Marginal Loss Factor Forum

Friday 17 December 2021

Via WebEx

Acknowledgement of Country

We acknowledge the Traditional Owners of the country throughout Australia and recognised their continuing connection to land, waters and culture. We pay our respects to their Elders past, present and emerging.

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Agenda

	Time (AEDT)	Agenda item	Presenter
Preliminary matters			
1	1:00pm – 1:10pm	Welcome, introductions, and forum objectives	James Lindley
Matters for discussion			
2	1:10pm – 1:30pm	2020-21 MLFs: Historical comparison insights	Chris Muffett
3	1:30pm – 1:50pm	2022-23 MLFs: Preliminary report	Daniel Flynn
4	1:50pm – 2:00pm	MLF publication and further information	Chris Muffett
5	2:00pm	Forum close	Chris Muffett

Welcome, introductions, and forum objectives

James Lindley

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Forum objectives

This forum is intended to support AEMO's objective of improving the transparency of the MLF process, the following topics will be presented:

2020-21 FY Historical Comparison

- Share insights on a comparison between published and historically-modelled MLF outcomes for the 2020-21 FY

Preliminary 2022-23 FY MLF Outcomes

- Share insights on forecast trends and preliminary MLF outcomes for the 2022-23 FY

2020-21 MLFs: Historical comparison insights

Chris Muffett

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Introduction

Methodology for historical comparison

While the historical comparison study has utilised inputs representative of historical outcomes (load/generation), there are limitations when performing historical MLF comparisons

- A single system normal network model is implemented

The following are not considered:

- Historical network outages
- Adjustments to network configuration (with exception of known augmentations)

Drivers of variation

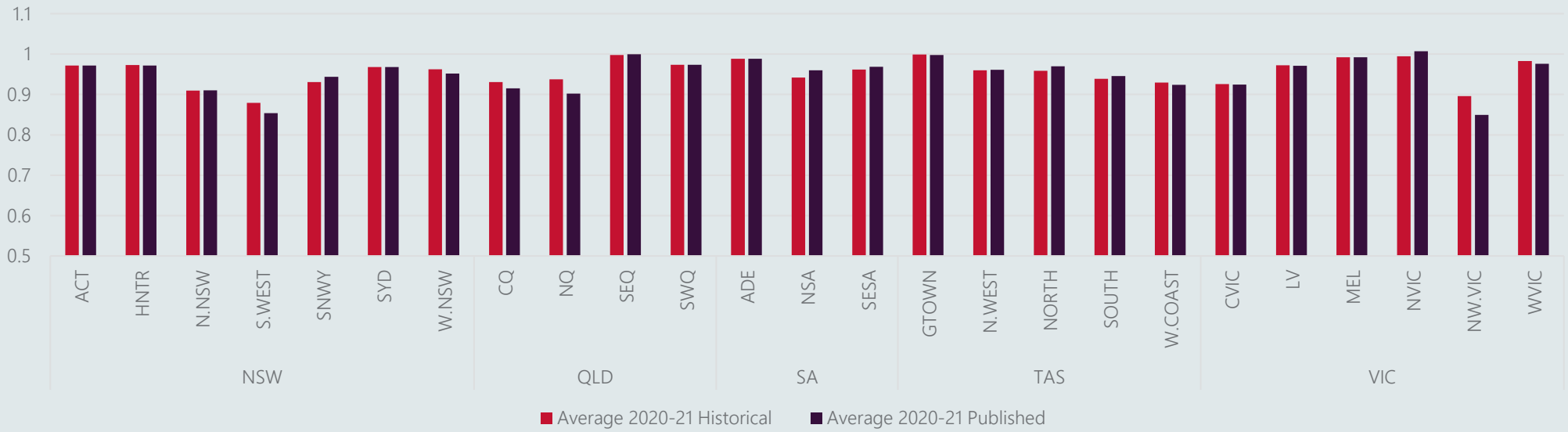
Generator connection/commissioning delays

- Timing of connection, commissioning and subsequently commercial operation of new generation capacity continues to be challenging

Operational limits

- Several new system normal limits, and revisions to existing limits impacted on both generation and inter-regional transfers
  - Improvements have been made in this space, however difficult to forecast impact of limits up to 15 months in advance

Regional average MLFs for Generators



New South Wales - South-west generator MLFs higher than published:

- Reduced northerly flows from Victoria
- Intra-regional constraints
- Commissioning of new capacity slower than anticipated

Queensland - Central and northern Queensland generator MLFs higher than published:

- Partially due to Callide event
- South-west Queensland generation increased materially, offsetting central Queensland thermal generation
- Some variation between forecast and actual rooftop PV uptake

Victoria - North-west Victoria generator MLFs higher than published:

- Partially due to change in relationship between Murraylink and Heywood flows due to constraints
- Commissioning of new capacity slower than anticipated

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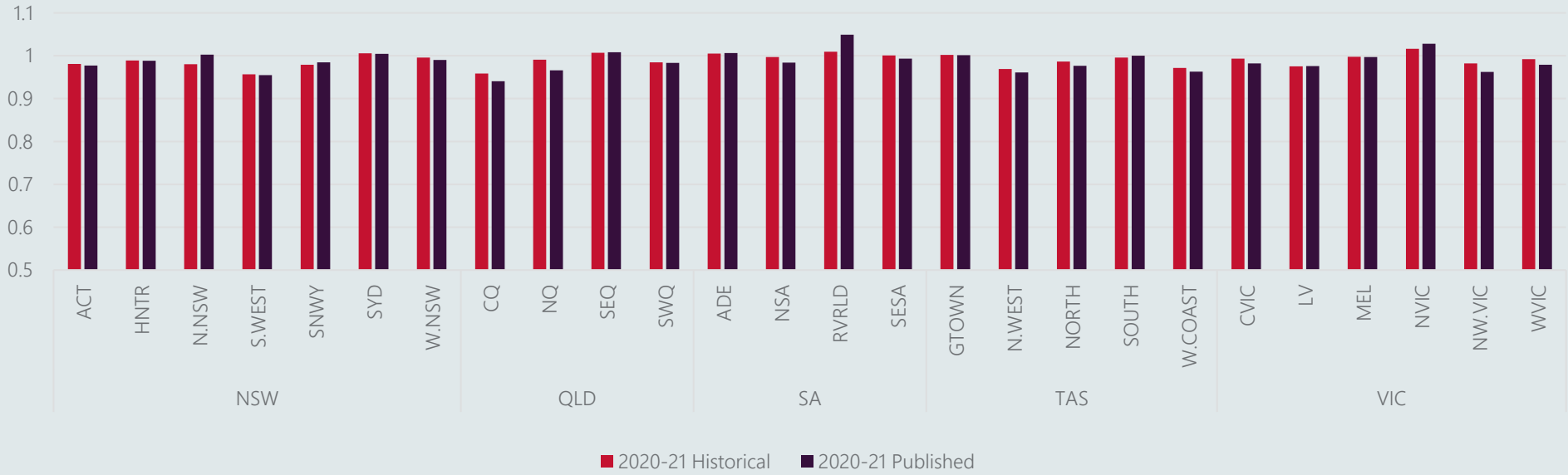
Regional average MLFs for Loads



Queensland

- Central and northern Queensland load MLFs higher than published:
  - Same drivers as generation

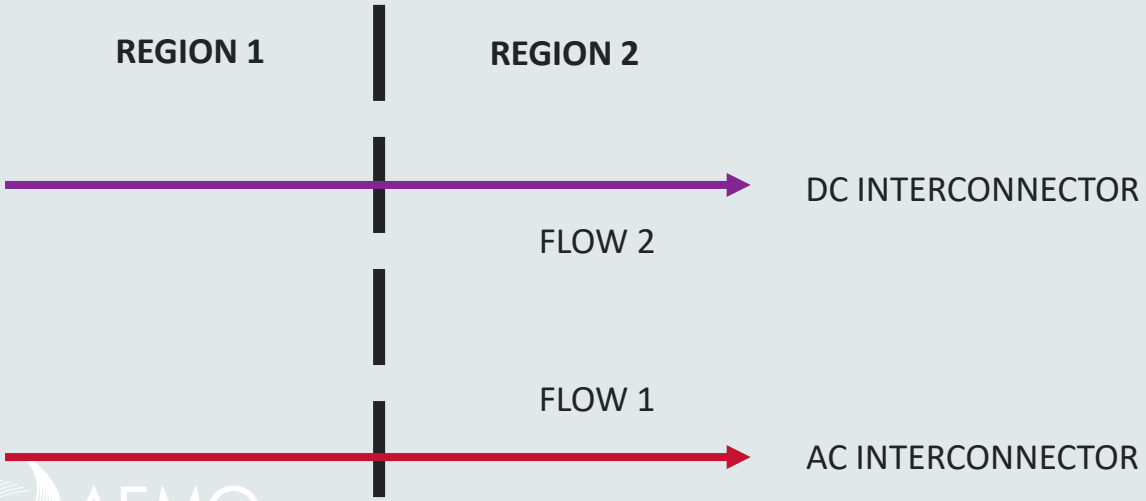
South Australia

- Riverland load MLFs lower than published:
  - Partially due to change in relationship between Murraylink and Heywood flows due to constraints
  - Additional embedded generation capacity between Riverland and RRN that was not considered in published 2020/21 FY MLF study (not COM/COM*)

Murraylink

As part of the 2020 Forward Looking Loss Factor Methodology review:

- The process for modelling of DC interconnectors in parallel was identified as potentially being problematic
- The previous process was for the DC interconnector to operate based on a ratio derived from the capacity of the AC and DC interconnectors
- As part of the methodology review, this was revised to a process where the relationship was derived from historical observations during the reference year
- Prior to finalisation of the 2021/22 FY MLF outcomes, it was apparent that the relationship between Heywood and Murraylink was diverging from a single ratio of their respective capacities
- The relationship was observed to be highly diurnal due to forced westerly flows as the result of constraints that bound at times of high solar generation in south-west NSW
- As it was apparent reference year flows were unlikely to be indicative of future outcomes, it was appropriate to move the reference period to the partial calculation year to better reflect the change in behaviour



$$Equation\ 1\ -\ Flow\ 2 = Flow\ 1 * \frac{DC\ IC\ CAPACITY}{AC\ IC\ CAPACITY}$$

$$Equation\ 2\ -\ Flow\ 2 = Flow\ 1 * X\ (Ratio) + Y\ (Offset)$$

Where,

X = Ratio derived from historical observation

Y = Offset derived from historical observation

Preliminary 2022-23 MLF results

Daniel Flynn

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Preliminary MLF Methodology

Item	Preliminary	Final
New generation projects	Inclusion based on generator project status in October 2021 Generation Information page. Projects are included where the status is COM or COM*.	Inclusion based on generator project status in January 2022 Generation Information page. Projects are included where the status is COM or COM*.
Load profiles	Historical load profiles from 2020-21 FY scaled to meet target year forecasts.	Forecast load profiles for 2022-23 FY.
Network model	2021-22 MLF study network model.	Revised network model incorporating future augmentations.
Intra-regional limit management	Intra-regional limits as identified and incorporated into the 2021-22 MLF study inclusive of new generators where applicable.	Intra-regional limits incorporated in the 2021-22 study will be reviewed and altered where required. Additional intra-regional constraints may also be identified and incorporated into the final study.
Inter-regional limit management	Inter-regional limits as per 2021-22 MLF study.	Inter-regional limits will be revised as required based on limit advice for the 2022-23 FY.

The primary drivers of change in recent years have been variations in,

- Increased semi-scheduled capacity and the associated diurnal impact of output
- Generator closures
- Generation shifting from electrically strong to electrically weak sections of network
- Increased diurnal variation in demand profile as a result of increased rooftop PV penetration

As generation has been the primary driver of change the preliminary study focused on changes to generation

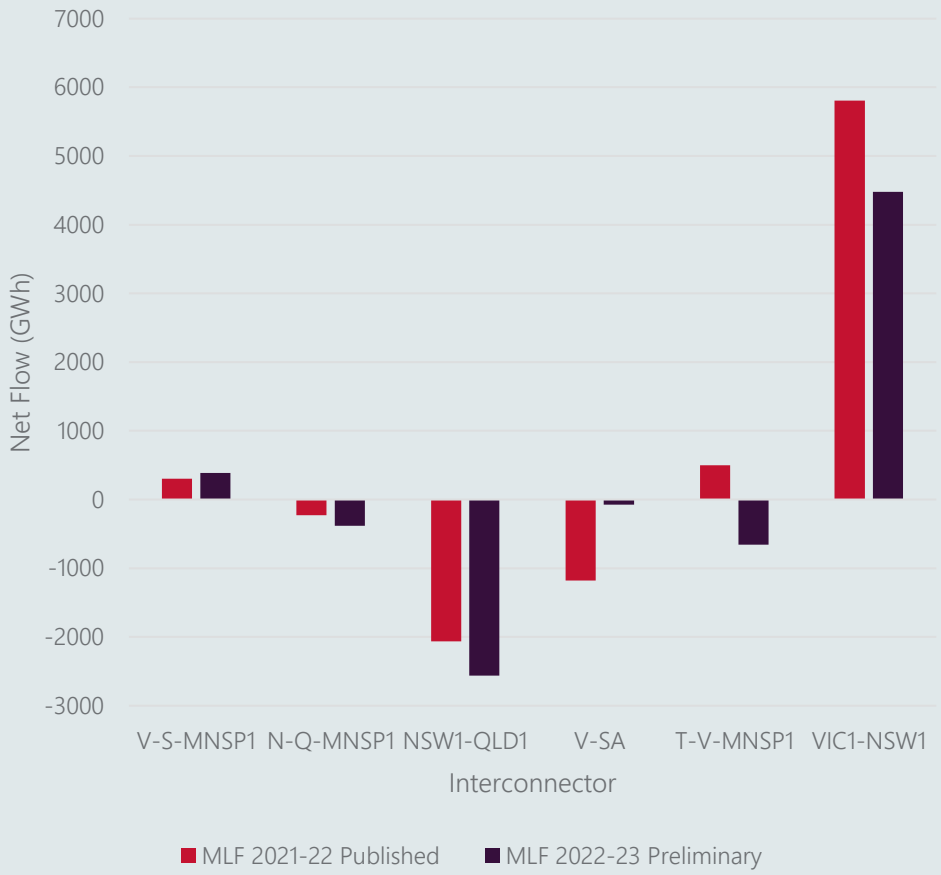
2021-22 vs 2022-23 Interconnector Flows

Forecast change in interconnector flows

- Decrease in flows from VIC to NSW
- Increase in flows from QLD to NSW
- Decrease in flows from SA to VIC
- Increase in flows from VIC to TAS

Forecast change in NEM generation

- Shift in new capacity to predominately occur in New South Wales and Queensland, with slowdown of additional capacity anticipated within Victoria
- Complete closure of Liddell Power station to occur within target year

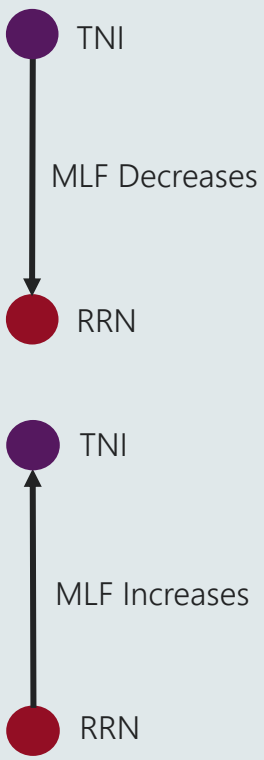


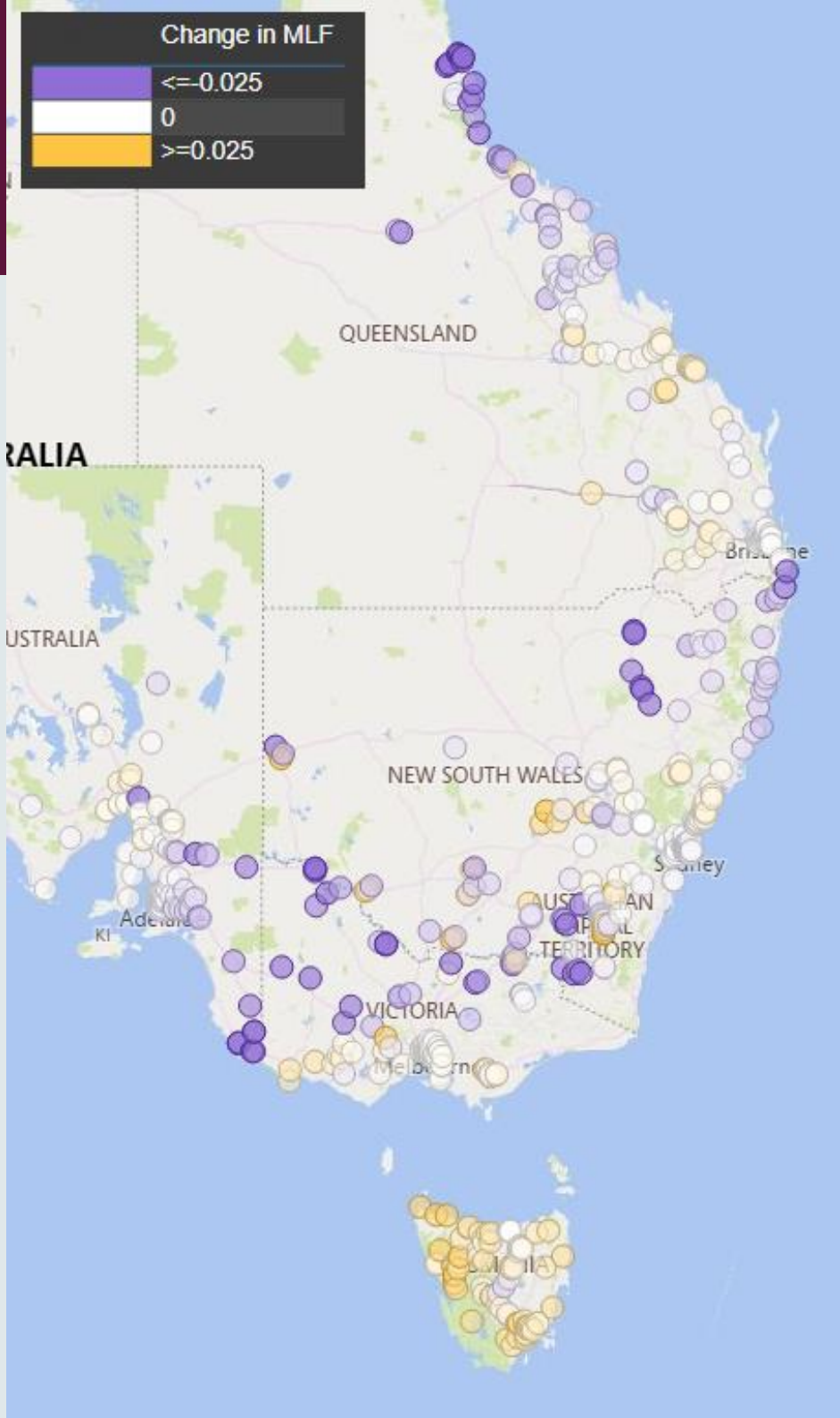
MLF heatmap

Changes in interconnector flows driven by changes in generation are currently the primary drivers of change

As flows increase from a TNI to the relevant RRN in general there will be a decrease in the MLF

As flows decrease from a TNI to the relevant RRN in general there will be an increase in the MLF





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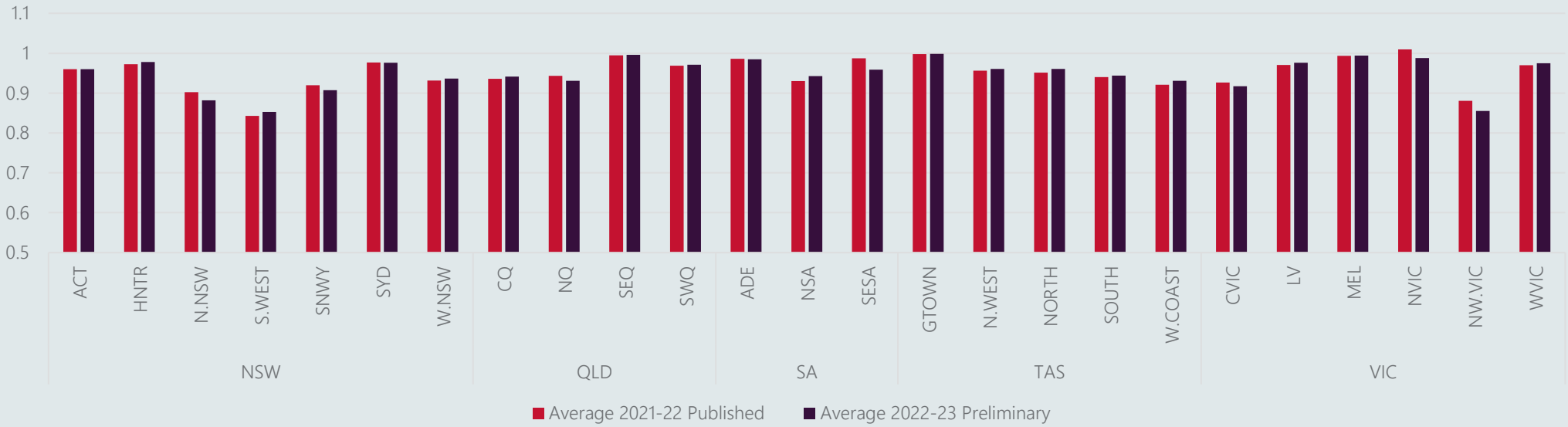
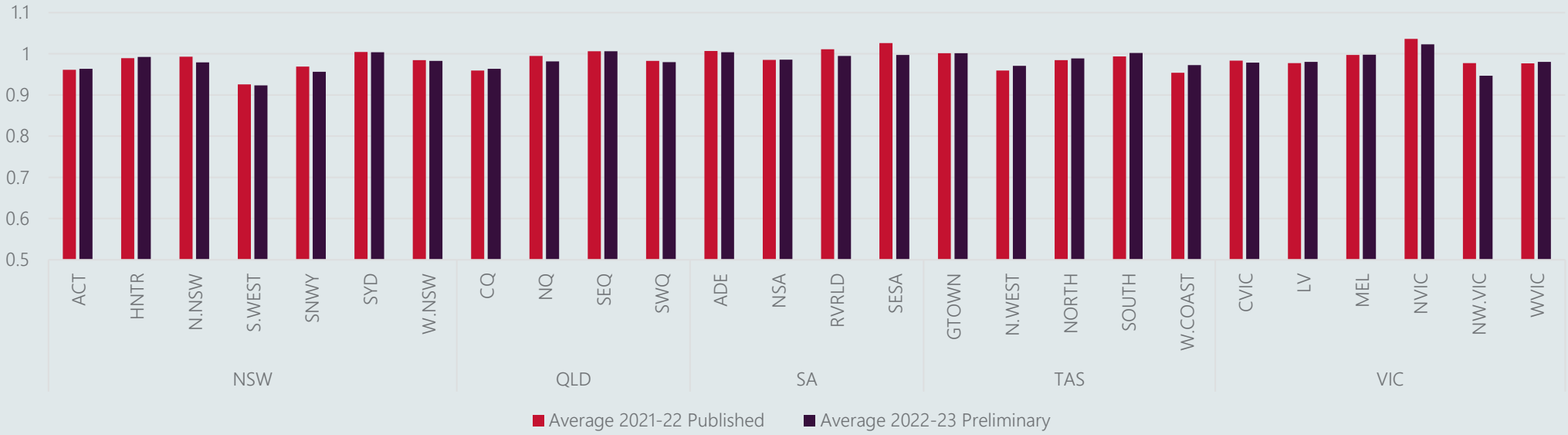
Generator MLF movements



- New South Wales – Divergence between MLF outcomes in Snowy and south-west largely result of diurnal shift in interconnector flows (positive impact on solar). Hunter MLF outcomes increased as a result of Liddell closure
- Queensland – Divergence between MLF outcomes in northern and central areas the result of increased generation capacity in the north, and decreased output from thermals in central Queensland
- South Australia – Decreased MLF outcomes in south-east primarily due to reduced VIC-SA flows.
- Victoria – Continued reduction in trend of MLFs decreasing in northern and north-west Victoria, driven by increased output of existing generation, increased capacity and the diurnal shift in the VIC-NSW flows (negative impact on solar)
- Tasmania – No material movement

Load MLF movements

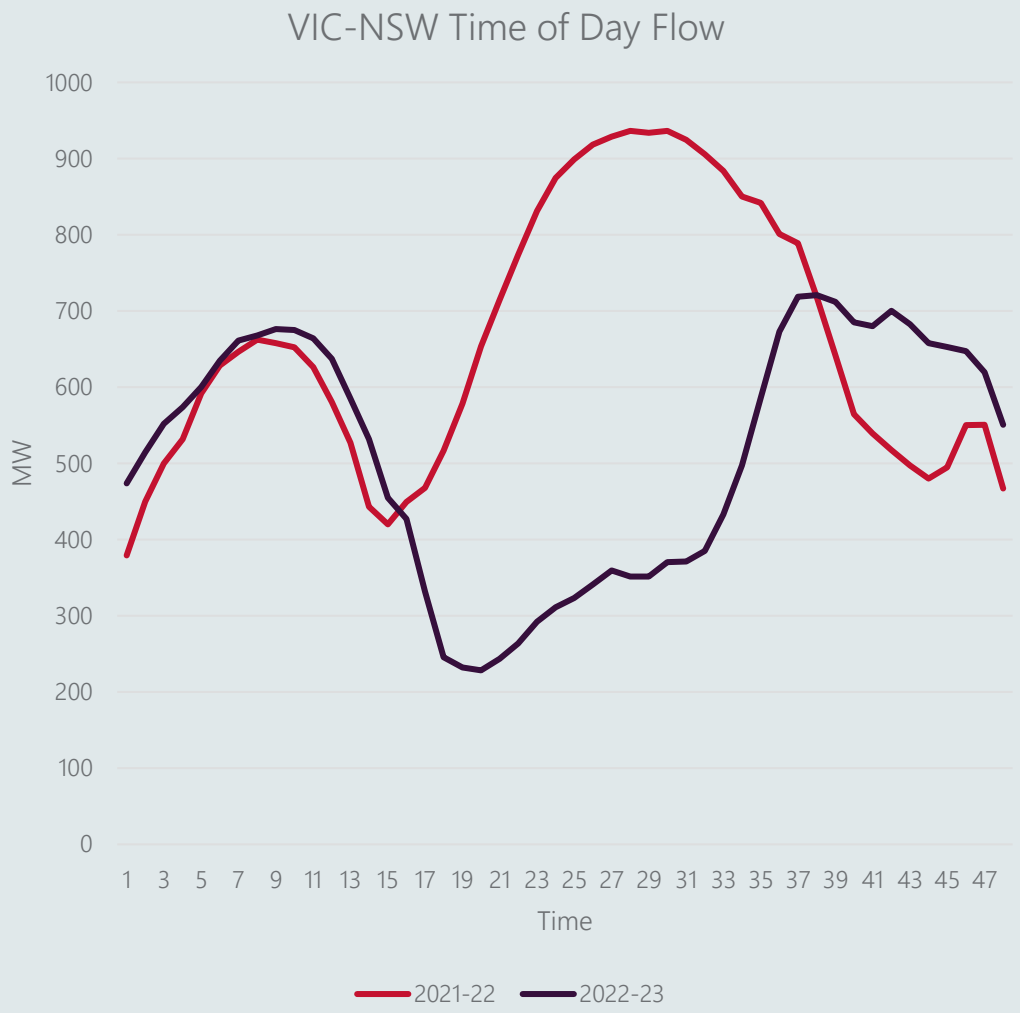


- New South Wales – Diurnal change in VIC-NSW less impact on load, reductions for both Snowy and south-west however south-west mild
- Queensland – Same drivers as per generation changes
- South Australia – Material reductions at both south-east and Riverland, south-east due to reduced exports and Riverland due to increased imports via Murraylink and new embedded generation capacity
- Victoria – Same drivers as per generation changes
- Tasmania – No material movement

Vic-NSW Interconnector Impact

The forecast time of day flows on the Victoria to New South Wales interconnector have seen a material shift during daylight hours

- This has resulted in a divergence of outcomes for MLFs in the south-west and Snowy areas of New South Wales
- Favourable impact to solar generation in south and south-west New South Wales
- Largely driven by shift in new generation capacity that is predominately located within New South Wales and Queensland



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Potential for Change (Preliminary vs Final)

The following are some of the preliminary vs final related (method related) items we anticipate may result in a material change between the preliminary 2022-23 MLF results and the final 2022-23 MLF outcomes to be published in 1 April 2022.

Load Forecast

- The preliminary study has been based on load data that is scaled to meet forecast targets, but the scaling process implemented for the preliminary study is simplistic in nature. E.g. No consideration was made for increased rooftop PV penetration.
- The load reference year loads will be reviewed and adjusted further prior to publication of the draft and final 2022/23 MLF outcomes.

New Generation

- If new generation achieves COM/COM* status by the cut-off date, these will be incorporated for the 2022-23 FY which will have an impact on MLF outcomes.
- Current generation profiles for future generation and existing generation that were not commercially operational for the reference year.

Intra/Inter-Regional Limits

- The intra/inter-regional limits considered in the 2021/22 MLF study have implemented into this preliminary 2022/23 MLF study. While they have been revised to incorporate additional generation and revisions to limits further analysis is required prior to the publication of the final 2022/23 MLF outcomes.
- This analysis may result in additional constraints being considered, or further changes to constraints currently considered.

MLF publication and further information

Chris Muffett

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NEMWEB Report

AEMO has started publishing daily reports on NEMWEB, the reports can be found at,

http://nemweb.com.au/Reports/Current/Marginal_Loss_Factors/

These reports include not only the MLFs applicable at the time of publication, but also a historical record of any intra-year revisions.

AEMO will continue to update the MLF report on a quarterly basis to incorporate both intra-year revisions to existing MLFs and MLFs for new connection points.

MLF publication cadence

Current MLF application period

April	July	October	January	April	July
MLF report	**Revised MLF report** New/modified connection points since final report	**Revised MLF report** New/modified connection points since final report	**Revised MLF report** New/modified connection points since final report	**Revised MLF report** New/modified connection points since final report	**Revised MLF report** New/modified connection points since final report

Next MLF application period

December	March	1 April
Preliminary MLF report	**Draft MLF report** Draft version of the final report allowing participants to review and provide feedback	**Final MLF report**

Feedback & further information

- Feedback can be provided directly to:
  MLF_feedback@aemo.com.au

- Methodology and MLF publications can be found at:
  https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Loss-factor-and-regional-boundaries

Questions?

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