



# Marginal Loss Factor Forum

Wednesday 16 December 2020

Via WebEx

# Agenda

	Time (AEDT)	Agenda item	Presenter
Preliminary matters			
1	3:00pm – 3:10pm	Welcome, introductions, and forum objectives	James Lindley
Matters for discussion			
2	3:10pm – 3:30pm	2020 FLLF Methodology Final Determination	Chris Muffett
3	3:30pm – 3:50pm	2019-20 MLFs: Historical comparison results	James Lindley
4	3:50pm – 4:10pm	2021-22 MLFs: Preliminary report	Daniel Flynn
5	4:10pm – 4:30pm	Stakeholder discussion and questions	Chris Muffett
Other business			
6	4:30pm	Forum close	Chris Muffett

# Welcome, introductions, and forum objectives

James Lindley

# 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 Methodology FLLF Review – Final Determination

- AEMO will publish the final determination and revised FLLF methodology on 18 December

## 2019/20 FY Historical Comparison

- Share insights on a comparison between predicted and historical MLF outcomes for the 2019/20 FY

## Preliminary 2021/22 FY MLF Outcomes

- Share insights on forecast trends and preliminary MLF outcomes for the 2021/22 FY

# 2020 FLLF Methodology Review

Chris Muffett

# 2020 FLLF Methodology Review

In 2020 AEMO commenced a formal review of the 2020 FLLF Methodology. The methodology review was focused on outcomes that could be incorporated into the 2021-22 FY MLF study.

The final determination is to be published on 18 December 2020.

Two non-administrative changes were incorporated between the draft determination and the final determination,

- Treatment of semi-scheduled generation in supply/demand balancing process
- Inclusion of additional section detailing process for intra-year revisions to MLFs
  - No change to process, but provides additional clarity for stakeholders

# Key issues considered

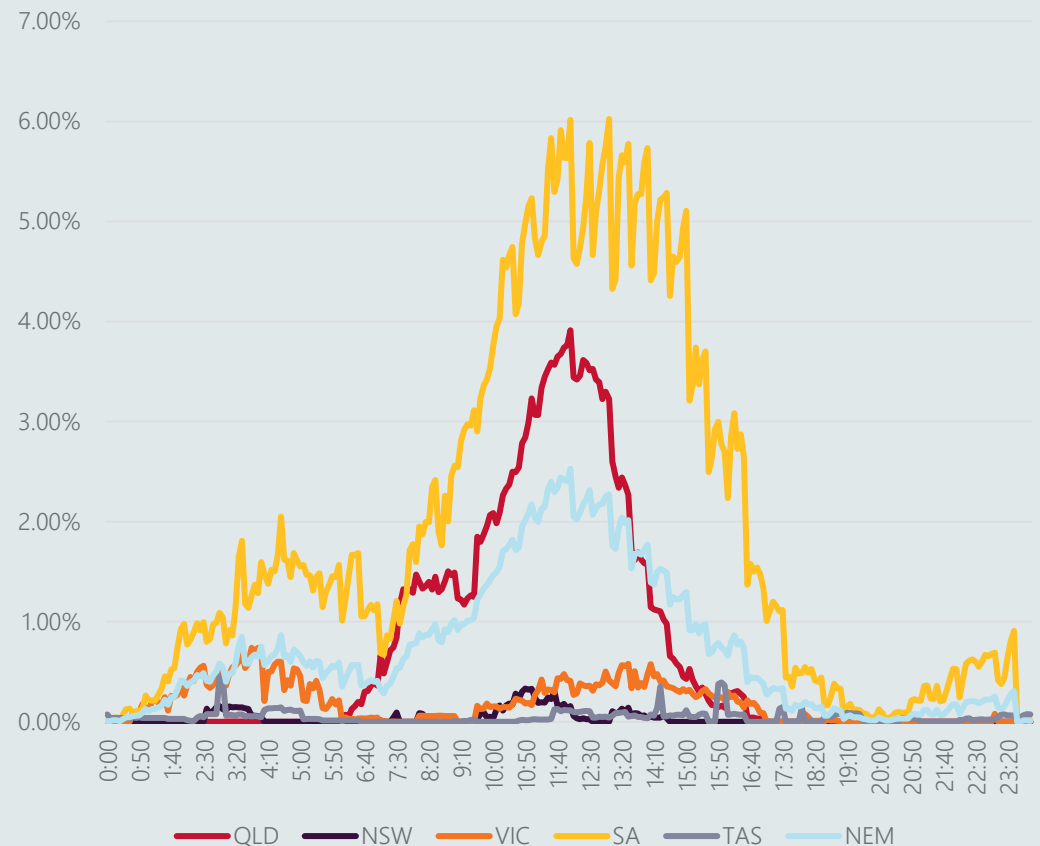
Issue	Initial position	Final determination
Reference Data	Retain existing period	No change
MNSP rule change implementation	Consider options at more dynamic approach	No change
Generator capacities	Change to use typical summer capacity	Change has been incorporated
New generation profiles	Updated to implement proposal	Change has been incorporated, additional change in final to incorporate economic curtailment (not in draft)
Minimum stable operation levels of thermal plant	Consider options to improve	Updated methodology to better reflect process
Minimal extrapolation theory	Consider options to improve	No change
Extrapolation capping	Consider options to improve	No change
Parallel AC/DC interconnectors	Change to use split based on actual flows	Change has been incorporated
Intra-regional limits	Change to better incorporate	Change has been incorporated
Transparency of MLFs	Change to reflect new reports	Change has been incorporated
Intra-year revisions	Change to formalise in methodology	Change has been incorporated to reporting. Clarify the rule requirement for modified connection points (not in draft)
Energy generation forecast study	Extend study to report renewables	Change has been incorporated
Treatment of problematic historical data	Consider options to improve	No change
Treatment of connected loads in close proximity to interconnectors	Suggestion from ERM to improve this, however requires rule changes	No change
Net energy balance and dual MLFs	Not raised	Change has been incorporated

# Semi-scheduled Generation Economic Curtailment

Feedback from several stakeholders raised concerns about the treatment of semi-scheduled generation within the minimal extrapolation theory.

- The existing MLF engine has limited configurations for the incorporation of generation into the supply/demand balancing process
- AEMO has not revised the treatment of semi-scheduled generation within the minimal extrapolation theory.
- However AEMO will incorporate a process for adjusting forecast semi-scheduled generation profiles on a regional and diurnal basis based on observed economic curtailment of semi-scheduled generation with the reference year.

Reference Year Semi-Scheduled Economic Curtailment Example





# Net Energy Balance (NEB) Threshold – Dual MLF

In recent years, the volume of connection points with bi-directional flows has increased. Historically application of dual MLFs has applied to pumped hydro, batteries, distribution ties and occasionally Basslink dependant on historical flows.

Bi-directional flow can lead to non-reflective MLF outcomes, and dual MLFs are utilised to ensure appropriate outcomes.

The current NEB threshold is <30% where the NEB is calculated as,

$$NEB = \frac{Absolute(\text{Sum of energy generated and consumed})}{Maximum(Absolute(\text{energy generated}), (Absolute(\text{energy consumed})))}$$

The revised base NEB threshold is <50%, however the following criteria have been added to capture and manage non-reflective outcomes.

- NEB >50% and <90% and the delta between the dual MLF outcomes is  $\geq 0.1$
- NEB >50% and <90% and the single MLF is <0.9 or >1.1

The additional criteria has been incorporated as the NEB test alone does not appropriately capture the materiality of the non-reflective outcomes of applying a single MLF. In particular within electrically weak and/or load/generator saturated parts of the transmission network where MLF outcomes are extreme in nature.

# 2019-20 MLFs: Historical comparison results

James Lindley

# Introduction

## Methodology for historical comparison (aka. backcast)

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 implemented, historical network outages and adjustments to network configuration (with exception of known augmentations) are not considered.
- While net region to region transfer is anticipated to be similar to historical, the proportioning of flow between parallel AC and DC interconnectors will not be reflective of historical flows given their treatment within the MLF engine.

# Drivers of variation

## Generator connection delays

- Actual commissioning for some new entrant generators was much later and slower than reported timelines. These commissioning delays were most notable in weaker sections of the transmission network.
- Eg Sunraysia SF, Darlington Pt SF, Yatpool SF, Crudine Ridge WF, Limondale 1 SF, Limondale 2 SF, Finley SF, Nevertire SF, Murra Warra Stage 1 WF

## Generators subjected to operational limits

- Some security limits that constrained generation in 2019/20 FY were not known at the time of the 2019/20 FY MLF study.
- Eg Limits impacting Gannawarra SF, Bannerton SP, Karadoc SF, Wemen SF

# Generator MLF Variation

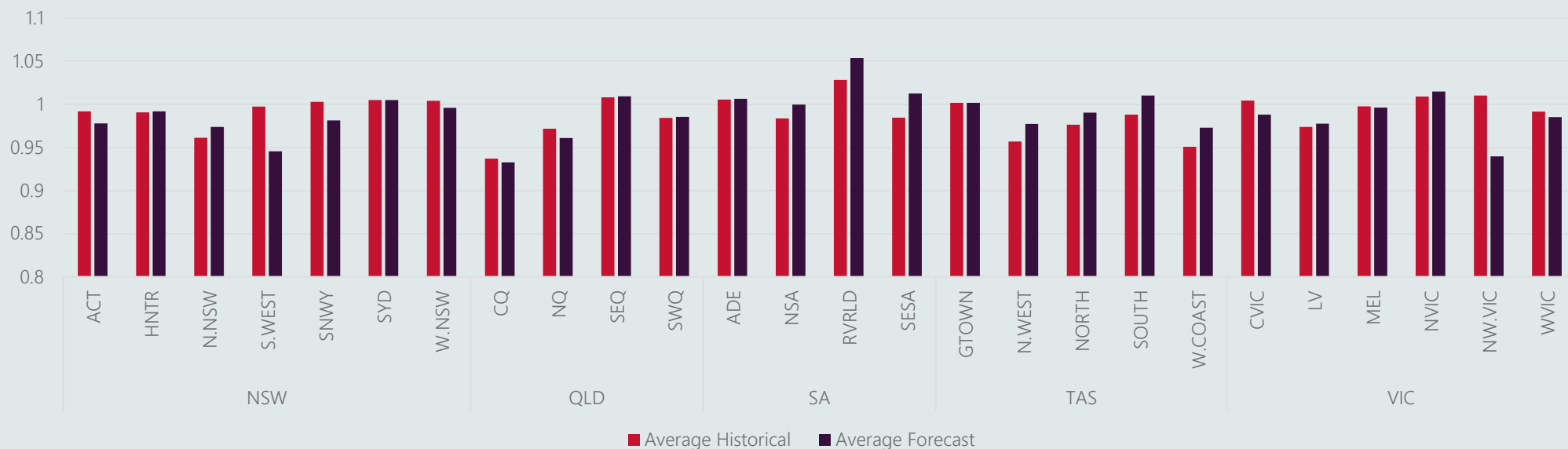
Generator TNIs - Indicative Only



- MLFs in north-west Victoria were observed to be higher than projected.
  - Export to NSW was less than the forecast for the year.
  - Reduction in north-west VIC generation exceeded reduction in export to NSW.
    - Flow towards the RRN reduced, therefore MLFs increased.
- MLFs in south-west and Snowy areas in NSW were observed to be higher than projected.
  - VIC import was less than the forecast for the year.
  - Local generation was less than the forecast.
    - Flow towards the RRN reduced, therefore MLFs increased.

# Load MLF Variation

Load TNIs - Indicative Only



Drivers of change in load MLFs in VIC and NSW are the same as for generators.

- MLFs in the Riverland and south east areas in SA were observed to be lower than projected.
  - Export to VIC was less than forecast for the year.
    - Decreased flow from the RRN, therefore MLFs decreased.

# Observations & discussion

## Input data variations

- Small variations in weaker sections of the transmission network can have large impact on MLFs

## Subsequent process/rule changes

- Rules on generation information to improve information such as expected commercial operation dates of new projects
- More regular MLF publications to improve the awareness on outcomes
- Improved process to get proponents feedback on profiles and commissioning schedules
- Proposed methodology changes to reflect some economic curtailment of semi-scheduled generators
- Improvements to process and internal tools to model known and expected intra regional limits

# Preliminary 2021-22 MLF results

Daniel Flynn



# Preliminary MLF Methodology

Item	Preliminary	Final
Methodology review	The existing methodology (version 7.0) followed for production of preliminary MLFs, with exception of the items listed below.	Changes resulting from 2020 FLLF methodology review to be implemented.
New generation projects	Inclusion based on generator project status in July 2020 Generation Information page. Projects are included where the status is COM or COM*.	Inclusion based on generator project status in January 2021 Generation Information page. Projects are included where the status is COM or COM*.
Load profiles	Historical load profiles from 2019-20 FY.	Forecast load profiles for 2021-22 FY.
Network model	2020-21 MLF study network model.	Revised network model incorporating future augmentations.
Intra-regional limit management	Intra-regional limits as identified and incorporated into the 2020-21 MLF study.	Intra-regional limits incorporated in the 2020-21 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 2020-21 MLF study.	Inter-regional limits will be revised as required based on limit advice for the 2021-22 FY.

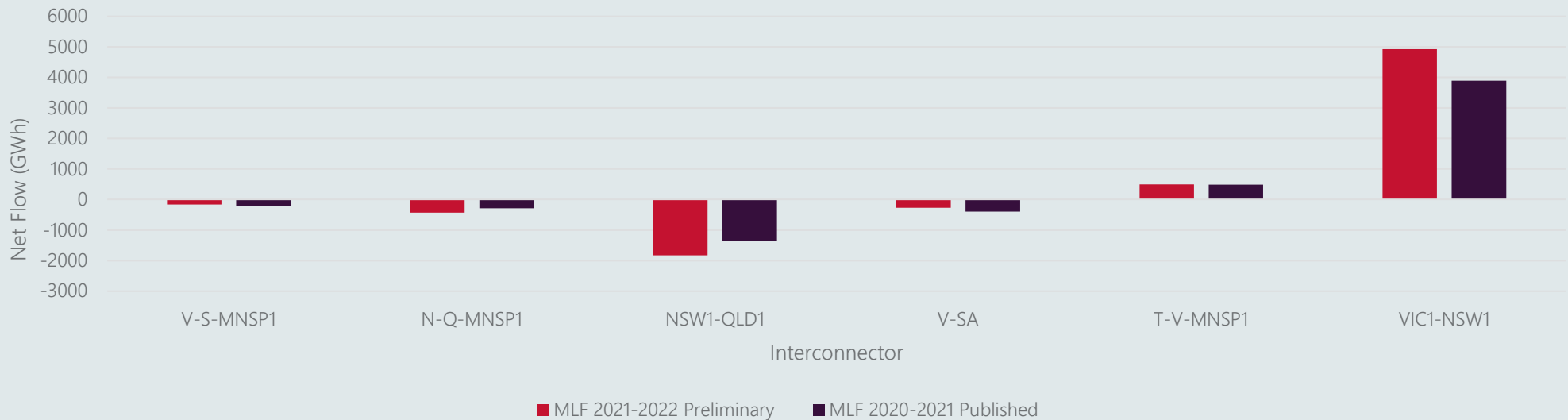
The primary drivers of change in recent years have been variations in,

- Increased semi-scheduled capacity
- 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.



# 2020-21 Vs 2021-22 interconnector flows



## Change in interconnector flow

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

## Change in NEM generation

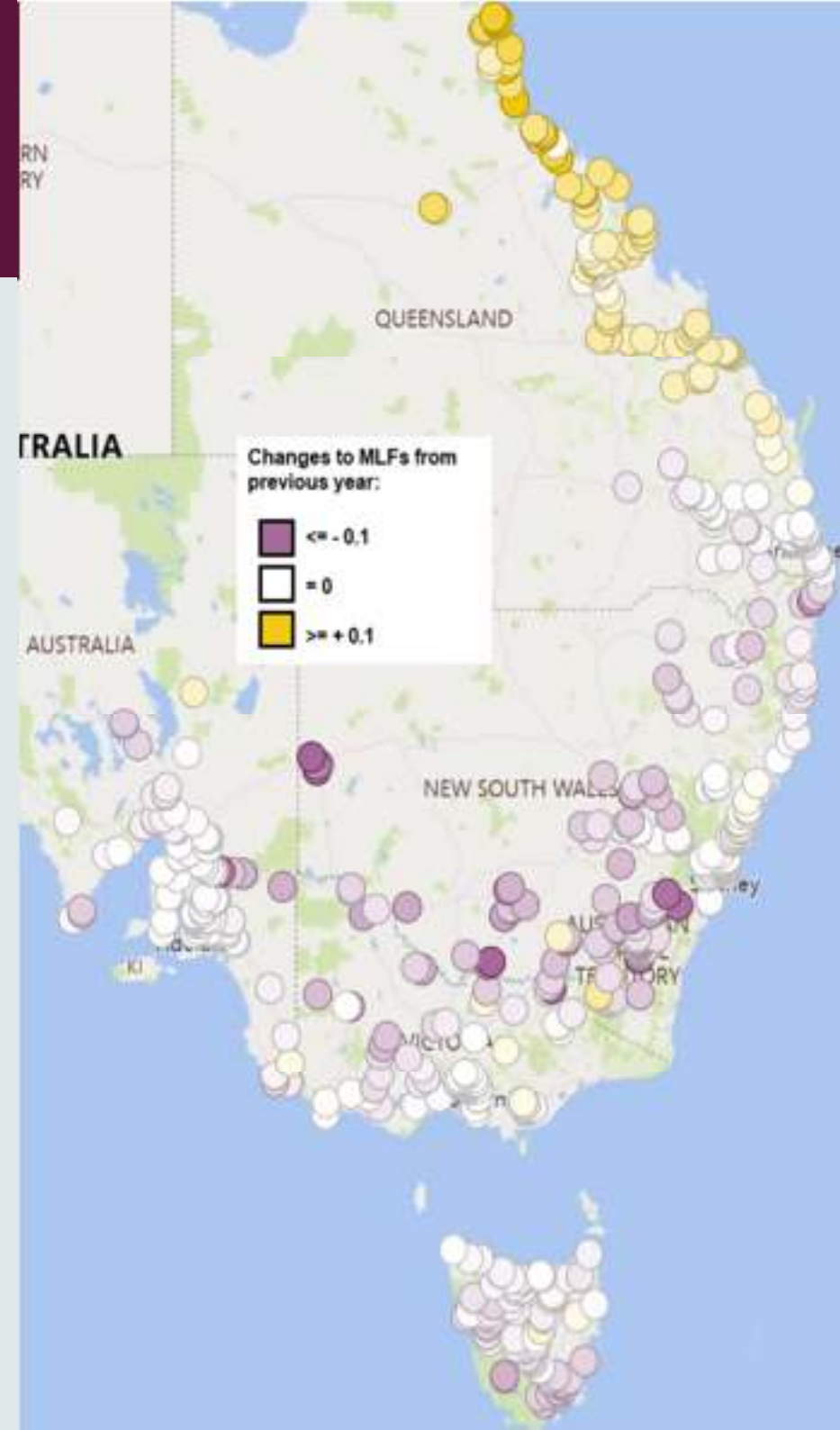
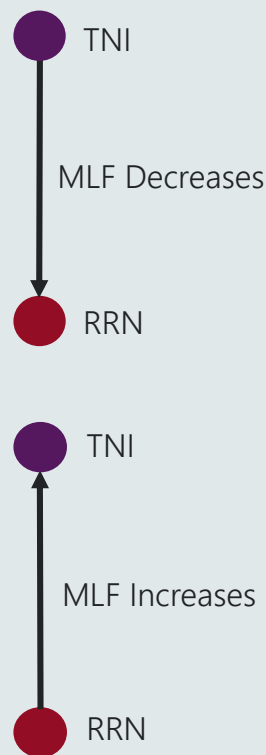
- Large increase in capacity of semi-scheduled generation in VIC and QLD has offset generation in other regions (particularly NSW)
- Partial closure of Liddell forecast to commence toward end of 2021-22 FY, resulting in decreased thermal generation within NSW

# MLF heatmap

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

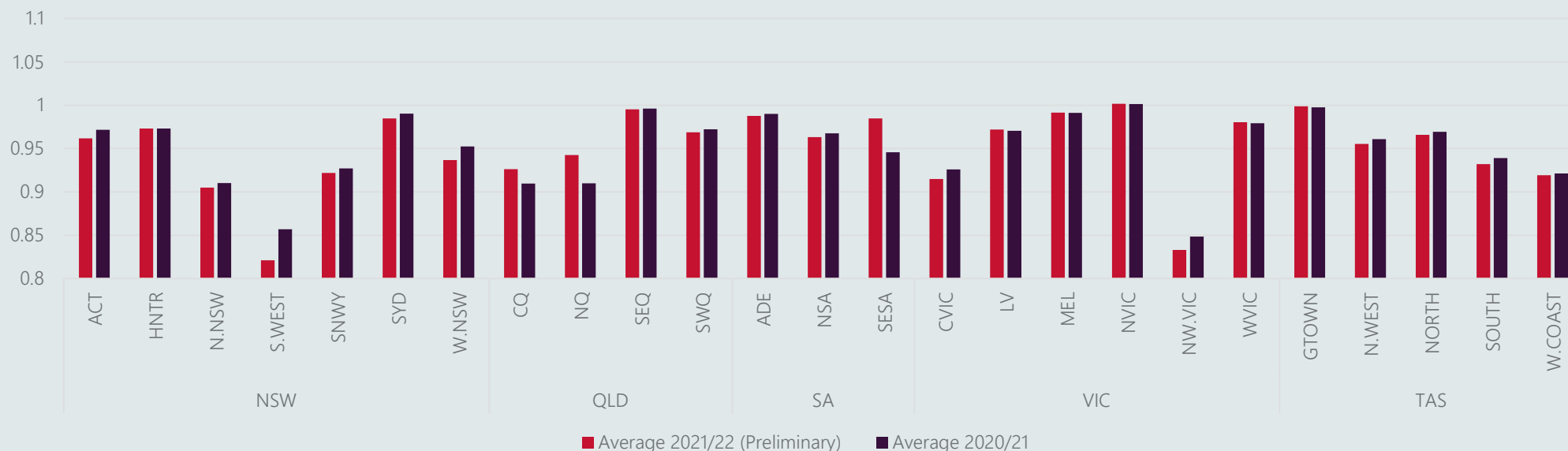
As flows increase from a TNI to the relevant RRN in general there will be a decrease in the MLF.

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



# Generator MLF Variation

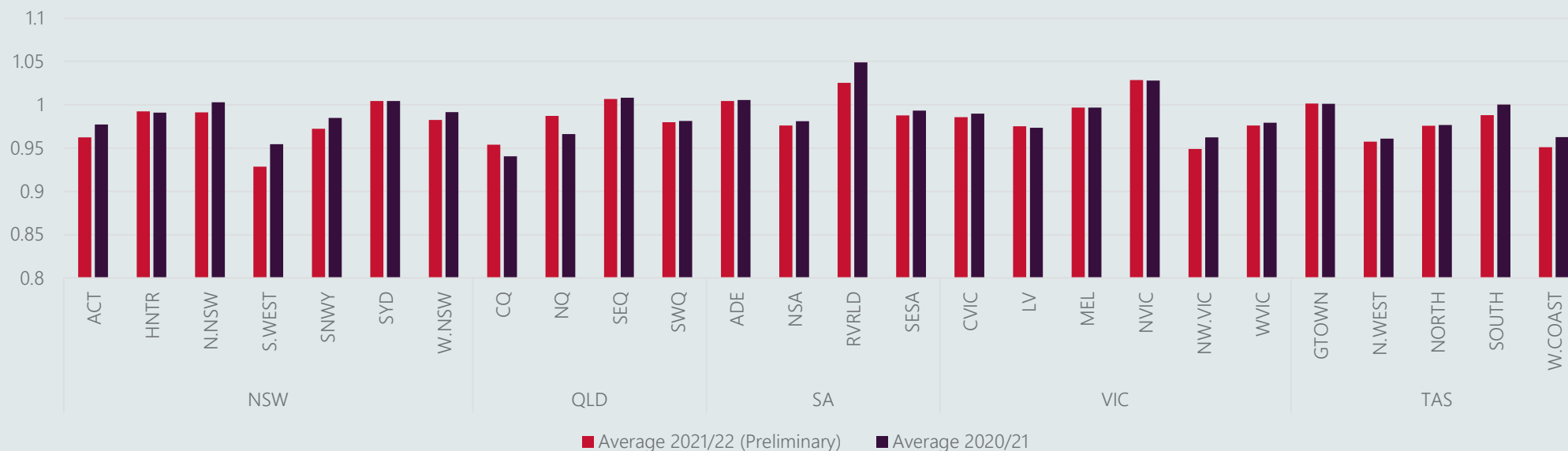
Generator MLF Variation - 2021/22 Preliminary MLF vs 2020/21 MLF



- New South Wales – Reduction in south-west, ACT and Snowy areas, primarily driven by increased generation in these areas and increased imports from Victoria.
- Queensland – Increase in MLFs in northern and central areas, primarily driven by reduced generation within central QLD resulting in reduced southerly flows.
- South Australia – Material increase in south-east SA is the result of a connection point with bi-directional flow, anticipated that this will be revised to a dual MLF for final outcome.
- Victoria – Reduction in north-west and central VIC primarily driven by increased generation.
- Tasmania – No material movement.

# Load MLF Variation

Load MLF Variation - 2021/22 Preliminary MLF vs 2020/21 MLF



- New South Wales – Reduction in south-west, ACT and Snowy areas, primarily driven by increased generation in these areas and increased imports from Victoria.
- Queensland – Increase in northern and central areas, primarily driven by reduced generation within central QLD resulting in reduced southerly flows.
- South Australia – Reduction at Riverland result of increased behind the meter generation and decreased exports.
- Victoria – No material movement.
- Tasmania – No material movement.

# Potential for Change (Methodology Review)

The following are some of the methodology review related items we anticipate may result in a material change between the preliminary 2021/22 MLF results and the final 2021/22 MLF outcomes to be published in March 2021.

## Dual MLF Test

- The dual MLF test has been expanded. This will result in an increase in dual MLF outcomes.

## Parallel AC/DC Interconnector Treatment

- Historically flows determined based on capacity ratio of AC/DC interconnectors.
- For the final 2021-22 FY MLFs, relationship will be derived from historical observations from the reference year.

## Semi-scheduled Economic Curtailment

- For the final 2021-22 FY MLFs, economic curtailment will be incorporated into forecast generation output profiles.

# 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 2021/22 MLF results and the final 2021/22 MLF outcomes to be published in March 2021.

## Load Forecast (COVID)

- The reference year contained historical load data impacted by COVID, in particular the associated lockdowns.
- The load forecast will alter the historical data (utilised for preliminary results) to correct for the impact of COVID and associated lockdowns.

## New Generation

- If new generation achieves COM/COM\* status by the cut-off date, these will be incorporated for the 2021-22 FY which will have an impact on MLF outcomes.

## Intra/Inter-Regional Limits

- The intra/inter-regional limits have not yet been reviewed, a review and implementation of revised/additional limits will occur prior to finalisation of 2021/22 MLF outcomes.
- Note the X5 limit in south-west NSW has not been incorporated into the 2021-22 FY MLF study

# Stakeholder discussion and questions

Chris Muffett



# NEMWEB Report

AEMO has recently 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		
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](mailto: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>

