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# Draft Marginal Loss Factors: FY 2019-20

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**March 2019**

A report for the National Electricity Market

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# Important notice

## **PURPOSE**

This document has been prepared by AEMO solely to inform Registered Participants of the draft intra-regional loss factors it proposes to determine for 2019-20 under clause 3.6.2 of the National Electricity Rules (Rules).

The Rules and the National Electricity Law (Law) prevail over this document to the extent of any inconsistency.

## **DISCLAIMER**

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# 1. Draft Marginal Loss Factors by region

This section shows the draft intra-regional loss factors, commonly known as marginal loss factors (MLFs), for financial year 2019-20, for every load or generation transmission node (TNI) in each National Electricity Market region. At this stage AEMO is finalising the modelling and input data. These draft factors are published for information only and are subject to revision.

AEMO will publish final MLFs by 1<sup>st</sup> April 2019 in accordance with clause 3.6.2(f1) of the National Electricity Rules.

## 1.1 Queensland Marginal Loss Factors

**Table 1 Queensland loads**

Location	Voltage in kilovolts (kV)	TNI	2019-20 MLF	2018-19 MLF
Abermain	33	QABM	1.0027	1.0015
Abermain	110	QABR	1.0043	0.9968
Alan Sherriff	132	QASF	0.9558	0.9656
Algerier	33	QALG	1.0178	1.0161
Alligator Creek	132	QALH	0.9511	0.9640
Alligator Creek	33	QALC	0.9595	0.9654
Ashgrove West	33	QAGW	1.0163	1.0139
Ashgrove West	110	QCBW	1.0137	1.0122
Belmont	110	QBMH	1.0132	1.0123
Belmont Wecker Road	33	QBBS	1.0149	1.0104
Belmont Wecker Road	11	QMOB	1.0143	1.0353
Biloela	66/11	QBIL	0.9027	0.9141
Blackstone	110	QBKS	1.0006	1.0001
Blackwater	66/11	QBWL	0.9553	0.9624
Blackwater	132	QBWH	0.9541	0.9621
Bluff	132	QBLF	0.9533	0.9608
Bolingbroke	132	QBNB	0.9408	0.9486
Bowen North	66	QBNN	0.9353	0.9469
Boyne Island	275	QBOH	0.9323	0.9411
Boyne Island	132	QBOL	0.9299	0.9383
Braemar – Kumbarilla Park	275	QBRE	0.9770	0.9764
Bulli Creek (Essential Energy)	132	QBK2	0.9796	0.9840
Bulli Creek (Waggamba)	132	QBLK	0.9796	0.9840
Bundamba	110	QBDA	1.0020	1.0013
Burton Downs	132	QBUR	0.9451	0.9596
Cairns	22	QCRN	0.9523	0.9713
Cairns City	132	QCNS	0.9466	0.9682
Callemondah (Rail)	132	QCMD	0.9225	0.9314
Calliope River	132	QCAR	0.9218	0.9258

Location	Voltage in kilovolts (kV)	TNI	2019-20 MLF	2018-19 MLF
Cardwell	22	QCDW	0.9577	0.9777
Chinchilla	132	QCHA	0.9764	0.9830
Clare	66	QCLR	0.9548	0.9615
Collinsville Load	33	QCOL	0.9341	0.9494
Columboola	132	QCBL	0.9891	0.9891
Columboola 132 (Bellevue LNG load)	132	QCBB	0.9903	0.9899
Coppabella (Rail)	132	QCOP	0.9580	0.9690
Dan Gleeson	66	QDGL	0.9574	0.9713
Dingo (Rail)	132	QDNG	0.9425	0.9538
Duaringa	132	QDRG	0.9483	0.9684
Dysart	66/22	QDYS	0.9588	0.9629
Eagle Downs Mine	132	QEGD	0.9519	0.9630
Edmonton	22	QEMT	0.9701	0.9847
Egans Hill	66	QEGN	0.9084	0.9159
El Arish	22	QELA	0.9716	0.9846
Garbutt	66	QGAR	0.9595	0.9664
Gin Gin	132	QGNG	0.9503	0.9541
Gladstone South	66/11	QGST	0.9256	0.9384
Goodna	33	QGDA	1.0063	1.0052
Goonyella Riverside Mine	132	QGYR	0.9650	0.9836
Grantleigh (Rail)	132	QGRN	0.9192	0.9150
Gregory (Rail)	132	QGRE	0.9379	0.9423
Ingham	66	QING	1.0330	0.9597
Innisfail	22	QINF	0.9641	0.9747
Invicta Load	132	QINV	0.9385	0.9644
Kamerunga	22	QKAM	0.9797	0.9844
Kemmis	66	QEMS	0.9584	0.9643
King Creek	132	QKCK	0.9337	0.9563
Lilyvale	66	QLIL	0.9300	0.9451
Lilyvale (Barcaldine)	132	QLCM	0.9635	0.9378
Loganlea	33	QLGL	1.0155	1.0151
Loganlea	110	QLGH	1.0128	1.0116
Mackay	33	QMKA	0.9400	0.9556
Middle Ridge (Energex)	110	QMRX	0.9848	0.9878
Middle Ridge (Ergon)	110	QMRG	0.9848	0.9878
Mindi (Rail)	132	QMND	0.9324	0.9425
Molendinar	110	QMAR	1.0151	1.0143
Molendinar	33	QMAL	1.0146	1.0136
Moranbah (Mine)	66	QMRN	0.9621	0.9819
Moranbah (Town) – Dual MLF (Generation)	11	QMRL	0.9601	0.9803
Moranbah (Town) – Dual MLF (Load)	11	QMRL	0.9601	0.9803
Moranbah South (Rail)	132	QMBS	0.9520	0.9745
Moranbah Substation	132	QMRH	0.9543	0.9709
Moura	66/11	QMRA	0.9380	0.9480
Mt McLaren (Rail)	132	QMTM	0.9544	0.9786

Location	Voltage in kilovolts (kV)	TNI	2019-20 MLF	2018-19 MLF
Mudgeeraba	33	QMGL	1.0142	1.0169
Mudgeeraba	110	QMGB	1.0140	1.0174
Murarrie (Belmont)	110	QMRE	1.0146	1.0130
Nebo	11	QNEB	0.9295	0.9394
Newlands	66	QNLD	0.9667	0.9831
North Goonyella	132	QNGY	0.9673	0.9789
Norwich Park (Rail)	132	QNOR	0.9464	0.9528
Oakey	110	QOKT	0.9820	0.9818
Oonooie (Rail)	132	QOON	0.9567	0.9651
Orana LNG	275	QORH	0.9797	0.9805
Palmwoods	132	QPWD	1.0023	1.0025
Pandoin	132	QPAN	0.9106	0.9198
Pandoin	66	QPAL	0.9111	0.9199
Peak Downs (Rail)	132	QPKD	0.9642	0.9710
Pioneer Valley	66	QPIV	0.9669	0.9623
Proserpine	66	QPRO	0.9620	0.9723
Queensland Alumina Ltd (Gladstone South)	132	QQAHA	0.9287	0.9381
Queensland Nickel (Yabulu)	132	QQNH	0.9446	0.9616
Raglan	275	QRGL	0.9142	0.9217
Redbank Plains	11	QRPN	1.0066	1.0031
Richlands	33	QRLD	1.0168	1.0149
Rockhampton	66	QROC	0.9117	0.9134
Rocklands (Rail)	132	QRCK	0.9048	0.9164
Rocklea (Archerfield)	110	QRLE	1.0064	1.0061
Ross	132	QROS	0.9468	0.9625
Runcorn	33	QRBS	1.0190	1.0174
South Pine	110	QSPN	1.0045	1.0042
Stony Creek	132	QSYC	0.9555	0.9723
Sumner	110	QSUM	1.0078	1.0071
Tangkam (Dalby)	110	QTKM	0.9850	0.9867
Tarong	66	QTRL	0.9731	0.9756
Teebar Creek	132	QTBC	0.9681	0.9764
Tennyson	33	QTNS	1.0104	1.0098
Tennyson (Rail)	110	QTNN	1.0089	1.0087
Townsville East	66	QTVE	0.9492	0.9669
Townsville South	66	QTVS	0.9542	0.9698
Tully	22	QTLL	1.0039	0.9516
Turkinje	66	QTUL	0.9778	0.9966
Turkinje (Craiglie)	132	QTUH	0.9803	0.9915
Wandoan South	132	QWSH	0.9987	1.0036
Wandoan South (NW Surat)	275	QWST	0.9975	1.0030
Wandoo (Rail)	132	QWAN	0.9393	0.9471
Wivenhoe Pump	275	QWIP	0.9970	0.9974
Woolooga (Energex)	132	QWLG	0.9770	0.9756
Woolooga (Ergon)	132	QWLN	0.9770	0.9756

Location	Voltage in kilovolts (kV)	TNI	2019-20 MLF	2018-19 MLF
Woree	132	QWRE	0.9568	0.9754
Wotonga (Rail)	132	QWOT	0.9543	0.9685
Wycarbah	132	QWCB	0.9099	0.9061
Yarwun – Boat Creek (Ergon)	132	QYAE	0.9225	0.9282
Yarwun – Rio Tinto	132	QYAR	0.9186	0.9266

**Table 2 Queensland generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Barcaldine Solar at Lilyvale (132)	132	BARCSF1	QLLV1B	QLLV	0.8678	0.8934
Barron Gorge Power Station (PS) Unit 1	132	BARRON-1	QBGH1	QBGH	0.9107	0.9346
Barron Gorge PS Unit 2	132	BARRON-2	QBGH2	QBGH	0.9107	0.9346
Braemar PS Unit 1	275	BRAEMAR1	QBRA1	QBRA	0.9680	0.9709
Braemar PS Unit 2	275	BRAEMAR2	QBRA2	QBRA	0.9680	0.9709
Braemar PS Unit 3	275	BRAEMAR3	QBRA3	QBRA	0.9680	0.9709
Braemar Stage 2 PS Unit 5	275	BRAEMAR5	QBRA5B	QBRA	0.9680	0.9709
Braemar Stage 2 PS Unit 6	275	BRAEMAR6	QBRA6B	QBRA	0.9680	0.9709
Braemar Stage 2 PS Unit 7	275	BRAEMAR7	QBRA7B	QBRA	0.9680	0.9709
Callide PS Load	132	CALLNL1	QCAX	QCAX	0.8946	0.9048
Callide A PS Unit 4	132	CALL_A_4	QCAA4	QCAA	0.8948	0.9074
Callide A PS Unit 4 Load	132	CALLNL4	QCAA2	QCAA	0.8948	0.9074
Callide B PS Unit 1	275	CALL_B_1	QCAB1	QCAB	0.8985	0.9069
Callide B PS Unit 2	275	CALL_B_2	QCAB2	QCAB	0.8985	0.9069
Callide C PS Unit 3	275	CPP_3	QCAC3	QCAC	0.8957	0.9080
Callide C PS Unit 4	275	CPP_4	QCAC4	QCAC	0.8957	0.9080
Clare Solar Farm	132	CLARES1	QCLA1C	QCLA	0.8266	0.8727
Collinsville Solar Farm	33	CSPVPS1	QCOS1C	QCOS	0.8420	0.8719
Columboola – Condamine PS	132	CPSA	QCND1C	QCND	0.9879	0.9882
Darling Downs PS	275	DDPS1	QBRA8D	QBRA	0.9680	0.9709
Darling Downs Solar Farm	275	DDSF1	QBR51D	QBR5	0.9821	0.9812
Daydream Solar Farm	33	DAYDSF1	QCCK1D	QCCK	0.8266	0.8836
Gladstone PS (132 kV) Unit 3	132	GSTONE3	QGLD3	QGLL	0.9170	0.9206
Gladstone PS (132 kV) Unit 4	132	GSTONE4	QGLD4	QGLL	0.9170	0.9206
Gladstone PS (132kV) Load	132	GLADNL1	QGLL	QGLL	0.9170	0.9206
Gladstone PS (275 kV) Unit 1	275	GSTONE1	QGLD1	QGLH	0.9174	0.9240
Gladstone PS (275 kV) Unit 2	275	GSTONE2	QGLD2	QGLH	0.9174	0.9240
Gladstone PS (275 kV) Unit 5	275	GSTONE5	QGLD5	QGLH	0.9174	0.9240
Gladstone PS (275 kV) Unit 6	275	GSTONE6	QGLD6	QGLH	0.9174	0.9240
Hamilton Solar Farm	33	HAMISF1	QSLD1H	QSLD	0.8379	0.8741
Hayman Solar Farm	33	HAYMSF1	QCCK2H	QCCK	0.8266	0.8836
Hughenden SF	132	HUGSF1	QROG2H	QROG	0.8611	0.8842
Kareeya PS Unit 1	132	KAREEYA1	QKAH1	QKYH	0.9250	0.9523
Kareeya PS Unit 2	132	KAREEYA2	QKAH2	QKYH	0.9250	0.9523
Kareeya PS Unit 3	132	KAREEYA3	QKAH3	QKYH	0.9250	0.9523

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Kareeya PS Unit 4	132	KAREEYA4	QKAH4	QKYH	0.9250	0.9523
Kidston Solar Farm	132	KSP1	QROG1K	QROG	0.8611	0.8842
Kogan Creek PS	275	KPP_1	QBRA4K	QWDN	0.9690	0.9743
Koombooloomba	132	KAREEYA5	QKYH5	QKYH	0.9250	0.9523
Lilyvale Solar Farm	132	LILYSF1	QBDR1L	QBDR	0.8675	0.8855
Millmeran PS Unit 1	330	MPP_1	QBCK1	QMLN	0.9785	0.9812
Millmeran PS Unit 2	330	MPP_2	QBCK2	QMLN	0.9785	0.9812
Mount Emerald Wind farm	275	MEWF1	QWKM1M	QWKM	0.9381	0.9515
Mt Stuart PS Unit 1	132	MSTUART1	QMSP1	QMSP	0.9422	0.8842
Mt Stuart PS Unit 2	132	MSTUART2	QMSP2	QMSP	0.9422	0.8842
Mt Stuart PS Unit 3	132	MSTUART3	QMSP3M	QMSP	0.9422	0.8842
Oakey PS Unit 1	110	OAKEY1	QOKY1	QOKY	0.9573	0.9562
Oakey PS Unit 2	110	OAKEY2	QOKY2	QOKY	0.9573	0.9562
Ross River Solar Farm	132	RRSF1	QROG3R	QROG	0.8611	0.8842
Stanwell PS Load	132	STANNL1	QSTX	QSTX	0.9023	0.9104
Stanwell PS Unit 1	275	STAN-1	QSTN1	QSTN	0.9008	0.9075
Stanwell PS Unit 2	275	STAN-2	QSTN2	QSTN	0.9008	0.9075
Stanwell PS Unit 3	275	STAN-3	QSTN3	QSTN	0.9008	0.9075
Stanwell PS Unit 4	275	STAN-4	QSTN4	QSTN	0.9008	0.9075
Staplyton	110	STAPLYTON1	QLGH4S	QLGH	1.0128	1.0116
Sun Metals Solar Farm	132	SMCSF1	QTZS1S	QTZS	0.9995	1.0147
Swanbank E GT	275	SWAN_E	QSWE	QSWE	1.0011	1.0009
Tarong North PS	275	TNPS1	QTNT	QTNT	0.9719	0.9755
Tarong PS Unit 1	275	TARONG#1	QTRN1	QTRN	0.9721	0.9752
Tarong PS Unit 2	275	TARONG#2	QTRN2	QTRN	0.9721	0.9752
Tarong PS Unit 3	275	TARONG#3	QTRN3	QTRN	0.9721	0.9752
Tarong PS Unit 4	275	TARONG#4	QTRN4	QTRN	0.9721	0.9752
Whitsunday Solar Farm	33	WHITSF1	QSL1W	QSL1	0.8240	0.8741
Wivenhoe Generation Unit 1	275	W/HOE#1	QWIV1	QWIV	0.9928	0.9939
Wivenhoe Generation Unit 2	275	W/HOE#2	QWIV2	QWIV	0.9928	0.9939
Wivenhoe Pump 1	275	PUMP1	QWIP1	QWIP	0.9970	0.9974
Wivenhoe Pump 2	275	PUMP2	QWIP2	QWIP	0.9970	0.9974
Yabulu PS	132	YABULU	QTYP	QTYP	0.9170	0.9346
Yarwun PS	132	YARWUN_1	QYAG1R	QYAG	0.9178	0.9245

**Table 3 Queensland embedded generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Baking Board Solar Farm (Chinchilla SF)	132	BAKING1	QCHS1C	QCHS	0.9788	0.9834
Barcaldine PS – Lilyvale	132	BARCALDN	QBCG	QBCG	0.7726	0.9029
Browns Plains Landfill Gas PS	110	BPLANDF1	QLGH3B	QLGH	1.0128	1.0116
Childers Solar Farm	132	CHILDSF1	QTBS1C	QTBS	0.9482	0.9511
Daandine PS	110	DAANDINE	QTKM1	QTKM	0.9850	0.9867



Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Emerald Solar Farm	66	EMERASF1	QLIS1E	QLIS	0.8651	0.8778
German Creek Generator	66	GERMCRK	QLIL2	QLIL	0.9300	0.9451
Grosvenor PS At Moranbah 66 No 2	66	GROSV2	QMRV1G	QMRV	0.9489	0.9683
Grosvenor PS At Moranbah 66 No 1	66	GROSV1	QMRN2G	QMRV	0.9489	0.9683
Invicta Sugar Mill	132	INVICTA	QINV1I	QINV	0.938471262	0.966
Isis CSM	132	ICSM	QGNG1I	QTBC	0.9681	0.9764
Longreach Solar Farm	132	LRSF1	QLLV2L	QLLV	0.8678	0.8934
Mackay GT	33	MACKAYGT	QMKG	QMKG	0.8953	0.8863
Moranbah Gen	11	MORANBAH	QMRL1M	QMRL	0.9601	0.9538
Moranbah North PS	66	MBAHNTH	QMRN1P	QMRN	0.9621	0.9819
Oaky Creek Generator	66	OAKYCRES	QLIL1	QLIL	0.9300	0.9451
Oaky Creek 2	66	OAKY2	QLIL3O	QLIL	0.9300	0.9451
Racecourse Mill PS 1 – 3	66	RACOMIL1	QMKA1R	QPIV	0.9669	0.9623
Rochedale Renewable Energy Plant	110	ROCHEDAL	QBMH2	QBMH	1.0132	1.0123
Rocky Point Gen (Loganlea 110kV)	110	RPCG	QLGH2	QLGH	1.0128	1.0116
Roghan Road Generator	110	EDLRGNRD	QSPN2	QSPN	1.0045	1.0042
Roma PS Unit 7 – Columboola	132	ROMA_7	QRMA7	QRMA	0.8540	0.9729
Roma PS Unit 8 – Columboola	132	ROMA_8	QRMA8	QRMA	0.8540	0.9729
Southbank Institute Of Technology	110	STHBKTEC	QCBD1S	QCBW	1.0137	1.0122
Sunshine Coast Solar Farm	132	VALDORA1	QPWD1S	QPWD	1.0023	1.0025
Susan River Solar Farm	132	SRSF1	QTBS2S	QTBS	0.9482	0.9511
Ti Tree BioReactor	33	TITREE	QABM1T	QABM	1.0027	1.0015
Whitwood Rd Renewable Energy Plant	110	WHIT1	QSBK1	QBKS	1.0006	1.0001
Windy Hill Wind Farm	66	WHILL1	QTUL	QTUL	0.9778	0.9966
Wivenhoe Small Hydro	110	WIVENSH	QABR1	QABR	1.0043	0.9968
Yabulu Steam Turbine (Garbutt 66kV)	66	YABULU2	QGAR1	QYST	0.9558	0.9495

## 1.2 New South Wales Marginal Loss Factors<sup>1</sup>

**Table 4 New South Wales loads**

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Alexandria	33	NALX	1.0081	1.0093
Albury	132	NALB	0.9894	1.0792
Alcan	132	NALC	0.9908	0.9932
Armidale	66	NAR1	0.9274	0.8957
Australian Newsprint Mill	132	NANM	0.9935	1.0810
Balranald	22	NBAL	0.9161	1.1047
Beaconsfield North	132	NBFN	1.0074	1.0084
Beaconsfield South	132	NBFS	1.0074	1.0084
Beaconsfield West	132	NBFW	1.0074	1.0084
Belmore Park	132	NBM1	1.0077	1.0085

<sup>1</sup>The New South Wales region includes the Australian Capital Territory (ACT). ACT generation and load are detailed separately for ease of reference.

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Beresfield	33	NBRF	0.9905	0.9957
Beryl	66	NBER	0.9721	1.0062
BHP (Waratah)	132	NWR1	0.9868	0.9893
Boambee South	132	NWST	0.9499	0.9125
Boggabri East	132	NBGE	0.9811	0.9692
Boggabri North	132	NBGN	0.9822	0.9692
Brandy Hill	11	NBHL	0.9907	0.9935
Broken Hill	22	NBKG	0.8443	1.0603
Broken Hill	220	NBKH	0.8226	1.0486
Bunnerong	132	NBG1	1.0069	1.0081
Bunnerong	33	NBG3	1.0092	1.0103
Burrinjuck	132	NBU2	0.9753	1.0155
Canterbury	33	NCTB	1.0159	1.0136
Carlingford	132	NCAR	1.0031	1.0033
Casino	132	NCSN	0.9460	0.8960
Charmhaven	11	NCHM	0.9994	0.9930
Chullora	132	NCHU	1.0070	1.0076
Coffs Harbour	66	NCH1	0.9460	0.9072
Coleambally	132	NCLY	0.9615	1.0783
Cooma	66	NCMA	0.9833	1.0307
Cooma (AusNet Services)	66	NCM2	0.9833	1.0307
Croydon	11	NCRD	1.0112	1.0089
Cowra	66	NCW8	1.0329	1.0411
Dapto (Endeavour Energy)	132	NDT1	0.9932	1.0037
Dapto (Essential Energy)	132	NDT2	0.9932	1.0037
Darlington Point	132	NDNT	0.9705	1.0764
Deniliquin	66	NDN7	0.9929	1.1081
Dorrigo	132	NDOR	0.9446	0.9070
Drummoyne	11	NDRM	1.0134	1.0087
Dunoon	132	NDUN	0.9520	0.8822
Far North VTN		NEV1	0.9683	0.9654
Finley	66	NFNY	1.0133	1.1441
Forbes	66	NFB2	1.0464	1.0429
Gadara	132	NGAD	0.9887	1.0504
Glen Innes	66	NGLN	0.9091	0.8920
Gosford	66	NGF3	1.0063	1.0011
Gosford	33	NGSF	1.0070	1.0021
Green Square	11	NGSQ	1.0103	1.0098
Griffith	33	NGRF	0.9887	1.0929
Gunnedah	66	NGN2	0.9784	0.9579
Haymarket	132	NHYM	1.0076	1.0084
Heron's Creek	132	NHNC	1.0034	0.9885
Holroyd	132	NHLD	1.0015	1.0000
Hurstville North	11	NHVN	1.0066	1.0068
Homebush Bay	11	NHBB	1.0116	1.0110

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Ilford	132	NLFD	0.9680	0.9901
Ingleburn	66	NING	0.9985	1.0006
Inverell	66	NNVL	0.9202	0.9063
Kemps Creek	330	NKCK	0.9942	0.9972
Kempsey	66	NKS2	0.9730	0.9510
Kempsey	33	NKS3	0.9822	0.9542
Koolkhan	66	NKL6	0.9602	0.9174
Kurnell	132	NKN1	1.0041	1.0054
Kogarah	11	NKOG	1.0089	1.0090
Kurri	33	NKU3	0.9931	0.9961
Kurri	11	NKU1	0.9913	0.9940
Kurri – Dual MLF (Generation)	132	NKUR	0.9922	0.9913
Kurri – Dual MLF (Load)	132	NKUR	0.9922	0.9913
Lake Munmorah	132	NMUN	0.9950	0.9835
Lane Cove	132	NLCV	1.0089	1.0083
Leichhardt	11	NLDT	1.0106	1.0103
Liddell	33	NLD3	0.9621	0.9596
Lismore	132	NLS2	0.9940	0.8965
Liverpool	132	NLP1	1.0011	1.0024
Macarthur	132	NMC1	0.9945	0.9987
Macarthur	66	NMC2	0.9960	1.0008
Macksville	132	NMCV	0.9669	0.9305
Macquarie Park	11	NMQP	1.0121	1.0122
Manildra	132	NMLD	1.0310	1.0223
Marrickville	11	NMKV	1.0138	1.0138
Marulan (Endeavour Energy)	132	NMR1	1.0163	0.9977
Marulan (Essential Energy)	132	NMR2	1.0163	0.9977
Mason Park	132	NMPK	1.0087	1.0084
Meadowbank	11	NMBK	1.0125	1.0116
Molong	132	NMOL	1.0323	1.0236
Moree	66	NMRE	0.9618	0.9612
Morven	132	NMVN	0.9846	1.0752
Mt Piper	66	NMP6	0.9712	0.9734
Mudgee	132	NMDG	0.9743	1.0039
Mullumbimby	11	NML1	0.9426	0.8642
Mullumbimby	132	NMLB	0.9391	0.8591
Munmorah STS 33	33	NMU3	0.9942	1.0058
Munyang	11	NMY1	0.9957	1.0256
Munyang	33	NMYG	0.9957	1.0256
Murrumbateman	132	NMBM	0.9795	1.0129
Murrumburrah	66	NMRU	0.9942	1.0448
Muswellbrook	132	NMRK	0.9688	0.9659
Nambucca Heads	132	NNAM	0.9637	0.9243
Narrabri	66	NNB2	0.9943	0.9789
Newcastle	132	NNEW	0.9877	0.9901

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
North of Broken Bay VTN		NEV2	0.9935	0.9933
Orange	66	NRGE	1.0335	1.0343
Orange	132	NRG1	1.0330	1.0348
Orange North	132	NONO	1.0283	1.0322
Ourimbah	33	NORB	1.0029	0.9986
Ourimbah	132	NOR1	1.0019	0.9972
Ourimbah	66	NOR6	1.0028	0.9972
Panorama	66	NPMA	1.0188	1.0225
Parke	66	NPK6	1.0416	1.0372
Parke	132	NPKS	1.0352	1.0336
Peakhurst	33	NPHT	1.0058	1.0063
Pt Macquarie	33	NPMQ	1.0005	0.9783
Pymont	33	NPT3	1.0091	1.0092
Pymont	132	NPT1	1.0080	1.0086
Queanbeyan 132	132	NQBY	0.9948	1.0457
Raleigh	132	NRAL	0.9592	0.9166
Regentville	132	NRGV	0.9978	0.9993
Rockdale (Ausgrid)	11	NRKD	1.0073	1.0081
Rookwood Road	132	NRWR	1.0023	1.0027
Rozelle	132	NRZH	1.0105	1.0092
Rozelle	33	NRZL	1.0109	1.0098
Snowy Adit	132	NSAD	0.9797	1.0132
Somersby	11	NSMB	1.0072	1.0020
South of Broken Bay VTN		NEV3	1.0063	1.0062
St Peters	11	NSPT	1.0113	1.0115
Stroud	132	NSRD	1.0006	1.0022
Sydney East	132	NSE2	1.0074	1.0049
Sydney North (Ausgrid)	132	NSN1	1.0019	1.0015
Sydney North (Endeavour Energy)	132	NSN2	1.0019	1.0015
Sydney South	132	NSYS	1.0021	1.0036
Sydney West (Ausgrid)	132	NSW1	1.0031	1.0033
Sydney West (Endeavour Energy)	132	NSW2	1.0031	1.0033
Tamworth	66	NTA2	0.9515	0.9348
Taree (Essential Energy)	132	NTR2	1.0178	1.0105
Tenterfield	132	NTTF	0.9277	0.8945
Terranora	110	NTNR	0.9763	0.9223
Tomago	330	NTMG	0.9876	0.9898
Tomago (Ausgrid)	132	NTME	0.9898	0.9925
Tomago (Essential Energy)	132	NTMC	0.9898	0.9925
Top Ryde	11	NTPR	1.0114	1.0091
Tuggerah	132	NTG3	0.9983	0.9935
Tumut	66	NTU2	0.9892	1.0438
Vales Pt.	132	NVP1	0.9924	0.9883
Vineyard	132	NVYD	0.9986	0.9991
Wagga	66	NWG2	0.9833	1.0616

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Wagga North	132	NWGN	0.9839	1.0642
Wagga North	66	NWG6	0.9850	1.0673
Wallerawang (Endeavour Energy)	132	NWW6	0.9716	0.9737
Wallerawang (Essential Energy)	132	NWW5	0.9716	0.9737
Wallerawang 66 (Essential Energy)	66	NWW4	0.9724	0.9747
Wallerawang 66	66	NWW7	0.9724	0.9747
Wallerawang 330 PS Load	330	NWWP	0.9725	0.9766
Wellington	132	NWL8	0.9839	0.9824
West Gosford	11	NGWF	1.0081	1.0026
Williamsdale	132	NWDL	0.9824	1.0258
Williamsdale (Essential Energy) (Bogong)	132	NWD1	0.9879	1.0272
Wyong	11	NWYG	1.0020	0.9958
Yanco	33	NYA3	0.9806	1.0833
Yass	66	NYS6	0.9802	1.0136
Yass	132	NYS1	0.9543	1.0054

**Table 5 New South Wales generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Bayswater PS Unit 1	330	BW01	NBAY1	NBAY	0.9553	0.9538
Bayswater PS Unit 2	330	BW02	NBAY2	NBAY	0.9553	0.9538
Bayswater PS Unit 3	500	BW03	NBAY3	NBYW	0.9566	0.9555
Bayswater PS Unit 4	500	BW04	NBAY4	NBYW	0.9566	0.9555
Blowering	132	BLOWRNG	NBLW8	NBLW	0.9436	0.9900
Bodangora Wind Farm	132	BODWF1	NBOD1B	NBOD	0.9616	0.9819
Broken Hill GT 1	22	GB01	NBKG1	NBKG	0.8443	1.0603
Broken Hill Solar Farm	22	BROKENH1	NBK11B	NBK1	0.7254	0.9789
Burrinjuck	132	BURRIN	NBUK	NBUK	0.9705	1.0124
Capital Wind Farm	330	CAPTL_WF	NCWF1R	NCWF	0.9724	1.0100
Colleambally Solar Farm	132	COLEASF1	NCLS1C	NCLS	0.8802	1.0019
Colongra PS Unit 1	330	CG1	NCLG1D	NCLG	0.9913	0.9827
Colongra PS Unit 2	330	CG2	NCLG2D	NCLG	0.9913	0.9827
Colongra PS Unit 3	330	CG3	NCLG3D	NCLG	0.9913	0.9827
Colongra PS Unit 4	330	CG4	NCLG4D	NCLG	0.9913	0.9827
Crookwell 2 Wind Farm	330	CROOKWF2	NCKW1C	NCKW	0.9751	0.9963
Ering 330 PS Unit 1	330	ER01	NEPS1	NEP3	0.9762	0.9828
Ering 330 PS Unit 2	330	ER02	NEPS2	NEP3	0.9762	0.9828
Ering 500 PS Unit 3	500	ER03	NEPS3	NEPS	0.9803	0.9853
Ering 500 PS Unit 4	500	ER04	NEPS4	NEPS	0.9803	0.9853
Ering PS Load	500	ERNL1	NEPSL	NEPS	0.9803	0.9853
Griffith Solar Farm	33	GRISFS1	NGG11G	NGG1	0.9211	1.0603
Gullen Range Solar Farm	330	GULLRSF1	NGUR2G	NGUR	0.9701	0.9959
Gullen Range Wind Farm	330	GULLRWF1	NGUR1G	NGUR	0.9701	0.9959
Guthega	132	GUTHEGA	NGUT8	NGUT	0.9038	0.9537

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Guthega Auxiliary Supply	11	GUTHNL1	NMY11	NMY1	0.9957	1.0256
Hume (New South Wales Share)	132	HUMENSW	NHUM	NHUM	0.9716	1.0675
Kangaroo Valley – Bendeela (Shoalhaven) Generation – Dual MLF	330	SHGEN	NSHL	NSHN	0.9781	0.9981
Kangaroo Valley (Shoalhaven) Pumps – Dual MLF	330	SHPUMP	NSHP1	NSHLPUMP	0.9972	1.0137
Liddell 330 PS Load	330	LIDDNL1	NLDPL	NLDP	0.9553	0.9537
Liddell 330 PS Unit 1	330	LD01	NLDP1	NLDP	0.9553	0.9537
Liddell 330 PS Unit 2	330	LD02	NLDP2	NLDP	0.9553	0.9537
Liddell 330 PS Unit 3	330	LD03	NLDP3	NLDP	0.9553	0.9537
Liddell 330 PS Unit 4	330	LD04	NLDP4	NLDP	0.9553	0.9537
Lower Tumut Generation – Dual MLF	330	TUMUT3	NLTS8	NLTS	0.9333	0.9954
Lower Tumut Pipeline Auxiliary	66	TUMT3NL3	NTU2L3	NTU2	0.9892	1.0438
Lower Tumut Pumps – Dual MLF	330	SNOWYP	NLTS3	NLTS	1.0142	1.0545
Lower Tumut T2 Auxiliary	66	TUMT3NL1	NTU2L1	NTU2	0.9892	1.0438
Lower Tumut T4 Auxiliary	66	TUMT3NL2	NTU2L2	NTU2	0.9892	1.0438
Mt Piper PS Load	330	MPNL1	NMPPL	NMTP	0.9698	0.9738
Mt Piper PS Unit 1	330	MP1	NMTP1	NMTP	0.9698	0.9738
Mt Piper PS Unit 2	330	MP2	NMTP2	NMTP	0.9698	0.9738
Murray (Geehi Tee off Auxiliary)	330	MURAYNL3	NMURL3	NMUR	0.9403	0.9069
Murray Power Station M1 Auxiliary	330	MURAYNL1	NMURL1	NMUR	0.9403	0.9069
Murray Power Station M2 Auxiliary	330	MURAYNL2	NMURL2	NMUR	0.9403	0.9069
Parkes Solar Farm	66	PARSF1	NPG11P	NPG1	0.9211	1.0603
Sapphire Wind Farm	330	SAPHWF1	NSAP1S	NSAP	0.9131	0.8821
Silverton Wind Farm	220	STWF1	NBKW1S	NBKW	0.7990	1.0062
Upper Tumut	330	UPPTUMUT	NUTS8	NUTS	0.9554	1.0112
Uranquinty PS Unit 11	132	URANQ11	NURQ1U	NURQ	0.8748	0.9609
Uranquinty PS Unit 12	132	URANQ12	NURQ2U	NURQ	0.8748	0.9609
Uranquinty PS Unit 13	132	URANQ13	NURQ3U	NURQ	0.8748	0.9609
Uranquinty PS Unit 14	132	URANQ14	NURQ4U	NURQ	0.8748	0.9609
Vales Point 330 PS Load	330	VPNL1	NVPP1	NVPP	0.9917	0.9851
Vales Point 330 PS Unit 5	330	VP5	NVPP5	NVPP	0.9917	0.9851
Vales Point 330 PS Unit 6	330	VP6	NVPP6	NVPP	0.9917	0.9851
Woodlawn Wind Farm	330	WOODLWN1	NCWF2W	NCWF	0.9724	1.0100
White Rock Wind Farm	132	WRWF1	NWRK1W	NWRK	0.8302	0.8427
White Rock Solar Farm	132	WRSF1	NWRK2W	NWRK	0.8302	0.8427

**Table 6 New South Wales embedded generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Appin Power Station	66	APPIN	NAPP1A	NAPP	0.9956	1.0010
Awaba Renewable Energy Facility	132	AWABAREF	NNEW2	NNEW	0.9877	0.9901
Bankstown Sport Club	132	BANKSPT1	NSYS3R	NSYS	1.0021	1.0036
Boco Rock Wind Farm	132	BOCORWF1	NCMA3B	NBCO	0.9585	1.0068
Broadwater PS	132	BWTR1	NLS21B	NLS2	0.9940	0.8965
Brown Mountain	66	BROWNMT	NCMA1	NCMA	0.9833	1.0307
Burrendong Hydro PS	132	BDONGHYD	NWL81B	NWL8	0.9839	0.9824
Campbelltown WSLC	66	WESTCBT1	NING1C	NING	0.9985	1.0006
Condong PS	110	CONDONG1	NTNR1C	NTNR	0.9763	0.9223
Copeton Hydro PS	66	COPTNHYD	NNVL1C	NNVL	0.9202	0.9063
Cullerin Range Wind Farm	132	CULLRGWF	NYS11C	NYS1	0.9543	1.0054
Eastern Creek	132	EASTCRK	NSW21	NSW2	1.0031	1.0033
Eraring 330 BS UN (GT)	330	ERGT01	NEP35B	NEP3	0.9762	0.9828
Glenbawn Hydro PS	132	GLBWNHYD	NMRK2G	NMRK	0.9688	0.9659
Glenn Innes (Pindari PS)	66	PINDARI	NGLN1	NGLN	0.9091	0.8920
Glennies Creek PS	132	GLENCRK	NMRK3T	NMRK	0.9688	0.9659
Grange Avenue	132	GRANGEAV	NVYD1	NVYD	0.9986	0.9991
Gunning Wind Farm	132	GUNNING1	NYS12A	NYS1	0.9543	1.0054
Jindabyne Generator	66	JNDABNE1	NCMA2	NCMA	0.9833	1.0307
Jounama PS	66	JOUNAMA1	NTU21J	NTU2	0.9892	1.0438
Keepit	66	KEEPIT	NKPT	NKPT	0.9784	0.9579
Kincumber Landfill	66	KINCUM1	NGF31K	NGF3	1.0063	1.0011
Liddell 33 – Hunter Valley GTs	33	HVGTS	NLD31	NLD3	0.9621	0.9596
Liverpool 132 (Jacks Gully)	132	JACKSGUL	NLP11	NSW2	1.0031	1.0033
Lucas Heights II Power Plant	132	LUCASHGT	NSYS2G	NSYS	1.0021	1.0036
Lucas Heights Stage 2 Power Station	132	LUCAS2S2	NSYS1	NSYS	1.0021	1.0036
Manildra Solar Farm	132	MANSLR1	NMLS1M	NMLS	0.9905	0.9923
Moree Solar Farm	66	MOREESF1	NMR41M	NMR4	0.8517	0.8988
Narromine Solar Farm	132	NASF1	NWLS1N	NWLS	0.9607	0.9708
Nine Willoughby	132	NINEWIL1	NSE21R	NSE2	1.0074	1.0049
Nyngan Solar Farm	132	NYNGAN1	NWL82N	NWL8	0.9839	0.9824
Sithe (Holroyd Generation)	132	SITHE01	NSYW1	NHD2	1.0010	1.0000
South Keswick Solar Farm	132	SKSF1	NWLS2S	NWLS	0.9607	0.9708
St George Leagues Club	33	STGEORG1	NPHT1E	NPHT	1.0058	1.0063
Tahmoor PS	132	TAHMOOR1	NLP12T	NLP1	1.0011	1.0024
Tallawarra PS	132	TALWA1	NDT13T	NTWA	0.9899	1.0001
Taralga Wind Farm	132	TARALGA1	NMR22T	NMR2	1.0163	0.9977
Teralba Power Station	132	TERALBA	NNEW1	NNEW	0.9877	0.9901
The Drop Power Station	66	THEDROP1	NFNY1D	NFNY	1.0133	1.1441
Tower Power Plant	132	TOWER	NLP11T	NLP1	1.0011	1.0024
West Nowra	132	AGLNOW1	NDT12	NDT1	0.9932	1.0037
West Illawara Leagues Club	132	WESTILL1	NDT14E	NDT1	0.9932	1.0037
Wilga Park A	66	WILGAPK	NNB21W	NNB2	0.9943	0.9789

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Wilga Park B	66	WILGB01	NNB22W	NNB2	0.9943	0.9789
Woodlawn Bioreactor	132	WDLNGN01	NMR21W	NMR2	1.0163	0.9977
Woy Woy Landfill	66	WOYWOY1	NGF32W	NGF3	1.0063	1.0011
Wyangala A PS	66	WYANGALA	NCW81A	NCW8	1.0329	1.0411
Wyangala B PS	66	WYANGALB	NCW82B	NCW8	1.0329	1.0411

Table 7 ACT loads

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Canberra	132	ACA1	0.9816	1.0266
Angle Crossing	132	AAXG	0.9836	1.0327
Belconnen	132	ABCN	0.9834	1.0288
City East	132	ACTE	0.9863	1.0322
Civic	132	ACVC	0.9837	1.0295
East lake	132	AELK	0.9851	1.0309
Gilmore	132	AGLM	0.9838	1.0303
Gold Creek	132	AGCK	0.9830	1.0283
Latham	132	ALTM	0.9824	1.0276
Telopea Park	132	ATLP	0.9859	1.0320
Theodore	132	ATDR	0.9833	1.0293
Wanniassa	132	AWSA	0.9840	1.0304
Woden	132	AWDN	0.9830	1.0296
ACT VTN	132	AAVT	0.9840	1.0300
Queanbeyan (ACTEW)	66	AQB1	0.9928	1.0438
Queanbeyan (Essential Energy)	66	AQB2	0.9928	1.0438

Table 8 ACT generation and embedded generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Capital East Solar Farm	66	CESF1	AQB21C	AQB2	0.9928	1.0438
Mugga Lane Solar Farm	132	MLSP1	ACA12M	ACA1	0.9688	1.0200
Royalla Solar Farm	132	ROYALLA1	ACA11R	ACA1	0.9682	1.0178
Williamsdale Solar Farm	132	TBA	AAXG	AAXG	0.9688	1.0200

The Regional Reference Node (RRN) for ACT load and generation is the Sydney West 330 kV node.

### 1.3 Victoria Marginal Loss Factors

Table 9 Victoria loads

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Altona	66	VATS	1.0089	1.0054
Altona	220	VAT2	0.9964	1.0018
Ballarat	66	VBAT	0.9609	1.0016



Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Bendigo	66	VBE6	0.9927	1.0136
Bendigo	22	VBE2	0.9937	1.0163
BHP Western Port	220	VJLA	0.9904	0.9944
Brooklyn (Jemena)	22	VBL2	1.0025	1.0051
Brooklyn (Jemena)	66	VBL6	1.0058	1.0042
Brooklyn (Powercor)	22	VBL3	1.0025	1.0051
Brooklyn (Powercor)	66	VBL7	1.0058	1.0042
Brunswick (CITIPOWER)	22	VBT2	0.9988	1.0008
Brunswick (Jemena)	22	VBTS	0.9988	1.0008
Brunswick 66 (CitiPower)	66	VBT6	0.9973	0.9992
Cranbourne	220	VCB2	0.9895	0.9935
Cranbourne (AusNet Services)	66	VCBT	0.9918	0.9957
Cranbourne (United Energy)	66	VCB5	0.9918	0.9957
Deer Park	66	VDPT	0.9992	1.0038
East Rowville (AusNet Services)	66	VER2	0.9951	0.9956
East Rowville (United Energy)	66	VERT	0.9951	0.9956
Fishermens Bend (CitiPower)	66	VFBT	0.9991	1.0034
Fishermens Bend (Powercor)	66	VFB2	0.9991	1.0034
Fosterville	220	VFVT	0.9927	1.0096
Geelong	66	VGT6	0.9896	1.0002
Glenrowan	66	VGNT	1.0189	0.9903
Heatherton	66	VHTS	0.9973	1.0001
Heywood	22	VHY2	0.9898	1.0028
Horsham	66	VHOT	0.8914	0.9957
Keilor (Jemena)	66	VKT2	1.0016	1.0024
Keilor (Powercor)	66	VKTS	1.0016	1.0024
Kerang	22	VKG2	0.9766	1.0292
Kerang	66	VKG6	0.9667	1.0192
Khancoban	330	NKHN	0.9980	0.9459
Loy Yang Substation	66	VLY6	0.9767	0.9822
Malvern	22	VMT2	0.9946	0.9983
Malvern	66	VMT6	0.9935	0.9971
Morwell Power Station Units 1 to 3	66	VMWG	0.9732	0.9816
Morwell PS (G4&5)	11	VMWP	0.9778	0.9817
Morwell TS	66	VMWT	0.9945	0.9879
Mt Beauty	66	VMBT	1.0013	0.9882
Portland	500	VAPD	0.9925	1.0058
Pt Henry	220	VPTH	0.9830	0.9980
Red Cliffs	22	VRC2	0.9033	1.0129
Red Cliffs	66	VRC6	0.8852	1.0062
Red Cliffs (Essential Energy)	66	VRCA	0.8852	1.0062
Richmond	22	VRT2	0.9962	0.9996
Richmond (CitiPower)	66	VRT7	0.9974	1.0011
Richmond (United Energy)	66	VRT6	0.9974	1.0011
Ringwood (AusNet Services)	22	VRW3	0.9977	1.0007

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Ringwood (AusNet Services)	66	VRW7	1.0007	1.0012
Ringwood (United Energy)	22	VRW2	0.9977	1.0007
Ringwood (United Energy)	66	VRW6	1.0007	1.0012
Shepparton	66	VSHT	1.0146	1.0002
South Morang (Jemena)	66	VSM6	0.9940	0.9979
South Morang (AusNet Services)	66	VSMT	0.9940	0.9979
Springvale (CitiPower)	66	VSVT	0.9990	0.9986
Springvale (United Energy)	66	VSV2	0.9990	0.9986
Templestowe (CitiPower)	66	VTS2	0.9983	1.0006
Templestowe (Jemena)	66	VTST	0.9983	1.0006
Templestowe (AusNet Services)	66	VTS3	0.9983	1.0006
Templestowe (United Energy)	66	VTS4	0.9983	1.0006
Terang	66	VTGT	0.9948	1.0149
Thomastown (Jemena)	66	VTT5	1.0000	1.0000
Thomastown (AusNet Services)	66	VTT2	1.0000	1.0000
Tyabb	66	VTBT	0.9917	0.9958
Wemen 66 (Essential Energy)	66	VWEA	0.8959	1.0066
Wemen TS	66	VWET	0.8959	1.0066
West Melbourne	22	VWM2	0.9988	1.0019
West Melbourne (CitiPower)	66	VWM7	0.9996	1.0029
West Melbourne (Jemena)	66	VWM6	0.9996	1.0029
Wodonga	22	VWO2	1.0077	0.9735
Wodonga	66	VWO6	1.0028	0.9712
Yallourn	11	VYP1	0.9553	0.9584

Table 10 Victoria generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Ararat WF	220	ARWF1	VART1A	VART	0.8831	0.9691
Ballarat BESS - Generation	22	BALBG1	VBA21B	VBA2	0.9526	0.9948
Ballarat BESS - Load	22	BALBL1	VBA22B	VBA2	0.9742	1.0085
Banimboola	220	BAPS	VDPS2	VDPS	0.9320	0.9249
Bannerton Solar Farm	66	BANN1	VWES1B	VWES	0.8015	0.9262
Basslink (Loy Yang Power Station Switchyard) Tasmania to Victoria	500	BLNKVIC	VLYP13	VTBL	0.9858	0.9839
Coonoor Bridge WF	66	CBWF1	VBE61C	VBE6	0.9927	1.0136
Crowlands WF	220	CROWLWF11	VCW11C	VCWL	0.9007	0.9803
Dartmouth PS	220	DARTM1	VDPS	VDPS	0.9320	0.9249
Eildon PS Unit 1	220	EILDON1	VEPS1	VEPS	0.9820	0.9782
Eildon PS Unit 2	220	EILDON2	VEPS2	VEPS	0.9820	0.9782
Gannawarra BESS (Generation)	33	GANNBG1	VKGB1G	VKGB	0.9488	1.0070
Gannawarra BESS (Load)	33	GANNBL1	VKGB2G	VKGL	1.0085	1.0311
Hazelwood PS Load	220	HWPNL1	VHWP	VHWP	0.9776	0.9813
Jeeralang A PS Unit 1	220	JLA01	VJLGA1	VJLG	0.9747	0.9783
Jeeralang A PS Unit 2	220	JLA02	VJLGA2	VJLG	0.9747	0.9783

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Jeeralang A PS Unit 3	220	JLA03	VJLGA3	VJLG	0.9747	0.9783
Jeeralang A PS Unit 4	220	JLA04	VJLGA4	VJLG	0.9747	0.9783
Jeeralang B PS Unit 1	220	JLB01	VJLGB1	VJLG	0.9747	0.9783
Jeeralang B PS Unit 2	220	JLB02	VJLGB2	VJLG	0.9747	0.9783
Jeeralang B PS Unit 3	220	JLB03	VJLGB3	VJLG	0.9747	0.9783
Jindabyne pump at Guthega	132	SNOWYGJP	NGJP	NGJP	1.0300	1.0124
Kiata Wind Farm	66	KIATAWF1	VHOG1K	VHOG	0.8611	0.9911
Laverton PS (LNGS1)	220	LNGS1	VAT21L	VAT2	0.9964	1.0018
Laverton PS (LNGS2)	220	LNGS2	VAT22L	VAT2	0.9964	1.0018
Loy Yang A PS Load	500	LYNL1	VLYPL	VLYP	0.9763	0.9798
Loy Yang A PS Unit 1	500	LYA1	VLYP1	VLYP	0.9763	0.9798
Loy Yang A PS Unit 2	500	LYA2	VLYP2	VLYP	0.9763	0.9798
Loy Yang A PS Unit 3	500	LYA3	VLYP3	VLYP	0.9763	0.9798
Loy Yang A PS Unit 4	500	LYA4	VLYP4	VLYP	0.9763	0.9798
Loy Yang B PS Unit 1	500	LOYYB1	VLYP5	VLYP	0.9763	0.9798
Loy Yang B PS Unit 2	500	LOYYB2	VLYP6	VLYP	0.9763	0.9798
MacArthur Wind Farm	500	MACARTH1	VTRT1M	VTRT	0.9831	0.9971
McKay Creek / Bogong PS	220	MCKAY1	VMKP1	VT14	0.9485	0.9265
Mortlake Unit 1	500	MORTLK11	VM0P1O	VM0P	0.9850	0.9961
Mortlake Unit 2	500	MORTLK12	VM0P2O	VM0P	0.9850	0.9961
Mt Mercer Windfarm	220	MERCER01	VELT1M	VELT	0.9552	0.9909
Murray	330	MURRAY	NMUR8	NMUR	0.9403	0.9069
Newport PS	220	NPS	VNPS	VNPS	0.9912	0.9962
Salt Creek Wind Farm	66	SALTCKR1	VTG61S	VTG6	0.9751	1.0076
Timboon West WF	66	TIMWEST	VTGT5T	VTGT	0.9878	1.0149
Valley Power Unit 1	500	VPGS1	VLYP07	VLYP	0.9763	0.9798
Valley Power Unit 2	500	VPGS2	VLYP08	VLYP	0.9763	0.9798
Valley Power Unit 3	500	VPGS3	VLYP09	VLYP	0.9763	0.9798
Valley Power Unit 4	500	VPGS4	VLYP010	VLYP	0.9763	0.9798
Valley Power Unit 5	500	VPGS5	VLYP011	VLYP	0.9763	0.9798
Valley Power Unit 6	500	VPGS6	VLYP012	VLYP	0.9763	0.9798
Waubra Wind Farm	220	WAUBRAWF	VWBT1A	VWBT	0.9151	0.9784
Wemen Solar Farm	66	WEMENSF1	VWES2W	VWES	0.8015	0.9262
West Kiewa PS Unit 1	220	WKIEWA1	VWKP1	VWKP	0.9895	0.9607
West Kiewa PS Unit 2	220	WKIEWA2	VWKP2	VWKP	0.9895	0.9607
Yallourn W PS 220 Load	220	YWNL1	VYP2L	VYP2	0.9535	0.9573
Yallourn W PS 220 Unit 1	220	YWPS1	VYP21	VYP3	0.9658	0.9696
Yallourn W PS 220 Unit 2	220	YWPS2	VYP22	VYP2	0.9535	0.9573
Yallourn W PS 220 Unit 3	220	YWPS3	VYP23	VYP2	0.9535	0.9573
Yallourn W PS 220 Unit 4	220	YWPS4	VYP24	VYP2	0.9535	0.9573
Yalook South WF	66	YSWF1	VBAT4Y	VBAT	0.9609	1.0016

**Table 11 Victoria embedded generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Bairnsdale Power Station	66	BDL01	VMWT2	VBDL	0.9880	0.9866
Bairnsdale Power Station Generator Unit 2	66	BDL02	VMWT3	VBDL	0.9880	0.9866
Bald Hills WF	66	BALDHWF1	VMWT9B	VMWT	0.9945	0.9879
Ballarat Health Services	66	BBASEHOS	VBAT1H	VBAT	0.9609	1.0016
Broadmeadows Power Plant	66	BROADMDW	VTT52B	VTT5	1.0000	1.0000
Brooklyn Landfill & Recycling Facility	66	BROOKLYN	VBL61	VBL6	1.0058	1.0042
Challicum Hills WF	66	CHALLHWF	VHOT1	VHOT	0.8914	0.9957
Chepstowe Wind Farm	66	CHPSTWF1	VBAT3C	VBAT	0.9609	1.0016
Clayton Landfill Gas Power Station	66	CLAYTON	VSV21B	VSV2	0.9990	0.9986
Clover PS	66	CLOVER	VMBT1	VMBT	1.0013	0.9882
Codrington Wind Farm	66	CODRINGTON	VTGT2C	VTGT	0.9948	1.0149
Corio LFG PS	66	CORIO1	VGT61C	VGT6	0.9896	1.0002
Eildon Hydro PS	66	EILDON3	VTT22E	VSMT	0.9940	0.9979
Gannawarra Solar Farm	66	GANNNSF1	VKGS1G	VKGS	0.9007	0.9729
Glenmaggie Hydro PS	66	GLENMAG1	VMWT8G	VMWT	0.9945	0.9879
Hallam Mini Hydro	66	HLMSEW01	VER21H	VER2	0.9951	0.9956
Hallam Road Renewable Energy Facility	66	HALAMRD1	VER22L	VER2	0.9951	0.9956
Hepburn Community WF	66	HEPWIND1	VBAT2L	VBAT	0.9609	1.0016
Hume (Victorian Share)	66	HUMEV	VHUM	VHUM	0.9408	0.9498
Karadoc Solar Farm	66	KARSF1	VRCSF1K	VRCS	0.7826	0.9472
Longford	66	LONGFORD	VMWT6	VMWT	0.9945	0.9879
Maroona Wind Farm	66	MAROWF1	VBAT5M	VBAT	0.9609	1.0016
Mortons Lane Wind Farm	66	MLWF1	VTGT4M	VTGT	0.9948	1.0149
Mt Gellibrand Windfarm	66	MTGELWF1	VGTW1M	VGTW	0.9890	0.9989
Oaklands Hill Wind Farm	66	OAKLAND1	VTGT3A	VTGT	0.9948	1.0149
Rubicon Mountain Streams Station	66	RUBICON	VTT21R	VSMT	0.9940	0.9979
Shepparton Waste Gas	66	SHEP1	VSHT2S	VSHT	1.0146	1.0002
Somerton Power Station	66	AGLSOM	VTT51	VSOM	0.9688	0.9963
Springvale Power Plant	66	SVALE1	VSV22S	VSV2	0.9990	0.9986
Tatura	66	TATURA01	VSHT1	VSHT	1.0146	1.0002
Toora Wind Farm	66	TOORAWF	VMWT5	VMWT	0.9945	0.9879
Traralgon NSS	66	TGNSS1	VMWT1T	VMWT	0.9945	0.9879
William Horvell Hydro PS	66	WILLHOV1	VW061W	VGNT	1.0028	0.9712
Wollert Renewable Energy Facility	66	WOLLERT1	VSMT1W	VSMT	0.9940	0.9979
Wonthaggi Wind Farm	66	WONWP	VMWT7	VMWT	0.9945	0.9879
Yambuk Wind Farm	66	YAMBUKWF	VTGT1	VTGT	0.9948	1.0149
Yarrawonga Hydro PS	66	YWNGAHYD	VSHT3Y	VSHT	1.0146	1.0002
Yawong WF	66	YAWWF1	VBE62Y	VBE6	0.9927	1.0136

## 1.4 South Australia Marginal Loss Factors

Table 12 South Australia loads

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Angas Creek	33	SANC	1.0110	1.0080
Ardrossan West	33	SARW	0.9412	0.9582
Back Callington	11	SBAC	1.0160	1.0094
Baroota	33	SBAR	0.9932	0.9997
Berri	66	SBER	1.1533	1.0072
Berri (Powercor)	66	SBE1	1.1533	1.0072
Blanche	33	SBLA	1.0369	0.9693
Blanche (Powercor)	33	SBL1	1.0369	0.9693
Brinkworth	33	SBRK	0.9924	0.9967
Bungama Industrial	33	SBUN	0.9872	0.9939
Bungama Rural	33	SBUR	0.9957	1.0026
City West	66	SACR	1.0077	1.0044
Clare North	33	SCLN	0.9926	0.9924
Dalrymple	33	SDAL	0.9065	0.9258
Davenport	275	SDAV	0.9914	0.9928
Davenport	33	SDAW	0.9929	0.9941
Dorrien	33	SDRN	1.0057	1.0064
East Terrace	66	SETC	1.0025	1.0036
Happy Valley	66	SHVA	1.0057	1.0054
Hummocks	33	SHUM	0.9593	0.9724
Kadina East	33	SKAD	0.9646	0.9791
Kanmantoo	11	SKAN	1.0160	1.0087
Keith	33	SKET	1.0336	0.9952
Kilburn	66	SKLB	1.0000	1.0019
Kincraig	33	SKNC	1.0343	0.9799
Lefevre	66	SLFE	0.9996	0.9999
Leigh Creek	33	SLCC	1.0518	1.0506
Leigh Creek South	33	SLCS	1.0577	1.0549
Magill	66	SMAG	1.0047	1.0039
Mannum	33	SMAN	1.0175	1.0090
Mannum – Adelaide Pipeline 1	3.3	SMA1	1.0206	1.0135
Mannum – Adelaide Pipeline 2	3.3	SMA2	1.0179	1.0122
Mannum – Adelaide Pipeline 3	3.3	SMA3	1.0174	1.0121
Middleback	33	SMDL	0.9949	0.9996
Middleback	132	SMBK	0.9924	1.0014
Millbrook	132	SMLB	1.0042	1.0040
Mobilong	33	SMBL	1.0171	1.0079
Morgan – Whyalla Pipeline 1	3.3	SMW1	1.0622	1.0023
Morgan – Whyalla Pipeline 2	3.3	SMW2	1.0345	0.9991
Morgan – Whyalla Pipeline 3	3.3	SMW3	1.0089	0.9947
Morgan – Whyalla Pipeline 4	3.3	SMW4	0.9971	0.9919

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Morphett Vale East	66	SMVE	1.0065	1.0068
Mount Barker South	66	SMBS	1.0080	1.0050
Mt Barker	66	SMBA	1.0069	1.0043
Mt Gambier	33	SMGA	1.0425	0.9708
Mt Gunson	33	SMGU	1.1087	1.0257
Munno Para	66	SMUP	1.0004	1.0002
Murray Bridge – Hahndorf Pipeline 1	11	SMH1	1.0208	1.0129
Murray Bridge – Hahndorf Pipeline 2	11	SMH2	1.0218	1.0157
Murray Bridge – Hahndorf Pipeline 3	11	SMH3	1.0184	1.0140
Neuroodla	33	SNEU	1.0225	1.0226
New Osborne	66	SNBN	0.9998	0.9997
North West Bend	66	SNWB	1.0638	1.0013
Northfield	66	SNFD	1.0023	1.0031
Para	66	SPAR	1.0014	1.0026
Parafield Gardens West	66	SPGW	1.0011	1.0030
Penola West 33	33	SPEN	1.0311	0.9664
Pimba	132	SPMB	1.2255	1.0731
Playford	132	SPAA	0.9904	0.9918
Port Lincoln	33	SPLN	0.9705	0.9850
Port Pirie	33	SPPR	0.9932	0.9990
Roseworthy	11	SRSW	1.0092	1.0090
Snuggery Industrial – Dual MLF (Generation)	33	SSNN	0.9318	0.9430
Snuggery Industrial – Dual MLF (Load)	33	SSNN	0.9318	0.9430
Snuggery Rural	33	SSNR	1.0049	0.9457
South Australian VTN		SJP1	1.0068	0.9998
Stony Point	11	SSPN	0.9960	0.9990
Tallem Bend	33	STAL	1.0212	1.0017
Templers	33	STEM	1.0039	1.0046
Torrens Island	66	STSY	1.0000	1.0000
Waterloo	33	SWAT	0.9867	0.9886
Whyalla Central Substation	33	SWYC	0.9980	0.9996
Whyalla Terminal BHP	33	SBHP	0.9981	0.9988
Woomera	132	SWMA	1.1210	1.0320
Wudina	66	SWUD	0.9884	1.0049
Yadnarie	66	SYAD	0.9753	0.9927

**Table 13 South Australia generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Bungala One Solar Farm	132	BNGSF1	SBEM1B	SBEM	0.9689	0.9700
Bungala Two Solar Farm	132	BNGSF2	SBEM2B	SBEM	0.9689	0.9700
Cathedral Rocks Wind Farm	132	CATHROCK	SCRK	SCRK	0.8756	0.8860
Clements Gap Wind Farm	132	CLEMGPWF	SCGW1P	SCGW	0.9580	0.9683
Dry Creek PS Unit 1	66	DRYCGT1	SDCA1	SDPS	0.9967	1.0030

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Dry Creek PS Unit 2	66	DRYCGT2	SDCA2	SDPS	0.9967	1.0030
Dry Creek PS Unit 3	66	DRYCGT3	SDCA3	SDPS	0.9967	1.0030
Dalrymple North BESS (Generation)	33	DALNTH01	SDAN1D	SDAN	0.9031	0.8880
Dalrymple North BESS (Load)	33	DALNTHL1	SDAN2D	SDAN	0.9995	0.9326
Hallett 2 Wind Farm	275	HALLWF2	SMOK1H	SMOK	0.9741	0.9715
Hallett PS	275	AGLHAL	SHPS1	SHPS	0.9743	0.9715
Hallett Wind Farm	275	HALLWF1	SHPS2W	SHPS	0.9743	0.9715
Hornsedale Wind Farm Stage 1	275	HDWF1	SHDW1H	SHDW	0.9686	0.9744
Hornsedale Wind Farm Stage 2	275	HDWF2	SHDW2H	SHDW	0.9686	0.9744
Hornsedale Wind Farm Stage 3	275	HDWF3	SHDW3H	SHDW	0.9686	0.9744
Hornsedale Battery (Generation)	275	HPRG1	SMTL1H	SMTL	0.9826	0.9771
Hornsedale Battery (Load)	275	HPRL1	SMTL2H	SMTL	0.9831	0.9853
Ladbroke Grove PS Unit 1	132	LADBROK1	SPEW1	SPEW	0.9884	0.9474
Ladbroke Grove PS Unit 2	132	LADBROK2	SPEW2	SPEW	0.9884	0.9474
Lake Bonney Wind Farm	33	LKBONNY1	SMAY1	SMAY	0.9643	0.9144
Lake Bonney Wind Farm Stage 2	33	LKBONNY2	SMAY2	SMAY	0.9643	0.9144
Lake Bonney Wind Farm Stage 3	33	LKBONNY3	SMAY3W	SMAY	0.9643	0.9144
Mintaro PS	132	MINTARO	SMPS	SMPS	0.9787	0.9942
Mt Millar Wind Farm	33	MTMILLAR	SMTM1	SMTM	0.8911	0.9055
North Brown Hill Wind Farm	275	NBHWF1	SBEL1A	SBEL	0.9701	0.9674
O.C.P.L. Unit 1	66	OSB-AG	SNBN1	SOCP	0.9997	0.9992
Pelican Point PS	275	PPCCGT	SPPT	SPPT	0.9984	1.0005
Port Lincoln 3	33	POR03	SPL31P	SPL3	0.9559	1.0383
Port Lincoln PS	132	POR01	SPLN1	SPTL	0.9526	0.9691
Quarantine PS Unit 1	66	QPS1	SQPS1	SQPS	0.9962	0.9854
Quarantine PS Unit 2	66	QPS2	SQPS2	SQPS	0.9962	0.9854
Quarantine PS Unit 3	66	QPS3	SQPS3	SQPS	0.9962	0.9854
Quarantine PS Unit 4	66	QPS4	SQPS4	SQPS	0.9962	0.9854
Quarantine PS Unit 5	66	QPS5	SQPS5Q	SQPS	0.9962	0.9854
Snowtown WF Stage 2 – North	275	SNOWNTH1	SBLWS1	SBLW	0.9719	0.9813
Snowtown WF Stage 2 – South	275	SNOWSTH1	SBLWS2	SBLW	0.9719	0.9813
Snowtown Wind Farm	33	SNOWTWN1	SNWF1T	SNWF	0.9091	0.9203
Snuggery PS Units 1 to 3	132	SNUG1	SSGA1	SSPS	0.9405	0.9325
Tailem Bend SF	132	TBSF1	STBS1T	STBS	1.0086	0.9973
The Bluff Wind Farm	275	BLUFF1	SBEL2P	SBEL	0.9701	0.9674
Torrens Island PS A Unit 1	275	TORRA1	STSA1	STPS	0.9993	1.0009
Torrens Island PS A Unit 2	275	TORRA2	STSA2	STPS	0.9993	1.0009
Torrens Island PS A Unit 3	275	TORRA3	STSA3	STPS	0.9993	1.0009
Torrens Island PS A Unit 4	275	TORRA4	STSA4	STPS	0.9993	1.0009
Torrens Island PS B Unit 1	275	TORRB1	STSB1	STPS	0.9993	1.0009
Torrens Island PS B Unit 2	275	TORRB2	STSB2	STPS	0.9993	1.0009
Torrens Island PS B Unit 3	275	TORRB3	STSB3	STPS	0.9993	1.0009
Torrens Island PS B Unit 4	275	TORRB4	STSB4	STPS	0.9993	1.0009
Torrens Island PS Load	66	TORN1	STSYL	STSY	1.0000	1.0000

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Waterloo Wind Farm	132	WATERLWF	SWLE1R	SWLE	0.9696	0.9712
Wattle Point Wind Farm	132	WPWF	SSYP1	SSYP	0.8130	0.8279
Willogoleche Wind Farm	275	WGW1	SWGL1W	SWGL	0.9797	0.9689

Table 14 South Australia embedded generation

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Amcors Glass UN 1	11	AMCORGR	SRSW1E	SRSW	1.0092	1.0090
Angaston Power Station	33	ANGAST1	SDRN1	SANG	0.9539	1.0087
Blue Lake Milling	33	BLULAKE1	SKET2B	SKET	1.0336	0.9952
Bolivar WWT Plant	66	BOLIVAR1	SPGW1B	SPGW	1.0011	1.0030
Canunda Wind Farm	33	CNUNDAWF	SSNN1	SCND	0.9804	0.9237
Cummins Lonsdale PS	66	LONSDALE	SMVE1	SMVE	1.0065	1.0068
Morphett Vale East 66 (Generation)	66	SATGS1	SMVG1L	SMVG	1.0059	1.0061
Para 66 (Generation)	66	SATGN1	SPAG1E	SPAG	1.0012	0.9971
Pt Stanvac PS	66	PTSTAN1	SMVE3P	SMVE	1.0065	1.0068
Starfish Hill Wind Farm	66	STARHLWF	SMVE2	SMVE	1.0065	1.0068
Tatiara Meat Co	33	TATIARA1	SKET1E	SKET	1.0336	0.9952
Wingfield 1 LFG PS	66	WINGF1_1	SKLB1W	SKLB	1.0000	1.0019
Wingfield 2 LFG PS	66	WINGF2_1	SNBN2W	SNBN	0.9998	0.9997

## 1.5 Tasmania Marginal Loss Factors

Table 15 Tasmania loads

Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Arthurs Lake	6.6	TAL2	0.9884	0.9943
Avoca	22	TAV2	1.0046	1.0140
Boyer SWA	6.6	TBYA	1.0152	1.0227
Boyer SWB	6.6	TBYB	1.0165	1.0239
Bridgewater	11	TBW2	1.0254	1.0233
Burnie	22	TBU3	0.9839	0.9857
Chapel St.	11	TCS3	1.0174	1.0231
Comalco	220	TCO1	1.0006	1.0006
Creek Road	33	TCR2	1.0174	1.0232
Derby	22	TDE2	0.9596	0.9647
Derwent Bridge	22	TDB2	0.9255	0.9386
Devonport	22	TDP2	0.9875	0.9885
Electrona	11	TEL2	1.0298	1.0360
Emu Bay	11	TEB2	0.9805	0.9832
Fisher (Rowallan)	220	TF1	0.9677	0.9660
George Town	22	TGT3	1.0022	1.0025
George Town (Basslink)	220	TGT1	1.0000	1.0000



Location	Voltage (kV)	TNI	2019-20 MLF	2018-19 MLF
Gordon	22	TGO2	0.9970	1.0024
Greater Hobart Area VTN		TVN1	1.0183	1.0236
Hadspen	22	THA3	0.9941	0.9967
Hampshire	110	THM2	0.9789	0.9819
Huon River	11	THR2	1.0253	1.0380
Kermandie	11	TKE2	1.0335	1.0399
Kingston	33	TK13	1.0222	1.0290
Kingston	11	TKI2	1.0245	1.0306
Knights Road	11	TKR2	1.0359	1.0433
Lindisfarne	33	TLF2	1.0189	1.0237
Meadowbank	22	TMB2	0.9823	0.9938
Mornington	33	TMT2	1.0210	1.0239
Mowbray	22	TMY2	0.9932	0.9955
New Norfolk	22	TNN2	1.0105	1.0179
Newton	22	TNT2	0.9712	0.9773
Newton	11	TNT3	0.9592	0.9552
North Hobart	11	TNH2	1.0165	1.0224
Norwood	22	TNW2	0.9928	0.9951
Palmerston	22	TPM3	0.9798	0.9847
Port Latta	22	TPL2	0.9563	0.9604
Que	22	TQU2	0.9710	0.9743
Queenstown	11	TQT3	0.9621	0.9635
Queenstown	22	TQT2	0.9619	0.9629
Railton	22	TRA2	0.9884	0.9900
Risdon	33	TRI4	1.0185	1.0245
Risdon	11	TRI3	1.0211	1.0257
Rokeby	11	TRK2	1.0212	1.0259
Rosebery	44	TRB2	0.9747	0.9750
Savage River	22	TSR2	1.0007	0.9938
Scottsdale	22	TSD2	0.9717	0.9731
Smithton	22	TST2	0.9401	0.9482
Sorell	22	TSO2	1.0274	1.0317
St Leonard	22	TSL2	0.9926	0.9947
St. Marys	22	TSM2	1.0204	1.0284
Starwood	110	TSW1	1.0010	1.0011
Tamar Region VTN		TVN2	0.9943	0.9965
Temco	110	TTE1	1.0039	1.0043
Trevallyn	22	TTR2	0.9939	0.9961
Triabunna	22	TTB2	1.0385	1.0454
Tungatinah	22	TTU2	0.9284	0.9396
Ulverstone	22	TUL2	0.9836	0.9879
Waddamana	22	TWA2	0.9465	0.9617
Wayatinah	11	TWY2	0.9948	1.0006
Wesley Vale	22	TWV2	0.9879	0.9867

**Table 16 Tasmania generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Basslink (George Town)	220	BLNKTAS	TGT11	TGT1	1.0000	1.0000
Bastyan	220	BASTYAN	TFA11	TFA1	0.9434	0.9410
Bell Bay No.3	110	BBTHREE1	TBB11	TBB1	0.9994	1.0003
Bell Bay No.3	110	BBTHREE2	TBB12	TBB1	0.9994	1.0003
Bell Bay No.3	110	BBTHREE3	TBB13	TBB1	0.9994	1.0003
Bluff Point and Studland Bay Wind Farms	110	WOOLNTH1	TST11	TST1	0.8892	0.8952
Butlers Gorge	110	BUTLERSG	TBG11	TBG1	0.9236	0.9350
Catagunya	220	LI_WY_CA	TLI11	TLI1	0.9919	0.9977
Cethana	220	CETHANA	TCE11	TCE1	0.9648	0.9628
Cluny	220	CLUNY	TCL11	TCL1	0.9946	1.0019
Devils gate	110	DEVILS_G	TDG11	TDG1	0.9687	0.9692
Fisher	220	FISHER	TFI11	TFI1	0.9677	0.9660
Gordon	220	GORDON	TGO11	TGO1	0.9578	0.9868
John Butters	220	JBUTTERS	TJB11	TJB1	0.9358	0.9365
Lake Echo	110	LK_ECHO	TLE11	TLE1	0.9352	0.9385
Lemonthyme	220	LEM_WIL	TSH11	TSH1	0.9686	0.9701
Liapootah	220	LI_WY_CA	TLI11	TLI1	0.9919	0.9977
Mackintosh	110	MACKNTSH	TMA11	TMA1	0.9333	0.9282
Meadowbank	110	MEADOWBK	TMB11	TMB1	0.9698	0.9773
Musselroe	110	MUSSELR1	TDE11M	TDE1	0.9094	0.9105
Paloona	110	PALOONA	TPA11	TPA1	0.9690	0.9771
Poatina	220	POAT220	TPM11	TPM1	0.9831	0.9912
Poatina	110	POAT110	TPM21	TPM2	0.9699	0.9799
Reece No.1	220	REECE1	TRCA1	TRCA	0.9296	0.9350
Reece No.2	220	REECE2	TRCB1	TRCB	0.9306	0.9264
Repulse	220	REPULSE	TCL12	TCL1	0.9946	1.0019
Rowallan	220	ROWALLAN	TFI12	TFI1	0.9677	0.9660
Tamar Valley CCGT	220	TVCC201	TTV11A	TTV1	1.0000	1.0000
Tamar Valley OCGT	110	TVPP104	TBB14A	TBB1	0.9994	1.0003
Tarraleah	110	TARRALEA	TTA11	TTA1	0.9270	0.9405
Trevallyn	110	TREVALLN	TTR11	TTR1	0.9896	0.9909
Tribute	220	TRIBUTE	TTI11	TTI1	0.9372	0.9377
Tungatinah	110	TUNGATIN	TTU11	TTU1	0.8991	0.9184
Wayatinah	220	LI_WY_CA	TLI11	TLI1	0.9919	0.9977
Wilmot	220	LEM_WIL	TSH11	TSH1	0.9686	0.9701

**Table 17 Tasmania embedded generation**

Location	Voltage (kV)	DUID	Connection Point ID	TNI	2019-20 MLF	2018-19 MLF
Midlands PS	22	MIDLDP51	TAV21M	TAV2	1.0046	1.0140
Remount	22	REMOUNT	TMY21	TVN2	0.9943	0.9965

## 2. Changes in Marginal Loss Factors

Year-on-year changes in MLF are driven by projected changes in the National Electricity Market (NEM). These changes fall into two main categories:

1. Changes to the impedance of the transmission network caused by augmentation of the transmission network, such as building new transmission lines.
  - If augmentations decrease the impedance of the transmission network between a connection point and the regional reference node (RRN), then the MLF for the connection point will move closer to 1.0.
2. Changes to projected power flows over the transmission network that are caused by projected changes to power system demand and generation, including building new power stations, retirement of power stations, and revised electricity consumption forecasts.
  - If the projected power flow from a connection point to the RRN increases, then the MLF for that connection point will decrease. If the projected power flow from a connection point to the regional reference node decreases, then the MLF for that connection point will increase.

Changes between the 2018-19 MLFs and the 2019-20 MLFs are mainly due to changes in projected power flow over the transmission network. The key driver for these changes is a large increase in generation connections to the NEM, particularly in Victoria, New South Wales and Queensland. The modelling for the 2019-20 MLFs includes 47 new connections providing approx. 5,600 MW of new capacity.

As more generation is connected to electrically weak areas of the network that are remote from the regional reference node, then the MLFs in these areas will continue to decline.

AEMO's final report, which will be published on 1 April 2019, will provide further detail.

# A1. 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.

## A1.1 Marginal Loss Factors calculation methodology

AEMO uses a forward-looking loss factor (FLLF) methodology (Methodology)<sup>2</sup> for calculating MLFs. 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 section 5.5 of the Methodology.
- Calculate the MLFs using the resulting power flows in the transmission network.

## A1.2 Load data requirements for the Marginal Loss Factors calculation

The annual energy targets used in load forecasting for the 2019-20 MLF calculation are in the table below.

Region	2019-20 forecast sent-out energy (GWh)	2018-19 forecast sent-out energy (GWh)
NSW	66,441	66,727
Victoria	43,184	42,828
Queensland	49,363	50,742
South Australia	11,834	11,949
Tasmania	10,412	10,421

### A1.2.1 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

<sup>2</sup> Forward Looking Transmission Loss Factors (Version 7), at [https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security\\_and\\_Reliability/Loss\\_Factors\\_and\\_Regional\\_Boundaries/2017/Forward-Looking-Loss-Factor-Methodology-v70.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2017/Forward-Looking-Loss-Factor-Methodology-v70.pdf).

<sup>3</sup> Forecast Operational consumption – as sent out. It was sourced from the most recent published Electricity Statement of Opportunities (ESOO). See link <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities>.

<sup>4</sup> Forecast Operational consumption – as sent out. It was sourced from the 2018 National Energy Forecasting Report (NEFR). See link <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities>.

- The demand forecast is consistent with the latest updated Electricity Statement of Opportunities (ESOO)
- 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.
- Industrial and auxiliary type loads are not scaled with residential drivers.

## A1.3 Generation data requirements for the Marginal Loss Factors calculation

AEMO obtains historical 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 2017 to 30 June 2018 from its settlements database.

AEMO also obtains the following data:

- Generation capacity data from Generation Information Page published in January 2019.
- Historical generation availability, as well as on-line and off-line status data from AEMO's Market Management System (MMS).
- Future generation availability based on most recent MT PASA data, as of 15 January, as a trigger for initiating discussions with participants with the potential to use an adjusted generation profile for the loss factor calculation.

### A1.3.1 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.

The following committed generation was included in the modelling, but AEMO does not publish MLFs for connections that are not yet registered:

- Queensland new generating units
  - Brigalow Solar Farm
  - Chinchilla Solar Farm
  - Clermont Solar Farm
  - Emerald Solar Park
  - Rugby Run Solar Farm
  - Teebar Solar Farm
  - Warwick Solar Farm
  - Yarranlea Solar
- NSW and ACT new generating units
  - Beryl Solar Farm
  - Crudine Ridge Solar Farm
  - Darlington Point Solar Farm
  - Finley Solar Farm
  - Limondale Solar Plant 1

- Limondale Solar Plant 1
- Nevertire Solar Farm
- Sunraysia Solar Farm
- Victoria new generating units
  - Berrybank Wind Farm
  - Bulgana Green Power Hub Battery
  - Bulgana Green Power Hub Wind Farm
  - Cherry Tree Wind Farm
  - Cohuna Solar Farm
  - Karadoc Solar Farm
  - Kiamal Solar Farm Stage 1
  - Lal Lal Wind Energy System – Elaine
  - Lal Lal Wind Energy System – Yendon
  - Moorabool Wind Farm
  - Murra Warra Wind Farm
  - Numurkah Solar Farm
  - Stockyard Hill Wind Farm
- South Australia new generating units
  - Barker Inlet PS
  - Lake Bonney BESS – Generation
- Tasmania new generating units
  - Granville Harbour Wind Farm
  - Wild Cattle Hill Wind Farm

### A1.3.2 Abnormal generation patterns

AEMO has adjusted a number of generation profiles for the 2019-20 MLF calculation in accordance with section 5.5.6 of the Methodology. This is due to changes in physical circumstances such as:

- Reduction in fuel availability.
- Outages greater than 30 continuous days.
- Reduction in rainfall and water storage levels.

Hydro Tasmania requested an update to forecast generation profiles in accordance with section 5.9 of the Methodology based on new developments.

AEMO has used the adjusted generation profiles to replace historical profiles as an input to the 2019-20 MLF calculation process. AEMO has endeavoured to ensure that the 2018-19 MLF calculation represents the expected system conditions, and has made corresponding adjustments to historical Basslink flows in accordance with section 5.3.1 of the Methodology.

## A1.4 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 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 2019-20 financial year. The snapshot is thus representative of the 2019-20 normally-operating power system.

### A1.4.1 Network augmentation for 2019-20

Relevant Transmission Network Service Providers (TNSPs) advised of the following network augmentations in 2019-20:

#### **Queensland network augmentations**

Powerlink provided the following list of planned network augmentations in 2019-20 in Queensland:

- Rebuild of Mackay Substation.
- Rebuild of Gin Gin Substation.

#### **New South Wales network augmentations**

New South Wales NSPs provided the following list of planned network augmentations in 2019-20 in NSW:

- Decommissioning of Upper Tumut – Canberra 330 kV line.
- Decommissioning of Upper Tumut – Stockdill 330 kV.
- Installation of new Stockdill – Canberra 330 kV line.
- Installation of new Stockdill – Williamsdale 330 kV line.
- Decommissioning of Canberra – Woden 132 kV line.
- Installation of new Canberra – Stockdill 132 kV line.
- Installation of new Stockdill – West Belconnen 132 kV line.
- Installation of new West Belconnen – Woden 132 kV line.
- Installation of new Stockdill 330/132 kV transformer.
- Replacement of Mason Park – Homebush feeder 90L.

#### **Victoria network augmentations**

AEMO's Victorian Planning Group provided the following list of planned network augmentations in 2019-20 in Victoria:

- Replacement of South Morang 330/220 kV Transformer.
- RTS Redevelopment.
- Ringwood RWTS B4 Transformer.

#### **South Australia network augmentations**

ElectraNet provided the following list of planned network augmentations in 2019-20 in South Australia:

- Upgrading of Davenport – Robertstown 275 kV lines.
- Installation of new Mount Gunson – Davenport – Pimba 132 kV line.
- Upgrading of Davenport – Robertstown 275 kV lines.
- Upgrading on Mount Gambier – South East 132 kV line.
- Upgrading on North West Bend – Monash 132 kV line.
- Upgrading of Para – Tungkillo 275 kV line.
- Implementation of automated voltage control in Eyre and Upper North regions.
- Implementation of new Murraylink Control Scheme.
- Upgrading of TIPS – Cherry Gardens 275 kV line.
- Upgrading of TIPS – Magill 275 kV line.
- Upgrading of Kincaig – Penola West 132 kV line.

### **Tasmania network augmentations**

TasNetworks provided the following list of planned network augmentations in 2019-20 in Tasmania:

- Decommissioning of Waddamana – Bridgewater Junction 110 kV line.
- Replacement of Lindisfarne Substation Transformer.
- Upgrading of Rosebery Substation Transformer Rating.
- Revised Newton 110 kV Arrangement.

#### **A1.4.2 Treatment of Basslink interconnector**

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

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.

The inter-regional loss factor equation for the Basslink will be published by 1st April 2019.

#### **A1.4.3 Treatment of 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.

The inter-regional loss factor equation for the Terranora will be published by 1st April 2019.

#### **A1.4.4 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.

The inter-regional loss factor equation for the Murraylink will be published by 1st April 2019.

#### **A1.4.5 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 2019-20 will differ from the historical switching pattern for Yallourn Unit 1.



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.

## A1.5 Interconnector capacity

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 as to 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	1,030	1,030	1,030	1,030
NSW	Queensland	400	550	400	550
NSW	Victoria	1,700 minus Murray Generation	1,700 minus Murray Generation	1,700 minus Murray Generation	1,700 minus Murray Generation
Victoria	NSW	3,200 minus Upper & Lower Tumut Generation	3,000 minus Upper & Lower Tumut Generation	3,200 minus Upper & Lower Tumut Generation	3,000 minus Upper & Lower Tumut Generation
Victoria	South Australia*	650	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 minus Northwest Bend & Berri loads	198 minus Northwest Bend & Berri loads	215 minus Northwest Bend & Berri loads	215 minus Northwest Bend & Berri loads
Queensland (Terranora)	NSW (Terranora)	224	224	224	224
NSW (Terranora)	Queensland (Terranora)	107	107	107	107
Tasmania (Basslink)	Victoria (Basslink)*	594	594	594	594
Victoria (Basslink)	Tasmania (Basslink)*	478	478	478	478

\* 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 7.00 am to 10.00 pm on weekdays.

## A1.6 Calculation of Marginal Loss Factors

AEMO uses the TPRICE<sup>5</sup> software to calculate MLFs using the following method:

- Convert 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.
- Adjust the load flow case to ensure a reasonable voltage profile in each region at times of high demand.
- Convert the load flow case into a format suitable for use in TPRICE.

<sup>5</sup> 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.

- Feed into TPRICE, one trading interval at a time, the half-hourly generation and load data for each connection point, generating unit capacity and availability data, with interconnector data. TPRICE allocates the load and generation values to the appropriate connection points in the load flow case.
- TPRICE iteratively dispatches generation to meet forecast demand and solves each half-hourly load flow case subject to the rules in section 5.5.2 of the Methodology, and calculates the loss factors appropriate to the load flow conditions.
- Refer the loss factors at each connection point in each region are referred to the Regional Reference Node (RRN).
- Average 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.

#### A1.6.1 Marginal Loss Factor calculation quality control

As with previous years, AEMO has 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 will utilise 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 will utilise the verification study to ensure that AEMO MLF calculation methods and results are accurate.

# 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 Identity
TNSP	Transmission Network Service Provider
VTN	Virtual Transmission Node