



Updated Regions and Marginal Loss Factors: FY 2019-20

July 2020

A report for the National Electricity Market

Important notice

PURPOSE

This document has been prepared by AEMO as the 'Regions Publication' under clause 2A.1.3 of the National Electricity Rules (Rules), and to inform Registered Participants of the 2019-20 inter-regional loss equations under clause 3.6.1 of the Rules and 2019-20 intra-regional loss factors under clause 3.6.2 of the Rules. This document has effect only for the purposes set out in the Rules. The National Electricity Law (Law) and the Rules prevail over this document to the extent of any inconsistency.

DISCLAIMER

The calculation of the loss factors presented in this document incorporates information and forecasts from third parties. AEMO has made every reasonable effort to ensure the quality of the information in this publication but cannot guarantee that any information, forecasts and assumptions are accurate, complete or appropriate for your circumstances.

Explanatory information in this document does not constitute legal or business advice, and should not be relied on as a substitute for obtaining detailed and specific advice about the Law, the Rules, any other applicable laws, procedures or policies or the future development of the National Electricity Market power system.

Accordingly, to the maximum extent permitted by law, AEMO and its officers, employees and consultants involved in the preparation of this document:

- make no representation or warranty, express or implied, as to the currency, accuracy, reliability or completeness of the information in this document; and
- are not liable (whether by reason of negligence or otherwise) for any statements or representations in this document, or any omissions from it, or for any use or reliance on the information in it.

COPYRIGHT

© 2019 Australian Energy Market Operator Limited. The material in this publication may be used in accordance with [the copyright permissions on AEMO's website](#).

VERSION CONTROL

| Version | Release date | Changes |
|---------|--------------|---|
| 1 | 29/3/2019 | Draft 2019-20 MLFs published. |
| 2 | 1/4/2019 | Updated draft 2019-20 MLFs published, AEMO deferred the publication of final 2019-20 MLFs to allow proponents to revise profiles. |
| 3 | 10/5/2019 | Final 2019-20 MLFs published including revision of profiles for 29 generators. |
| 4 | 21/6/2019 | Updated final 2019-20 MLFs published following further review of generation modelling. |
| 5 | 21/4/2020 | April 2020 including the following new and revised connection points: <ul style="list-style-type: none">• QLD Generation: Marryrough Solar Farm (Brigalow Solar Farm), Yarranlea Solar Farm, Oakey 2 Solar Farm |

| Version | Release date | Changes |
|---------|--------------|--|
| | | <ul style="list-style-type: none"> • NSW Generation: Bomen Solar Farm, Eastern Creek 2, Finley Solar Farm, Limondale Solar Plant 2, Narrowmine Solar Farm, Nevertire Solar Farm, South Keswick Solar Farm, Teralba Power station, Wilga Park A, Wilga Park B • NSW Load: Newcastle, Tomago (132kV) (and removed inactive connection points Alcan, Beresfield, Kuri 11kV, 33kV and 132kV), Buronga, Grafton East 132, holroy (Ausgrid), Tumut 66 (Ausnet DNSP), Potts Hill (132kV, 11kV), Chullora, Rockwood Road, Narrabri. • VIC Generation: Elaine Wind Farm • TAS Generation: Granville Harbour Wind Farm, Wild Cattle Hill Wind Farm |
| 6 | 22/7/2020 | <p>July 2020 including the following new and revised connection points:</p> <ul style="list-style-type: none"> • NSW Generation: Gullen Range 2 Wind Farm, Goonumbla Solar Farm, Parkes Solar Farm, Limondale Solar Plant 1 • VIC Generaion: Bulgana Green Power Hub, Cherry Tree Wind Farm • SA: Hornsdale Battery |

Introduction

This document sets out the updated 2019-20 National Electricity Market (NEM) intra-regional loss factors, commonly referred to as marginal loss factors (MLFs), calculated under clause 3.6.2 of the National Electricity Rules (NER).

As well as MLFs, this document includes the 2019-20 NEM inter-regional loss factor equations and loss equations (NER clause 3.6.1) and restates the following information published on 1 April 2019 related to NEM regions:

- Virtual transmission nodes (VTNs).
- Connection point transmission node identifiers (TNIs).
- Regions, regional reference nodes (RRNs), and region boundaries.

Loss factors apply for 2019-20 only, and should not be relied on as an indicator for future years. AEMO continues to work with participants and the Australian Energy Market Commission (AEMC) to identify efficient short and longer-term solutions to manage the impact of potentially volatile MLFs in the rapidly changing NEM, in the interests of electricity consumers.

Marginal loss factors in a transforming NEM

The NEM continues to transform, driven by new technology, a changing generation mix, and rapidly developing areas of high renewable energy penetration. This transformation is leading to large year-on-year changes in MLFs calculated under the current regulatory framework and methodology.

In many locations, MLFs have fallen by large margins, and this in turn has material financial implications for existing and intending market participants.

AEMO is actively engaged with industry and the AEMC on options to minimise these impacts of current rules, both in the relatively short term and in the longer term through appropriate amendments to the National Electricity Rules (NER):

- AEMO continues to support the work program currently being progressed by the AEMC that will consider why and how losses in the NEM are changing and what measures may be introduced to make these changes more manageable for generators. This will include consideration of two rule change requests from Adani Renewables which deal with issues related to the existing MLF framework in the NER and how this might be improved.
- In the longer term, the AEMC is progressing a work program to examine how generation and transmission investment may be more effectively coordinated, including how generators gain access to the transmission network. This longer-term work program is taking a more holistic view of issues related to losses.

The large year-on-year changes in MLFs demonstrate the ongoing need for comprehensive planning of both generation and transmission to minimise costs to consumers. All-of-system planning documents, such as the 2018 Integrated System Plan (ISP), are critical in the provision of information to participants regarding the needs and changes to the power system.

MLFs reflect the quality of input assumptions

After publishing the initial draft 2019-20 MLFs on 8 March 2019, AEMO received substantial and credible new information on the status of several committed projects which did not align with the information that AEMO had considered when calculating the draft loss factors. This meant the draft MLFs were unlikely to reflect

actual marginal losses between the regional reference node and each transmission connection point in many parts of the network. Given the potential materiality of this new information for MLF calculations, and after informing the Australian Energy Regulator (AER), AEMO considered it necessary to defer finalisation of the 2019-20 MLFs beyond the normal 1 April publication date. This allowed AEMO to seek confirmation of the most up to date generation profiles for relevant projects from proponents.

In April 2019, AEMO wrote to proponents requesting updates on the status and commissioning timelines for 46 generation projects, and received advice that the generation profile of 29 projects needed to be revised. AEMO subsequently completed the assessment of MLFs for 2019-20 using this updated information and published them in May 2019.

In June 2019, AEMO discovered that some generators in the original 2019-20 MLF calculations, as published in May, were modelled with incorrect generation profiles. To ensure MLFs are as accurate as possible, AEMO completed a full review of how generation is modelled in the MLF calculation so that the calculation conforms with the Forward-Looking Transmission Loss Factors (FLLF) methodology. AEMO has now recalculated the 2019-20 MLFs and is updating them in this document, which replaces the version published in May.

Observations and trends

MLFs represent electrical transmission losses within each of the five regions in the NEM – Queensland, New South Wales, Victoria, South Australia, and Tasmania.

In general, MLFs have declined between 2018-19 and 2019-20. The main changes in regional loss factors are, in summary:

- Reduction in MLFs at connection points in central and northern Queensland.
- A very large reduction in MLFs at connection points in south-west New South Wales, with a moderate reduction in the Australian Capital Territory and Snowy subregions, and a moderate increase in northern New South Wales.
- A very large reduction in MLFs at connection points in north-west Victoria, a moderate reduction in central Victoria, and a small increase in MLFs at connection points in northern Victoria.
- Increase in MLFs at connection points in the south-east and Riverland area in South Australia.
- A general decrease in MLFs at connection points in Tasmania.

Changes between the 2018-19 MLFs and the 2019-20 MLFs are mainly driven by the large volume of new generation projects connecting to the NEM. Of the 46 new generator connections considered, 13 are registered and the remaining 33 are included in the 2019-20 MLF study due to their committed¹ status, representing approximately 4,500 megawatts (MW) of new capacity that is being considered for the first time.

New generation is increasingly connecting at the periphery of the transmission network, including north-west Victoria, south-west New South Wales, and north and central Queensland. In these areas, access to renewable resources is good, yet the network is electrically weak and remote from the regional reference node. This additional generation has resulted in a large reduction in MLFs in these areas.

The reduction in MLFs is exacerbated by the high correlation in generation profiles, where new generation tends to be running at the same time as other nearby generators, as well as during periods of light load in the area.

AEMO applied a number of quality assurance steps when calculating the 2019-20 MLFs. This included engaging an independent consultant to perform a two-step parallel MLF calculation to identify and resolve issues and ensure outcomes are consistent with the FLLF methodology. The consultant is satisfied that AEMO is appropriately applying the published FLLF methodology based on the data provided by market participants, historical market data and AEMO's electricity consumption forecasts. AEMO also engaged a consultant to carry out due diligence on the profiles of new generation projects.

¹ Committed refers to the new development status as published in the latest Generation information page, at <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information>.

Contents

| | |
|---|-----------|
| Introduction | 4 |
| 1. Marginal Loss Factors by region | 9 |
| 1.1 Queensland Marginal Loss Factors | 9 |
| 1.2 New South Wales Marginal Loss Factors | 18 |
| 1.3 Victoria Marginal Loss Factors | 30 |
| 1.4 South Australia Marginal Loss Factors | 37 |
| 1.5 Tasmania Marginal Loss Factors | 43 |
| 2. Changes in Marginal Loss Factors | 47 |
| 2.1 MLFs in the NEM | 47 |
| 2.2 Reasons why MLFs change | 47 |
| 2.3 Changes between 2018-19 MLF and 2019-20 MLF | 48 |
| 3. Inter-regional loss factor equations | 54 |
| 4. Inter-regional loss equations | 57 |
| 5. Basslink, Terranora, Murraylink loss equations | 60 |
| 5.1 Basslink | 60 |
| 5.2 Murraylink | 61 |
| 5.3 Terranora | 62 |
| 6. Proportioning of inter-regional losses to regions | 64 |
| 7. Regions and regional reference nodes | 65 |
| 7.1 Regions and Regional Reference Nodes | 65 |
| 7.2 Region boundaries | 65 |
| 8. Virtual transmission nodes | 67 |
| 8.1 New South Wales Virtual Transmission Nodes | 67 |
| 8.2 South Australia Virtual Transmission Nodes | 67 |
| 8.3 Tasmania Virtual Transmission Nodes | 68 |
| A1. Background to marginal loss factors | 69 |
| A1.1 Rules requirements | 69 |
| A1.2 Application of Marginal Loss Factors | 69 |
| A2. Methodology, inputs and assumptions | 71 |
| A2.1 Marginal Loss Factors calculation methodology | 71 |
| A2.2 Load data requirements for the Marginal Loss Factors calculation | 71 |
| A2.3 Generation data requirements for the Marginal Loss Factors calculation | 72 |
| A2.4 Network representation in the Marginal Loss Factors calculation | 76 |

| | | |
|------------|---|-----------|
| A2.5 | Interconnector capacity | 78 |
| A2.6 | Calculation of Marginal Loss Factors | 79 |
| A3. | Impact of highly correlated generation profiles on MLF | 80 |
| | Glossary | 81 |

Tables

| | | |
|----------|---|----|
| Table 1 | Queensland loads | 9 |
| Table 2 | Queensland generation | 13 |
| Table 3 | Queensland embedded generation | 16 |
| Table 4 | New South Wales loads | 18 |
| Table 5 | New South Wales generation | 23 |
| Table 6 | New South Wales embedded generation | 26 |
| Table 7 | ACT loads | 28 |
| Table 8 | ACT generation and embedded generation | 29 |
| Table 9 | Victoria loads | 30 |
| Table 10 | Victoria generation | 32 |
| Table 11 | Victoria embedded generation | 34 |
| Table 12 | South Australia loads | 37 |
| Table 13 | South Australia generation | 39 |
| Table 14 | South Australia embedded generation | 41 |
| Table 15 | Tasmania loads | 43 |
| Table 16 | Tasmania generation | 45 |
| Table 17 | Tasmania embedded generation | 46 |
| Table 18 | South Pine 275 referred to Sydney West 330 MLF versus New South Wales to Queensland flow coefficient statistics | 55 |
| Table 19 | Sydney West 330 referred to Thomastown 66 MLF versus Victoria to New South Wales flow coefficient statistics | 56 |
| Table 20 | Torrens Island 66 referred to Thomastown 66 MLF versus Victoria to South Australia flow coefficient statistics | 56 |
| Table 21 | Regression statistics for Murraylink | 61 |
| Table 22 | Regression statistics for Terranora | 62 |
| Table 23 | Factors for inter-regional losses | 64 |
| Table 24 | Regions and Regional Reference Nodes | 65 |
| Table 25 | New South Wales Virtual Transmission Nodes | 67 |
| Table 26 | Tasmania Virtual Transmission Nodes | 68 |

Table 27 Forecast energy for 2019-20 71

Table 28 The expected timing of full commercial use as advised to AEMO 74

Table 29 Adjusted generation values for Tasmania 75

Table 30 Interconnector capacity 78

1. Marginal Loss Factors by region

This section shows the intra-regional loss factors, commonly known as marginal loss factors (MLFs), for financial year 2019-20, for every existing load or generation transmission connection point (identified by TNI) in each NEM region. As required by clause 3.6.2 of the NER, these MLFs have been calculated in accordance with AEMO's published FLLF methodology.

The generation profiles for committed but not yet NEM registered projects are included in the MLF calculation, however AEMO does not publish MLFs for connection points relating to projects whose registration has not been completed as at the date of publication. On registration, AEMO will publish MLFs for those connection points. MLF updates and additions that are developed throughout the year will be included in the "2019-20 MLF Applicable from 1 July 2019" spreadsheet which is also published on AEMO's website².

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 | 0.9612 | 0.9656 |
| Algeria | 33 | QALG | 1.0164 | 1.0161 |
| Alligator Creek | 132 | QALH | 0.9560 | 0.964 |
| Alligator Creek | 33 | QALC | 0.9641 | 0.9654 |
| Ashgrove West | 33 | QAGW | 1.0152 | 1.0139 |
| Ashgrove West | 110 | QCBW | 1.0128 | 1.0122 |
| Belmont | 110 | QBMH | 1.0121 | 1.0123 |
| Belmont Wecker Road | 33 | QBBS | 1.0111 | 1.0104 |
| Belmont Wecker Road | 11 | QMOB | 1.0356 | 1.0353 |
| Biloela | 66/11 | QBIL | 0.9100 | 0.9141 |
| Blackstone | 110 | QBKS | 1.0006 | 1.0001 |
| Blackwater | 66/11 | QBWL | 0.9536 | 0.9624 |
| Blackwater | 132 | QBWH | 0.9525 | 0.9621 |

² At <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Loss-factor-and-regional-boundaries>.

| Location | Voltage in kilovolts (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------------------|---------------------------|------|-------------|-------------|
| Bluff | 132 | QBLF | 0.9517 | 0.9608 |
| Bolingbroke | 132 | QBNB | 0.9456 | 0.9486 |
| Bowen North | 66 | QBNN | 0.9411 | 0.9469 |
| Boyne Island | 275 | QBOH | 0.9371 | 0.9411 |
| Boyne Island | 132 | QBOL | 0.9355 | 0.9383 |
| Braemar – Kumbarilla Park | 275 | QBRE | 0.9786 | 0.9764 |
| Bulli Creek (Essential Energy) | 132 | QBK2 | 0.9800 | 0.984 |
| Bulli Creek (Waggamba) | 132 | QBLK | 0.9800 | 0.984 |
| Bundamba | 110 | QBDA | 1.0020 | 1.0013 |
| Burton Downs | 132 | QBUR | 0.9501 | 0.9596 |
| Cairns | 22 | QCRN | 0.9581 | 0.9713 |
| Cairns City | 132 | QCNS | 0.9525 | 0.9682 |
| Callemondah (Rail) | 132 | QCMD | 0.9263 | 0.9314 |
| Calliope River | 132 | QCAR | 0.9257 | 0.9258 |
| Cardwell | 22 | QCDW | 0.9642 | 0.9777 |
| Chinchilla | 132 | QCHA | 0.9844 | 0.983 |
| Clare | 66 | QCLR | 0.9755 | 0.9615 |
| Collinsville Load | 33 | QCOL | 0.9405 | 0.9494 |
| Columboola | 132 | QCBL | 0.9879 | 0.9891 |
| Columboola 132 (Bellevue LNG load) | 132 | QCBB | 0.9909 | 0.9899 |
| Coppabella (Rail) | 132 | QCOP | 0.9623 | 0.969 |
| Dan Gleeson | 66 | QDGL | 0.9628 | 0.9713 |
| Dingo (Rail) | 132 | QDNG | 0.9417 | 0.9538 |
| Duaringa | 132 | QDRG | 0.9476 | 0.9684 |
| Dysart | 66/22 | QDYS | 0.9594 | 0.9629 |
| Eagle Downs Mine | 132 | QEGD | 0.9555 | 0.963 |
| Edmonton | 22 | QEMT | 0.9753 | 0.9847 |
| Egans Hill | 66 | QEGN | 0.9140 | 0.9159 |
| El Arish | 22 | QELA | 0.9771 | 0.9846 |
| Garbutt | 66 | QGAR | 0.9643 | 0.9664 |
| Gin Gin | 132 | QGNG | 0.9557 | 0.9541 |
| Gladstone South | 66/11 | QGST | 0.9301 | 0.9384 |

| Location | Voltage in kilovolts (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|--------------------------|---------------------------|------|-------------|-------------|
| Goodna | 33 | QGDA | 1.0059 | 1.0052 |
| Goonyella Riverside Mine | 132 | QGYR | 0.9697 | 0.9836 |
| Grantleigh (Rail) | 132 | QGRN | 0.9213 | 0.915 |
| Gregory (Rail) | 132 | QGRE | 0.9286 | 0.9423 |
| Ingham | 66 | QING | 1.0375 | 0.9597 |
| Innisfail | 22 | QINF | 0.9695 | 0.9747 |
| Invicta Load | 132 | QINV | 0.9045 | 0.966 |
| Kamerunga | 22 | QKAM | 0.9852 | 0.9844 |
| Kemmis | 66 | QEMS | 0.9631 | 0.9643 |
| King Creek | 132 | QKCK | 0.9469 | 0.9563 |
| Lilyvale | 66 | QLIL | 0.9335 | 0.9451 |
| Lilyvale (Barcaldine) | 132 | QLCM | 0.9658 | 0.9378 |
| Loganlea | 33 | QLGL | 1.0142 | 1.0151 |
| Loganlea | 110 | QLGH | 1.0117 | 1.0116 |
| Mackay | 33 | QMKA | 0.9466 | 0.9556 |
| Middle Ridge (Energex) | 110 | QMRX | 0.9858 | 0.9878 |
| Middle Ridge (Ergon) | 110 | QMRG | 0.9858 | 0.9878 |
| Mindi (Rail) | 132 | QMND | 0.9372 | 0.9425 |
| Molendinar | 110 | QMAR | 1.0137 | 1.0143 |
| Molendinar | 33 | QMAL | 1.0132 | 1.0136 |
| Moranbah (Mine) | 66 | QMRN | 0.9700 | 0.9819 |
| Moranbah (Town) | 11 | QMRL | 0.9639 | 0.9538 |
| Moranbah South (Rail) | 132 | QMBS | 0.9569 | 0.9745 |
| Moranbah Substation | 132 | QMRH | 0.9592 | 0.9709 |
| Moura | 66/11 | QMRA | 0.9419 | 0.948 |
| Mt McLaren (Rail) | 132 | QMTM | 0.9625 | 0.9786 |
| Mudgeeraba | 33 | QMGL | 1.0124 | 1.0169 |
| Mudgeeraba | 110 | QMGB | 1.0121 | 1.0174 |
| Murarie (Belmont) | 110 | QMRE | 1.0133 | 1.013 |
| Nebo | 11 | QNEB | 0.9346 | 0.9394 |
| Newlands | 66 | QNLD | 0.9721 | 0.9831 |
| North Goonyella | 132 | QNGY | 0.9721 | 0.9789 |

| Location | Voltage in kilovolts (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|--|---------------------------|-------|-------------|-------------|
| Norwich Park (Rail) | 132 | QNOR | 0.9464 | 0.9528 |
| Oakey | 110 | QOKT | 0.9833 | 0.9818 |
| Oonooie (Rail) | 132 | QOON | 0.9614 | 0.9651 |
| Orana LNG | 275 | QORH | 0.9805 | 0.9805 |
| Palmwoods | 132 | QPWD | 1.0021 | 1.0025 |
| Pandoin | 132 | QPAN | 0.9160 | 0.9198 |
| Pandoin | 66 | QPAL | 0.9168 | 0.9199 |
| Peak Downs (Rail) | 132 | QPKD | 0.9671 | 0.971 |
| Pioneer Valley | 66 | QPIV | 0.9724 | 0.9623 |
| Proserpine | 66 | QPRO | 0.9680 | 0.9723 |
| Queensland Alumina Ltd (Gladstone South) | 132 | QQAHA | 0.9337 | 0.9381 |
| Queensland Nickel (Yabulu) | 132 | QQNH | 0.9515 | 0.9616 |
| Raglan | 275 | QRGL | 0.9191 | 0.9217 |
| Redbank Plains | 11 | QRPN | 1.0061 | 1.0031 |
| Richlands | 33 | QRLD | 1.0155 | 1.0149 |
| Rockhampton | 66 | QROC | 0.9174 | 0.9134 |
| Rocklands (Rail) | 132 | QRCK | 0.9103 | 0.9164 |
| Rocklea (Archerfield) | 110 | QRLE | 1.0059 | 1.0061 |
| Ross | 132 | QROS | 0.9521 | 0.9625 |
| Runcorn | 33 | QRBS | 1.0175 | 1.0174 |
| South Pine | 110 | QSPN | 1.0042 | 1.0042 |
| Stony Creek | 132 | QSYC | 0.9621 | 0.9723 |
| Sumner | 110 | QSUM | 1.0072 | 1.0071 |
| Tangkam (Dalby) | 110 | QTKM | 0.9848 | 0.9867 |
| Tarong | 66 | QTRL | 0.9756 | 0.9756 |
| Teebar Creek | 132 | QTBC | 0.9728 | 0.9764 |
| Tennyson | 33 | QTNS | 1.0096 | 1.0098 |
| Tennyson (Rail) | 110 | QTNN | 1.0082 | 1.0087 |
| Townsville East | 66 | QTVE | 0.9548 | 0.9669 |
| Townsville South | 66 | QTVS | 0.9599 | 0.9698 |
| Townsville South (KZ) | 132 | QTZS | 1.0037 | 1.0147 |
| Tully | 22 | QTLL | 1.0051 | 0.9516 |

| Location | Voltage in kilovolts (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|-----------------------------|---------------------------|------|-------------|-------------|
| Turkinje | 66 | QTUL | 0.9846 | 0.9966 |
| Turkinje (Craiglie) | 132 | QTUH | 0.9867 | 0.9915 |
| Wandoan South | 132 | QWSH | 0.9977 | 1.0036 |
| Wandoan South (NW Surat) | 275 | QWST | 0.9966 | 1.003 |
| Wandoo (Rail) | 132 | QWAN | 0.9442 | 0.9471 |
| Wivenhoe Pump | 275 | QWIP | 0.9976 | 0.9974 |
| Woolooga (Energex) | 132 | QWLG | 0.9769 | 0.9756 |
| Woolooga (Ergon) | 132 | QWLN | 0.9769 | 0.9756 |
| Woree | 132 | QWRE | 0.9624 | 0.9754 |
| Wotonga (Rail) | 132 | QWOT | 0.9590 | 0.9685 |
| Wycarbah | 132 | QWCB | 0.9137 | 0.9061 |
| Yarwun – Boat Creek (Ergon) | 132 | QYAE | 0.9269 | 0.9282 |
| Yarwun – Rio Tinto | 132 | QYAR | 0.9230 | 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 | 0.8735 | 0.8862 |
| Barron Gorge Power Station (PS) Unit 1 | 132 | BARRON-1 | QBGH1 | QBGH | 0.9144 | 0.9346 |
| Barron Gorge PS Unit 2 | 132 | BARRON-2 | QBGH2 | QBGH | 0.9144 | 0.9346 |
| Braemar PS Unit 1 | 275 | BRAEMAR1 | QBRA1 | QBRA | 0.9702 | 0.9709 |
| Braemar PS Unit 2 | 275 | BRAEMAR2 | QBRA2 | QBRA | 0.9702 | 0.9709 |
| Braemar PS Unit 3 | 275 | BRAEMAR3 | QBRA3 | QBRA | 0.9702 | 0.9709 |
| Braemar Stage 2 PS Unit 5 | 275 | BRAEMAR5 | QBRA5B | QBRA | 0.9702 | 0.9709 |
| Braemar Stage 2 PS Unit 6 | 275 | BRAEMAR6 | QBRA6B | QBRA | 0.9702 | 0.9709 |
| Braemar Stage 2 PS Unit 7 | 275 | BRAEMAR7 | QBRA7B | QBRA | 0.9702 | 0.9709 |
| Callide PS Load | 132 | CALLNL1 | QCAX | QCAX | 0.9024 | 0.9048 |
| Callide A PS Unit 4 | 132 | CALL_A_4 | QCAA4 | QCAA | 0.9022 | 0.9074 |
| Callide A PS Unit 4 Load | 132 | CALLNL4 | QCAA2 | QCAA | 0.9022 | 0.9074 |
| Callide B PS Unit 1 | 275 | CALL_B_1 | QCAB1 | QCAB | 0.9050 | 0.9069 |
| Callide B PS Unit 2 | 275 | CALL_B_2 | QCAB2 | QCAB | 0.9050 | 0.9069 |
| Callide C PS Unit 3 | 275 | CPP_3 | QCAC3 | QCAC | 0.9025 | 0.9080 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Callide C PS Unit 4 | 275 | CPP_4 | QCAC4 | QCAC | 0.9025 | 0.9080 |
| Clare Solar Farm | 132 | CLARESF1 | QCLA1C | QCLA | 0.8596 | 0.8727 |
| Clermont Solar Farm | 132 | CLERMSF1 | QLLV3C | QLLV | 0.8735 | 0.8862 |
| Coopers Gap Wind Farm | 275 | COOPGWF1 | QCPG1C | QCPG | 0.9705 | 0.9742 |
| Darling Downs PS | 275 | DDPS1 | QBRA8D | QBRA | 0.9702 | 0.9709 |
| Darling Downs Solar Farm | 275 | DDSF1 | QBRS1D | QBRS | 0.9822 | 0.9812 |
| Daydream Solar Farm | 33 | DAYDSF1 | QCCK1D | QCCK | 0.8494 | 0.8836 |
| Gladstone PS (132 kV) Unit 3 | 132 | GSTONE3 | QGLD3 | QGLL | 0.9203 | 0.9206 |
| Gladstone PS (132 kV) Unit 4 | 132 | GSTONE4 | QGLD4 | QGLL | 0.9203 | 0.9206 |
| Gladstone PS (132kV) Load | 132 | GLADNL1 | QGLL | QGLL | 0.9203 | 0.9206 |
| Gladstone PS (275 kV) Unit 1 | 275 | GSTONE1 | QGLD1 | QGLH | 0.9223 | 0.9240 |
| Gladstone PS (275 kV) Unit 2 | 275 | GSTONE2 | QGLD2 | QGLH | 0.9223 | 0.9240 |
| Gladstone PS (275 kV) Unit 5 | 275 | GSTONE5 | QGLD5 | QGLH | 0.9223 | 0.9240 |
| Gladstone PS (275 kV) Unit 6 | 275 | GSTONE6 | QGLD6 | QGLH | 0.9223 | 0.9240 |
| Hamilton Solar Farm | 33 | HAMISF1 | QSLD1H | QSLD | 0.8573 | 0.8741 |
| Haughton Solar Farm | 275 | HAUGHT11 | QHAR1H | QHAR | 0.8701 | 0.8623 |
| Hayman Solar Farm | 33 | HAYMSF1 | QCCK2H | QCCK | 0.8494 | 0.8836 |
| Hughenden Solar Farm | 132 | HUGSF1 | QROG2H | QROG | 0.8678 | 0.8842 |
| Kareeya PS Unit 1 | 132 | KAREEYA1 | QKAH1 | QKYH | 0.9296 | 0.9523 |
| Kareeya PS Unit 2 | 132 | KAREEYA2 | QKAH2 | QKYH | 0.9296 | 0.9523 |
| Kareeya PS Unit 3 | 132 | KAREEYA3 | QKAH3 | QKYH | 0.9296 | 0.9523 |
| Kareeya PS Unit 4 | 132 | KAREEYA4 | QKAH4 | QKYH | 0.9296 | 0.9523 |
| Kidston Solar Farm | 132 | KSP1 | QROG1K | QROG | 0.8678 | 0.8842 |
| Kogan Creek PS | 275 | KPP_1 | QBRA4K | QWDN | 0.9711 | 0.9743 |
| Koombooloomba | 132 | KAREEYA5 | QKYH5 | QKYH | 0.9296 | 0.9523 |
| Lilyvale Solar Farm | 132 | LILYSF1 | QBDR1L | QBDR | 0.8692 | 0.8855 |
| Millmerran PS Unit 1 | 330 | MPP_1 | QBCK1 | QMLN | 0.9797 | 0.9812 |
| Millmerran PS Unit 2 | 330 | MPP_2 | QBCK2 | QMLN | 0.9797 | 0.9812 |
| Mount Emerald Wind farm | 275 | MEWF1 | QWKM1M | QWKM | 0.9440 | 0.9515 |
| Mt Stuart PS Unit 1 | 132 | MSTUART1 | QMSP1 | QMSP | 0.9037 | 0.8842 |
| Mt Stuart PS Unit 2 | 132 | MSTUART2 | QMSP2 | QMSP | 0.9037 | 0.8842 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|----------------------------|--------------|------------|---------------------|------|-------------|-------------|
| Mt Stuart PS Unit 3 | 132 | MSTUART3 | QMSP3M | QMSP | 0.9037 | 0.8842 |
| Oakey PS Unit 1 | 110 | Oakey1 | QOKY1 | QOKY | 0.9589 | 0.9562 |
| Oakey PS Unit 2 | 110 | Oakey2 | QOKY2 | QOKY | 0.9589 | 0.9562 |
| Ross River Solar Farm | 132 | RRSF1 | QROG3R | QROG | 0.8678 | 0.8842 |
| Rugby Run Solar Farm | 132 | RUGBYR1 | QMPL1R | QMPL | 0.8709 | 0.8703 |
| Stanwell PS Load | 132 | STANNL1 | QSTX | QSTX | 0.9054 | 0.9104 |
| Stanwell PS Unit 1 | 275 | STAN-1 | QSTN1 | QSTN | 0.9060 | 0.9075 |
| Stanwell PS Unit 2 | 275 | STAN-2 | QSTN2 | QSTN | 0.9060 | 0.9075 |
| Stanwell PS Unit 3 | 275 | STAN-3 | QSTN3 | QSTN | 0.9060 | 0.9075 |
| Stanwell PS Unit 4 | 275 | STAN-4 | QSTN4 | QSTN | 0.9060 | 0.9075 |
| Stapylton | 110 | STAPYLTON1 | QLGH4S | QLGH | 1.0117 | 1.0116 |
| Sun Metals Solar Farm | 132 | SMCSF1 | QTZS1S | QTZS | 1.0037 | 1.0147 |
| Swanbank E GT | 275 | SWAN_E | QSWE | QSWE | 1.0010 | 1.0009 |
| Tarong North PS | 275 | TNPS1 | QTNT | QTNT | 0.9745 | 0.9755 |
| Tarong PS Unit 1 | 275 | TARONG#1 | QTRN1 | QTRN | 0.9748 | 0.9752 |
| Tarong PS Unit 2 | 275 | TARONG#2 | QTRN2 | QTRN | 0.9748 | 0.9752 |
| Tarong PS Unit 3 | 275 | TARONG#3 | QTRN3 | QTRN | 0.9748 | 0.9752 |
| Tarong PS Unit 4 | 275 | TARONG#4 | QTRN4 | QTRN | 0.9748 | 0.9752 |
| Whitsunday Solar Farm | 33 | WHITSF1 | QSL1W | QSL | 0.8573 | 0.8741 |
| Wivenhoe Generation Unit 1 | 275 | W/HOE#1 | QWIV1 | QWIV | 0.9936 | 0.9939 |
| Wivenhoe Generation Unit 2 | 275 | W/HOE#2 | QWIV2 | QWIV | 0.9936 | 0.9939 |
| Wivenhoe Pump 1 | 275 | PUMP1 | QWIP1 | QWIP | 0.9976 | 0.9974 |
| Wivenhoe Pump 2 | 275 | PUMP2 | QWIP2 | QWIP | 0.9976 | 0.9974 |
| Yabulu PS | 132 | YABULU | QTYP | QTYP | 0.9156 | 0.9346 |
| Yarwun PS | 132 | YARWUN_1 | QYAG1R | QYAG | 0.9225 | 0.9245 |

Table 3 Queensland embedded³ generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Baking Board Solar Farm (Chinchilla Solar Farm) | 132 | BAKING1 | QCHS1C | QCHS | 0.9862 | 0.9834 |
| Barcaldine PS – Lilyvale | 132 | BARCALDN | QBCG | QBCG | 0.8873 | 0.9029 |
| Browns Plains Landfill Gas PS | 110 | BPLANDF1 | QLGH3B | QLGH | 1.0117 | 1.0116 |
| Childers Solar Farm | 132 | CHILDSF1 | QTBS1C | QTBS | 0.9532 | 0.9511 |
| Collinsville Solar Farm | 33 | CSPVPS1 | QCOS1C | QCOS | 0.8585 | 0.8719 |
| Columboola – Condamine PS | 132 | CPSA | QCND1C | QCND | 0.9888 | 0.9882 |
| Daandine PS | 110 | DAANDINE | QTKM1 | QTKM | 0.9848 | 0.9867 |
| Emerald Solar Farm | 66 | EMERASF1 | QLIS1E | QLIS | 0.8712 | 0.8778 |
| German Creek Generator | 66 | GERMCRK | QLIL2 | QLIL | 0.9335 | 0.9451 |
| Grosvenor PS At Moranbah 66 No 2 | 66 | GROSV2 | QMRV1G | QMRV | 0.9567 | 0.9683 |
| Grosvenor PS At Moranbah 66 No 1 | 66 | GROSV1 | QMRN2G | QMRV | 0.9567 | 0.9683 |
| Invicta Sugar Mill | 132 | INVICTA | QINV1I | QINV | 0.9045 | 0.9660 |
| Isis CSM | 132 | ICSM | QGNG1I | QTBC | 0.9728 | 0.9764 |
| Longreach Solar Farm | 132 | LRSF1 | QLLV2L | QLLV | 0.8735 | 0.8862 |
| Mackay GT | 33 | MACKAYGT | QMKG | QMKG | 0.9062 | 0.8863 |
| Maryorough Solar Farm (Brigalow Solar Farm) | 110 | MARYRSF1 | QMRY2M | QMRY | 0.9872 | |
| Moranbah Generation | 11 | MORANBAH | QMRL1M | QMRL | 0.9639 | 0.9803 |
| Moranbah North PS | 66 | MBAHNTH | QMRN1P | QMRN | 0.9700 | 0.9819 |
| Oakey 1 Solar Farm | 110 | OAKEY1SF | QTKS1O | QTKS | 0.9824 | 0.9826 |
| Oakey 2 Solar Farm | 110 | OAKEY2SF | QTKS2O | QTKS | 0.9824 | |
| Oaky Creek Generator | 66 | OAKYCREK | QLIL1 | QLIL | 0.9335 | 0.9451 |
| Oaky Creek 2 | 66 | OAKY2 | QLIL3O | QLIL | 0.9335 | 0.9451 |
| Racecourse Mill PS 1 – 3 | 66 | RACOMIL1 | QMKA1R | QPIV | 0.9724 | 0.9623 |
| Rochedale Renewable Energy Plant | 110 | ROCHEDAL | QBMH2 | QBMH | 1.0121 | 1.0123 |
| Rocky Point Gen (Loganlea 110kV) | 110 | RPCG | QLGH2 | QLGH | 1.0117 | 1.0116 |
| Roghan Road Generator | 110 | EDLRGNRD | QSPN2 | QSPN | 1.0042 | 1.0042 |
| Roma PS Unit 7 – Columboola | 132 | ROMA_7 | QRMA7 | QRMA | 0.9759 | 0.9729 |

³ Please note that the breakdown between transmission connected and embedded generation is provided for information purposes only. Please refer to the Distribution Loss Factor publication to determine if a DLF applies, at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2019/Distribution-Loss-Factors-for-the-2019-20-Financial-Year.pdf.

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|--|--------------|----------|---------------------|------|-------------|-------------|
| Roma PS Unit 8 – Columboola | 132 | ROMA_8 | QRMA8 | QRMA | 0.9759 | 0.9729 |
| Southbank Institute Of Technology | 110 | STHBKTEC | QCBD1S | QCBW | 1.0128 | 1.0122 |
| Sunshine Coast Solar Farm | 132 | VALDORA1 | QPWD1S | QPWD | 1.0021 | 1.0025 |
| Susan River Solar Farm | 132 | SRSF1 | QTBS2S | QTBS | 0.9532 | 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 | 0.9846 | 0.9966 |
| Wivenhoe Small Hydro | 110 | WIVENSH | QABR1 | QABR | 1.0043 | 0.9968 |
| Yabulu Steam Turbine (Garbutt 66kV) | 66 | YABULU2 | QGAR1 | QYST | 0.9197 | 0.9495 |
| Yarranlea Solar Farm (effective prior to 25/02/2020) | 110 | YARANSF1 | QMRY1Y | QMRY | 0.9877 | |
| Yarranlea Solar Farm (effective from 25/02/2020) | 110 | YARANSF1 | QMRY1Y | QMRY | 0.9872 | |

1.2 New South Wales Marginal Loss Factors ⁴

Table 4 New South Wales loads

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|--|--------------|------|-------------|-------------|
| Alexandria | 33 | NALX | 1.0040 | 1.0093 |
| Albury | 132 | NALB | 0.9772 | 1.0792 |
| Alcan (effective prior to 09/02/2020) | 132 | NALC | 0.9932 | 0.9932 |
| Alcan (effective from 09/02/2020) | 132 | NALC | 0.9915 | |
| Armidale | 66 | NAR1 | 0.9395 | 0.8957 |
| Australian Newsprint Mill | 132 | NANM | 0.9817 | 1.0810 |
| Balranald | 22 | NBAL | 0.9078 | 1.1047 |
| Beaconsfield North | 132 | NBFN | 1.0034 | 1.0084 |
| Beaconsfield South | 132 | NBFS | 1.0034 | 1.0084 |
| Belmore Park | 132 | NBM1 | 1.0036 | 1.0085 |
| Beresfield (effective prior to 09/02/2020) | 33 | NBRF | 0.9936 | 0.9957 |
| Beresfield (effective from 09/02/2020) | 33 | NBRF | 0.9915 | |
| Beryl | 66 | NBER | 0.9710 | 1.0062 |
| BHP (Waratah) | 132 | NWR1 | 0.9907 | 0.9893 |
| Boambee South | 132 | NWST | 0.9630 | 0.9125 |
| Boggabri East | 132 | NBGE | 0.9897 | 0.9692 |
| Boggabri North | 132 | NBGN | 0.9906 | 0.9692 |
| Brandy Hill | 11 | NBHL | 0.9940 | 0.9935 |
| Broken Hill | 22 | NBKG | 0.8538 | 1.0603 |
| Broken Hill | 220 | NBKH | 0.8349 | 1.0486 |
| Bunnerong | 132 | NBG1 | 1.0032 | 1.0081 |
| Bunnerong | 33 | NBG3 | 1.0056 | 1.0103 |
| Buronga | 220 | NBRG | 0.8698 | |
| Burrinjuck | 132 | NBU2 | 0.9729 | 1.0155 |
| Canterbury | 33 | NCTB | 1.0120 | 1.0136 |
| Carlingford | 132 | NCAR | 1.0010 | 1.0033 |
| Casino | 132 | NCSN | 0.9599 | 0.8960 |

⁴ 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 |
|--|--------------|------|-------------|-------------|
| Charmhaven | 11 | NCHM | 0.9949 | 0.9930 |
| Chullora (effective prior to 05/04/2020) | 132 | NCHU | 1.0021 | 1.0076 |
| Chullora (effective from 05/04/2020) | 132 | NCHU | 1.0024 | |
| Coffs Harbour | 66 | NCH1 | 0.9592 | 0.9072 |
| Coleambally | 132 | NCLY | 0.9483 | 1.0783 |
| Cooma | 66 | NCMA | 0.9797 | 1.0307 |
| Cooma (AusNet Services) | 66 | NCM2 | 0.9797 | 1.0307 |
| Croydon | 11 | NCRD | 1.0178 | 1.0089 |
| Cowra | 66 | NCW8 | 1.0314 | 1.0411 |
| Dapto (Endeavour Energy) | 132 | NDT1 | 0.9929 | 1.0037 |
| Dapto (Essential Energy) | 132 | NDT2 | 0.9929 | 1.0037 |
| Darlington Point | 132 | NDNT | 0.9596 | 1.0764 |
| Deniliquin | 66 | NDN7 | 0.9788 | 1.1081 |
| Dorrigo | 132 | NDOR | 0.9573 | 0.9070 |
| Drummoyne | 11 | NDRM | 1.0204 | 1.0087 |
| Dunoon | 132 | NDUN | 0.9676 | 0.8822 |
| Far North VTN | | NEV1 | 0.9723 | 0.9654 |
| Finley | 66 | NFNY | 0.9895 | 1.1441 |
| Forbes | 66 | NFB2 | 1.0437 | 1.0429 |
| Gadara | 132 | NGAD | 0.9827 | 1.0504 |
| Glen Innes | 66 | NGLN | 0.9205 | 0.8920 |
| Gosford | 66 | NGF3 | 1.0036 | 1.0011 |
| Gosford | 33 | NGSF | 1.0043 | 1.0021 |
| Grafton East 132 | 132 | NGFT | 0.9608 | |
| Green Square | 11 | NGSQ | 1.0059 | 1.0098 |
| Griffith | 33 | NGRF | 0.9757 | 1.0929 |
| Gunnedah | 66 | NGN2 | 0.9866 | 0.9579 |
| Haymarket | 132 | NHYM | 1.0036 | 1.0084 |
| Heron's Creek | 132 | NHNC | 1.0120 | 0.9885 |
| Holroyd | 132 | NHLD | 1.0025 | 1.0000 |
| Holroyd (Ausgrid) | 132 | NHLX | 1.0025 | |
| Hurstville North | 11 | NHVN | 1.0040 | 1.0068 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|------|-------------|-------------|
| Homebush Bay | 11 | NHBB | 1.0184 | 1.0110 |
| Ilford | 132 | NLFD | 0.9665 | 0.9901 |
| Ingleburn | 66 | NING | 0.9973 | 1.0006 |
| Inverell | 66 | NNVL | 0.9303 | 0.9063 |
| Kemps Creek | 330 | NKCK | 0.9944 | 0.9972 |
| Kempsey | 66 | NKS2 | 0.9840 | 0.9510 |
| Kempsey | 33 | NKS3 | 0.9934 | 0.9542 |
| Koolkhan | 66 | NKL6 | 0.9738 | 0.9174 |
| Kurnell | 132 | NKN1 | 1.0014 | 1.0054 |
| Kogarah | 11 | NKOG | 1.0062 | 1.0090 |
| Kurri (effective prior to 09/02/2020) | 33 | NKU3 | 0.9959 | 0.9961 |
| Kurri (effective from 09/02/2020) | 33 | NKU3 | 0.9916 | |
| Kurri (effective prior to 09/02/2020) | 11 | NKU1 | 0.9941 | 0.9940 |
| Kurri (effective from 09/02/2020) | 11 | NKU1 | 0.9915 | |
| Kurri – Dual MLF (Generation) (effective prior to 09/02/2020) | 132 | NKUR | 0.9949 | 0.9913 |
| Kurri – Dual MLF (Generation) (effective from 09/02/2020) | 132 | NKUR | 0.9916 | |
| Kurri – Dual MLF (Load) (effective prior to 09/02/2020) | 132 | NKUR | 0.9949 | 0.9934 |
| Kurri – Dual MLF (Load) (effective from 09/02/2020) | 132 | NKUR | 0.9916 | |
| Lake Munmorah | 132 | NMUN | 0.9880 | 0.9835 |
| Lane Cove | 132 | NLCV | 1.0151 | 1.0083 |
| Leichhardt | 11 | NLDT | 1.0173 | 1.0103 |
| Liddell | 33 | NLD3 | 0.9654 | 0.9596 |
| Lismore | 132 | NLS2 | 1.0107 | 0.8965 |
| Liverpool | 132 | NLP1 | 1.0009 | 1.0024 |
| Macarthur | 132 | NMC1 | 0.9941 | 0.9987 |
| Macarthur | 66 | NMC2 | 0.9957 | 1.0008 |
| Macksville | 132 | NMCV | 0.9794 | 0.9305 |
| Macquarie Park | 11 | NMQP | 1.0300 | 1.0122 |
| Manildra | 132 | NMLD | 1.0252 | 1.0223 |
| Marrickville | 11 | NMKV | 1.0089 | 1.0138 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|------|-------------|-------------|
| Marulan (Endeavour Energy) | 132 | NMR1 | 1.0086 | 0.9977 |
| Marulan (Essential Energy) | 132 | NMR2 | 1.0086 | 0.9977 |
| Mason Park | 132 | NMPK | 1.0154 | 1.0084 |
| Meadowbank | 11 | NMBK | 1.0192 | 1.0116 |
| Molong | 132 | NMOL | 1.0275 | 1.0236 |
| Moree | 66 | NMRE | 0.9714 | 0.9612 |
| Morven | 132 | NMVN | 0.9740 | 1.0752 |
| Mt Piper | 66 | NMP6 | 0.9729 | 0.9734 |
| Mudgee | 132 | NMDG | 0.9722 | 1.0039 |
| Mullumbimby | 11 | NML1 | 0.9594 | 0.8642 |
| Mullumbimby | 132 | NMLB | 0.9559 | 0.8591 |
| Munmorah STS 33 | 33 | NMU3 | 0.9906 | 1.0058 |
| Munyang | 11 | NMY1 | 0.9922 | 1.0256 |
| Munyang | 33 | NMYG | 0.9922 | 1.0256 |
| Murrumbateman | 132 | NMBM | 0.9793 | 1.0129 |
| Murrumburrah | 66 | NMRU | 0.9904 | 1.0448 |
| Muswellbrook | 132 | NMRK | 0.9728 | 0.9659 |
| Nambucca Heads | 132 | NNAM | 0.9764 | 0.9243 |
| Narrabri (effective prior to 08/04/2020) | 66 | NNB2 | 1.0030 | 0.9789 |
| Narrabri (effective from 08/04/2020) | 66 | NNB2 | 1.0019 | |
| Newcastle (effective prior to 09/02/2020) | 132 | NNEW | 0.9904 | 0.9901 |
| Newcastle (effective from 09/02/2020) | 132 | NNEW | 0.9907 | |
| North of Broken Bay VTN | | NEV2 | 0.9945 | 0.9933 |
| Orange | 66 | NRGE | 1.0303 | 1.0343 |
| Orange North | 132 | NONO | 1.0296 | 1.0322 |
| Ourimbah | 33 | NORB | 1.0004 | 0.9986 |
| Ourimbah | 132 | NOR1 | 0.9991 | 0.9972 |
| Ourimbah | 66 | NOR6 | 0.9998 | 0.9972 |
| Panorama | 66 | NPMA | 1.0167 | 1.0225 |
| Parkes | 66 | NPK6 | 1.0385 | 1.0372 |
| Parkes | 132 | NPKS | 1.0322 | 1.0336 |
| Peakhurst | 33 | NPHT | 1.0030 | 1.0063 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|--|--------------|------|-------------|-------------|
| Pt Macquarie | 33 | NPMQ | 1.0104 | 0.9783 |
| Pymont | 33 | NPT3 | 1.0070 | 1.0092 |
| Potts Hill 11 | 11 | NPHL | 1.0036 | |
| Potts Hill 132 | 132 | NPO1 | 1.0009 | |
| Pymont | 132 | NPT1 | 1.0040 | 1.0086 |
| Queanbeyan 132 | 132 | NQBY | 0.9913 | 1.0457 |
| Raleigh | 132 | NRAL | 0.9722 | 0.9166 |
| Regentville | 132 | NRGV | 0.9981 | 0.9993 |
| Rockdale (Ausgrid) | 11 | NRKD | 1.0047 | 1.0081 |
| Rookwood Road (effective prior to 05/04/2020) | 132 | NRWR | 1.0020 | 1.0027 |
| Rookwood Road (effective from 05/04/2020) | 132 | NRWR | 1.0023 | |
| Rozelle | 132 | NRZH | 1.0174 | 1.0092 |
| Rozelle | 33 | NRZL | 1.0172 | 1.0098 |
| Snowy Adit | 132 | NSAD | 0.9767 | 1.0132 |
| Somersby | 11 | NSMB | 1.0049 | 1.0020 |
| South of Broken Bay VTN | | NEV3 | 1.0057 | 1.0062 |
| St Peters | 11 | NSPT | 1.0067 | 1.0115 |
| Stroud | 132 | NSRD | 1.0042 | 1.0022 |
| Sydney East | 132 | NSE2 | 1.0070 | 1.0049 |
| Sydney North (Ausgrid) | 132 | NSN1 | 1.0045 | 1.0015 |
| Sydney North (Endeavour Energy) | 132 | NSN2 | 1.0045 | 1.0015 |
| Sydney South | 132 | NSYS | 1.0001 | 1.0036 |
| Sydney West (Ausgrid) | 132 | NSW1 | 1.0010 | 1.0033 |
| Sydney West (Endeavour Energy) | 132 | NSW2 | 1.0010 | 1.0033 |
| Tamworth | 66 | NTA2 | 0.9596 | 0.9348 |
| Taree (Essential Energy) | 132 | NTR2 | 1.0238 | 1.0105 |
| Tenterfield | 132 | NTTF | 0.9399 | 0.8945 |
| Terranora | 110 | NTNR | 0.9835 | 0.9223 |
| Tomago | 330 | NTMG | 0.9910 | 0.9898 |
| Tomago (Ausgrid) (effective prior to 09/02/2020) | 132 | NTME | 0.9930 | 0.9925 |
| Tomago (Ausgrid) (effective from 09/02/2020) | 132 | NTME | 0.9927 | |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|------|-------------|-------------|
| Tomago (Essential Energy) (effective prior to 09/02/2020) | 132 | NTMC | 0.9930 | 0.9925 |
| Tomago (Essential Energy) (effective from 09/02/2020) | 132 | NTMC | 0.9927 | |
| Top Ryde | 11 | NTPR | 1.0181 | 1.0091 |
| Tuggerah | 132 | NTG3 | 0.9952 | 0.9935 |
| Tumut | 66 | NTU2 | 0.9840 | 1.0438 |
| Tumut 66 (AusNet DNSP) | 66 | NTUX | 0.9840 | |
| Vales Pt. | 132 | NVP1 | 0.9902 | 0.9883 |
| Vineyard | 132 | NVYD | 0.9997 | 0.9991 |
| Wagga | 66 | NWG2 | 0.9740 | 1.0616 |
| Wagga North | 132 | NWGN | 0.9751 | 1.0642 |
| Wagga North | 66 | NWG6 | 0.9757 | 1.0673 |
| Wallerawang (Endeavour Energy) | 132 | NWW6 | 0.9733 | 0.9737 |
| Wallerawang (Essential Energy) | 132 | NWW5 | 0.9733 | 0.9737 |
| Wallerawang 66 (Essential Energy) | 66 | NWW4 | 0.9740 | 0.9747 |
| Wallerawang 66 | 66 | NWW7 | 0.9740 | 0.9747 |
| Wallerawang 330 PS Load | 330 | NWWP | 0.9737 | 0.9766 |
| Wellington | 132 | NWL8 | 0.9835 | 0.9824 |
| West Gosford | 11 | NGWF | 1.0055 | 1.0026 |
| Williamsdale (Essential Energy) (Bogong) | 132 | NWD1 | 0.9840 | 1.0272 |
| Wyang | 11 | NWYG | 0.9977 | 0.9958 |
| Yanco | 33 | NYA3 | 0.9692 | 1.0833 |
| Yass | 66 | NYS6 | 0.9799 | 1.0136 |
| Yass | 132 | NYS1 | 0.9713 | 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 | 0.9592 | 0.9538 |
| Bayswater PS Unit 2 | 330 | BW02 | NBAY2 | NBAY | 0.9592 | 0.9538 |
| Bayswater PS Unit 3 | 500 | BW03 | NBAY3 | NBYW | 0.9598 | 0.9555 |
| Bayswater PS Unit 4 | 500 | BW04 | NBAY4 | NBYW | 0.9598 | 0.9555 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Beryl Solar Farm | 66 | BERYLSF1 | NBES1B | NBES | 0.9243 | 0.9654 |
| Blowering | 132 | BLOWERNG | NBLW8 | NBLW | 0.9391 | 0.9900 |
| Bodangora Wind Farm | 132 | BODWF1 | NBOD1B | NBOD | 0.9495 | 0.9819 |
| Bomen Solar Farm | 132 | BOMENSF1 | NWGS1B | NWGS | 0.9181 | |
| Broken Hill GT 1 | 22 | GB01 | NBKG1 | NBKG | 0.8538 | 1.0603 |
| Broken Hill Solar Farm | 22 | BROKENH1 | NBK11B | NBK1 | 0.7566 | 0.9789 |
| Burrinjuck PS | 132 | BURRIN | NBUK | NBUK | 0.9670 | 1.0124 |
| Capital Wind Farm | 330 | CAPTL_WF | NCWF1R | NCWF | 0.9701 | 1.0100 |
| Coleambally Solar Farm | 132 | COLEASF1 | NCLS1C | NCLS | 0.8689 | 1.0019 |
| Colongra PS Unit 1 | 330 | CG1 | NCLG1D | NCLG | 0.9852 | 0.9827 |
| Colongra PS Unit 2 | 330 | CG2 | NCLG2D | NCLG | 0.9852 | 0.9827 |
| Colongra PS Unit 3 | 330 | CG3 | NCLG3D | NCLG | 0.9852 | 0.9827 |
| Colongra PS Unit 4 | 330 | CG4 | NCLG4D | NCLG | 0.9852 | 0.9827 |
| Crookwell 2 Wind Farm | 330 | CROOKWF2 | NCKW1C | NCKW | 0.9742 | 0.9963 |
| Erating 330 PS Unit 1 | 330 | ER01 | NEPS1 | NEP3 | 0.9836 | 0.9828 |
| Erating 330 PS Unit 2 | 330 | ER02 | NEPS2 | NEP3 | 0.9836 | 0.9828 |
| Erating 500 PS Unit 3 | 500 | ER03 | NEPS3 | NEPS | 0.9845 | 0.9853 |
| Erating 500 PS Unit 4 | 500 | ER04 | NEPS4 | NEPS | 0.9845 | 0.9853 |
| Erating PS Load | 500 | ERNL1 | NEPSL | NEPS | 0.9845 | 0.9853 |
| Finley Solar Farm | 132 | FINLYSF1 | NFNS1F | NFNS | 0.8461 | |
| Goonumbla Solar Farm | 66 | GOONSF1 | NPG12G | NPG1 | 0.9791 | |
| Gullen Range Solar Farm | 330 | GULLRSF1 | NGUR2G | NGUR | 0.9694 | 0.9959 |
| Gullen Range 1 Wind Farm | 330 | GULLRWF1 | NGUR1G | NGUR | 0.9694 | 0.9959 |
| Gullen Range 2 Wind Farm | 330 | GULLRWF2 | NGUR3G | NGUR | 0.9694 | |
| Guthega | 132 | GUTHEGA | NGUT8 | NGUT | 0.9016 | 0.9537 |
| Guthega Auxiliary Supply | 11 | GUTHNL1 | NMY11 | NMY1 | 0.9922 | 1.0256 |
| Hume (New South Wales Share) | 132 | HUMENSW | NHUM | NHUM | 0.9574 | 1.0675 |
| Kangaroo Valley – Bendeela (Shoalhaven) Generation – Dual MLF | 330 | SHGEN | NSHL | NSHN | 0.9769 | 0.9981 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Kangaroo Valley (Shoalhaven) Pumps – Dual MLF | 330 | SHPUMP | NSHP1 | NSHN | 0.9962 | 1.0137 |
| Liddell 330 PS Load | 330 | LIDDNL1 | NLDPL | NLDP | 0.9593 | 0.9537 |
| Liddell 330 PS Unit 1 | 330 | LD01 | NLDP1 | NLDP | 0.9593 | 0.9537 |
| Liddell 330 PS Unit 2 | 330 | LD02 | NLDP2 | NLDP | 0.9593 | 0.9537 |
| Liddell 330 PS Unit 3 | 330 | LD03 | NLDP3 | NLDP | 0.9593 | 0.9537 |
| Liddell 330 PS Unit 4 | 330 | LD04 | NLDP4 | NLDP | 0.9593 | 0.9537 |
| Limondale Solar Plant 1 (effective from 30/06/2020) | 220 | LIMOSF11 | NBSF1L | NBSF | 0.7628 | |
| Limondale Solar Plant 2 | 22 | LIMOSF21 | NBL21L | NBL2 | 0.7872 | |
| Lower Tumut Generation – dual MLF | 330 | TUMUT3 | NLTS8 | NLTS | 0.9276 | 0.9954 |
| Lower Tumut Pipeline Auxiliary | 66 | TUMT3NL3 | NTU2L3 | NTU2 | 0.9840 | 1.0438 |
| Lower Tumut Pumps – dual MLF | 330 | SNOWYP | NLTS3 | NLTS | 0.9986 | 1.0545 |
| Lower Tumut T2 Auxiliary | 66 | TUMT3NL1 | NTU2L1 | NTU2 | 0.9840 | 1.0438 |
| Lower Tumut T4 Auxiliary | 66 | TUMT3NL2 | NTU2L2 | NTU2 | 0.9840 | 1.0438 |
| Mt Piper PS Load | 330 | MPNL1 | NMPPL | NMTP | 0.9714 | 0.9738 |
| Mt Piper PS Unit 1 | 330 | MP1 | NMTP1 | NMTP | 0.9714 | 0.9738 |
| Mt Piper PS Unit 2 | 330 | MP2 | NMTP2 | NMTP | 0.9714 | 0.9738 |
| Sapphire Wind Farm | 330 | SAPHWF1 | NSAP1S | NSAP | 0.9301 | 0.8821 |
| Silverton Wind Farm | 220 | STWF1 | NBKW1S | NBKW | 0.8298 | 1.0062 |
| Upper Tumut | 330 | UPPTUMUT | NUTS8 | NUTS | 0.9514 | 1.0112 |
| Uranquinty PS Unit 11 | 132 | URANQ11 | NURQ1U | NURQ | 0.8671 | 0.9609 |
| Uranquinty PS Unit 12 | 132 | URANQ12 | NURQ2U | NURQ | 0.8671 | 0.9609 |
| Uranquinty PS Unit 13 | 132 | URANQ13 | NURQ3U | NURQ | 0.8671 | 0.9609 |
| Uranquinty PS Unit 14 | 132 | URANQ14 | NURQ4U | NURQ | 0.8671 | 0.9609 |
| Vales Point 330 PS Load | 330 | VPNL1 | NVPPL | NVPP | 0.9865 | 0.9851 |
| Vales Point 330 PS Unit 5 | 330 | VP5 | NVPP5 | NVPP | 0.9865 | 0.9851 |
| Vales Point 330 PS Unit 6 | 330 | VP6 | NVPP6 | NVPP | 0.9865 | 0.9851 |
| Woodlawn Wind Farm | 330 | WOODLWN1 | NCWF2W | NCWF | 0.9701 | 1.0100 |
| White Rock Wind Farm | 132 | WRWF1 | NWRK1W | NWRK | 0.8394 | 0.8427 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|-----------------------|--------------|-------|---------------------|------|-------------|-------------|
| White Rock Solar Farm | 132 | WRSF1 | NWRK2W | NWRK | 0.8394 | 0.8427 |

Table 6 New South Wales embedded⁵ generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|--------------------------|--------------|----------|---------------------|------|-------------|-------------|
| AGL Sita Landfill 1 | 132 | AGLSITA1 | NLP13K | NLP1 | 1.0009 | 1.0024 |
| Appin Power Station | 66 | APPIN | NAPP1A | NAPP | 0.9953 | 1.0010 |
| Boco Rock Wind Farm | 132 | BOCORWF1 | NCMA3B | NBCO | 0.9555 | 1.0068 |
| Broadwater PS | 132 | BWTR1 | NLS21B | NLS2 | 1.0107 | 0.8965 |
| Brown Mountain | 66 | BROWNM | NCMA1 | NCMA | 0.9797 | 1.0307 |
| Burrendong Hydro PS | 132 | BDONGHYD | NWL81B | NWL8 | 0.9835 | 0.9824 |
| Campbelltown WSLC | 66 | WESTCBT1 | NING1C | NING | 0.9973 | 1.0006 |
| Condong PS | 110 | CONDONG1 | NTNR1C | NTNR | 0.9835 | 0.9223 |
| Copeton Hydro PS | 66 | COPTNHYD | NNVL1C | NNVL | 0.9303 | 0.9063 |
| Cullerin Range Wind Farm | 132 | CULLRGWF | NYS11C | NYS1 | 0.9713 | 1.0054 |
| Eastern Creek | 132 | EASTCRK | NSW21 | NSW2 | 1.0010 | 1.0033 |
| Eastern Creek 2 | 132 | EASTCRK2 | NSW23L | NSW2 | 1.0010 | |
| Eraring 330 BS UN (GT) | 330 | ERGT01 | NEP35B | NEP3 | 0.9836 | 0.9828 |
| Glenbawn Hydro PS | 132 | GLBWNHYD | NMRK2G | NMRK | 0.9728 | 0.9659 |
| Glenn Innes (Pindari PS) | 66 | PINDARI | NGLN1 | NGLN | 0.9205 | 0.8920 |
| Glennies Creek PS | 132 | GLENNCRK | NMRK3T | NMRK | 0.9728 | 0.9659 |
| Grange Avenue | 132 | GRANGEAV | NVYD1 | NVYD | 0.9997 | 0.9991 |
| Griffith Solar Farm | 33 | GRIFSF1 | NGG11G | NGG1 | 0.9063 | 1.0603 |
| Gunning Wind Farm | 132 | GUNNING1 | NYS12A | NYS1 | 0.9713 | 1.0054 |
| Jindabyne Generator | 66 | JNDABNE1 | NCMA2 | NCMA | 0.9797 | 1.0307 |
| Jounama PS | 66 | JOUNAMA1 | NTU21J | NTU2 | 0.9840 | 1.0438 |
| Keepit | 66 | KEEPIT | NKPT | NKPT | 0.9866 | 0.9579 |
| Kincumber Landfill | 66 | KINCUM1 | NGF31K | NGF3 | 1.0036 | 1.0011 |

⁵ Please note that the breakdown between transmission connected and embedded generation is provided for information purposes only. Please refer to the Distribution Loss Factor publication to determine if a DLF applies, at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2019/Distribution-Loss-Factors-for-the-2019-20-Financial-Year.pdf.

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|--|--------------|----------|---------------------|------|-------------|-------------|
| Liddell 33 – Hunter Valley GTs | 33 | HVGTS | NLD31 | NLD3 | 0.9654 | 0.9596 |
| Liverpool 132 (Jacks Gully) | 132 | JACKSGUL | NLP11 | NSW2 | 1.0010 | 1.0033 |
| Lucas Heights II Power Plant | 132 | LUCASHGT | NSYS2G | NSYS | 1.0001 | 1.0036 |
| Lucas Heights Stage 2 Power Station | 132 | LUCAS2S2 | NSYS1 | NSYS | 1.0001 | 1.0036 |
| Manildra Solar Farm | 132 | MANSLR1 | NMLS1M | NMLS | 0.9818 | 0.9905 |
| Moree Solar Farm | 66 | MOREESF1 | NMR41M | NMR4 | 0.8602 | 0.8988 |
| Narromine Solar Farm (effective prior to 02/12/2019) | 132 | NASF1 | NWLS1N | NWLS | 0.9603 | 0.9708 |
| Narromine Solar Farm (effective from 02/12/2019) | 132 | NASF1 | NWLS1N | NWLS | 0.9582 | |
| Nevertire Solar Farm | 132 | NEVERSF1 | NWLS3N | NWLS | 0.9582 | |
| Nine Willoughby | 132 | NINEWIL1 | NSE21R | NSE2 | 1.0070 | 1.0049 |
| Nyngan Solar Farm | 132 | NYNGAN1 | NWL82N | NWL8 | 0.9835 | 0.9824 |
| Parkes Solar Farm (effective prior to 12/05/2020) | 66 | PARSF1 | NPG11P | NPG1 | 0.9812 | 0.9964 |
| Parkes Solar Farm (effective from 12/05/2020) | 66 | PARSF1 | NPG11P | NPG1 | 0.9791 | |
| Sithe (Holroyd Generation) | 132 | SITHE01 | NSYW1 | NHD2 | 1.0029 | 1.0000 |
| South Keswick Solar Farm (effective prior to 02/12/2019) | 132 | SKSF1 | NWLS2S | NWLS | 0.9603 | 0.9708 |
| South Keswick Solar Farm (effective from 02/12/2019) | 132 | SKSF1 | NWLS2S | NWLS | 0.9582 | |
| St George Leagues Club | 33 | STGEORG1 | NPHT1E | NPHT | 1.0030 | 1.0063 |
| Tahmoor PS | 132 | TAHMOOR1 | NLP12T | NLP1 | 1.0009 | 1.0024 |
| Tallawarra PS | 132 | TALWA1 | NDT13T | NTWA | 0.9893 | 1.0001 |
| Taralga Wind Farm | 132 | TARALGA1 | NMR22T | NMR2 | 1.0086 | 0.9977 |
| Teralba Power Station (effective prior to 09/02/2020) | 132 | TERALBA | NNEW1 | NNEW | 0.9904 | 0.9901 |
| Teralba Power Station (effective from 09/02/2020) | 132 | TERALBA | NNEW1 | NNEW | 0.9907 | |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|--|--------------|----------|---------------------|------|-------------|-------------|
| The Drop Power Station | 66 | THEDROP1 | NFNY1D | NFNY | 0.9895 | 1.1441 |
| Tower Power Plant | 132 | TOWER | NLP11T | NLP1 | 1.0009 | 1.0024 |
| West Nowra | 132 | AGLNOW1 | NDT12 | NDT1 | 0.9929 | 1.0037 |
| West Illawara Leagues Club | 132 | WESTILL1 | NDT14E | NDT1 | 0.9929 | 1.0037 |
| Wilga Park A (effective prior to 08/04/2020) | 66 | WILGAPK | NNB21W | NNB2 | 1.0030 | 0.9789 |
| Wilga Park A (effective from 08/04/2020) | 66 | WILGAPK | NNB21W | NNB2 | 1.0019 | |
| Wilga Park B (effective prior to 08/04/2020) | 66 | WILGB01 | NNB22W | NNB2 | 1.0030 | 0.9789 |
| Wilga Park B (effective from 08/04/2020) | 66 | WILGB01 | NNB22W | NNB2 | 1.0019 | |
| Woodlawn Bioreactor | 132 | WDLNGN01 | NMR21W | NMR2 | 1.0086 | 0.9977 |
| Woy Woy Landfill | 66 | WOYWOY1 | NGF32W | NGF3 | 1.0036 | 1.0011 |
| Wyangala A PS | 66 | WYANGALA | NCW81A | NCW8 | 1.0314 | 1.0411 |
| Wyangala B PS | 66 | WYANGALB | NCW82B | NCW8 | 1.0314 | 1.0411 |

Table 7 ACT loads

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|--------------------|--------------|------|-------------|-------------|
| Angle Crossing | 132 | AAXG | 0.9875 | 1.0327 |
| Belconnen | 132 | ABCN | 0.9797 | 1.0288 |
| City East | 132 | ACTE | 0.9825 | 1.0322 |
| Civic | 132 | ACVC | 0.9800 | 1.0295 |
| East lake | 132 | AELK | 0.9813 | 1.0309 |
| Gilmore | 132 | AGLM | 0.9800 | 1.0303 |
| Gold Creek | 132 | AGCK | 0.9793 | 1.0283 |
| Latham | 132 | ALTM | 0.9788 | 1.0276 |
| Telopea Park | 132 | ATLP | 0.9821 | 1.0320 |
| Theodore | 132 | ATDR | 0.9793 | 1.0293 |
| Wanniassa | 132 | AWSA | 0.9802 | 1.0304 |
| Woden | 132 | AWDN | 0.9792 | 1.0296 |
| ACT VTN | 132 | AAVT | 0.9803 | 1.0300 |
| Queanbeyan (ACTEW) | 66 | AQB1 | 0.9890 | 1.0438 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|-------------------------------|--------------|------|-------------|-------------|
| Queanbeyan (Essential Energy) | 66 | AQB2 | 0.9890 | 1.0438 |

Table 8 ACT generation and embedded⁶ generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|-------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Capital East Solar Farm | 66 | CESF1 | AQB21C | AQB2 | 0.9890 | 1.0438 |
| Mugga Lane Solar Farm | 132 | MLSP1 | ACA12M | AMS1 | 0.9645 | 1.0200 |
| Royalla Solar Farm | 132 | ROYALLA1 | ACA11R | ARS1 | 0.9639 | 1.0178 |

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

⁶ Please note that the breakdown between transmission connected and embedded generation is provided for information purposes only. Please refer to the Distribution Loss Factor publication to determine if a DLF applies, at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2019/Distribution-Loss-Factors-for-the-2019-20-Financial-Year.pdf.

1.3 Victoria Marginal Loss Factors

Table 9 Victoria loads

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|---------------------------------|--------------|------|-------------|-------------|
| Altona | 66 | VATS | 1.0033 | 1.0054 |
| Altona | 220 | VAT2 | 0.9944 | 1.0018 |
| Ballarat | 66 | VBAT | 0.9716 | 1.0016 |
| Bendigo | 66 | VBE6 | 1.0012 | 1.0136 |
| Bendigo | 22 | VBE2 | 1.0025 | 1.0163 |
| BHP Western Port | 220 | VJLA | 0.9898 | 0.9944 |
| Brooklyn (Jemena) | 22 | VBL2 | 1.0007 | 1.0051 |
| Brooklyn (Jemena) | 66 | VBL6 | 1.0027 | 1.0042 |
| Brooklyn (POWERCOR) | 22 | VBL3 | 1.0007 | 1.0051 |
| Brooklyn (POWERCOR) | 66 | VBL7 | 1.0027 | 1.0042 |
| Brunswick (CitiPower) | 22 | VBT2 | 0.9974 | 1.0008 |
| Brunswick (Jemena) | 22 | VBTS | 0.9974 | 1.0008 |
| Brunswick 66 (CitiPower) | 66 | VBT6 | 0.9958 | 0.9992 |
| Cranbourne | 220 | VCB2 | 0.9882 | 0.9935 |
| Cranbourne (AusNet Services) | 66 | VCBT | 0.9911 | 0.9957 |
| Cranbourne (United Energy) | 66 | VCB5 | 0.9911 | 0.9957 |
| Deer Park | 66 | VDPT | 0.9981 | 1.0038 |
| East Rowville (AusNet Services) | 66 | VER2 | 0.9944 | 0.9956 |
| East Rowville (United Energy) | 66 | VERT | 0.9944 | 0.9956 |
| Fishermens Bend (CITIPower) | 66 | VFBT | 0.9992 | 1.0034 |
| Fishermens Bend (POWERCOR) | 66 | VFB2 | 0.9992 | 1.0034 |
| Fosterville | 220 | VFVT | 1.0009 | 1.0096 |
| Geelong | 66 | VGT6 | 0.9908 | 1.0002 |
| Glenrowan | 66 | VGNT | 1.0188 | 0.9903 |
| Heatherton | 66 | VHTS | 0.9970 | 1.0001 |
| Heywood | 22 | VHY2 | 0.9889 | 1.0028 |
| Horsham | 66 | VHOT | 0.9193 | 0.9957 |
| Keilor (Jemena) | 66 | VKT2 | 0.9987 | 1.0024 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------------------|--------------|------|-------------|-------------|
| Keilor (POWERCOR) | 66 | VKTS | 0.9987 | 1.0024 |
| Kerang | 22 | VKG2 | 0.9900 | 1.0292 |
| Kerang | 66 | VKG6 | 0.9810 | 1.0192 |
| Khancoban | 330 | NKHN | 1.0087 | 0.9459 |
| Loy Yang Substation | 66 | VLY6 | 0.9757 | 0.9822 |
| Malvern | 22 | VMT2 | 0.9943 | 0.9983 |
| Malvern | 66 | VMT6 | 0.9932 | 0.9971 |
| Morwell Power Station Units 1 to 3 | 66 | VMWG | 0.9724 | 0.9816 |
| Morwell PS (G4&5) | 11 | VMWP | 0.9770 | 0.9817 |
| Morwell TS | 66 | VMWT | 0.9938 | 0.9879 |
| Mt Beauty | 66 | VMBT | 1.0192 | 0.9882 |
| Portland | 500 | VAPD | 0.9922 | 1.0058 |
| Pt Henry | 220 | VPTH | 0.9859 | 0.9980 |
| Red Cliffs | 22 | VRC2 | 0.9237 | 1.0129 |
| Red Cliffs | 66 | VRC6 | 0.9082 | 1.0062 |
| Red Cliffs (Essential Energy) | 66 | VRCA | 0.9082 | 1.0062 |
| Richmond | 22 | VRT2 | 0.9959 | 0.9996 |
| Richmond (CITIPOWER) | 66 | VRT7 | 0.9972 | 1.0011 |
| Richmond (United Energy) | 66 | VRT6 | 0.9972 | 1.0011 |
| Ringwood (AusNet Services) | 22 | VRW3 | 0.9973 | 1.0007 |
| Ringwood (AusNet Services) | 66 | VRW7 | 1.0003 | 1.0012 |
| Ringwood (United Energy) | 22 | VRW2 | 0.9973 | 1.0007 |
| Ringwood (United Energy) | 66 | VRW6 | 1.0003 | 1.0012 |
| Shepparton | 66 | VSHT | 1.0203 | 1.0002 |
| South Morang (Jemena) | 66 | VSM6 | 0.9941 | 0.9979 |
| South Morang (AusNet Services) | 66 | VSMT | 0.9941 | 0.9979 |
| Springvale (CITIPOWER) | 66 | VSVT | 0.9987 | 0.9986 |
| Springvale (United Energy) | 66 | VSV2 | 0.9987 | 0.9986 |
| Templestowe (CITIPOWER) | 66 | VTS2 | 0.9985 | 1.0006 |
| Templestowe (Jemena) | 66 | VTST | 0.9985 | 1.0006 |
| Templestowe (AusNet Services) | 66 | VTS3 | 0.9985 | 1.0006 |
| Templestowe (United Energy) | 66 | VTS4 | 0.9985 | 1.0006 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------------|--------------|-------|-------------|-------------|
| Terang | 66 | VTGT | 1.0019 | 1.0149 |
| Thomastown (Jemena) | 66 | VTTTS | 1.0000 | 1.0000 |
| Thomastown (AusNet Services) | 66 | VTT2 | 1.0000 | 1.0000 |
| Tyabb | 66 | VTBT | 0.9910 | 0.9958 |
| Wemen 66 (Essential Energy) | 66 | VWEA | 0.9161 | 1.0066 |
| Wemen TS | 66 | VWET | 0.9161 | 1.0066 |
| West Melbourne | 22 | VWM2 | 0.9987 | 1.0019 |
| West Melbourne (CITIPower) | 66 | VWM7 | 0.9994 | 1.0029 |
| West Melbourne (Jemena) | 66 | VWM6 | 0.9994 | 1.0029 |
| Wodonga | 22 | VWO2 | 1.0164 | 0.9735 |
| Wodonga | 66 | VWO6 | 1.0116 | 0.9712 |
| Yallourn | 11 | VYP1 | 0.9563 | 0.9584 |

Table 10 Victoria generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Ararat Wind Farm | 220 | ARWF1 | VART1A | VART | 0.9038 | 0.9691 |
| Ballarat BESS - Generation | 22 | BALBG1 | VBA21B | VBA2 | 0.9634 | 0.9948 |
| Ballarat BESS - Load | 22 | BALBL1 | VBA22B | VBA2 | 0.9830 | 1.0085 |
| Banimboola | 220 | BAPS | VDPS2 | VDPS | 0.9490 | 0.9249 |
| Basslink (Loy Yang Power Station Switchyard) Victoria to Tasmania | 500 | BLNKVIC | VLYP13 | VTBL | 0.9789 | 0.9839 |
| Basslink (Loy Yang Power Station Switchyard) Tasmania to Victoria | 500 | BLNKVIC | VLYP13 | VTBL | 0.9728 | 0.9839 |
| Coonooer Bridge Wind Farm | 66 | CBWF1 | VBE61C | VBE6 | 1.0012 | 1.0136 |
| Crowlands Wind Farm | 220 | CROWLWF1 | VCWL1C | VCWL | 0.9139 | 0.9803 |
| Dartmouth PS | 220 | DARTM1 | VDPS | VDPS | 0.9490 | 0.9249 |
| Dundonnell Wind Farm 1 | 500 | DUNDWF1 | VM051D | VM05 | 0.9812 | |
| Dundonnell Wind Farm 2 | 500 | DUNDWF2 | VM052D | VM05 | 0.9812 | |
| Dundonnell Wind Farm 3 | 500 | DUNDWF3 | VM053D | VM05 | 0.9812 | |
| Eildon PS Unit 1 | 220 | EILDON1 | VEPS1 | VEPS | 0.9859 | 0.9782 |
| Eildon PS Unit 2 | 220 | EILDON2 | VEPS2 | VEPS | 0.9859 | 0.9782 |
| Elaine Wind Farm | 220 | ELAINWF1 | VELT3E | VELT | 0.9650 | |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|-----------------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Gannawarra BESS (Generation) | 66 | GANNBG1 | VKGB1G | VKGB | 0.9643 | 1.0070 |
| Gannawarra BESS (Load) | 66 | GANNBL1 | VKGB2G | VKGL | 1.0191 | 1.0311 |
| Jeeralang A PS Unit 1 | 220 | JLA01 | VJLGA1 | VJLG | 0.9731 | 0.9783 |
| Jeeralang A PS Unit 2 | 220 | JLA02 | VJLGA2 | VJLG | 0.9731 | 0.9783 |
| Jeeralang A PS Unit 3 | 220 | JLA03 | VJLGA3 | VJLG | 0.9731 | 0.9783 |
| Jeeralang A PS Unit 4 | 220 | JLA04 | VJLGA4 | VJLG | 0.9731 | 0.9783 |
| Jeeralang B PS Unit 1 | 220 | JLB01 | VJLGB1 | VJLG | 0.9731 | 0.9783 |
| Jeeralang B PS Unit 2 | 220 | JLB02 | VJLGB2 | VJLG | 0.9731 | 0.9783 |
| Jeeralang B PS Unit 3 | 220 | JLB03 | VJLGB3 | VJLG | 0.9731 | 0.9783 |
| Jindabyne pump at Guthega | 132 | SNOWYGJP | NGJP | NGJP | 1.0211 | 1.0124 |
| Kiata Wind Farm | 66 | KIATAWF1 | VHOG1K | VHOG | 0.9066 | 0.9911 |
| Laverton PS (LNGS1) | 220 | LNGS1 | VAT21L | VAT2 | 0.9944 | 1.0018 |
| Laverton PS (LNGS2) | 220 | LNGS2 | VAT22L | VAT2 | 0.9944 | 1.0018 |
| Loy Yang A PS Load | 500 | LYNL1 | VLYPL | VLYP | 0.9754 | 0.9798 |
| Loy Yang A PS Unit 1 | 500 | LYA1 | VLYP1 | VLYP | 0.9754 | 0.9798 |
| Loy Yang A PS Unit 2 | 500 | LYA2 | VLYP2 | VLYP | 0.9754 | 0.9798 |
| Loy Yang A PS Unit 3 | 500 | LYA3 | VLYP3 | VLYP | 0.9754 | 0.9798 |
| Loy Yang A PS Unit 4 | 500 | LYA4 | VLYP4 | VLYP | 0.9754 | 0.9798 |
| Loy Yang B PS Unit 1 | 500 | LOYYB1 | VLYP5 | VLYP | 0.9754 | 0.9798 |
| Loy Yang B PS Unit 2 | 500 | LOYYB2 | VLYP6 | VLYP | 0.9754 | 0.9798 |
| MacArthur Wind Farm | 500 | MACARTH1 | VTRT1M | VTRT | 0.9818 | 0.9971 |
| McKay Creek / Bogong PS | 220 | MCKAY1 | VMKP1 | VT14 | 0.9618 | 0.9265 |
| Mortlake Unit 1 | 500 | MORTLK11 | VM0P1O | VM0P | 0.9852 | 0.9961 |
| Mortlake Unit 2 | 500 | MORTLK12 | VM0P2O | VM0P | 0.9852 | 0.9961 |
| Mt Mercer Windfarm | 220 | MERCER01 | VELT1M | VELT | 0.9650 | 0.9909 |
| Murray | 330 | MURRAY | NMUR8 | NMUR | 0.9539 | 0.9069 |
| Murray (Geehi Tee off Auxiliary) | 330 | MURAYNL3 | NMURL3 | NMUR | 0.9539 | 0.9069 |
| Murray Power Station M1 Auxiliary | 330 | MURAYNL1 | NMURL1 | NMUR | 0.9539 | 0.9069 |
| Murray Power Station M2 Auxiliary | 330 | MURAYNL2 | NMURL2 | NMUR | 0.9539 | 0.9069 |
| Murra Warra Wind Farm | 220 | MUWAWF1 | VMRT1M | VMRT | 0.8885 | 0.9549 |
| Newport PS | 220 | NPS | VNPS | VNPS | 0.9922 | 0.9962 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|--------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Numurkah Solar Farm | 66 | NUMURSF1 | VSHS1N | VSHS | 0.9896 | 0.9820 |
| Salt Creek Wind Farm | 66 | SALTCKR1 | VTG61S | VTG6 | 0.9742 | 1.0076 |
| Valley Power Unit 1 | 500 | VPGS1 | VLYP07 | VLYP | 0.9754 | 0.9798 |
| Valley Power Unit 2 | 500 | VPGS2 | VLYP08 | VLYP | 0.9754 | 0.9798 |
| Valley Power Unit 3 | 500 | VPGS3 | VLYP09 | VLYP | 0.9754 | 0.9798 |
| Valley Power Unit 4 | 500 | VPGS4 | VLYP010 | VLYP | 0.9754 | 0.9798 |
| Valley Power Unit 5 | 500 | VPGS5 | VLYP011 | VLYP | 0.9754 | 0.9798 |
| Valley Power Unit 6 | 500 | VPGS6 | VLYP012 | VLYP | 0.9754 | 0.9798 |
| Waubra Wind Farm | 220 | WAUBRAWF | VWBT1A | VWBT | 0.9324 | 0.9784 |
| Wemen Solar Farm | 66 | WEMENSF1 | VWES2W | VWES | 0.8246 | 0.9262 |
| West Kiewa PS Unit 1 | 220 | WKIEWA1 | VWKP1 | VWKP | 0.9989 | 0.9607 |
| West Kiewa PS Unit 2 | 220 | WKIEWA2 | VWKP2 | VWKP | 0.9989 | 0.9607 |
| Yallourn W PS 220 Load | 220 | YWNL1 | VYP2L | VYP2 | 0.9546 | 0.9573 |
| Yallourn W PS 220 Unit 1 | 220 | YWPS1 | VYP21 | VYP3 | 0.9650 | 0.9696 |
| Yallourn W PS 220 Unit 2 | 220 | YWPS2 | VYP22 | VYP2 | 0.9546 | 0.9573 |
| Yallourn W PS 220 Unit 3 | 220 | YWPS3 | VYP23 | VYP2 | 0.9546 | 0.9573 |
| Yallourn W PS 220 Unit 4 | 220 | YWPS4 | VYP24 | VYP2 | 0.9546 | 0.9573 |

Table 11 Victoria embedded⁷ generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Bairnsdale Power Station | 66 | BDL01 | VMWT2 | VBDL | 0.9871 | 0.9866 |
| Bairnsdale Power Station Generator Unit 2 | 66 | BDL02 | VMWT3 | VBDL | 0.9871 | 0.9866 |
| Bald Hills Wind Farm | 66 | BALDHW1 | VMWT9B | VMWT | 0.9938 | 0.9879 |
| Ballarat Health Services | 66 | BBASEHOS | VBAT1H | VBAT | 0.9716 | 1.0016 |
| Bannerton Solar Farm | 66 | BANN1 | VWES1B | VWES | 0.8246 | 0.9262 |
| Broadmeadows Power Plant | 66 | BROADMDW | VTTS2B | VTTS | 1.0000 | 1.0000 |
| Brooklyn Landfill & Recycling Facility | 66 | BROOKLYN | VBL61 | VBL6 | 1.0027 | 1.0042 |
| Bulgana Green Power Hub | 220 | BULGANA1 | VBGT1B | VBGT | 0.9014 | |

⁷ Please note that the breakdown between transmission connected and embedded generation is provided for information purposes only. Please refer to the Distribution Loss Factor publication to determine if a DLF applies, at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2019/Distribution-Loss-Factors-for-the-2019-20-Financial-Year.pdf.

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---------------------------------------|--------------|-----------|---------------------|------|-------------|-------------|
| Challicum Hills Wind Farm | 66 | CHALLHWF | VHOT1 | VHOT | 0.9193 | 0.9957 |
| Chepstowe Wind Farm | 66 | CHPSTWF1 | VBAT3C | VBAT | 0.9716 | 1.0016 |
| Cherry Tree Wind Farm | 66 | CHYTWF1 | VSM71C | VSM7 | 0.9944 | |
| Clayton Landfill Gas Power Station | 66 | CLAYTON | VSV21B | VSV2 | 0.9987 | 0.9986 |
| Clover PS | 66 | CLOVER | VMBT1 | VMBT | 1.0192 | 0.9882 |
| Codrington Wind Farm | 66 | CODRNGTON | VTGT2C | VTGT | 1.0019 | 1.0149 |
| Corio LFG PS | 66 | CORIO1 | VGT61C | VGT6 | 0.9908 | 1.0002 |
| Eildon Hydro PS | 66 | EILDON3 | VTT22E | VSMT | 0.9941 | 0.9979 |
| Gannawarra Solar Farm | 66 | GANNFS1 | VKGS1G | VKGS | 0.8994 | 0.9729 |
| Glenmaggie Hydro PS | 66 | GLENMAG1 | VMWT8G | VMWT | 0.9938 | 0.9879 |
| Hallam Mini Hydro | 66 | HLMSEW01 | VER21H | VER2 | 0.9944 | 0.9956 |
| Hallam Road Renewable Energy Facility | 66 | HALAMRD1 | VER22L | VER2 | 0.9944 | 0.9956 |
| Hepburn Community Wind Farm | 66 | HEPWIND1 | VBAT2L | VBAT | 0.9716 | 1.0016 |
| Hume (Victorian Share) | 66 | HUMEV | VHUM | VHUM | 0.9439 | 0.9498 |
| Karadoc Solar Farm | 66 | KARSF1 | VRCS1K | VRCS | 0.8097 | 0.9472 |
| Longford | 66 | LONGFORD | VMWT6 | VMWT | 0.9938 | 0.9879 |
| Maroona Wind Farm | 66 | MAROOWF1 | VBAT5M | VBAT | 0.9716 | 1.0016 |
| Mortons Lane Wind Farm | 66 | MLWF1 | VTGT4M | VTGT | 1.0019 | 1.0149 |
| Mt Gellibrand Windfarm | 66 | MTGELWF1 | VGW1M | VGW | 0.9871 | 0.9989 |
| Oaklands Hill Wind Farm | 66 | OAKLAND1 | VTGT3A | VTGT | 1.0019 | 1.0149 |
| Rubicon Mountain Streams Station | 66 | RUBICON | VTT21R | VSMT | 0.9941 | 0.9979 |
| Shepparton Waste Gas | 66 | SHEP1 | VSHT2S | VSHT | 1.0203 | 1.0002 |
| Somerton Power Station | 66 | AGLSOM | VTT1S | VSOM | 0.9915 | 0.9963 |
| Springvale Power Plant | 66 | SVALE1 | VSV22S | VSV2 | 0.9987 | 0.9986 |
| Tatura | 66 | TATURA01 | VSHT1 | VSHT | 1.0203 | 1.0002 |
| Timboon West Wind Farm | 66 | TIMWEST | VTGT5T | VTGT | 1.0019 | 1.0149 |
| Toora Wind Farm | 66 | TOORAWF | VMWT5 | VMWT | 0.9938 | 0.9879 |
| Traralgon NSS | 66 | TGNSS1 | VMWT1T | VMWT | 0.9938 | 0.9879 |
| William Hovell Hydro PS | 66 | WILLHOV1 | VW061W | VGNT | 1.0188 | 0.9903 |
| Wollert Renewable Energy Facility | 66 | WOLLERT1 | VSMT1W | VSMT | 0.9941 | 0.9979 |
| Wonthaggi Wind Farm | 66 | WONWP | VMWT7 | VMWT | 0.9938 | 0.9879 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Yaloak South Wind Farm | 66 | YSWF1 | VBAT4Y | VBAT | 0.9716 | 1.0016 |
| Yambuk Wind Farm | 66 | YAMBUKWF | VTGT1 | VTGT | 1.0019 | 1.0149 |
| Yarrowonga Hydro PS | 66 | YWNGAHYD | VSHT3Y | VSHT | 1.0203 | 1.0002 |
| Yawong Wind Farm | 66 | YAWWF1 | VBE62Y | VBE6 | 1.0012 | 1.0136 |
| Yendon Wind Farm | 66 | YENDWF1 | VBAW1Y | VBAW | 0.9612 | 0.9986 |

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 | 1.0102 | 1.0080 |
| Ardrossan West | 33 | SARW | 0.9419 | 0.9582 |
| Back Callington | 11 | SBAC | 1.0137 | 1.0094 |
| Baroota | 33 | SBAR | 0.9958 | 0.9997 |
| Berri | 66 | SBER | 1.1277 | 1.0072 |
| Berri (POWERCOR) | 66 | SBE1 | 1.1277 | 1.0072 |
| Blanche | 33 | SBLA | 1.0285 | 0.9693 |
| Blanche (POWERCOR) | 33 | SBL1 | 1.0285 | 0.9693 |
| Brinkworth | 33 | SBRK | 0.9941 | 0.9967 |
| Bungama Industrial | 33 | SBUN | 0.9890 | 0.9939 |
| Bungama Rural | 33 | SBUR | 0.9976 | 1.0026 |
| City West | 66 | SACR | 1.0076 | 1.0044 |
| Clare North | 33 | SCLN | 0.9923 | 0.9924 |
| Dalrymple | 33 | SDAL | 0.9069 | 0.9258 |
| Davenport | 275 | SDAV | 0.9937 | 0.9928 |
| Davenport | 33 | SDAW | 0.9957 | 0.9941 |
| Dorrien | 33 | SDRN | 1.0053 | 1.0064 |
| East Terrace | 66 | SETC | 1.0024 | 1.0036 |
| Happy Valley | 66 | SHVA | 1.0053 | 1.0054 |
| Hummocks | 33 | SHUM | 0.9597 | 0.9724 |
| Kadina East | 33 | SKAD | 0.9654 | 0.9791 |
| Kanmantoo | 11 | SKAN | 1.0140 | 1.0087 |
| Keith | 33 | SKET | 1.0256 | 0.9952 |
| Kilburn | 66 | SKLB | 0.9998 | 1.0019 |
| Kincraig | 33 | SKNC | 1.0243 | 0.9799 |
| Lefevre | 66 | SLFE | 0.9998 | 0.9999 |
| Leigh Creek | 33 | SLCC | 1.0541 | 1.0506 |
| Leigh Creek South | 33 | SLCS | 1.0604 | 1.0549 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|-------------------------------------|--------------|------|-------------|-------------|
| Magill | 66 | SMAG | 1.0046 | 1.0039 |
| Mannum | 33 | SMAN | 1.0150 | 1.0090 |
| Mannum – Adelaide Pipeline 1 | 3.3 | SMA1 | 1.0177 | 1.0135 |
| Mannum – Adelaide Pipeline 2 | 3.3 | SMA2 | 1.0156 | 1.0122 |
| Mannum – Adelaide Pipeline 3 | 3.3 | SMA3 | 1.0152 | 1.0121 |
| Middleback | 33 | SMDL | 0.9977 | 0.9996 |
| Middleback | 132 | SMBK | 0.9957 | 1.0014 |
| Millbrook | 132 | SMLB | 1.0038 | 1.0040 |
| Mobilong | 33 | SMBL | 1.0143 | 1.0079 |
| Morgan – Whyalla Pipeline 1 | 3.3 | SMW1 | 1.0512 | 1.0023 |
| Morgan – Whyalla Pipeline 2 | 3.3 | SMW2 | 1.0284 | 0.9991 |
| Morgan – Whyalla Pipeline 3 | 3.3 | SMW3 | 1.0072 | 0.9947 |
| Morgan – Whyalla Pipeline 4 | 3.3 | SMW4 | 0.9963 | 0.9919 |
| Morphett Vale East | 66 | SMVE | 1.0053 | 1.0068 |
| Mount Barker South | 66 | SMBS | 1.0071 | 1.0050 |
| Mt Barker | 66 | SMBA | 1.0064 | 1.0043 |
| Mt Gambier | 33 | SMGA | 1.0316 | 0.9708 |
| Mt Gunson South | 132 | SMGS | 1.1310 | 1.0257 |
| Mt Gunson | 33 | SMGU | 1.1148 | 1.0257 |
| Munno Para | 66 | SMUP | 1.0009 | 1.0002 |
| Murray Bridge – Hahndorf Pipeline 1 | 11 | SMH1 | 1.0170 | 1.0129 |
| Murray Bridge – Hahndorf Pipeline 2 | 11 | SMH2 | 1.0181 | 1.0157 |
| Murray Bridge – Hahndorf Pipeline 3 | 11 | SMH3 | 1.0155 | 1.0140 |
| Neuroodla | 33 | SNEU | 1.0256 | 1.0226 |
| New Osborne | 66 | SNBN | 0.9999 | 0.9997 |
| North West Bend | 66 | SNWB | 1.0531 | 1.0013 |
| Northfield | 66 | SNFD | 1.0024 | 1.0031 |
| Para | 66 | SPAR | 1.0009 | 1.0026 |
| Parafield Gardens West | 66 | SPGW | 1.0016 | 1.0030 |
| Penola West 33 | 33 | SPEN | 1.0199 | 0.9664 |
| Pimba | 132 | SPMB | 1.2248 | 1.0731 |
| Playford | 132 | SPAA | 0.9929 | 0.9918 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|------|-------------|-------------|
| Port Lincoln | 33 | SPLN | 0.9789 | 0.9850 |
| Port Pirie | 33 | SPPR | 0.9949 | 0.9990 |
| Roseworthy | 11 | SRSW | 1.0086 | 1.0090 |
| Snuggery Industrial – Dual MLF (Generation) | 33 | SSNN | 0.9996 | 0.9430 |
| Snuggery Industrial – Dual MLF (Load) | 33 | SSNN | 1.0150 | 0.9482 |
| Snuggery Rural | 33 | SSNR | 1.0045 | 0.9457 |
| South Australian VTN | | SJP1 | 1.0060 | 0.9998 |
| Stony Point | 11 | SSPN | 0.9985 | 0.9990 |
| Tailem Bend | 33 | STAL | 1.0161 | 1.0017 |
| Templers | 33 | STEM | 1.0035 | 1.0046 |
| Torrens Island | 66 | STSY | 1.0000 | 1.0000 |
| Waterloo | 33 | SWAT | 0.9854 | 0.9886 |
| Whyalla Central Substation | 33 | SWYC | 1.0006 | 0.9996 |
| Whyalla Terminal BHP | 33 | SBHP | 1.0006 | 0.9988 |
| Woomera | 132 | SWMA | 1.1268 | 1.0320 |
| Wudina | 66 | SWUD | 0.9936 | 1.0049 |
| Yadnarie | 66 | SYAD | 0.9806 | 0.9927 |

Table 13 South Australia generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Barker Inlet PS | 275 | BARKIPS1 | SBPS1B | SBPS | 0.9998 | |
| Bungala One Solar Farm | 132 | BNGSF1 | SBEM1B | SBEM | 0.9717 | 0.9700 |
| Bungala Two Solar Farm | 132 | BNGSF2 | SBEM2B | SBEM | 0.9717 | 0.9700 |
| Cathedral Rocks Wind Farm | 132 | CATHROCK | SCRK | SCRK | 0.8858 | 0.8860 |
| Clements Gap Wind Farm | 132 | CLEMGPF | SCGW1P | SCGW | 0.9583 | 0.9683 |
| Dry Creek PS Unit 1 | 66 | DRYCGT1 | SDCA1 | SDPS | 0.9971 | 1.0030 |
| Dry Creek PS Unit 2 | 66 | DRYCGT2 | SDCA2 | SDPS | 0.9971 | 1.0030 |
| Dry Creek PS Unit 3 | 66 | DRYCGT3 | SDCA3 | SDPS | 0.9971 | 1.0030 |
| Hallett PS | 275 | AGLHAL | SHPS1 | SHPS | 0.9748 | 0.9715 |
| Hallett 1 Wind Farm | 275 | HALLWF1 | SHPS2W | SHPS | 0.9748 | 0.9715 |
| Hallett 2 Wind Farm | 275 | HALLWF2 | SMOK1H | SMOK | 0.9770 | 0.9715 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Hornsedale Wind Farm Stage 1 | 275 | HDWF1 | SHDW1H | SHDW | 0.9698 | 0.9744 |
| Hornsedale Wind Farm Stage 2 | 275 | HDWF2 | SHDW2H | SHDW | 0.9698 | 0.9744 |
| Hornsedale Wind Farm Stage 3 | 275 | HDWF3 | SHDW3H | SHDW | 0.9698 | 0.9744 |
| Hornsedale Battery (Generation) (effective prior to 25/06/2020) | 275 | HPRG1 | SMTL1H | SMTL | 0.9851 | 0.9771 |
| Hornsedale Battery (Generation) (effective from 25/06/2020) | 275 | HPRG1 | SMTL1H | SMTL | 0.9838 | |
| Hornsedale Battery (Load) (effective prior to 25/06/2020) | 275 | HPRL1 | SMTL2H | SMTL | 0.9831 | 0.9853 |
| Hornsedale Battery (Load) (effective from 25/06/2020) | 275 | HPRL1 | SMTL2H | SMTL | 0.9841 | |
| Ladbroke Grove PS Unit 1 | 132 | LADBROK1 | SPEW1 | SPEW | 0.9831 | 0.9474 |
| Ladbroke Grove PS Unit 2 | 132 | LADBROK2 | SPEW2 | SPEW | 0.9831 | 0.9474 |
| Lake Bonney BESS - Generation | 33 | LBBG1 | SLBB1L | SLBB | 0.9922 | |
| Lake Bonney BESS - Load | 33 | LBBL1 | SLBB2L | SLBB | 1.0059 | |
| Lake Bonney Wind Farm | 33 | LKBONNY1 | SMAY1 | SMAY | 0.9777 | 0.9144 |
| Lake Bonney Wind Farm Stage 2 | 33 | LKBONNY2 | SMAY2 | SMAY | 0.9777 | 0.9144 |
| Lake Bonney Wind Farm Stage 3 | 33 | LKBONNY3 | SMAY3W | SMAY | 0.9777 | 0.9144 |
| Lincoln Gap Wind Farm | 275 | LGAPWF1 | SLGW1L | SLGW | 0.9821 | 0.9947 |
| Mintaro PS | 132 | MINTARO | SMPS | SMPS | 0.9795 | 0.9942 |
| Mt Millar Wind Farm | 33 | MTMILLAR | SMTM1 | SMTM | 0.8935 | 0.9055 |
| North Brown Hill Wind Farm | 275 | NBHWF1 | SBEL1A | SBEL | 0.9728 | 0.9674 |
| O.C.P.L. Unit 1 | 66 | OSB-AG | SNBN1 | SOCP | 0.9997 | 0.9992 |
| Pelican Point PS | 275 | PPCCGT | SPPT | SPPT | 0.9989 | 1.0005 |
| Port Lincoln 3 | 33 | POR03 | SPL31P | SPL3 | 0.9707 | 1.0383 |
| Port Lincoln PS | 132 | POR01 | SPLN1 | SPTL | 0.9676 | 0.9691 |
| Quarantine PS Unit 1 | 66 | QPS1 | SQPS1 | SQPS | 0.9852 | 0.9854 |
| Quarantine PS Unit 2 | 66 | QPS2 | SQPS2 | SQPS | 0.9852 | 0.9854 |
| Quarantine PS Unit 3 | 66 | QPS3 | SQPS3 | SQPS | 0.9852 | 0.9854 |
| Quarantine PS Unit 4 | 66 | QPS4 | SQPS4 | SQPS | 0.9852 | 0.9854 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Quarantine PS Unit 5 | 66 | QPS5 | SQPS5Q | SQPS | 0.9852 | 0.9854 |
| Snowtown Wind Farm Stage 2 – North | 275 | SNOWNTH1 | SBLWS1 | SBLW | 0.9722 | 0.9813 |
| Snowtown Wind Farm Stage 2 – South | 275 | SNOWSTH1 | SBLWS2 | SBLW | 0.9722 | 0.9813 |
| Snowtown Wind Farm | 33 | SNOWTWN1 | SNWF1T | SNWF | 0.9095 | 0.9203 |
| Snuggery PS Units 1 to 3 | 132 | SNUG1 | SSGA1 | SSPS | 0.9474 | 0.9325 |
| Tailem Bend Solar Farm | 132 | TBSF1 | STBS1T | STBS | 1.0054 | 0.9973 |
| The Bluff wind Farm | 275 | BLUFF1 | SBEL2P | SBEL | 0.9728 | 0.9674 |
| Torrens Island PS A Unit 1 | 275 | TORRA1 | STSA1 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS A Unit 2 | 275 | TORRA2 | STSA2 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS A Unit 3 | 275 | TORRA3 | STSA3 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS A Unit 4 | 275 | TORRA4 | STSA4 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS B Unit 1 | 275 | TORRB1 | STSB1 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS B Unit 2 | 275 | TORRB2 | STSB2 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS B Unit 3 | 275 | TORRB3 | STSB3 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS B Unit 4 | 275 | TORRB4 | STSB4 | STPS | 0.9997 | 1.0009 |
| Torrens Island PS Load | 66 | TORN1 | STSYL | STSY | 1.0000 | 1.0000 |
| Waterloo Wind Farm | 132 | WATERLWF | SWLE1R | SWLE | 0.9677 | 0.9712 |
| Wattle Point Wind Farm | 132 | WPWF | SSYP1 | SSYP | 0.8125 | 0.8279 |
| Willogeleche Wind Farm | 275 | WGWF1 | SWGL1W | SWGL | 0.9828 | 0.9689 |

Table 14 South Australia embedded⁸ generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|-----------------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Angaston Power Station | 33 | ANGAST1 | SDRN1 | SANG | 0.9517 | 1.0087 |
| Bolivar WWT Plant | 66 | BOLIVAR1 | SPGW1B | SPGW | 1.0016 | 1.0030 |
| Canunda Wind Farm | 33 | CNUNDAWF | SSNN1 | SCND | 0.9881 | 0.9237 |
| Cummins Lonsdale PS | 66 | LONSDALE | SMVE1 | SMVE | 1.0053 | 1.0068 |
| Dalrymple North BESS (Generation) | 33 | DALNTH01 | SDAN1D | SDAM | 0.9045 | 0.8880 |
| Dalrymple North BESS (Load) | 33 | DALNTHL1 | SDAN2D | SDAN | 0.9990 | 0.9326 |

⁸ Please note that the breakdown between transmission connected and embedded generation is provided for information purposes only. Please refer to the Distribution Loss Factor publication to determine if a DLF applies, at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2019/Distribution-Loss-Factors-for-the-2019-20-Financial-Year.pdf.

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Morphett Vale East 66 (Generation) | 66 | SATGS1 | SMVG1L | SMVG | 1.0045 | 1.0061 |
| Para 66 (Generation) | 66 | SATGN1 | SPAG1E | SPAG | 1.0006 | 0.9971 |
| Pt Stanvac PS | 66 | PTSTAN1 | SMVE3P | SMVE | 1.0053 | 1.0068 |
| Starfish Hill Wind Farm | 66 | STARHLWF | SMVE2 | SMVE | 1.0053 | 1.0068 |
| Tatiara Meat Co | 33 | TATIARA1 | SKET1E | SKET | 1.0256 | 0.9952 |
| Wingfield 1 LFG PS | 66 | WINGF1_1 | SKLB1W | SKLB | 0.9998 | 1.0019 |
| Wingfield 2 LFG PS | 66 | WINGF2_1 | SNBN2W | SNBN | 0.9999 | 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 | 0.9902 | 0.9943 |
| Avoca | 22 | TAV2 | 1.0064 | 1.0140 |
| Boyer SWA | 6.6 | TBYA | 1.0168 | 1.0227 |
| Boyer SWB | 6.6 | TBYB | 1.0169 | 1.0239 |
| Bridgewater | 11 | TBW2 | 1.0265 | 1.0233 |
| Burnie | 22 | TBU3 | 0.9850 | 0.9857 |
| Chapel St. | 11 | TCS3 | 1.0187 | 1.0231 |
| Comalco | 220 | TCO1 | 1.0006 | 1.0006 |
| Creek Road | 33 | TCR2 | 1.0186 | 1.0232 |
| Derby | 22 | TDE2 | 0.9577 | 0.9647 |
| Derwent Bridge | 22 | TDB2 | 0.9325 | 0.9386 |
| Devonport | 22 | TDP2 | 0.9885 | 0.9885 |
| Electrona | 11 | TEL2 | 1.0308 | 1.0360 |
| Emu Bay | 11 | TEB2 | 0.9815 | 0.9832 |
| Fisher (Rowallan) | 220 | TFI1 | 0.9688 | 0.9660 |
| George Town | 22 | TGT3 | 1.0020 | 1.0025 |
| George Town (Basslink) | 220 | TGT1 | 1.0000 | 1.0000 |
| Gordon | 22 | TGO2 | 0.9984 | 1.0024 |
| Greater Hobart Area VTN | | TVN1 | 1.0195 | 1.0236 |
| Hadspen | 22 | THA3 | 0.9939 | 0.9967 |
| Hampshire | 110 | THM2 | 0.9798 | 0.9819 |
| Huon River | 11 | THR2 | 1.0259 | 1.0380 |
| Kermantle | 11 | TKE2 | 1.0343 | 1.0399 |
| Kingston | 33 | TK13 | 1.0233 | 1.0290 |
| Kingston | 11 | TKI2 | 1.0258 | 1.0306 |
| Knights Road | 11 | TKR2 | 1.0364 | 1.0433 |
| Lindisfarne | 33 | TLF2 | 1.0202 | 1.0237 |
| Meadowbank | 22 | TMB2 | 0.9828 | 0.9938 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|------------------|--------------|------|-------------|-------------|
| Mornington | 33 | TMT2 | 1.0224 | 1.0239 |
| Mowbray | 22 | TMY2 | 0.9924 | 0.9955 |
| New Norfolk | 22 | TNN2 | 1.0112 | 1.0179 |
| Newton | 22 | TNT2 | 0.9731 | 0.9773 |
| Newton | 11 | TNT3 | 0.9611 | 0.9552 |
| North Hobart | 11 | TNH2 | 1.0176 | 1.0224 |
| Norwood | 22 | TNW2 | 0.9923 | 0.9951 |
| Palmerston | 22 | TPM3 | 0.9816 | 0.9847 |
| Port Latta | 22 | TPL2 | 0.9573 | 0.9604 |
| Que | 22 | TQU2 | 0.9729 | 0.9743 |
| Queenstown | 11 | TQT3 | 0.9637 | 0.9635 |
| Queenstown | 22 | TQT2 | 0.9639 | 0.9629 |
| Railton | 22 | TRA2 | 0.9894 | 0.9900 |
| Risdon | 33 | TRI4 | 1.0195 | 1.0245 |
| Risdon | 11 | TRI3 | 1.0219 | 1.0257 |
| Rokeby | 11 | TRK2 | 1.0223 | 1.0259 |
| Rosebery | 44 | TRB2 | 0.9733 | 0.9750 |
| Savage River | 22 | TSR2 | 1.0030 | 0.9938 |
| Scottsdale | 22 | TSD2 | 0.9704 | 0.9731 |
| Smithton | 22 | TST2 | 0.9409 | 0.9482 |
| Sorell | 22 | TSO2 | 1.0284 | 1.0317 |
| St Leonard | 22 | TSL2 | 0.9921 | 0.9947 |
| St. Marys | 22 | TSM2 | 1.0224 | 1.0284 |
| Starwood | 110 | TSW1 | 1.0009 | 1.0011 |
| Tamar Region VTN | | TVN2 | 0.9938 | 0.9965 |
| Temco | 110 | TTE1 | 1.0037 | 1.0043 |
| Trevallyn | 22 | TTR2 | 0.9931 | 0.9961 |
| Triabunna | 22 | TTB2 | 1.0393 | 1.0454 |
| Tungatimah | 22 | TTU2 | 0.9351 | 0.9396 |
| Ulverstone | 22 | TUL2 | 0.9847 | 0.9879 |
| Waddamana | 22 | TWA2 | 0.9465 | 0.9617 |
| Wayatinah | 11 | TWY2 | 0.9958 | 1.0006 |

| Location | Voltage (kV) | TNI | 2019-20 MLF | 2018-19 MLF |
|-------------|--------------|------|-------------|-------------|
| Wesley Vale | 22 | TWV2 | 0.9890 | 0.9867 |

Table 16 Tasmania generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|---|--------------|----------|---------------------|------|-------------|-------------|
| Basslink (George Town) | 220 | BLNK TAS | TGT11 | TGT1 | 1.0000 | 1.0000 |
| Bastyan | 220 | BASTYAN | TFA11 | TFA1 | 0.9456 | 0.9410 |
| Bell Bay No.3 | 110 | BBTHREE1 | TBB11 | TBB1 | 0.9997 | 1.0003 |
| Bell Bay No.3 | 110 | BBTHREE2 | TBB12 | TBB1 | 0.9997 | 1.0003 |
| Bell Bay No.3 | 110 | BBTHREE3 | TBB13 | TBB1 | 0.9997 | 1.0003 |
| Bluff Point and Studland Bay Wind Farms | 110 | WOOLNTH1 | TST11 | TST1 | 0.8900 | 0.8952 |
| Butlers Gorge | 110 | BUTLERSG | TBG11 | TBG1 | 0.9305 | 0.9350 |
| Catagunya | 220 | LI_WY_CA | TLI11 | TLI1 | 0.9936 | 0.9977 |
| Cethana | 220 | CETHANA | TCE11 | TCE1 | 0.9658 | 0.9628 |
| Cluny | 220 | CLUNY | TCL11 | TCL1 | 0.9961 | 1.0019 |
| Devils gate | 110 | DEVILS_G | TDG11 | TDG1 | 0.9698 | 0.9692 |
| Fisher | 220 | FISHER | TFI11 | TFI1 | 0.9688 | 0.9660 |
| Gordon | 220 | GORDON | TGO11 | TGO1 | 0.9594 | 0.9868 |
| Granville Harbour Wind Farm | 220 | GRANWF1 | TGH11G | TGH1 | 0.9590 | |
| John Butters | 220 | JBUTTERS | TJB11 | TJB1 | 0.9370 | 0.9365 |
| Lake Echo | 110 | LK_ECHO | TLE11 | TLE1 | 0.9257 | 0.9385 |
| Lemonthyme | 220 | LEM_WIL | TSH11 | TSH1 | 0.9716 | 0.9701 |
| Liapootah | 220 | LI_WY_CA | TLI11 | TLI1 | 0.9936 | 0.9977 |
| Mackintosh | 110 | MACKNTSH | TMA11 | TMA1 | 0.9347 | 0.9282 |
| Meadowbank | 110 | MEADOWBK | TMB11 | TMB1 | 0.9716 | 0.9773 |
| Musselroe | 110 | MUSSELR1 | TDE11M | TDE1 | 0.9060 | 0.9105 |
| Paloona | 110 | PALOONA | TPA11 | TPA1 | 0.9702 | 0.9771 |
| Poatina | 220 | POAT220 | TPM11 | TPM1 | 0.9846 | 0.9912 |
| Poatina | 110 | POAT110 | TPM21 | TPM2 | 0.9728 | 0.9799 |
| Reece No.1 | 220 | REECE1 | TRCA1 | TRCA | 0.9410 | 0.9350 |
| Reece No.2 | 220 | REECE2 | TRCB1 | TRCB | 0.9351 | 0.9264 |
| Repulse | 220 | REPULSE | TCL12 | TCL1 | 0.9961 | 1.0019 |

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|----------------------------|--------------|----------|---------------------|------|-------------|-------------|
| Rowallan | 220 | ROWALLAN | TFI12 | TFI1 | 0.9688 | 0.9660 |
| Tamar Valley CCGT | 220 | TVCC201 | TTV11A | TTV1 | 1.0000 | 0.9999 |
| Tamar Valley OCGT | 110 | TVPP104 | TBB14A | TBB1 | 0.9997 | 1.0003 |
| Tarraleah | 110 | TARRALEA | TTA11 | TTA1 | 0.9363 | 0.9405 |
| Trevallyn | 110 | TREBALLN | TTR11 | TTR1 | 0.9889 | 0.9909 |
| Tribute | 220 | TRIBUTE | TTI11 | TTI1 | 0.9401 | 0.9377 |
| Tungatinah | 110 | TUNGATIN | TTU11 | TTU1 | 0.9065 | 0.9184 |
| Wayatinah | 220 | LI_WY_CA | TLI11 | TLI1 | 0.9936 | 0.9977 |
| Wild Cattle Hill Wind Farm | 220 | CTHLWF1 | TWC11C | TWC1 | 0.9860 | |
| Wilmot | 220 | LEM_WIL | TSH11 | TSH1 | 0.9716 | 0.9701 |

Table 17 Tasmania embedded⁹ generation

| Location | Voltage (kV) | DUID | Connection Point ID | TNI | 2019-20 MLF | 2018-19 MLF |
|-------------|--------------|---------|---------------------|------|-------------|-------------|
| Midlands PS | 22 | MIDLPS1 | TAV21M | TAV2 | 1.0064 | 1.0140 |
| Remount | 22 | REMOUNT | TMY21 | TVN2 | 0.9938 | 0.9965 |

⁹ Please note that the breakdown between transmission connected and embedded generation is provided for information purposes only. Please refer to the Distribution Loss Factor publication to determine if a DLF applies, at http://aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2019/Distribution-Loss-Factors-for-the-2019-20-Financial-Year.pdf.

2. Changes in Marginal Loss Factors

2.1 MLFs in the NEM

The MLF for a connection point represents the marginal electrical transmission losses in electrical power flow between that connection point and the regional reference node (RRN) for the region in which the connection point is located.

An MLF below 1 indicates that an incremental increase in power flow from the connection point to the RRN would increase total losses in the network. An MLF above 1 indicates the opposite.

According to the current NEM design, the difference between the cost of electricity at a connection point remote from the RRN and the cost of electricity at the RRN is directly proportional to the MLF for the connection point. If the MLF for a connection point is 0.9 then the effective values of electricity purchased or sold at that connection point will be 90% of the regional reference price. Consequently, a fall in MLF at a connection point is likely to have a positive impact on customers and a negative impact on generators.

More information on the treatment of electricity losses in the NEM is available on AEMO's website¹⁰.

2.2 Reasons why MLFs change

There are two main reasons why the MLF for a connection point changes from year to year:

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 would be expected to move closer to 1.
2. Changes to projected power flows over the transmission network caused by projected changes to power system generation and demand, including building new generation, retirement of power stations, and revised electricity consumption forecasts.
 - If the projected power flow from a connection point towards the RRN increases, then the MLF for that connection point would be expected to decrease. Conversely, if the projected power flow from a connection point towards the regional reference node decreases, then the MLF for that connection point would be expected to increase.

The location of new generation projects and load developments on the transmission and distribution network has a significant impact on the MLFs in an area. As more generation is connected to electrically weak areas of the network that are remote from the regional reference node, MLFs in these areas will continue to decline.

The correlation of the generator output in an area also has a significant bearing on MLFs. If new generation is running at the same times as other nearby generators, then the MLF will decline. Further, if new and existing generation in the area is mainly running at times when there is light load on the network, the decline in MLFs will be even greater. This subject is discussed in further detail in Appendix A3.

¹⁰ AEMO, Treatment of Loss Factors in the National Electricity Market, 1 July 2012, available at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2016/Treatment_of_Loss_Factors_in_the_NEM.pdf.

2.3 Changes between 2018-19 MLF and 2019-20 MLF

This section summarises the changes in MLFs for 2019-20 from the 2018-19 MLFs at a zone level, and the general trends driving the changes. Appendix A2 provides more detailed information on the inputs, methodology and assumptions for the 2019-20 calculations, and key changes from 2018-19.

2.3.1 Changes to Marginal Loss Factors in Queensland

In the 2019-20 MLF study, Queensland thermal generation is projected to decrease by more than the projected increase from new wind and solar projects. Consequently, the net total energy transferred from Queensland to New South Wales through the interconnectors is projected to reduce for the 2019-20 MLF calculation study compared to the 2018-19 study.

Electricity generated by new solar and wind generators connecting and ramping up in north and central Queensland will increase power flow from the north of the region toward the RRN located in Brisbane.

Central Queensland coal generation projections are lower in the 2019-20 MLF calculation study than the 2018-19 study, however the impact of increased renewable generation is greater than the decrease in coal generation. This means the power flow from central Queensland to south Queensland is higher in the 2019-20 MLF study than the 2018-19 study.

The increase in projected power flow from north and central Queensland toward the RRN has led to decreases in MLFs for connection points in northern Queensland of 0.9% on average and decreases for connection points in central Queensland of 0.39% on average.

The MLFs for connection points in north Queensland have decreased more than those in central Queensland due to a combination of two issues:

- First, the network impedance between northern Queensland and the RRN is higher than it is for central Queensland.
- Second, much of the new renewable generation is located in northern Queensland.

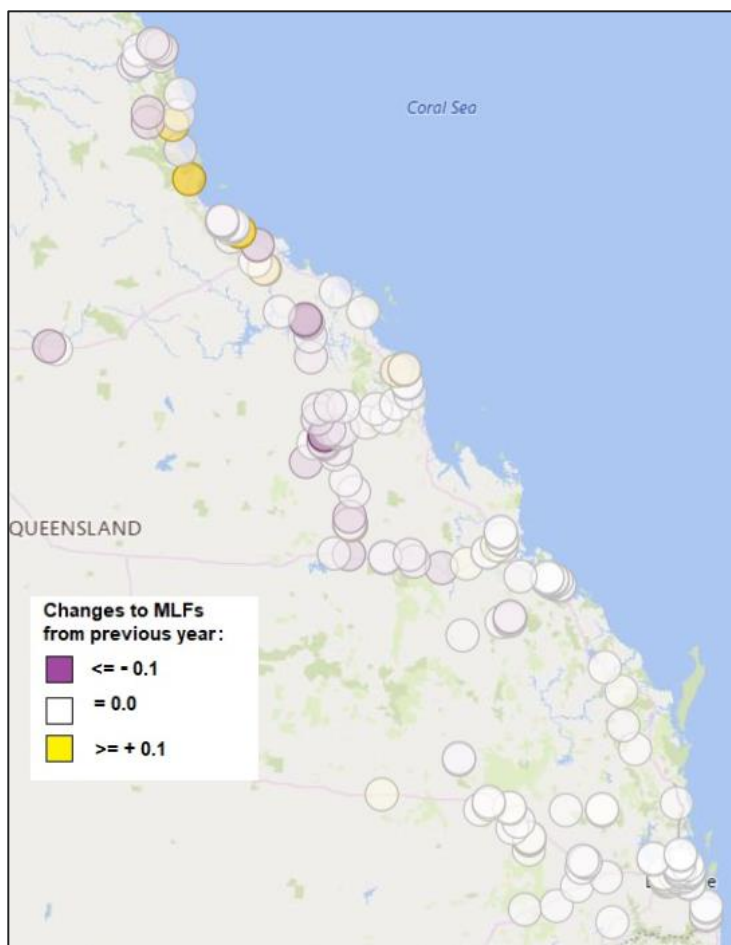
Combined, these issues mean the increase in projected losses between north Queensland and the RRN is higher than that between central Queensland and the RRN.

South-west Queensland MLFs reduced on average by 0.06% due to expected new generation in the area as well as the reduction in projected flow south across the QNI interconnector.

MLFs for connection points in south east Queensland have not changed substantially from 2019-20, because most connection points in the area are electrically close to the RRN.

Figure 1 shows the changes to MLFs at Queensland connection points in the 2019-20 study compared to the previous year.

Figure 1 Queensland changes to 2019-20 MLFs



2.3.2 Changes to Marginal Loss Factors in New South Wales

MLFs for connection points in the south of New South Wales and the ACT, including Canberra and Snowy, have decreased on average by 3.9% and 3.5% respectively. New renewable generation connections in the area, combined with a reduction in projected interconnector flow from Queensland as well as from New South Wales to Victoria, have resulted in an effective projected power flow increase toward the RRN in western Sydney from the south of the region.

MLFs for connection points in south-west New South Wales have decreased by 11.5% on average. The amount of wind and solar generation that has connected near Broken Hill has increased, thus increasing the projected power flow toward the RRN substantially.

MLFs for most connection points in west New South Wales have reduced by 1.4% on average from 2018-19 to 2019-20. The new solar and wind farms in this area contributed to an increase in flow towards the RRN hence MLFs in the area have decreased.

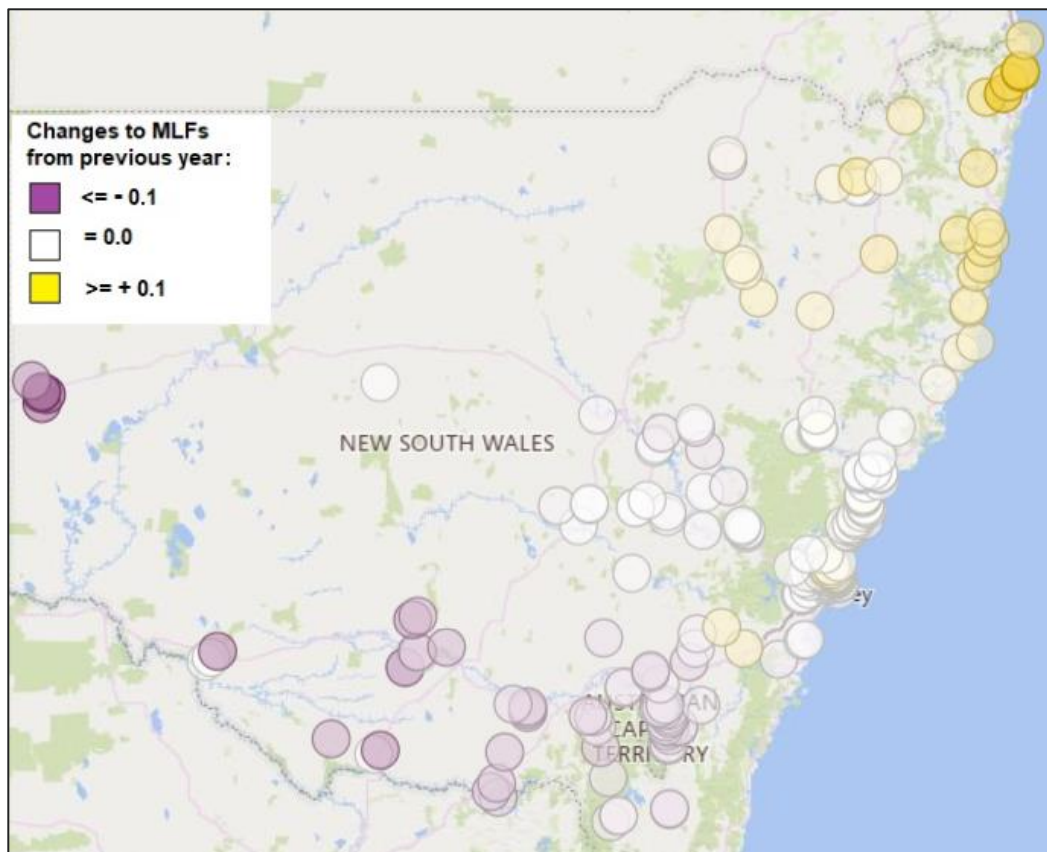
MLFs for connection points in the Sydney zone have not changed substantially from 2018-19 since most connection points in the area are electrically close to the RRN.

Connection points in north New South Wales have increased by 2.87% on average due to reduced projected interconnector import from Queensland. However, there are localised reductions in MLF connected to the 132 kV transmission network caused by projected increases in generation connected to this network.

Changes in MLFs for the Hunter region from 2018-19 to 2019-20 are very small (0.13%) due to the lack of changes to the supply and demand balance in this area compared to the previous year.

Figure 2 shows the changes to MLFs at New South Wales connection points in the 2019-20 study compared to the previous year.

Figure 2 New South Wales changes to 2019-20 MLFs



2.3.3 Changes to Marginal Loss Factors in Victoria

MLFs for connection points in central and north-west Victoria have decreased on average by 3.6% and 8.18% respectively. This is due to the increase in projected generation in the region from new wind and solar farms, causing an increase in projected power flow from these areas to the RRN located in Melbourne, as well as additional power from South Australia through the Murraylink interconnector.

Connection points in north Victoria lie on the transmission flow path connecting the main components of the Victoria – New South Wales interconnection with the RRN. MLFs in north Victoria have increased by 1.84% on average due to increased generation in Victoria and increased imports from South Australia resulting in increased flows to New South Wales.

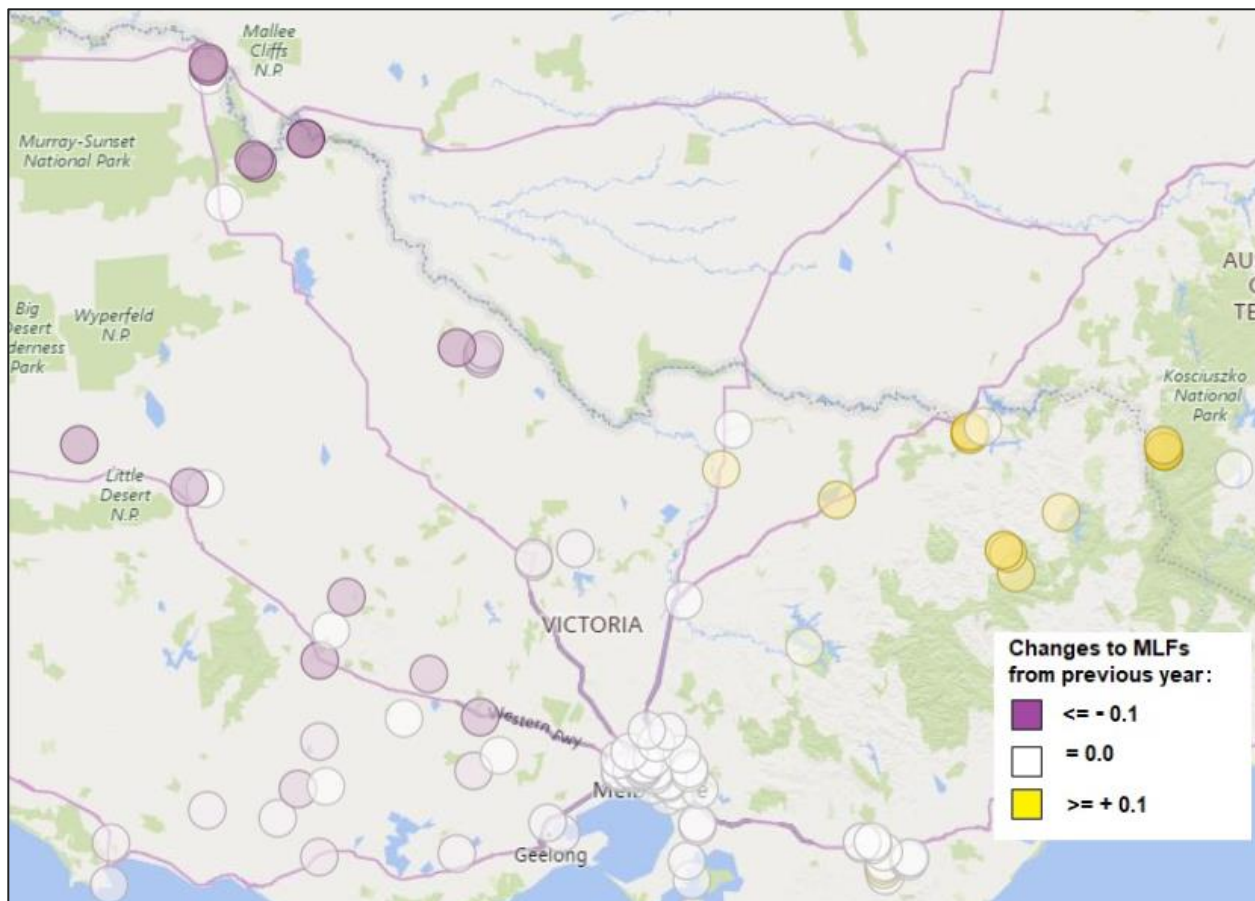
MLFs for connection points in western Victoria have decreased by 1.5% on average, largely due to the projected decrease in interconnector export to South Australia and the new wind farms scheduled to connect in that area. Connection points in this zone lie on the transmission flow path connecting the Victorian RRN with the Heywood interconnector. A decrease in projected interconnector export effectively increases power flow from these connection points to the RRN.

The average changes to the MLFs for connection points in the Latrobe Valley reduced by 0.16%. The total forecast generation in that area has reduced by close to 10% compared to 2018-19 however the flow to Tasmania has also reversed this year, with net import from Tasmania to Victoria in the 2019-20 study.

MLFs for connection points in the Melbourne zone have reduced on average 0.34%. from 2018-19 to 2019-20, as the connection points in this zone are electrically close to the RRN.

Figure 3 shows the changes to MLFs at Victorian connection points in the 2019-20 study compared to the previous year.

Figure 3 Victoria changes to 2019-20 MLFs



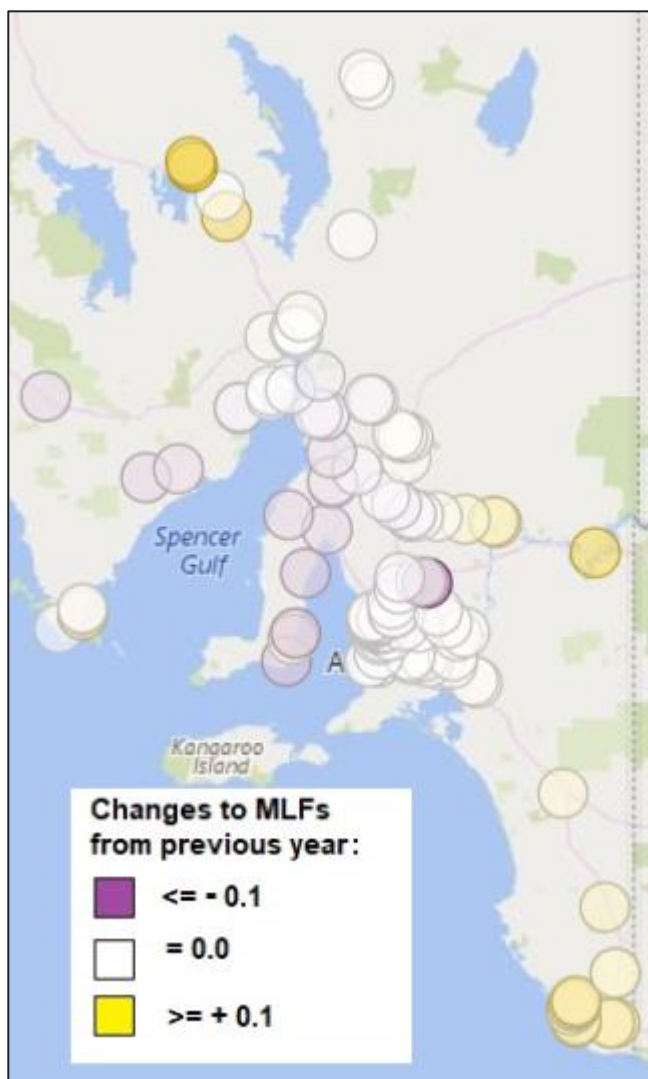
2.3.4 Changes to Marginal Loss Factors in South Australia

Loss factors in the Riverland and south-east South Australia zones have increased on average by 4.12% and 3.95% respectively. Connection points for these zones lie on the transmission corridors between the Heywood and Murraylink interconnectors and the RRN. Projected transfer across these interconnectors reversed this year from Victoria – South Australia to South Australia – Victoria. The resulting projected increased power flow from the South Australia reference node to these regions has led to increased MLFs.

MLFs for connection points in the Adelaide zone have not changed on average from 2018-19 to 2019-20. This is because the connection points in this zone are generally electrically closer to the RRN.

Figure 4 shows the changes to MLFs at South Australian connection points in the 2019-20 study compared to the previous year.

Figure 4 South Australia changes to 2019-20 MLFs



2.3.5 Changes to Marginal Loss Factors in Tasmania

Basslink flow is an input into the MLF calculation (as detailed in A2.4.2). In the 2019-20 studies net power transfers are from Tasmania to the mainland which differs from the 2018-19 studies where net power transfer were from the mainland to Tasmania.

The impact of these changes is to reduce MLFs by 3.2% on average for connection points in the south Tasmania zone, and 1.7% for connection points in the north Tasmania zone. Generation from these regions increases to meet the additional demand due to lack of imports from Victoria.

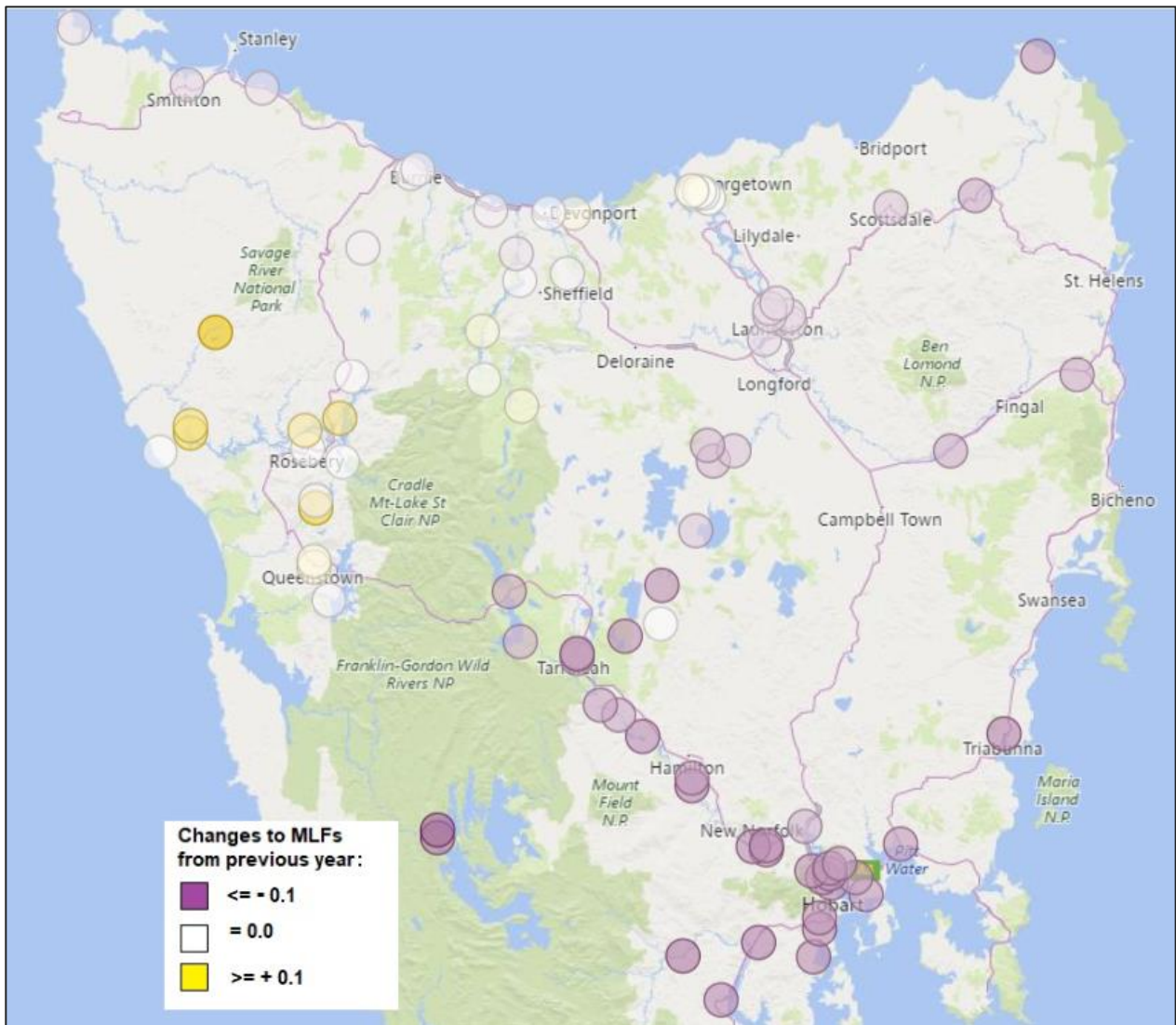
MLFs for connection points in north-west Tasmania decreased by 0.4% on average, due to small changes in demand within this zone.

The MLFs for connection points on the west coast have only reduced by 0.2%, as there has been little change in supply and demand since the 2018-19 study.

MLFs for connection points in the Georgetown zone have not materially changed on average from 2018-19 to 2019-20, because the connection points in this zone are electrically close to the RRN.

Figure 5 shows the changes to MLFs at Tasmanian connection points in the 2019-20 study compared to the previous year.

Figure 5 Tasmania changes to 2019-20 MLFs



3. Inter-regional loss factor equations

This section describes the 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)

$$= 0.9529 + 1.9617E-04*NQt + 1.0044E-05*Qd + -3.5146E-07*Nd$$

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

$$= 1.0657 + 1.7027E-04*VNt + -3.1523E-05*Vd + 2.1734E-05*Nd + -6.5967E-05*Sd$$

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

$$= 1.0138 + 2.9522E-04*VSAt + 1.3598E-06*Vd + -1.3290E-05*Sd$$

Where:

Qd = Queensland demand

Vd = Victorian demand

Nd = New South Wales demand

Sd = South Australian demand

NQt = transfer from New South Wales to Queensland

VNt = transfer from Victoria to New South Wales

VSAt = transfer from Victoria to South Australia

Figure 6 MLF (South Pine 275 referred to Sydney West 330)

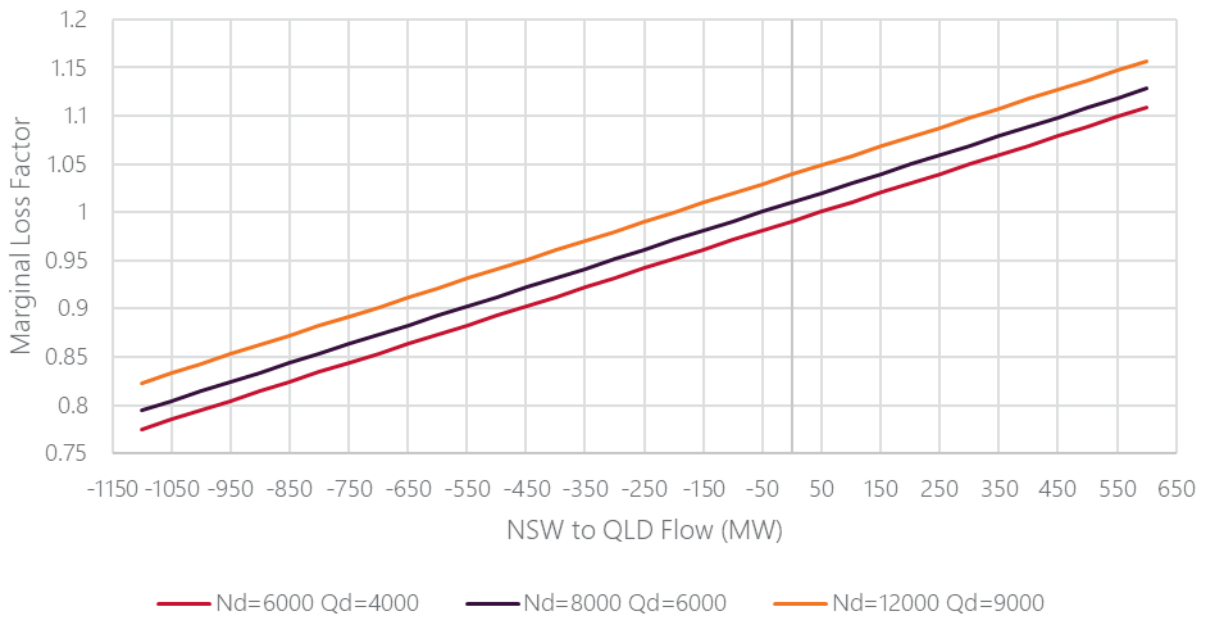


Table 18 South Pine 275 referred to Sydney West 330 MLF versus New South Wales to Queensland flow coefficient statistics

| Coefficient | Qd | Nd | NQt | CONSTANT |
|-------------------|------------|-------------|------------|------------|
| Coefficient value | 1.0044E-05 | -3.5146E-07 | 1.9617E-04 | 9.5290E-01 |

Figure 7 MLF (Sydney West 330 referred to Thomastown 66)



Table 19 Sydney West 330 referred to Thomastown 66 MLF versus Victoria to New South Wales flow coefficient statistics

| Coefficient | Sd | Nd | Vd | VNt | CONSTANT |
|-------------------|-------------|------------|-------------|------------|------------|
| Coefficient value | -6.5967E-05 | 2.1734E-05 | -3.1523E-05 | 1.7027E-04 | 1.0657E+00 |

Figure 8 MLF (Torrens Island 66 referred to Thomastown 66)

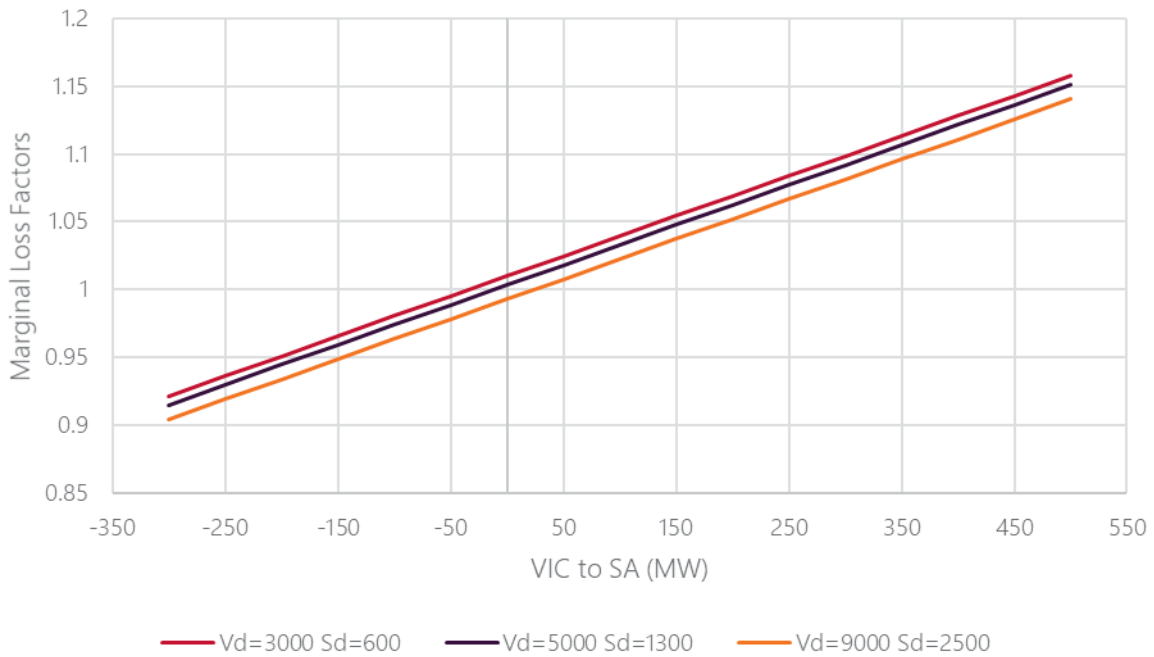


Table 20 Torrens Island 66 referred to Thomastown 66 MLF versus Victoria to South Australia flow coefficient statistics

| Coefficient | Sd | Vd | VSAf | CONSTANT |
|-------------------|-------------|------------|------------|------------|
| Coefficient value | -1.3290E-05 | 1.3598E-06 | 2.9522E-04 | 1.0138E+00 |

4. Inter-regional loss equations

This section describes how inter-regional loss equations are derived.

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

$$\text{Losses} = \int (\text{Loss factor} - 1) d\text{Flow}$$

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

$$= (-0.0471 + 1.0044\text{E-}05 \cdot Q_d + -3.5146\text{E-}07 \cdot N_d) \cdot N_{Qt} + 9.8083\text{E-}05 \cdot (N_{Qt})^2$$

Sydney West 330 referred to Thomastown 66 notional link average losses

$$= (0.0657 + -3.1523\text{E-}05 \cdot V_d + 2.1734\text{E-}05 \cdot N_d + -6.5967\text{E-}05 \cdot S_d) \cdot V_{Nt} + 8.5133\text{E-}05 \cdot (V_{Nt})^2$$

Torrens Island 66 referred to Thomastown 66 notional link average losses

$$= (0.0138 + 1.3598\text{E-}06 \cdot V_d + -1.3290\text{E-}05 \cdot S_d) \cdot V_{SAt} + 1.4761\text{E-}04 \cdot (V_{SAt})^2$$

Where:

Q_d = Queensland demand

V_d = Victorian demand

N_d = New South Wales demand

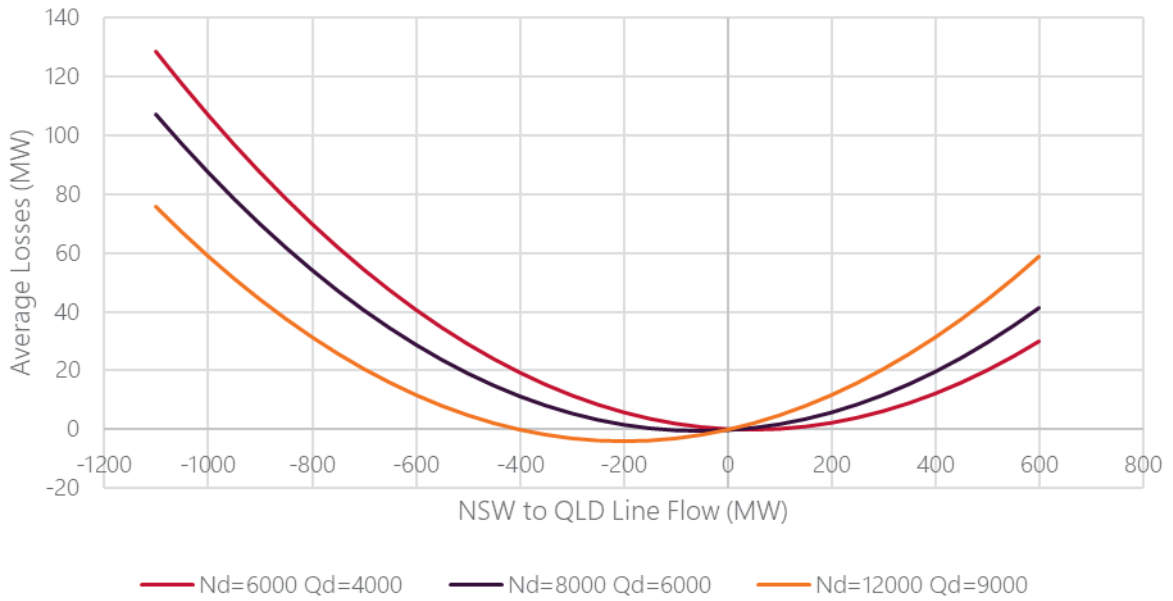
S_d = South Australia demand

N_{Qt} = transfer from New South Wales to Queensland

V_{Nt} = transfer from Victoria to New South Wales

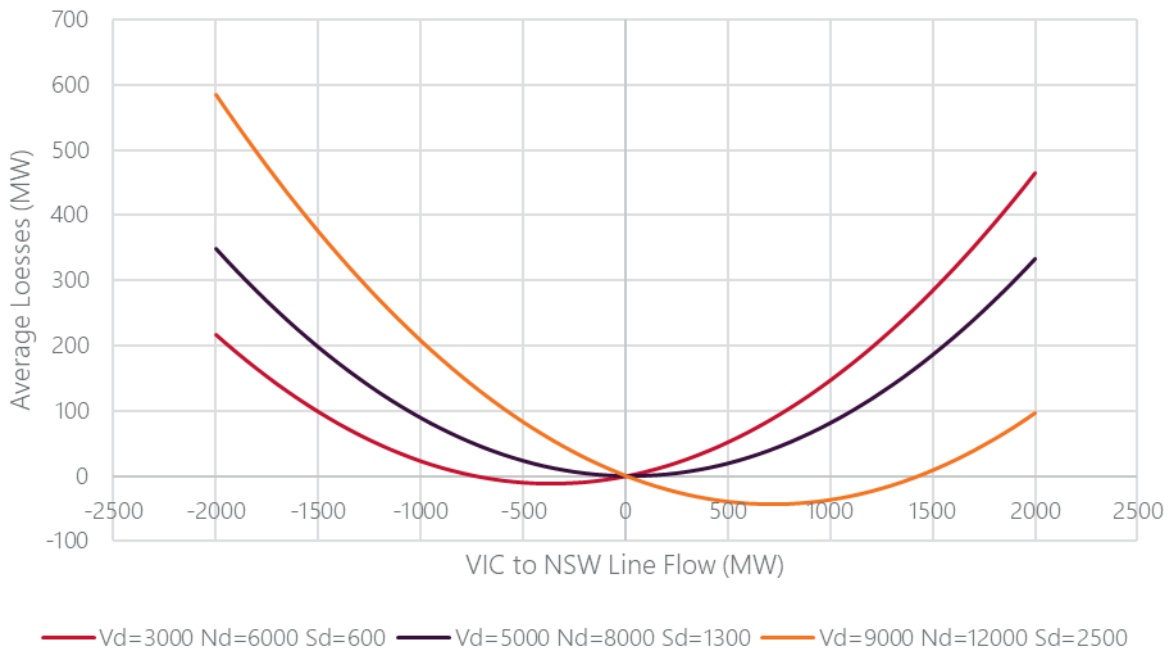
V_{SAt} = transfer from Victoria to South Australia

Figure 9 Average Losses for New South Wales – Queensland Notional Link



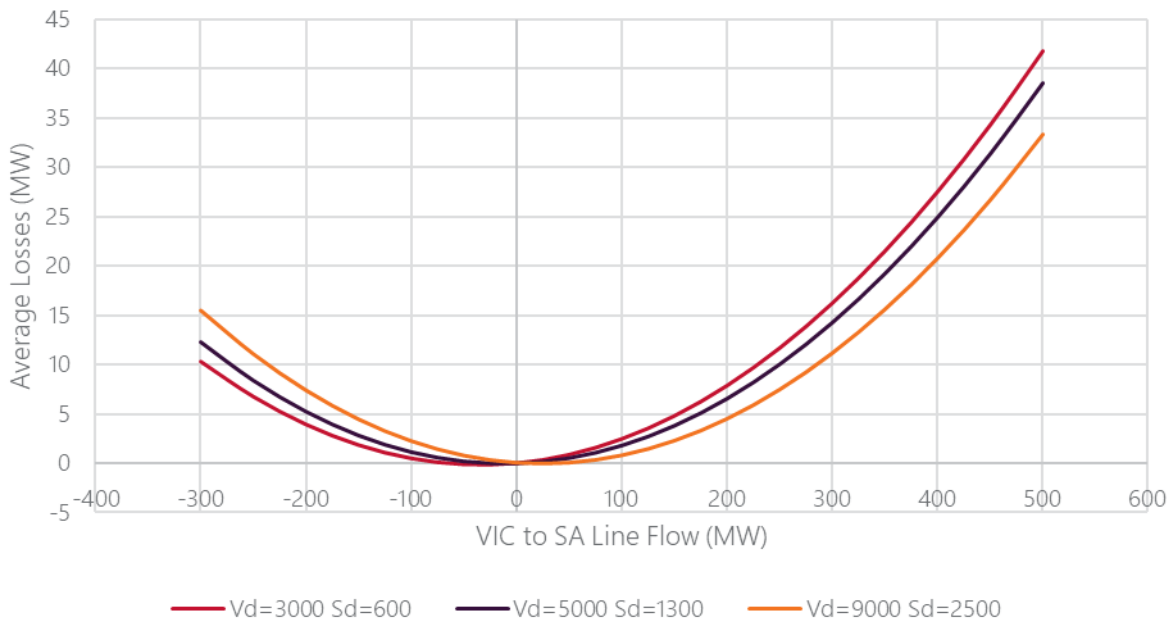
New South Wales to Queensland notional link losses versus New South Wales to Queensland notional link flow

Figure 10 Average Losses for Victoria - New South Wales Notional Link



Victoria to New South Wales notional link losses versus Victoria to New South Wales notional link flow

Figure 11 Average Losses for Victoria – South Australia Notional Link



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

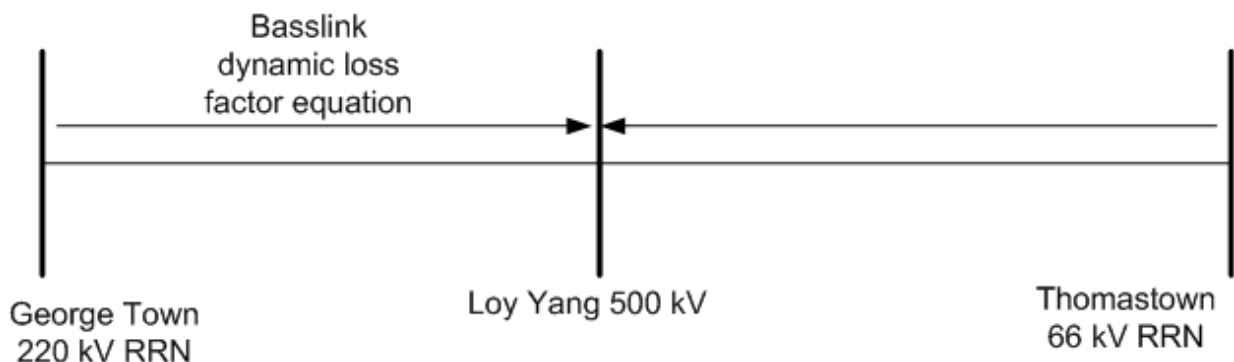
5. Basslink, Terranora, Murraylink loss equations

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 parts:

- George Town 220 kV MLF referred to Tasmania RRN = 1.0000
- Basslink (Loy Yang PS Switchyard) 500 kV MLF referred to Victorian RRN is 0.9789 when exporting power to Tasmania and 0.9728 when importing power from Tasmania.
- Receiving end dynamic loss factor referred to the sending end = $0.99608 + 2.0786 \times 10^{-4} * P(\text{receive})$, where $P(\text{receive})$ 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:

$$P(\text{send}) = P(\text{receive}) + [(-3.92 \times 10^{-3}) * P(\text{receive}) + (1.0393 \times 10^{-4}) * P(\text{receive})^2 + 4]$$

Where:

$P(\text{send})$: Power in MW measured at the sending end,

$P(\text{receive})$: Power in MW measured at the receiving end.

The model is limited from 40 MW to 630 MW. When the model falls below 40 MW, 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 Australian regions.

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

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

AEMO determined the following Murraylink MLF model using regression analysis:

$$\text{Murraylink MLF (Torrens Island 66 referred to Thomastown 66)} = 0.8933 + 1.8119\text{E-}03 * \text{Flow}$$

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:

Table 21 Regression statistics for Murraylink

| COEFFICIENT | Murraylink flow | CONSTANT |
|--------------------------|-----------------|----------|
| Coefficient Value | 1.8119E-03 | 0.8933 |

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

$$\text{Murraylink loss} = -0.1067 * \text{Flow} + 9.0595\text{E-}04 * (\text{Flow})^2$$

Figure 12 Murraylink MLF (Torrens Island 66 referred to Thomastown 66)

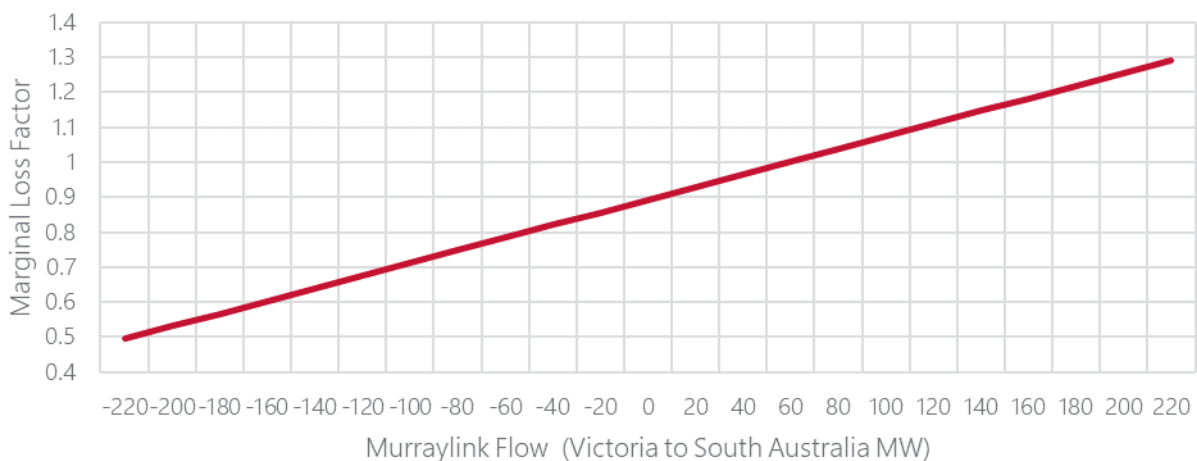
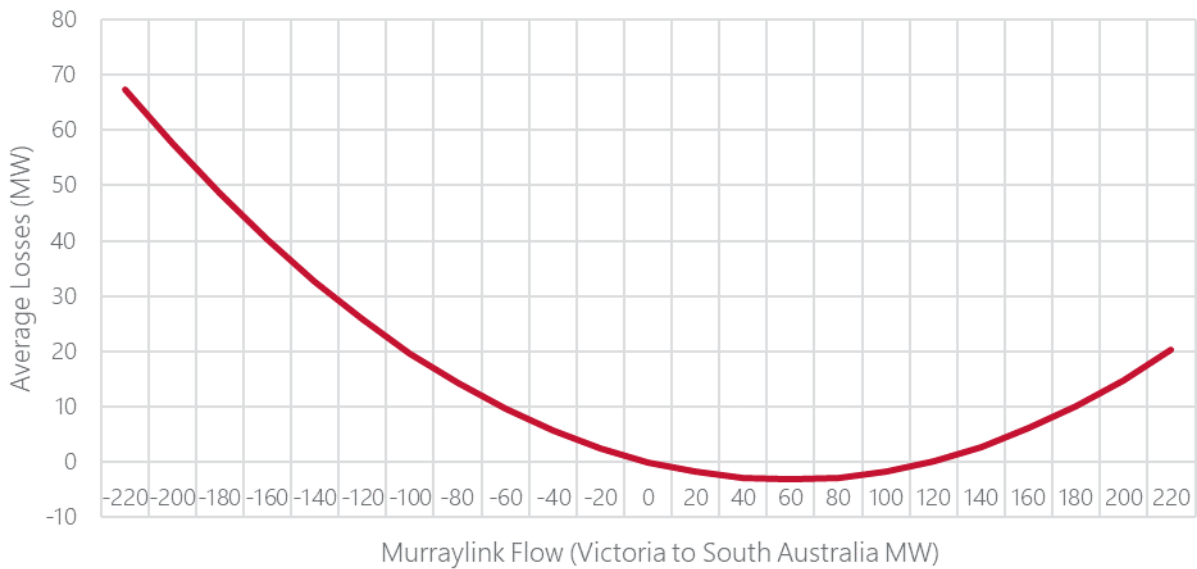


Figure 13 Average losses for Murraylink interconnector (Torrens Island 66 referred to Thomastown 66)



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 New South Wales 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 New South Wales and Queensland regions.

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

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

AEMO determined the following Terranora MLF model using regression analysis:

$$\begin{aligned} \text{Terranora interconnector MLF (South Pine 275 referred to Sydney West 330)} \\ = 1.0331 + 2.6048\text{E-}03 * \text{Flow} \end{aligned}$$

This model consisting of a constant and a Terranora 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:

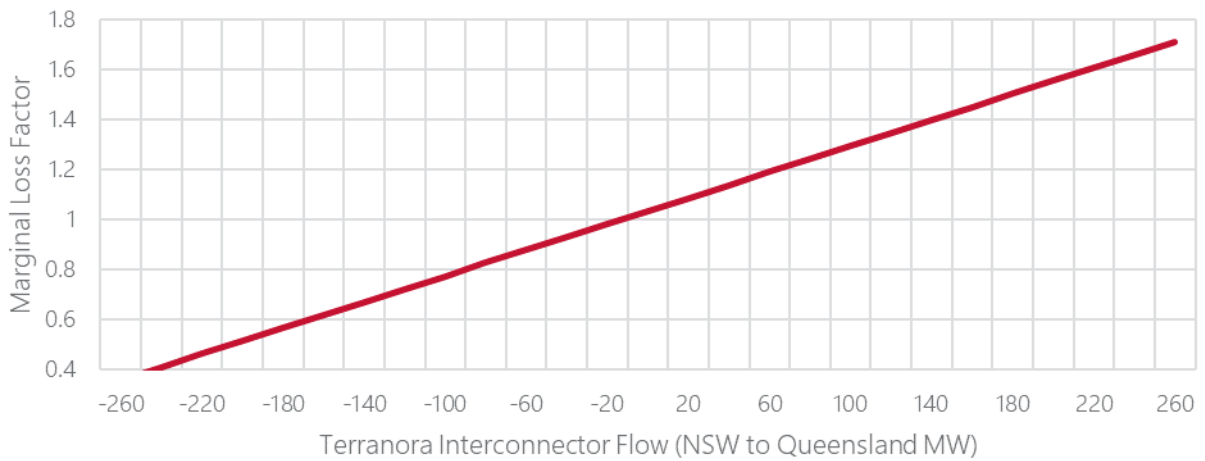
Table 22 Regression statistics for Terranora

| Coefficient value | Flow _t | CONSTANT |
|-------------------|-------------------|----------|
| Coefficient Value | 2.6048E-03 | 1.0331 |

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

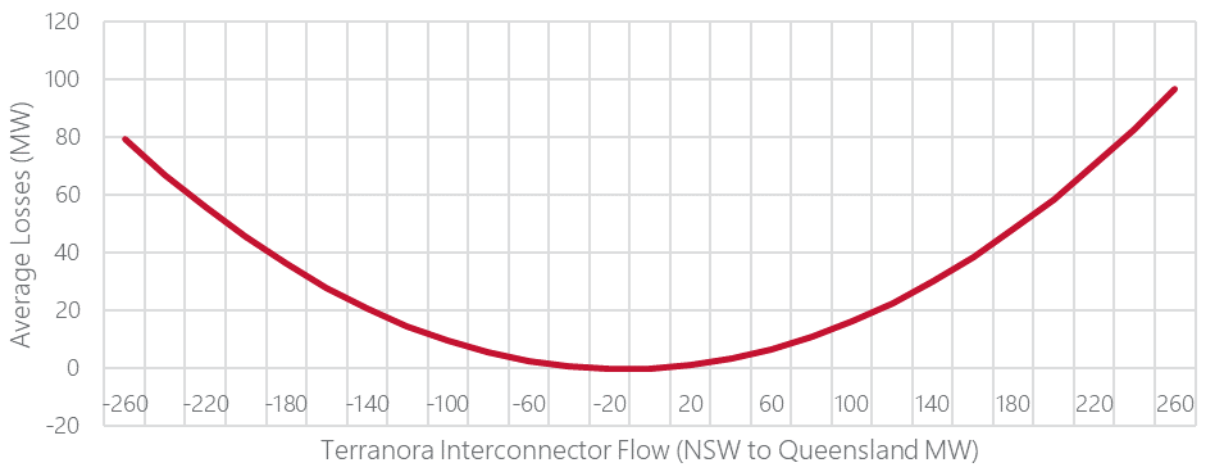
$$\text{Terranora loss} = 0.0331 * \text{Flow} + 1.3024\text{E-}03 * (\text{Flow})^2$$

Figure 14 Terranora interconnector MLF (South Pine 275 referred to Sydney West 330)



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

Figure 15 Average losses for Terranora interconnector (South Pine 275 referred to Sydney West 330)



Terranora interconnector notional link losses versus flow (New South Wales to Queensland)

6. Proportioning of inter-regional losses to regions

This section details how the inter-regional losses are proportioned by the National Electricity Market Dispatch Engine (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 2019-20 financial year:

Table 23 Factors for inter-regional losses

| Notional interconnector | Proportioning factor | Applied to |
|---|----------------------|-----------------|
| Queensland – New South Wales (QNI) | 0.56 | New South Wales |
| Queensland – New South Wales (Terranora Interconnector) | 0.54 | New South Wales |
| Victoria – New South Wales | 0.54 | Victoria |
| Victoria – South Australia (Heywood) | 0.73 | Victoria |
| Victoria – South Australia (Murraylink) | 0.73 | Victoria |

7. Regions and regional reference nodes

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

7.1 Regions and Regional Reference Nodes

Regions and Regional Reference Nodes

| Region | Regional Reference Node |
|-----------------|-----------------------------|
| Queensland | South Pine 275kV node |
| New South Wales | Sydney West 330kV node |
| Victoria | Thomastown 66kV node |
| South Australia | Torrens Island 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.

7.2.1 Between the Queensland and New South Wales regions

- At Dumaresq Substation on the 8L and 8M Dumaresq to Bulli Creek 330kV lines¹¹.
- 10.8 km north of Terranora on the two 110kV lines between Terranora and Mudgeeraba (lines 757 & 758). Metering at Mudgeeraba adjusted for that point.

7.2.2 Between the New South Wales 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.

¹¹ The metering at Dumaresq is internally scaled to produce an equivalent flow at the NEW SOUTH WALES/Queensland State borders.

7.2.3 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.

7.2.4 Between the Victoria and Tasmania regions

Basslink is not a regulated interconnector, it has the following metering points:

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

8. Virtual transmission nodes

This section describes the configuration of the different virtual transmission nodes (VTNs), that have been advised to AEMO at time of publication.

VTNs are aggregations of transmission nodes for which a single MLF is applied. AEMO has considered the following VTNs which have been approved by the Australian Energy Regulator (AER).

8.1 New South Wales Virtual Transmission Nodes

Table 25 New South Wales 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, Lake Munmorrah 132, 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, Hydro Aluminium 132 |
| NEV3 | South of Broken Bay | Sydney North 132 (Ausgrid), Lane Cove 132, Meadowbank 11, Mason Park 132, Homebush Bay 11, Chullora 132 kV, 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 132, Kurnell 132, Belmore Park 132, Green Square 11, Carlingford 132, Hurstville North 11, Kogarah 11, and Haymarket 132, Croydon 11 |
| AAVT | ACT | Angle Crossing 132, Belconnen 132, City East 132, Civic 132, East Lake 132, Gilmore 132, Gold Creek 132, Latham 132, Telopia Park 132, Theodore 132, Wanniasa 132, Woden 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

Table 26 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 |

A1. Background to marginal loss factors

This section summarises the method AEMO uses to account for electricity 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 to set electricity prices that need to include 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 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 MLFs to determine dispatch of generation.

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

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

A1.1 Rules requirements

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

Rule 3.6 of the Rules requires AEMO to calculate the inter-regional loss factor equations (clause 3.6.1) and intra-regional loss factors (MLFs) (clause 3.6.2) each year that will apply for the next financial year.

Clauses 3.6.1, 3.6.2 and 3.6.2A specify the requirements for calculating the inter-regional loss factor equations and MLFs, 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.

A1.2 Application 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. Depending on network and loading configurations MLFs vary, ranging from below 1.0 to above 1.0.

A1.2.1 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 electrical power at the RRN and transmitting it 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, 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 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.

A1.2.2 Marginal Loss Factors less than 1.0

Losses increase with distance, so the greater 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 existing net flow. At any instant, when additional flow is against net flow, total network losses 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 local load.

Using the example above, if 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.

A1.2.3 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 Market 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 $1.05 \times 1000 = \$1050$. The higher purchase value covers the cost of the electrical losses in transporting electricity to the Market Customer's connection point from the RRN.

A Market 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 $0.95 \times 1000 = \$950$. The lower sales value covers the cost of the electrical losses in transporting electricity from the Market 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.

A2. 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.

A2.1 Marginal Loss Factors calculation methodology

AEMO uses a forward-looking loss factor (FLLF) methodology (Methodology)¹² 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.

A2.2 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.

Table 27 Forecast energy for 2019-20

| Region | 2019-20 forecast sent-out energy ¹³ (GWh) | 2018-19 forecast sent-out energy ¹⁴ (GWh) |
|-----------------|--|--|
| New South Wales | 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 |

¹² 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.

¹³ Forecast Operational consumption – as sent out. It was sourced from the most recent published Electricity Statement of Opportunities (ESOO), at <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities>.

¹⁴ Forecast Operational consumption – as sent out. It was sourced from the 2018 National Energy Forecasting Report (NEFR), at <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Statement-of-Opportunities>.

A2.2.1 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 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.

A2.3 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.

A2.3.1 New generating units

For new generating units (not previously modelled in MLF calculations), AEMO requests the relevant proponent to provide a generation profile. Where an appropriate profile is not provided, AEMO calculates the initial estimate of the output by reference to 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 but not yet registered 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
- Kennedy Energy Park (Battery + PV + Wind)
- Tableland Mill
- Oakey 2 Solar Farm
- Warwick Solar Farm
- Yarranlea Solar

- Dunblane Solar Farm

New South Wales and ACT new generating units

- Crudine Ridge Wind Farm
- Darlington Point Solar Farm
- Finley Solar Farm
- Limondale Solar Plant 1
- Limondale Solar Plant 2
- Nevertire Solar Farm
- Sunraysia Solar Farm

Victoria new generating units

- Bulgana Green Power Hub Battery
- Bulgana Green Power Hub Wind Farm
- Cherry Tree Wind Farm
- Cohuna Solar Farm
- Dundonnell Wind Farm
- Kiamal Solar Farm Stage 1
- Lal Lal Wind Energy System – Elaine
- Moorabool Wind Farm
- Stockyard Hill Wind Farm
- Yatpool Solar Farm

South Australia new generating units

- Barker Inlet PS
- Lake Bonney Battery

Tasmania new generating units

- Granville Harbour Wind Farm
- Wild Cattle Hill Wind Farm

Updates to generation profiles for new projects

In April AEMO requested the proponents of 46 new generation projects to review and if necessary update the generation information previously submitted, to reflect:

- Best estimate of actual electrical power generation over the year commencing 1 July 2019, under a neutral scenario (50% POE).
- Best estimate of timing of first export of actual electrical power generation as well as provision for progressive commissioning hold points.
- Any known electrical power generation limitations that are expected to be applied to the generating unit following commissioning, e.g. local limits.

For any projects where hold point schedules had not yet been determined, AEMO suggested the following generic hold point schedule assumption for wind and solar projects (noting that actual hold points would be individually determined based on plant and network considerations):

- Hold point at 1/3 of individual generating units in service for 2 months.
- Hold point at 2/3 of individual generating units in service for 2 months.
- 100% thereafter.

AEMO received updated generation profiles for 29 projects. One additional project¹⁵ was no longer considered committed and was removed from MLF modelling. A due diligence process was applied and MLFs were subsequently recalculated. Table 28 shows the revised full commercial use dates (where not advised to AEMO as confidential) for the 29 projects which updated their generation profiles since the draft MLFs were published on 1 April 2019.

Table 28 The expected timing of full commercial use as advised to AEMO

| Generator name | Region | Full commercial use date modelled |
|-----------------------------|--------|-----------------------------------|
| Brigalow Solar Farm | QLD | April 2020 |
| Clare Solar Farm | QLD | October 2019 |
| Coopers Gap Wind Farm | QLD | April 2020 |
| Haughton Solar Farm | QLD | July 2019 |
| Kennedy Energy Park | QLD | July 2019 |
| Lilyvale Solar Farm | QLD | July 2019 |
| Oakey 1 Solar Farm | QLD | August 2019 |
| Oakey 2 Solar Farm | QLD | November 2019 |
| Rugby Run Solar Farm | QLD | December 2019 |
| Tableland Mill Expansion | QLD | September 2019 |
| Warwick Solar Farm | QLD | November 2020 |
| Yarranlea Solar Farm | QLD | January 2020 |
| Crudine Ridge Wind Farm | NSW | May 2020 |
| Darlington Point Solar Farm | NSW | March 2020 |
| Limondale Solar Plant 2 | NSW | December 2019 |
| Nevertire Solar Farm | NSW | September 2019 |
| Silverton Wind Farm | NSW | Confidential |
| Sunraysia Solar Farm | NSW | November 2019 |
| Bulgana Battery | VIC | Confidential |
| Bulgana Wind Farm | VIC | Confidential |
| Kiamal Solar Farm | VIC | Confidential |
| Moorabool Wind Farm | VIC | March 2020 |

¹⁵ Teebar Solar Farm in Queensland.

| Generator name | Region | Full commercial use date modelled |
|-----------------------------|--------|-----------------------------------|
| Murra Warra Wind Farm | VIC | October 2019 |
| Stockyard Hill Wind Farm | VIC | Confidential |
| Barker Inlet PS | SA | October 2019 |
| Lake Bonney Battery | SA | July 2019 |
| Lincoln Gap Wind Farm | SA | February 2020 |
| Granville Harbour Wind Farm | TAS | March 2020 |
| Wild Cattle Hill Wind Farm | TAS | Confidential |

A2.3.2 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 2019-20 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.

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

Table 29 Adjusted generation values for Tasmania

| | Historical generation (GWh) | Adjusted generation (GWh) |
|-----------|-----------------------------|---------------------------|
| Jul – Sep | 783.49 | 652.15 |
| Oct – Dec | 429.51 | 398.49 |
| Jan – Mar | 337.26 | 267.95 |
| Apr – Jun | 771.55 | 626.43 |
| Total | 2,321.81 | 1,945.02 |

A2.4 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.

A2.4.1 Network augmentation for 2019-20

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

Queensland network augmentations

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

- Rebuild of Mackay Substation.
- Rebuild of Gin Gin Substation.
- Dysart Transformer Replacement (132/66 kV)
- Ingham South Transformer Replacement (132/66 kV)
- Kemmis Transformer 2 Replacement (132/66 kV)

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.
- Installation of new 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 132 kV feeder (90L).

Victoria network augmentations

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

- Ballarat – Waubra – Ararat – Crowlands – Bulgana - Horsham 220kV line upgrades
- Richmond 66kV permanent load transfer to new Brunswick 66kV by

- Minor upgrade of Red Cliffs – Buronga 220 kV line

South Australia network augmentations

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

- Taillem Bend - Cherry Gardens 275 kV tie-in at Tungkillo
- Mount Gunson 132 kV South Supply

Please note: The following augmentations have not been modelled as they have no impact on MLF calculation for 2019-20.

- Upgrading of Davenport – Robertstown 275 kV lines.
- Upgrading of TIPS – Cherry Gardens 275 kV line.
- Upgrading of TIPS – Magill 275 kV line.
- Upgrading of Kincaig – Penola West 132 kV line.
- Smart Wires PowerGuardian Technology trial - Waterloo - Templers 132 kV line

Tasmania network augmentations

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

- Decommissioning of Waddamana – Bridgewater Junction 110 kV line.
- Replacement of Lindisfarne Substation Transformer (110/33 kV).
- Upgrading of Rosebery Substation Transformer Rating (110/44 kV).
- George Town–Comalco 220 kV transmission line replacement

A2.4.2 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 if required to reflect any change in forecast generation in Tasmania.

Section 5 outlines the loss model for Basslink.

A2.4.3 Treatment of Terranora interconnector

The Terranora interconnector is a regulated interconnector.

The boundary between Queensland and New South Wales 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.

A2.4.4 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.

A2.4.5 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.

A2.5 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.

Table 30 Interconnector capacity

| From region | To region | Summer peak (MW) | Summer off-peak (MW) | Winter peak (MW) | Winter off-peak (MW) |
|------------------------------|------------------------------|--|--|--|--|
| Queensland | New South Wales | 1,078 | 1,078 | 1,078 | 1,078 |
| New South Wales | Queensland | 400 | 550 | 400 | 550 |
| New South Wales | Victoria | 1,700 minus Murray Generation | 1,700 minus Murray Generation | 1,700 minus Murray Generation | 1,700 minus Murray Generation |
| Victoria | New South Wales | 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) | New South Wales (Terranora) | 224 | 224 | 224 | 224 |
| New South Wales (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.

A2.6 Calculation of Marginal Loss Factors

AEMO uses the TPRICE¹⁶ 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.
- 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.

A2.6.1 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.
- A due diligence review of the MW profiles for new generation projects.

¹⁶ 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.

A3. Impact of highly correlated generation profiles on MLF

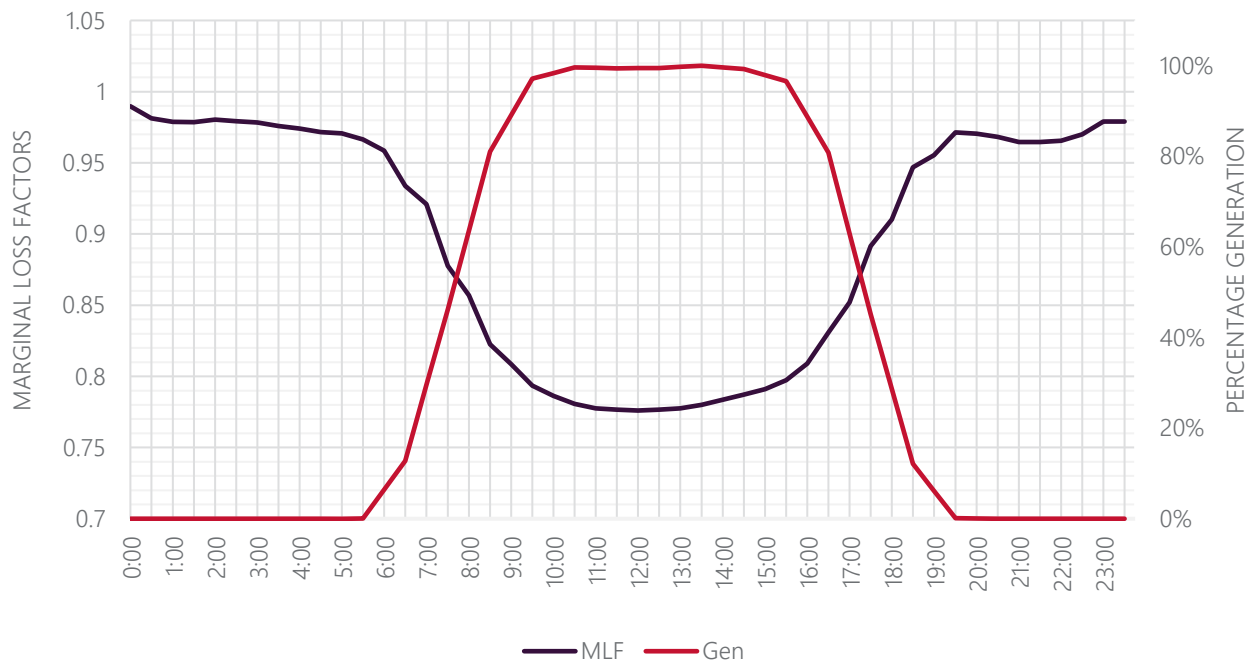
As discussed in Appendix A2.6, MLFs are calculated by simulating power flows on the network for every half-hour, in the next financial year, using forecast supply and demand values. The calculated raw loss factors for each half-hour are then weighted by the volume of energy at the TNI to calculate the MLF for that TNI.

Calculated raw loss factors reflect the supply and demand at each half-hour, hence can have a large range. With increased generation connections of the same technology in an area, a daily pattern is observed due to increased supply and low demand during daylight hours. As a result, MLFs in these areas are declining sharply.

As an example, Figure 16 shows the time of day average MLF and percentage generation for a selected solar farm, located in an area with a high solar penetration. The MLF at night time is just below 1, however, the MLF during the day is below 0.8. The generation output is nearly 100% during the day, but zero at night. When volume weighted averages are applied, the MLF for the solar farm is close to 0.8.

If, however, a generator with a profile that is not correlated to solar connects in this area, it would have a significantly higher MLF than the solar farm.

Figure 16 Time of day average MLF and percentage generation



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 |