# MARKET PROCEDURE: DETERMINING LOSS FACTORS

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| PREPARED BY: | AEMO \| Western Australia \| WA Market Operations |
| VERSION: | 4.0 |
| EFFECTIVE DATE: | 1 July 2019 |
| STATUS: | DRAFT |

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## VERSION RELEASE HISTORY

| Version | Effective Date | Summary of Changes |
|---|---|---|
| 1.0 | 21 September 2006 | Market Procedure for Determining Loss Factors |
| 2.0 | 20 May 2013 | Amendments to Market Procedure resulting from PC_2012_09 |
| 3.0 | 30 November 2015 | Changes resulting from the transfer of functions from the IMO to AEMO |
| 4.0 | 1 July 2019 | Changes reflecting:<br>• the Procedure Change Proposal AEPC_2019_06 related to the Rule Change Proposal RC_2014_06: Removal of Resource Plans and Dispatchable Loads;<br>• Western Power's fourth access arrangement;<br>• the inclusion of WEM Rule references for increased accessibility; and<br>• administrative improvements, including an updated template. |

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# 1. INTRODUCTION

## 1.1. Purpose and scope

1.1.1. This is the Market Procedure for Determining Loss Factors (Procedure) made under clause 2.27.17 of the Wholesale Electricity Market (WEM) Rules.

1.1.2. This Procedure has effect only for the purposes set out in the WEM Rules and the WEM Rules prevail over these Procedures to the extent of any inconsistency.

1.1.3. The purpose of this Procedure is to describe the standards, methodologies, classification systems and procedures to be used by all Network Operators in determining Loss Factors.

1.1.4. A Network Operator is not required to comply with obligations prescribed in section 5 of this Procedure if it has no Required Connection Points.

1.1.5. In this Procedure where obligations are conferred on a Rule Participant that Rule Participant must comply with the relevant obligations in accordance with clauses 2.9.7, 2.9.7A, 2.9.7B, 2.9.7C and 2.9.8 of the WEM Rules, as applicable.

1.1.6. Reference to particular WEM Rules within the Procedure in bold and square brackets **[clause XX]** are included for convenience only and are not part of this Procedure.

## 1.2. Definitions and interpretation

Terms defined in the WEM Rules have the same meanings in this Procedure unless otherwise specified in this clause.

The words, phrases and abbreviations in the table below have the meanings set out opposite them in the table when used in this Procedure.

| Term | Definition |
|---|---|
| Access Contract | Has the meaning given to it in the *Electricity Networks Access Code 2004*. |
| Applicable Reference Service | The subset of Reference Services that are offered by Western Power for the purposes of providing access to the Western Power Network, and documented in Western Power's access arrangement as approved by the Economic Regulation Authority and in effect at the time. |
| Connection Point | Has the meaning given to it in the *Electricity Networks Access Code 2004*. Typically each Connection Point in the WEM is identified by a National Meter Identifier (NMI), but in some cases Western Power may treat a number of NMIs as a single logical Connection Point in an Access Contract. This means that a Connection Point as defined by Western Power may relate to several Loads in the WEM (each identified by a NMI) or to several Scheduled Generators or Non-Scheduled Generators (each of which may relate to one or more NMIs). |
| Distribution System | Has the meaning given to it in the *Electricity Networks Access Code 2004*. |
| DLF | Means Distribution Loss Factor. |
| DLF Analysis Period | In respect of the annual recalculation of Distribution Loss Factors, the 12 month period ending on 31 December of the year immediately prior to the 1 June deadline by which the recalculated Distribution Loss Factors must be provided to AEMO. |

| Term | Definition |
|---|---|
| DLF Class | Means Distribution Loss Factor Class. |
| Entry Point | Has the meaning given to it in the *Electricity Networks Access Code 2004*. |
| Exit Point | Has the meaning given to it in the *Electricity Networks Access Code 2004*. |
| Market Operations | The group within AEMO responsible for day to day administration of Loss Factors. Contact details for Market Operations (WA) are available on the Market Web Site. |
| Peak Consumption | Means the Contracted Maximum Demand (CMD) for an Exit Point declared in an Access Contract, or where no CMD is declared, it means the peak demand that is likely to occur at an exit point over a 12 month period as determined by the Network Operator, acting as a reasonable and prudent person. |
| Pricing Zone | A grouping of several Substations based on their location, as defined in the 'Price List' for the relevant year and documented in Western Power's access arrangement as approved by the Economic Regulation Authority and in effect at the time. |
| Registered Market Participant | In respect of a Required Connection Point, the Market Participant to which the Facility connected at that Connection Point is registered. |
| Required Connection Point | In respect of a Network Operator, a Connection Point in the Network Operator's Network identified under clause 2.27.1(a) of the WEM Rules, for which the Network Operator must determine a Loss Factor. |
| Substation | Means the network equipment at which lines are switched for operational purposes, and which may include one or more transformers so that some connected lines operate at different nominal voltages to others. Substations are identified in the SWIS by a Transmission Node Identifier (TNI). |
| TLF | Means Transmission Loss Factor. |
| TLF Analysis Period | In respect of the annual recalculation of Transmission Loss Factors, the 12 month period ending on the last day of February of the year immediately prior to the 1 June deadline by which the recalculated Transmission Loss Factors must be provided to AEMO. |
| TLF Calculation Program | Means an appropriate industry standard package used by a Network Operator to calculate Transmission Loss Factors. |
| TLF Class | Means Transmission Loss Factor Class. |
| Total Losses | Means the total kWh losses from Western Power's distribution system over a DLF Analysis Period, used by Western Power in the calculation of DLFs for its Required Connection Points. |
| Total Sales | Means the total net kWh consumption from Western Power's distribution system over a DLF Analysis Period, used by Western Power in the calculation of DLFs for its Required Connection Points. |
| Transmission SWIN Average TLF Class | Means the TLF Class defined for the transmission system as a whole. |
| Transmission System | Has the meaning given to it in the *Electricity Networks Access Code 2004*. |
| Transmission Urban Average TLF Class | Means the TLF Class defined for the group of Substations assigned to the 'Urban' and 'CBD' Pricing Zones. |
| Zone Substation | Means a Substation connecting the transmission and distribution System. |

## 1.3. Interpretation

1.3.1. The following principles of interpretation apply to this Procedure unless otherwise expressly indicated:

a) references to time are references to Australian Western Standard Time;

b) terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules;

c) to the extent that this Procedure is inconsistent with the WEM Rules, the WEM Rules prevail to the extent of the inconsistency;

d) a reference to the WEM Rules or Market Procedures includes any associated forms required or contemplated by the WEM Rules or Market Procedures; and

e) words expressed in the singular include the plural and vice versa.

## 1.4. Related documents

1.4.1. The following Market Procedure (available on the Market Web Site[1]) provides background information to this Procedure:

(a) Market Procedure: Notices and Communications;

# 2. DETERMINATION AND PROVISION OF LOSS FACTORS

## 2.1. Assignment of Connection Points to Loss Factor Classes

2.1.1. When a Network Operator becomes aware of a new Required Connection Point in its Network (including a Connection Point for a Non-Dispatchable Load that is upgraded from basic to interval metering), the Network Operator must, as soon as practicable but before the information is required for use in calculations under the WEM Rules:

(a) determine the TLF Class and DLF Class for the Required Connection Point in accordance with the classification system prescribed for that Network Operator in section 3 of this Procedure [clause 2.27.12]; and

(b) provide to AEMO and the Registered Market Participant:

(i) the Loss Factor Classes for the Required Connection Point; and

(ii) the Trading Day from which the Loss Factor Classes will have effect. [clause 2.27.14]

2.1.2. When a change occurs to a Required Connection Point that might alter its applicable Loss Factor Classes, the Network Operator must, as soon as practicable but before the information is required for use in calculations under the WEM Rules:

(a) re-determine the Loss Factor Classes for the Required Connection Point in accordance with the classification system prescribed for that Network Operator in section 3 of this Procedure [clause 2.27.13]; and

(b) if the re-determination results in a change to the TLF Class or DLF Class, provide to AEMO and the Registered Market Participant:

[1] Available at http://aemo.com.au/Electricity/Wholesale-Electricity-Market-WEM/Procedures.

(i) the new TLF Class or DLF Class (as applicable) for the Required Connection Point; and

(ii) the Trading Day from which the new Loss Factor Class will have effect, which must as far as practicable reflect the time of the change that triggered the re-determination. [clause 2.27.14]

2.1.3. When a Network Operator becomes aware of a change of Registered Market Participant for a Required Connection Point, the Network Operator must as soon as practicable provide to the new Registered Market Participant the Loss Factor Classes for the Required Connection Point.

## 2.2. Annual recalculation of Loss Factors

2.2.1. Each year by 1 June each Network Operator must:

(a) identify and document any changes to the list of Applicable Reference Services together with the associated Loss Factor Class as applicable;

(b) recalculate the Loss Factors for its Required Connection Points, in accordance with the methodology prescribed for that Network Operator in section 4 of this Procedure; and

(c) provide by email to Market Operations:

(i) updated TLFs and DLFs as applicable for each Loss Factor Class in the Network Operator's classification system [clause 2.27.6]; and

(ii) a written explanation of any change of more than 0.025 between an updated TLF or DLF and the previous value assigned to that Loss Factor Class.

2.2.2. Within two Business Days after receiving the updated TLFs and DLFs from a Network Operator under step 2.2.1(c), AEMO must publish on the Market Web Site:

(a) the list of Applicable Reference Services and the associated Loss Factor Class, as applicable;

(b) the updated TLFs and DLFs received from the Network Operator [clause 2.27.7];

(c) any written explanation of changes to TLFs or DLFs received from the Network Operator; and

(d) the Trading Day from which the updated TLFs and DLFs will apply, which must allow sufficient time for Rule Participants to identify and update any submission or forecast data that is dependent on Loss Factors. [clauses 2.27.8 and 2.27.9]

## 2.3. Creation of new Loss Factor Classes

2.3.1. If a Network Operator must develop a new Loss Factor Class to comply with its prescribed classification system then the Network Operator must, as soon as practicable but before a Required Connection Point is assigned to the new Loss Factor Class:

(a) calculate the initial TLF or DLF for the new Loss Factor Class in accordance with the methodology prescribed in section 4 of this Procedure; and

(b) provide by email to Market Operations, the details of the new Loss Factor Class, including its initial TLF or DLF (as applicable). [clause 2.27.10]

2.3.2. If AEMO receives details of a new Loss Factor Class from a Network Operator under step 2.3.1(b), AEMO must within two Business Days publish the details of the new Loss Factor Class and its initial TLF or DLF on the Market Web Site. [clause 2.27.11]

## 2.4. Reassessment of Loss Factors [clause 2.27.15]

2.4.1. Where a Market Participant believes that:

(a) the TLF for a TLF Class has been calculated incorrectly;

(b) the DLF for a DLF Class has been calculated incorrectly; or

(c) a Required Connection Point has been assigned to the wrong TLF Class or DLF Class,

the Market Participant may apply to AEMO for reassessment in accordance with clause 2.27.15 of the WEM Rules and this Procedure and AEMO must process an application in accordance with this Procedure.

2.4.2. A Market Participant may seek reassessment for any TLF or DLF applying to a Required Connection Point for which it is the Registered Market Participant.

2.4.3. To seek a reassessment the Market Participant must apply by email to Market Operations within 15 Business Days of the Market Participant receiving notification of the TLF or DLF it believes to be in error. The application must outline:

(a) the TLF or DLF believed to be in error; and

(b) the Market Participant's reasons for believing the TLF or DLF should be a different value.

2.4.4. AEMO must acknowledge receipt of an application for reassessment by email within one Business Day.

2.4.5. Within two Business Days after receiving an application for reassessment, AEMO must provide by email to the relevant Network Operator a notification which includes:

(a) details of the Market Participant's application; and

(b) the levels of audit that AEMO considers likely to be required, which may include any one or more of the following:

(i) Level 1 - reviewing the reasons provided by the Market Participant for believing the TLF or DLF should be a different value and any reasons provided by the Network Operator for the TLF or DLF value as calculated;

(ii) Level 2 - reviewing or analysing the data used to calculate the TLF or DLF; and

(iii) Level 3 - reviewing, replicating or rerunning the models or calculation processes used to calculate the TLF or DLF.

2.4.6. Within two Business Days after receiving a notification under step 2.4.5, the Network Operator must advise AEMO by email:

(a) whether or not the Network Operator agrees that the relevant TLF or DLF is in error; and

(b) if the Network Operator does not consider the TLF or DLF is in error, the Network Operator's estimate of the reasonable costs it would expect to incur assisting AEMO with an audit.

2.4.7. If the Network Operator advises AEMO under step 2.4.6(a) that it agrees the TLF or DLF is in error, then AEMO must within one Business Day notify the Market Participant by email of the Network Operator's agreement.

2.4.8. If the Network Operator advises AEMO under step 2.4.6(a) that it does not consider the relevant TLF or DLF to be in error, then AEMO must within two Business Days provide by email to the Market Participant an indicative estimate of the likely costs of an audit, which must include:

(a) the estimated costs provided by the Network Operator under step 2.4.6(b); and

(b) any reasonable costs, not otherwise included in AEMO's budget, that AEMO expects to incur in conducting an audit.

2.4.9. Within five Business Days after receiving an estimate of audit costs the Market Participant must confirm by email to AEMO whether or not it requires AEMO to proceed with the audit.

2.4.10. If AEMO receives confirmation from the Market Participant that the Market Participant requires AEMO to proceed with an audit, then AEMO must within two Business Days notify the Network Operator that AEMO will be conducting an audit. The notification must include:

(a) details of the Market Participant's application for reassessment;

(b) a request for access to the relevant data and calculations used in producing the TLF or DLF for the Loss Factor Class, or determining the Loss Factor Class for the Connection Point (as applicable), which may include:

(i) provision of written information to AEMO by the Network Operator; and

(ii) access to the Network Operator's premises, systems and personnel for AEMO to review relevant data and calculations, including the Network Operator providing a demonstration of any systems and processes used to calculate Loss Factors or replication of the process used to calculate the Loss Factors in dispute; and

(c) a date by which the Network Operator must comply with the request, which must be at least five Business Days from the date of AEMO's notification.

2.4.11. AEMO may, at its discretion, aggregate its audit of Loss Factor calculations that are the subject of Market Participant applications for reassessment under section 2.4 of this Procedure, provided AEMO adheres to the timing parameters outlined in this Procedure for each individual Market Participant's application for reassessment.

2.4.12. The Network Operator must comply with a request received under step 2.4.10(b) by the date set out in step 2.4.10(c).

2.4.13. Within 20 Business Days after receiving confirmation to proceed with an audit under step 2.4.9, AEMO must:

(a) conduct the audit; and

(b) notify by email to the Network Operator and to the Market Participant the findings of the audit.

2.4.14. Where an error in the calculation of a TLF or DLF for a Loss Factor Class is identified through an audit conducted under step 2.4.13(a) or is confirmed by a Network Operator under step 2.4.6(a), AEMO must direct the relevant Network Operator by email to recalculate the TLF or DLF. AEMO may also direct the Network Operator to recalculate any other TLFs or DLFs, where AEMO is of the view that a recalculation is warranted.

2.4.15. The Network Operator must provide any recalculated TLFs or DLFs to AEMO as soon as practicable after receipt of AEMO's direction to recalculate.

2.4.16. Within two Business Days after receiving a recalculated TLF or DLF from a Network Operator under step 2.4.15, AEMO must publish on the Market Web Site:

(a) the recalculated TLF or DLF; and

(b) the Trading Day from which the recalculated TLF or DLF will apply, which must allow sufficient time for Rule Participants to identify and update any forecast or submission data that is dependent on Loss Factors.

2.4.17. Where an error in the assignment of a Required Connection Point to a Loss Factor Class is identified through an audit conducted under step 2.4.13(a) or is confirmed by a Network Operator under step 2.4.6(a), AEMO must direct the relevant Network Operator by email to correct the error and re-determine the Loss Factor Class.

2.4.18. Where directed by AEMO under step 2.4.17, a Network Operator must as soon as reasonably practicable:

(a) correct the error which caused the incorrect assignment;

(b) re-determine the Loss Factor Class for the Required Connection Point; and

(c) provide to AEMO and the Registered Market Participant:

(i) the new TLF Class or DLF Class (as applicable) for the Required Connection Point; and

(ii) the Trading Day from which the new Loss Factor Class will apply.

2.4.19. The costs of an audit conducted by AEMO under step 2.4.13(a), including any costs incurred by the Network Operator and any costs, not otherwise included in AEMO's budget, incurred by AEMO, are payable by the Market Participant who made the application for reassessment, unless the audit reveals:

(a) an error of more than 0.0025 in a TLF of DLF calculation; or

(b) an incorrect assignment of a Connection Point to a Loss Factor Class,

in which case all costs are payable by the relevant Network Operator. [clause 2.27.15(h)]

## 2.5. Failure to provide Loss Factors

2.5.1. In the event a Network Operator fails to provide AEMO with a TLF or DLF, as required in accordance with this Procedure or the WEM Rules, AEMO must use the equivalent TLF or DLF from the previous year until such time as the Network Operator has provided AEMO with a new TLF or DLF and that TLF or DLF as appropriate has taken effect. [clause 2.27.16]

2.5.2. Where a Network Operator subsequently provides an updated TLF or DLF, the previous year's TLF or DLF will continue to apply until the commencement of the applicable Trading Day published by AEMO for the updated value in accordance with clause 2.27.8 of the WEM Rules.

# 3. LOSS FACTOR CLASSIFICATION SYSTEMS [CLAUSE 2.27.4]

## 3.1. TLF Classes – Western Power

3.1.1. Western Power must define a unique TLF Class for:

(a) subject to step 3.1.2, each Connection Point on its transmission system at which a Scheduled Generator, Non-Scheduled Generator or Load is connected;

(b) each Zone Substation on its network;

(c) its transmission system as a whole as the Transmission SWIN Average TLF Class; and

(d) the group of Substations assigned to the Transmission Urban Average TLF Class.

3.1.2. Where multiple physical transmission connections at a Substation are identified as a single Connection Point by Western Power in an Access Contract, Western Power may define a single TLF Class to apply to each Scheduled Generator, Non-Scheduled Generator or Load connected at that Connection Point.

3.1.3. Western Power must assign each Required Connection Point on its network to a TLF Class in accordance with the following:

(a) if the Connection Point is on the transmission system it must be assigned to the specific TLF Class for the Connection Point prescribed in step 3.1.1(a); or

(b) if the Connection Point:

(i) is contracted on an Applicable Reference Service that is only available to Connection Points with Peak Consumption less than 1,000 kVA; or

(ii) has Peak Consumption less than 1,000 kVA,

it must be assigned to the Transmission SWIN Average TLF Class prescribed in step 3.1.1(c); or

(c) if the Connection Point has Peak Consumption greater than or equal to 1,000 kVA and:

(i) the associated Substation identified in an Access Contract; or

(ii) the electrically closest Substation (if a Substation is not identified in the Access Contract),

is in the Urban or CBD Pricing Zones, the Connection Point must be assigned to the Transmission Urban Average TLF Class prescribed in step 3.1.1(d); or

(d) if a specific Substation is identified in the Access Contract for the Connection Point, the Connection Point must be assigned to the TLF Class prescribed in step 3.1.1(b) for that Substation; or

(e) the Connection Point must be assigned to the TLF Class prescribed in step 3.1.1(b) for the electrically closest Substation.

3.1.4. Western Power must assign the Notional Wholesale Meter to the Transmission SWIN Average TLF Class prescribed in step 3.1.1(c).

## 3.2. DLF Classes – Western Power

3.2.1. Western Power must define a unique DLF Class for:

(a) Connection Points on the transmission system ("Transmission Connected");

(b) Connection Points connected to the network at the distribution busbar of a Zone Substation ("Zone Substation Connected");

(c) each Connection Point on the distribution system for which Western Power determines under step 3.2.3 that a specific DLF Class is required;

(d) each of the Applicable Reference Services in step 3.1.3(b)(i); and

(e) the Notional Wholesale Meter.

3.2.2. Where a site that is supplied by multiple distribution feeders is identified as a single Connection Point by Western Power in an Access Contract and Western Power defines a specific DLF Class for the Connection Point, then that DLF Class will be assigned to each National Metering Identifier (NMI) associated with the Connection Point.

3.2.3. Western Power must assign each Required Connection Point on its network to a DLF Class in accordance with the following:

(a) if the Connection Point is on the transmission system then it must be assigned to the Transmission Connected DLF Class prescribed in step 3.2.1(a); or

(b) if the Connection Point is connected to the network at the distribution busbar of a Zone Substation, it must be assigned to the Zone Substation Connected DLF Class prescribed in step 3.2.1(b); or

(c) if a Scheduled Generator, Non-Scheduled Generator or Interruptible Load is connected through the Connection Point, then the Connection Point must be assigned to a specific DLF Class defined for it in step 3.2.1(c); or

(d) if the Connection Point is contracted on one of the Applicable Reference Services listed in step 3.1.3(b) then it must be assigned to the DLF Class prescribed for the relevant Applicable Reference Service in step 3.2.1(d); or

(e) if the Connection Point is:

(i) has Peak Consumption greater than 7,000 kVA; or

(ii) an Entry Point,

it must be assigned to a specific DLF Class defined for it in step 3.2.1(c); or

(f) if the Connection Point has Peak Consumption less than 1,000 kVA then:

(i) if the Connection Point is connected to the distribution system at low voltage (nominally 415 volts or less) and is located at a residential premise or a premise occupied by a voluntary/charitable organisation, it must be assigned to the Anytime Energy (Residential) Exit Service DLF Class; or

(ii) if the Connection Point is connected to the distribution system at low voltage (nominally 415 volts or less) and is located at a commercial premise, it must be assigned to the Anytime Energy (Business) Exit Service DLF Class; or

(iii) if the Connection Point is connected to the distribution system at high voltage (nominally greater than 415 volts), it must be assigned to the High Voltage Metered Demand Exit Service DLF Class; or

(g) if the Connection Point is located greater than 10 km from:

(i) the associated Substation identified in an Access Contract; or

(ii) the electrically closest Substation (if a Substation is not identified in the Access Contract),

it must be assigned to a specific DLF Class defined for it in step 3.2.1(c); or

(h) if the Registered Market Participant has requested Western Power to calculate a specific DLF for the Connection Point at the Market Participant's expense in step 3.2.5 or step 3.2.7, the Connection Point must be assigned to a specific DLF Class defined for it in step 3.2.1(c); or

(i) if the Connection Point is connected to the distribution system at high voltage (nominally greater than 415 volts) it must be assigned to the High Voltage Metered Demand Exit Service DLF Class; or

(j) the Connection Point must be assigned to the Low Voltage Metered Demand Exit Service DLF Class.

3.2.4. Western Power must assign the Notional Wholesale Meter to the Notional Wholesale Meter DLF Class prescribed in step 3.2.1(e).

Requests for individual DLF calculations for eligible Connection Points

3.2.5. If a Required Connection Point on Western Power's network:

(a) has Peak Consumption between 1,000 kVA and 7,000 kVA inclusive; and

(b) is located 10 km or less from:

(i) the associated Substation identified in an Access Contract; or

(ii) the electrically closest Substation (if a Substation is not identified in the Access Contract),

the Registered Market Participant may request Western Power to calculate a specific DLF for the Connection Point at the Market Participant's expense, by notifying the Western Power account manager assigned to the Market Participant in writing.

3.2.6. Before recalculating its DLFs each year under step 2.2.1, Western Power must:

(a) identify those Connection Points that are eligible to have an individual DLF calculated at the Registered Market Participant's expense; and

(b) provide each affected Market Participant, through its Western Power account manager, with a list of its eligible Connection Points and request that the Market Participant confirm for which of these Connection Points an individual DLF is required.

3.2.7. If a Market Participant receives a notification under step 3.2.6(b), then within 10 Business Days it must notify its Western Power account manager, in writing, for which of its eligible Connection Points it requires the calculation of an individual DLF.

# 4. LOSS FACTOR CALCULATION METHODOLOGIES

## 4.1. TLF Methodology – Western Power

Annual recalculation of TLFs

4.1.1. Western Power must select an appropriate industry standard program as its TLF Calculation Program.

4.1.2. Western Power must compile schedules of historical network load (exit) and generation (entry) energy quantities for each Trading Interval in the TLF Analysis Period, for each physical transmission connection on the boundary of its transmission system for which this information is available.

4.1.3. Where a physical transmission connection is used for both entry and exit, Western Power must compile separate schedules for each (i.e. entry and exit quantities must not be netted against one another).

4.1.4. Western Power must allocate each physical transmission connection on the boundary of its transmission system to a TLF Class as follows:

(a) if the physical transmission connection is identified as part or all of a Connection Point by Western Power in an Access Contract, then the physical transmission connection must be assigned to the TLF Class defined for that Connection Point in step 3.1.1(a); or

(b) if the physical connection point provides a connection to the distribution system then it must be assigned to the TLF Class defined for the relevant Zone Substation in step 3.1.1(b).

4.1.5. Where a single physical transmission connection is allocated to a TLF Class, Western Power must allocate the schedules of exit data and/or entry data (as applicable) for the physical transmission connection to that TLF Class.

4.1.6. Where multiple physical transmission connections are allocated to a TLF Class, Western Power must summate the schedules of exit and/or entry data (as applicable) compiled in step 4.1.2 for the physical transmission connection to produce single schedules of exit data and/or entry data (as applicable) for that TLF Class.

4.1.7. For any Trading Interval in the TLF Analysis Period, if total generation (as measured by the sum of the entry schedules identified in step 4.1.2) does not equal total load (as measured by the sum of the exit schedules identified in step 4.1.2) +/- 10%, then Western Power must exclude the data for that Trading Interval from the schedules determined for each TLF Class in steps 4.1.5 and 4.1.6.

4.1.8. Western Power must sufficiently document the source and processing of the generation and load information it uses to calculate TLFs to allow it to be reviewed should the information become subject to an AEMO audit.

4.1.9. Western Power must compile network topology information that reflects the actual system configuration, impedance and state, using its TLF Calculation Program. The base load flow case must include commissioned equipment as at 31 March in the relevant year and be representative

of the typical system operating state consistent with the Western Power Drawing No TS1 (Transmission System Diagram).

4.1.10. Western Power must load the schedules described in steps 4.1.5 and 4.1.6, as amended as appropriate in step 4.1.7, into its TLF Calculation Program.

4.1.11. Western Power must have in place processes:

(a) to examine the information files for errors, including missing or erroneous data; and

(b) for reloading the correct information and recalculating data, as required, including a process to check that any error or changes required have been fixed.

4.1.12. Western Power must use its TLF Calculation Program to calculate static average marginal Loss Factors for each modelled Exit Point and Entry Point. The calculation must involve the following steps:

(a) a load flow is solved for each Trading Interval in the TLF Analysis Period (except for Trading Intervals excluded in step 4.1.7) using the energy schedules compiled for each modelled Entry Point and Exit Point;

(b) a marginal Loss Factor is calculated for each modelled Entry Point and Exit Point for each Trading Interval with respect to the Reference Node; and

(c) the static average marginal Loss Factor for each modelled Entry Point or Exit Point is calculated as the energy weighted average of the marginal Loss Factors calculated for that Connection Point.

4.1.13. If either an Entry Point or an Exit Point (but not both) was modeled for a TLF Class in step 4.1.12 then Western Power must determine the TLF for that TLF Class to be the static average marginal Loss Factor calculated for that Entry Point or Exit Point (as applicable) in step 4.1.12(c).

4.1.14. If both an Entry Point and an Exit Point were modeled for a TLF Class in step 4.1.12 then Western Power must determine the TLF for that TLF Class to be the energy weighted average of the static average marginal Loss Factors calculated for the Entry Point and the Exit Point in step 4.1.12(c).

4.1.15. Western Power must calculate the TLF for the Transmission SWIN Average TLF Class as the energy weighted average of all the static average marginal Loss Factors calculated for Exit Points in step 4.1.12(c).

4.1.16. Western Power must calculate the TLF for the Transmission Urban Average TLF Class as the energy weighted average of all the static average marginal Loss Factors calculated for Exit Points for TLF Classes defined for Substations in the 'Urban' and 'CBD' Pricing Zones.

Calculation of a TLF for a new TLF Class

4.1.17. If a new Substation is commissioned then Western Power must assign the TLF of the electrically nearest Substation to any new TLF Classes defined for the new Substation or its Connection Points in steps 3.1.1(a)(a) or 3.1.1(b), until specific TLFs are determined for these TLF Classes in the next annual recalculation of Loss Factors.

4.1.18. If a new Connection Point is connected to an existing Substation then Western Power must assign the TLF for that Substation to the new TLF Class defined for the Connection Point in step 3.1.1(a), until a specific TLF is determined for this TLF Class in the next annual recalculation of Loss Factors.

## 4.2. DLF Methodology – Western Power

Annual recalculation of DLFs

4.2.1. Western Power must determine from its information systems:

(a) the total net kWh consumption from its distribution system over the DLF Analysis Period ("Total Sales"); and

(b) the total kWh distribution losses over the DLF Analysis Period ("Total Losses").

4.2.2. Western Power must assign a DLF to the Zone Substation Connected DLF Class that reflects typical Zone Substation transformer losses incurred by a Connection Point connected to the network at the distribution busbar of a Zone Substation.

4.2.3. Western Power must identify each Connection Point on its distribution system for which:

(a) the calculation of an individual DLF is required under steps 3.2.3(c), 3.2.3(e) or 3.2.3(g); or

(b) the Registered Market Participant has confirmed that an individually calculated DLF is required in step 3.2.7.

4.2.4. For each Connection Point identified in step 4.2.3, Western Power must:

(a) compile details of the Connection Point's maximum demand or Declared Sent Out Capacity (as applicable), network configuration and feeder peak demand, where these details may be sourced from historical data in Western Power's information systems or from forecasted values if Western Power considers these to be more appropriate;

(b) use an appropriate industry software package to calculate an individual DLF for the Connection Point using the formula and methodology detailed in Schedule 4 of the *Electricity Distribution Regulations 1997*; and

(c) assign the calculated DLF to the DLF Class defined for that Connection Point.

4.2.5. Where an individual DLF must be determined for a site that is supplied by multiple distribution feeders but is identified as a single Connection Point by Western Power in an Access Contract, Western Power must determine DLFs for each feeder as described in step 4.2.4(b), and then calculate the DLF for the DLF Class as the average of the calculated DLFs.

4.2.6. Western Power must determine the DLFs for the High Voltage Metered Demand Exit Service DLF Class and the Low Voltage Metered Demand Exit Service DLF Class using appropriate assumptions with regard to losses on high voltage lines and in distribution transformers.

4.2.7. Western Power must apply the DLFs calculated in steps 4.2.2, 4.2.4 and 4.2.6 to the total net kWh consumption ("sales") for the applicable Connection Points to calculate the losses attributable to these Connection Points over the DLF Analysis Period.

4.2.8. Western Power must allocate the remaining losses (i.e. Total Losses minus losses calculated in step 4.2.7) amongst the remaining Connection Points on the distribution system according to their contracted Applicable Reference Service, based on the estimated relative contribution to peak load losses of typical customers on each of the relevant Applicable Reference Services.

4.2.9. Western Power must use the losses assigned to each Applicable Reference Service in step 4.2.8 and the sales for each of these Applicable Reference Services over the DLF Analysis Period to calculate DLFs for each of the DLF Classes for the Applicable Reference Services determined in step 3.1.3(b)(i).

4.2.10. Western Power must apply the DLFs calculated in step 4.2.9 to the sales for the applicable (interval metered) Required Connection Points to calculate the losses attributable to these Connection Points over the DLF Analysis Period.

4.2.11. Western Power must calculate the DLF for the Notional Wholesale Meter DLF Class as one plus the ratio of the remaining losses (i.e. Total Losses minus losses calculated in steps 4.2.7 and 4.2.10) to the remaining sales (i.e. Total Sales minus sales for the Connection Points whose losses were calculated in steps 4.2.7 and 4.2.10).

4.2.12. Western Power must assign a DLF of one to the Transmission Connected DLF Class.

Calculation of a Distribution Loss Factor for a new Distribution Loss Factor Class

4.2.13. If a Market Participant requests Western Power to calculate an individual DLF for a Connection Point in step 3.2.5, Western Power must calculate the individual DLF using the methodology outlined in step 4.2.4 of this Procedure.

# 5. DOCUMENTATION, PROCESS CHANGE AND REVIEW

## 5.1. Documentation requirements

5.1.1. A Network Operator must have in place internal procedures for calculating Loss Factors.

5.1.2. A Network Operator must sufficiently document all of its methodologies, models, software, data sources and internal procedures used for Loss Factor calculation to allow for these to be reviewed should the Loss Factor calculations become subject to an AEMO audit under step 2.4.13(a) or review under step 5.3.1.

5.1.3. If requested by AEMO, a Network Operator must assist AEMO in responding to a query raised by or on behalf of a Rule Participant about the processes used by the Network Operator to calculate Loss Factors.

## 5.2. Changes to a Network Operator's Loss Factor calculation processes

5.2.1. A Network Operator must obtain approval from AEMO before it makes a material change to the methodologies, models, software, data sources or internal procedures it uses for Loss Factor calculation. To seek approval the Network Operator must apply by email to Market Operations. The application must include:

(a) details of the proposed change and its potential impacts on the calculation of Loss Factors by the Network Operator; and

(b) evidence of testing undertaken by the Network Operator to demonstrate the change does not adversely impact on the accuracy of the Network Operator's Loss Factor calculations.

5.2.2. AEMO must acknowledge receipt of an application made under step 5.2.1 by email within one Business Day.

5.2.3. Within five Business Days of receiving an application under step 5.2.1, AEMO may request the Network Operator by email to provide to AEMO any further information or test evidence AEMO considers necessary to assess the application.

5.2.4. If the Network Operator receives a request from AEMO under step 5.2.3 then the Network Operator must comply with that request as soon as practicable.

5.2.5. Within 20 Business Days after AEMO receives the application under step 5.2.1 and any further information or test evidence requested under step 5.2.3 AEMO must:

(a) decide whether or not to approve the change proposed by the Network Operator; and

(b) notify the Network Operator by email of its decision and the reasons for that decision.

## 5.3. AEMO review of Loss Factor calculation processes

5.3.1. AEMO may, at any time, review the effectiveness of the processes used by a Network Operator for Loss Factor calculation in meeting the Wholesale Market Objectives. AEMO may request a Network Operator to provide to AEMO any information relating to the methodologies, models, software, data sources and internal procedures used by the Network Operator for Loss Factor calculation that AEMO considers relevant to its review. The request must be provided in writing and include:

(a) a description of the requested information;

(b) AEMO's reasons for requesting the information;

(c) the manner and form in which the information must be provided; and

(d) the date by which the Network Operator must comply with the request, which must be a date AEMO considers reasonable, having regard to the nature and form of the information requested.

5.3.2. If a Network Operator receives a request under step 5.3.1 then it must provide to AEMO the requested information by the date and in the manner and form set out in the request.