Australian Energy Market Commission

RULE CHANGE

DRAFT RULE DETERMINATION

National Electricity Amendment (Application of Dual Marginal Loss Factors) Rule 2011

Rule Proponent(s)

Australian Energy Market Operator

Commissioners

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14 April 2011

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For and on behalf of the Australian Energy Market Commission

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AEMC 2011, Application of Dual Marginal Loss Factors, Draft Rule Determination, 14 April 2011, Sydney.

About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. Our key responsibilities are to consider rule change proposals, conduct energy market reviews and provide policy advice to the Ministerial Council as requested, or on AEMC initiated reviews of energy matters.

Summary of Draft Determination

On 7 October 2010, the Australian Energy Market Operator (AEMO or the Proponent) submitted a Rule change request to the Australian Energy Market Commission (AEMC or Commission) regarding the application of static intra-regional marginal loss factors (MLFs) at particular connection points (the Rule change request or Proposed Rule).

The Rule change request seeks to amend clause 3.6.2 of the National Electricity Rules (the Rules or NER), to allow AEMO to apply two separate volume weighted static MLFs at specific connection points, where the application of one volume weighted static MLF would not accurately represent transmission network losses at those connection points.

AEMO state that this Rule change addresses a problem which arises at connection points where there is both energy generation and consumption. AEMO state that where the difference between annual energy generated and consumed is less than 30% of annual energy generated at such connection points, a single volume weighted MLF may not accurately represent intra-regional losses. This can have implications for the efficiency of dispatch, pricing and settlement in the National Electricity Market (NEM).

Commission's Decision

The Commission has decided to make a Rule change which incorporates the changes proposed by AEMO (the Draft Rule). The Draft Rule includes some minor amendments to AEMO's Proposed Rule.

Reasons for the Commission's decision.

The Commission is satisfied that the Draft Rule meets the Rule making test and will, or is likely to, contribute to the achievement of the National Electricity Objective (NEO).

In particular, the Commission considers that the Draft Rule will contribute to more efficient investment in, operation and use of electricity services for the long term interests of consumers of electricity, with particular respect to the price of electricity.

In coming to this decision, the Commission considers that the Draft Rule is likely to contribute to more efficient dispatch processes, as well as helping to ensure that regional reference prices (RRPs) consistently reflect the true marginal costs of meeting demand at the regional reference node (RRN). The Commission considers that the Proposed Rule will also ensure efficient pricing outcomes for all participants. Lastly, the Commission considers that the Draft Rule is likely to reduce the extent of negative intra-regional residues (intra-RR), which will help maintain the effectiveness of price signals faced by various participants.

Consultation on the Rule change Request

On 9 December 2010, the Commission commenced a standard Rule change process, giving notice under section 95 of the National Electricity Law (NEL) of the commencement of the Application of Dual Marginal Loss Factors Rule change.

Stakeholders were invited to provide comment on the Rule change request. Eight submissions were received from stakeholders representing generators, energy users and network service providers (NSPs).

In accordance with the notice published under section 99 of the NEL, the Commission now invites submissions on this Draft Rule and Draft Rule Determination, (Draft Determination) by 26 May 2011.

In accordance with section 101(1a) of the NEL, any interested person or body may request that the Commission hold a hearing in relation to the Draft Determination. Any request for a hearing must be made in writing and must be received by the Commission no later than Thursday 21 April 2011.

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1 AEMO's Rule change request

1.1 The Rule change request

On 7 October 2010, AEMO made a request to the Commission to make a Rule regarding the Application of Dual Marginal Loss Factors.

The Rule change request seeks to amend clause 3.6.2 of the Rules, to allow AEMO to apply two separate static volume weighted MLFs at specific connection points, where the application of one static volume weighted MLF would not accurately represent transmission network losses at that connection point.

1.2 Rationale for Rule change request

Intra-regional transmission losses are normally reflected in dispatch and settlement of the NEM via the application of single, static, volume weighted MLFs. These static MLFs are calculated by AEMO annually, based on adjusted prior energy consumption patterns, and are applied at every connection point in the NEM. AEMO state that in most instances, the single volume weighted approach delivers MLF values which are an accurate reflection of the average of marginal intra-regional losses at each connection point.

However, in specific circumstances, use of the single volume weighted approach may deliver inaccurate MLFs. AEMO state that this occurs where the difference between the annual quantities of energy generated and consumed at a connection point is 30% or less of the total amount of energy generated at that connection point.

AEMO state that these inaccurate MLF values may interfere with the efficiency of dispatch and settlement in the NEM, with consequent impacts on the efficient operation, use of, and investment in electricity services for the long term interests of consumers.

1.3 Solution proposed in the Rule change request

AEMO proposed a Rule change that allows for the application two separate volume weighted MLFs, at those connection points where the application of a single MLF would not satisfactorily represent transmission network losses for the active energy generation and consumption at that connection point.

The Proposed Rule also states that AEMO must apply two separate MLFs in accordance with its forward looking loss factor methodology (the FLLF methodology), which it must develop under clause 3.6.2(d) of the Rules.

1.4 Relevant Background

On 29 October 2008, the National Electricity Market Management Company Limited (NEMMCO, now AEMO), commenced a review of its FLLF methodology.[1]

This review dealt with a number of issues, including:

- abnormal underlying conditions, such as drought, fuel supply or extended outages, which affect the energy inputs used in calculating intra-regional MLFs;
- pump storage facilities and the most appropriate method to calculate and apply MLFs at these connection points; and
- generator information utilised in the FLLF methodology.

NEMMCO included consideration of the pump storage issue following the unusually high MLF that was calculated for Lower Tumut in 2008/09, which was primarily due to changed generation and pumping behaviours in response to drought conditions.[2] Due to these changed conditions, use of the single volume weighted approach would have resulted in a static MLF of 5.8319 for Lower Tumut. This was significantly outside of the range of normal MLF values, and was not an accurate reflection of the average of marginal losses for that connection point.[3]

In the final determination of this Review, NEMMCO decided that:

- where abnormal underlying conditions resulted in unusual generation patterns, the FLLF methodology would be amended to allow generators to provide NEMMCO with an adjusted generation profile. NEMMCO would then have the discretion to accept or reject this amended profile;
- in regards to connection points with pump storage facilities, NEMMCO would seek a change to the Rules to allow for more than one volume weighted MLF to be applied to connection points with pump storage facilities; and
- until such time as that Rule was made, where the net energy balance between annual generation and consumption was less than 30% of the total energy generation, NEMMCO would apply a single time weighted MLF at those connection points.

Accordingly, a single time weighted MLF was applied at Lower Tumut in 2008/9, 2009/10 and 2010/11.

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1 NEMMCO, *Changes to Forward Looking Loss Factor Methodology to address unusual conditions, pump storage schemes and advice on committed generator projects: Final Determination*, February 2009.

2 Lower Tumut has the capability to capture some of the water that runs through its turbines when generating, and then pump that water back uphill to a reservoir. When drought conditions have reduced the level of natural inflow into the reservoir, Lower Tumut may operate as a pump more frequently in order to maximise its available water supplies.

3 The basis of static MLF values and their function in the NEM is explained in further detail in section 3.1 below.

This Rule change request follows NEMMCO's decision at the conclusion of the FLLF methodology consultation to propose a Rule change to allow for the application of two volume weighted MLFs. However, it should be noted that while the FLLF methodology consultation focussed specifically on connection points with pump storage facilities, the Proposed Rule would allow for the application of two MLFs at any connection point where the relevant criteria are met.

1.5 Commencement of Rule making process

On 9 December 2010, the Commission published a notice under section 95 of the NEL advising of its commencement of a Rule change process and the first round of consultation in respect of the Rule change request. A consultation paper prepared by AEMC staff identifying specific issues and questions for consultation was also published with the Rule change request. Submissions closed on 10 February 2011.

The Commission received eight submissions on the Rule change request as part of the first round of consultation. These submissions are available on the AEMC website.[4] A summary of the issues raised in submissions and the Commission's response to each issue is contained in Appendix A.

1.6 Consultation on Draft Determination

In accordance with the notice published under section 99 of the NEL, the Commission invites submissions on this Draft Rule and Draft Determination by 26 May 2011.

In accordance with section 101(1a) of the NEL, any person or body may request that the Commission hold a hearing in relation to the Draft Determination. Any request for a hearing must be made in writing and must be received by the Commission no later than 21 April 2011.

Submissions and requests for a hearing should quote project number "ERC0117" and may be lodged online at www.aemc.gov.au or by mail to:

Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

4 www.aemc.gov.au

2 Draft Determination

2.1 Commission's Draft Determination

In accordance with section 99 of the NEL, the Commission has made this Draft Determination in relation to the Rule proposed by AEMO.

The Commission has determined it should make, with some minor amendments, the Proposed Rule by the Rule Proponent.[5]

The Commission's reasons for making this Draft Determination are set out in section 3.1 below.

A draft of the Rule that the Commission proposes to be made is attached to and published with this Draft Determination. The Draft Rule is different from AEMO's Proposed Rule. Its key features are described in section 3.2.

2.2 Commission's considerations

In assessing the Rule change request the Commission considered:

- the Commission's powers under the NEL to make the Rule;
- the Rule change request;
- previous consultation undertaken by AEMO;
- market analysis provided by AEMO;
- the fact that there is no relevant Ministerial Council on Energy (MCE) Statement of Policy Principles;[6]
- submissions received during first round consultation; and
- the Commission's analysis as to the ways in which the Proposed Rule will or is likely to, contribute to the NEO.

2.3 Commission's power to make the Rule

The Commission is satisfied that the Draft Rule falls within the subject matter about which the Commission may make Rules. The Draft Rule falls within section 34 of the NEL as it relates to regulating the operation of the NEM. Further, the Draft Rule falls within the matters set out in schedule 1 to the NEL as it relates to:

5 Under section 99(3) of the NEL the draft of the Rule to be made need not be the same as the draft of the proposed Rule to which the notice under section 95 relates.

- the setting of prices for electricity and services purchased through the wholesale exchange; and

- the setting of methodology and formulae to be applied in setting prices.

These parts of schedule 1 are applicable as MLFs have a direct impact on the pricing of energy purchased through the wholesale market. Furthermore, the Draft Rule has a direct impact on how AEMO develops and applies its FLLF methodology, which determines how MLFs are calculated and applied.

2.4 Rule making test

Under section 88(1) of the NEL the Commission may only make a Rule if it is satisfied that the Rule will, or is likely to, contribute to the achievement of the NEO. This is the decision making framework that the Commission must apply.

The NEO is set out in section 7 of the NEL as follows:

> "The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system."

For the Rule change request, the Commission considers that the relevant aspect of the NEO is the promotion of efficient investment in, and efficient operation and use of electricity services, with particular relevance to the efficient pricing of electricity.[7]

The Commission is satisfied that the Draft Rule will, or is likely to, contribute to the achievement of the NEO because:

- the Draft Rule will support the calculation and application of more accurate MLFs, which will in turn promote the efficient consideration of intra-regional losses in dispatch;

- this is likely to reduce the likelihood of out of merit order dispatch, promoting efficient use of resources;

- efficient dispatch promotes efficient RRPs. Efficient prices provide incentives for more efficient usage and operation of electricity services in the short term, and more efficient investment in the longer term; and

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6 Under section 33 of the NEL the AEMC must have regard to any relevant MCE statement of policy principles in making a Rule.

- efficient pricing is also likely to result in more efficient settlement of the market. This will strengthen price signals faced by participants, promoting efficient operation of and investment in electricity services.

The Commission also considers that the Draft Rule strikes an appropriate balance between providing market certainty and operational flexibility, in terms of the criteria of when two MLFs are applied. The Commission considers that this balance will promote efficient participant behaviour, while allowing for AEMO to make future adjustments to the application of MLFs where this would provide clear efficiency gains.

Declared Network Functions

Under section 91(8) of the NEL the Commission may only make a Rule that has effect with respect to an adoptive jurisdiction if satisfied that the Proposed Rule is compatible with the proper performance of AEMO's declared network functions. The Draft Rule is compatible with AEMO's declared network functions because it does not interfere with, or in any way impact on, AEMO's ability to perform its declared network functions.

7 Under section 88(2), for the purposes of section 88(1) the AEMC may give such weight to any aspect of the NEO as it considers appropriate in all the circumstances, having regard to any relevant MCE Statement of Policy Principles.

3 Commission's reasons

The Commission has analysed the Rule change request and assessed a number of related issues. For the reasons set out below, the Commission has determined that a Rule be made. Its analysis of the Proposed Rule is also set out below.

3.1 Assessment of issues

3.1.1 Background

When energy is transmitted between two points on a network, a portion of this energy is lost in the form of waste heat. This Rule change refers only to those losses that occur within the borders of a NEM region (intra-regional losses); losses that can be attributed to power flows between NEM regions (inter-regional losses) are accounted for via different mechanisms to intra-regional losses, and are not discussed in this Rule change.

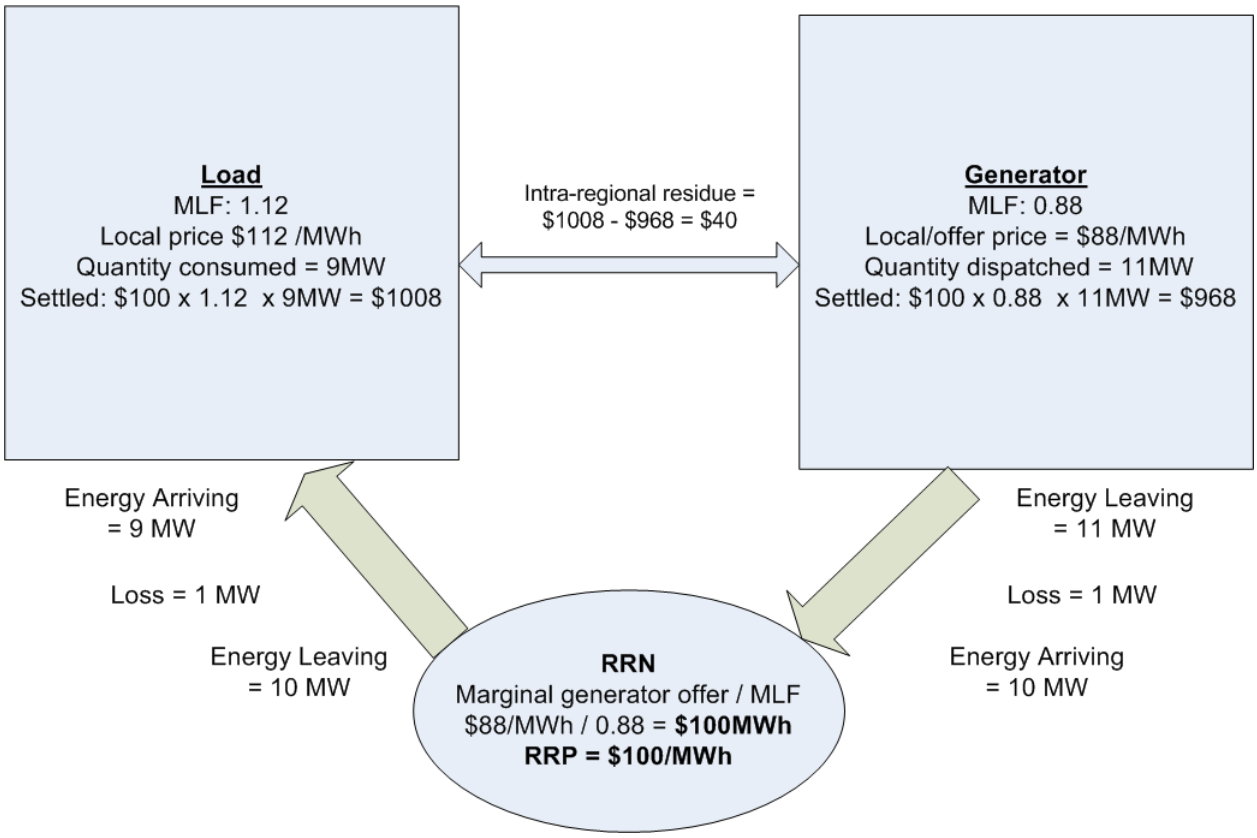
To account for intra-regional losses in NEM dispatch and settlement, AEMO annually calculates and applies a single, static MLF at each connection point in the NEM. These static MLFs are the averaged value of the marginal loss that is incurred when transporting electricity between the connection point and the RRN, for each trading interval of the relevant financial year.

Generator offers are divided by their static MLF to refer their "local price" to the RRN. This means that the losses incurred in transporting a marginal unit of energy between the Generator and the RRN are accounted for in dispatch at the RRN, and the setting of the RRP.

Static MLFs are also applied to the settlement of the market. Loads pay the RRP, multiplied by their static MLF, multiplied by the quantity of energy they have consumed. Similarly, Generators are paid the RRP, multiplied by their static MLF, multiplied by the quantity of energy they have generated.

Figure 3.1 below is a simplified example of how MLFs are used to determine an RRP and to determine how much participants are paid, or pay, for the energy they produce or consume. The diagram represents a hypothetical market with one generator and one load, with simplified losses between each connection point and the RRN.

Figure 3.1 MLFs in Dispatch and Settlement



Static MLFs are the average of the marginal loss values that are incurred in each trading interval, at the relevant connection point, throughout a year. Each of these marginal loss values is generally higher than the average loss value that would apply for the same trading interval. Given that static MLFs represent the average of these higher marginal loss values, they will, under normal circumstances, usually result in a slight over-recovery of revenue in settlement. This positive over-recovery, or positive intra-regional residue (intra-RR), is returned to load, via offsetting of transmission use of system (TUoS) charges. Where the intra-RR is negative, this amount is recovered from all load by TNSPs.

Clause 3.6.2 of the Rules places a number of requirements on AEMO in regards to how static MLFs must be calculated and applied, including:

- AEMO must calculate and apply a single static intra-regional loss factor at each connection point;
- AEMO must use a volume weighted averaging approach when determining these intra-regional loss factors;
- static intra-regional loss factors must, as closely as is reasonably practicable, describe the average of marginal electrical energy losses for electricity transmitted between a transmission network connection point and the RRN, for each trading interval;
- intra-regional loss factors must apply for a full financial year; and

- intra-regional loss factors must be prepared utilising forecast load and generation data.

In order to determine a single average volume weighted MLF for each connection point, AEMO analyses patterns of energy generation and consumption at each connection point, for each trading interval, over a financial year. These energy patterns are adjusted to account for forecast changes in generation and load, MLFs are calculated for each corresponding trading interval in the financial year, and an average static MLF value is calculated using the following equation:

Figure 3.2 MLF equation

$$MLF = \frac{(MLF_1 \times E_1) + (MLF_2 \times E_2) + \ldots + (MLF_i \times E_i) + \ldots (MLF_{17520} \times E_{17520})}{E_1 + E_2 + \ldots + E_i + \ldots + E_{17520}}$$

In this equation, MLF_1 refers to the MLF calculated in trading interval one, based on the adjusted energy value (E_1) for that trading interval. There are normally 17520 trading intervals in a year. The values represented by E may have positive terms (generation), or negative terms (consumption).

The resulting single MLF value generated by this equation is applied at that connection point for the following financial year. Generally, this equation will deliver MLFs that are slightly less than one for connection points with generation, and slightly higher than one for connection points with load.

3.1.2 Problem identified in the Rule change

AEMO state that the average volume weighting approach normally delivers single static MLFs which are an accurate reflection of average marginal losses at each connection point.

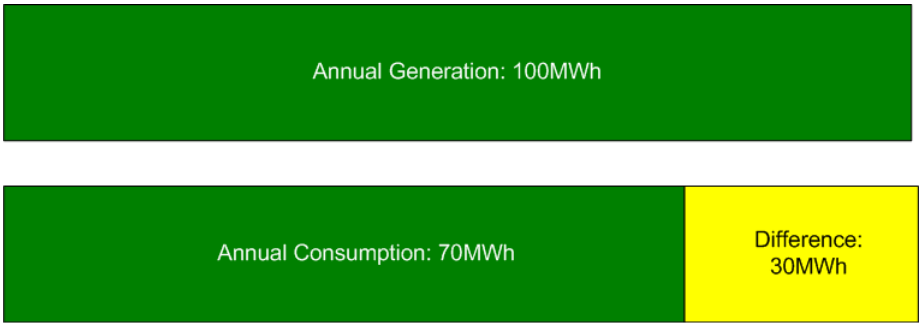
However, in certain circumstances, use of the single volume weighted approach may deliver MLF values which can vary significantly from one. These MLFs may not accurately represent average marginal losses for generation or consumption at that connection point. AEMO state that this occurs where the difference between the total annual energy generated and consumed at a connection point is less than 30% of the total annual energy generated at that connection point. AEMO describe this condition as the 30% net energy balance (30% NEB).[8]

Figure 3.3 below illustrates a situation where the 30% NEB is met. In this example, the difference between the total annual quantity of energy generated and consumed (100MWh-70MWh = 30MWh) is 30% of the total annual energy generated at that

8 Since submitting their Rule change request, AEMO's definition of the NEB has been further developed. AEMO advise that the NEB is now determined by expressing the net energy at a transmission connection point as a percentage of the total energy generated or consumed at a transmission connection point, whichever is greater. Further information is available in the following document: http://www.aemo.com.au/electricityops/0178-0020.pdf

connection point (30MWh = 30% of 100MWh). In this case, or if the difference between the generation and consumption was any smaller, AEMO state that use of the single volume weighted approach would deliver inaccurate MLFs.

Figure 3.3 30% net energy balance



AEMO state that inaccurate MLF figures can result in these circumstances, due to the use of the equation described in figure 3.2. The denominator in this equation relates to the quantities of energy generated and consumed at a connection point. In the situation described above, positive term generation values begin to equal negative term consumption values; accordingly, the denominator value in the equation begins to approach zero. As this occurs, the equation starts to divide by increasingly small numbers, which in turn delivers increasingly large output values.[9]

AEMO states that MLFs with inaccurately high or low values can have significant market impacts, in terms of efficiency of dispatch and settlement. Given that Generator offers are divided by their MLF to refer them to the RRN, a generating unit with an MLF significantly larger than one may appear to be cheaper at the RRN, and may be dispatched ahead of other generating units. This can result in inefficiencies, if this generating unit has higher fuel costs than another unit with lower fuel costs but a less favourable MLF.

AEMO also highlight that inaccurate MLFs at specific connection points may result in problematic settlement outcomes. Given that Generators are paid the RRP multiplied by their MLF, a Generator with an MLF greater than one will receive a multiple of the RRP. When the RRP is a high value, this may result in an under-recovery of revenue by AEMO, and the accrual of negative intra-RR.

3.1.3 Commission's consideration

Having reviewing the information and analysis contained in AEMO's Rule change request, the Commission considers that there is a likelihood that the problem identified has, or is likely to have, a number of negative market impacts. The Commission also considers that the materiality of these impacts is significant and likely to result in a number of market inefficiencies.

9 As the denominator approaches zero, the equation begins to produce values which increase exponentially, into either the negative or positive, eventually generating infinite values.

Specifically, the Commission considers that the identified problem may interfere with the effectiveness of the dispatch process, which may contribute to an inefficient use of resources. The Commission also considers that the efficiency of settlement may be affected, primarily through the accrual of significant negative intra-RR, with related impacts on the effectiveness of price signals. Furthermore, the identified problem may affect the setting of efficient prices, through interfering with competitive outcomes amongst generators and reducing the ability of the market to determine efficient RRPs. The Commission considers that each of these factors may contribute to a number of inefficient usage, operation or investment outcomes in the NEM.

Further detail of the Commission's assessment of the identified problem can be found in chapter 5 below.

3.2 Assessment of Proposed Rule

3.2.1 AEMO's Proposed Rule

In its Rule change request, AEMO stated that the identified problem could be effectively addressed by applying two separate average volume weighted MLFs. One MLF would be applied to energy consumed, while the other MLF would be applied to energy generated.

AEMO proposed that this would occur at those connection points where one MLF value would not accurately reflect losses for energy generation and consumption at that connection point.

AEMO proposed an amendment to clause 3.6.2(b) of the Rules. This proposed Rule change states that intra-regional loss factors will be either:

> "(i) two *intra-regional loss factors* where one *intra-regional loss factor* does not satisfactorily represent *transmission network losses* for the *active energy generation* and consumption at a *transmission network connection point* as determined by AEMO in accordance with the methodology under clause 3.6.2(d); or
>
> (ii) one static *intra-regional loss factor* in all other circumstances."

Alternatively, AEMO stated that deleting current clause 3.6.2(b)(2), which contains the requirement that intra-regional loss factors be represented by a single value, would achieve the same outcome as introducing the Proposed Rule above.

AEMO also asked for a transitional arrangement in Chapter 11 of the Rules, which would allow them to amend those parts of the FLLF methodology determined under clause 3.6.2(d) which related to calculating MLFs. AEMO requested that it be able to amend the FLLF, within 9 months of the making of the amending Rule, so that:

- Two MLFs will be determined for a connection point that has active energy generation and consumption and where one loss factor does not satisfactorily

represent the transmission network losses. This connection point must meet the 30% net energy balance condition before two MLFs will be applied. This will be reviewed each year and will be based on the most recently available historical data that can be used to calculate the MLFs from the previous financial year; and

- Any relevant action taken by AEMO prior to, and in anticipation of, the commencement date of the Amending Rule should be deemed to have been taken for the purpose of the Amending Rule and continues to have effect for that purpose.

The Commission understands that AEMO's intention in requesting this amendment was to allow for the amendment of the FLLF methodology without engaging in a Rules Consultation Process, as is normally required under clause 3.6.2(d).[10]

3.2.2 Commission's consideration and Draft Rule

The Commission has determined that a change to the Rules is necessary to address the identified problem. The Commission considers that without an amendment to the Rules, it is unlikely that a reasonable and proportionate solution to the identified problem can be developed.

The Commission also considers that the solution proposed by AEMO is reasonable and appropriate. The Proposed Rule represents a proportionate response as it will satisfactorily address the identified problem, while minimising the extent of unnecessary market intervention and implementation costs.

Accordingly, the Commission has determined to make a Draft Rule which largely adopts the content of AEMO's Proposed Rule, with some minor changes.

The Commission's Draft Rule differs from the Proposed Rule in that reference to the FLLF methodology is brought forward to the beginning of clause 3.6.2(b)(2)(i). The Commission considers that this will clarify that AEMO must comply with the FLLF methodology in its entirety, before it can apply two or more MLFs at a connection point.

The Commission's Draft Rule also differs from the Proposed Rule in that it clarifies that two MLFs will only be applied in those situations where AEMO determines that one MLF would not describe the average of the marginal losses for electricity transmitted between a transmission connection point and the RRN, for the active energy generation and consumption at that connection point. The Commission considers that this will clarify the situation where AEMO may apply two MLFs.

As discussed above, the transitional arrangements proposed in AEMO's Rule change request allowed for amendment of the FLLF methodology to reflect the Proposed Rule change, without any Rules Consultation Process. However, the Commission notes that AEMO has since decided to commence a Rules Consultation Process on proposed

10 The Rules Consultation Procedures are defined in clause 8.9 of the NER.

amendments to the FLLF methodology, to allow for application of two MLFs.[11] Accordingly, no such transitional arrangement has been included in the Draft Rule.

AEMO has also stated that if its FLLF methodology consultation and this Rule change process are completed in time, it will seek to apply the new FLLF methodology in the 2011-12 financial year.[12] Accordingly, the Commission has decided to include transitional provisions in its Draft Rule which will:

- allow for any consultation undertaken by AEMO, prior to the making of the Final Rule, to be considered valid for the purposes of amending the FLLF methodology;
- allow AEMO to publish intra-regional loss factors to apply for the next financial year, on or by 30 June 2011; and
- clarify that any MLFs published by AEMO on April 1 2011, in accordance with clause 3.6.2(f1), will not apply for the relevant financial year (2011-12), unless they are published by AEMO, on or by 30 June 2011.

The Commission has also clarified that AEMO is not required to recalculate any intra-regional loss factors that were previously published, except where this is necessary as a result of a change to the FLLF methodology.

11 http://www.aemo.com.au/electricityops/0178-0020.html

12 AEMO, *Electricity market event report: Negative Intra-regional Residues in New South Wales – Billing Week Commencing Sunday 30 January 2011*, 11 April 2011, p.8. Available at http://www.aemo.com.au/reports/0180-0008.pdf

4 Commission's assessment approach

In assessing the Rule change request, the Commission has considered the requirements set out in the NEL. This has included consideration of the NEO, and section 88(2) of the NEL, which allows the AEMC to give weight to any aspect of the NEO as it considers appropriate in all the circumstances.

In assessing the Rule change request, the Commission has considered the following issues:

- the extent to which the identified problem has, or is likely to, result in material market inefficiencies. The Commission has specifically focused on the extent to which the identified problem may cause problems with dispatch, pricing and settlement of the market, and how these problems may result in inefficient operational, usage and investment decisions by various participants;

- the optimal MLF calculation methodology that should be applied to address the identified problem. The Commission has sought to determine what solution will provide a proportionate response to the identified problem, while minimising implementation cost and unnecessary market interference; and

- the appropriate level of specificity that should be included in the Rules, in regards to the criterion for application of two MLFs. The Commission has sought to strike a balance between providing certainty regarding the circumstances where this may occur, while allowing AEMO some flexibility to adjust this criterion where this becomes necessary.

In order to inform its assessment of the current and potential materiality of the identified problem, the Commission sought advice from AEMO regarding potential market outcomes under different MLF scenarios. This included:

- a modelled assessment of changes to dispatch that may occur, where different MLFs are applied at Lower Tumut for dispatch; and

- a modelled assessment of changes in settlement outcomes, where different MLFs are applied at Lower Tumut for settlement.

5 Materiality of the identified problem

5.1 Rule Proponent's view

In their Rule change request, AEMO stated that the identified problem has had, and was likely to continue to have, a number of material market impacts. These impacts were based around the fact that, at specific connection points, the identified problem could result in an MLF which became "unrealistically high or low as the net annual energy approaches zero...[which] significantly misrepresent the losses at the connection point".[13]

AEMO state that one potential consequence of the application of inaccurate MLFs can be to interfere with the dispatch process. Where inaccurate MLFs are applied in dispatch, there is a risk that more expensive generation with a higher MLF could be dispatched ahead of cheaper generation with a less favourable MLF. Such out of merit order dispatch would be in contravention of the requirement set out in NER clause 3.6.2(e)(2A) that loss factors should minimise the impact on dispatch compared to that which would result from a fully optimised dispatch process.

Although AEMO's Rule change request highlights how the identified problem may result in inefficient dispatch, no quantitative evidence is provided of the actual extent to which this has occurred, or is likely to occur.

The Rule change request also states that the identified problem may lead to "a larger payment calculated for the generation of energy and a smaller cost for the consumption of energy when pumping, or vice versa, that should ideally apply, leading to the under or over-recovery of settlement residue."[14] This means that a participant with an inaccurately low MLF value may be "underpaid" for its generation, with a related over-recovery of revenue by AEMO. Alternatively, an inaccurately high MLF value may cause a participant to be "overpaid" for its generation, resulting in a consequent under-recovery of revenue by AEMO to ensure this participant is paid. This situation may lead to the accrual of a negative intra-RR. AEMO indicated that application of a single time weighted MLF at Lower Tumut contributed to such an outcome in NSW during 2009/10, delivering a significant negative cumulative intra-RR value. By way of comparison, AEMO stated that application of two volume weighted MLFs would have resulted in a positive intra-RR value.

Since publication of the Rule change request and Consultation Paper, AEMO have provided updated figures demonstrating the extent of intra-RR that would have accrued under a range of MLF scenarios at Lower Tumut. These updated figures reflect the adjustments made as AEMO has undertaken its settlement reconciliation process. Importantly, while there are some differences between the values included in AEMO's Rule change request and the figures presented below, the difference in intra-RR

13 AEMO, Rule change request, p.5.

14 Ibid, p.7

between the single volume weighted and single time weighted scenarios is about $6.8M, which is the same as in the Rule change request.

The figures presented in table 5.1 below have been sourced from AEMO's analysis of settlement outcomes and intra-RR accrual under a range of modelled scenarios. Further detail of this analysis is included in section 5.3.2 below. Table 5.1 demonstrates the intra-RR values which accrued when various MLFs are applied at Lower Tumut. It clearly demonstrates the significant negative values which would have accrued under application of a single volume weighted MLF at Lower Tumut.[15]

Table 5.1 Cumulative intra-RR values for NSW as at 30 June 2010, given different MLFs at Lower Tumut

Single time weighted	Single volume weighted	Two volume weighted
-$858,250	-$119,111,480	$5,916,907

AEMO state that while the Proposed Rule would not, and is not intended to, eliminate the recovery of some intra-RR, it is likely to minimise the extent to which negative intra-RR occurs.

5.2 Stakeholder views

Several stakeholders commented on the materiality of the identified issue.

A number of stakeholders stated that the identified issue was likely to have a material impact, through its effect on the efficiency of dispatch and pricing.

Energy Australia stated that the effect of the identified problem would be to distort the apparent offer price of affected generators, potentially resulting in out of merit order dispatch. While this could provide such generators with a favourable outcome, Energy Australia stated that it may also artificially lower the regional price in a region, resulting in inefficient operational and investment decisions by other participants.[16] Origin Energy also indicated that the identified problem can result in inefficient dispatch outcomes, with potential impacts on the efficiency of pricing and participant operational and investment decisions.[17]

15 This very large value is partly due to the dispatch of Lower Tumut for a large portion of its available capacity, on days when prices approached the market price cap. On these days, Lower Tumut earns the RRP, multiplied by its dispatched capacity, multiplied by its large single volume weighted MLF (1.566). If insufficient revenue is collected by AEMO in settlement to cover this revenue flow, a negative intra-RR value results.

16 Energy Australia, 1st round submission, pp. 1-2.

17 Origin Energy, 1st round submission, p.1

ActewAGL stated that the Proposed Rule was likely to improve the efficiency of operation of the NEM, and that this would encourage more efficient operation and investment decisions by participants.[18]

Larger energy users, including the Energy Users Association of Australia (EUAA) and Norske Skog, as well as NSPs TransGrid and ActewAGL, focused on the impact of the identified problem on the accrual of intra-RR. Energy Australia, ActewAGL and the EUAA advised that significant changes in levels of intra-RR can result in significant year to year variations in TUoS, which may influence the consumption and investment decisions of larger customers.[19] This was supported by Norske Skog, who advised that variability in the extent of TUoS charges has a direct influence on the viability of their business.[20]

ActewAGL and TransGrid indicated that the level of intra-RR has been directly responsible for significant fluctuations in TUoS charges faced by customers in the ACT and NSW respectively. In the ACT, ActewAGL stated that the available offsetting for TUoS charges fell from $159 million in 2007/08 to $17 million in 2010/11, while there has been an average increase in the transmission charge to the ACT of 33% pa in the last 3 years.[21] TransGrid stated that NSW TUoS charges have increased by around 7% between 2009/10 to 2010/11, in order to account for the extent of negative intra-RR in 2009/10 and forecast negative intra-RR for 2010/11.[22]

Snowy Hydro questioned the materiality of the identified problem, stating that recent problematic issues with MLFs for Lower Tumut were caused by changed generation and consumption patterns. Snowy went on to say that these changed patterns were due to underlying drought conditions, which were unlikely to be repeated in the future.[23]

Snowy stated that as Lower Tumut is an energy constrained plant, the dominant factor determining whether the plant generates is the opportunity cost of not doing so. Accordingly, the impact of the MLF value attached to Lower Tumut has little impact on the operational or investment decisions related to Lower Tumut.[24]

Snowy considered that AEMO had over-estimated the effect of different MLFs at Lower Tumut on the level of intra-RR. Snowy stated that at those times when Lower Tumut was the marginal generator, the level of MLF applied to that generator would

18 ActewAGL, 1st round submission, p.3.

19 Energy Australia, 1st round submission, p.3.; EUAA, 1st round submission, p.1.; ActewAGL, 1st round submission, p.1.

20 Norske Skog, 1st round submission, p.1.

21 ActewAGL, 1st round submission, pp.1-3.

22 TransGrid, 1st round submission, p.1.

23 Snowy Hydro, 1st round submission, p.1.

24 Snowy Hydro, 1st round submission, p.2.

have a negligible impact on the RRP. Snowy stated that this means the Lower Tumut MLF would have little impact on the extent of intra-RR accrued at that time.[25]

Snowy also stated that the levels of intra-RR cited by AEMO in their Rule change request (see table 5.1 above) would have included the bidding behaviour of other market participants. Accordingly, the level of intra-RR cannot be solely attributed to the application of MLFs at Lower Tumut.[26]

5.3 Other relevant considerations

In order to inform its consideration of the materiality of the identified problem, the Commission sought advice from AEMO which examined several scenarios including:

- the effect of application of different MLFs at Lower Tumut on dispatch; and
- the effect of application of different MLFs at Lower Tumut on settlement.

The Commission acknowledges that the analysis provided by AEMO, while useful and informative, was necessarily limited in scope. Accordingly, the Commission considers this information to be indicative only, rather than proof of the materiality of the identified problem. Nevertheless, the results produced support the Commission's conclusion that the identified problem is having, or is likely to have, a material market impact.

5.3.1 AEMO's dispatch analysis

AEMO utilised its NEMDEQueue market simulation model to deliver an analysis of dispatch.[27]

This analysis utilised actual generator offers and demand from five trading days in 2009 and 2010.[28] AEMO "re-ran" the dispatch process in NEMDEQueue, keeping this information constant but applying different MLFs to the generator offers of Lower Tumut.[29]

These reruns produced a base case and two scenarios:

- Basecase: one time weighted MLF of value 1.0151 applied at Lower Tumut;

25 Ibid

26 Ibid.

27 NEMDEQueue is a dispatch modelling engine which replicates the processes of the NEM dispatch engine.

28 These five days were intended to be representative of a range of market outcomes in the NEM; they were selected as they represented days with high, average and low prices.

29 Lower Tumut was the focus of this analysis as it is the only connection point which has been affected by the identified problem to date.

- Scenario 1: one volume weighted MLF of value 1.5660 applied at Lower Tumut; and

- Scenario 2: two volume weighted MLFs of value 1.0373 (consumption) and 0.9850 (generation) at Lower Tumut.

The primary outcome of this analysis was to demonstrate the impact of different MLFs at Lower Tumut on the setting of RRPs. Across the 5 days modelled:

- application of two volume weighted MLFs at Lower Tumut (scenario 2), delivered average RRP values across all regions which were 1.7% higher than those that occurred under the base case; and

- application of one volume weighted MLF at Lower Tumut (scenario 1), delivered average RRP values across all regions which were 7.7% lower than those that occurred under the base case.

It should be noted that from the 5 days modelled, only those dispatch intervals where the various MLF values resulted in changed generation targets for Lower Tumut were selected for analysis. Of these dispatch intervals, the analysis focused on those intervals where there was a change in RRP between scenarios; that is, only those dispatch intervals where changes in Lower Tumut's generation targets resulted in a shift in the RRP.

These results are relevant as they show a consistent lowering of prices as time weighted and single volume weighted MLFs are applied. This supports the Commission's consideration that two volume weighted MLFs, which most closely reflect the average of actual marginal losses, are likely to result in RRPs which most accurately account for marginal intra-regional losses.

The consequences of these results are discussed in more detail in section 5.4 below.

5.3.2 AEMO's intra-RR analysis

In its Rule change request, AEMO described the different levels of cumulative intra-RR that accrued in NSW during financial year 2009/10.

In order to inform the AEMC's analysis, AEMO provided further information which plots the accrual of this cumulative intra-RR over the financial year 2009/10. This information was based around actual patterns of dispatch for 2009/10; that is, it utilised the dispatch that occurred where a single time weighted MLF was applied at Lower Tumut. However, settlement outcomes and subsequent levels of intra-RR were based around application of different MLFs at Lower Tumut.[30]

30 The Commission considers that applying different MLFs in dispatch and settlement is valid, as this is unlikely to have significantly changed Lower Tumut's actual dispatch targets. That is, it is likely that under a different MLF, Lower Tumut would have adjusted its offer prices to maximise its dispatch and access to high value RRPs.

The outcome of this analysis is provided in figures 5.1 and 5.2 below. In these graphs:

- the base case refers to settlement with a single time weighted MLF applied at Lower Tumut;
- scenario 1 refers to settlement with a single volume weighted MLF applied at Lower Tumut; and
- scenario 2 refers to settlement with two volume weighted MLFs applied at Lower Tumut.

Figure 5.1 Cumulative NSW intra-RR 2009/10: 1 time weighted & 2 volume weighted MLFs at Lower Tumut

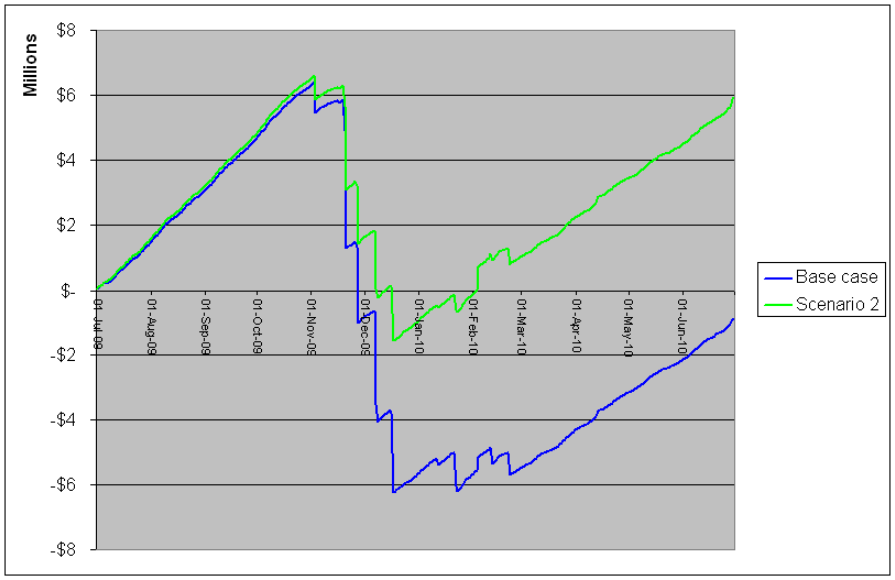
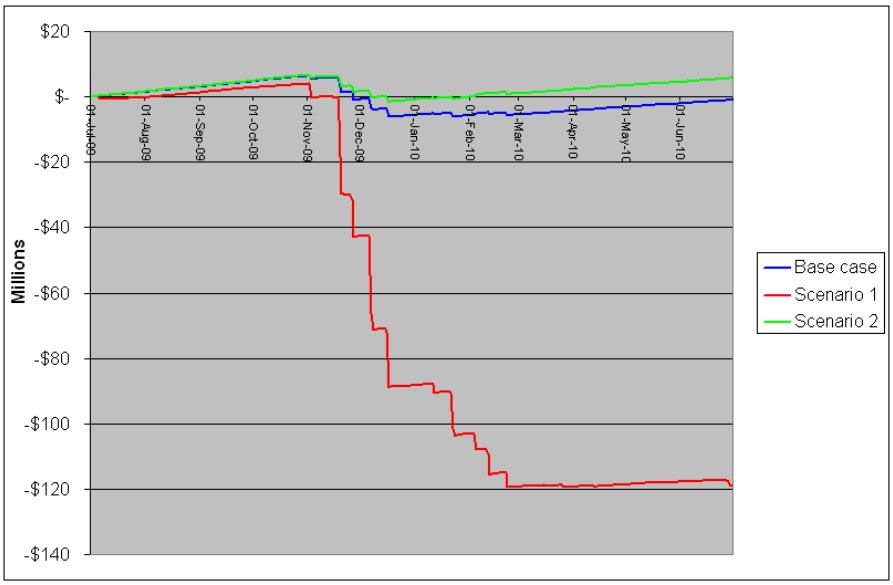


Figure 5.2 Cumulative NSW intra-RR 2009/10: 1 time weighted, 1 volume weighted & 2 volume weighted MLFs at Lower Tumut



These tables demonstrate the extent of the outcomes which occur when different MLF values are applied in settlement for Lower Tumut. The majority of the variance between the different cumulative intra-RR curves occur on specific days when market prices in NSW were high. For example, on 20 November 2009, the average NSW spot price was $1135/MWh, with prices in specific trading intervals as high as $9283/MWh. This corresponds to a significant drop in the levels of cumulative intra-RR on each curve, but also to one of the first major variances between the 3 curves.

The extent of these drops in cumulative intra-RR values is most obvious in scenario 1. The reason for the large drops on this curve relate to the confluence of very high prices on particular days, Lower Tumut being dispatched for a significant quantity of its available capacity, and the application of Lower Tumut's single volume weighted MLF of 1.566. Given these three factors, Lower Tumut theoretically earns 1.5 times the market price cap, multiplied by its total available capacity. This can result in very rapid accrual of negative intra-RR, as AEMO is unlikely to obtain sufficient revenue from load to ensure that Lower Tumut can be settled for this amount. The cumulative intra-RR value is slow to climb again once these high priced events have passed, as normal market outcomes have reasserted themselves, with the associated small positive intra-RR values that occur under average market conditions.

The Commission notes that the drops on each curve cannot be solely attributed to Lower Tumut, as other Generators may have contributed to the accrual of negative intra-RR on each day. However, the significant variance between the three curves can be attributed to the effect of Lower Tumut's static MLF, as all other factors were held constant between the three scenarios.

It is worth noting that the cumulative figures here correspond to the values in table 5.1 above.

5.4 Commission's considerations and conclusion

Having considered the information presented in AEMO's Rule change request, first round submissions and AEMO's analysis, the Commission considers that the identified problem has had, or is likely to have, a material market impact. This relates to the impact of the identified problem on the effectiveness of dispatch, pricing and settlement, and the subsequent efficient operation, use of and investment in electricity services for the long term interests of customers.

However, the Commission also notes that to date, the identified problem has affected only a small number of connection points. This is supported by stakeholders, including ActewAGL, who highlight that the identified problem has to date only affected connection points with pump storage facilities.[31] Accordingly, the Commission considers that it is important for its analysis to consider not only the relatively limited number of connection points where the identified problem has had an impact to date, but also the potential for the identified problem to cause material issues in the future.

31 ActewAGL, 1st round submission, p.5.

5.4.1 Efficiency of dispatch

As highlighted by AEMO in their Rule change request, and supported by stakeholders in first round submissions, the application of inaccurate MLFs may result in the distortion of dispatch outcomes. This distortion occurs in those instances where a high cost generator with a favourable MLF appears cheaper at the RRN than a low cost generator with a less favourable MLF. Such out of merit order dispatch is a clear example of productive inefficiency, and may contribute to inefficient operational and investment decisions by participants.

The Commission acknowledges that the identified problem does not automatically result in this situation occurring. This is because:

- the application of more or less favourable MLFs will not automatically result in displacement of one Generator by another in dispatch; and
- if this does occur, the Generator with a favourable MLF will not necessarily have a higher production cost than the displaced generator.

Furthermore, although AEMO's market modelling did show some displacement of other Generators when a more favourable MLF was applied at Lower Tumut, the Commission does not consider this result to be conclusive.[32]

Nevertheless, the Commission considers that there is a clear potential for the identified problem to interfere with the effectiveness of dispatch. Table 6.1 below, which lists the various MLFs calculated for Lower Tumut, clearly demonstrates how the identified problem can deliver MLFs which vary significantly from one. The Commission considers that such large values would be likely to distort the effectiveness of dispatch, and that this could result in out of merit order dispatch with related productive inefficiencies.

Problems with dispatch may also result in the setting of inefficient RRPs, which can in turn have a direct impact on the efficiency of participant operational, usage and investment decisions. This is explored in further detail below.

5.4.2 Efficiency of pricing

Efficient setting of RRPs

The Commission considers there is a likelihood that the identified problem may have an impact on the efficient setting of regional prices. This occurs when the dispatch of a generator affected by the identified problem depresses RRPs, which may result in inefficient participant production and consumption decisions.

32 AEMO's dispatch analysis was necessarily limited in this regard as it was unable to model real world circumstances, such as rates of change, or changed bidding behaviour by different participants. Additionally, while some generator displacement was identified, AEMO's modelling could not attribute any production cost differences between scenarios. This is related to the difficulty in identifying a meaningful and objective SRMC for hydroelectric generation.

An inaccurately high MLF may cause an affected generator to appear cheaper than other generators at the RRN, which may in turn result in the artificial lowering of the RRP where the affected generator is marginal. As discussed in section 5.3.1 above, AEMO's dispatch analysis demonstrated how this may result in the depression of prices across multiple regions. The extent of this depression is related to the relative accuracy of the static MLFs applied; application of a single volume weighted MLF at Lower Tumut resulted in significantly lower RRP values than the base case (time weighting), while time weighting delivered only a slightly lower value than dual volume weighting.

The Commission considers that depression of RRPs may result in a number of inefficient outcomes. An inaccurately low RRP represents an undervaluing of the actual cost to produce energy, and may encourage inefficiently high levels of consumption. Artificially low RRPs may also change the operational decisions of other generators with more accurate but less favourable MLFs.

The Commission considers that such changed behaviours represent an inefficient use and operation of electricity services. To the extent that these impacts are sustained, they may drive inefficient participant investment decisions. Lastly, sustained inaccurate RRPs may also lead to inefficient pricing of contracts in secondary markets.

The Commission acknowledges that an inverse outcome is also possible; the identified problem could result in a Generator with an inaccurately low MLF, that is, an MLF significantly less than one. If such a Generator wished to earn a specific level of revenue, it must offer its capacity at this price. However, if dispatched, it would appear significantly more expensive at the RRN and, if marginal, would result in an artificially raised RRP. AEMO's dispatch modelling did not assess this potential outcome. However, the Commission acknowledges that such a theoretical outcome could result in similar usage and operational inefficiencies as described above, as well as recovery of levels of intra-RR above what would be expected under normal conditions.

Pricing impact on specific participants

The Commission considers that the identified problem may also interfere with the ability of the market to discover efficient offer prices from all participants. Under normal conditions, a Generator with an MLF which is slightly less than one will offer its capacity into the market knowing that this offer will be divided by its MLF.[33] That is, such a Generator knows that its offered capacity will appear more expensive at the RRN.[34] The Generator will therefore only be dispatched if its MLF adjusted offer, which is inclusive of its marginal cost of losses, is competitive with other Generators' MLF adjusted offers at the RRN. An accurately set MLF therefore forces a Generator who wishes to be dispatched to offer its capacity at a price which recognises the losses incurred in transporting its energy to the RRN.

33 In reality, some Generators may have MLFs greater than one. Under normal conditions, this is usually an intentional reflection of their positive impact on intra-regional losses, and the issue described here does not apply.

However, where an affected Generator has an inaccurate MLF, the effect of this "constraint" may be artificially increased or reduced. If the identified problem results in the calculation of an MLF of one or more, the affected Generator will appear cheaper at the RRN, and will face a competitive advantage over other Generators. The inverse situation occurs with an inaccurately low MLF value of less than one. In either case, this situation represents an inefficient pricing outcome.

The Commission considers that this situation represents a weakening of the ability of the market mechanisms to discover efficient prices. Depending on the impact on individual Generators, this may drive operational inefficiencies in the short term, as Generators amend their behaviours to counter the effect of their MLFs. Overall, this impact may result in reduced dispatch efficiency, if an affected Generator is either discouraged or encouraged to offer its capacity and a Generator with either a greater or preferable production cost is subsequently affected. If the identified effect is sustained, it may also result in inefficient investment decisions by affected participants.

5.4.3 Efficiency of Settlement

The Commission considers that the identified problem has had, and is likely to have, a material impact via its effect on settlement and accrual of intra-RR. As highlighted by AEMO and a number of stakeholders in first round submissions, inaccurate MLFs may result in the accrual of significant negative intra-RR during settlement, with subsequent impacts on TUoS charges faced by participants. The Commission considers that this impact on TUoS may result in a number of inefficient outcomes, including a weakening of the price signals related to intra-regional losses, as well as inefficient operational, usage and investment decisions by both load and generators.

Settlement and intra-RR

Settlement in the NEM is the process whereby AEMO collects and allocates revenue between participants. This incorporates a number of factors, including accounting for the extent of marginal losses incurred in transporting energy to and from the RRN. Settlement of the market involves multiplying the RRP by the relevant MLF, in order to determine a local price. The participant at a connection point then pays, or is paid, this local price multiplied by the quantity it consumed or produced.

Following the principle of marginal costing utilised in the NEM, the static MLFs utilised in this process are based around the volume weighted average of all marginal losses incurred at each connection point in every trading interval of the relevant year. As marginal losses are generally larger than average losses, static MLFs will tend to over-represent the extent of losses. Normally, this results in a small revenue surplus, once the settlement process has been completed (all monies owed have been collected from load, and all Generators have been paid). This surplus, or positive intra-RR, is redistributed back to load. Transmission Network Service Providers (TNSPs) are

34 In this case, the effect of constraints are ignored and normal competitive market conditions are assumed.

responsible for this redistribution and do so by offsetting any positive intra-RR amount against the non-locational component of TUoS charges.

However, in some circumstances, AEMO may not collect sufficient revenue to ensure that all generators are paid fully. This may occur where the identified problem has resulted in a Generator with an MLF greater than one, particularly in those instances where the RRP is high. As with positive intra-RR, this negative intra-RR is recovered from load by TNSPs, via an additional charge on top of normal TUoS charges.

Extent of negative intra-RR in 2009/10

AEMO's analysis, described in figures 5.1 and 5.2 above, demonstrates the different levels of cumulative intra-RR which would have accrued in 2009/10 if various MLF values were applied to Lower Tumut in settlement. This analysis shows that the application of a single time weighted MLF to Lower Tumut resulted in accrual of a negative intra-RR value in 2009/10, while application of two volume weighted MLFs would have resulted in a positive value.

The Commission notes Snowy Hydro's submission, which argues that AEMO has overestimated the impact of different Lower Tumut MLF values on the extent of intra-RR. Snowy states that in those instances where Lower Tumut was the marginal generator, the actual level of MLF applied to this generator in dispatch would have a negligible impact on setting the RRP. Hence, the quantum of intra-RR residues in periods where Lower Tumut was the marginal Generator was not a function of MLFs. Snowy states that the extent of intra-RR accrued is also dependent on the bidding behaviour of other generators, and that regardless of the MLF value at Lower Tumut, these behaviours would not have changed in the face of factors such as tight supply demand balances, outages and constraints.[35]

The Commission agrees that other factors contribute to levels of cumulative intra-RR. However, while it may be true that different MLFs at Lower Tumut when that Generator is marginal will not change RRPs significantly, the Commission considers that it is the combination of high RRPs and Lower Tumut's MLF values in *settlement*, rather than the effect of these MLFs in dispatch, that is true driver of the accrual of negative intra-RR. Furthermore, while the Commission acknowledges that the bidding behaviour of generators other than Lower Tumut will contribute to the accrual of negative intra-RR, AEMO's analysis clearly demonstrates the extent to which different MLF values at Lower Tumut contribute to different quantities of intra-RR accrued.

Effect of negative intra-RR on TUoS charges

The Commission considers that accrual of negative intra-RR, and its related impact on the variability of TUoS charges, can create significant uncertainty for load customers. This is supported by stakeholder submissions from TransGrid, Energy Australia, ActewAGL and the EUAA, which indicate that negative intra-RR has contributed to the significant inter-year variability in NSW TUoS charges. This is also supported by Norske Skog's submission, which states that uncertainty relating to changes in TUoS

35 Snowy Hydro, 1st round submission, p.2

may have a direct impact on the viability of transmission network connected customers.

Having considered these submissions and AEMO's analysis, the Commission considers that this uncertainty may result in material inefficiencies. For example, it may encourage inefficient consumption decisions by consumers, as firms try to minimise their exposure to this uncertainty. In the longer term, firms may be dissuaded from making efficient investments, if the ongoing perceived risk of variability of TUoS charges in a region is too great. The Commission therefore considers that there is a likelihood that the identified problem may result in operational, usage and investment inefficiencies.

Intra-RR and weakened price signals

As discussed above, any positive intra-RR accrued in settlement is returned to load via TNSPs, through offsetting of the non-locational component of TUoS. This redistribution of positive intra-RR can be viewed as part of a price signal that reflects the relative impact of loads on losses. Loads who contribute to the worsening of intra-regional losses will generally have a larger MLF and will therefore pay a larger amount for the energy they consume. In doing so, these loads make a larger contribution to any positive intra-RR, which is then redistributed to *all* consumers via offsetting of TUoS. This combination of higher energy prices and positive intra-RR redistribution sends a price signal that encourages load to make operational, usage and investment decisions which reflect the extent of their contribution to intra-regional losses.

The Commission considers that this outcome represents the normal and expected function of the market, and is likely to help deliver efficient outcomes.

However, the identified problem is likely to interfere with the efficient function of this process. As discussed above, where an affected Generator has an MLF that is larger than one, there is an increased risk that AEMO will not collect sufficient revenue from load to settle the market, which may result in accrual of negative intra-RR.

This circumstance represents a weakening of the price signal identified above. While load who contribute to the worsening of intra-regional losses continue to pay more for energy, there is no supplementary lessening of TUoS charges for load who contribute to a reduction in the extent of losses. This reduces the effectiveness of the "positive" aspect of the price signal. Additionally, this circumstance can actually result in a positive price signal being sent to a Generator who may in fact be worsening losses.

The Commission considers that the circumstances discussed above may result in inefficient operational and investment decisions, by both load and generation. Given the demonstrated scale of intra-RR differences between different scenarios as identified by AEMO, the Commission considers that there is a material risk of such inefficiencies occurring.

5.4.4 Conclusion

The Commission considers that the identified problem has had, or is likely to have, a significant and material market impact. This occurs primarily through the effect of the identified problem on the efficiency of dispatch, pricing and settlement.

The Commission is satisfied that the information provided by AEMO in its Rule change request, as well as stakeholder submissions, provides evidence which supports this conclusion. AEMO's analysis of dispatch also provides some indication of how the identified problem may cause inefficiencies in regards to pricing. Lastly, AEMO's analysis of intra-RR across multiple scenarios demonstrates the extent of the identified problem in regards to its impact on the efficiency of settlement.

The Commission is also satisfied that the materiality of the problem identified in this chapter is proportionate to the solution that is developed in the following two chapters. The Commission considers that in addressing the identified problem, the Draft Rule will result in improved operational, usage and investment efficiencies, with particular respect to the efficient pricing of electricity for the long term interests of consumers.

6 Optimal methodology to address the issue

6.1 Rule Proponent's view

In its Rule change request, AEMO stated that the optimal approach to addressing the identified problem was the application of two separate volume weighted MLFs, to be applied respectively to energy generated and energy consumed at a connection point. AEMO suggested that this would be appropriate at connection points where application of one volume weighted MLF would deliver a sub optimal outcome.

As discussed in section 1.4 above, such a sub-optimal outcome occurred at Lower Tumut in 2008/09, where a single volume weighted MLF value of 5.8319 was calculated. This number, which falls well outside the normal range of MLF values, occurred because the annual total generation and consumption at Lower Tumut in preceding years had approached parity. In order to prevent the significant distortions to dispatch and settlement that would have occurred if this value was applied, AEMO applied a single time weighted value at Lower Tumut.

AEMO have provided a summary of the different MLF values that have been calculated for Lower Tumut, utilising the single volume weighted, single time weighted and dual volume weighted approach.

Table 6.1 Comparison of MLFs for Lower Tumut 2008-09 to 2010-11 using different methodologies

	2008-09	2009-10	2010-11
Single volume weighted average MLF for both energy generation and consumption	5.8319	1.5660	2.4874
Single time weighted average MLF for both energy generation and consumption	1.0197	1.0151	1.0092
Separate volume weighted average MLF for energy generation	0.9762	0.9850	0.9774
Separate volume weighted average MLF for energy consumption	1.0428	1.0373	1.0242

Source: AEMO, Rule change request, p.6.

AEMO have advised that the application of time weighting was designed to address the identified issue at Lower Tumut, while also complying with the requirement set out in NER clause 3.6.2(b)(2) to apply one MLF value at each connection point.

However, AEMO state that while this outcome delivers an MLF that falls within the expected range of values, it is not in keeping with NER clause 3.6.2(e)(5), which requires the utilisation of a volume weighted averaging approach. Accordingly, AEMO seek to amend the Rules to allow the application of two volume weighted MLFs, which it states will provide an optimal solution to the identified problem.

AEMO also considered a range of alternative approaches in the Rule change request, including:

- New connection points and metering: this approach would require an affected Registered Participant to establish a second connection point and install the necessary metering. AEMO state that this approach would be expensive to implement, not always physically possible at all connection points, and would potentially require additional amendments to the Rules;

- Time weighted loss factors: AEMO consider that this methodology is not the most efficient approach. While it provides a value which is less inaccurate than the single volume weighted approach, it remains less accurate than two volume weighted MLFs;

- Dynamic loss factors at all connection points: AEMO acknowledge that the application of dynamic loss factors at all connection points would address the identified problem and deliver accurate MLFs across the full range of power conditions.[36] However, AEMO state that such an approach would involve significant implementation costs, and would also represent a significant change in the design of the market;

- Dynamic loss factors at connection points affected by the identified problem: AEMO consider that while this approach would address the identified problem, it represents an inconsistent approach in regards to dispatch and pricing. Furthermore, it would also incur significant implementation costs, which AEMO assert would be similar to applying dynamic loss factors at all connection points;

- Dual loss factors only at connection points with pump storage facilities: AEMO consider that this approach would be overly proscriptive and not capture other circumstances where generation and consumption approach parity; and

- Application of two volume weighted MLFs at all connection points with both energy generation and consumption: AEMO state this would result in significant implementation costs for both AEMO and market participants, as it would affect a large number of connection points.

AEMO's proposed approach to implementation in dispatch and settlement

AEMO have proposed to implement the application of two volume weighted MLFs via making changes to their market management system (MMS). AEMO state that by

36 Dynamic loss factors are calculated and applied at each trading interval, and reflect the actual system losses occurring at that time.

amending the MMS, rather than requiring more costly implementation measures such as physical alteration of connection assets and meters, costs to participants will be minimised.[37] AEMO also state that the estimated cost of implementing its proposed changes in MMS would cost around $114,000, and that once these MMS changes have been made, no further implementation costs have been identified.[38]

In regards to dispatch of participants with two separate MLFs, AEMO state that this will be achieved in MMS through the application of two separate dispatchable unit identifiers (DUIDs) to represent generation or consumption at a connection point. Each of these DUIDs are independent in MMS, allowing for the separate dispatch of either generation or load.

In regards to the settlement of participants with two separate MLFs, AEMO state that the MLF applied in MMS and the quantity settled in a trading interval will be related to the net energy value for that trading interval. The net energy value is the energy value that remains after the quantities of energy generated and consumed by a participant in a trading interval have been netted off against each other. The MLF that is applied in MMS for settlement of that trading interval therefore corresponds to the net energy value - the generation MLF is applied for a net positive value, the load MLF is applied for a net negative value. The quantity settled is the net energy value itself. AEMO advise that this approach is necessitated by the fact that metering data is provided to AEMO as a net value for each trading interval.

6.2 Stakeholder views

A number of stakeholders commented on the appropriateness of various methodological approaches to resolve the identified problem.

Two volume weighted MLFs

The majority of stakeholders supported two volume weighted MLFs as a solution to the identified problem. Energy Australia, Origin Energy, TransGrid, EUAA, ActewAGL, International Power and Norske Skog indicated that they supported the proposed change to the Rules. Snowy Hydro stated that they supported the Rule change request, subject to certain conditions.

No stakeholders indicated that they were opposed to two volume weighted MLFs as the optimal solution.

New connection point and metering

Snowy Hydro stated that it is not feasible to reconfigure the metering of Lower Tumut to allow for separate connection points for generation and pumping.

37 AEMO, Rule change request, p.8.

38 Ibid, p.13.

Snowy Hydro, ActewAGL and Energy Australia also stated that dual connection points would create significant implementation costs and would represent a disproportionate response to the identified problem.[39]

Time weighted approach

Snowy Hydro stated that, given the materiality of the identified problem, the time weighted approach had provided a reasonable solution.[40] However, ActewAGL and Energy Australia stated that the time weighted approach was unlikely to lead to optimal patterns of dispatch.[41]

Dynamic marginal loss factors

Energy Australia stated that application of dynamic MLFs would create significant implementation costs.[42] ActewAGL, Snowy Hydro and International Power stated that dynamic MLFs would represent a major change to market frameworks and would create increased levels of uncertainty.[43] This would be likely to reduce levels of contracting.[44]

Two volume weighted MLFs at all connection points with energy generation and consumption

Energy Australia stated that application of two MLFs at all connection points with both generation and consumption would create a significant and unnecessary administrative burden for a large number of participants.[45]ActewAGL stated that application of two MLFs at all connection points would involve significant implementation costs.[46]

Connection points with pump storage facilities

ActewAGL stated that two MLFs should not be applied in a technology specific manner, that is, it should not be applied solely to pump storage schemes.[47]

Time sculpted loss factors

International Power suggested than an alternative approach may be to apply "time sculpted" MLFs. This involves applying different MLF values based on patterns of energy flow at specific time periods during a trading day, or specific days during the week. International Power suggested that while such an approach may address the

39 Snowy Hydro, 1st round submission, p.3; Energy Australia, 1st round submission, 3; ActewAGL, 1st round submission, p.4.

40 Snowy Hydro, 1st round submission, p.3.

41 ActewAGL, 1st round submission, p.4; Energy Australia, 1st round submission, p.2.

42 Energy Australia, 1st round submission, p.3

43 ActewAGL, 1st round submission, p.4; International Power, 1st round submission, p.2.

44 Snowy Hydro, 1st round submission, p.3.

45 Energy Australia, 1st round submission, p.3.

46 ActewAGL, 1st round submission, p.4.

47 ActewAGL, 1st round submission, p.5.

identified problem, it would also be incompatible with the current market frameworks. Generators adjust their offers in the context of fixed MLFs, in order to determine how their offers will appear at the RRN. If different MLFs are applied within a trading day, generators will be unable to manage the effect of this MLF adjustment to their offer.[48]

6.4 Commission's considerations and conclusion

The Commission considers that application of two volume weighted MLFs is the optimal solution, at those connection points affected by the identified problem. Considering the materiality of the identified problem and the relatively small number of connection points likely to be affected, the Commission is of the opinion that this solution is the most proportionate, represents the lowest cost to implement and is likely to create the lowest level of market interference.

6.4.1 Consideration of other approaches

The Commission has considered each of these approaches in the context of the materiality of the identified problem, likely implementation costs, market uncertainty and likely effectiveness.

New connection point and metering

The Commission acknowledges that this approach would most likely address the identified problem, as a different MLF would be applied at each connection point to reflect either energy generation or consumption at that point.

The Commission also acknowledges Snowy Hydro's submission, which indicates that this solution may not be viable in a number of instances. Furthermore, such a solution would likely present significant implementation costs, as new metering and connection equipment is installed. There may also be implications for the negotiation of connection agreements, as well as arrangements with metering service/data providers.

The Commission considers that the costs related to such an arrangement are not proportionate to the materiality of the identified problem. While such arrangements would likely address the identified problem, the application of two MLFs in the MMS system is likely to deliver a solution which is equally effective, but which involves substantially less market interference and a significantly lower cost.

Time weighted approach

The Commission considers that the time weighted approach utilised by AEMO at Lower Tumut has delivered an MLF value at that connection point that was less distortionary than the single volume weighted MLF which would have otherwise applied. Application of such an approach may also deliver a preferable outcome in other circumstances where a single volume weighted MLF is non-viable.

48 International Power, 1st round submission, p.2.

However, the Commission considers that the values presented in figures 5.1 and 5.2, and in table 6.1 above, demonstrate that time weighting does not represent the optimal solution. Time weighting at Lower Tumut contributed to the accrual of negative intra-RR value in 2009/10, while the time weighted MLF values shown in table 6.1 may have had some distortionary impact in the process of dispatch and pricing. The Commission also considers that the emphasis on the use of volume weighting in the Rules (as described in clause 3.6.2(e)(6)) is appropriate, and should remain the basis of loss factor calculation.

The Commission considers that while the time weighted approach has represented an adequate interim measure, the application of two volume weighted MLFs represents a preferable and more efficient solution going forward.

Dynamic loss factors

The Commission acknowledges that dynamic MLFs would likely provide an accurate representation of intra regional losses. Such an approach would potentially mirror the methodology used in the calculation of inter-regional losses, which are calculated and applied half hourly to reflect actual losses at that time.

However, the Commission considers that there are a number of issues with such an approach which do not warrant its application. Dynamic MLFs at all connection points would represent a major change to market frameworks, and would create significant market uncertainty. For example, such a change would introduce intra-regional basis risk, which is likely to have an impact on the level of contracting offered by participants.[49] Furthermore, dynamic intra-regional loss factors would require major adjustment to AEMO's systems, whether applied on a market wide scale, or at specific connection points.

If dynamic loss factors were applied at specific connection points, the Commission considers that this would introduce major uncertainties and risks for those participants, with likely impacts on their operational and investment behaviour. Such impacts need to be considered in the context of the materiality of the identified problem.

The Commission considers that the introduction of dynamic MLFs at all connection points, or only at those connection points affected by the identified problem, does not represent a proportionate solution to the identified problem. Implementation costs, increased uncertainty and related impacts on contracting, mean that this approach is not considered as effective as application of two volume weighted MLFs at affected connection points.

49 In this case, basis risk entails uncertainty about a generator's ability to access the RRP. Dynamic intra-regional loss factors would mean that a Generator's offers would be adjusted by a constantly shifting MLF value to refer them to the RRP, reducing those Generators' revenue certainty.

Two MLFs at all connection points with energy generation and consumption, or only at connection points with pump storage facilities.

The Commission considers that these approaches lack an appropriate level of specificity. AEMO have advised that application of two MLFs at all connection points would represent a significant increase in administrative and implementation costs. Furthermore, at connection points unaffected by the identified problem, such an approach is unlikely to deliver MLF values with significantly improved accuracy.[50]

Application of two MLFs at only those connection points with pump storage facilities is also unlikely to represent an optimal solution, as it fails to allow for other circumstances where the identified problem may occur. Furthermore, the Commission considers that such an approach is likely to be in conflict with the market design principles established in clause 3.1.4(a) of the Rules, in particular clause 3.1.4(a)(3). This clause states that one of the market design principles is to avoid any special treatment in respect of different technologies used by market participants.[51]

The Commission considers that these approaches do not represent the optimal solution to the identified problem, as they would introduce unnecessary changes to the market frameworks, or would fail to address all instances where the identified problem may occur.

Time sculpted MLFs

The Commission considers that this approach may address the identified problem. Furthermore, the Commission agrees with International Power that application of such an approach may account for situations where variations in the actual loss factor exhibit a regular or predictable pattern.

However, as highlighted by International Power, such an approach would likely interfere with the ability of generators to factor the effect of losses into their generation offers. Generators must specify, ahead of the trading day, the 10 price bands into which they will offer capacity. If the MLF that applies to these 10 price bands were to vary throughout the trading day, Generators would have a reduced capability to ensure that their offer prices factored in the cost of losses.

6.4.2 Conclusion

Having considered the range of alternative approaches discussed above, the Commission considers that the optimal solution is the application of two volume weighted MLFs, at those connection points affected by the identified problem.

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50 At connection points where energy is both generated and consumed, the final single MLF value may vary slightly from separate values for generation and consumption. However, where the dominant energy pattern at a connection point is either generation or consumption, the extent of this variance is likely to be very small, and will not have a material impact on dispatch, pricing or settlement.

51 NER clause 3.1.4(a)(3).

The Commission considers that use of volume weighting to deliver static MLF values remains the optimal approach to account for intra-regional losses. Static MLF values are fixed and therefore provide participants with certainty as to their impact on losses, allowing for efficient production, consumption and investment decisions. Utilisation of the volume weighted approach emphasises the impact of losses incurred when a participant is making maximum use of the network. Accordingly, the Commission considers use of other approaches, such as dynamic loss factors and time weighted loss factors, do not represent an optimal approach to the calculation and representation of intra-regional losses.

Application of two volume weighted MLFs also represents a solution which minimises market intervention and administrative costs. By restricting the application of two MLFs only to connection points affected by the identified problem, the Commission considers that the likelihood of unnecessary market interference will be minimised, reducing the potential for inefficient usage, operational and investment decisions. This will also limit the extent of AEMO's administrative and implementation costs, which will manifest as a cost saving for all market participants.

7 Appropriate level of specificity in the Rules: Criteria for application and alternative energy inputs

7.1 Rule Proponent's view

7.1.1 Criteria for application

In its Rule change request, AEMO stated that the Rules should be amended to allow for the application of two MLFs, in those circumstances where one MLF would not satisfactorily represent transmission network losses for the active energy generation and consumption at a transmission network connection point.

AEMO stated that it considered the 30% NEB to be an effective criteria that indicated when a single MLF would no longer satisfactorily represent transmission network losses for energy generation and consumption at a connection point. This was based on the consultation undertaken in 2009 regarding the proposed amendments to the FLLF methodology, as described in section 1.4 above. In this consultation, NEMMCO stated that it had performed a due diligence review, and considered the 30% NEB to be appropriate.[52]

Despite stating that it considered the 30% NEB to be the appropriate criteria as to when two MLFs should be applied, AEMO did not propose that the 30% NEB be incorporated into the Rules. AEMO instead indicated that the FLLF methodology should be amended to incorporate the 30% NEB as the criteria for application of two volume weighted MLFs.

7.1.2 Alternative energy inputs

AEMO did not include any discussion of this issue in their Rule change request.

However, this issue was discussed as part of the 2009 consultation on the FLLF methodology. In that document, NEMMCO consulted on whether the FLLF methodology should be amended to allow for "abnormal conditions affecting NEM generation patterns". This refers to a situation where underlying conditions[53] have resulted in abnormal energy generation and consumption patterns. Utilising these inputs in calculating a forward looking MLF may be problematic, if these underlying conditions are unlikely to be repeated in future years.

Acknowledging this as an issue, NEMMCO amended the FLLF methodology to include a clause which allows generators who have been affected by "unforseen circumstances" to provide an adjusted generation profile. NEMMCO would then

52 AEMO, *Changes to Forward Looking Loss Factor Methodology to address unusual conditions, pump storage schemes and advice on committed generator projects: Draft Determination*, 21 January 2009, p.7.

53 NEMMCO listed events such as drought conditions, major plant failures resulting in forced outages and fuel supply problems as examples of abnormal underlying conditions.

consider this profile, with the discretion to accept or reject it as an input when calculating MLFs.[54]

7.2 Stakeholder views

7.2.1 Criteria for application

Several stakeholders, including Energy Australia and Snowy Hydro, stated that the 30% NEB was the appropriate criteria for application of two volume weighted MLFs at a connection point. Snowy stated that this criteria had already been subject to sufficient consultation, while Energy Australia stated that AEMO should not have any discretion to use any criteria other than the 30% NEB.[55]

However, other stakeholders suggested that the Rules should allow for greater discretion, and that the 30% NEB may not be the most appropriate criteria to determine when two MLFs should be applied.

ActewAGL suggested that the 30% NEB should not be written into the Rules, and that the Rules should allow for some "guided flexibility" in application of the criterion. ActewAGL stated that such flexibility would allow for the timely refinement of the criterion if necessary as new technologies and energy sources emerge. Accordingly, ActewAGL stated that the AEMC should not be "exploring a range of alternative eligibility criteria" but rather that the Rules should "establish the principles that the criterion needs to address and provide for the criterion to be established by AEMO following consultation".[56]

International Power expanded on this point, stating that AEMO's Rule change request focused too narrowly on addressing a "computational difficulty", rather than seeking to develop a Rule change which would provide an opportunity to "gain greater benefits in relation to the NEO". International Power suggests that the Rules should include less specificity on the appropriate criteria for application. Instead, AEMO should be required to consider whether the application of two MLFs would more accurately describe average losses at a connection point, and whether it would minimise impacts on the central dispatch process, as described in NER clauses 3.6.2(e)(2) and 3.6.2(e)(2A).[57]

7.2.2 Alternative energy inputs

Two stakeholders commented on this issue. Origin Energy stated that while they supported the Rule change itself, AEMO may need to consider more than one year of data when determining whether to apply two volume weighted MLFs at a connection

54 AEMO, *Methodology for calculating forward-looking transmission loss factors: final methodology*, clause 5.5.6, p.28, 1 April 2010.

55 Snowy Hydro, 1st round submission, p.4; Energy Australia, 1st round submission, p.4.

56 ActewAGL, 1st round submission, p.5.

57 International Power, 1st round submission, p.3.

point. Origin stated that this was important, as fluctuating between one and two MLFs from year to year could create significant uncertainty for participants.[58]

Snowy Hydro also stated that historical generation and consumption patterns may not be representative of future generation and consumption, and that the calculated MLF may therefore be an inaccurate approximation of future losses. Snowy re-iterated that it is important for Generators to be able to demonstrate to AEMO that the preceding two years of data would be unrepresentative of future generation and consumption patterns. However, Snowy went on to say that it had reviewed AEMO's FLLF methodology and the Proposed Rule change, and considered that nothing prevented AEMO from applying a different set of generation and consumption data.[59]

7.3 Commission's considerations and conclusion

7.3.1 Criteria for application

The Commission has considered the optimal criteria for the application of two MLFs in the context of the appropriate level of specificity in the Rules. That is, the Commission has sought to determine whether this criteria is most appropriately defined in the Rules, or in AEMO's FLLF methodology. In doing so, the Commission has considered whether the benefits of less specificity in the Rules would outweigh the potential for increased uncertainty and related operational inefficiencies.

Overall, the Commission considers that no specific numerical criteria for application should be written into the Rules. Such criteria, including the 30% NEB, are dependent on underlying market conditions, and are likely to be subject to alteration as these conditions change. Accordingly, the Commission considers that such a level of specificity in the Rules would be inappropriate. The FLLF methodology, which can only be amended by AEMO via a Rules Consultation procedure, remains the appropriate vehicle for the description of this criteria.

However, the Commission considers that there is currently a reasonably clear set of circumstances where the single volume weighted approach delivers suboptimal outcomes; the identified problem has to date only occurred at connection points where annual levels of energy consumption and generation approach parity. The Commission therefore considers that it is appropriate for the Rules to refer to this particular situation; namely, where application of a single MLF would not accurately reflect losses for energy generation and consumption at a connection point. Furthermore, while the Commission acknowledges ActewAGL's suggestion that new technologies and market behaviours may warrant different criteria in the future, it is appropriate that the Rules be considered in the context of these circumstances as they emerge, so that adequate consideration can be given to all market impacts.

58 Origin Energy, 1st round submission, p.1.

59 Snowy Hydro, 1st round submission, p.4.

The Commission considers that providing any less specificity than this in the Rules may create the potential for inefficient operational processes. Where the Rules require AEMO to develop methodologies and guidelines, it follows that some interpretation of the Rules is required. If the Rules are less specific, this interpretation is less clear, and more likely to be challenged. The Commission considers that this creates an increased likelihood of extended disputes where participants disagree with a decision to apply two MLFs, with related costs for AEMO and customers. Alternatively, the Commission considers that there is a risk that AEMO would not seek to apply two MLFs at all, in order to minimise its exposure to risk of dispute from affected participants.

Generally, the Commission considers that the Draft Rule reflects an appropriate allocation of responsibilities between AEMO and the AEMC. While the Commission agrees that the identified problem is material and that the application of two volume weighted MLFs is likely to represent the optimal solution, the AEMC is not the appropriate market body to make a determination on the numerical criteria for the application of two MLFs. AEMO, as the market operator responsible for the analysis and development of MLFs for each connection point, is best placed to determine this criteria.

Accordingly, the Commission emphasises that this Draft Determination makes no comment on the appropriateness, or otherwise, of the 30% NEB as the criteria for when AEMO applies two MLFs. The appropriateness of this value must be determined by AEMO and, if a different value is to be utilised in the future, AEMO would be required to undertake a Rules Consultation Procedure, as required under clause 3.6.2(d) to make this change.

7.3.2 Alternative energy inputs

The Commission considers that underlying conditions may change from one year to the next, and that this may have an impact on the effectiveness of MLF values. Accordingly, it is important that a mechanism exists which allows for the consideration of alternative energy inputs in the calculation of MLFs.

As acknowledged by Snowy Hydro in their submission, current arrangements do provide an opportunity for Generators to provide AEMO with alternative energy inputs, in circumstances where they have been affected by abnormal underlying conditions. This arrangement is described in clause 5.5.6 of the FLLF methodology, which allows generators to provide adjusted generation profiles, where its generation pattern has been affected by "unforseen circumstances". While the Commission notes that AEMO is not obligated to include consideration of these alternative inputs, this arrangement is considered to provide a reasonably effective mechanism to address the stated issue.

The Commission notes that AEMO may need to further develop its processes, in light of potential clause 5.5.6 claims from participants subject to a decision to apply two MLFs. The Commission considers that AEMO is best positioned to determine whether this could be achieved through development of further guidelines or procedures.

Abbreviations

30% NEB	30% net energy balance
AEMC	See Commission
AEMO	Australian Energy Market Operator
Commission	Australian Energy Market Commission
EUAA	Energy Users Association of Australia
FLLF methodology	forward looking loss factor methodology
intra-RR	intra-regional residues
MCE	Ministerial Council on Energy
MLF	marginal loss factors
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company Limited
NEO	National Electricity Objective
NER	See the Rules
NSP	network service providers
RRN	regional reference node
RRP	regional reference price
the Proponent	See AEMO
the Rules	National Electricity Rules
TNSP	Transmission Network Service Providers
TUoS	Transmission use of system charges

A Summary of issues raised in submissions

Stakeholder	Issue	AEMC Response
Energy Australia	The problem has a material market impact. This is caused by the inaccurate MLF lowering the spot price in the region, resulting in under recovery of intra-regional residues.	The Commission agrees that the issue is material and that it has an impact on the setting of efficient RRPs.
Energy Australia	Time weighting approach to calculating MLFs is inefficient	The Commission agrees that time weighting is an inefficient approach.
Energy Australia	Primary impact of identified problem is that cheapest Generation is not always dispatched. That is, a more expensive form of Generation may appear cheaper and is dispatched ahead of cheaper Generation with a more accurate MLF.	The Commission agrees that a potential consequence of the identified problem is dispatch inefficiency.
Energy Australia	Uncertainty of TUoS charges caused by changes in intra-RR can impact on consumption and investment decisions of larger transmission and distribution connected customers	The Commission agrees that the identified problem may cause uncertainty amongst customers
Energy Australia	Dynamic loss factors would create additional administration costs, due to complexities of calculation and implementation.	The Commission agrees that dynamic loss factors would result in increased costs and complexities and do not represent the optimal solution to the identified problem.
Energy Australia	Dual connection points would require a modification to the NER and would also create additional participant costs.	The Commission agrees that dual connection points would create significant additional costs and do not represent the optimal solution to the identified problem.
Origin Energy	Recommend that AEMO utilise more than 1 years worth of data in determining whether a connection	The Commission considers that the existing arrangements under the FLLF Methodology provides adequate opportunity for provision of

Stakeholder	Issue	AEMC Response
	points meets the threshold trigger to introduce two volume weighted MLFs	alternative inputs.
Snowy Hydro	Recent problematic issues with MLFs for Lower Tumut have been due to changed generation and consumption patterns, flowing from severe drought conditions. This is unlikely to be repeated in the near future....Historical patterns of generation and consumption may not be reflective of future patterns. AEMO should have the discretion to apply alternative generation and consumption inputs into the methodology where it can be reasonably demonstrated that historical data would be unrepresentative of future Generation / consumption expectations.	The Commission notes this. It is considered that the current FLLF methodology provides adequate opportunity to allow for these changed underlying conditions.
Snowy Hydro	30% NEB is the appropriate trigger, as it has been subject to analysis and consultation - should not be re-opened for consultation.	The Commission notes this, but considers that AEMO represent the appropriate body to determine whether the numerical criteria for application of two MLFs should be re-opened for consultation.
Snowy Hydro	Support for Rule change is dependent on AEMO applying different inputs to the MLF methodology in circumstances where historical generation and consumption patterns are not representative of future expectations	The Commission notes this. It is considered that the current FLLF methodology provides adequate opportunity to allow for these changed underlying conditions.
Snowy Hydro	Materiality of the identified problem is low - AEMO has overestimated the impact of Lower Tumut on intra-RR. The MLF applied at Lower Tumut has little impact on the RRP when Lower Tumut is marginal, and other Generators are equally responsible for the accumulation of negative intra-RR.	The Commission notes this, but considers that AEMO's analysis relates more to the effect of MLFs in settlement, rather than to the effect of MLFs in dispatch and setting of RRP. Additionally, it is acknowledged that other Generators contribute to the accrual of negative intra-RR, however the Commission considers the AEMO's analysis demonstrates that Lower Tumut has made a significant contribution in its own right.

Stakeholder	Issue	AEMC Response
Snowy Hydro	The extent of the variance in different sorts of MLFs calculated under different methodologies is between 2% and 3%. It would have little impact on the operational and investment decisions for Lower Tumut.	The Commission notes this, but considers that the primary impact of the identified problem is via settlement outcomes.
Snowy Hydro	Single time weighted methodology has provided a reasonable solution where the NEB is less than 30%. Materiality of the identified problem is small and so this represents an appropriate solution.	The Commission notes this, but considers that while single time weighted MLFs have represented an interim solution, application of dual volume weighted MLFs provides preferable outcome.
Snowy Hydro	Dynamic loss factors are complicated and represent a major change in market frameworks. Would create uncertainty as participants would not know how their offers would appear at the RRN. Would lead to conservative contracting behaviour and hence a reduction in the contract market.	The Commission agrees that dynamic loss factors would result in increased costs and complexities and do not represent the optimal solution to the identified problem.
Snowy Hydro	Not feasible to reconfigure the metering of Lower Tumut so that there are separate connection points for generation and pumping. Dual connection points would be an onerous and disproportionate response.	The Commission agrees that dual connection points would create significant additional costs.
Energy Australia	Movements in intra-RR have impacted significantly on transmission prices - this particularly impacts large customers ... reversal of $35 million in intra-regional residues accruing in NSW a year had two impacts on transmission charges in that region. The shortfall in transmission revenue of $35 million required an increase of the same amount of transmission revenue to be recovered in NSW in 2010-11. In addition, the value of intra-regional	The Commission notes this, and considers that it demonstrates the extent of the impact of negative intra-RR on load customers.

Stakeholder	Issue	AEMC Response
	residues to accrue in 2010-1 1 is uncertain but was forecast to fall by a comparable amount on the assumption of a similar set of market events in that year ... Together these two impacts increased in NSW transmission charges by around 7% from 2009-10 to 2010-1 1.	
EUAA	Inaccurate MLFs can create changes in residues, which can have material impacts on the transmission charges faced by users. MLFs should be set as accurately and predictably as possible year to year.	The Commission agrees that intra-RR levels can have a significant impact on TUoS charges.
ActewAGL	Transmission charge to the ACT has risen by an average of 33% over the last three years...the proposed Rule change, if it had applied in 2009/10, would have led to an increase of $6.8 million in the intra regional residue. That would have reduced TUoS charges to NSW and the ACT by about 1 per cent in the following year...ActewAGL Distribution is concerned about the rapid decline in available offsets to the transmission prices, which have fallen from $159.0 million in 2007108 to just $17.1 million in 2010/11.	The Commission notes this, and considers that it demonstrates the extent of the impact of negative intra-RR and related changes in TUoS on load customers.
ActewAGL	The year-on-year material increases in transmission charges also have the potential to affect the consumption and investment decisions of larger transmission and distribution connected consumers, for whom the transmission charge represents a significant input cost.	The Commission notes this, and considers that it demonstrates the extent of the impact of negative intra-RR on load customers.
ActewAGL	The dual loss factor proposal identified is an appropriate and proportionate solution to resolve	The Commission agrees that the dual volume weighted approach is the

Stakeholder	Issue	AEMC Response
	the current deficiency in market design.	optimal solution to the identified problem.
ActewAGL	A single time weighted MLF for load generation sites is unlikely to significantly improve the efficient dispatch of electricity and thereby the efficiency of market operation.	The Commission agrees that the time weighting approach is not the optimal solution to the identified problem.
ActewAGL	The use of dynamic loss factors raises significant issues of market complexity of design, and management of the associated loss factor variability.	The Commission agrees that dynamic loss factors would result in increased costs and complexities and do not represent the optimal solution to the identified problem.
ActewAGL	Establishment of dual connection points and metering would involve significant implementation cost.	The Commission agrees that dual connection points would create significant additional costs and do not represent the optimal solution to the identified problem.
ActewAGL	The inefficiency in the market design that the dual loss factor proposal is designed to address has been highlighted by the particular situation of Lower Tumut pumps. AEMO has not identified, and ActewAGL Distribution is not aware of, a material issue at other locations at this stage.	The Commission notes this, and considers that it is an important factor to consider when determining the materiality of the identified problem.
ActewAGL	It is also important that the eligibility criterion should not apply in a technology specific manner, eg. solely to pumped storage schemes; or to all connection points where energy is both generated and consumed.	The Commission agrees that the solution to the identified problem should not be limited to connection points with only one type of technology, nor applied across all connection points.
ActewAGL	The Rule change should provide for some guided flexibility in application of the criterion, rather than having it 'hard coded' into the Rules. This would allow for more timely refinement of the criterion if it proves necessary in the future as new technologies	The Commission notes ActewAGL's statement that the Rules should provide less specificity in regards to the criteria for application of dual volume weighted MLFs. However, the Commission considers that some specificity is important as it delivers market certainty. Additionally, while the Commission acknowledges that new technologies and energy

Stakeholder	Issue	AEMC Response
	and energy sources emerge...the Rule change should establish the principles that the criterion needs to address and provide for the criterion to be established by AEMO following consultation with industry participants.	sources may arise, at present the identified problem has only occurred at connection points that display particular energy generation and consumption patterns. The Commission considers that new problem connection points should be dealt with as they arise, and do not currently warrant including less specificity in the Rules.
International Power	There is clearly a potential for more efficient dispatch by using dynamic loss factors. However, the use of dynamic loss factors would also create a new source of uncertainty for participants, especially through the application in market settlement.	The Commission agrees that dynamic loss factors would result in increased costs and complexities and do not represent the optimal solution to the identified problem.
International Power	Propose that the mandatory identification of a loss factor with a connection point be eliminated and replaced with a requirement that for each loss factor AEMO must provide a robust definition of its application in settlement and if relevant, in dispatch....rather than having the criteria for the application of dual MLFs being where the 30% NEB is met, it is proposed that dual MLFS should be applied in all circumstances where it can be shown that this would lead to improved dispatch efficiency.	The Commission notes International Power's suggestion of less specificity in the Rules, and that AEMO should discretion to apply dual MLFs where this would improve market efficiency. However, as stated above, it is considered that any benefits that may occur with less specificity would be outweighed by increased levels of market uncertainty and related inefficiencies.
International Power	Time varying values could be defined in advance with specified patterns based on, for example, the hour of the day, the day of the week etc. A time sculpted loss factor regime could achieve greater dispatch efficiency than a single value where the variations in the actual loss factor exhibit some regular and predictable patterns....however time sculpted MLFs would not allow for Generators to	The Commission notes International Power's suggestion of time weighted MLFs, but considers that such an approach would reduce the ability of Generators to effectively factor in the extent of losses into their offers.

Stakeholder	Issue	AEMC Response
	adjust their bids in reference to the RRP.	
Norske Skog	The ongoing viability of large network connected customers is influenced by their ability to control costs. This is related to the variability in the levels of TUoS charges faced by customers.	The Commission notes this and considers that the impact of negative intra-RR and inter-year variability in TUoS charges is likely to have a material impact on the efficiency of operational and usage decisions of large network connected customers.