Australian Energy Market Commission

RULE CHANGE

CONSULTATION PAPER

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

Rule Proponent
Australian Energy Market Operator

9 December 2010

This consultation paper has been prepared to facilitate public consultation on the Rule change proposal and does not represent the views of the Commission or any individual Commissioner of the Australian Energy Market Commission.

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AEMC 2010, Application of Dual Marginal Loss Factors, Consultation Paper, 9 December 2010, 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 to be the rule maker for national energy markets. The AEMC is currently responsible for rules and providing advice to the MCE on matters relevant to the national energy markets. We are an independent, national body. 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 initiative.

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1 Introduction

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) in relation to the calculation and application of static marginal loss factors (MLFs) at particular connection points.

This Consultation Paper has been prepared by the staff of the AEMC to facilitate public consultation on the Rule change proposal and does not necessarily represent the views of the AEMC of any individual Commissioner of the AEMC.

This paper:

- sets out a summary of, and a background to, the Rule change proposed by AEMO;
- identifies a number of questions and issues to facilitate the consultation on this Rule change request; and
- outlines the process for making submissions.

The Rule change proposal is likely to be of interest to:

- Generators, particularly those Generators with an annual energy profile where levels of consumption and generation are similar; and
- Load customers, including both scheduled and non-scheduled load customers, particularly those customers with an annual energy profile where levels of consumption and generation are similar.

2 Background

Intra-regional losses and MLFs

When energy is transmitted between two points on a network, a portion of this energy is lost in the form of waste heat. In order to ensure that demand and supply in the National Electricity Market (NEM) is always balanced, AEMO must consider the extent of these losses when dispatching the market.

AEMO accounts for network losses in several ways. This Rule change relates only to the mechanism that AEMO utilises to account for losses that occur within a region of the NEM (intra-regional losses). Losses that occur between regions are calculated and accounted for in a different manner, and are not considered in this Rule change.

Intra regional losses are currently accounted for in the NEM by the application of static MLFs.[1] An MLF is a notional representation of the losses incurred when transporting a marginal unit of energy between a connection point and the regional reference node (RRN).

Generator offers and load bids are divided by their MLF to refer them to the RRN. This forms the basis of dispatch and is designed to ensure that the regional reference price (RRP) includes the marginal cost of losses. Following dispatch of the market, the RRP is multiplied by the MLF to determine a "local price" for each connection point. This forms the basis of settlement and is designed to ensure that the marginal cost of losses is included in how much is paid to generators, or paid by load, for energy.

MLFs are calculated based on an assessment of the energy generated and consumed at a connection point over the previous year. These retrospective figures are analysed by AEMO and scaled to reflect likely changes in generation and demand. The resultant MLF value is then applied at that connection point for the following year.

Currently, the National Electricity Rules (the Rules or NER) place a number of requirements on how AEMO must calculate and apply MLFs. AEMO is required to apply a single static intra-regional loss factor at each connection point, and must use a volume weighting methodology when determining this loss factor.[2] AEMO's intra-regional loss factor must also describe the average of marginal electricity losses between the connection point and the RRN for a given year, and should aim to minimise any distortionary impacts on the central dispatch process.[3]

AEMO fulfils these requirements by calculating an average volume weighted static MLF for each connection point, based on the following equation:

1 The term "static" refers to the fact that the MLF is a single value which is applied for a year, rather than a value which changes within the course of a year.

2 NER, 3.6.2(b)(2) and 3.6.2 (e)(5).

3 NER, 3.6.2(e)(2) and 3.6.2 (e)(2A).

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

In this equation, an MLF is calculated by AEMO for a connection point for each trading interval of the relevant year, and then multiplied by the quantity of energy generated or consumed at that connection point in each trading interval. The sum of these figures for the entire year is divided by the total energy consumed or generated at that connection point.

AEMO state that use of the volume weighting methodology described above generally delivers a static MLF which is reflective of the average marginal intra-regional losses incurred at the relevant connection point.

The identified problem

Although the methodology identified above generally delivers accurate results, AEMO state that in specific circumstances, the methodology can deliver unrealistically high or low MLFs. These figures may not be an accurate representation of the average marginal intra-regional losses incurred at a connection point in a given year. AEMO state that this may occur at those connection points where the annual quantities of energy consumption and generation approach parity.

Specifically, AEMO state that when the difference between the annual energy generated and consumed at a connection point is less than 30% of the total energy generated at that connection point (the 30% Net Energy Balance, or 30% NEB), use of the volume weighted methodology may deliver an MLF with a very large value. Such a large value would be unrepresentative of the average marginal intra-regional losses incurred at that connection point.

This large value MLF results because as the net energy at the connection point approaches zero (that is, total annual quantities of energy generated and consumed approach parity), the energy volume denominator in the equation described above also comes closer to zero. In this case, the larger numerator values are divided by an increasingly smaller denominator, and deliver increasingly large numbers as zero net energy is approached.

Consequences of the identified problem

The application of an inaccurately high or low MLF may distort Generator offers and Load bids in the process of dispatch. This occurs because Generator offers and Load bids are divided by their MLF to refer them to the RRN. An example of such a distortion occurs where a Generator with higher costs (manifested as a higher offer price) but with an inaccurately high MLF, appears cheaper at the RRN than a lower cost Generator with a more accurate MLF. In this instance, the higher cost Generator may be dispatched before the lower cost Generator, resulting in out of merit order dispatch. This is an example of productive inefficiency, as more expensive fuel resources are being utilised when cheaper resources are available.

A further consequence of out of merit order dispatch may be under recovery of intra regional residues (IRR). This negative IRR occurs because the RRP that is set in dispatch is multiplied by the MLF to give a local price, which is the price paid by load and paid to Generators. A Generator with an inaccurately high MLF will then earn a large multiple of the RRP; however, AEMO may not have recovered sufficient revenue from load to pay this Generator for its output.

Alternatively, an unrepresentatively high MLF may result in load paying a large multiple of the RRP, resulting in recovery of revenue which represents a significant surplus to the amount needed by AEMO to settle the market. This positive IRR represents an over-recovery of revenue and will affect those specific load customers.

In both of the instances described above, the cost of the over or under recovery of IRR may result in increased costs to certain customers.

The cost of negative IRR is recovered from all customers via the non-locational component of Transmission Use of System charges (TUoS).

As explained above, an inaccurately high MLF may result in the over recovery of IRR, representing excessive payments for energy by specific load customers. Any surplus revenue is transferred to all customers via an adjustment of non locational TUoS. However, this represents an inefficient wealth transfer between customers, and is likely to result in changed behaviour and potential price increases as those affected load customers seek to recoup their losses.

Finally, it is possible that inaccurate MLFs may distort the operational and investment incentives faced by participants. For example, a hydroelectric pump storage Generator with a high MLF may operate its pumping or generating facilities differently, or may face incentives to generate at inappropriate times. This may not represent an efficient outcome, depending on the specific market circumstances. Inaccurate MLF values may also distort locational signals for new investment, or upgrade of existing infrastructure.

Previous consultation and current arrangements

AEMO has previously consulted on the issue described above, with a specific focus on pump storage facilities.[4] This consultation sought to address the issue of unacceptably high MLFs for connection points with both active energy consumption and generation, where one MLF does not satisfactorily represent losses. Inaccurate MLFs at Lower Tumut power station were a focus of this consultation.

In its conclusion to this consultation, AEMO decided that it would seek a change to the Rules to allow it to apply more than one intra-regional loss factor, at those connection points with pump storage facilities.[5]

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4 AEMO, *Changes to Forward Looking Loss Factor Methodology to address unusual conditions, pump storage schemes and advice on committed generator projects*, February 2009.

5 It should be noted that this Rule change proposal seeks to apply dual MLFs at all connection points where the 30% NEB is met, not only at those connection points with pump storage facilities, as originally suggested by AEMO in this earlier consultation.

Until this Rule change application was made, AEMO advised that it would apply an alternative model of MLF calculation at specific connection points, to ensure that an accurate MLF was calculated and applied. This involved the application of a single time weighted approach at those connection points:

- with pump storage facilities;
- where it was not feasible to have separate metering and connection points for each direction of energy flow; and
- where the 30% NEB was met.

Since this consultation in 2009, AEMO has applied a time weighting approach to determine the MLF for the Lower Tumut power station connection point for the 2009-10 and 2010-11 financial years.[6]

AEMO have acknowledged[7] that the Rules require the application of a single MLF at all connection points[8] and that this single MLF should be calculated using a volume weighted approach.[9] Accordingly, by applying a time weighted approach rather than volume weighting at Lower Tumut, it can be argued that AEMO may not be in compliance with all the requirements of the Rules.

However, AEMO considered that in the specific conditions outlined above, fulfilling both of these requirements would violate several other clauses in the Rules.

For example, the Rules state that an MLF should provide an accurate reflection of the average marginal losses between a connection point and the RRN for each trading interval of the financial year[10], and that an MLF should minimise the impact on the central dispatch process of generation and scheduled load compared to what would result from a fully optimised dispatch process[11]. Given the identified problem and the consequences for dispatch as discussed above, it was considered that application of the average volume weighted MLF approach at these connection points would violate these Rule requirements.

Accordingly, AEMO determined that it could best satisfy a majority of the current Rule requirements by applying a single time weighted MLF at Lower Tumut, until such time as it could propose an amendment to the Rules to allow the application of two separate volume weighted MLFs. AEMO have advised that while a single time weighted MLF provides the best possible reflection of average losses and minimises the impact on central dispatch under the current Rule requirements, amending the

6 AEMO, Rule change proposal, p.5.

7 AEMO, Rule change request, pp. 3-6.

8 NER, clause 3.6.2(b)(2).

9 NER clause 3.6.2(e)(5).

10 NER, clause 3.6.2(e)(2).

11 NER, clause 3.6.2(e)(2A).

Rules to allow the application of two separate volume weighted MLFs would provide the optimal solution when considered against these requirements.

During this consultation, AEMO advised that the 30% NEB criteria was subjected to a due diligence review, and was found to be an effective indicator of when the single average volume weighted approach began to provide inaccurate representations of average marginal intra-regional losses.

3 Details of the Rule Change Request

The Rule change request from the Proponent proposes to amend clause 3.6.2(b)(2) of the Rules, to allow AEMO to apply two separate volume weighted MLFs, in those circumstances where a single volume weighted MLF would not adequately represent the actual transmission network losses at the relevant connection point. This approach would result in a separate average volume weighted MLF calculated and applied to energy generated at the connection point, while another average volume weighted MLF would be calculated and applied to energy consumed.

AEMO proposes that an appropriate criteria for the application of two separate MLFs would be where the 30% NEB is met.

In its Rule change request, AEMO provides its rationale for the Rule change. A number of key points raised in the Rule change request are summarised as follows:

- Where the 30% NEB is met, use of volume weighted averaging may deliver a single static MLF which does not accurately describe the average marginal intra-regional energy losses at that connection point;
- As MLFs are used to refer Generator offers and Load bids to the RRN, an inaccurate static MLF may result in an inefficient dispatch process;
- Inaccurate MLFs and subsequent inefficient dispatch processes may result in:
  - the over or under recovery of IRR, with inefficient price outcomes for customers;
  - inefficient operational decisions by participants; and
  - inaccurate locational signals, which may result in inefficient investment decisions by participants.

AEMO propose that where the 30% NEB is met, the application of two separate average volume weighted MLFs would address the issues identified above. AEMO also summarise a number of other methodological approaches to the identified issues and alternative criteria for the application of these approaches, but state that the application of dual average volume weighted MLFs where the 30% NEB is met is the optimal methodological approach and application criteria.

AEMO's proposed Rule change contains a proposed Rule.

The Commission has decided that the Rule meets the criteria as set out in section 94 of the National Electricity Law (NEL) and has decided to assess the Rule change proposal under the standard Rule making procedure.

4 Assessment Framework

The Commission's assessment of this Rule change request must consider whether the proposed Rule promotes the National Electricity Objective (NEO) as set out under section 7 of the NEL.

It is proposed that the analytical framework will determine the extent to which the current Rule arrangements could lead to inefficient dispatch outcomes, and whether this may result in inefficient pricing outcomes for customers, or lead to inefficient operational and investment decisions by participants.

This assessment will include a market materiality assessment of any such outcomes.

The proposed framework will then assess a range of options to address any identified inefficiencies. These options are likely to include a number of different methodological approaches for the calculation of MLFs at those connection points where the current approach may result in suboptimal outcomes. Consideration will also be given to the appropriate criteria or trigger which should determine when an alternative methodology for the calculation of MLFs is applied.

When assessing these alternative methodologies and criteria for application, the assessment framework will consider whether each proposed solution is proportional to the materiality of the identified problem.

The assessment framework will also consider the incentives faced by different participants under each option, in order to determine whether these incentives and subsequent changed participant behaviours are likely to result in beneficial market wide outcomes, as assessed against the status quo.

A change to the Rules will only be made where it can be clearly identified that these outcomes provide a clear net benefit when assessed against the NEO.

5 Issues for Consultation

Taking into consideration the assessment framework discussed above, we have identified a number of issues for consultation that appear to be relevant to this Rule change request.

The issues outlined below are provided for guidance. Stakeholders are encouraged to comment on these issues as well as any other aspect of the Rule change request, or this Consultation paper, including the proposed framework.

The issues identified for consultation include an assessment of:

- the identified problem, including consideration of its current and likely materiality;
- options to address the identified problem; and
- criteria for the application of options to address the identified problem.

5.1 Materiality and extent of the identified problem

One of the potential benefits of the proposed Rule change is an increased likelihood of efficient market outcomes. These include improved investment and operational incentives for participants and improved price outcomes for consumers.

However, whether any such beneficial outcomes arise is dependent on the extent to which the identified problem is actually causing, or has the potential to cause, material market inefficiencies.

It is therefore proposed that assessment of this Rule change should seek to determine whether the identified problem has the potential to cause material dispatch inefficiencies and subsequent inefficient outcomes, relating to participant operational and investment decisions, and prices for customers.

In doing so, this assessment may analyse different costs of dispatch under various MLF methodologies, focussing on those connection points which meet the 30% NEB.

This assessment will also review the extent of IRR which accrues under the different MLF methodologies. It is noted that AEMO's Rule change proposal contains some indication of the cost of negative IRR to the market, however further analysis of these figures is likely to be warranted.

It is also likely that the assessment will seek to determine whether the identified problem and proposed Rule change has the potential to affect participant operational and investment decisions.

It is also proposed that the assessment of this Rule change seeks to identify which parties are currently affected by the identified problem and the proposed Rule change,

including analysis of the specific incentives faced by these participants under the existing and proposed Rules.

The primary focus of AEMO's Rule change proposal and previous consultation has been on pump storage schemes. However, assessment of the materiality of the identified problem will also seek to determine the likelihood of other generation and load types being affected by the identified problem and proposed Rule change, either currently or in the short to long term.

Questions: Materiality and extent of the identified problem

Stakeholders are invited to comment on the following issues, or any other issues considered relevant.

- **To what extent is the identified problem causing, or is likely to cause, a material market impact?**
- **Will the identified problem primarily have a material impact through:**
  - **over/under recovery of IRR?;**
  - **changed operational and investment decisions for participants?; or**
  - **any other avenue?**
- **What parties are most affected by the identified problem and the proposed Rule? How?**
- **Are there any parties, other than hydroelectric Generators with pump storage, who are likely to be affected by the identified problem and proposed Rule change in the medium to long term?**

5.2 Options to address the identified problem

In its Rule change proposal, AEMO stated that its preferred methodological approach to address the identified problem was to apply two separate volume weighted MLFs, for energy consumed and generated at specific connection points.

However, AEMO also listed a number of alternative methodological approaches for consideration. These included:

- a single time weighted averaging methodology;
- a dynamic loss factor methodology; and
- dual connection points and metering.

In addition to these methodologies, the AEMC has identified a different approach which may deliver an effective MLF where the standard single average volume weighting methodology fails to do so. This involves removing all negative signs from

the energy values in the existing volume weighting MLF equation, as described in section 2. In this approach, all quantities with negative values are given positive values; this approach delivers a static MLF value which appears to be a relatively accurate representation of average intra-regional marginal losses at a connection point.

Assessment of this Rule change proposal will examine each of these proposed methodological approaches, and will consider the effectiveness of each in the context of resolving the identified problem. In doing so, assessment of each option will seek to determine the likely impact of that option on the incentives faced by different participants.

It is noted that AEMO identified a number of market wide solutions to the identified problem in its Rule change proposal, such as the application of dynamic loss factors to describe all intra-regional losses. The analytical framework will acknowledge these as potential alternative solutions to the identified problem.

However, it is noted that any identified solution will be assessed in terms of whether it represents a proportionate response to the materiality of the identified problem. Accordingly, when examining each potential option, factors including the likely cost of implementation and market impact of that option will be considered in the context of the materiality of the identified problem.

Questions: Options to address the identified problem

Stakeholders are invited to comment on the following issues, or any other issues considered relevant.

- **Do any of the options listed above represent a viable and proportionate solution to the identified problem?**
- **Are there any alternative options which have not been considered?**
- **How are each of these options likely to affect participant behaviour?**

5.3 Criteria for the application of options to address the identified problem

In its Rule change proposal, AEMO proposed that the 30% NEB represented an appropriate criterion, or trigger, for the application of an alternative MLF calculation methodology to a connection point.

As described above, the 30% NEB is met when the difference between the energy generated and consumed at a connection point over a given year is less than 30% of the total energy generated in that year. AEMO advise that when this criteria is met, MLFs delivered under the single average volume weighted methodology deliver increasingly inaccurate and unrepresentative results.

While AEMO have advised that the 30% NEB has been subjected to a due diligence review, the assessment framework will consider whether there are more appropriate criteria for the application of an alternative methodological approach.

A number of criteria may be examined in the assessment framework, including:

- where the 30% NEB criteria is met;
- where a range between 25% and 35% NEB is met;
- allowance for AEMO to exercise discretion as to the application of an alternate MLF methodology;
- at all connection points with pump storage facilities;
- at all connection points where energy is both generated and consumed;
- at all connection points where the NEB is less than 95%; and
- at all connection points.

In considering each of these application criteria, the assessment framework will seek to determine how participant incentives and subsequent behaviours will change. This will include consideration of the likelihood of any "gaming" scenarios that might be possible under the different application criteria.

Questions: Criteria for the application of options to address the identified problem

Stakeholders are invited to comment on the following issues, or any other issues considered relevant.

- **Do any of the criteria listed above present a viable solution as to how an alternative MLF methodology should be applied?**
- **Do any of the criteria listed above represent a proportional response to the identified problem?**
- **Are there any alternative criteria which have not been considered?**
- **How are each of the criteria listed above likely to affect participant behaviour?**

6 Lodging a Submission

The Commission has published a notice under section 95 of the NEL for this Rule change proposal inviting written submissions. Submissions are to be lodged online or by mail by 13 January 2011 in accordance with the following requirements.

Where practicable, submissions should be prepared in accordance with the Commission's Guidelines for making written submissions on Rule change proposals.[12] The Commission publishes all submissions on its website subject to a claim of confidentiality.

All enquiries on this project should be addressed to Christiaan Zuur on (02) 8296 7800.

6.1 Lodging a submission electronically

Electronic submissions must be lodged online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code ["ERC0117"]. The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Upon receipt of the electronic submission, the Commission will issue a confirmation email. If this confirmation email is not received within 3 business days, it is the submitter's responsibility to ensure the submission has been delivered successfully.

6.2 Lodging a submission by mail

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated. The submission should be sent by mail to:

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Or by Fax to (02) 8296 7899.

The envelope must be clearly marked with the project reference code: ERC0117.

Except in circumstances where the submission has been received electronically, upon receipt of the hardcopy submission the Commission will issue a confirmation letter.

If this confirmation letter is not received within 3 business days, it is the submitter's responsibility to ensure successful delivery of the submission has occurred.

12 This guideline is available on the Commission's website.

Abbreviations

AEMC	See Commission
AEMO	Australian Energy Market Operator
the Commission	Australian Energy Market Commission
IRR	Intra regional residues
MLF	Marginal loss factor
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	See the Rules
RRN	Regional reference node
RRP	Regional reference price
the Proponent	See AEMO
the Rules	National Electricity Rules
TUoS	Transmission Use of System charges