

# Appendix C.2

## Distribution Low Voltage Connection Scheme Unit Rate Methodology (marked up) Revised proposed access arrangement

14 June 2018

**Important note** – Amendments that were made as part of Western Power's original proposal are shown as **blue**, amendments that are made as part of this revised proposal are shown as **red**.

Access arrangement for the period  
1 July 2017 to 30 June 2022

# Distribution Low Voltage Connection Scheme Methodology

14 June 2018



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# **1 Definitions Defined Terms and Interpretation**

## **1.1 Defined Terms**

In this methodology document the following terms are used and have the same meaning [given to them or as given in the contributions policy](#) or the *Code* (reproduced below for convenience).

**“applicant”** has the same meaning [given to it in the contributions policy](#).

*{Note: Under the contributions policy “applicant” means “a person (who may be a user, a customer or a developer) who has lodged, or intends to lodge, a connection application, and includes a person who does so on behalf of another person”.}*

**“Code”** means the *Electricity Networks Access Code 2004* (as amended).

**“connection application”** has the same meaning given to it in the *contributions policy*.

*{Note: Under the contributions policy “connection application” means “an application lodged with Western Power under the applications and queuing policy that has the potential to require a modification to the network”.}*

**“connection point”** has the same meaning given to it in the *contributions policy*.

*{Note: Under the contributions policy “connection point” means “an exit point or an entry point or a bi-directional point identified or to be identified as such in an access contract”.}*

**“contribution”** has the same meaning given to it in the *Code*, but also includes an *alternative option contribution*.

*{Note: Under the Code “contribution” in relation to a covered network, means “a capital contribution, a non-capital contribution or a headworks charge”.}*

**“contributions policy”** has the same meaning given to it in the *Code*.

*{Note: Under the Code “contributions policy” means “a policy in an access arrangement under section 5.1(h) dealing with contributions by users”.}*

**“distribution low voltage connection scheme”** means the scheme described in clause [76](#) of the *contributions policy*.

**“distribution low voltage connection scheme application”** has the same meaning given to ~~it~~ [“distribution low voltage connection headworks scheme application”](#) in the *contributions policy*.

*{Note: Under the contributions policy “distribution low voltage connection [headworks](#) scheme application” means a connection application where:*

*the proposed [or existing](#) connection point [for a new or upgraded connection](#) is to the distribution system low voltage network and is within 25 kms of the relevant zone substation~~, and,~~}*

*(a) ~~the applicant’s required electrical capacity is in excess of:~~*

- (i) ~~the original design capacity for a greenfield development on an existing electricity serviced lot, or~~*
- (ii) ~~the existing capacity in respect of that connection point for a brownfield development.~~}*

**“distribution low voltage connection scheme base charge”** has the same meaning given to ~~it~~ [“distribution low voltage connection headworks scheme base charge”](#) in the *contributions policy*.

*{Note: Under the contributions policy “distribution low voltage connection [headworks](#) scheme base charge” means the dollar value defined in section [76.3](#) of this contributions policy.}*

**“distribution low voltage connection scheme works”** has the same meaning given to ~~it~~ [“distribution low voltage connection headworks scheme works”](#) in the *contributions policy*.



{Note: Under the *contributions policy* “distribution low voltage connection [headworks](#) scheme works” with respect to a *distribution low voltage connection scheme application*, means works on the *distribution system* reasonably adjacent the *connection point* [\(to which the distribution low voltage connection headworks scheme application relates\)](#) that directly provides for delivery of electricity capacity to that *connection point* and that may include switchgear, HV cable, transformers, *low voltage* cable and equipment.}

**“distribution system”** has the same meaning given to it in the *contributions policy*.

{Note: Under the *contributions policy* “distribution system” has the same meaning given to it in the *Code*, but excludes equipment within zone substations used for the transportation of electricity at nominal voltage of less than 66 kV.}

**“forecast costs”** has the same meaning given to it in the *contributions policy*.

{Note: Under the *contributions policy* “forecast costs” means “any or all of the *forecast new facilities investment* or the *forecast alternative option costs*, as applicable, to be incurred by Western Power with regards to works”.

~~“headworks” has the same meaning given to it in the *Code*.~~

~~{Note under the *Code* “headworks” in respect of a *headworks scheme* means “the class of works identified under section 5.17D (a) as the class in respect of which the *headworks scheme* applies”.~~

~~“headworks charge” has the same meaning given to it in the *Code*.~~

~~{Note: Under the *Code* “headworks charge”, in respect of a *headworks scheme*, means “the amount payable by a user to a service provider under the *headworks scheme* in respect of a *connection point*”.~~

~~“headworks scheme” has the same meaning given to it in the *Code*.~~

{Note: Under the *Code* “headworks scheme” means “a scheme under section 5.17C”.

**“load”** has the same meaning given to it in the *Code*.

{Note: Under the *Code* “load” means “the amount of electrical power transferred out of a *network* at a *connection point* at a specified time”.

**“low voltage”** has the same meaning given to it in the *contributions policy*

{Note: Under the *Contributions Policy* “low voltage” means “the low voltage level of the distribution network where the voltage is less than 1 kV.”}

**“network”** has the same meaning given to “Western Power Network” in the *Code*.

{Note: Under the *Code* “Western Power Network” means “the *covered network* that is *covered* under section 3.1”. The “Western Power Network” is the portion of the SWIN that is owned by the Electricity Networks Corporation.}

**“relevant distribution transformer”** has the same meaning given to it in the *contributions policy*.

{Note: Under the *contributions policy* “relevant distribution transformer” with respect to the *distribution low voltage connection scheme* means the transformer from which the new or upgraded *connection* will be supplied under normal system operating conditions.}

**“relevant zone substation”** has the same meaning given to it in the *contributions policy*.

{Note: Under the *contributions policy* “relevant zone substation” means the zone substation to which the new or upgraded *connection* will be connected under normal system operating conditions.}

~~“scheme” means the *distribution low voltage connection scheme* as defined in the *contributions policy*.~~

~~“street feed” means a *connection* to the *distribution network* which is not contiguous to the *relevant distribution transformer*.~~

**“SWIS”** has the meaning given to it in the *Code*.

{Note: Under the *Code* "SWIS" has the same meaning as given to it in the *Electricity Industry Act 2004*, being "the interconnected transmission and distribution systems, generating works and associated works -

- (a) located in the South West of the State and extending generally between Kalbarri, Albany and Kalgoorlie; and
- (b) into which electricity is supplied by -
  - (i) one or more of the electricity generation plants at Kwinana, Muja, Collie and Pinjar; or
  - (ii) any prescribed electricity generation plant".}

**“user”** has the same meaning given to it in the *Code*.

{Note: Under the *Code* "user" means "a person, including a *generator* or a *consumer*, who is a party to a contract for services with a *service provider*, and under section 13.4(e) includes another *business* as a party to a *deemed access contract*".}

**“works”** has the same meaning given to it in the *contributions policy*.

{Note: Under the *contributions policy* “works” includes “*headworks* and all works required to be undertaken to provide an *applicant* with the *covered services* sought by the *applicant* in a *connection application*”.

## 1.2 Interpretation

(a) Unless the contrary intention is apparent:

- (i) a rule of interpretation in the *Code*; and
- (ii) the Interpretation Act 1984,

apply to the interpretation of this methodology document.

(b) Unless:

- (i) the *contrary* intention is apparent; or
- ~~(i)~~ (ii) the term has been redefined ~~above~~ in clause 1.1 or in the *contributions policy*,

a term with a defined meaning in the *Code* has the same meaning in this methodology document.

## 2 Introduction

This document explains Western Power's *distribution low voltage connection scheme* methodology used to determine the prices that may be applied under the ~~Contributions Policy~~ *contributions policy*, as provided for under sections 5.17C and 5.17D of the *Code*. This *distribution low voltage connection scheme* complies with those *Code* provisions which apply to all *headworks schemes*.

### 2.1 Code Requirements

The following *Code* provisions apply to a *headworks scheme*.

5.17C Despite section 5.14, the *Authority* may approve a *contributions policy* that includes a “**headworks scheme**” which requires a *user* to make a payment to the *service provider* in respect of the *user's* capacity at a *connection point* on a *distribution system* because the *user* is a member of a class, whether or not there is any *required work* in respect of the *user*.

5.17D A *headworks scheme* must:

- (a) identify the class of *works* in respect of which the scheme applies, which must not include any works on a *transmission system* or any *works* which effect a geographic extension of a *network*; and
- (b) not seek to recover *headworks charges* in an *access arrangement period* which in aggregate exceed 5% of the *distribution system target revenue* for the *access arrangement period*; and
- (c) identify the class of *users* who must make a payment under the scheme; and
- (d) set out the method for calculating the *headworks charge*, which method:
  - (i) must have the objective that *headworks charges* under the *headworks scheme* will, in the long term, and when applied across all *users* in the class referred to in section 5.17D (c), recover no more than the *service provider's* costs (such as would be incurred by a *service provider* efficiently minimising costs) of any *headworks*; and
  - (ii) must have the objective that the *headworks charge* payable by one *user* will differ from that payable by another *user* as a result of material differences in the *users' capacities* and the locations of their *connection points*, unless the *Authority* considers that a different approach would better achieve the *Code objective*; and
  - (iii) may use estimates and forecasts (including long term estimates and forecasts) of loads and costs; and
  - (iv) must contain a mechanism designed to ensure that there is no double recovery of costs in all the circumstances, including the manner of calculation of other *contributions* and *tariffs*; and
  - (v) may exclude a rebate mechanism (of the type contemplated by clauses A4.13(d) or A4.14(c)(ii) of Appendix 4) and may exclude a mechanism for retrospective adjustments to account for the difference between forecast and actual values.

This methodology document explains how the requirements of sections 5.17D (d) (i), (ii) and (iii) have been met in the *contributions policy*.



## 2.2 Code Compliance of the Methodology with Section 5.17D (d)

With respect to section 5.17D (d) (i), the *distribution low voltage connection scheme* is designed to recover the *forecast costs of distribution low voltage connection scheme works*. The prices of the *distribution low voltage connection scheme* are to be reviewed not less than once every 18 months to reflect the actual costs of the provision of *distribution low voltage connection scheme works*.

With respect to section 5.17D (d) (ii), the *distribution low voltage connection scheme* is designed such that the *contribution* for an *applicant* depends on their individual required electricity demand, and the point of the network to which they are connected. Consequently, *headworks charges* for each applicant will differ as a result of differences in the users' capacity requirements and the locations of their connection points.

With respect to section 5.17D (d) (iii), the *distribution low voltage connection scheme* prices are based on estimates and forecasts (including long term estimates and forecasts) of loads and costs.

## 2.3 Overview of the Distribution Low Voltage Connection Scheme

~~(a)~~—The *distribution low voltage connection scheme* and associated prices apply to the provision of *distribution low voltage connection scheme works* only. The class of *applicants* must have a meet the following criteria~~criterion~~:

~~(b)~~~~(a)~~ The proposed or existing connection point for a new or upgraded connection is to the distribution system low voltage network and which is within 25 kms of the relevant zone substation.~~and~~

~~(i)~~—~~the applicant's required electrical capacity is in excess of:~~

~~(A)~~—~~the original design capacity for a greenfield development on an existing electricity serviced lot, or~~

~~(B)~~—~~the existing capacity in respect of that connection point for a brownfield development.~~

~~(c)~~~~(b)~~ The prices are in terms of \$/kVA.

~~(d)~~~~(c)~~ The *distribution low voltage connection scheme headworks charge*~~price~~ that an *applicant* pays depends on their *required electricity demand*~~incremental capacity requirement~~ and whether *there will be a distribution transformer on the lot where location of the connection point is located on the same, adjoining or nearby a land lot separate from the relevant distribution transformer.*

### 3 Objectives of the Distribution Low Voltage Connection Scheme

This section sets out the objectives used in determining the *Distribution Low Voltage Connection Scheme*.

- (a) The *distribution low voltage connection scheme* has been designed to meet the high-level objectives described below.
  - (i) Comply and be consistent with the regulatory framework;
  - (ii) Provide a method for allocating the costs of the provision of *distribution low voltage connection scheme works* in a fair and equitable manner;
  - (iii) Be as cost reflective as is reasonable to reflect the network *user's* utilisation of the network capacity;
  - (iv) Be as simple and straight forward as is reasonable taking into account other objectives; and
  - (v) Provide price stability and certainty to enable network users to make informed investment decisions.
- (b) The methodology must ensure *contributions* from the *scheme* will, in the long term, recover no more than Western Power's costs of *distribution low voltage connection scheme works*.

## 4 Methodology Overview

This section provides an overview of the methodology used in determining the *distribution low voltage connection scheme* prices. It is noted that the cost of the provision of electricity capacity at a particular location is a function of:

- (a) the ~~amount of~~ incremental capacity requirement sought by an *applicant*; and
- (b) whether:
  - (i) the location of the connection point is ~~contiguous to~~ the ~~location of~~ same, adjoining or nearby land lot as the relevant distribution transformer (transformer direct connection);  
or
  - (ii) ~~or whether~~ the connection point is supplied from the low voltage street network (street feed connection);  
as determined by Western Power having regard to what is the most prudent and efficient network connection design.

On this basis, the approach taken to develop the *distribution low voltage connection scheme* prices is as follows.

- (a) Western Power determines the costs of *distribution low voltage connection scheme works* for connection of *applicants* that meet the eligibility ~~criteria~~ criterion for the *distribution low voltage connection scheme* over a period of 12 months.
- (b) The costs of *distribution low voltage connection scheme works* determined under (a) have been allocated to categories as follows:
  - (i) whether the incremental capacity requirement at the *connection point* determined under clause ~~76.3~~ (a) of the *contributions policy* is:
    - less than 216 kVA; or
    - between 216 kVA and 630 kVA; or
    - greater than 630 kVA, and
  - (ii) whether:
    - (A) the location of the connection point ~~is~~ ~~is on~~ ~~at~~ the same, adjoining or nearby land lot ~~separate from the location of~~ ~~as~~ the relevant distribution transformer (transformer direct connection);  
or
    - (B) ~~or whether~~ the connection point is supplied from the low voltage street network (street feed connection);  
as determined by Western Power having regard to what is the most prudent and efficient network connection design.
- (c) From the costs of *distribution low voltage connection scheme work* and the incremental ~~electricity demand~~ capacity requirement associated with the categories defined in (b) above, the total costs of supply for each tranche can be determined in terms of \$ per kVA.

- (d) The price structure and prices are then derived to reflect the average costs derived under (a) and (b) above. Prices are expressed in a block structure that provides for a continuous price path. Note that there is a separate price path for connections with a contiguous connection point on the same, adjoining or nearby land lot as the relevant distribution transformer to those connected to with a connection point supplied from the low voltage street network.

## 5 Methodology Detail

This section provides additional detail with respect to the price determination process.

### 5.1 Price Tranche Thresholds

Western Power ~~has developed~~ standard *distribution low voltage connection scheme* prices based on modelling of *connections* over at least the past 12 month period. Costs per unit of capacity (kVA) reduce as the demand increases due to economies of scale. Those economies reflect the following factors~~;~~:

- fixed costs including cable trenching, reinstatement, traffic management, mobilisation costs and installation costs are incurred regardless of capacity supplied~~;~~;
- increased utilisation of installed assets~~;~~ and
- reduction in the per unit cost of transformers in terms of dollars per kVA of capacity. (transformers are purchased in standard sizes, typically 315 kVA, 630 kVA and 1000 kVA and on a per kVA basis the costs of these transformers reduce significantly as the size increases).

In order for these economies of scale to be recognised in the pricing structure thresholds are set that reflect both the cost of plant and the nature of the network required to provide the requested capacities. For example, in general customers seeking less than 216 kVA are supplied from the low voltage ~~distribution~~street network, customers seeking demand between 216 kVA and 630 kVA require installation of a new transformer and may require that transformer to be installed on their lot, and in almost all circumstances customers seeking loads in excess of 630 kVA will require direct connection to a new transformer on their lot. Consequently the thresholds identified are:

- Tranche 1 - ~~for the first~~less than 216 kVA of ~~requested load~~incremental capacity requirement~~;~~;
- Tranche 2 - ~~for additional units of load from~~between 216 kVA ~~to and~~ 630 kVA of incremental capacity requirement~~;~~ and
- Tranche 3 - ~~for additional units greater than 630 kVA~~ of ~~load above 631 kVA~~incremental capacity requirement.

### 5.2 Price Setting

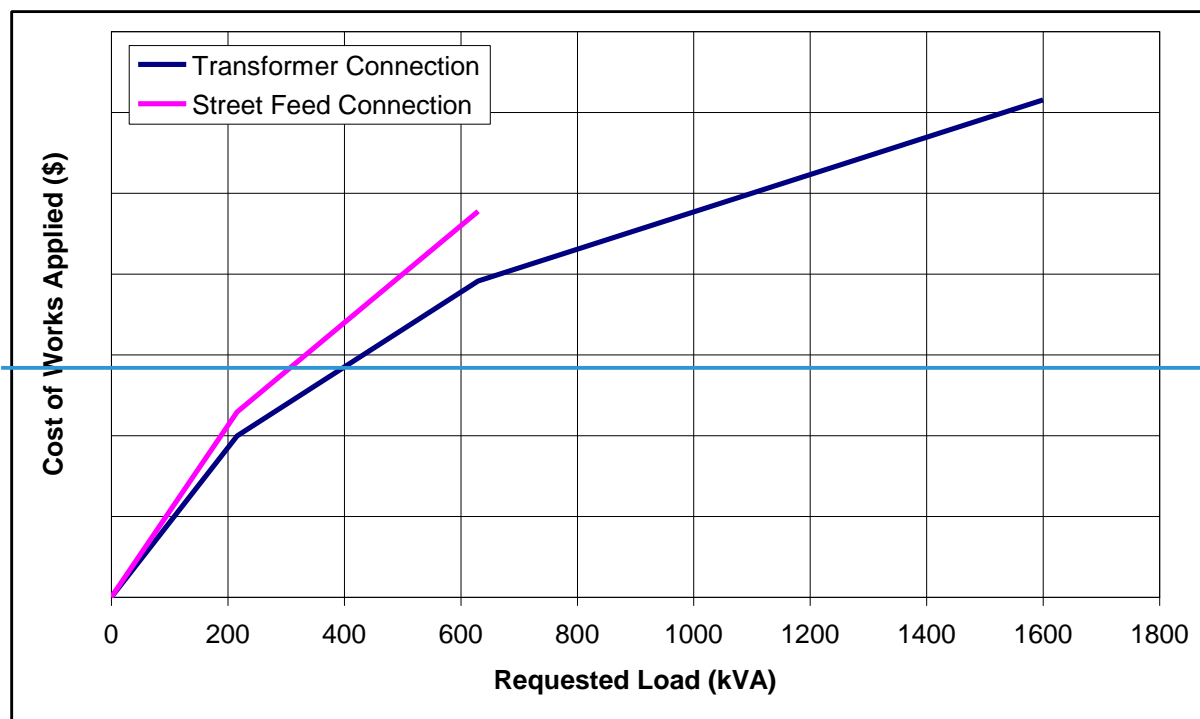
Prices are set within each tranche to only recover Western Power's costs over the long term, when applied across all *distribution low voltage connection scheme* applicants.

### 5.3 Separate Prices for Transformer Direct Connection and Low Voltage Street Connection

Direct connection to transformers avoids the cost of the low voltage street network and as such, the prices for these connections reflect this lower cost. Connection to the low voltage street network involves increased cost and consequently separate prices are put in place.

The difference between the two sets of prices is based on the average cost of the low voltage street network. ~~Figure 5.1 below illustrates t~~he price tranches applied to both relevant distribution transformer direct connections and low voltage street network connections.

**Figure 5.1 – Modelling of the cost of works applied to the customer for Transformer Connections and Low Voltage Street Feed Network Connections.**



## 5.4 Price Structure

Two sets of prices are provided in block structure that reflects the separate price tranches for direct transformer [connections](#) and low voltage street [connection-network connections](#). Prices are illustrative only. Actual prices will be published on Western [PowersPower's](#) website as detailed in this document.

	<u>Load tranche for incremental capacity</u>	<u>Fixed price</u>	<u>Variable price for incremental kVA in excess of tranche lower threshold</u>
Direct transformer connection	0 to 216 kVA	\$0	\$500/kVA
Direct transformer connection	216 to 630 kVA	\$108,000	\$250/kVA
Direct transformer connection	Greater than 630 kVA	\$211,500	\$125/kVA
Low voltage street connection	0 to 216 kVA	\$0	\$600/kVA
Low voltage street connection	216 to 630 kVA	\$129,600	\$350/kVA



## 6 Exclusion

A *distribution low voltage connection scheme application* is excluded from the provisions of the *distribution low voltage connection scheme* where the *distribution low voltage connection scheme base charge* plus the exclusion threshold is less than the *forecast costs of works* as determined under clause 5.4 of the *contributions policy*.

The methodology for determining the exclusion threshold is as follows:

- (a) For all works over the same period over which connections are modelled under clause 5.1 in the last twelve months ~~12 month period since the most recent review of prices~~ Western Power will:
  - (i) determine the amount of the *forecast costs* of the *works* applied to the ~~customer~~ applicants as per section 5.4 of the *contributions policy*; ~~and~~;
  - (ii) subtract from the amount in section (a) the *distribution low voltage connection scheme base charge*;
- (b) The exclusion threshold is equal to two standard deviations of all instances where the value in section (ii) is positive.

Western Power will publish the amount of the exclusion threshold as detailed in this document.

## 7 Publishing and Review of Prices and Exclusion Threshold

Western Power publishes the *distribution low voltage connection scheme* prices as a price list and the exclusion threshold on its website. The price list is as illustrated in section 5.4.

Prices and the exclusion threshold will be reviewed periodically to reflect changes in the cost of provision of network assets. Any adjustments will apply for a minimum of six months.