Appendix C.2
Distribution Low Voltage Connection Scheme Methodology (marked up)
Amended proposed access arrangement

16 November 2018

Important note – Amendments that were made as part of Western Power’s
• original proposal is marked-up as purple;
• revised proposal is marked-up as blue; and
• revised amended proposal is marked-up as red.

Access Arrangement (AA) for the period
1 July 2017 to 30 June 2022
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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”.)


“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

(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, 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, at least once every 12 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 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 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 straightforward 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, on the location of same, adjoining or nearby land lot as the relevant distribution transformer (transformer direct connection); or

(ii) 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 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 on the same, adjoining or nearby land lot separate from the location of 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:

(a) Tranche 1 - for the first less than 216 kVA of requested incremental capacity requirement;
(b) Tranche 2 - for additional units of load from between 216 kVA to and 630 kVA of incremental capacity requirement; and
(c) Tranche 3 - for additional units greater than 630 kVA of load above 631 kVA of 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 the price tranches applied to both relevant distribution transformer direct connections and low voltage street 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 network connections. Prices are illustrative only. Actual prices will be published on Western Power’s website as detailed in this document.

Table 5.1: Price Structure

<table>
<thead>
<tr>
<th></th>
<th>Load tranche for incremental capacity</th>
<th>Fixed price</th>
<th>Variable price for incremental kVA in excess of tranche lower threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct transformer connection</td>
<td>0 to 216 kVA</td>
<td>$0</td>
<td>$500/kVA</td>
</tr>
<tr>
<td>Direct transformer connection</td>
<td>216 to 630 kVA</td>
<td>$108,000</td>
<td>$250/kVA</td>
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<tr>
<td>Direct transformer connection</td>
<td>Greater than 630 kVA</td>
<td>$211,500</td>
<td>$125/kVA</td>
</tr>
<tr>
<td>Low voltage street connection</td>
<td>0 to 216 kVA</td>
<td>$0</td>
<td>$600/kVA</td>
</tr>
<tr>
<td>Low voltage street connection</td>
<td>216 to 630 kVA</td>
<td>$129,600</td>
<td>$350/kVA</td>
</tr>
</tbody>
</table>
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 in the last twelve months 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.