queensland Loads

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Abermain	33	QABM	0.9965	0.9943
Abermain	110	QABR	0.9945	0.9915
Alan Sherriff	132	QASF	1.0855	1.0948
Algester	33	QALG	1.0112	1.0127
Alligator Creek	132	QALH	1.0627	1.0817
Alligator Creek	33	QALC	1.0627	1.0809
Ashgrove West	33	QAGW	1.0152	1.0270
Ashgrove West	110	QCBW	1.0141	1.0237
Belmont	110	QBMH	1.0067	1.0061
Belmont Wecker Road	33	QBBS	1.0012	1.0040
Belmont Wecker Road	11	QMOB	1.0313	1.0335
Biloela	66/11	QBIL	0.9625	0.9497
Blackstone	110	QBKS	0.9953	0.9927
Blackwater	66/11	QBWL	1.0575	1.0548
Blackwater	132	QBWH	1.0565	1.0537
Bluff	132	QBLF	1.0594	1.0555
Bolingbroke	132	QBNB	1.0447	1.0543
Bowen North	66	QBNN	1.0586	1.0748
Boyne Island	275	QBOH	1.0050	0.9999
Boyne Island	132	QBOL	1.0054	0.9998
Braemer - Kumbarilla Park	275	QBRE	0.9593	0.9510
Bulli Creek (Essential Energy)	132	QBK2	0.9608	0.9523
Bulli Creek (Waggamba)	132	QBLK	0.9608	0.9523
Bundamba	110	QBDA	0.9961	0.9938
Burton Downs	132	QBUR	1.0679	1.0845
Cairns	22	QCRN	1.0928	1.1148
Cairns City	132	QCNS	1.0914	1.1117
Callemondah (Rail)	132	QCMD	0.9930	0.9873
Calliope River	132	QCAR	0.9906	0.9836
Cardwell	22	QCDW	1.0893	1.1025
Chinchilla	132	QCHA	0.9722	0.9726
Clare	66	QCLR	1.0990	1.1110
Collinsville Load	33	QCOL	1.0637	1.0723
Columboola	132	QCBL	0.9651	0.9522
Coppabella (Rail)	132	QCOP	1.0767	1.0974
Dan Gleeson	66	QDGL	1.0869	1.1035
Dingo (Rail)	132	QDNG	1.0481	1.0333
Duaringa	132	QDRG	1.0381	1.0332
Dysart	66/22	QDYS	1.0696	1.0834

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Eagle Downs Mine	132	QEGD	1.0798	1.1026
Edmonton	22	QEMT	1.0934	1.1188
Egans Hill	66	QEGN	0.9880	0.9838
El Arish	22	QELA	1.0922	1.1123
Garbutt	66	QGAR	1.0887	1.1026
Gin Gin	132	QGNG	1.0024	1.0020
Gladstone South	66/11	QGST	0.9961	0.9932
Goodna	33	QGDA	1.0013	1.0010
Goonyella Riverside Mine	132	QGYR	1.0973	1.1191
Grantleigh (Rail)	132	QGRN	1.0116	0.9941
Gregory (Rail)	132	QGRE	1.0288	1.0356
Ingham	66	QING	1.0936	1.1159
Innisfail	22	QINF	1.0960	1.1195
Invicta Load	132	QINV	1.1033	1.0877
Kamerunga	22	QKAM	1.0949	1.1178
Kemmis	132	QEMS	1.0581	1.0702
King Creek	132	QKCK	1.0700	1.0894
Lilyvale	66	QLIL	1.0373	1.0352
Lilyvale (Barcaldine)	132	QLCM	1.0328	1.0314
Loganlea	33	QLGL	1.0118	1.0099
Loganlea	110	QLGH	1.0078	1.0055
Mackay	33	QMKA	1.0602	1.0731
Middle Ridge (Energex)	110	QMRX	0.9729	0.9732
Middle Ridge (Ergon)	110	QMRG	0.9729	0.9732
Mindi (Rail)	132	QMND	1.0365	1.0406
Molendinar	110	QMAR	1.0042	1.0042
Molendinar	33	QMAL	1.0039	1.0037
Moranbah (Mine)	66	QMRN	1.0890	1.1070
Moranbah (Town)	11	QMRL	1.0824	1.1000
Moranbah South (Rail)	132	QMBS	1.0871	1.1087
Moranbah Substation	132	QMRH	1.0839	1.1058
Moura	66/11	QMRA	1.0056	0.9992
Mt McLaren (Rail)	132	QMTM	1.0875	1.1259
Mudgeeraba	33	QMGL	1.0041	1.0023
Mudgeeraba	110	QMGB	1.0036	1.0016
Murarrie (Belmont)	110	QMRE	1.0069	1.0071
Nebo	11	QNEB	1.0343	1.0388
Newlands	66	QNLD	1.0977	1.1173
North Goonyella	132	QNGY	1.0981	1.1225
Norwich Park (Rail)	132	QNOR	1.0559	1.0640
Oakey	110	QOKT	0.9725	0.9750
Oonooie (Rail)	132	QOON	1.0703	1.0899
Orana LNG	275	QORH	0.9625	0.9517
Palmwoods	132/~~110~~	QPWD	1.0124	1.0155
Pandoin	132	QPAN	0.9914	0.9870
Pandoin	66	QPAL	0.9909	0.9854
Peak Downs (Rail)	132	QPKD	1.0832	1.1030

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Pioneer Valley	66	QPIV	1.0568	1.0717
Proserpine	66	QPRO	1.0937	1.0956
Queensland Alumina Ltd (Gladstone South)	132	QQAH	0.9974	0.9921
Queensland Nickel (Yabulu)	132	QQNH	1.0779	1.0809
Raglan	275	QRGL	0.9886	0.9809
Redbank Plains	11	QRPN	0.9996	0.9978
Richlands	33	QRLD	1.0099	1.0137
Rockhampton	66	QROC	0.9949	0.9901
Rocklands (Rail)	132	QRCK	0.9858	0.9787
Rocklea (Archerfield)	110	QRLE	1.0039	1.0004
Ross	132	QROS	1.0764	1.0870
Runcorn	33	QRBS	1.0123	1.0135
South Pine	110	QSPN	1.0057	1.0071
Stony Creek	132	QSYC	1.0805	1.0962
Sumner	110	QSUM	1.0044	1.0027
Tangkam (Dalby)	110	QTKM	0.9747	0.9702
Tarong	66	QTRL	0.9711	0.9684
Teebar Creek	132	QTBC	1.0107	1.0126
Tennyson	33	QTNS	1.0076	1.0043
Tennyson (Rail)	110	QTNN	1.0056	1.0017
Townsville East	66	QTVE	1.0886	1.1046
Townsville South	66	QTVS	1.0872	1.1020
Townsville South (KZ)	132	QTZS	1.0916	1.1022
Tully	22	QTLL	1.1003	1.1317
Turkinje	66	QTUL	1.1137	1.1355
Turkinje (Craiglee)	132	QTUH	1.1127	1.1343
Wandoan South	132	QWSH	0.9744	0.9587
Wandoo (Rail)	132	QWAN	1.0387	1.0526
Wivenhoe Pump	275	QWIP	0.9941	0.9930
Woolooga (Energex)	132	QWLG	1.0062	1.0083
Woolooga (Ergon)	132	QWLN	1.0062	1.0083
Woree	132	QWRE	1.0902	1.1127
Wotonga (Rail)	~~275~~132	QWOT	1.0769	1.0950
Wycarbah	132	QWCB	0.9901	0.9859
Yarwun – Boat Creek (Ergon)	132	QYAE	0.9901	0.9842
Yarwun – Rio Tinto	132	QYAR	0.9889	0.9840

Table 2 Queensland Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Barron Gorge PS Unit 1	132	BARRON-1	QBGH1	QBGH	1.0677	1.0883
Barron Gorge PS Unit 2	132	BARRON-2	QBGH2	QBGH	1.0677	1.0883
Braemar PS Unit 1	275	BRAEMAR1	QBRA1	QBRA	0.9567	0.9480
Braemar PS Unit 2	275	BRAEMAR2	QBRA2	QBRA	0.9567	0.9480
Braemar PS Unit 3	275	BRAEMAR3	QBRA3	QBRA	0.9567	0.9480
Braemar Stage 2 PS Unit 5	275	BRAEMAR5	QBRA5B	QBRA	0.9567	0.9480
Braemar Stage 2 PS Unit 6	275	BRAEMAR6	QBRA6B	QBRA	0.9567	0.9480
Braemar Stage 2 PS Unit 7	275	BRAEMAR7	QBRA7B	QBRA	0.9567	0.9480
Callide PS Load	132	CALLNL1	QCAX	QCAX	0.9590	0.9412
Callide A PS Unit 4	132	CALL_A_4	QCAA4	QCAA	0.9563	0.9365
Callide A PS Unit 4 Load	132	CALLNL4	QCAA2	QCAA	0.9563	0.9365
Callide B PS Unit 1	275	CALL_B_1	QCAB1	QCAB	0.9671	0.9525
Callide B PS Unit 2	275	CALL_B_2	QCAB2	QCAB	0.9671	0.9525
Callide C PS Unit 3	275	CPP_3	QCAC3	QCAC	0.9648	0.9525
Callide C PS Unit 4	275	CPP_4	QCAC4	QCAC	0.9648	0.9525
Condamine PS	132	CPSA	QCND1C	QCND	0.9642	0.9519
Darling Downs PS	275	DDPS1	QBRA8D	QBRA	0.9567	0.9480
Gladstone PS (132 kV) Unit 3	132	GSTONE3	QGLD3	QGLL	0.9855	0.9777
Gladstone PS (132 kV) Unit 4	132	GSTONE4	QGLD4	QGLL	0.9855	0.9777
Gladstone PS (132kV) Load	132	GLADNL1	QGLL	QGLL	0.9855	0.9777
Gladstone PS (275 kV) Unit 1	275	GSTONE1	QGLD1	QGLH	0.9868	0.9807
Gladstone PS (275 kV) Unit 2	275	GSTONE2	QGLD2	QGLH	0.9868	0.9807
Gladstone PS (275 kV) Unit 5	275	GSTONE5	QGLD5	QGLH	0.9868	0.9807
Gladstone PS (275 kV) Unit 6	275	GSTONE6	QGLD6	QGLH	0.9868	0.9807
Kareeya PS Unit 1	132	KAREEYA1	QKAH1	QKYH	1.0690	1.0870
Kareeya PS Unit 2	132	KAREEYA2	QKAH2	QKYH	1.0690	1.0870
Kareeya PS Unit 3	132	KAREEYA3	QKAH3	QKYH	1.0690	1.0870
Kareeya PS Unit 4	132	KAREEYA4	QKAH4	QKYH	1.0690	1.0870
Kogan Creek PS	275	KPP_1	QBRA4K	QWDN	0.9582	0.9493
Koombooloomba	132	KAREEYA5	QKYH5	QKYH	1.0690	1.0870
Millmerran PS Unit 1 (Millmerran)	330	MPP_1	QBCK1	QMLN	0.9612	0.9532
Millmerran PS Unit 2 (Millmerran)	330	MPP_2	QBCK2	QMLN	0.9612	0.9532
Mt Stuart PS Unit 1	132	MSTUART1	QMSP1	QMSP	1.0156	1.0041
Mt Stuart PS Unit 2	132	MSTUART2	QMSP2	QMSP	1.0156	1.0041
Mt Stuart PS Unit 3	132	MSTUART3	QMSP3M	QMSP	1.0156	1.0041
Oakey PS Unit 1	110	OAKEY1	QOKY1	QOKY	0.9498	0.9519
Oakey PS Unit 2	110	OAKEY2	QOKY2	QOKY	0.9498	0.9519
Stanwell PS Load	132	STANNL1	QSTX	QSTX	0.9897	0.9858
Stanwell PS Unit 1	275	STAN-1	QSTN1	QSTN	0.9784	0.9693
Stanwell PS Unit 2	275	STAN-2	QSTN2	QSTN	0.9784	0.9693
Stanwell PS Unit 3	275	STAN-3	QSTN3	QSTN	0.9784	0.9693
Stanwell PS Unit 4	275	STAN-4	QSTN4	QSTN	0.9784	0.9693
Swanbank E GT	275	SWAN_E	QSWE	QSWE	0.9972	0.9934
Tarong North PS	275	TNPS1	QTNT	QTNT	0.9707	0.9678

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Tarong PS Unit 1	275	TARONG#1	QTRN1	QTRN	0.9708	0.9677
Tarong PS Unit 2	275	TARONG#2	QTRN2	QTRN	0.9708	0.9677
Tarong PS Unit 3	275	TARONG#3	QTRN3	QTRN	0.9708	0.9677
Tarong PS Unit 4	275	TARONG#4	QTRN4	QTRN	0.9708	0.9677
Wivenhoe Generation Unit 1	275	W/HOE#1	QWIV1	QWIV	0.9895	0.9891
Wivenhoe Generation Unit 2	275	W/HOE#2	QWIV2	QWIV	0.9895	0.9891
Wivenhoe Pump 1	275	PUMP1	QWIP1	QWIP	0.9941	0.9930
Wivenhoe Pump 2	275	PUMP2	QWIP2	QWIP	0.9941	0.9930
Yabulu PS	132	YABULU	QTYP	QTYP	1.0337	1.0292
Yarwun PS	132	YARWUN_1	QYAG1R	QYAG	0.9879	0.9837

Table 3 Queensland Embedded Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Barcaldine PS - Lilyvale	132	BARCALDN	QBCG	QBCG	0.9935	0.9871
Browns Plains Landfill Gas PS	110	BPLANDF1	QLGH3B	QLGH	1.0078	1.0055
Daandine PS	110	DAANDINE	QTKM1	QTKM	0.9747	0.9702
German Creek Generator	66	GERMCRK	QLIL2	QLIL	1.0373	1.0352
Isis CSM	132	ICSM	QGNG1I	QTBC	1.0107	1.0126
Mackay GT	33	MACKAYGT	QMKG	QMKG	1.0550	1.0305
Moranbah Gen	11	MORANBAH	QMRL1M	QMRL	1.0824	1.1000
Moranbah North PS	66	MBAHNTH	QMRN1P	QMRN	1.0890	1.1070
Oakey Creek Generator	66	OAKYCREK	QLIL1	QLIL	1.0373	1.0352
Rochedale Renewable Energy Plant	110	ROCHEDAL	QBMH2	QBMH	1.0067	1.0061
Rocky Point Gen (Loganlea 110kV)	110	RPCG	QLGH2	QLGH	1.0078	1.0055
Roghan Road Generator	110	EDLRGNRD	QSPN2	QSPN	1.0057	1.0071
Roma PS Unit 7 - Columboola	132	ROMA_7	QRMA7	QRMA	0.9591	0.9404
Roma PS Unit 8 - Columboola	132	ROMA_8	QRMA8	QRMA	0.9591	0.9404
Southbank Institute Of Technology	110	STHBKTEC	QCBD1S	QCBW	1.0141	1.0237
Suncoast Gold Macadamias Co-Gen (Palmwoods)	~~110~~132	SUNCOAST	QPWD1	QPWD	1.0124	1.0155
Ti Tree BioReactor	33	TITREE	QABM1T	QABM	0.9965	0.9943
Whitwood Rd Renewable Energy Plant	110	WHIT1	QSBK1	QBKS	0.9953	0.9927
Windy Hill WF	66	WHILL1	QTUL	QTUL	1.1137	1.1355
Wivenhoe Small Hydro	110	WIVENSH	QABR1	QABR	0.9945	0.9915
Yabulu Steam Turbine (Garbutt 66kV)	66	YABULU2	QGAR1	QYST	1.0428	1.0285

1.2 NSW Marginal Loss Factors[1]

Table 4 NSW Loads

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Albury	132	NALB	0.9779	0.9420
Alcan	132	NALC	0.9943	0.9922
Armidale	66	NAR1	0.9905	1.0266
Australian Newsprint Mill	132	NANM	0.9824	0.9421
Balranald	22	NBAL	1.0259	0.9728
Beaconsfield North	132	NBFN	1.0065	1.0058
Beaconsfield South	132	NBFS	1.0065	1.0058
Beaconsfield West	132	NBFW	1.0065	1.0058
Belmore Park	132	NBM1	1.0061	1.0056
Beresfield	33	NBRF	0.9973	0.9958
Beryl	66	NBER	1.0077	1.0155
BHP (Waratah)	132	NWR1	0.9923	0.9919
Boambee South	132	NWST	1.0157	1.1322
Boggabri East	132	NBGE	1.0578	
Boggabri North	132	NBGN	1.0609	
~~Brandy Hill~~	~~132~~	~~NBH1~~	~~0.9959~~	~~0.9941~~
Brandy Hill	11	NBHL	0.9958	0.9941
Broken Hill	22	NBKG	1.0480	0.9978
Broken Hill	220	NBKH	1.0427	0.9901
Bunnerong	132	NBG1	1.0054	1.0054
Bunnerong	33	NBG3	1.0090	1.0089
Burrinjuck	132	NBU2	0.9764	0.9597
Canterbury	33	NCTB	1.0114	1.0090
Canterbury	132	NCB1	1.0041	
Carlingford	132	NCAR	1.~~0013~~0018	1.0001
Casino	132	NCSN	1.0213	1.0907
Charmhaven	11	NCHM	0.9944	0.9933
Chullora	132	NCHU	1.0072	1.0065
Coffs Harbour	66	NCH1	1.0124	1.0631
Coleambally	132	NCLY	1.0004	0.9637
Cooma	66	NCMA	0.9763	0.9683
Cooma (AusNet Services)	66	NCM2	0.9763	0.9683
Cowra	66	NCW8	1.0099	1.0040
Dapto (Endeavour Energy)	132	NDT1	0.9916	0.9883
Dapto (Essential Energy)	132	NDT2	0.9916	0.9883
Darlington Point	132	NDNT	0.9961	0.9593
Deniliquin	66	NDN7	1.0154	0.9833
Dorrigo	132	NDOR	1.0044	1.0507
Drummoyne	11	NDRM	1.0122	1.0101
Dunoon	132	NDUN	1.0251	1.1151
Far North VTN		NEV1	0.9819	0.9756
Finley[2] – Dual MLF - Load	66	NFNY	1.0235	0.9752

[1] The NSW region includes the ACT. ACT generation and load are detailed separately for ease of reference.
[2] The dual MLF for Finley TNI (NFNY), is due to the impact of in-feed at Finley.

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Finley[2] – Dual MLF - Generation	66	NFNY	0.9670	0.9752
Forbes	66	NFB2	1.0411	1.0517
Gadara	132	NGAD	0.9934	0.9652
Glen Innes	66	NGLN	1.0217	1.0672
Gosford	66	NGF3	1.0017	1.0001
Gosford	33	NGSF	1.0019	0.9992
Green Square	11	NGSQ	1.0069	1.0060
Griffith	33	NGRF	1.0146	0.9773
Gunnedah	66	NGN2	1.0360	1.0571
Haymarket	132	NHYM	1.0068	1.0055
Heron's Creek	132	NHNC	1.0462	1.0860
Holroyd	132	NHLD	1.0029	1.0008
Homebush Bay	11	NHBB	1.0108	1.0082
Ilford	132	NLFD	0.9895	0.9882
Ingleburn	66	NING	0.9991	0.9977
Inverell	66	NNVL	1.0377	1.0786
Kemps Creek	330	NKCK	0.9954	0.9943
Kempsey	66	NKS2	1.0360	1.0803
Kempsey	33	NKS3	1.0391	1.0824
Koolkhan	66	NKL6	1.0250	1.0839
Kurnell	132	NKN1	1.0039	1.0037
Kurri	33	NKU3	0.9969	0.9949
Kurri	11	NKU1	0.9942	0.9919
Kurri	132	NKUR	0.9944	0.9833
Lake Munmorah	132	NMUN	0.9885	0.9859
Lane Cove	132	NLCV	1.0082	1.0054
Liddell	33	NLD3	0.9740	0.9755
Lismore	132	NLS2	1.0268	1.1047
Liverpool	132	NLP1	1.0010	1.0004
Macarthur	132	NMC1	0.9913	0.9928
Macarthur	66	NMC2	0.9959	0.9950
Macksville	132	NMCV	1.0272	1.0735
Macquarie Park	11	NMQP	1.0109	1.0088
Manildra	132	NMLD	1.0342	1.0387
Marrickville	11	NMKV	1.0117	1.0113
Marulan (Endeavour Energy)	132	NMR1	0.9844	0.9772
Marulan (Essential Energy)	132	NMR2	0.9844	0.9772
Mason Park	132	NMPK	1.0086	1.0059
Meadowbank	11	NMBK	1.0112	1.0092
Molong	132	NMOL	1.0302	1.0330
Moree	66	NMRE	1.0847	1.1208
Morven	132	NMVN	0.9844	0.9419
Mt Piper	66	NMP6	0.9754	0.9696
Mudgee	132	NMDG	1.0042	1.0089
Mullumbimby	11	NML1	1.0346	1.1466
Mullumbimby	132	NMLB	1.0336	1.1416

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Munmorah 330 kV[3]	330	NMN1	0.9899	
Munyang	11	NMY1	0.9549	0.9885
Munyang	33	NMYG	0.9549	0.9885
Murrumbateman	132	NMBM	0.9800	0.9656
Murrumburrah	66	NMRU	0.9950	0.9722
Muswellbrook	132	NMRK	0.9828	0.9757
Nambucca Heads	132	NNAM	1.0237	1.0721
Narrabri	66	NNB2	1.0699	1.1056
Newcastle	132	NNEW	0.9926	0.9900
North of Broken Bay VTN		NEV2	0.9949	0.9931
Orange	66	NRGE	1.0398	1.0421
Orange	132	NRG1	1.0387	1.0396
Orange North	132	NONO	1.0367	1.0406
Ourimbah	33	NORB	0.9994	0.9990
Ourimbah	132	NOR1	0.9981	0.9968
Ourimbah	66	NOR6	0.9981	0.9967
Panorama	66	NPMA	1.0246	1.0083
Parkes	66	NPK6	1.0432	1.0514
Parkes	132	NPKS	1.0413	1.0493
Peakhurst	33	NPHT	1.0059	1.0054
Peakhurst	132	NPH1	1.0033	1.0026
Pt Macquarie	33	NPMQ	1.0518	1.0931
Pyrmont	33	NPT3	1.0073	1.0061
Pyrmont	132	NPT1	1.0069	1.0056
Raleigh	132	NRAL	1.0166	1.0651
Regentville	132	NRGV	0.9984	0.9972
Rookwood Road	132	NRWR	1.0013	1.0011
Rozelle	132	NRZH	1.0085	1.0064
Rozelle	33	NRZL	1.0097	1.0069
Snowy Adit	132	NSAD	0.9763	0.9612
Somersby	11	NSMB	1.0027	1.0012
South of Broken Bay VTN		NEV3	1.0050	1.0044
St Peters	11	NSPT	1.0096	1.0089
Stroud	132	NSRD	1.0096	1.0119
Sydney East	132	NSE2	1.0051	1.0041
Sydney North (Ausgrid)	132	NSN1	1.0013	1.0001
Sydney North (Endeavour Energy)	132	NSN2	1.0013	1.0001
Sydney South	132	NSYS	1.0016	1.0011
Sydney West (Ausgrid)	132	NSW1	1.0018	1.0026
Sydney West (Endeavour Energy)	132	NSW2	1.0018	1.0026
Tamworth	66	NTA2	0.9830	1.0044
Taree (Essential Energy)	132	NTR2	1.0462	1.0680
Tenterfield	132	NTTF	1.0259	1.0802
Terranora	110	NTNR	1.0347	1.0956
Tomago	330	NTMG	0.9931	0.9925
Tomago (Ausgrid)	132	NTME	0.9928	0.9911

[3] TNI NMNP (33 kV) has been changed to NMN1 (330 kV).

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Tomago (Essential Energy)	132	NTMC	0.9928	0.9911
Top Ryde	11	NTPR	1.0091	1.0066
Tuggerah	132	NTG3	0.9946	0.9933
Tumut	66	NTU2	0.9910	0.9666
Vales Pt.	132	NVP1	0.9898	0.9858
Vineyard	132	NVYD	0.9996	0.9998
Wagga	66	NWG2	0.9889	0.9533
Wagga North	132	NWGN	0.9910	0.9545
Wagga North	66	NWG6	0.9923	0.9545
Wallerawang (Endeavour Energy)	132	NWW6	0.9741	0.9691
Wallerawang (Essential Energy)	132	NWW5	0.9741	0.9691
Wallerawang 66	66	NWW7	0.9748	0.9700
Wallerawang 330 PS Load	330	NWWP	0.9760	0.9729
Wellington	132	NWL8	0.9903	0.9875
West Gosford	11	NGWF	1.0033	1.0018
Williamsdale	132	NWDL	0.9830	0.9655
Wyong	11	NWYG	0.9966	0.9955
Yanco	33	NYA3	1.0049	0.9672
Yass	66	NYS6	0.9806	0.9661
Yass	132	NYS1	0.9742	0.9609

Table 5 NSW Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Bayswater PS Unit 1	330	BW01	NBAY1	NBAY	0.9668	0.9656
Bayswater PS Unit 2	330	BW02	NBAY2	NBAY	0.9668	0.9656
Bayswater PS Unit 3	500	BW03	NBAY3	NBYW	0.9668	0.9650
Bayswater PS Unit 4	500	BW04	NBAY4	NBYW	0.9668	0.9650
Blowering	132	BLOWERNG	NBLW8	NBLW	0.9431	0.9368
Broken Hill GT 1	22	GB01	NBKG1	NBKG	1.0480	0.9978
Burrinjuck	132	BURRIN	NBUK	NBUK	0.9589	0.9481
Capital Wind Farm	330	CAPTL_WF	NCWF1R	NCWF	0.9748	0.9618
Colongra PS Unit 1	330	CG1	NCLG1D	NCLG	0.9793	0.9855
Colongra PS Unit 2	330	CG2	NCLG2D	NCLG	0.9793	0.9855
Colongra PS Unit 3	330	CG3	NCLG3D	NCLG	0.9793	0.9855
Colongra PS Unit 4	330	CG4	NCLG4D	NCLG	0.9793	0.9855
Eraring 330 PS Unit 1	330	ER01	NEPS1	NEP3	0.9856	0.9842
Eraring 330 PS Unit 2	330	ER02	NEPS2	NEP3	0.9856	0.9842
Eraring 500 PS Unit 3	500	ER03	NEPS3	NEPS	0.9867	0.9857
Eraring 500 PS Unit 4	500	ER04	NEPS4	NEPS	0.9867	0.9857
Eraring PS Load	500	ERNL1	NEPSL	NEPS	0.9867	0.9857
Gullen Range Wind Farm	330	GULLRWF1	NGUR1G	NGUR	0.9770	0.9667
Guthega	132	GUTHEGA	NGUT8	NGUT	0.8882	0.8987
Guthega Auxiliary Supply	11	GUTHNL1	NMY11	NMY1	0.9549	0.9885
Hume (NSW Share)	132	HUMENSW	NHUM	NHUM	0.9483	0.9232

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Kangaroo Valley – Bendeela (Shoalhaven) Generation - dual MLF	330	SHGEN	NSHL	NSHN~~L~~	0.9838	0.9737
Kangaroo Valley (Shoalhaven) Pumps - dual MLF	330	SHPUMP	NSHP1	NSHN~~L~~	0.9941	0.9877
Liddell 330 PS Load	330	LIDDNL1	NLDPL	NLDP	0.9676	0.9663
Liddell 330 PS Unit 1	330	LD01	NLDP1	NLDP	0.9676	0.9663
Liddell 330 PS Unit 2	330	LD02	NLDP2	NLDP	0.9676	0.9663
Liddell 330 PS Unit 3	330	LD03	NLDP3	NLDP	0.9676	0.9663
Liddell 330 PS Unit 4	330	LD04	NLDP4	NLDP	0.9676	0.9663
Lower Tumut Generation - dual MLF	330	TUMUT3	NLTS8	NLTS	0.9465	0.9309
Lower Tumut Pipeline Auxiliary	66	TUMT3NL3	NTU2L3	NTU2	0.9910	0.9666
Lower Tumut Pumps - dual MLF	330	SNOWYP	NLTS3	NLTS	0.9773	0.9490
Lower Tumut T2 Auxiliary	66	TUMT3NL1	NTU2L1	NTU2	0.9910	0.9666
Lower Tumut T4 Auxiliary	66	TUMT3NL2	NTU2L2	NTU2	0.9910	0.9666
Mt Piper PS Load	330	MPNL1	NMPPL	NMTP	0.9744	0.9698
Mt Piper PS Unit 1	330	MP1	NMTP1	NMTP	0.9744	0.9698
Mt Piper PS Unit 2	330	MP2	NMTP2	NMTP	0.9744	0.9698
~~Munmorah 330 Load~~	~~330~~	~~MMNL1~~	~~NMNPL~~	~~NMN1~~	~~0.9899~~	~~0.9894~~
Taralga Wind Farm	132	TARALGA1	NMR22T	NMR1	0.9844	0.~~9762~~9772
Upper Tumut	330	UPPTUMUT	NUTS8	NUTS	0.9538	0.9363
Uranquinty PS Unit 11	132	URANQ11	NURQ1U	NURQ	0.8970	0.8675
Uranquinty PS Unit 12	132	URANQ12	NURQ2U	NURQ	0.8970	0.8675
Uranquinty PS Unit 13	132	URANQ13	NURQ3U	NURQ	0.8970	0.8675
Uranquinty PS Unit 14	132	URANQ14	NURQ4U	NURQ	0.8970	0.8675
Vales Point 330 PS Load	330	VPNL1	NVPPL	NVPP	0.9877	0.9865
Vales Point 330 PS Unit 5	330	VP5	NVPP5	NVPP	0.9877	0.9865
Vales Point 330 PS Unit 6	330	VP6	NVPP6	NVPP	0.9877	0.9865
Woodlawn Wind Farm	330	WOODLWN1	NCWF2W	NCWF	0.9748	0.9618

Table 6 NSW Embedded Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Awaba Renewable Energy Facility	132	AWABAREF	NNEW2	NNEW	0.9926	0.9900
Bankstown Sport Club	132	BANKSPT1	NSYS3R	NSYS	1.0016	1.0011
Boco Rock Wind Farm	132	BOCORWF1	NCMA3B	NBCO	0.9602	
Broadwater PS	132	BWTR1	NLS21B	NLS2	1.0268	1.1047
Brown Mountain	66	BROWNMT	NCMA1	NCMA	0.9763	0.9683
Burrendong Hydro PS	132	BDONGHYD	NWL81B	NWL8	0.9903	0.9875
Campbelltown WSLC	66	WESTCBT1	NING1C	NING	0.9991	0.9977
Condong PS	110	CONDONG1	NTNR1C	NTNR	1.0347	1.0956
Copeton Hydro PS	66	COPTNHYD	NNVL1C	NNVL	1.0377	1.0786
Cullerin Range Wind Farm	132	CULLRGWF	NYS11C	NYS1	0.9742	0.9609
Eastern Creek	132	EASTCRK	NSW21	~~NSW1~~NSW2	1.0018	1.0026
Eraring 330 BS UN (GT)	330	ERGT01	NEP35B	NEP3	0.9856	0.9842
Glenbawn Hydro PS	132	GLBWNHYD	NMRK2G	NMRK	0.9828	0.9757

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Glenn Innes (Pindari PS)	66	PINDARI	NGLN1	NGLN	1.0217	1.0672
Grange Avenue	132	GRANGEAV	NVYD1	NVYD	0.9996	0.9998
Gunning Wind Farm	132	GUNNING1	NYS12A	NYS1	0.9742	0.9609
HEZ PS	33	HEZ	NKU31H	NKU3	0.9969	0.9949
Jindabyne Generator	66	JNDABNE1	NCMA2	NCMA	0.9763	0.9683
Jounama PS	66	JOUNAMA1	NTU21J	NTU2	0.9910	0.9666
Keepit	66	KEEPIT	NKPT	NKPT	1.0360	1.0571
Kincumber Landfill	66	KINCUM1	NGF31K	NGF3	1.0017	1.0001
Liddell 33 – Hunter Valley GTs	33	HVGTS	NLD31	NLD3~~1~~	0.9740	0.9755
Liverpool 132 (Jacks Gully)	132	JACKSGUL	NLP11	NSW2	1.0018	1.0026
Lucas Heights II Power Plant	132	LUCASHGT	NSYS2G	NSYS	1.0016	1.0011
Lucas Heights Stage 2 PS	132	LUCAS2S2	NSYS1	NSYS	1.0016	1.0011
Nine Willoughby	132	NINEWIL1	NSE21R	NSE2	1.0051	1.0041
Nyngan Solar Farm	132	NYNGAN1	NWL82N	NWL8	0.9903	0.9875
Redbank PS Unit 1	132	REDBANK1	NMRK1	NRED	0.9843	0.9744
Sithe	132	SITHE01	NSYW1	NSW2	1.0018	1.0026
St George Leagues Club	33	STGEORG1	NPHT1E	NPHT	1.0059	1.0054
Tallawarra PS	132	TALWA1	NDT13T	NTWA	0.9912	0.9839
Teralba PS	132	TERALBA	NNEW1	NNEW	0.9926	0.9900
The Drop PS – Dual MLF associated to Finley (NFNY) - Load	~~22~~66	THEDROP1	NFNY1D	NFNY	1.0235	0.9752
The Drop PS – Dual MLF associated to Finley (NFNY) - Generation	~~22~~66	THEDROP1	NFNY1D	NFNY	0.9670	0.9752
West Nowra	132	AGLNOW1	NDT12	NDT1	0.9916	0.9883
Wests Illawara Leagues Club	132	WESTILL1	NDT14E	NDT1	0.9916	0.9883
Wilga Park A	66	WILGAPK	NNB21W	NNB2	1.0699	1.1056
Wilga Park B	66	WILGB01	NNB22W	NNB2	1.0699	1.1056
Woodlawn Bioreactor	132	WDLNGN01	NMR21W	NMR2	0.~~9836~~9844	0.9772
Woy Woy Landfill	66	WOYWOY1	NGF32W	NGF3	1.0017	1.0001
Wyangala A PS	66	WYANGALA	NCW81A	NCW8	1.0099	1.0040
Wyangala B PS	66	WYANGALB	NCW82B	NCW8	1.0099	1.0040

Table 7 ACT Loads

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Canberra	132	ACA1	0.9828	0.9642
Queanbeyan (ACTEW)	66	AQB1	0.9924	0.9752
Queanbeyan (Essential Energy)	66	AQB2	0.9924	0.9752

Table 8 ACT Embedded Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Capital East Solar Farm	66	CESF1	AQB21C	AQB2	0.9924	0.9752
Royalla Solar Farm	132	ROYALLA1	ACA11R	ACA1	0.9828	0.9642

The regional reference node for ACT load and generation is the Sydney West 330kV node.

1.3 Victoria Marginal Loss Factors

Table 9 Victorian Loads

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Altona	66	VATS	1.0032	1.0036
Altona	220	VAT2	0.9985	0.9972
Ballarat	66	VBAT	1.0207	1.0239
Bendigo	66	VBE6	1.0672	1.0784
Bendigo	22	VBE2	1.0684	1.0781
BHP Western Port	220	VJLA	0.9910	0.9893
Brooklyn (Jemena)	22	VBL2	1.0039	1.0039
Brooklyn (Jemena)	66	VBL6	1.0053	1.0034
Brooklyn (Powercor)	22	VBL3	1.0039	1.0039
Brooklyn (Powercor)	66	VBL7	1.0053	1.0034
Brunswick (CitiPower)	22	VBT2	0.9995	0.9994
Brunswick (Jemena)	22	VBTS	0.9995	0.9994
Cranbourne	220	VCB2	0.9901	0.9878
Cranbourne (AusNet Services)	66	VCBT	0.9919	0.9904
Cranbourne (United Energy)	66	VCB5	0.9919	0.9904
East Rowville (AusNet Services)	66	VER2	0.9931	0.9916
East Rowville (United Energy)	66	VERT	0.9931	0.9916
Fishermens Bend (CitiPower)	66	VFBT	1.0043	1.0053
Fishermens Bend (Powercor)	66	VFB2	1.0043	1.0053
Fosterville	220	VFVT	1.0649	1.0800
Geelong	66	VGT6	0.9987	0.9982
Glenrowan	66	VGNT	1.0532	1.0799
Heatherton	66	VHTS	0.9985	0.9990
Heywood	22	VHY2	1.0007	0.9984
Horsham	66	VHOT	1.0680	1.0760
Keilor (Jemena)	66	VKT2	1.0014	1.0015
Keilor (Powercor)	66	VKTS	1.0014	1.0015
Kerang	22	VKG2	1.0988	1.1077
Kerang	66	VKG6	1.0986	1.1070
Khancoban	330	NKHN	1.0468	1.0826
Loy Yang Substation	66	VLY6	0.9765	0.9703
Malvern	22	VMT2	0.9964	0.9960
Malvern	66	VMT6	0.9953	0.9947
Morwell TS	66	VMWT	0.~~9798~~9799	0.9777
Mt Beauty	66	VMBT	1.0368	1.0539
Portland	500	VAPD	1.0033	1.0005
Red Cliffs	22	VRC2	1.1205	1.1260
Red Cliffs	66	VRC6	1.1212	1.1243
Red Cliffs (Essential Energy)	66	VRCA	1.1212	1.1243
Richmond	22	VRT2	0.9977	0.9969
Richmond (CitiPower)	66	VRT7	1.0023	0.9993
Richmond (United Energy)	66	VRT6	1.0023	0.9993
Ringwood (AusNet Services)	22	VRW3	0.9998	0.9998
Ringwood (AusNet Services)	66	VRW7	0.9993	0.9992

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Ringwood (United Energy)	22	VRW2	0.9998	0.9998
Ringwood (United Energy)	66	VRW6	0.9993	0.9992
Shepparton	66	VSHT	1.0639	1.0869
South Morang (Jemena)	66	VSM6	0.9987	0.9992
South Morang (AusNet Services)	66	VSMT	0.9987	0.9992
Springvale (CitiPower)	66	VSVT	0.9970	0.9965
Springvale (United Energy)	66	VSV2	0.9970	0.9965
Templestowe (CitiPower)	66	VTS2	0.9993	0.9991
Templestowe (Jemena)	66	VTST	0.9993	0.9991
Templestowe (AusNet Services)	66	VTS3	0.9993	0.9991
Templestowe (United Energy)	66	VTS4	0.9993	0.9991
Terang	66	VTGT	1.0300	1.0262
Thomastown (Jemena)	66	VTTS	1.0000	1.0000
Thomastown (AusNet Services)	66	VTT2	1.0000	1.0000
Tyabb	66	VTBT	0.9924	0.9909
Wemen TS	66	VWET	1.1206	1.1240
West Melbourne	22	VWM2	1.0023	1.0026
West Melbourne (CitiPower)	66	VWM7	1.0039	1.0043
West Melbourne (Jemena)	66	VWM6	1.0039	1.0043
Wodonga	22	VWO2	1.0495	1.0756
Wodonga	66	VWO6	1.0480	1.0733
Yallourn	11	VYP1	0.9597	0.9564

Table 10 Victoria Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Anglesea PS	220	APS	VAPS	VPTH	0.9915	0.9849
Banimboola	220	BAPS	VDPS2	VDPS	1.0004	1.0097
Basslink (Loy Yang PS Switchyard) Tasmania to Victoria	500	BLNKVIC	VLYP13	VTBL	0.9828	0.9684
Dartmouth PS	220	DARTM1	VDPS	VDPS	1.0004	1.0097
Eildon PS Unit 1	220	EILDON1	VEPS1	VEPS	1.0026	1.0078
Eildon PS Unit 2	220	EILDON2	VEPS2	VEPS	1.0026	1.0078
Hazelwood PS Load	220	HWPNL1	VHWPL	VHWP	0.9723	0.9691
Hazelwood PS Unit 1	220	HWPS1	VHWP1	VHWP	0.9723	0.9691
Hazelwood PS Unit 2	220	HWPS2	VHWP2	VHWP	0.9723	0.9691
Hazelwood PS Unit 3	220	HWPS3	VHWP3	VHWP	0.9723	0.9691
Hazelwood PS Unit 4	220	HWPS4	VHWP4	VHWP	0.9723	0.9691
Hazelwood PS Unit 5	220	HWPS5	VHWP5	VHWP	0.9723	0.9691
Hazelwood PS Unit 6	220	HWPS6	VHWP6	VHWP	0.9723	0.9691
Hazelwood PS Unit 7	220	HWPS7	VHWP7	VHWP	0.9723	0.9691
Hazelwood PS Unit 8	220	HWPS8	VHWP8	VHWP	0.9723	0.9691
Jeeralang A PS Unit 1	220	JLA01	VJLGA1	VJLG	0.9667	0.9647
Jeeralang A PS Unit 2	220	JLA02	VJLGA2	VJLG	0.9667	0.9647
Jeeralang A PS Unit 3	220	JLA03	VJLGA3	VJLG	0.9667	0.9647
Jeeralang A PS Unit 4	220	JLA04	VJLGA4	VJLG	0.9667	0.9647

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Jeeralang B PS Unit 1	220	JLB01	VJLGB1	VJLG	0.9667	0.9647
Jeeralang B PS Unit 2	220	JLB02	VJLGB2	VJLG	0.9667	0.9647
Jeeralang B PS Unit 3	220	JLB03	VJLGB3	VJLG	0.9667	0.9647
Jindabyne pump at Guthega	132	SNOWYGJP	NGJP	NGJP	1.1380	1.1865
Laverton PS (LNGS1)	220	~~LAVNORTH~~LNGS1	VAT21L	VAT2	0.9985	0.9972
Laverton PS (LNGS2)	220	LNGS2	VAT22L	VAT2	0.9985	0.9972
Loy Yang A PS Load	500	LYNL1	VLYPL	VLYP	0.9742	0.9704
Loy Yang A PS Unit 1	500	LYA1	VLYP1	VLYP	0.9742	0.9704
Loy Yang A PS Unit 2	500	LYA2	VLYP2	VLYP	0.9742	0.9704
Loy Yang A PS Unit 3	500	LYA3	VLYP3	VLYP	0.9742	0.9704
Loy Yang A PS Unit 4	500	LYA4	VLYP4	VLYP	0.9742	0.9704
Loy Yang B PS Unit 1	500	LOYYB1	VLYP5	VLYP	0.9742	0.9704
Loy Yang B PS Unit 2	500	LOYYB2	VLYP6	VLYP	0.9742	0.9704
MacArthur Wind Farm	500	MACARTH1	VTRT1M	VTRT	0.9940	0.9946
McKay Creek / Bogong PS	220	MCKAY1	VMKP1	VT14	0.9883	1.0083
Mortlake Unit 1	500	MORTLK11	VM0P1O	VM0P	0.9942	0.9922
Mortlake Unit 2	500	MORTLK12	VM0P2O	VM0P	0.9942	0.9922
Morwell PS G1, 2 and 3	66	MOR1	VMWT1	VMWG	0.9704	0.9682
Morwell PS G4	11	MOR2	VMWP4	VMWP	0.9732	0.9698
Morwell PS G5	11	MOR3	VMWP5	VMWP	0.9732	0.9698
Morwell PS Load	66	MORNL1	VMWTL	VMWT	0.9799	0.9777
Mt Mercer Windfarm	220	MERCER01	VELT1M	VELT	1.0033	1.0064
Murray	330	MURRAY	NMUR8	NMUR	0.9885	1.0178
Newport PS	220	NPS	VNPS	VNPS	0.9952	0.9953
Valley Power ~~PS~~Unit 1	500	VPGS1	VLYP07	VLYP	0.9742	0.9704
Valley Power Unit 2	500	VPGS2	VLYP08	VLYP	0.9742	0.9704
Valley Power Unit 3	500	VPGS3	VLYP09	VLYP	0.9742	0.9704
Valley Power Unit 4	500	VPGS4	VLYP010	VLYP	0.9742	0.9704
Valley Power Unit 5	500	VPGS5	VLYP011	VLYP	0.9742	0.9704
Valley Power Unit 6	500	VPGS6	VLYP012	VLYP	0.9742	0.9704
Waubra Wind Farm	220	WAUBRAWF	VWBT1A	VWBT	1.0122	1.0157
West Kiewa PS Unit 1	220	WKIEWA1	VWKP1	VWKP	1.0247	1.0416
West Kiewa PS Unit 2	220	WKIEWA2	VWKP2	VWKP	1.0247	1.0416
Yallourn W PS 220 Load	220	YWNL1	VYP2L	VYP2	0.9563	0.9536
Yallourn W PS 220 Unit 1	220	YWPS1	VYP21	VYP3	0.9589	0.9538
Yallourn W PS 220 Unit 2	220	YWPS2	VYP22	VYP2	0.9563	0.9536
Yallourn W PS 220 Unit 3	220	YWPS3	VYP23	VYP2	0.9563	0.9536
Yallourn W PS 220 Unit 4	220	YWPS4	VYP24	VYP2	0.9563	0.9536

Table 11 Victoria Embedded Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Bairnsdale PS	66	BDL01	VMWT2	VBDL	0.9771	0.9745
Bairnsdale PS Generator Unit 2	66	BDL02	VMWT3	VBDL	0.9771	0.9745

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Balds Hill WF (NEW)	66	BALDHWF1	VMWT9B	VMWT	0.9799	0.9777
Ballarat Health Services	66	BBASEHOS	VBAT1H	VBAT	1.0207	1.0239
Brooklyn Landfill & Recycling Facility	66	BROOKLYN	VBL61	VBL6	1.0053	1.0034
Clayton Landfill Gas PS	~~22~~66	CLAYTON	VSV21B	VSV2	0.9970	0.9965
Codrington Wind Farm	66	CODRNGTON	VTGT2C	VTGT	1.0300	1.0262
Corio LFG PS	~~22~~66	CORIO1	VGT61C	VGT6	0.9987	0.9982
Glenmaggie Hydro PS	66	GLENMAG1	VMWT8G	VMWT	0.9799	0.9777
Hallam Mini Hydro	66	HLMSEW01	VER21H	VER2	0.9931	0.9916
Hallam Road Renewable Energy Facility	66	HALLAMRD1	VER22L	VER2	0.9931	0.9916
Hepburn Community WF	66	HEPWIND1	VBAT2L	VBAT	1.0207	1.0239
Hume (Victorian Share)	66	HUMEV	VHUM	VHUM	0.9768	0.9912
Longford	66	LONGFORD	VMWT6	VMWT	0.9799	0.9777
Mornington Landfill Site Generator	66	MORNW	VTBT1	VTBT	0.9924	0.9909
Mortons Lane Wind Farm	66	MLWF1	VTGT4M	VTGT	1.0300	1.0262
Oaklands Hill Wind Farm	66	OAKLAND1	VTGT3A	VTGT	1.0300	1.0262
Shepparton Waste Gas	66	SHEP1	VSHT2S	VSHT	1.0639	1.0869
Somerton PS	66	AGLSOM	VTTS1	VSOM	0.9946	0.9927
Springvale Power Plant	~~22~~66	SVALE1	VSV22S	VSV2	0.9970	0.9965
Tatura	66	TATURA01	VSHT1	VSHT	1.0639	1.0869
Toora Wind Farm	66	TOORAWF	VMWT5	VMWT	0.9799	0.9777
Traralgon NSS	~~22~~66	TGNSS1	VMWT1T	VMWT	0.9799	0.9777
William Horvell Hydro PS	66	WILLHOV1	VW061W	VWO6	1.0480	1.0733
Wollert Renewable Energy Facility	66	WOLLERT1	VSMT1W	VSMT	0.9987	0.9992
Wonthaggi Wind Farm	66	WONWP	VMWT7	VMWT	0.9799	0.9777
Wyndham Landfill Site Generator	66	WYNDW	VATS1	VATS	1.0032	1.0036
Yambuk Wind Farm	66	YAMBUKWF	VTGT1	VTGT	1.0300	1.0262
Yarawonga Hydro PS	66	YWNGAHYD	VSHT3Y	VSHT	1.0639	1.0869

1.4 South Australia Marginal Loss Factors

Table 12 South Australia Loads

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Angas Creek	33	SANC	1.0115	1.0120
Ardrossan West	33	SARW	0.9382	0.9459
Back Callington	11	SBAC	1.0133	1.0155
Baroota	33	SBAR	0.9918	0.9918
Berri	66	SBER	1.0536	1.1204
Berri (Powercor)	66	SBE1	1.0536	1.1204
Blanche	33	SBLA	0.9903	1.0241
Blanche (Powercor)	33	SBL1	0.9903	1.0241
Brinkworth	33	SBRK	0.9928	0.9928
Bungama Industrial	33	SBUN	0.9874	0.9879
Bungama Rural	33	SBUR	0.9984	0.9880
City West	66	SACR	1.0054	1.0047
Clare North	33	SCLN	0.9906	0.9931
Dalrymple	33	SDAL	0.8995	0.9157
Davenport	275	SDAV	0.9886	0.9890
Davenport	33	SDAW	0.9891	0.9895
Dorrien	33	SDRN	1.0082	1.0048
East Terrace	66	SETC	1.0055	1.0050
Happy Valley	66	SHVA	1.0068	1.0070
Hummocks	33	SHUM	0.9599	0.9613
Kadina East	33	SKAD	0.9648	0.9680
Kanmantoo	11	SKAN	1.0133	1.0153
Keith	33	SKET	1.0062	1.0258
Kilburn	66	SKLB	1.0029	1.0030
Kincraig	33	SKNC	0.9975	1.0262
Lefevre	66	SLFE	1.0002	0.9995
Leigh Creek	33	SLCC	1.0482	1.0348
Leigh Creek South	33	SLCS	1.0477	1.0383
Magill	66	SMAG	1.0053	1.0050
Mannum	33	SMAN	1.0140	1.0176
Mannum - Adelaide Pipeline 1	3.3	SMA1	1.0199	1.0232
Mannum - Adelaide Pipeline 2	3.3	SMA2	1.0191	1.0224
Mannum - Adelaide Pipeline 3	3.3	SMA3	1.0177	1.0205
Middleback	33	SMDL	0.9880	0.9878
Middleback	132	SMBK	0.9893	0.9889
Millbrook	132	SMLB	1.0061	1.0047
Mobilong	33	SMBL	1.0126	1.0162
Morgan - Whyalla Pipeline 1	3.3	SMW1	1.0292	1.0540
Morgan - Whyalla Pipeline 2	3.3	SMW2	1.0163	1.0309
Morgan - Whyalla Pipeline 3	3.3	SMW3	1.0028	1.0093
Morgan - Whyalla Pipeline 4	3.3	SMW4	0.9957	0.9995
Morphett Vale East	66	SMVE	1.0075	1.0080
Mount Barker South	66	SMBS	1.0073	1.0078

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Mt Barker	66	SMBA	1.0072	1.0077
Mt Gambier	33	SMGA	0.9908	1.0231
Mt Gunson	33	SMGU	0.9969	0.9747
Murray Bridge - Hahndorf Pipeline 1	11	SMH1	1.0173	1.0192
Murray Bridge - Hahndorf Pipeline 2	11	SMH2	1.0193	1.0200
Murray Bridge - Hahndorf Pipeline 3	11	SMH3	1.0166	1.0170
Neuroodla	33	SNEU	1.0164	1.0138
New Osborne	66	SNBN	0.9998	0.9992
North West Bend	66	SNWB	1.0261	1.0567
Northfield	66	SNFD	1.0042	1.0029
Para	66	SPAR	1.0059	1.0036
Parafield Gardens West	66	SPGW	1.0045	1.0024
Penola West 33	33	SPEN	0.9861	1.0194
Pimba	132	SPMB	0.9991	0.9845
Playford	~~33~~132	SPAA	0.9929	0.9993
Port Lincoln	33	SPLN	0.9645	0.9726
Port Pirie	33	SPPR	0.9957	0.9906
Roseworthy	11	SRSW	1.0111	1.0092
Snuggery Industrial	33	SSNN	0.9704	1.0081
Snuggery Rural	33	SSNR	0.9701	1.0030
South Australian VTN		SJP1	1.0012	1.0049
Stony Point	11	SSPN	0.9947	0.9947
Tailem Bend	33	STAL	1.0096	1.0161
Templers	33	STEM	1.0062	1.0048
Torrens Island	66	STSY	1.0000	1.0000
Waterloo	33	SWAT	0.9881	0.9924
Whyalla Central Substation	33	SWYC	0.9930	0.9933
Whyalla Terminal BHP	33	SBHP	0.9943	0.9938
Woomera	132	SWMA	0.9984	0.9664
Wudina	66	SWUD	0.9855	0.9905
Yadnarie	66	SYAD	0.9731	0.9777

Table 13 South Australia Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Cathedral Rocks Wind Farm	132	CATHROCK	SCRK	SCRK	0.8775	0.8774
Clements Gap Wind Farm	132	CLEMGPWF	SCGW1P	SCGW	0.9701	0.9658
Dry Creek PS Unit 1	66	DRYCGT1	SDCA1	SDPS	1.0018	1.0022
Dry Creek PS Unit 2	66	DRYCGT2	SDCA2	SDPS	1.0018	1.0022
Dry Creek PS Unit 3	66	DRYCGT3	SDCA3	SDPS	1.0018	1.0022
Hallet 2 WF	275	HALLWF2	SMOK1H	SMOK	0.9811	0.9843
Hallet PS	275	AGLHAL	SHPS1	SHPS	0.9835	0.9869
Hallet WF	275	HALLWF1	SHPS2W	SHPS	0.9835	0.9869
Ladbroke Grove PS Unit 1	132	LADBROK1	SPEW1	SPEW	0.9563	0.9884
Ladbroke Grove PS Unit 2	132	LADBROK2	SPEW2	SPEW	0.9563	0.9884
Lake Bonney Wind Farm	33	LKBONNY1	SMAY1	SMAY	0.9352	0.9665

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Lake Bonney Wind Farm Stage 2	33	LKBONNY2	SMAY2	SMAY	0.9352	0.9665
Lake Bonney Wind Farm Stage 3	33	LKBONNY3	SMAY3W	SMAY	0.9352	0.9665
Leigh Creek Northern PS Load 2	33	NPSNL2	SLCCL	SLCC	1.0482	1.0348
Mintaro PS	132	MINTARO	SMPS	SMPS	0.9736	0.9879
Mt Millar Wind Farm	33	MTMILLAR	SMTM1	SMTM	0.9016	0.8971
North Brown Hill Wind Farm	275	NBHWF1	SBEL1A	SBEL	0.9767	0.9795
Northern PS Unit 1	275	NPS1	SNPA1	SNPS	0.9826	0.9744
Northern PS Unit 2	275	NPS2	SNPA2	SNPS	0.9826	0.9744
O.C.P.L. Unit 1	66	OSB-AG	SNBN1	SOCP	0.9995	0.9990
Pelican Point PS	275	PPCCGT	SPPT	SPPT	1.0010	0.9994
Playford Northern PS Load 1	132	NPSNL1	SPAAL	SPAA	0.9929	0.9993
Playford PS	275	PLAYB-AG	SPSD1	SPPS	0.9881	0.9882
Port Lincoln 3	33	POR03	SPL31P	SPL3	0.8976	0.9108
Port Lincoln PS	132	POR01	SPLN1	SPTL	0.9520	0.9447
Quarantine PS Unit 1	66	QPS1	SQPS1	SQPS	0.9932	0.9939
Quarantine PS Unit 2	66	QPS2	SQPS2	SQPS	0.9932	0.9939
Quarantine PS Unit 3	66	QPS3	SQPS3	SQPS	0.9932	0.9939
Quarantine PS Unit 4	66	QPS4	SQPS4	SQPS	0.9932	0.9939
Quarantine PS Unit 5	66	QPS5	SQPS5Q	SQPS	0.9932	0.9939
Snowtown WF Stage 2 - North	275	SNOWNTH1	SBLWS1	SBLW	0.9782	0.9861
Snowtown WF Stage 2 - South	275	SNOWSTH1	SBLWS2	SBLW	0.9782	0.9861
Snowtown Wind Farm	33	SNOWTWN1	SNWF1T	SNWF	0.9198	0.9136
Snuggery PS Units 1 to 3	132	SNUG1	SSGA1	SSPS	0.9829	0.9944
The Bluff wind Farm	275	BLUFF1	SBEL2P	SBEL	0.9767	0.9795
Torrens Island PS A Unit 1	275	TORRA1	STSA1	STPS	1.0019	1.0004
Torrens Island PS A Unit 2	275	TORRA2	STSA2	STPS	1.0019	1.0004
Torrens Island PS A Unit 3	275	TORRA3	STSA3	STPS	1.0019	1.0004
Torrens Island PS A Unit 4	275	TORRA4	STSA4	STPS	1.0019	1.0004
Torrens Island PS B Unit 1	275	TORRB1	STSB1	STPS	1.0019	1.0004
Torrens Island PS B Unit 2	275	TORRB2	STSB2	STPS	1.0019	1.0004
Torrens Island PS B Unit 3	275	TORRB3	STSB3	STPS	1.0019	1.0004
Torrens Island PS B Unit 4	275	TORRB4	STSB4	STPS	1.0019	1.0004
Torrens Island PS Load	66	TORNL1	STSYL	STSY	1.0000	1.0000
Waterloo Wind Farm	132	WATERLWF	SWLE1R	SWLE	0.9764	0.9819
Wattle Point Wind Farm	132	WPWF	SSYP1	SSYP	0.8195	0.8218

Table 14 South Australia Embedded Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Amcor Glass UN 1	11	AMCORGR	SRSW1E	SRSW	1.0111	1.0092
Angaston PS	33	ANGAS1	SDRN1	SANG	1.0061	0.9498
Angaston PS	33	ANGAS2	SDRN2	SANG	1.0061	0.9498
Blue Lake Milling	33	BLULAKE1	SKET2B	SKET	1.0062	1.0258
Bolivar WWT Plant (NEW)	66	BOLIVAR1	SPGW1B	SPGW	1.0045	1.0024
Canunda Wind Farm	33	CNUNDAWF	SSNN1	SCND	0.9432	
Cummins Lonsdale PS	66	LONSDALE	SMVE1	SMVE	1.0075	1.0080

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Highbury LFG PS	~~11~~66	HIGHBRY1	SNFD2H	SNFD	1.0042	1.0029
Pedler Creek Landfill Gas PS	~~11~~66	PEDLER1	SMVE5C	SMVE	1.0075	1.0080
Pt Stanvac Unit 1	66	STANV1	SMVE3P	SMVE	1.0075	1.0080
Pt Stanvac Unit 2	66	STANV2	SMVE4P	SMVE	1.0075	1.0080
Starfish Hill Wind Farm	66	STARHLWF	SMVE2	SMVE	1.0075	1.0080
Tatiara Meat Co	33	TATIARA1	SKET1E	SKET	1.0062	1.0258
Tea Tree Gully LFG PS	~~11~~66	TEATREE1	SNFD2T	SNFD	1.0042	1.0029
Terminal Storage Mini-Hydro	66	TERMSTOR	SNFD1	SNFD	1.0042	1.0029
Wingfield 1 LFG PS	~~11~~66	WINGF1_1	SKLB1W	SKLB	1.0029	1.0030
Wingfield 2 LFG PS	~~11~~66	WINGF2_1	SNBN2W	SNBN	0.9998	0.9992

1.5 Tasmania Marginal Loss Factors

Table 15 Tasmania Loads

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Arthurs Lake	6.6	TAL2	0.9911	0.9849
Avoca	22	TAV2	1.0167	0.9940
Boyer SWA	6.6	TBYA	1.0141	0.9891
Boyer SWB	6.6	TBYB	1.0223	0.9982
Bridgewater	11	TBW2	1.0143	0.9911
Burnie	22	TBU3	0.9835	0.9821
Chapel St.	11	TCS3	1.0132	0.9898
Comalco	220	TCO1	1.0006	1.0006
Creek Road	33	TCR2	1.0127	0.9891
Derby	22	TDE2	0.9566	0.9366
Derwent Bridge	22	TDB2	0.9438	0.9154
Devonport	22	TDP2	0.9874	0.9859
Electrona	11	TEL2	1.0235	1.0020
Emu Bay	11	TEB2	0.9811	0.9789
Fisher (Rowallan)	220	TFI1	0.9701	0.9645
George Town	22	TGT3	1.0025	1.0024
George Town (Basslink)	220	TGT1	1.0000	1.0000
Gordon	22	TGO2	0.9903	0.9530
Greater Hobart Area VTN		TVN1	1.0137	0.9902
Hadspen	22	THA3	0.9904	0.9789
Hampshire	110	THM2	0.9796	0.9782
Huon River	11	THR2	1.0179	1.0003
Kermandie	11	TKE2	1.0256	1.0028
Kingston	33	TK13	1.0179	0.9938
Kingston	11	TKI2	1.0200	0.9942
Knights Road	11	TKR2	1.0284	1.0040
Lindisfarne	33	TLF2	1.0164	0.9938
Meadowbank	22	TMB2	0.9828	0.9624
Mornington	33	TMT2	1.0145	0.9879
Mowbray	22	TMY2	0.9881	0.9766
New Norfolk	22	TNN2	1.0068	0.9828

Location	Voltage (kV)	TNI	2015–16 MLF	2014–15 MLF
Newton	22	TNT2	0.9603	0.9795
Newton	11	TNT3	0.9642	0.9616
North Hobart	11	TNH2	1.0119	0.9872
Norwood	22	TNW2	0.9884	0.9776
Palmerston	22	TPM3	0.9844	0.9626
Port Latta	22	TPL2	0.9589	0.9563
Que	22	TQU2	0.9731	0.9678
Queenstown	11	TQT3	0.9668	0.9748
Queenstown	22	TQT2	0.9633	0.9658
Railton	22	TRA2	0.9878	0.9853
Risdon	33	TRI4	1.0131	0.9890
Risdon	11	TRI3	1.0152	0.9889
Rokeby	11	TRK2	1.0175	0.9975
Rosebery	44	TRB2	0.9707	0.9710
Savage River	22	TSR2	1.0003	0.9982
Scottsdale	22	TSD2	0.9661	0.9554
Smithton	22	TST2	0.9414	0.9434
Sorell	22	TSO2	1.0207	0.9985
St Leonard	22	TSL2	0.9880	0.9780
St. Marys	22	TSM2	1.0324	1.0098
Starwood	110	TSW1	1.0010	1.0010
Tamar Region VTN		TVN2	0.9904	0.9811
Temco	110	TTE1	1.0041	1.0037
Trevallyn	22	TTR2	0.9886	0.9779
Triabunna	22	TTB2	1.0332	1.0018
Tungatinah	22	TTU2	0.9483	0.9210
Ulverstone	22	TUL2	0.9854	0.9830
Waddamana	22	TWA2	0.9644	0.9389
Wayatinah	11	TWY2	0.9927	0.9693
Wesley Vale	22	TWV2	0.9845	0.9765

Table 16 Tasmania Generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Basslink (George Town)	220	BLNKTAS	TGT11	TGT1	1.0000	1.0000
Bastyan	220	BASTYAN	TFA11	TFA1	0.9466	0.9396
Bell Bay No.3	110	BBTHREE1	TBB11	TBB1	0.9995	0.9999
Bell Bay No.3	110	BBTHREE2	TBB12	TBB1	0.9995	0.9999
Bell Bay No.3	110	BBTHREE3	TBB13	TBB1	0.9995	0.9999
Bluff Point and Studland Bay Wind Farms	110	WOOLNTH1	TST11	TST1	0.8944	0.8913
Butlers Gorge	110	BUTLERSG	TBG11	TBG1	0.9418	0.9142
Catagunya	220	LI_WY_CA	TLI11	TLI1	0.9915	0.9702
Cethana	220	CETHANA	TCE11	TCE1	0.9671	0.9593
Cluny	220	CLUNY	TCL11	TCL1	0.9933	0.9737
Devils gate	110	DEVILS_G	TDG11	TDG1	0.9719	0.9639

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Fisher	220	FISHER	TFI11	TFI1	0.9701	0.9645
Gordon	220	GORDON	TGO11	TGO1	0.9400	0.9046
John Butters	220	JBUTTERS	TJB11	TJB1	0.9384	0.9405
Lake Echo	110	LK_ECHO	TLE11	TLE1	0.9338	0.9028
Lemonthyme	220	LEM_WIL	TSH11	TSH1	0.9746	0.9683
Liapootah	220	LI_WY_CA	TLI11	TLI1	0.9915	0.9702
Mackintosh	110	MACKNTSH	TMA11	TMA1	0.9381	0.9296
Meadowbank	110	MEADOWBK	TMB11	TMB1	0.9737	0.9644
Musselroe	110	MUSSELR1	TDE11M	TDE1	0.9039	0.8957
Paloona	110	PALOONA	TPA11	TPA1	0.9830	0.9657
Poatina	220	POAT220	TPM11	TPM1	0.9725	0.9681
Poatina	110	POAT110	TPM21	TPM2	0.9630	0.9571
Reece No.1	220	REECE1	TRCA1	TRCA	0.9425	0.9315
Reece No.2	220	REECE2	TRCB1	TRCB	0.9426	0.9319
Repulse	220	REPULSE	TCL12	TCL1	0.9933	0.9737
Rowallan	220	ROWALLAN	TFI12	TFI1	0.9701	0.9645
Tamar Valley CCGT	220	TVCC201	TTV11A	TTV1	0.9996	0.9990
Tamar Valley OCGT	110	TVPP104	TBB14A	TBB1	0.9995	0.9999
Tarraleah	110	TARRALEA	TTA11	TTA1	0.9432	0.9195
Trevallyn	110	TREVALLN	TTR11	TTR1	0.9857	0.9745
Tribute	220	TRIBUTE	TTI11	TTI1	0.9421	0.9339
Tungatinah	110	TUNGATIN	TTU11	TTU1	0.9404	0.9122
Wayatinah	220	LI_WY_CA	TLI11	TLI1	0.9915	0.9702
Wilmot	220	LEM_WIL	TSH11	TSH1	0.9746	0.9683

Table 17 Tasmania Embedded Generation

Location	Voltage [kV]	DUID	Connection Point ID	TNI	2015–16 MLF	2014–15 MLF
Midlands PS	22	MIDLDPS1	TAV21M	TAV2	1.0167	0.9940
Remount	22	REMOUNT	TMY21	TVN2	0.9904	0.9811

2. CHANGES IN MARGINAL LOSS FACTORS

This section summarises changes in MLFs in 2015–16 from 2014–15 and the trends driving them.

The following major trends in the NEM dictated changes in MLFs in 2015–16 from 2014–15:

- Reduced regional demand forecast in all regions.
- Reduced generation forecast in Tasmania.
- Reduced Basslink power transfers from Tasmania to Victoria.
- Increased demand forecast in Southern Queensland, in particular driven by new LNG load connections around Columboola.

Reduced thermal generation in South Australia. These major trends dictated the following changes in modelled net power transfer on interconnectors:

- Increased power flow from Victoria to Tasmania compared to the 2014–15 MLF study.
- Reduced power flow from South Australia to Victoria compared to the 2014–15 MLF study.
- Reduced power from Victoria to NSW compared to the 2014–15 MLF study.
- Increased power flow from Queensland to NSW compared to the 2014–15 MLF study.

These changes have a consequent effect on MLFs, in particular at locations geographically close to interconnectors.

The following events also occurred in the NEM. However, they had minimal impact on changes to 2015–16 MLFs since most were already known and modelled in the 2014–15 MLF study.

- Closure of the Point Henry Aluminium Smelter in Geelong, Victoria.
- De-commissioning of Wallerawang, and removal from service of Redbank and Munmorah PSs in NSW, Morwell PS in Victoria, and Swanbank E PS in Queensland.

2.1 Changes to Marginal Loss Factors in Queensland

Despite the increase in the southern Queensland demand due to LNG load connections, overall demand forecast for Queensland in 2015–16 has reduced. This has led to increased transfers from Queensland to NSW compared to the 2014–15 MLF study. There is a general reduction in MLFs at connection points in Northern Queensland, and an increase in MLFs at connection points in Central and Southern Queensland.

2.2 Changes to Marginal Loss Factors in NSW

The NSW energy demand forecast for 2015–16 has reduced compared to the 2014–15 MLF study. Generation in the Hunter region has reduced. There is also an increasing trend towards non-conventional generation. Wallerawang PS has been decommissioned, and Redbank and Munmorah PSs have been removed from service.

Overall, NSW is importing more from Queensland and importing less from Victoria compared to the 2014–15 MLF study.

As a result, the significant MLF changes in NSW are:

- MLFs at connection points in Southern NSW have increased due to reduced power imports from Victoria.
- MLFs at connection points in Northern NSW have reduced due to increased power imports from Queensland.

2.3 Changes to Marginal Loss Factors in Victoria

Forecast generation in Tasmania has reduced significantly compared to the 2014–15 MLF study (refer to section B.3.2). This has resulted in increased Basslink transfers from Victoria to Tasmania.

The Point Henry Aluminium Smelter has closed. Victoria's energy demand forecast for 2015–16 has reduced compared to the 2014–15 MLF study.

In general, Victoria is exporting more energy to Tasmania, importing less energy from South Australia and exporting less energy to NSW compared to the 2014–15 MLF study.

The significant MLF changes in Victoria are:

- MLFs at connection points near the Victoria-NSW interconnector have reduced along with reduced power transfers from Victoria to NSW.

2.4 Changes to Marginal Loss Factors in South Australia

The South Australian energy demand forecast for 2015–16 has reduced compared to the 2014–15 MLF study, along with a reduction in generation at Pelican Point and Torrens Island PSs, which has led to reduced exports to Victoria.

South Australian MLFs are mostly similar to those of the previous year. The significant MLF changes in South Australia are:

- Reduced power exports to Victoria have led to reduced MLFs at connection points in the Riverland region.
- Reduced power transfers to Victoria have led to reduced MLFs at connection points in the South Australia's south east.

2.5 Changes to Marginal Loss Factors in Tasmania

The Tasmanian energy demand forecast for 2015–16 has reduced compared to the 2014–15 MLF study. Forecast generation in Tasmania has reduced (refer to section B.3.2), resulting in reduced exports to Victoria via Basslink.

The significant MLF changes in Tasmania are:

- General increase in MLFs in Tasmania.

3. INTER-REGIONAL LOSS FACTOR EQUATIONS

This section describes inter-regional loss factor equations.

Inter-regional loss factor equations describe the variation in loss factor at one regional reference node (RRN) with respect to an adjacent RRN. These equations are necessary to cater for the large variations in loss factors that may occur between RRNs as a result of different power flow patterns. This is important in minimising the distortion of economic dispatch of generating units.

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

= 1.0026 + 2.2177E-04*NQt + 2.0008E-06*Nd + 5.4593E-06*Qd

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

= 1.0828 + 1.6677E-04*VNt - 2.0810E-05*Vd + 1.3312E-06*Nd - 4.7327E-06*Sd

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

= 1.0232 + 3.4717E-04*VSAt +2.6978E-06*Vd - 2.5754E-05*Sd

Where:

Qd = Queensland demand

Vd = Victorian demand

Nd = NSW demand

Sd = South Australian demand

NQt = transfer from NSW to Queensland

VNt = transfer from Victoria to NSW

VSAt = transfer from Victoria to South Australia

Figure 1 MLF (South Pine 275 referred to Sydney West 330)

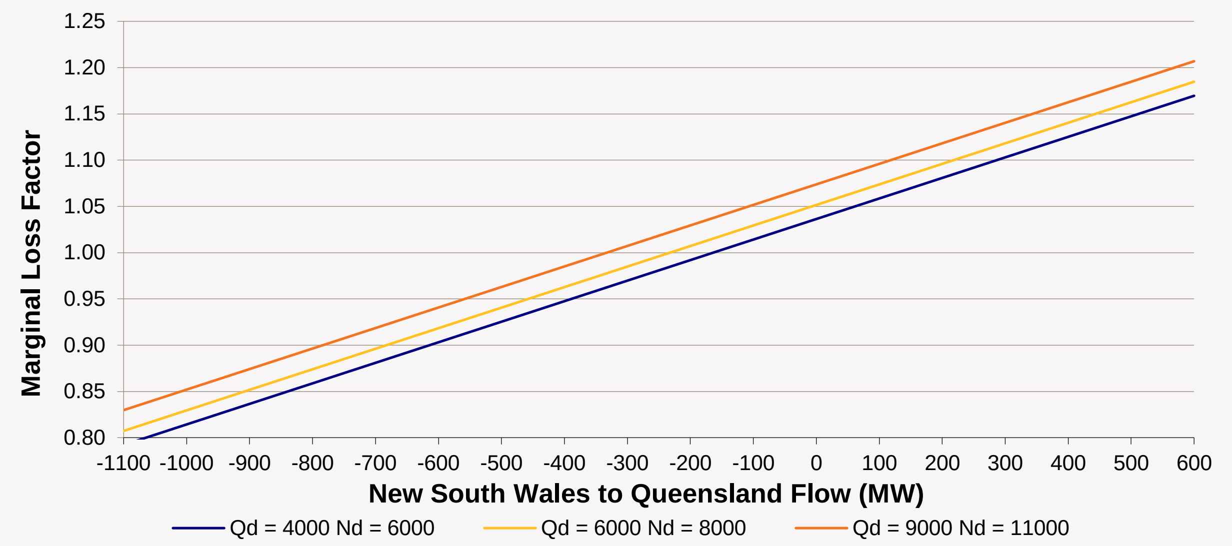


Table 18 South Pine 275 referred to Sydney West 330 MLF versus NSW to Queensland flow Coefficient statistics

Coefficient	Q_d	N_d	NQ_t	CONSTANT
Coefficient value	5.4593E-06	2.0008E-06	2.2177E-04	1.0026
Standard error values for the coefficients	1.7187E-07	1.1111E-07	3.4872E-07	6.7933E-04
Coefficient of determination (R^2)	0.9720			
Standard error of the y estimate	0.0091			

Figure 2 MLF (Sydney West 330 referred toThomastown 66)

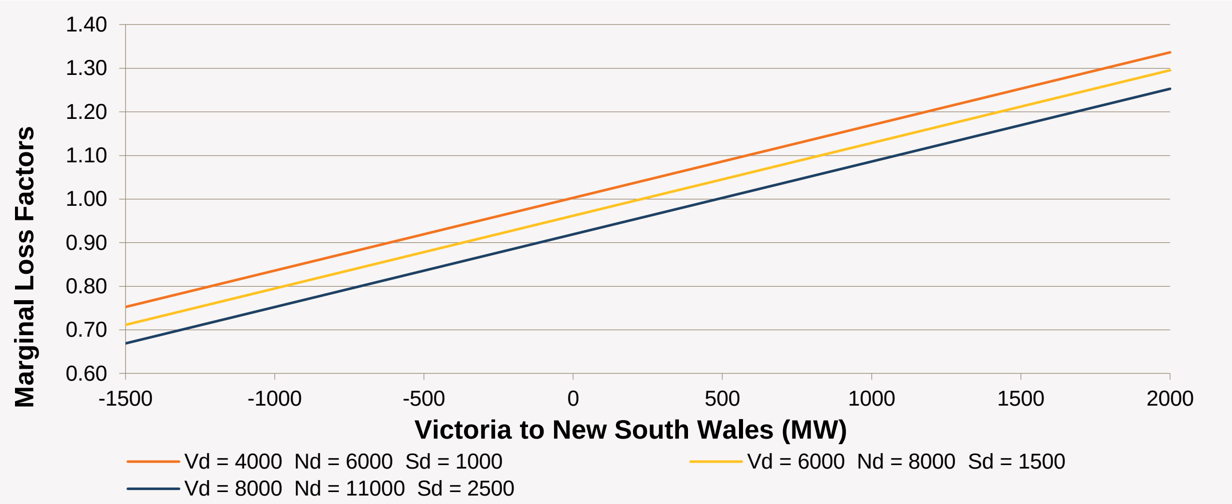
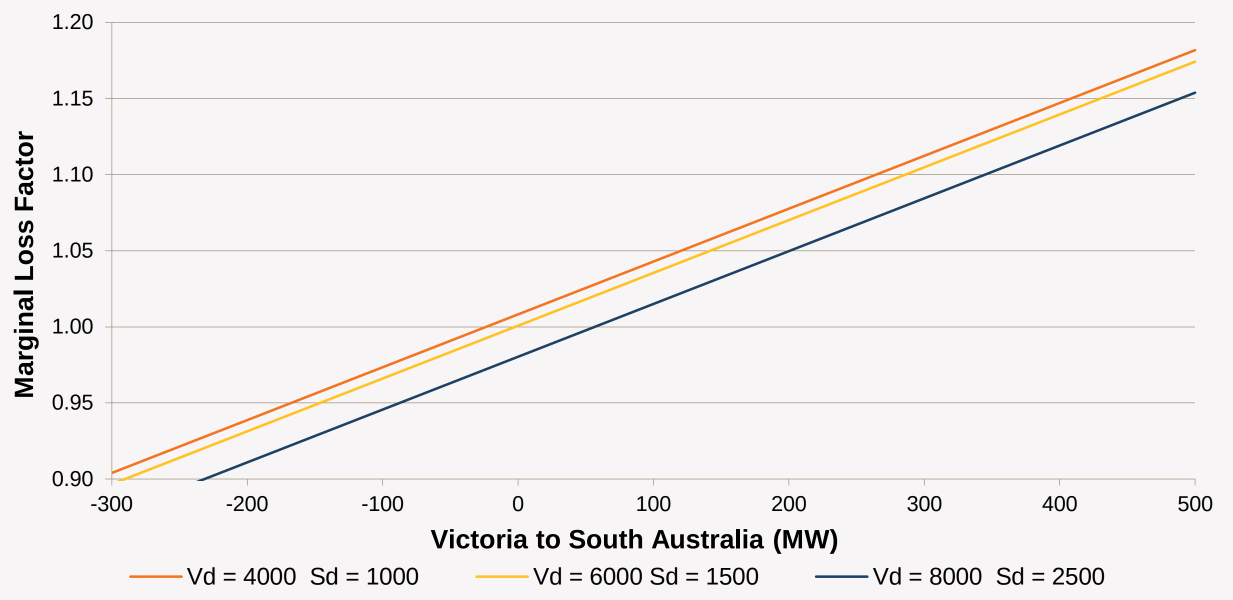


Table 19 Sydney West 330 referred to Thomastown 66 MLF versus Victoria to NSW flow Coefficient statistics

Coefficient	S_d	N_d	V_d	VN_t	CONSTANT
Coefficient value	-4.7327E-06	1.3312E-06	-2.0810E-05	1.6677E-04	1.0828
Standard error values for the coefficients	7.7454E-07	3.8894E-07	5.7027E-07	7.6641E-07	1.9597E-03
Coefficient of determination (R^2)	0.8799				
Standard error of the y estimate	0.0294				

Figure 3 MLF (Torrens Island 66 referred to Thomastown 66)



Torrens Island 66 referred to Thomastown 66 MLF versus Victoria to South Australia flow Coefficient statistics

Coefficient	Sd	Vd	VSAt	CONSTANT
Coefficient value	-2.5754E-05	2.6978E-06	3.4717E-04	1.0232
Standard error values for the coefficients	7.1981E-07	2.4669E-07	1.3341E-06	8.0252E-04
Coefficient of determination (R2)	0.8934			
Standard error of the y estimate	0.0178			

4. INTER-REGIONAL LOSS EQUATIONS

This section describes how the Inter-regional loss equations are derived.

The inter-regional loss equations are derived by integrating the equation (Loss factor – 1) with respect to the interconnector flow, i.e.:

Losses = ∫(Loss factor – 1) dFlow

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

= (0.0026 + 2.0008E-06*Nd + 5.4593E-06*Qd)*NQt + 1.1089E-04*NQt^2

Sydney West 330 referred to Thomastown 66 notional link average losses

= (0.0828 - 2.0810E-05*Vd + 1.3312E-06*Nd - 4.7327E-06*Sd)*VNt + 8.34E-05*VNt^2

Torrens Island 66 referred to Thomastown 66 notional link average losses

= (0.0232 + 2.6978E-06*Vd - 2.5754E-05*Sd)*VSAt + 1.736E-04*$VSAt^2$

Where:

Qd = Queensland demand

Vd = Victorian demand

Nd = NSW demand

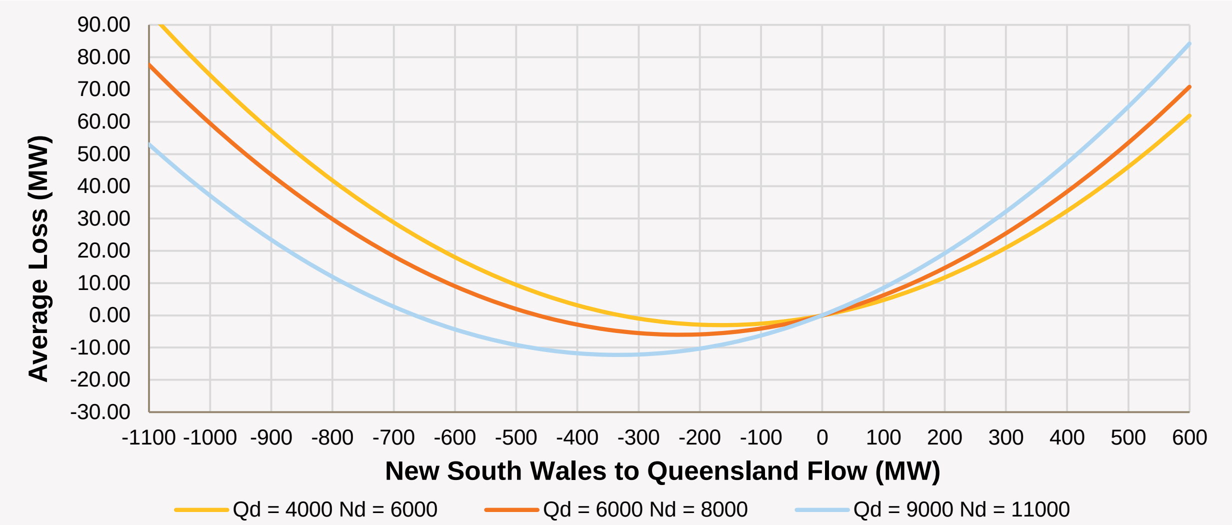
Sd = South Australia demand

NQt = transfer from NSW to Queensland

VNt = transfer from Victoria to NSW

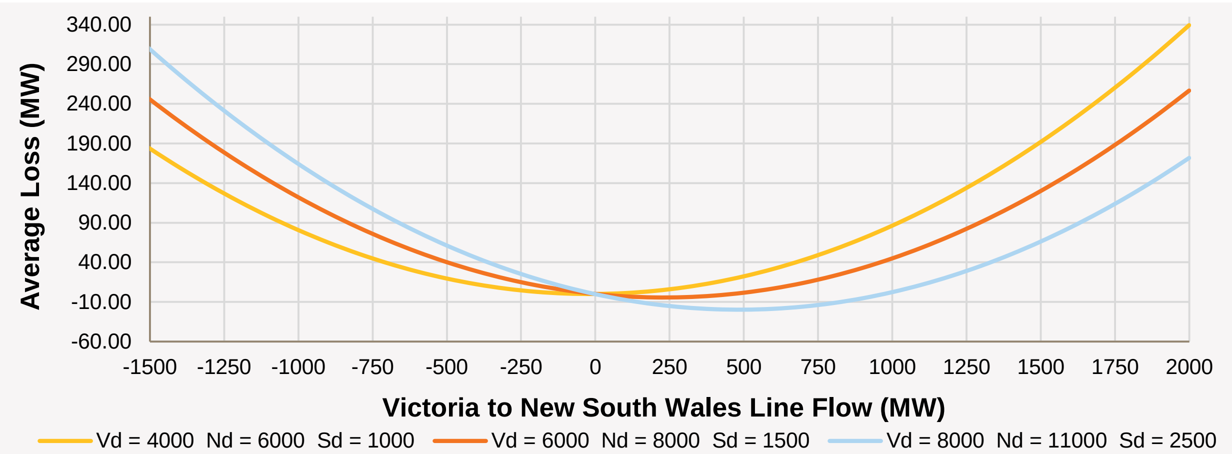
VSAt = transfer from Victoria to South Australia

Figure 4 Average Losses for New South Wales - Queensland Notional Link



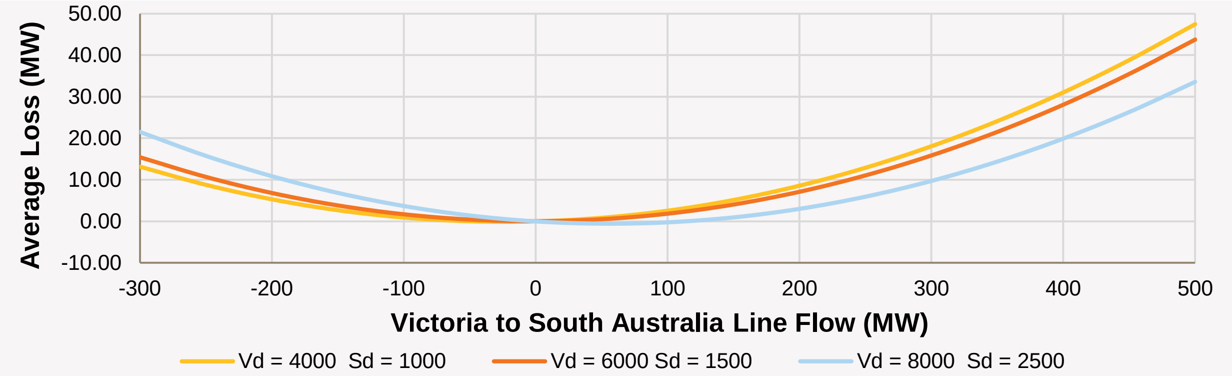
NSW to Queensland notional link losses versus NSW to Queensland notional link flow

Figure 5 Average Losses for Victoria - New South Wales Notional Link



Victoria to NSW notional link losses versus Victoria to NSW notional link flow

Figure 6 Average Losses for Victoria – SA National Link



Victoria to South Australia notional link losses versus Victoria to South Australia notional link flow

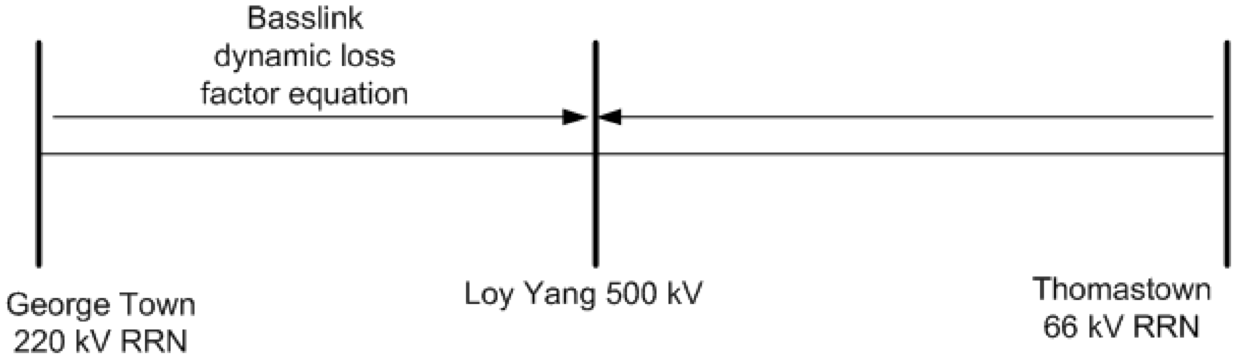
5. BASSLINK, TERRANORA, MURRAYLINK LOSS EQUATIONS

This section describes the loss equations for the DC interconnectors.

5.1 Basslink

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

- George Town 220 kV MLF referred to Tasmania RRN = 1.0000
- Basslink (Loy Yang PS Switchyard) 500 kV MLF referred to Victorian RRN = 0.9828.
- 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.



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.

The model is limited from 40MW to 630MW. When the model falls below 40MW, this is within the ±50 MW 'no-go zone' requirement for Basslink operation.

5.2 Murraylink

Murraylink is a regulated interconnector. In accordance with clause 3.6.1(a) of the Rules, the Murraylink loss model consists of a single dynamic MLF from the Victorian RRN to the South Australian RRN.

The measurement point is the 132 kV connection to the Monash converter, which effectively forms part of the boundary between the Victorian and South Australia regions.

The losses between the Red Cliffs 220 kV and Monash 132 kV connection points is given by the following equation:

$$Losses = (0.0039 * Flow_t + 2.8177 * 10^{-4} * Flow_t^{\ 2})$$

AEMO determined the following Murraylink MLF model using regression analysis:

$$\text{Murraylink MLF (Torrens Island 66 referred to Thomastown 66)} = 1.0813 + 2.3565E\text{-}03*Flow_t$$

This model, consisting of a constant and a Murraylink flow coefficient, is suitable because most of the loss is due to variations in the Murraylink flow, and other potential variables do not improve the model.

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

Coefficient	$Flow_t$	CONSTANT
Coefficient Value	2.3565E-03	1.0813
Standard error values for the coefficient	3.4051E-06	1.9565E-04
Coefficient of determination (R2)	0.9647	
Standard error of the y estimate	0.0259	

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

$$\text{Murraylink loss} = 0.0813*Flow_t + 1.1783E\text{-}03*Flow_t^2$$

Figure 7 Murraylink MLF (Torrens Island 66 referred to Thomastown 66)

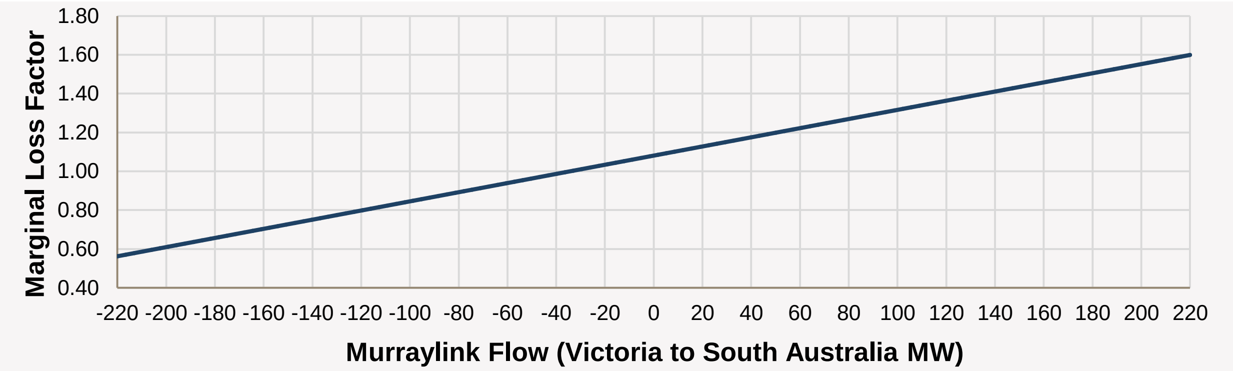
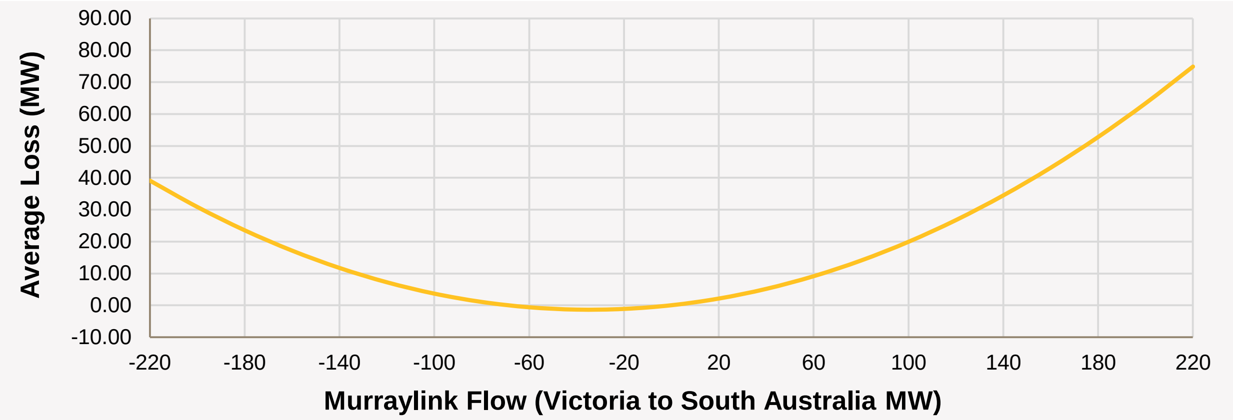


Figure 8 Average Losses for Murraylink Interconnector (Torrens Island 66 referred to Thomastown 66)



Murraylink notional link losses versus Murraylink flow (Victoria to South Australia)

5.3 Terranora

Terranora is a regulated interconnector. In accordance with clause 3.6.1(a) of the Rules, the Terranora loss model consists of a single dynamic MLF from the NSW RRN to the Queensland RRN.

The measurement point is 10.8 km north from Terranora on the two 110 kV lines between Terranora and Mudgeeraba, which effectively forms part of the boundary between the NSW and Queensland regions.

The losses between the Mullumbimby 132 kV and Terranora 110 kV connection points is given by the following equation:

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

AEMO determined the following Terranora MLF model using regression analysis:

Terranora interconnector MLF
(South Pine 275 referred to Sydney West 330) = 1.1147 + 2.2959E-03* $Flow_t$

This model consisting of a constant and a Murraylink flow coefficient is suitable because most of the loss is due to variations in the Terranora flow and other potential variables do not improve the model.

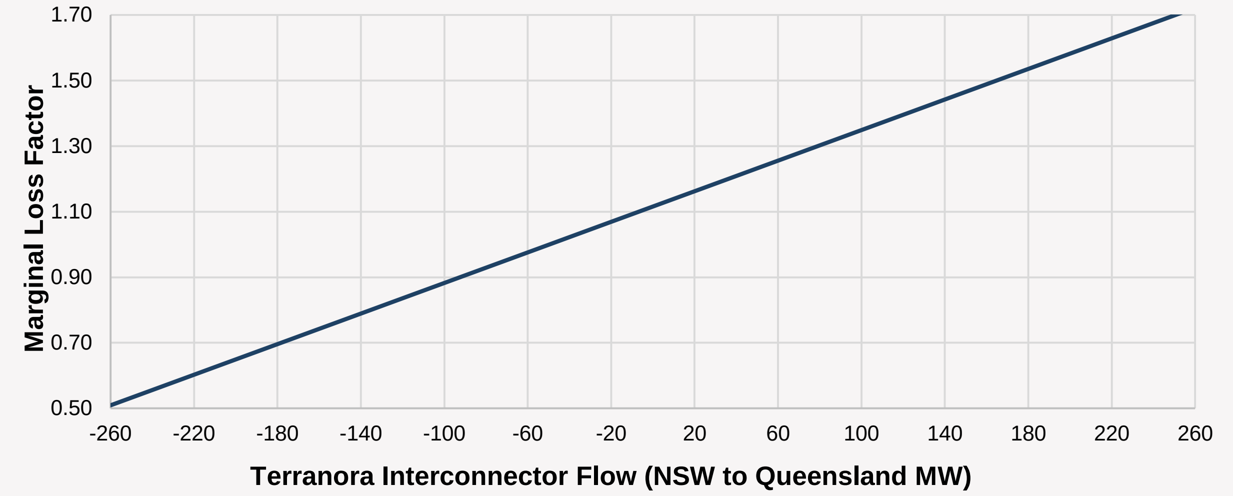
The regression statistics for this Terranora loss factor model are presented in the following table:

Coefficient	$Flow_t$	CONSTANT
Coefficient Value	2.2959E-03	1.1147
Standard error values for the coefficient	4.5558E-06	3.1609E-04
Coefficient of determination (R2)	0.9355	
Standard error of the y estimate	0.0338	

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

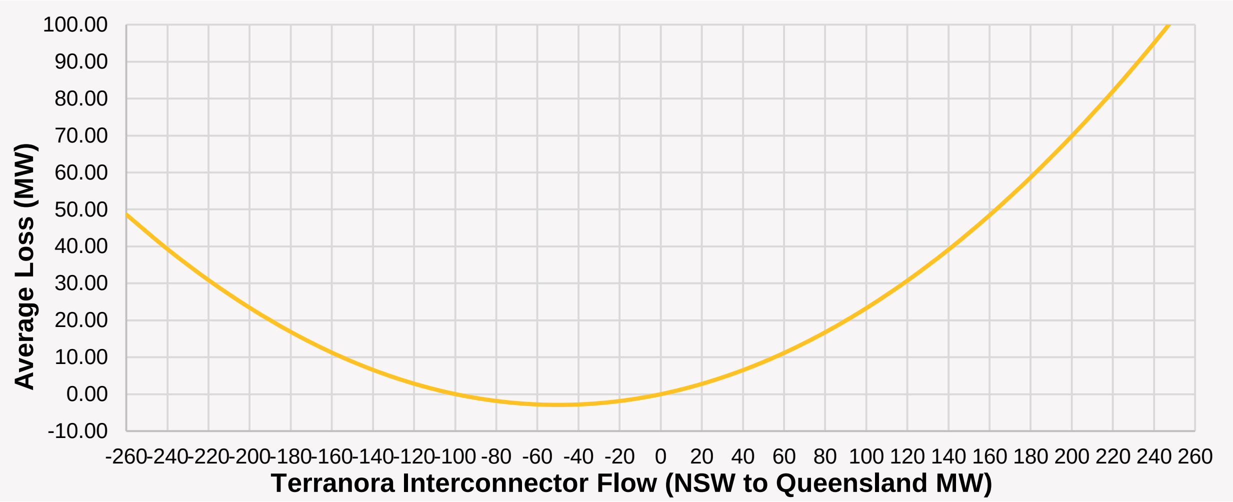
$$Terranora\ loss = 0.1147*Flow_t + 1.1480E-03*Flow_t^2$$

Figure 9 Terranora Interconnector MLF (South Pine 275 referred to Sydney West 330)



South Pine 275 referred to Sydney West 330 MLF versus Terranora interconnector flow (NSW to Queensland)

Figure 10 Average Losses for Terranora Interconnector (South Pine 275 referred to Sydney West 330)



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

6. PROPORTIONING OF INTER-REGIONAL LOSSES TO REGIONS

This section details how the inter-regional losses are proportioned by NEMDE.

NEMDE implements inter-regional loss factors by allocating the inter-regional losses to the two regions associated with a notional interconnector.

The proportioning factors are used to portion the inter-regional losses to two regions by an increment of load at one RRN from the second RRN. The incremental changes to the inter-regional losses in each region are found from changes to interconnector flow and additional generation at the second RRN.

The average proportion of inter-regional losses in each region constitutes a single static loss factor.

The following table provides the factors used to portion inter-regional losses to the associated regions for the 2015–16 financial year:

Notional interconnector	Proportioning factor	Applied to
Queensland – NSW (QNI)	0.55	NSW
Queensland – NSW (Terranora Interconnector)	0.60	NSW
Victoria – NSW	0.39	Victoria
Victoria – South Australia (Heywood)	0.77	Victoria
Victoria – South Australia (Murraylink)	0.82	Victoria

7. REGIONS AND REGIONAL REFERENCE NODES

This section describes the regions in the NEM, the RRN for each region and the regional boundaries.

7.1 Regions and Regional Reference Nodes

Region	Regional Reference Node
Queensland	South Pine 275kV node
NSW	Sydney West 330kV node
Victoria	Thomastown 66kV node
South Australia	Torrens Island PS 66kV node
Tasmania	George Town 220 kV node

7.2 Region boundaries

Physical metering points defining the region boundaries are at the following locations.

Between the Queensland and NSW regions

- At Dumaresq Substation on the 8L and 8M Dumaresq to Bulli Creek 330kV lines;[4]
- 10.8km north of Terranora on the two 110kV lines between Terranora and Mudgeeraba (lines 757 & 758). Metering at Mudgeeraba adjusted for that point.

7.2.1 Between the NSW and Victoria 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.

7.2.2 Between the Victoria and South Australia 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.

7.2.3 Between the Victoria and Tasmania regions

Basslink is not a regulated interconnector with the following metering points:

- At Loy Yang 500 kV PS.
- At George Town 220 kV Switching Station.

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

8. VIRTUAL TRANSMISSION NODES

This section shows the configuration of the different virtual transmission nodes

VTNs are aggregations of transmission nodes for which a single MLF is applied. AEMO has considered the following virtual transmission nodes (VTNs).

8.1 NSW Virtual Transmission Nodes

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

8.2 South Australia Virtual Transmission Nodes

The SJP1 VTN for South Australia includes all South Australian load transmission connection points, excluding:

- Snuggery Industrial, as nearly its entire capacity services an industrial facility at Millicent.
- Whyalla MLF, as its entire capacity services an industrial plant in Whyalla.

8.3 Tasmania Virtual Transmission Nodes

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

APPENDIX A. BACKGROUND TO MARGINAL LOSS FACTORS

This section summarises the method and interpretation AEMO uses to account for electrical losses in the NEM. It also specifies AEMO's Rules responsibilities related to regions, calculation of MLFs, and calculation of inter-regional loss factor equations.

The NEM uses marginal costs as the basis for setting electricity prices that also require pricing of transmission electrical losses.

For electricity transmission, electrical losses are a transport cost that needs to be recovered. A feature of electrical losses is that they also increase with an increase in the electrical power transmitted. That is, the more a transmission line is loaded, the higher the percentage losses. Thus, the price differences between the sending and receiving ends is not determined by the average losses, but by the marginal losses of the last increment of electrical power delivered.

Electrical power in the NEM is traded through the spot market managed by AEMO. The central dispatch process schedules generation to meet demand in order to maximise the value of trade.

Static MLFs represent intra-regional electrical losses of transporting electricity between a connection point and the RRN. In the dispatch process, generation prices within each region are adjusted by the MLFs to determine dispatch of generation.

Dynamic inter-regional loss factor equations calculate the losses between regions. Depending on the flows between regions, the inter-regional losses also adjust the prices in determining generation dispatch to meet demand.

AEMO calculates the RRP for each region, which is then adjusted by reference to the MLFs between customer connection points and the RRN.

A.1 Rules requirements for the Marginal Loss Factor calculation

Clause 2A.1.3 of the Rules requires AEMO to establish, maintain, review and publish by 1 April each year a list of regions, RRNs, and the market connection points (represented by TNIs) in each region.

Clause 3.6 of the Rules requires AEMO to calculate the MLFs and inter-regional loss factor equations by 1 April each year that will apply for the next financial year.

Clauses 3.6.1, 3.6.2 and 3.6.2(A) specify the requirements for calculating the MLFs and inter-regional loss factor equations, and the data used in the calculation.

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

A.2 Interpretation of Marginal Loss Factors

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

Consistent with this, the marginal losses are the incremental increase in total losses for each incremental additional unit of electricity. The MLF of a connection point represents the marginal losses to deliver electricity to that connection point from the RRN.

The tables in section 1 show the MLFs for each region. The price of electricity at a TNI is the price at the RRN multiplied by the MLF between it and the RRN. Depending on network and loading configurations MLFs vary, ranging from below 1.0 to above 1.0.

A.2.1 Marginal Loss Factors greater than 1.0

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

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

A.2.2 Marginal Loss Factors less than 1.0

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

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

A.2.3 Marginal Loss Factors impact on National Electricity Market settlements

For settlement purposes, the value of electricity purchased or sold at a connection point is multiplied by the connection point MLF. For example:

A customer at a connection point with an MLF of 1.05 purchases $1000 of electricity. The MLF of 1.05 multiplies the purchase value to 1.05 x 1000 = $1050. The higher purchase value covers the cost of the electrical losses in transporting electricity to the customer’s connection point from the RRN.

A Generator at a connection point with an MLF of 0.95 sells $1000 of electricity. The MLF of 0.95 multiplies the sales value to 0.95 x 1000 = $950. The lower sales value covers the cost of the electrical losses in transporting electricity from the Generator’s connection point to the RRN.

Therefore, it follows that in the settlements process:

- Higher MLFs tend to advantage, and lower MLFs tend to disadvantage generation connection points.
- Higher MLFs tend to disadvantage, and lower MLFs tend to advantage load connection points.

APPENDIX B. METHODOLOGY, INPUTS AND ASSUMPTIONS

This section outlines the principles underlying the MLF calculation, the load and generation data inputs AEMO obtains and uses for the calculation and how AEMO checks the quality of this data. It also explains how networks and interconnectors are modelled in the MLF calculation.

B.1 Marginal Loss Factors calculation Methodology

AEMO uses a forward-looking loss factor (FLLF) methodology (Methodology) for calculating MLFs.[5] The Methodology uses the principle of "minimal extrapolation". An overview of the steps in this Methodology is:

- Develop a load flow model of the transmission network that includes committed augmentations for the year that the MLFs will apply.
- Obtain connection point demand forecasts for the year that the MLFs will apply.
- Estimate the dispatch of committed new generating units.
- Adjust the dispatch of new and existing generating units to restore the supply-demand balance in accordance with the FLLF Methodology.
- Calculate the MLFs using the resulting power flows in the transmission network.

B.2 Load data requirements for the Marginal Loss Factors calculation

The annual energy targets used in load forecasting for the 2015–16 MLF calculation are in the table below:

Region	2015–16 forecast sent-out energy[6] (GWh)	2014–15 forecast sent-out energy[7] (GWh)
NSW	66,636	69,574
Victoria	43,041	44,971[8]
Queensland	51,030	55,278
South Australia	12,481	12,598
Tasmania	10,392	10,462

B.2.1 Historical data accuracy and due diligence of the forecast data

AEMO regularly verifies the accuracy of historical connection point data. AEMO calculates the losses using this historical data, by adding the summated generation values to the interconnector flow and subtracting the summated load values. These transmission losses are used to verify that no large errors occur in the data.

AEMO also performs due diligence checks of connection point load traces to ensure that:

- The demand forecast is consistent with NEFR 2014.
- Load profiles are reasonable, and that the drivers for load profiles that have changed from the historical data are identifiable.
- The forecast for connection points includes any relevant embedded generation.

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[5] The Methodology is available on the AEMO website.

[6] In 2014 NEFR report, the sent out energy for all regions is defined as native energy that includes non-scheduled generation. For the MLF calculation process, the forecast sent-out energy was adjusted to ensure consistency between forecast load energy and generation being modelled.

[7] Forecast energy used for the 2014–15 MLF calculation. It was sourced from the 2013 NEFR Report, and adjusted as required for the 2014–15 MLF study.

[8] This figure accounts for the announced closure of the Point Henry Aluminium Smelter.

- Industrial and auxiliary type loads are not scaled.

B.3 Generation data requirements for the Marginal Loss Factors calculation

AEMO obtains historical generation real power (MW) and reactive power (MVAr) data for each trading interval (half-hour) covering every generation connection point in the NEM from 1 July 2013 to 30 June 2014 from its settlements database.

AEMO also obtains the following data:

- Generation capacity data from the 2014 ESOO.
- Historical generation availability, as well as and on-line and off-line status data from AEMO's Market Management System (MMS).

B.3.1 New generating units

For new generating units, AEMO calculates the initial estimate of the output by identifying similar technology and fuel type in accordance with section 5.4.2 of the Methodology.

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

Queensland new generating units

Solar boost at Kogan Creek. The 44 MW solar boost is not changing the capacity of the PS.

NSW new generating units

Royalla Solar Farm, Taralga Wind Farm, Boco Rock Wind Farm, Nyngan Solar Farm, Broken Hill Solar Farm and Moree Solar Farm, are included.

Victoria new generating units

Portland Wind Farm stage 4 (Cape Sir William Grant and Cape Nelson North), and Bald Hills Wind Farm are included.

South Australia new generating units

There are no new committed generation projects in South Australia during 2015–16.

Tasmania new generating units

There are no committed generation projects in Tasmania during 2015–16.

B.3.2 Abnormal generation patterns

Due to changes in physical circumstances (reduction in rainfall and storage levels), generation in Tasmania is expected to decrease in 2015–16 compared to 2014–15 MLF study. Hydro Tasmania has provided expected generation profiles for the 2015–16 MLF calculation in accordance with section 5.5.6 of the Methodology.

AEMO has accepted the adjusted generation profiles, and has used them to replace the historical profiles as an input to the 2015–16 MLF calculation process. AEMO has made corresponding adjustments to historical Basslink flows in accordance with section 5.3.1 of the Methodology.

The table below shows the historical and adjusted generation values aggregated quarterly and on a sub-regional level.

	Historical Generation (GWh)		Adjusted Generation (GWh)	
	Northern Tasmania	Southern Tasmania	Northern Tasmania	Southern Tasmania

	Historical Generation (GWh)		Adjusted Generation (GWh)	
Jul - Sep	2343	1355	1965	894
Oct - Dec	1926	1460	1455	865
Jan - Mar	1708	1301	1124	814
Apr - Jun	2187	1459	1801	767
Total	**8165**	**5576**	**6345**	**3340**

B.4 Network representation in the Marginal Loss Factors calculation

An actual network configuration recorded by AEMO's Energy Management System (EMS) is used to prepare the NEM interconnected power system load flow model for the MLF calculation. This recording is referred to as a 'snapshot'.

AEMO reviews the snapshot and modifies it where necessary to accurately represent all normally connected equipment. AEMO also checks the switching arrangements for the Victorian Latrobe Valley's 220 kV and 500 kV networks to ensure they reflect normal operating conditions.

AEMO adds relevant network augmentations that will occur in the 2015–16 financial year. The snapshot is thus representative of the 2015–16 normally-operating power system.

B.4.1 Network augmentations for 2015–16

Relevant TNSPs advised of the following network augmentations in 2015–16 are:

Queensland network augmentations

Powerlink provided the following list of network augmentations in 2015–16 in Queensland:

- Decommissioning of the two Mackay – Proserpine 132 kV lines.
- Switching of the existing Nebo – Mackay 132 kV line at Pioneer Valley, to create Nebo – Pioneer Valley and Pioneer Valley – Mackay 132 kV lines.
- Modification of Mackay 132 kV bus.
- Installation of a new capacitor bank at Moranbah 132 kV (50 MVAr).
- Replacement of one 132/66 kV transformer at Moranbah.
- Replacement of two transformer tertiary connected reactors with a single bus connected reactor at Ross 275 kV (84 MVAr).
- Installation of two 132 kV lines exiting from Wotonga Rail Station (to Moranbah and Nebo).
- Replacement of two 132/22 kV transformers at Cardwell.

NSW network augmentations

NSW NSPs provided the following list of network augmentations in 2015–16 in NSW:

- Replacement of shunt reactor at Buronga (24.2 MVAr).
- Decommissioning of three 132/66/11 kV transformers at Comma and installation of two new 132/66/11 kV transformers.
- Replacement of two 220 kV reactors at Broken Hill (25 MVAr each)

Victoria network augmentations

AEMO's Victorian Planning Group provided the following list of network augmentations in 2015–16 in Victoria.

- Installation of three capacitor banks at Cranbourne (50 MVAr each)
- Installation of one 220/66 kV transformer at Brunswick.
- Installation of a new capacitor bank at Rowville (200 MVAr)
- Installation of third 500/275 kV transformer at Heywood.

South Australia network augmentations

ElectraNet provided the following list of network augmentations in 2015–16 in South Australia:

- Establishment of the new 275/66 kV Munno Substation.
- Replacement of Mt Gunson substation, and installation of a new 132/33 kV transformer.
- Replacement of Neuroodla substation, and installation of a new 132/33 kV transformer.

Tasmania network augmentations

TasNetworks (formerly Transend) provided the following list of network augmentations to in 2015–16 in Tasmania:

- Realignment of 110 kV lines from Tungatinah to New Norfolk Substation following the installation of double tee connection at Meadowbank.

B.4.2 Treatment of the Basslink interconnector

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

In accordance with sections 5.3.1 and 5.3.2 of the Methodology, AEMO calculates the Basslink connection point MLFs using historical data, adjusted to reflect any change in forecast generation in Tasmania. Section 5 outlines the loss model for Basslink.

B.4.3 Treatment of the Terranora interconnector

The Terranora interconnector is a regulated interconnector.

The boundary between Queensland and NSW between Terranora and Mudgeeraba is north of Directlink. The Terranora interconnector is in series with Directlink and, in the MLF calculation, AEMO manages the Terranora interconnector limit by varying the Directlink limit when necessary.

Section 5 outlines the inter-regional loss factor equation for the Terranora interconnector.

B.4.4 Treatment of the Murraylink Interconnector

The Murraylink interconnector is a regulated interconnector.

In accordance with section 5.3 of the Methodology, AEMO treats the Murraylink interconnector as a controllable network element in parallel with the regulated Heywood interconnector.

Section 5 outlines the inter-regional loss factor equation for Murraylink.

B.4.5 Treatment of Yallourn Unit 1

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

EnergyAustralia informed AEMO that the switching pattern for 2015–16 will differ significantly from the historical switching pattern for Yallourn Unit 1. AEMO, in consultation with AusNet Services, accepted the proposed switching profile provided by EnergyAustralia, and has used it as an input to the 2015–16 MLF calculation.

AEMO modelled Yallourn Unit 1 at the two connection points (one at 220 kV and the other one at 500 kV) and calculated loss factors for each connection point. AEMO then calculated a single volume-weighted loss factor for Yallourn Unit 1 based on the individual loss factors at 220 kV and at 500 kV, and the output of the unit.

B.5 Interconnector capability

In accordance with section 5.5.4 of the Methodology, AEMO estimates nominal interconnector limits for summer peak, summer off-peak, winter peak and winter off-peak periods. These values are in the table below. AEMO also sought feedback from the relevant TNSPs on whether there were any additional factors that might influence these limits.

From region	To region	Summer peak (MW)	Summer off-peak (MW)	Winter peak (MW)	Winter off-peak (MW)
Queensland	NSW	1078	1078	1078	1078
NSW	Queensland	400	550	400	550
NSW	Victoria	1700[b]	1700[b]	1700[b]	1700[b]
Victoria	NSW	3200[c]	3000[c]	3200[c]	3000[c]
Victoria	South Australia	650[a]	650	650	650
South Australia	Victoria	650	650	650	650
Victoria (Murraylink)	South Australia (Murraylink)	220	220	220	220
South Australia (Murraylink)	–Victoria (Murraylink)	188[c]	198[c]	215[c]	215[c]
Queensland (Terranora)	NSW (Terranora)	224	224	224	224
NSW (Terranora)	Queensland (Terranora)	107	107	107	107
Tasmania (Basslink)	Victoria (Basslink)[e]	594	594	594	594
Victoria (Basslink)	Tasmania (Basslink)[e]	478	478	478	478

a Victoria to South Australia and South Australia to Victoria limits have changed due to the inclusion of the third transformer at Heywood. 650 MW is the best estimated value at the time that the 2015–16 MLF calculations were done.
b minus Murray generation
c minus Upper & Lower Tumut generation
d minus Northwest Bend & Berri loads
e Limit referring to the receiving end.

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

B.6 Calculation of Marginal Loss Factors

AEMO uses the TPRICE[9] software to calculate MLFs. The TPRICE MLF calculation method is as follows:

- It converts the half-hourly forecast load and historical generation data, generating unit capacity and availability data together with interconnector data into a format suitable for input to TPRICE.
- It adjusts the load flow case to ensure a reasonable voltage profile in each region at times of high demand.
- It converts the load flow case into a format suitable for use in TPRICE.

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

- The half-hourly generation and load data for each connection point, generating unit capacity and availability data, together with interconnector data feed into TPRICE one trading interval at a time. TPRICE allocates the load and generation values to the appropriate connection points in the load flow case.
- It iteratively dispatches generation to meet forecast demand and solves each half-hourly load flow case and calculates the loss factors appropriate to the load flow conditions.
- The loss factors at each connection point in each region are referred to the RRN.
- It averages the loss factors for each trading interval and for each connection point using volume weighting.

Typically, the MLF calculation weights generation loss factors against generation output and load loss factors against load consumption. However, where load and generation are connected at the same connection point and individual metering is not available for the separate components, the same loss factor is calculated for both generation and load.

In accordance with section 5.6.1 of the Methodology, AEMO calculates dual MLF values at connection points where one MLF does not satisfactorily represent active power generation and consumption.

AEMO will also make the MLFs available in Comma Separated Value file format.[10]

B.6.1 Inter-regional loss factor equations

The inter-regional loss factor equations applying for the 2015–16 financial year are provided in section 3. AEMO derives these equations by applying linear regression to the set of loss factor data for the RRNs. To meet the requirements of the AEMO dispatch algorithm, the choice of variables and equation formulation is restricted:

- Only linear terms are permitted in the equation.
- Only the notional link flow between the RRNs for which the loss factor difference is being determined is used.
- Region demands are allowed as equation variables.
- Other variables such as generation outputs are not used.

Graphs of variation in inter-regional loss factors with notional link flow are in section 3.

The inter-regional loss equations obtained by integrating the (inter-regional loss factor – 1) function are in section 4.

The inter-regional loss equations for Basslink, Terranora and Murraylink are in section 5.

The factors used to apportion the inter-regional losses to the associated regions for 2015–16 are in section 6.

B.6.2 Marginal Loss Factor calculation – quality control

As with previous years, AEMO engaged consultants to ensure the quality and accuracy of the MLF calculation. The consultants performed the following work:

- A benchmark study using independent data sources to calculate the MLFs. AEMO used the benchmark study to identify potential issues with AEMO data inputs to the MLF calculation.
- A subsequent verification study using AEMO's input data to independently reproduce AEMO's calculation results. AEMO used the verification study to ensure that AEMO MLF calculation methods and results are accurate.

[10] Available on the AEMO website

GLOSSARY

Term	Definition
ACT	Australian Capital Territory
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ESOO	Electricity Statement Of Opportunities
FLLF	Forward Looking Loss Factor
GWh	Gigawatt-hour
km	Kilometre
kV	Kilovolt
LNG	Liquefied natural gas
MLF	Marginal Loss Factor
Methodology	Forward-looking Loss Factor Methodology
MNSP	Market Network Service Provider
MVAr	Megavolt-ampere-reactive
MW	Megawatt
NEFR	National Energy Forecasting Report
NEM	National Electricity Market
NEMDE	National Electricity Market Dispatch Engine
NSP	Network Service Provider
NSW	New South Wales
PS	Power station
RRN	Regional Reference Node
Rules	National Electricity Rules
TNI	Transmission Node Identifier
TNSP	Transmission Network Service Provider
VTN	Virtual Transmission Node