



INDEPENDENT  
MARKET  
OPERATOR



## Market Procedure: Determining Loss Factors

VERSION 2



ELECTRICITY INDUSTRY ACT 2004  
ELECTRICITY INDUSTRY  
(WHOLESALE ELECTRICITY MARKET)

REGULATIONS 2004

WHOLESALE ELECTRICITY MARKET RULES

COMMENCEMENT:

This Market Procedure took effect from 8:00am (WST) on the same date as the Wholesale Electricity Market Rules.

VERSION HISTORY

Version	Effective Date	Notes
1	21 September 2006	Market Procedure for Determining Loss Factors
2	20 May 2013	Amendments to Market Procedure resulting from PC_2012_09

## TABLE OF CONTENTS

<b>1</b>	<b>PROCEDURE OVERVIEW</b>	<b>4</b>
1.1	<i>Relationship with the Market Rules</i>	4
1.2	<i>Purpose of this Procedure</i>	4
1.3	<i>Application of this Procedure</i>	4
1.4	<i>Associated Market Procedures</i>	4
1.5	<i>Conventions Used</i>	4
1.6	<i>Terminologies and Definitions</i>	4
<b>2</b>	<b>DETERMINATION AND PROVISION OF LOSS FACTORS</b>	<b>6</b>
2.1	<i>Assignment of Connection Points to Loss Factor Classes</i>	6
2.2	<i>Annual recalculation of Loss Factors</i>	7
2.3	<i>Creation of new Loss Factor Classes</i>	7
2.4	<i>Reassessment of Loss Factors</i>	8
2.5	<i>Failure to provide Loss Factors</i>	10
<b>3</b>	<b>LOSS FACTOR CLASSIFICATION SYSTEMS</b>	<b>11</b>
3.1	<i>Transmission Loss Factor Classes – Western Power</i>	11
3.2	<i>Distribution Loss Factor Classes – Western Power</i>	12
	<i>Requests for individual DLF calculations for eligible Connection Points</i>	13
<b>4</b>	<b>LOSS FACTOR CALCULATION METHODOLOGIES</b>	<b>14</b>
4.1	<i>Transmission Loss Factor Methodology – Western Power</i>	14
	<i>Annual recalculation of Transmission Loss Factors</i>	14
	<i>Calculation of a Transmission Loss Factor for a new Transmission Loss Factor Class</i>	16
4.2	<i>Distribution Loss Factor Methodology – Western Power</i>	16
	<i>Annual recalculation of Distribution Loss Factors</i>	16
	<i>Calculation of a Distribution Loss Factor for a new Distribution Loss Factor Class</i>	17
<b>5</b>	<b>DOCUMENTATION, PROCESS CHANGE AND REVIEW</b>	<b>18</b>
5.1	<i>Documentation requirements</i>	18
5.2	<i>Changes to a Network Operator’s Loss Factor calculation processes</i>	18
5.3	<i>IMO review of Loss Factor calculation processes</i>	18

## LIST OF TABLES

<i>Table 1 – Defined Terms</i>	6
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## 1 PROCEDURE OVERVIEW

### 1.1 Relationship with the Market Rules

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

1.1.2 Reference to particular Market Rules within the Procedure in bold and square brackets **[Clause XX]** are current as of 20 May 2013. These references are included for convenience only and are not part of this Procedure.

### 1.2 Purpose of this Procedure

1.2.1 This Procedure outlines the standards, methodologies, classification systems and procedures to be used in determining Loss Factors.

### 1.3 Application of this Procedure

1.3.1 In this Procedure where obligations are conferred on a Rule Participant that Rule Participant must comply with the relevant obligations in accordance with clauses 2.9.6, 2.9.7 and 2.9.8 of the Market Rules, as applicable.

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

### 1.4 Associated Market Procedures

1.4.1 The following IMO Market Procedure is associated with this Procedure:

(a) Notices and Communications.

### 1.5 Conventions Used

1.5.1 In this Procedure, the conventions specified in clauses 1.3 - 1.5 of the Market Rules apply.

### 1.6 Terminologies and Definitions

1.6.1 A word or phrase defined in the Market Rules, the Electricity Industry Act or the Regulations has the same meaning when used in this Procedure. In addition the following defined terms have the meaning given.

Term	Definition
<b>Access Contract</b>	Has the meaning given to it in the Electricity Networks Access Code 2004.
<b>Connection Point</b>	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

Term	Definition
	Non-Scheduled Generators (each of which may relate to one or more NMIs).
<b>Distribution System</b>	Has the meaning given to it in the Electricity Networks Access Code 2004.
<b>DLF</b>	Means Distribution Loss Factor.
<b>DLF Analysis Period</b>	In respect of the annual recalculation of Distribution Loss Factors, the 12 month period ending on 31 December immediately prior to the 1 June by which the recalculated Distribution Loss Factors must be provided to the IMO.
<b>DLF Class</b>	Means Distribution Loss Factor Class.
<b>Entry Point</b>	Has the meaning given to it in the Electricity Networks Access Code 2004.
<b>Exit Point</b>	Has the meaning given to it in the Electricity Networks Access Code 2004.
<b>Market Operations</b>	The group within the IMO responsible for day to day administration of Loss Factors. Contact details for Market Operations are available on the Market Web Site.
<b>Peak Consumption</b>	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.
<b>Pricing Zone</b>	A grouping of several Substations based on their location, as defined in the Price List approved by the Economic Regulation Authority from time to time.
<b>Reference Service</b>	Has the meaning given to it in the Electricity Networks Access Code 2004.
<b>Registered Market Participant</b>	In respect of a Required Connection Point, the Market Participant to which the Facility connected at that Connection Point is registered.
<b>Required Connection Point</b>	In respect of a Network Operator, a Connection Point in the Network Operator's Network identified under clause 2.27.1(a) of the Market Rules, for which the Network Operator must determine a Loss Factor.
<b>Substation</b>	Means a network facility 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).
<b>TLF</b>	Means Transmission Loss Factor.
<b>TLF Analysis Period</b>	In respect of the annual recalculation of Transmission Loss Factors, the 12 month period ending on the last day of

Term	Definition
	February immediately prior to the 1 June by which the recalculated Transmission Loss Factors must be provided to the IMO.
<b>TLF Calculation Program</b>	Means an appropriate industry standard package used by a Network Operator to calculate Transmission Loss Factors.
<b>TLF Class</b>	Means Transmission Loss Factor Class.
<b>Total Losses</b>	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.
<b>Total Sales</b>	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.
<b>Transmission SWIN Average TLF Class</b>	Means the TLF Class defined for the transmission system as a whole.
<b>Transmission System</b>	Has the meaning given to it in the Electricity Networks Access Code 2004.
<b>Transmission Urban Average TLF Class</b>	Means the TLF Class defined for the group of Substations assigned to the Urban and CBD Pricing Zones.
<b>Zone Substation</b>	Means a Substation connecting the Transmission and Distribution System.

Table 1 – Defined Terms

## 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 Market Rules:

- (a) determine the Transmission Loss Factor Class (TLF Class) and Distribution Loss Factor Class (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 the IMO 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 Market 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 the IMO 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 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) 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;
- (b) provide by email to Market Operations:
  - i. updated Transmission Loss Factors (TLFs) and Distribution Loss Factors (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(b), the IMO must publish on the Market Web Site:

- (a) the updated TLFs and DLFs received from the Network Operator [**Clause 2.27.7**];
- (b) any written explanation of changes to TLFs or DLFs received from the Network Operator; and
- (c) 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;
  - (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 the IMO receives details of a new Loss Factor Class from a Network Operator under step 2.3.1(b), the IMO 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**

- 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 the IMO for reassessment. **[Clause 2.27.15]**
- 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 The IMO 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, the IMO 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 the IMO 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 the IMO 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 the IMO with an audit.
- 2.4.7 If the Network Operator advises the IMO under step 2.4.6(a) that it agrees the TLF or DLF is in error, then the IMO 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 the IMO under step 2.4.6(a) that it does not consider the relevant TLF or DLF to be in error, then the IMO 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 the IMO's budget, that the IMO 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 the IMO whether or not it requires the IMO to proceed with the audit.
- 2.4.10 If the IMO receives confirmation from the Market Participant that the Market Participant requires the IMO to proceed with an audit, then the IMO must within two Business Days notify the Network Operator that the IMO 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 the IMO by the Network Operator; and
    - ii. access to the Network Operator's premises, systems and personnel for the IMO 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 the IMO's notification.
- 2.4.11 The IMO 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 the IMO 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, the IMO 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), the IMO must direct the relevant Network Operator by email to recalculate the TLF or DLF. The IMO may also direct the Network Operator to recalculate any other TLFs or DLFs, where the IMO is of the view that a recalculation is warranted.
- 2.4.15 The Network Operator must provide any recalculated TLFs or DLFs to the IMO as soon as practicable after receipt of the IMO'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, the IMO 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), the IMO 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 the IMO 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 the IMO 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 the IMO under step 2.4.13(a), including any costs incurred by the Network Operator and any costs, not otherwise included in the IMO's budget, incurred by the IMO, 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 or 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.

## 2.5 Failure to provide Loss Factors

- 2.5.1 In the event a Network Operator fails to provide the IMO with a TLF or DLF, as required in accordance with this Procedure or the Market Rules, the IMO must use the equivalent TLF or DLF from the previous year.

- 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 the IMO for the updated value.

### **3 LOSS FACTOR CLASSIFICATION SYSTEMS**

#### **3.1 Transmission Loss Factor 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 ("Transmission SWIN Average"); and
- (d) the group of Substations assigned to the Urban and CBD Pricing Zones ("Transmission Urban Average").

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 through 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 else
- (b) if the Connection Point:
  - i. is contracted on any of the following Reference Services:
    - 1. A1 – Anytime Energy (Residential) Exit Service;
    - 2. A2 – Anytime Energy (Business) Exit Service;
    - 3. A3 – Time of Use Energy (Residential) Exit Service;
    - 4. A4 – Time of Use Energy (Business) Exit Service;
    - 5. A5 – High Voltage Metered Demand Exit Service;
    - 6. A6 – Low Voltage Metered Demand Exit Service;
    - 7. C1 – Anytime Energy (Residential) Bi-directional Service;
    - 8. C2 – Anytime Energy (Business) Bi-directional Service;
    - 9. C3 – Time of Use Energy (Residential) Bi-directional Service; or
    - 10. C4 – Time of Use Energy (Business) Bi-directional Service; or
  - ii. is an Exit Point with Peak Consumption less than 1000 kVA, it must be assigned to the Transmission SWIN Average TLF Class prescribed in step 3.1.1(c); or else
- (c) if the Connection Point has Peak Consumption greater than or equal to 1000 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 else

- (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 else
  - (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 Distribution Loss Factor 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 Reference Services listed 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 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 else
- (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 else
- (c) if a Scheduled Generator, Non-Scheduled Generator, Dispatchable Load 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 else
- (d) if the Connection Point is contracted on one of the Reference Services listed in step 3.1.3(b) then it must be assigned to the DLF Class prescribed for the relevant Reference Service in step 3.2.1(d); or else
- (e) if the Connection Point is:
  - i. an Exit Point with Peak Consumption greater than 7000 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 else
- (f) if the Connection Point has Peak Consumption less than 1000 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 prescribed in step 3.2.1(d); 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 prescribed in step 3.2.1(d); 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 prescribed in step 3.2.1(d); or else
- (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 else
- (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 else
- (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 prescribed in step 3.2.1(d); or else
- (j) the Connection Point must be assigned to the Low Voltage Metered Demand Exit Service DLF Class prescribed in step 3.2.1(d).

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 1000 kVA and 7000 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 Transmission Loss Factor Methodology – Western Power**

#### ***Annual recalculation of Transmission Loss Factors***

- 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 IMO 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 as commissioned equipment 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 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 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 and exit point;
  - (b) a marginal loss factor is calculated for each modelled entry 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 or exit point is calculated as the energy weighted average of the marginal loss factors calculated for that 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 Transmission Loss Factor for a new Transmission Loss Factor 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) 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 Distribution Loss Factor Methodology – Western Power**

### ***Annual recalculation of Distribution Loss Factors***

- 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 calculated 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 Reference Service, based on the estimated relative contribution to peak load losses of typical customers on each of the relevant Reference Services.
- 4.2.9 Western Power must use the losses assigned to each Reference Service in step 4.2.8 and the sales for each of these Reference Services over the DLF Analysis Period to calculate DLFs for each of the following DLF Classes:
- (a) Anytime Energy (Residential) Exit Service DLF Class;
  - (b) Anytime Energy (Business) Exit Service DLF Class;
  - (c) Time of Use Energy (Residential) Exit Service DLF Class;
  - (d) Time of Use Energy (Business) Exit Service DLF Class;
  - (e) Anytime Energy (Residential) Bi-directional Service DLF Class;
  - (f) Anytime Energy (Business) Bi-directional Service DLF Class;
  - (g) Time of Use Energy (Residential) Bi-directional Service DLF Class; and
  - (h) Time of Use Energy (Business) Bi-directional Service DLF Class.
- 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 IMO audit or review.
- 5.1.3 If requested by the IMO, a Network Operator must assist the IMO 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 the IMO 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 The IMO 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, the IMO may request the Network Operator by email to provide to the IMO any further information or test evidence the IMO considers necessary to assess the application.
- 5.2.4 If the Network Operator receives a request from the IMO 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 the IMO receives the application under step 5.2.1 and any further information or test evidence requested under step 5.2.3 the IMO 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 IMO review of Loss Factor calculation processes**

- 5.3.1 The IMO 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. The IMO may request a Network Operator to provide to the IMO any information relating to the methodologies, models, software, data sources and internal procedures used by the Network Operator for Loss Factor calculation that

the IMO considers relevant to its review. The request must be provided in writing and include:

- (a) a description of the requested information;
- (b) the IMO'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 the IMO 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 the IMO the requested information by the date and in the manner and form set out in the request.